



2014:14

Sida Decentralised Evaluation

Stein-Erik Kruse
Matti Tedre
Teshome Nekatibeb
Aimtonga Amani

Evaluation of the Swedish Research Cooperation with Tanzania 2009-2013

Final Report

Evaluation of the Swedish Research Cooperation with Tanzania 2009-2013

**Final Report
March 2014**

**Stein-Erik Kruse
Matti Tedre
Teshome Nekatibeb
Aimtonga Amani**

Authors: Stein-Erik Kruse, Matti Tedre, Teshome Nekatibeb and Aimtonga Amani

The views and interpretations expressed in this report are the authors' and do not necessarily reflect those of the Swedish International Development Cooperation Agency, Sida.

Sida Decentralised Evaluation 2014:14

Commissioned by the Embassy of Sweden in Dar es Salaam, Tanzania

Copyright: Sida and the authors

Date of final report: March 2014

Published by Citat 2014

Art. no. Sida61716en

urn:nbn:se:sida-61716en

This publication can be downloaded from: <http://www.sida.se/publications>

SWEDISH INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

Address: S-105 25 Stockholm, Sweden. Office: Valhallavägen 199, Stockholm

Telephone: +46 (0)8-698 50 00. Telefax: +46 (0)8-20 88 64

E-mail: info@sida.se. Homepage: <http://www.sida.se>

Acronyms

ARU	Ardhi University
ARWU	Academic Ranking of World Universities
CoET	College of Engineering and Technology
COSTECH	Tanzania Commission for Science and Technology
DIEC	Directorate of Innovation Entrepreneurship and Competitiveness
DVC	Deputy Vice Chancellor
GPA	Grade Point average
ICT	Information and Communication Technology
IPR	Intellectual Property Rights
IRA	Institute of Resource Assessment
ISCP	Innovation System and Cluster Programme
k	Thousands (e.g., 2,500 = 2.5k)
KI	Karolinska Institutet
KTH	Kungliga Tekniska Högskolan (Royal Institute of Technology)
M	Millions (e.g., 5,200,000 = 5.2M)
M&E	Monitoring and Evaluation
MA/M.Sc.	Master of Arts/Master of Science
MKUKUTA	Swahili acronym for Tanzania's National Strategy for Growth and Poverty Reduction
MoCST	Ministry of Communication, Science and Technology
MSEK	Millions of Swedish Kronor
MUHAS	Muhimbili University of Health and Allied Sciences
NFAST	National Fund for the Advancement of Science and Technology
OJP	Open Journal System
PMC	Programme Monitoring Committee
R&D	Research and development
RBM	Results-based management
S&T	Science and Technology
SEK	Swedish Kronor
SICD	Scandinavian Institute for Competition and Development
SIDO	Small Industries Development Organisation
STI	Science, Technology, and Innovation
SU	Stockholm University
TCU	Tanzania Commission of Universities
TZS	Tanzanian Shilling
U.S	United States of America
UCLAS	University College of Lands and Architectural Studies
UDBS	University of Dar es Salaam Business School

ACRONYMS

UDSM	University of Dar es Salaam
URAP	University Ranking by Academic Performance

Table of Contents

Acronyms	5
Table of Contents.....	7
Executive Summary.....	9
1 Introduction.....	18
1.1 Background	18
1.2 Purpose and scope.....	19
1.3 Approach and method	20
1.4 Phases and methods.....	21
1.5 Limitations	23
2 Overview Programme and Context	25
2.1 Historical evolution	25
2.2 Policy and programme.....	27
2.3 Tanzanian research outputs: General trends in 1996–2012.....	28
3 Research and Capacity Building Results	33
3.1 Training outputs.....	34
3.2 Publication activity	38
3.3 Costs and efficiency	39
3.4 Role and importance of Swedish partnerships	41
3.5 Concluding remarks.....	44
4 Institutional Capacity	45
4.1. Research processes/procedures	45
4.2. Research management	54
4.3. Research Funds	60
4.4. Research infrastructure	64
4.5. Concluding remarks.....	66
4.6. COSTECH	67
4.7. Development of Innovation Systems and Cluster Programme.....	71
5 Findings and Conclusions	76
5.1 Relevance	76

5.2 Efficiency	77
5.3 Effectiveness	79
5.4 Sustainability	82
5.5 Wider impact	83
6 Future Scenarios and Lessons Learned.....	88
6.1 Future options.....	88
6.2 Lessons learned	94
Annex 1: Terms of Reference	98
Annex 2: People Met.....	110
Annex 3: References	113
Annex 4: Basic Data and Information	116

Executive Summary

BACKGROUND

The overall objective of the Swedish – Tanzanian research cooperation programme was to strengthen the national research capacity and improve the quality of research conducted in Tanzania in areas of national relevance to contribute to poverty reduction and the country's sustainable development. The programme was designed to build up the capacities at the three largest public universities (University of Dar es Salaam, Ardhi University and Muhimbili University for Health and Allied Sciences) by setting-up post graduate Ph.D. and MA/M.Sc. programmes in relevant fields and to strengthen the institutional capacity for research management and promotion at COSTECH. The Innovation Systems and Cluster Programme was added later. The total allocation to the programme was 229,9 Mill. SEK for four years starting 1 July 2009 to 30 June 2013. A no cost extension was granted until June 2014.

PURPOSE

The purpose of the evaluation was three-fold:

1. Analyse and assess the achievements of Swedish cooperation to strengthen the Tanzanian research and innovation system during the years 2009-2013.
2. Serve as a basis for identifying the next steps for the country to achieve national and institutional sustainability for research.
3. Contribute to “lessons learnt” to the development of the Swedish modality used to strengthen research and innovation systems in low-income countries.

MAIN FINDINGS

Relevance

The research cooperation programme is clearly in line with the Swedish research support policy: Partner countries should be able to better plan, produce and use research for the fight against poverty. The programme also supports Tanzanian overall development plans and the most recent research policy emphasising the increasing role of research in the country's socio-economic development. The same is true looking at the individual institutions benefiting from Swedish support. With such support, they are able to train researchers – increase the research capacity within each institution and in the country, carry out research with short- and long-term effects and contribute to dissemination and utilisation of research.

The more difficult and lingering question is to what extent Swedish support remains strategically relevant to further growth and development of research in Tanzania. Are the existing activities and outputs consistent with the intended long-term impacts? Would another strategy and approach create higher volume and quality of research? The support has followed the same pattern for a long period of time. The research environment in Tanzania has changed with the introduction of a large number of new universities. What changes are required?

Most of the support is provided to researcher training – based on the logical assumptions that a critical mass of well qualified researchers are required for production of high quality research and for establishing sustainable research institutions able to train their own researchers. Research projects are also supported, but mainly as a part of Ph.D. training. Funds provided for post-doctoral (post-doc) research is marginal. Research as part of PhD training is and can be of high quality, but it is still part of training junior researchers.

Given the large number of Ph.D. holders trained, growing research outputs, and an emerging culture of research, time may have come to shift the emphasis from strengthening capacity for research to supporting research. Based on their research output and number of qualified supervisors, the universities have now the capacity to train researchers (Ph.D.'s) without support from Sida, but none would be able to do it at the same level, in all thematic areas, and with the same level of internationalization as they do now. There is also a need to increase the level of high quality research. It is possible that by increasing opportunities for more senior researchers to do research, incentives will be created for individuals to finish their Ph.D. training on time and for the institutions to provide the necessary support. With increased opportunities for research, incentives will be linked to opportunities for a more long-term career as a researcher in larger programmes.

EFFICIENCY

Assessments of efficiency are complicated by the fact that anticipated results and effects were not quantified in detail in advance in a consolidated programme document. The overall results matrix is incomplete and has not been used so it is difficult to judge if the current achievements are high, medium or low. Indicators for measuring changes in institutional capacity are also missing.

Looking at the actual outputs of the programme at the end of 2013, the numbers of masters and Ph.D. students enrolled and that have graduated on time during the programme period are both few. The total number of Master students enrolled are 202 and 51 have graduated (25%). 151 Ph.D.s were enrolled, but so far only 25 have graduated (16%). Its contribution to building national research capacity is still small.

On the other hand, there are reasons for the delays – some beyond the control of the partners. There have been delays in transfer of funds. Planning was unrealistic. Ph.D.

students were expected to finish in three years while four or five years are normal. There were also delays in recruiting students – so a large majority did not start their studies before 2010 and 2011 and would not be able to complete successfully before the end of 2014 or in 2015. In other words, the large majority of students enrolled will most likely graduate, but later than expected. The modus operandi of Sida's subsequent programmes in Tanzania has, for a while, been that students who did not graduate may continue in the next programme, which blurs the results of single programmes.

Most of the institutions have only received between 50 to 60% of their original budget so level of expenditure has been low. Certain efficiency problems have been identified concerning the use of the Swedish academic resource base for capacity development, including the difficulties finding relevant partners in Sweden who also have the time and other resources for cooperation.

There are no donor coordination mechanisms in place for external support to researcher training and research in the four institutions – neither among the donors nor initiated by the universities themselves. The principles from the Paris agenda seem to be forgotten.

In terms of cost, a sandwich programme falls between a doctoral programme taken fully in Tanzania and a programme taken fully in Sweden. Comparisons are difficult due to the different ways one can put a price on a doctoral degree. Similar, there is no straightforward way of putting a price on doctoral training in Tanzanian universities.

But doctoral programs cannot be evaluated by their quantitative cost-efficiency alone. There was an unanimous consensus of the benefits, worth, and value of the sandwich programme compared to 100% Swedish and 100% Tanzanian programmes. Students got exposure to different academic environments, they got a “feel” of a different way of working and organizing things independently, as well as influences from different styles of teaching and learning. Students got access to top-class laboratories, e-resources, and experts in an international community. Students got uninterrupted time without other work duties, social and family activities, or consultancies. Students became connected with a network of international students who were in the same situation as they are, all becoming experts in similar fields, and through social media networks, those connections last.

EFFECTIVENESS

Effectiveness can be measured against verifiable indicators specified at the beginning of the programme. However, there was not a set of core performance indicators and benchmarks for the programme and only some of the sub programmes have targets for research outputs. It was also a problem that aggregate figures such as achievements for the entire programme period and not only last year, were not presented or difficult to find in Annual Reports. However, our findings are as follows:

Training outputs

By January 2014, UDSM had been able to get 13% of their 120 enrolled Ph.D. students to complete. The completion rate for MUHAS was similar— 18% completed, but with nearly no dropouts reported. Of ARU's six started students, none had completed, but as everyone had finished their Ph.Lic. theses in 2011–2012, all were at least halfway their studies already by 2012. The target time for most Ph.D. programmes was four years, but some of the Swedish interviewees reported that depending on the programme type and full- or part-time mode of studies, in Sweden target time was often longer. Hence, as in many programmes doctoral students started around 2011, it would be reasonable to expect a large number of graduates in 2015–2016, but that is difficult to establish at this point.

Master's level training programs were another important capacity building component, especially in UDSM. In some subcomponent fields, the available pool of capable master's degree holders was not large enough to initiate doctoral training. Roughly half of the enrolled Master's students in the program completed their studies before January 2014.

Scientific results and publications

Overall, the contribution of Swedish funding to scientific results was considerable. A large number of small research projects have been undertaken, and those have created starting points for further research and some have yielded publishable research results on their own. The programme has contributed greatly to internationalization of the partner institutions' publication profiles.

Both ARU and MUHAS provided sufficiently organized data about their publishing activity within this programme. In their publication counts, universities included peer reviewed journal articles and book chapters where at least one of the authors was a recipient of Sida funding at the time of the article publication. In many fields—such as medicine and some natural sciences—publication numbers were greatly boosted by the multiple-paper Ph.D. thesis format, in which the thesis is a collection of journal articles with a short introductory chapter. Also the average number of authors per publication greatly varies between disciplines, with medicine at the high end of the scale. In contrast to that, in this programme there were fields, notably in ARU, where the primary format of Ph.D. thesis was a monograph, as well as fields where the journal article is not the only authoritative form of publishing.

In terms of peer-reviewed publications, the research output of MUHAS—132 journal articles over the programme period—was excellent. With only a quarter of MUHAS's budget, ARU's research output of 21 articles was also satisfactory even if one does not take into account the less publication-oriented ethos of engineering fields in general. Without multiple-paper theses creating a steady flow of articles from Ph.D.

thesis projects, and for a traditional design and engineering school in transition to a research institution, ARU's output was promising, yet not outstanding.

Swedish collaboration is clearly visible in the numbers. More than one third of MUHAS's publications are related to Sida funding. The most important foreign collaborator of UDSM in Elsevier's Scopus database is Stockholm University. The most important collaborator of MUHAS is Karolinska (Institute and University hospital).

Conferences and presentations

Although conference attendance was active, it was limited by available funds. ARU and MUHAS had the most reliable data on conference participation through the current programme: 21 presentations and 41 presentations, respectively. In order to get permission and funding to attend a conference, the universities typically required a paper to be presented. The status and value of conferences varies greatly between disciplines, with many engineering fields emphasizing them due to the fast turnover time from submission to publication of proceedings.

Institutional capacity

There have been significant improvements in institutional capacity in all the four institutions. Universities have been involved in promoting use of research in society. Research can be transformed into a major tool for career opportunities. Female participation in postgraduate education has improved. All the three universities have gender policies. Affirmative action was in use, but results were so far limited, and maternity caused difficulties for female doctoral students. Intellectual property ownership was institutionalized.

The overall trend was that research is facilitated through the formation of new administrative structures, professional capacity building programmes and small grants. Universities also associate promotions with research, publication and dissemination. Research policies have been developed with Swedish support. Efforts were underway to promote the use of research results in society. Research management has improved, but there were still inherent bottlenecks such as delays in transfer of funds, long bureaucratic procedures, approval processes, lack of transparency on how to use funds and inadequacy of infrastructure.

COSTECH

There are a number of achievements that can be attributed to COSTECH's activities including research projects, organisation of scientific meetings, courses, giving awards to innovators and inventors, support to national professional associations and networks, support to scientific activities in schools, contribution to national, regional, and international science bodies and publications.

COSTECH went through an organisational transformation from 2010. The organisation has become more visible, attracted younger well-qualified staff and become more efficient and effective, but suffered still from a weak reputation as an ineffective and political body, variable and unpredictable funding and a structural ambiguity - being an intermediary with a formal coordination role between a political Ministry and all the universities/R&D institutions. It has few opportunities to coordinate and sanction highly autonomous institutions with no desire to being coordinated.

Cluster initiative

The results reported from the Cluster Initiative coordinated by COSTECH were impressive, but mostly based on internal reports. There has been no systematic external evaluation and collection of empirical evidence from all or a sample of clusters. There were no in depth case study explaining the evolution and successes of particular clusters. If Sida support to the cluster initiative should continue, a systematic evaluation would be required.

SUSTAINABILITY

The academic, institutional and organisational sustainability has been strengthened. There was little doubt that the research capacity strengthening in the four institutions would not have taken place to the extent achieved to date without Sida support. The cooperation has resulted in an increased number of qualified academics and a more supportive research environment. The academic standing of the universities has also been affected positively. Research has increasingly been integrated into national and institutional structures and processes. A research environment and culture were taking form in each of the institutions.

Despite such improvements, funding remains the most critical issue for all the universities. Donor financing does not form a good basis for the maintenance of the quality of research capacity in the long term. Sida and other external donors have been and still are the primary source of funding for researcher training and research. The attempts to supplement donor and government funding with locally raised funds have had limited success.

It has earlier been suggested that a National Research Fund should be created and “not less than 1% of the GDP” allocated to such a fund. The current level is around 0.2 and 0.3%, but the figures are disputed.

WIDER IMPACT

The large majority of the research topics in the current programme were relevant to Tanzania’s development and poverty reduction. However, the impact of research on social and economic development and poverty reduction was not only about selecting research topics with apparently high political and developmental relevance. The qual-

ity of the research is often more important. Low quality research on politically correct topics is often of limited value. However, this study was not in a position to assess quality, so the questions about relevance and impact require future attention. It should also be emphasised that innovation requires a level of uncertainty and risk beyond immediate utility, which applied research may undervalue.

There is much evidence that all the universities have made deliberate efforts to select and prioritise research projects with high relevance and potential development impact. Most of the research projects have a high score on social relevance and utility. There are increasing efforts to disseminate and follow up results from research projects. Academic staff were recruited to senior government positions and used extensively as advisors to the government. Several research projects have a potential direct utility and impact, but in most cases the effects are indirect and long-term. The Sida financed research contributed to create conditions and support processes that eventually would lead to poverty reduction.

FUTURE SCENARIOS

The cooperation has changed over time in form and volume, but the focus has remained on research and researcher training at public universities with a strong link to Swedish institutions. Qualified researchers have been educated in a broad range of priority areas for Tanzania. Organisational capacities have been strengthened at all the four institutions and the socio-economic relevance and impact of research enhanced. However, the programme still suffers from internal and external inefficiencies and the lingering question is: “To what extent the same resources could be used more efficiently and effectively in the future to produce higher outputs and stronger impact?” There is no clear answer, but Sida in collaboration with universities and other stakeholders in Tanzania should discuss future options. Six future scenarios, partly overlapping and partly mutually exclusive, to be considered are:

Scenario 1: Focus and concentrate on less partners

The current programme of support is broad and fragmented – covering four institutions and a wide range of thematic programmes. If the overriding goal is to produce a critical mass of quality researchers and research of high socio-economic relevance and potential impact, this may not be an optimal strategy. It could be better to channel all funds to one university with the best qualifications and outreach. It is also possible to select only certain faculties and institutes as beneficiaries. The universities will then have to apply and compete and the best qualified will be awarded a contract.

Scenario 2: Move from researcher training to research

Swedish development support for research has long been committed to the idea that Ph.D. training is the main foundation for strengthening research capacity. No tracer study has been conducted to prove the truth of such an idea. It has been a problem – even if we do not know the magnitude of the problem – that Ph.D. graduates may continue to perform the same duties before and after graduation. Few become en-

gaged as researchers due to lack of resources for conducting research. Too little high quality, independent research is carried out as a result of the training of researchers.

Hence, one can justify moving focus and resources in the Swedish programme from training of researchers (Ph.D.'s) to post doc research of international standards and networks. In some subprograms, especially at MUHAS, the current recruitment base was no longer able to provide candidates to fulfil the target quota, and there were a large number of qualified degree holders with already high research output, and providing those degree holders opportunities for continuing a research career might prove fruitful. Regarding degrees, raw outputs are too low compared to investments, but that deficiency is also affected by the programme design in which students are not even expected to finish within the programme period. There is also a need to increase the volume of actual research; quality research in particular.

More and better opportunities and funding of research may attract qualified researchers and help them to remain researchers. Funding of post doc research may increase the quality and possibly also the relevance of research projects.

Scenario 3: Support to national and/or university based research fund

Another option is for Sida to help establish a strong independent national research fund. Such a fund can be established at either national, university, or faculty level. Such a national fund will issue calls for proposals and have a broad coverage. All qualified researchers from all Tanzanian research institutions would be able to apply. It will also be competitive and only high quality proposals will be funded. A second level for locating the fund is a university. In such a situation, the fund would cater for individual researchers within that institution. The third level is a college or faculty that would be responsible for a broad, countrywide call.

The idea of promoting a research culture, in which conventional standards for managing scientific activities apply, suggests that the fund model should be placed at the research council level. Yet, if ownership by local researchers – not university administrators – is the objective, the fund should be at the lowest possible level. The former presupposes that an effective system is in place in which all parts are seen as interdependent and objective actors. A governance and decision making system perceived as transparent, efficient, professional and fair are required.

If Sida would consider providing more support to NFAST, it has to be on two conditions: (a) A robust governance, review and decision making system in place, and (b) dedicated qualified personnel working with NFAST.

Scenario 4: Move from institutional reform to research support

The Swedish cooperation has so far targeted four institutions and included organisational and institutional components in the programme. Sida has played a role in institutional transformation by providing various kinds of support to infrastructure, individual capacity building and research management. It can be argued that the transformations are now well underway. Time has come for Swedish support to change.

An option would be to focus more exclusively on doing research and less on supporting the “enabling environment” for research (ICT, library, management etc.)

Scenario 5: Focus and concentrate on fewer research areas and sub programmes

The current programme includes a broad range of thematic areas from HIV/AIDS, renewable energy to archaeology and linguistics. It covers training of Masters and Ph.D. students, research management, faculty core support and a library project. The first option favoured less partners and the next more exclusive focus on research while this option goes one step further and argues for focusing and concentrating support to selected programme areas of high priority. The current portfolio is relevant to social and economic development, but the direct relevance to poverty reduction and socio-economic development varies. A future option would be to select one or a few programme areas and make funding available only for those areas.

Scenario 6: From sandwich to country based training

The sandwich model has been an integral part in the Swedish programme with active cooperation between Tanzanian and Swedish researchers and universities. The model has changed over the years, and there is no single model consistently in use, but most of the Ph.D. training has involved Swedish counterparts. The Tanzanian student was in Sweden for a period of time, had a Swedish supervisor and graduated either from the Swedish or Tanzanian University. There have been and are several benefits from the sandwich model – academically, but also in creating stronger cultural and individual linkages between Sweden and Tanzania. Such benefits are significant in terms of quality of researcher training and networking, but often intangible and difficult to measure in monetary terms. From a strictly financial perspective, the sandwich model adds costs. It is more expensive than training Ph.D. students only in Tanzania.

If outputs in terms of number of people trained should increase (with the same level of resources), the sandwich model should be replaced or complemented with more national training or gradually move in that direction. It would still be possible to maintain several elements from the sandwich approach as for instance: (a) Invite Swedish professors to Tanzania for giving specialised courses, (b) establish a virtual supervision and support facility for Tanzanian students (e.g. Swedish supervisors providing on-line support to individual students, (c) organise selected targeted exchange visits and (d) support attendance at international conferences. Some facts do, however, speak against a move to national training: Firstly, it is not sure how quality would be affected. Secondly, new incentives for Swedish partners should be sought. Thirdly, the current problems have not been about too few opportunities for too many eager candidates, but about inability to recruit enough candidates. Hence, increasing the quota might be unnecessary and resources could be directed to providing the few selected students better resources.

1 Introduction

1.1 BACKGROUND

Research cooperation with Tanzania was initiated in 1977. Since 1994, the support targeted the University of Dar es Salaam (UDSM), the largest public university identified as the institution best suited to make a strategic contribution to the overall Tanzanian research capacity. Since 2007, two new universities branched off from UDSM—Ardhi University (ARU) and Muhimbili University for Health and Allied Sciences (MUHAS).

The preparation of the current programme was based on previous experiences, lessons learnt and the context of emerging issues in the national and global agenda. While institutional research capacities had been strengthened through previous cooperation programmes, additional support was needed to further develop and consolidate these capacities, ensure their use in development processes and sustainability by strengthening the research promotion and coordinating capacity of Tanzania Commission for Science and Technology (COSTECH).

Sida's research cooperation with Tanzania aims to address issues related to alleviation of poverty, as outlined in the central Sida policy document *Perspectives on Poverty*. It is aligned with Tanzania's National Strategy for Growth and Poverty Reduction (MKUKUTA) that calls for development of the country's human resources and improvement on the availability and efficient use of knowledge and research/technology as key tools for increased productivity and reduced poverty.

The overall objective of the research programme is to strengthen the national research capacity and improve the quality of research conducted in Tanzania in areas of national relevance to contribute to poverty reduction and the country's sustainable development. The research cooperation is designed to build up the capacities at the three largest public universities by setting-up post graduate Ph.D. and MA/M.Sc. programmes in relevant fields and to strengthen the institutional capacity for research management and promotion at COSTECH.

The total allocation to the programme was 229,852 MSEK for four years starting 1 July 2009 to 30 June 2013, with indicative amounts of 32,35 MSEK during July-Dec 2009, 53,5 MSEK in 2010, 56 MSEK in 2011, 58,5 MSEK in 2012, and 29,5 MSEK during Jan-Jun 2013.

1.2 PURPOSE AND SCOPE

The purpose of the evaluation is three-fold:

- (a) Analyse and assess the achievements of Swedish cooperation to strengthen the Tanzanian research and innovation system during the years 2009-2013.
- (b) Serve as a basis for identifying the next steps for the country to achieve national and institutional sustainability for research.
- (c) Contribute to “lessons learnt” to the development of the Swedish modality used to strengthen research and innovation systems in low-income countries.

Apart from assessing output and outcomes of the Swedish research cooperation, the evaluation should also provide guidance for future research cooperation in Tanzania and other low-income countries. While the evaluation focuses on the cooperation between 2009 and 2013, it should prepare a short historical overview of the cooperation since 1977, to appropriately analyse the research cooperation in its context.

The evaluation includes four institutions receiving support from Sweden: UDSM, ARU, MUHAS and COSTECH. In 2003, funds were provided for development of innovation clusters with the main objective to promote the use of research for societal development through strengthening the links between research, innovation and small enterprise development since 2009 through COSTECH.

The Tanzanian institutions

University of Dar es Salaam (UDSM) was first established in 1961 as a College of the University of London. In 1963 it became a Constituent College of the University of East Africa. In August 1970, it became a National University by Act 12, 1970. The University was established with three main objectives, namely:

- To transmit knowledge as a basis of action, from one generation to another,
- To act as a centre where the frontiers of knowledge could be advanced by scientific research.
- To meet the high level human resource needs of the Tanzanian society.

The University started with the Faculty of Law. It expanded over the years with the establishment of the numerous Faculties and Institutes it is boasting of now. It established a number of colleges, some of which were later converted into independent Universities.

The Muhimbili University College of Health Sciences was established in 1991 from the Faculty of Medicine of the University of Dar es Salaam. The former College is now a fully-fledged University in the name **Muhimbili University Health and Allied Sciences (MUHAS)** from 2007.

The University College of Lands and Architectural Studies (UCLAS) was established from what was then Ardhi Institute in 1996. This was promoted to an independent University in 2007, namely **Ardhi University (ARU)**.

COSTECH is the principal advisory organ to the government on matters pertaining to STI (science, technology, and innovation) and their application for socio-economic development. Its mandate includes, among others, formulation of STI policies and priorities, promotion, coordination, monitoring and evaluation of scientific research and technological development. COSTECH administers also the National Fund for the Advancement of Science and Technology (NFAST), which was established in 1995 to provide research grants for the development of science and technology in national priority areas considered of social economic benefit to Tanzanian society.

1.3 APPROACH AND METHOD

The Terms of Reference (ToR) are comprehensive, but it was agreed in the Inception Report that the evaluation should focus on the capacity building aspects in the four institutions and their results (outputs, outcomes and impact) in three areas:

- (a) Institutional capacity for research.
- (b) The production of scientific results, their quality and relevance.
- (c) The societal impact of building institutional research capacity.

The ambitious long-term objective of the research programme is to contribute to alleviation of poverty. This is built on the assumption that the development of human resources through more and better knowledge and research are prerequisites for social and economic development. However, there are no direct causal links between support to research and alleviation of poverty, so it is not possible to measure impact directly. We followed a bottom-up approach in the assessment of results. First, it was important to establish to what extent the programme has been implemented - that people have been trained and research carried out as expected. Secondly, it was possible to evaluate to what extent the institutional capacity has been strengthened in all the four institutions. Thirdly, we assessed the quality and relevance of research and fourthly, we searched for evidence that the research has been used for practical and productive purposes. This is as far as we could get. Measuring the long-term impact would require another and different type of evaluation. We were neither tracing graduates for finding out where they end up working afterwards – partly because it is premature (most students have not finished yet) and a separate tracer study will be carried out. It should also be mentioned that a separate study providing a broader overview of higher education and research is carried out in parallel with our study.

Levels of institutional development

Our approach to the evaluation was explained in the proposal including three distinct levels of capacity development:

- (a) *Development of human resources* concerned with how researchers are educated and trained, competence for research built up, translated into actual research projects and products and then used. This includes the steps in the internal research process and is the first and basic *building block in institutional development*.
- (b) *Organisational development* is concerned with strengthening structures, processes and management systems in the universities in order to improve the efficiency and effectiveness of organisational performance.
- (c) *Institutional or system development* seeks to capture what goes beyond organisational development and each university. It brings in the context within which the universities operate and the linkages between organisations, the policy and institutional environment for the universities and the overall context. It includes also links between research, innovation and small enterprise development

The evaluation also serves as a basis for identifying next steps required for Tanzania to achieve national and institutional sustainability for research and contribute to “lessons learned” for Sida. The analysis of institutional sustainability and “lessons learned” are an integral part in all steps of the evaluation and informed by findings and conclusions from the three building blocks.

1.4 PHASES AND METHODS

The evaluation had three distinct phases. The first (Inception phase) was mostly descriptive and served to map the actual production of research and existing research capacity (inputs and outputs). The description covered all the four institutions and the period 2009-2013. The second phase (Institutional assessment and analysis) moved towards the *analytical and evaluative processes* as part of the field work in Tanzania. A debriefing workshop was organised at the end attended by embassy staff, local stakeholders and the evaluation team. Major findings were shared and discussed and the conclusions from the workshop inform drafting of the final report.

The third phase (synthesis and reporting phase) consisted of synthesising findings and observations and preparing the draft report. After the submission of the draft report, a Skype conference was held with the Embassy, to discuss the report. On the basis of this discussion, the report was finalised and submitted to the Embassy.

The evaluation used three methods for collecting data and information: Document review, interviews (individual and group interviews) and surveys. The review of background documents started during the inception phase and continued to the end and included applications from the four institutions, appraisal and appropriation documents from the Swedish Embassy, progress and annual reports, previous reviews and evaluations and relevant secondary information and materials¹.

At the four institutions interviews were conducted with programme coordinators or contact persons², academic staff members involved in teaching, supervision and research for all research areas supported by Sweden, senior management and Ph.D./MA/M.Sc. students. Other people interviewed were Government officials, donors supporting research and other relevant stakeholders³. Most of the interviews were with individuals or pairs of individuals, while focus group interviews were used with students⁴.

All interviews were based on semi-structured questionnaires/interview guidelines (included in the Inception Report: (a) A “master questionnaire” for the three universities covering all the questions in the ToR. They provided institutional profiles for the comparative analysis in the synthesis and are shared with the Swedish Embassy, (b) Summary of results matrix indicators for all institutions/programmes (data are presented in Annex 4), and (c) Questions for focus group discussions with students/staff, (d) Questionnaire for COSTECH and national policy makers and (d) Questionnaire for external stakeholders.

Sida identified thirteen Swedish coordinators representing Swedish universities. A subset of questions from the master questionnaire was posed to those coordinators related to the collaboration between Swedish and Tanzanian universities, tangible and intangible benefits of collaboration, and the changing role of the “sandwich model”.

It is a major task to analyse relevance and application of research. What we have done are: (a) Included questions about relevance and application of research in

¹ See Annex 3: References.

² The total number of projects proposed to Sida in the current agreement period 2009-13 was 73. Of these the total number of approved projects was 45 Projects. (ARDI=6, MUHAS=14, UDSM=25, COTECH=2). These projects were coordinated by a total of 28 coordinators or contact persons.

³ See Annex 2: People met.

⁴ Focus group interviews with Ph.D. students and one focus group interview each with Masters and post doc Students in USDM, two Group interviews each in ARDI and MUHAS (one for Masters and one for Ph.D. students). Each group will have 5-8 students representing different programmes.

all interviews – meaning that we have a broad range of qualitative perceptions from internal and external stakeholders, (b) selected a few research projects from each university considered innovative and of high quality. They are used as illustrative cases in this report. Finally, (c) compilation of statistics concerning relevant Tanzanian publications and references to relevant Tanzanian research in citation indexes, as well as other indicators of usage in order to assess relevance and use of research. The quality assurer reviewed the draft Inception report and the draft final report, making sure that the documents correspond to Sida standards.

1.5 LIMITATIONS

Terms of Reference consisted of a large number of factual questions including aggregate data for the entire programme such as expenditure, total number of MA/M.Sc./Ph.D. graduated, publications and attendance at conferences. Such data were not readily available in the programme annual reports and had to be provided by the four institutions through their existing monitoring and reporting systems. There were several gaps in such systems, so all data are not provided as for instance number of articles in different type of publications.

The major limitations and challenges in this evaluation were:

- A comprehensive ToR with a large number of questions and a relatively short time frame for collecting data.
- Missing and incomplete data and information to answer several of the factual questions due to weak monitoring and evaluation systems.
- Complex processes involving short- and long-term change that are difficult to capture in an evaluation such as this. Longitudinal data are typically required to study change.
- Different institutions and settings are likely to affect outcomes – meaning that findings may not be generalisable across the universities.
- An evaluation of discrete research projects face challenges in trying to judge to what extent the outcomes and impact can be attributed to specific research projects, when a range of other external factors are likely to have made a difference.

At the first two levels of analysis (research products and capacity), we have been able to provide solid empirical evidence. It was more difficult to assess medium- and short-term effects of research. The effects are often catalytic, indirect and long- term. We have not been in a position to assess the quality of research projects since they are in so many specialised areas.

In order to mitigate these limitations, we have:

- Focused on the key evaluation issues as established in the ToR, adding value to analysis from the investigation of their interrelationships and through ar-

gumentative interpretation, supported by an extensive review of documents and previous studies.

- Triangulated information from (even limited) different sources, in order to make their applicability and validity explicit.
- Shared and verified the evaluation results with key stakeholders.

2 Overview Programme and Context

2.1 HISTORICAL EVOLUTION

Research cooperation with Tanzania started in 1977 with support to the national Research Council (UTAFITI). In 1985, an evaluation showed that academic capacity in the country was far too low, and that the Council did not perform its functions and lacked the capability to prioritize research based on scientific criteria. As from 1986, support to research capacity building focused on individuals at universities, research institutes and ministries using the so-called sandwich model. At the beginning of the 1990s, it became clear that such fragmented support could not contribute to the creation of sustainable research environments. Training of researchers had to be supplemented with investments in research infrastructure and scientific equipment. Catering for the needs of scientific information support to libraries and archives was included in the approach. Together, these should contribute to the establishment of research environments that would be attractive work places for the researchers. Through these additions, the support gradually became more institutional than individual. In the beginning of the 1990s, a further shift was made to favour more comprehensive support with the aim of inculcating research cultures at national public universities.

A university reform at the University of Dar es Salaam (UDSM) made it possible for Sida to fund the preparation of a strategic plan for institutional research capacity building at that university. As the Government of Tanzania extended this process to the entire sub-sector, the logical sequence was to move to a systemic approach to capacity building. The main objective of the cooperation was to facilitate the development of research capacity at the UDSM through:

- Promotion of the university reform programme at UDSM.
- Support of the setting up of structures for research management.
- Research cooperation between the UDSM and the Swedish universities.
- Research training within research cooperation projects with the following intended outputs:
 - Strengthened and empowered human resource for more active participation in the development process of Tanzania.
 - Broadened Tanzania's knowledge base.
 - Strengthened links between research and other institutions in society.

The agreement for the period 1998 to 2000 amounted to 111 MSEK and the period January 2001–June 2004 to 84.5 MSEK, supporting 15 research projects.

The next agreement for the period July 2004 to June 2008 amounted to 155 MSEK and covered research cooperation in the fields of health, science, engineering, marine sciences, linguistics, business and architecture / land surveying at the UDSM. Thirteen projects altogether were supported, and a number of Swedish universities were involved as cooperation partners.

The support to reform management of UDSM was considered to be successful in achieving strategic objectives and Sida/SAREC phased out support for the reform programme during phase 2, 2001–2004. The human resource development continued to focus on increasing the number of postgraduate staff. The major issue has been to allow staff members to join master's training programmes rather than Ph.D. programmes, when no recruitment base for Ph.D. training existed. The bilateral research programme has opened up avenues for other initiatives such as regional collaboration, curriculum development and collaboration with stakeholders outside the university.

Currently, the intention is both to support the growth of research cultures at national universities and to contribute to the establishment of national research strategies that are coordinated with the countries' strategies for development and for poverty reduction.

It is interesting to observe the shifts in Sida's approach over time. The ultimate goal of Swedish policy has been to turn money over to trustworthy governments (Hyden 2006). Because development cooperation has never really been a foreign policy tool for the Swedish government, it has vacillated between two primary principles: (a) partnership and (b) ownership. Both principles presume a cooperative relationship between donor and recipient based on mutual trust and dialogue. Ownership is the more radical of the two in the sense that it involves allowing the recipient of assistance to make key decisions about its use. Only an overall frame is set in advance. Within this agenda, the recipient government is free to make decisions regarding final allocations. The Swedish contribution was to help establish and fund national research that could mobilize local resources for research in a catalytic fashion. However, the research councils became very bureaucratic with little influence at government level and poor contacts with the research community. Hence, the next ten years saw a shift toward supporting researchers. This new orientation that began in the latter part of the 1980s involved support of collaborative research between researchers in developing countries, sometimes collaborating with Swedish counterparts. It also entailed support for training graduate students from the developing world at Swedish universities. During this period partnership was the prevailing principle.

In the last ten years, the pendulum has gradually swung back in the direction of ownership by local institutions. Since the late 1990s, Sida has actively supported local efforts to improve university administration and make it more attuned to the needs of the research community. For instance, it helped University of Dar es

Salaam to engage in a local audit that produced a new management plan for the institution. The support of university/faculty funds for research is another step in the same direction. Instead of just giving project or programme funding, this approach is meant to encourage local universities to take greater control of setting priorities for research, consider how supplementary local funding may be generated, and acquire the necessary experience to do the things that Sida and other donors were doing in the past. In short, it is a way of encouraging greater self-reliance and a stronger sense of ownership.

2.2 POLICY AND PROGRAMME

The overall objective of the research programme 2009-2013 is to strengthen the national research capacity and improve the quality of research conducted in Tanzania in areas of national relevance to contribute to poverty reduction and the country's sustainable development. The research cooperation is designed to build up the capacities at the three largest public universities by setting up postgraduate (Ph.D.) and graduate (MA/M.Sc.) programs in relevant fields and to strengthen the institutional capacity for research management and promotion at the Tanzanian Council for Science and Technology (COSTECH).

According to the results matrix, the programme has one "specific objective" and three "output goals":

Specific objective:

- The Tanzanian research system produces research that is used to contribute to Tanzania's development.

Output goals:

- Improved analytical and research capacity and pertinent research undertaken with postgraduate (Ph.D.) programmes.
- An environment conducive to research.
- Improved financial sustainability for research.

According to the appropriation document from the Swedish Embassy (08-26-2009), Sida committed 203 390 000 SEK for four years (July 2009 to June 2013) and in addition 26.46 MSEK to finalise research activities of on-going students.

The amount was allocated and disbursed as follows:

Institution	Original budget	Revised budget	Disbursed	Accounted for	% utilised
UDSM	138	111	56,3	43,3	48%
MUHAS	61,50	42,8	30,9	25,6	60%
ARU	12,8	12,8	11,3	11,3	88%
COSTECH	17	23	12,3	12,3	54%
Total	203,4	189,7	109,6	92,5	55%

The table above explains the following:

- The original total budget (appropriation document) was reduced with approximately 7%, mostly from UDSM and MUHAS. We have not seen the justification for the reduction. The 6 MSEK increase for COSTECH refers to the added cluster initiative.
- 109,6 MSEK or 57% of the revised budget was actually disbursed from Sida to the four institutions by the end of 2013.
- Out of the total amount received 92,5 MSEK was used and accounted for.
- This means that almost half (45%) of the total revised budget remains unspent six months before the end of the extended programme period (June 2014). In terms of utilisation of funds, ARU is exceptional with a nearly 90% utilisation rate.

Information about the programme is based on the following documents:

- Detailed applications from all the four institutions.
- An assessment of all the components of the programme and budgets by Sida and external reviewers.
- An assessment memo (dated 26/8-2009) providing an overview of the entire programme (background, assessment, relevance, design of the Swedish contribution and the budget) to be approved by the Swedish Ambassador on behalf of Sida.

The assessments by Sida and external reviewers suggested several changes in the proposed components and major cuts in budgets. All the universities were requested to prepare revised plans and budgets. However, there was no final consolidated programme document with updated plans and budgets. This complicated both monitoring and evaluation of the programme since the programme was not clearly defined and the targets and benchmarks against which to measure performance were missing or inadequate.

There was a brief result matrix for the entire programme, but it was incomplete with no relevant baseline data and clear targets for the numerical indicators, such as number of graduates, publications and courses. In addition, there was no evidence that the core performance indicators were systematically collected and used for monitoring by the universities or Sida. Aggregate data for core performance indicators are missing.

2.3 TANZANIAN RESEARCH OUTPUTS: GENERAL TRENDS IN 1996–2012

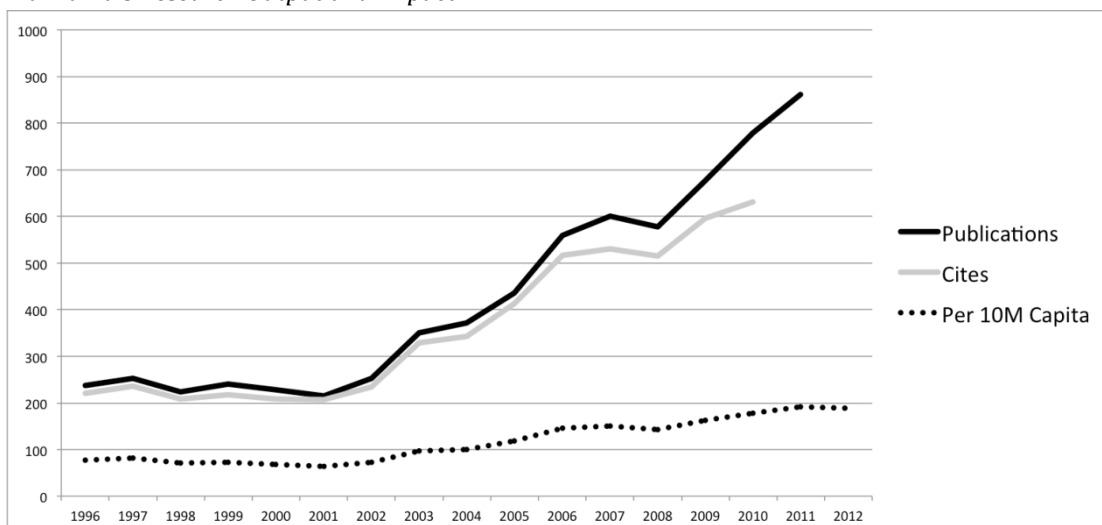
Each country's research output could be measured in various ways, for which publishing and citation indices offer one of the most reliable measures. Metadata from all publications in major academic forums are recorded in bibliographic databases such as Web of Science, CiteSeer, or Scopus. Those indices can be used to evaluate research output (number of publications) as well as impact of re-

search on various levels, such as the number of times others have referred to those publications. Of the various citation indices, Scopus offers extraction of country-level and discipline-level data from 5000 publishers and 21000 titles, and was hence selected for this evaluation (SCImago, 2014). The same database (Elsevier, 2014) provides per-university data. Population data for weighted averages was extracted from the World Bank (2014) open database. For a broader perspective to changes in Tanzanian research, the starting date for analysis was extended to 1996.

In the 1990s Tanzania's small research output—at least in terms of publications in major academic forums—reflected the country's limited university sector. In the 1990s the number of indexed research publications with Tanzanian authors was roughly 240 per year, which was around 1,4% of Sweden's at the time (17.000 per year)—which is well in line with the small number of active, professional researchers in Tanzania at the time. In the 1990s Tanzania's research output attributed to 0,02% of the world's annual research output. In the late 1990s legislative changes started a mushrooming of colleges and universities around the country, but many of the new colleges were not heavily involved in research activities.

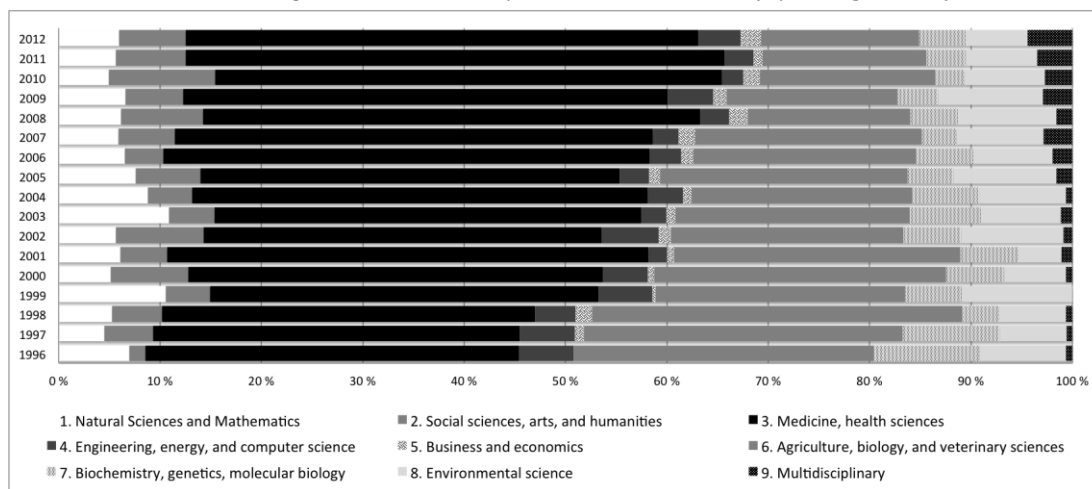
However, in the early 2000s Tanzania's research output started to grow rapidly. Whereas the average annual growth of research output in Western Europe between 2002 and 2012 was 6%, Tanzania's average annual growth was 14%, with record years in 2003 (38% growth from the previous year) and 2006 (27% growth). International collaboration grew in the early 2000s and stabilized to around 80% of articles being a product of international collaboration (Sweden is at 56% but constantly growing). The figure below presents the rapid growth of number of publications with Tanzanian authors, the number of citations to those publications, and Tanzania's research output per 10 million people.

Tanzania's Research Output and Impact 1996–2012

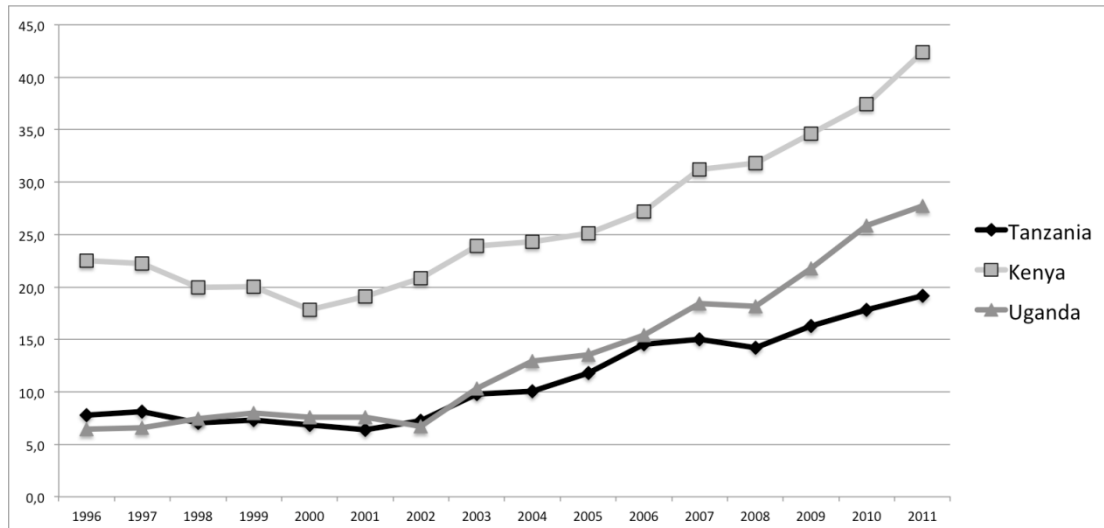


The focal areas of publishing activity have dramatically changed between 1996 and 2012 (see figure below). The two most significant trends in the country's publication profile are decreasing importance of agricultural and biological sciences and the increasing centrality of medicine related fields. Agricultural and biological sciences dropped in relative importance from almost one in three publications (29.7% in 1996) to less than one in six publications (15.6% in 2012). In 1996 medicine accounted for one third of publications, but in 2012 more than half of Tanzania's publications are produced in medicine and related fields—more than in the three next largest areas combined. In 2012, 34.9% of publications with Tanzanian authors were from medicine alone, followed by agricultural and biological sciences (12.5%), immunology and microbiology (11.5%), environmental science (6.1%), social sciences (5.4%), and biochemistry (4.5%). The publication ratios between academic fields in Tanzania are somewhat similar to those of any other country, with a number of notable exceptions—especially the near absence of engineering, physics, computer science, and mathematics (in the figure below those are subsumed under broader categories). The impact numbers, as measured by cites per document, are not notably different between Western Europe and Tanzania.

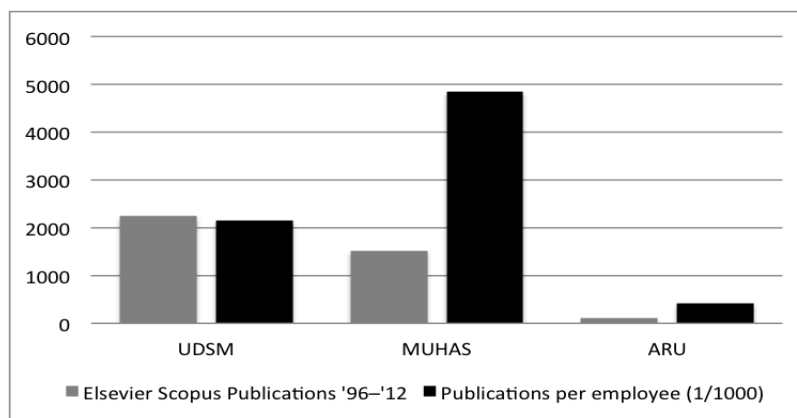
Publications in Tanzania per Field and Year (Some Fields Combined) (Scimago, 2014)



The rapid growth of Tanzania's research activity has doubled the country's share of the world's combined research output from 0,02% to 0,04%. In terms of raw research output on the African continent, Tanzania ranks eighth, after the regional R&D giant South Africa, the populous Nigeria, Northern African Tunisia, Morocco, and Algeria, and the East African Kenya and Ethiopia. As the research sector in a number of African countries is emerging, South Africa's share of the region's research is diminishing (a steady decline from 42% to 34% between 1996 and 2012). Compared to her two large neighbours, Tanzania still produces less research publications per capita than Kenya and Uganda, and Uganda has been able to ramp up her research productivity faster than Tanzania has (figure below).

Research Output of Three East African Countries (Per Million People)

Although the research output data clearly describe upward trends, the reasons behind those trends are not clear. As bibliographic databases do not yield information about corresponding authors, research project coordination, or contribution to publications, it is not known whether Tanzanian researchers appear more as main authors or as co-authors. In addition, the research indices do not offer institution-level data over different years, so other data sources are necessary for comparisons between universities. However, looking at 1996–2012 the Elsevier database does show 2245 publications from UDSM, 1523 from MUHAS, and 100 from ARU—but it should be noted that because the data starts from 1996, UDSM’s publication count includes also ARU’s and MUHAS’s publications before they were separated from UDSM. The figure below is not unexpected, given the common publication profiles of medical universities and engineering universities.

Publications by 2012 in Elsevier Scopus (UDSM includes part of MUHAS and ARU numbers)

Universities of the world are ranked by various institutions and using various metrics, but none of the commonly used ranking lists—Times Higher Education, QS University Ranking, or ARWU ranking—include African universities due to their small outputs. However, the universities in this program are included in a number of other, less prominent ranking systems. URAP (2013) ranked MUHAS as #1578 in the world and 37/61 in Africa and UDSM #1719 in the world and 51/61 in Africa. It should be noted that already being on the African list means that the universities are influential on the continent and even more so in the region. Based on the Scopus database, SIR (2014b) ranked MUHAS 2428/2744 in the world and 56th in Africa and UDSM 2463/2744 in the world and 59th in Africa. ARU is not included in either ranking. However, due to various shortcomings of the ranking mechanisms used, those rankings should be considered indicative only.

3 Research and Capacity Building Results

The three universities in this program—ARU, MUHAS, and UDSM—are very different by nature. University of Dar es Salaam is the country's oldest and largest public university, and it is a multi-faculty university that consists of a large number of colleges, schools, institutes, centers, and administrative faculties. By contrast, at only a quarter of UDSM's size in terms of staff members, Muhimbili University of Health and Allied Sciences is a medical university with a clear sectoral mission. And very different from the other two, Ardhi University has a distinct design, engineering, and planning charter that shapes its academic profile to be different from the other two.

The different backgrounds of the three universities render direct comparisons between them difficult. The sheer size and breadth of traditional multi-faculty universities, like UDSM, provides educational opportunities and workforce for many sectors of society, and due to their size, they can have a noteworthy impact on their focal areas. Medical universities, in contrast, are often characterized by focused research efforts, a culture of constant and frequent publishing, ample channels for journal publication, and doctoral training programs that are often based on active publishing. In engineering fields and technical fields, which ARU well represents, worth and value are often expressed in terms of practical usefulness and relevance of results and their applicability and contribution to society.

This section describes the research and capacity building results of the current program in the three involved academic institutions. The quantitative data is compiled from a large variety of sources, including universities' annual reports, project reports, "facts and figures" publications, and dozens of interviews. Qualitative data was also collected from a large number of interviews with program partners. Where applicable, the field data is amended from Scopus (Elsevier) database for national and university-specific publication data (that data set extends from 1996–2012, but those numbers are indicative only because they are not specific to this program). Unfortunately, in many cases different sources offer conflicting data, both quantitative and qualitative, so one must take the presented data with some reservations.

3.1 TRAINING OUTPUTS

The current program was aimed at strengthening Tanzania's national research capacity, and at improving "the quality of research conducted in Tanzania in areas of national relevance to contribute to poverty reduction and the country's sustainable development" (assessment memo, 2009-08-26). The primary vehicle for strengthening research capacity was support to researcher training, primarily for staff members, both on graduate (M.Sc. / M.A.) and on postgraduate (Ph.D.) levels. Sida's assessment memorandum (2009-08-26) noted that the initial proposal of universities was to train 174 Ph.D. holders, but as universities were requested to cut their budgets, the goal was reduced, yet the final target number is not found in the available documents. The table below presents the target numbers of Ph.D. graduates (from different, not comparable sources), as well as the numbers of students who enrolled in postgraduate programs, completed their studies, are still studying, or have dropped out.

Postgraduate (Ph.D.) Students' Status as of January 2014.

	Target	Enrolled	Completed	Ongoing	Missing
UDSM	~120*	120	16	104	25
ARU	6	6	0**	6	0
MUHAS	50	32	9	22	1
COSTECH	1	1	0	1	0
Total	174	159	25	127	26

* Sida assessment memo (2009-08-26) before the budget cuts

** All six completed their Ph.Lic. degrees in 2011–2012.

Some Ph.D. capacity building efforts were initially aimed at employees of each institution—with the provision that universities provide matching fund in form of salaries for their employees during their studies—but especially after MUHAS and some UDSM subprograms fell short of their quota, calls were extended outside the institutions. Even after that, UDSM and MUHAS struggled to encourage candidates to apply. For example, MUHAS was able to fill only 32 of their 50 open Ph.D. scholarship positions. The target number for UDSM is not documented after the budgets were cut, but individual subprograms, such as "ICT Protection at CoET", reported that they were not able to fill their quotas. Some reasons for these challenges are outlined in the next section.

Already by January 2014, UDSM had been able to get 13% of their 120 enrolled Ph.D. students to complete. The completion rate for MUHAS is similar—28% completed—but with nearly no dropouts reported. Of ARU's six started students, none had completed, but as everyone had finished their Ph.Lic. theses in 2011–2012, all were at least halfway their studies already by that point. The target time for most Ph.D. programs is four years, but some of the Swedish interviewees reported that in Sweden that target time is often exceeded. Hence, as in many programs doctoral students started around 2011, it would be reasonable

to expect a large number of graduates in 2015–2016, but that is difficult to establish at this point. Although the Swedish Ph.Lic. degree is very poorly known outside a few countries, in this case it offers confirmed and concrete progress towards a Ph.D. degree.

Graduate level (M.A. / M.Sc.) training programs were another important capacity building component, especially in UDSM. In some subcomponent fields, the available pool of capable master's degree holders was not large enough to initiate postgraduate training. For instance, in the "Empowering the languages of Tanzania" subcomponent of UDSM, capacity-building efforts focused on Master's level training, with no doctoral training component. Roughly half of the enrolled Master's students in the program completed their studies before January 2014.

Graduate (M.Sc./M.A.) Students' Status as of January 2014

	Target	Enrolled	Completed	Ongoing	Missing
UDSM	N/A	182	40	142	0
ARU	N/A	6	4	2	0
MUHAS	N/A	11	4	7	0
COSTECH	N/A	3	3	0	0

In most cases, there were no problems with getting a good number of applications for graduate (M.Sc./M.A.) level programs. In UDSM, for instance a grade point average cut-off was often used in graduate programs to implement the principle of selectivity. However, in some cases, like UDSM's "Protection of ICT Equipment" program, there were fewer applicants than positions in graduate programs too.

Reasons for low attractiveness of Ph.D. programs

In ARU, there were no immediate difficulties in getting students to Ph.D. programs, although some weak signals were visible: Students in ARU's Ph.D. program mentioned that although the call was "very competitive," the acceptance rate was relatively high. On the contrary, in MUHAS and some UDSM subprograms recruitment difficulties were very real and they were serious. For instance, MUHAS was able to enrol only two thirds of the target quota and to name one example from UDSM, their "Protection of ICT Equipment" subprogram was able to retain only two M.Sc. students out of their projected one Ph.D. and five M.Sc. students. In that UDSM's subprogram, the research capacity aspects of the program were all but abandoned, turning the subprogram into an equipment acquisition program.

A good number of explanations were proposed for recruitment difficulties for Ph.D. scholarships. As the implementations of the sandwich program varied, explanations too varied between subprograms. Firstly, some interviewees attributed the difficulties to poor understanding of career paths. Doing a doctoral degree takes at least four years, but its benefits are not well understood by the

potential candidates. Secondly, financial issues were raised by a number of interviewees. In fields like ICT and electrical engineering, capable B.Sc. holders can make the same income as their Swedish colleagues do, and two more study years for M.Sc. degree or four years for Ph.D. degrees does not sound financially tempting because it does not result as significantly increased income. Similar, several interviewees reported that in medicine medical doctors have already done 5 years of medical school, 1-year internship, and a 3-year specialization, and at that point they have to face a choice between starting to earn quite good money and engaging in four more years of studies, albeit with some salary. The salary lost over the additional study years would need to be compensated by a significantly higher salary after graduation, and that causes uncertainty. The ability to mix work and studies in the sandwich mode of studies depended on the subprogram. Thirdly, the recruitment base was, in some cases, too limited for the quota (initially the program was aimed at in-house staff training only), and in some institutions, most importantly in MUHAS, employment was restricted at the onset of the program.

Fourthly, Swedish long-term collaborators gave additional perspectives to the problem with low attractiveness. One of the most important reasons named by one long-term partner was increased number of players in the scholarship scene and the lacking measures to adapt Sida programs to the changing face of doctoral training in Tanzania. In specific, there are an increasing number of other Ph.D. scholarships—by the U.S., Chinese, and the Dutch, for instance—that make Sida scholarships in some ways less attractive for Ph.D. studies. One Swedish long-term partner reminisced about the situation 20 years ago, when each doctoral program could pick the very best candidates from a large pool of capable people. That situation stands in contrast with the current situation where doctoral programs have far fewer students to choose from and many are struggling to find enough qualified candidates to fill their quota. Sixthly, the programme's modus operandi biases the reported numbers from the actual achievements. Namely, over the years the mode of funding has turned so that students who have started halfway one programme can be rolled over to the next programme, which causes problems with program evaluation, program planning, and rigorous monitoring and evaluation.

Quality assurance of academic programs

Quality assurance of academic programs happens on various levels, through various procedures, and by various stakeholders. One of the implicit functions of universities is to act as an intermediary between the potential student body and the job markets. That function is best fulfilled by a dual promise: For prospective students the promise states that a degree from a specific university puts them in a good position in the job market, and for potential employers the promise states that graduates from that university are competent and well educated. Well working quality assurance is essential for the fulfilment of those promises and for the continued trust of employers and students.

The Tanzania Commission of Universities (TCU) handles the basic procedures of accreditation and quality assurance of new educational programs in Tanzania, but much depends on the institutions. In this funding program, there were numerous layers and angles to quality assurance. On the very fundamental level, quality should be controlled through competitive calls for student and scholarship positions, but in this program that control mechanism failed in many occasions. In some cases, students reported no competition at all: There were more positions than applicants, so everyone who met the formal requirements got a scholarship. In faculty training that might not necessarily pose a problem because any training of faculty is better than no training at all, but lack of competition does not help to pick the best talents, either.

On other levels of quality assurance, there are a wide range of possibilities for formative and summative mechanisms for evaluation and quality control. Formative mechanisms look at the quality of students' work during their studies: Such mechanisms were, for example, progress report and evaluation sessions, seminars, and reviews. In this program, formative and summative mechanisms were done in a variety of ways and although their rigor could not in all cases be evaluated, there is no question about them being sufficient in number. One of the well working quality assurance schemes was Ardhi University's "program monitoring committee" (PMC) mechanism that monitors students' progress, rigorously and thoroughly criticizes students' work, and finds solutions to any problems that students may face. At UDSM, students could only get their stipends extended and research grants released upon providing progress reports. Typical summative mechanisms were, for instance, final examinations, formal thesis evaluation, and reviews. Similar to many other countries, in these Tanzanian universities the final Ph.D. theses were subject to internal and external evaluation. In addition to the Tanzanian quality checks, in many subcomponents the Swedish partner universities provided checks and balances in student evaluation.

On a very practical level, supervisors should provide continuous, everyday quality assurance and support. Many students felt that the supervision process was smooth and well organized. Some students, however, felt that supervision did not always meet their expectations. Unhappy students from all three universities had similar complaints: In some cases, supervisor feedback was delayed or unavailable, proposal defences took long to set up, and procedures and processes were complex and slow. The "follow-up culture", in which every request has to be frequently followed up or it gets lost and forgotten, made some students and researchers feel powerless in front of a faceless bureaucracy, and the problem was felt harder by those who were not staff members in the participating institutions. Although those cases may be individual cases, the fact that in all institutions they were brought up signals a broader problem.

3.2 PUBLICATION ACTIVITY

Both ARU and MUHAS provided sufficiently organized data about their publishing activity within this program (See table below). In their publication counts, universities included peer reviewed journal articles and book chapters where at least one of the authors was a recipient of Sida funding at the time of the article publication. In many fields—such as medicine and some natural sciences—publication numbers were greatly boosted by the multiple-paper Ph.D. thesis format, in which the thesis is a collection of journal articles with a short introductory chapter. In contrast to that, there were fields, notably in ARU, where the primary format of Ph.D. thesis was a monograph—a previously unpublished, stand-alone, book-sized piece of work.

In terms of peer-reviewed publications, the research output of MUHAS was very good, albeit unevenly distributed across the subprograms. More than half of MUHAS's 71 publications within this program were produced by one of the smaller subprograms, the malaria subprogram, which used 4.3M SEK to produce and co-produce 44 journal articles—a deal that any university in the world would take without hesitation. One reason for its prolific publication activity was that the malaria subprogram was very closely tied with some much larger research programs—which is also a very desirable result. With only a quarter of MUHAS's budget, ARU's research output of 21 articles was also good even if one does not take into account the less publication-oriented ethos of engineering fields in general. Without multiple-paper theses creating a steady flow of articles from Ph.D. thesis projects, and for a traditional design and engineering school in transition to a research institution, ARU's output is promising, yet not stellar.

Peer-Reviewed Publications and Conference Presentations from the Three Universities

University	Overall journal publications per year	Produced in this program, 2009–2013		
		Peer-Reviewed Publications	Conference presentations	SEK per publication
ARU	N/A*	21	21	538095
MUHAS total	174**	132	41	360192
UDSM	314**	No data	No data	N/A

* The "Documented Recent Publications at ARU" on ARU website reports 5 publications for 2012.

** In 2010/2011 Annual Report / other 2010/2011 data.

Although a comprehensive analysis of publication arenas in this particular program is not feasible, an analysis of Scopus database reveals each institution's top publication venues. The five most common journals in the publication profiles of both MUHAS and UDSM included two international journals, two regionally focused journals, and one Tanzanian journal. ARU's data set of 100 publications between 1996–2012 was too limited for conclusions.

Although conference attendance was active, it was somewhat limited by available funds, while surely not by the available potential. ARU and MUHAS had most reliable data on conference participation through the current program: 21 presentations and 16 presentations, respectively. In order to get permission and funding to attend a conference, the universities typically required a paper to be presented. The status and value of conferences varies greatly between disciplines, with many engineering fields emphasizing them due to the fast turnover time from submission to publication of proceedings.

On the policy level, each university encouraged research and publishing. For instance, UDSM strategic plan 2004–2013 emphasized research and publishing, and underlined in the research policy the fact that research is an internal administrative duty for members of UDSM academic staff. On the practical level, each university encouraged publishing activity in their tenure track programs or career advancement programs. Typically a promotion between the levels of lecturer, senior lecturer, associate professor, and professor requires between three and ten publication points, where each journal article typically accounts for one or less points, depending on the number of co-authors and quality of the journal. In addition, universities encourage active publishing through incentives such as salary increases, travel funding, and changed status and work duties. Research activities are supported through various support structures, most common being a directorate of research and publication, which was found in each university under slightly different functions and names. In addition, research was supported through research committees, continuous training, and advisory bodies.

3.3 COSTS AND EFFICIENCY

In terms of cost, the sandwich program falls between a doctoral program taken fully in Tanzania and a program taken fully in Sweden. Comparisons are, however, difficult due to the very different ways one can put a price on a doctoral degree. In Scandinavian countries, funding applications for 4-year full-time doctoral student training amount to around 3.5 million SEK, which includes salaries and social charges, university overheads, student mobility, materials, tools, and other miscellaneous charges. But for self-funded students Swedish universities suggest a budget of 10.000 SEK per month for living and studying costs, amounting to 480.000 SEK over 4 years and excluding tuitions, flights, tools, material, mobility, and other charges.

Similar, there is no straightforward way of putting a price on doctoral training in Tanzanian universities. But according to UDSM statistics, their 3-year doctoral program (by thesis) has an average price of 204.000 SEK (50.6M TZS), and their 4-year doctoral program by thesis and coursework is estimated at 208.000 SEK (51.8M TZS) on average. Both estimates are inclusive of a 2400 SEK (0.6M TZS) monthly stipend.

The cost of sandwich training in this program, too, can be calculated in various ways, depending on which budget lines of subprograms are included under doctoral training costs and what price tag is put on Swedish supervision and from which budget the Swedish costs are taken. Although such calculation is highly speculative, looking purely at funding spent and number of students enrolled, the price tags in this sandwich program generally fall between 0.5 and 1.5 million SEK per Ph.D. graduate, given that all enrolled students indeed will graduate. It is not known whether Swedish supervisors' remuneration is included in the current financial reports.

Quality costs

But doctoral programs can hardly be evaluated by their quantitative cost-efficiency alone: Quality concerns are important for students, too. Internationally students frequently choose Harvard and Princeton despite their \$40,000 annual tuition fees. Hence, it is important to look at the participants' opinions on the qualitative benefits of a 100% Tanzanian program, a sandwich program, and a 100% Swedish degree done in Sweden.

Qualitative speaking, there was a unanimous consensus of the benefits, worth, and value of the sandwich program compared to 100% Swedish and 100% Tanzanian programs. Firstly, as students got exposure to different academic environments, they got a "feel" of a different way of working and organizing things independently, as well as influences from different styles of teaching and learning. Secondly, students got access to top-class laboratories, e-resources, and experts in an international community. Thirdly, students got uninterrupted time without things like work duties, social and family activities, or consultancies. Fourthly, students became connected in a network of international students who were in a same situation as they are, all becoming experts in similar fields, and through social media networks, those connections last. The value of extensive alumni networks of graduates from international and sandwich programs should be emphasized and individuals' ability to harness those networks should be supported by all possible means.

Fifthly, students got a chance to take courses outside the course offering of their home university. Especially courses in the theory of science and methodology got praise from their Tanzanian supervisors, too: Professor Aldo Lupala, the Dean of School of Architecture and Design at ARU, recollected that "*my student came back like a born-again person, completely transformed, ... as an international person*". Exposure to different environments is equally valued elsewhere in the world, too. In many top universities of the world, it is rare to get a faculty position without spending several years in another institution.

3.4 ROLE AND IMPORTANCE OF SWEDISH PARTNERSHIPS

The importance of international collaboration with Sweden cannot be overstated. Evidence for its centrality for development of the three universities' research capacity is ample in both qualitative as well as quantitative data gathered from the program.

In quantitative terms, the centrality of Swedish collaboration can be concretely seen in publication analysis of the collaborating institutions. Elsevier's Scopus database ranks Karolinska (Institute and Hospital combined) to be the most significant collaborator of MUHAS (172 joint articles). The most significant foreign collaborator of UDSM was Stockholm University and the third was Uppsala University. Again, ARU's number of publications in Scopus (100) was too small for conclusions.

Research collaboration with Tanzanian institutions is far from insignificant for many Swedish collaborators, too. In an interview, the coordinator for Karolinska Institute emphasized the scientific outputs of the collaboration as well as the fact that Sida funding enabled some research groups at KI to apply for and win much larger EU projects, which required a certain percentage of funding from other sources. Sida funding for Tanzanian partners was reported as the necessary "other funding source," and thus the Tanzanian partners became central for the EU-Africa collaboration, too. In two large projects, worth 3.5 million and 5.5 million Euros, principal investigators were from MUHAS. It is highly notable and quite unusual for major European research projects to be led by principal investigators from a developing country.

Many kinds of sandwiches

There was no one kind of sandwich model in this program. Differences between the sandwich program models varied in terms of time students spent in Sweden, structure of studies, roles of Swedish and Tanzanian supervisors throughout the projects, the kinds of support students got from Sweden, the amount of study time versus working hours students got while in Tanzania, and whether students got their degrees from Tanzanian or Swedish institutions. There was no clear preference for combination of those variables.

Practically all Ph.D. students spent some time in Sweden, although that time varied from weeks to months. The Swedish support was mainly of three kinds: Thesis (co-) supervision, doctoral level courses, and use of advanced facilities. Typically the role of Swedish partners varied over the sandwich program. As there were many different implementations of the sandwich model, the roles of Swedish partners also differed between the institutions, research groups, and between supervisor-student pairs. For instance, in ARU students' Ph.Lic. theses Swedish partners were main supervisors and Tanzanian researchers were co-

supervisors, but at the Ph.D. thesis stage the roles were reversed. In the collaboration between MUHAS and Karolinska Institute (KI), Tanzanian students became active members of KI's existing research groups. In most cases, the roles changed when students moved between countries: When students were in Sweden, Swedish partners played the main supervisor role, and when they were in Tanzania, Tanzanian partners assumed the main role. It should be noted that in the academic world there is never a single fixed, determined role neither for the supervisor nor the student, but each has to take many roles throughout the Ph.D. study process.

The efficiency of the sandwich model was, in many cases, eroded by the still acute staff shortage in Tanzanian universities. Although students' progress was fast during their visits to Sweden, Swedish supervisors as well as students frequently remarked that when in Tanzania, many students were snowed under a heavy teaching and administration load, with too little time left for actually doing their Ph.D. research with the focus that it requires. When students were at the same time tangled in their social and family commitments, in most cases the most rapid progress happened during the periods away from home. This phenomenon speaks for the importance of the sandwich program, but if funding models were changed, it would be necessary to give students full stipends in Tanzania and to ensure that universities stick to their commitment regarding time allocated for research.

The Swedish partnerships also gave impetus to various changes in the Tanzanian universities, although the younger universities were more flexible to changes. Since the Swedish co-operation started, ARU has revised many previously incompatible policies and requirements to accommodate the Swedish and European system that was in many ways different from the original ARU system. ARU now recognizes a Ph.Lic. degree, accepts coursework as a part of a doctoral degree, and recommends various methodological and conceptual courses.

Research vs. researcher training

Several Swedish partners wished to note that doctoral training and research programs are two different things. Ph.D. training programs are exactly what they claim to be: They are educational programs for future researchers, and although they do produce research publications, they are not research programs as such. A doctoral degree is a passport to research and publishing, and it prepares one to do research. Given proper support for research, the most fruitful years of researcher careers happen after the Ph.D. degree. (Of course, not everyone ends up as researcher. Some Ph.D. graduates choose a research-oriented career, while many others choose other alternatives that do not involve research and publication.)

In Tanzania, one Swedish interviewee suspected, post-doc opportunities are few and far between, and once Ph.D. graduates return to their home institutions, they

have little or no finances for research or conference travels, a weak support infrastructure for research, and too few research-oriented colleagues to co-operate with. The interviewee continued to propose that one should reduce the number of Ph.D. students and re-allocate those funds to post-doc resources. The same feeling was repeated by a number of Swedish interviewees: "*they've been trained now, and now they need the funding to start their own projects, to become independent researchers*" (Professor, Stockholm University). A number of Tanzanian interviewees repeated the same sentiments. Another suggested that the role of Swedish collaboration could be expert support, network building, and hosting students or researchers for shorter periods of time. There again, some interviewees were of the opinion that in their fields there was not yet sufficient capacity for independent research projects, or not enough Ph.D. holders in general. For example, despite their recruitment problems, MUHAS requested continued support to Ph.D. training due to the university's expansion plans.

Equality and collaboration

Many Tanzanian interviewees lauded the Swedish partnerships for their equality between partners. Those voices ranged from acknowledging that both partners have power over decisions, to appreciating the shared responsibilities model, and to emphasizing the importance of Tanzanian senior researchers being involved in publications. One interviewee contrasted the current Swedish collaboration with some "joint" research programs, funded by other donors, where Tanzanian partners handled research permits and practical arrangements in exchange for some junior researcher getting his or her name added to an insignificant position in the list of authors. All the real scientific contribution and merit in those "joint" programs went to the foreign researchers. The interviewee called such activity "scientific colonialism" and, although the Swedish collaboration was characterized as an equal one, called for increased Tanzanian ownership of research projects and an advisory or support role for Swedish collaborators. It must be noted, however, that such advisory, quality assurance, or support role must retain academic incentives for Swedish partners too: They must be involved in planning, research, and research reporting activities. Instead of changed ownership, some Tanzanian partners hoped that a dual degree model could further level the playing field: If the student could get a dual degree from both universities, both institutions would get the credit for the finished Ph.D. degree. That credit is extremely important for departments, research groups, supervisors, and universities.

Regardless of how future development co-operation in terms of research might be arranged, co-operation with Swedish universities was perceived as greatly beneficial for the participating universities, although there was no consensus of the mode and degree of those benefits. The following list summarizes the gains that Swedish partners perceived to get from the program.

- *Research possibilities.* There were various kinds of research that could not be done in Sweden at all, such as some types of research on malaria, tropical marine science, and Tanzanian languages.
- *New perspectives.* In addition to research that could not be done in Sweden, other topics got a new spin in the Tanzanian context. For instance, engineering researchers got the chance to work with new types of renewable material, such as brick material from Zanzibar and waste material from sugar cane.
- *Researcher networks.* Swedish researchers become networked during their visits in Tanzania, but also the incoming Tanzanian visitors bring their extended international networks. In some subprograms those networks have been extremely beneficial for the Swedish partners, but in other subprograms their importance has been negligible.
- *Alumni networks.* Swedish universities' alumni networks reach high in Tanzanian academic and governmental institutions. The extensive alumni networks of Swedish universities offer Tanzanian and Swedish partners significant and extensive leverage in different institutions and countries. Unfortunately, those alumni networks are largely untapped at this point.
- *Co-Funding.* In some cases, it is possible to use the Sida funds as co-funding required by some larger funding applications.
- *Joint publications.* In a world dominated by a “publish or perish” mentality, every joint publication is a welcome addition to the results of individual researchers, departments, and universities.
- *Intangible gains.* The intangible gains were numerous but hard to pinpoint: “A lot of our learning happens on coffee breaks. You get a more intuitive sort of understanding of the different research contexts” (Professor, KTH).

3.5 CONCLUDING REMARKS

The contribution of Swedish funding to scientific results is considerable. Firstly, a sizable number of articles in acknowledged scientific journal have resulted from the program. Secondly, a large number of small research projects have been undertaken, and those have created starting points for further research or publishable research results on their own. Those small projects have supported bottom-up development based on the ideas of capable, individual researchers. Thirdly, the program has contributed greatly to internationalization of the partner institutions' publication profiles. Fourthly, a number of research champions have emerged with the support of this program—some through Ph.D. studies and some through the supervision roles in research teams enabled by this program. Some of the most successful research champions are on steeply upward academic careers.

4 Institutional Capacity

Strengthening institutional capacity is a key objective in the current research cooperation programme including strengthening or putting in place research processes and procedures, management structures, facilities and funding mechanisms. The main purpose of this chapter is to assess the achievements and changes in terms of institutional capacity. It also examines the challenges faced and issues that need to be sorted out for further collaboration.

4.1. RESEARCH PROCESSES/PROCEDURES

The following table provides a synopsis (ratings with a three word scale from missing (NA)—developing (DE)—well developed (WD) of our findings⁵. The findings are elaborated further in the text.

Research processes	UDSM	ARU	MUHAS
Research is actively encouraged and facilitated.	WD	DE	WD
There are formal regulations and procedures for selecting and following up Ph.D. and M.Sc. students.	WD	WD	WD
Ph.D. and M.Sc./M.A. students are actively followed up.	DE	DE	DE
Formal regulations and procedures are known.	DE	DE	DE
Admissions take place in open and competitive environment.	WD	WD	DE
Number of research grant applications per year submitted.	NA	NA.	NA
Internal procedures for planning and monitoring research proposals in place.	WD	WD	WD
Structures for managing the research process in place.	WD	DE	WD

Rating: NA – Missing, DE-Developing, WD-Well Developed

Research facilitation mechanisms

In UDSM structural reforms, training, small grants and the use of publications for promotion serve as the main procedures or tools for facilitating research. The university has made significant structural reforms particularly since 2011. Be-

⁵ The ratings are based on our findings and perceptions and seeks to illustrate findings and differences more than measuring them.

fore 2011, there were only two Deputy Vice Chancellors: DVC for Academic Programmes and Research, and DVC for Administration. As of 2011, a third DVC was created for Research and Knowledge Exchange. The responsibility of this office is to promote research and community outreach programmes. Since the 1970s, this function was under the office of the Directorate of Research. There are also advisory bodies called *Research Committees* at various academic units of the university. The university senate has its own committee for research and knowledge exchange. UDSM gives an important role to the training of academic staff members in methods of proposal writing in order to facilitate their likelihood of winning research grants. Moreover, the Directorate of Research has a small grants programme for academic staff members and a policy, which requires staff members to publish in peer-reviewed journals to get academic promotions.

At ARU, research and publication was previously not a central activity. The university's focal areas (such as architecture, land management, and urban and rural planning) were considered by staff as low-research intensive areas. Consultancy and outreach were perceived as more important than research and publishing. That mind-set is gradually changing and more and more people see research and publishing as an integral part of their work. However, the cycle of research and publication is excruciatingly slow. From starting to plan a research study to getting it finally published in a journal can easily take two or three years. There is a growing recognition that publishing needs more patience. The university invests 8% of its income in research. Studies that do not attract other funds, but are deemed of high quality can be funded from that budget. The Directorate of Postgraduate Studies, Research and Publication advises researchers about sources for funding and provides quality assurance. The directorate has also funds for publishing in peer-reviewed journals. MUHAS is not different from the other universities. It provides small grants for academic staff to research and use the outputs for the purpose of academic promotions. In 2012-13, it has provided 21 such grants and for the entire agreement period it has given out 50 small grants.

The overall trend is that research is facilitated through the formation of new administrative structures, professional capacity building programmes and small grants. Universities also associate promotions with research, publication and dissemination. As the largest and most experienced university, UDSM has more advanced facilitation procedures than the other universities.

Procedures of selection and admission of students

At UDSM, selection is formal, competitive and transparent. It involves the following steps: programmes are publically announced, students apply on the basis of the announcements and departments select students considering the available places using grade point averages (GPAs) as cut-points. Applications to MA programs usually exceed the available places. Thus, the use of GPA as the main crite-

tion is obligatory. For Ph.D. students, the availability of a research supervisor is critical. The challenge for UDSM is not selection, but it is to get all selected students to register because most complain about inadequacy or lack of funds. Like in UDSM, selection is a formal procedure in ARU, and M.Sc. students need to follow the rules of the Directorate of Postgraduate Studies, Research and Publication.

In MUHAS, the procedures are the same, but due to shortage of applicants, experience was somewhat different from the two other universities. The calls could hardly be called competitive when there are more open positions than applicants—so every candidate who meets the minimum qualifications is accepted. One group of interviewees reported that the reason for difficulties in recruiting students is the problem in *“the way young people perceive the benefits of the Ph.D. program”*. As explained above, medical degree takes long time and an additional Ph.D. may incur significant loss of earned money. Consequently, it is very hard to get people from the clinical side to do a Ph.D. degree, and there is little movement between hospitals and universities. There is also a belief that if one works in a hospital then a Ph.D. doesn’t change one’s career. Publishing is not so important in a hospital setting and allowances are low in a Ph.D. programme.

From the above findings, two interrelated trends emerge. Firstly, the selection of students are procedural and to some degree transparent in all universities whereas the selection cannot be considered competitive in MUHAS and in some subprograms in UDSM. Furthermore, interviewed students at MUHAS were not always sure of the selection criteria for programs—yet that is irrelevant if everyone who meets minimal qualifications is accepted. Secondly, like Ph.D. students in MUHAS, students who were recruited to local Master programs do not all join their chosen field of studies to pursue their education (e.g. UDSM) because there is a perception of insufficiency of funds. Whether or not students join a postgraduate programme seems to be conditioned by the level of perceived funding.

According to data released by UDSM, unit cost per student varies from program to program, but the average grand per student unit cost for an 18 month Masters program is 21,028,333.33TZs. The highest grant per Masters student for an 18-month program is 26,520,000TZs and the lowest 14,632,500TZs. A stipend for a Masters student is 500,000 TZS/month. Similarly, for 24 months Masters by thesis program, the average grant per student is 32,675,000 TZs. This implies that universities need to assess the adequacy of their funds to local postgraduate programs, and need to essentially improve their effectiveness in the recruitment of students so that they are joined by all selected candidates. The following table shows UDSM average unit costs of sponsoring masters students for 2014 (March).

UDSM-Average Unit Costs of Sponsoring Masters Students-March, 2014

No	Types Unit Costs	Types of Matser programs	
		18 Month pro-grammes Average Unit Cost (TZS)	24 Months Pro-grammes Average Unit Costs (TZS)
1	Registration	95,000	-
2	Tuition fee	5,300,000	8,041,666.66
3	Direct Student Cost (Stipend Allowance)	9,000,000	12,000,000
4	Direct Student Cost (Book and Stationary Allowance)	105,000	1,750,000
5	Research Costs	5,583,333.33	5,583,333.33
	Average \Grand Unit Cost Per masters Student	21,028,333.33	32,675,000

The above costs are average costs. Direct costs payable to the university include student union, registration, caution money and student ID.

Student monitoring

At UDSM, student monitoring is based on progress reviews. Students are required to provide progress reports in order to get their stipends extended and research grants released. Supervisors play key roles in these processes. They provide feedback about their student's progress. The university also has formats for progress evaluation in its Research Policy and Operational Procedures document of 2008. These formats are newly introduced by the central administration to fast track low graduation rates of sponsored candidates. In fact, it was also revealed that students who extend the duration of their local studies beyond the given period of study are required to pay fees in order to get extensions.

In ARU, Master students are tracked according to the rules of the Directorate of Postgraduate Studies, Research and Publication. A Programme Monitoring Committee (PMC) that convenes on quarterly basis also monitors Ph.D. students. The PMC monitors Ph.D. student progress, and as the PMC membership includes top university administration, its decisions can be quickly acted upon. During focus group interviews, students expressed that progress presentations are good tools for getting advice, and that critique in those meetings can be harsh. There were practice defences, seminars, and reviews. Thesis defence in ARU involves reviews by both external and internal examiners. Different from the university guidelines, students felt that that before the thesis submission process there were no formal quality assurance procedures, although a lot happens in practice. In MUHAS, student monitoring involves supervisor follow up, progress follow up by the Directorate of Postgraduate Studies as well as follow up by departments.

Overall, the capacity for tracking student progress is reported to involve rigorous and participatory procedures including supervisors, departments, committees, and directorates of research. Unfortunately, the different processes that

exist in principle do not readily translate into practice, or they manifest in excessively bureaucratic and inflexible arrangements that do not necessarily result in rapid graduation of students. For instance, experience from UDSM suggests that there are long procedures for fast tracking student completion. Primarily, evaluations include teaching-learning, course as well tracer studies. Secondly, Information is gathered through postgraduate students academic progress formats prepared by the central administration. This format is filled by the student, supervisor and department chair. Another format is used for extension of studies and it has to go through the supervisors, department chairs and director of postgraduate studies. Progress evaluations apply to the whole university since this is a part of the regulations and guidelines for Postgraduate studies of UDSM. Reviews are made at a system level and if students fall behind the given duration, they are required to pay high extension fees as inducements not to seek further extensions. With all these procedures in place, however, UDSM reports that the rate of completion of sponsored students has been low.

Number of external and internal grant applications for research

At UDSM, it is generally known that there are two levels at which research grant applications can be submitted. The Directorate of Research and Publication centrally submit some proposals to external funding institutions while others are submitted by individual researchers in academic units or departments. The exact numbers of applications submitted are not known, but attempts to get research grants are apparent. For instance, the Directorate of Research and Publication has submitted five project proposals in 2013. The following table illustrates efforts to submit research proposals, but the number of research projects completed at UDSM has dropped to 162 during 2010/11.

Number of research projects completed and in progress at UDSM

UDSM	Year				
	2006/07	2007/08	2008/09	2009/10	2010/11
Completed and ongoing	275	258	247	247	162

Source: UDSM (2012). Facts and Figures 2011/12

Figures for 2006/07 and 2007/08 may include those of MUHAS and ARU since these two universities branched off from UDSM only in 2007. Nonetheless, the table shows that the number of successful grants decreased from 247 in 2008/09 and 2009/10 to 162 in 2010/11. Even then, this sum does not show the total number of submitted applications. At ARU and MUHAS, there are also no tracking of the total number of applications submitted for research grants, as many are done by individual researchers and they do not always go through the university system. In MUHAS, grants have been won, for instance, from EU, USAID, and IPPF, and other very competitive and high prestige grant givers. In ARU, the following table shows the number of successful proposals tracked by the university and the decreasing trends in their progress.

Number of ongoing and completed research projects at ARU

ARU	Year			
	2007/08	2008/09	2009/10	2010/11
Ongoing	34	20	31	14
Completed	20	17	5	10

Source: ARU (2012). Facts and Figures

In summary, tracking the number of applications submitted for grants is weak in all institutions. In UDSM, the Directorate of Research seems not to track those applications submitted by individual researchers to external sources. In the other two universities, the situation is even less organized and no information exists about the total number of applications submitted other than the number of successful proposals currently ongoing or already completed.

Planning, approval and monitoring of research

UDSM has operational procedures to be followed in the process of developing a research proposal. After planning is over, the proposal is submitted to committees for review. These committees, known as Research and Publication Committees, are organized at departmental, faculty and at the university level. They do assessments according to established criteria in the research policy. All research proposals are registered after approval. The Directorate for Research and Publications coordinates research project registration.

ARU also follows an elaborate, multi-layer system for planning and monitoring research proposals. The first checkpoint happens on the departmental level, after which the head of the department may submit the application further to the school (faculty) board. The school board evaluates those proposals and upon approval submits them further to the university senate higher degrees committee. The higher degrees committee, chaired by the Vice Chancellor for academic affairs, ultimately approves all the proposals. In principle, MUHAS has the same multi-layer procedure for planning and monitoring research. However, many proposals in MUHAS do not undergo the formal procedures in the multi-layer system for approval. Individuals may respond to external calls for proposal submission and go through external peer reviews on their own. Nevertheless, the proposals that receive external grants must get scientific and ethical clearance from MUHAS before the research is conducted. For internal grants like Sida grants no one gets the funds before scrutiny through university organs. .

In conclusion, the universities have developed organized systems for planning, approval and monitoring of research at various levels of formalization. UDSM and ARU have more formal procedures than MUHAS. At MUHAS, the many co-applications and co-projects with foreign partners do not always go through the MUHAS formal channels.

Structures for managing the research process

UDSM established a Directorate for Research and Publication in 1998. The directorate is responsible for coordinating internal and external linkages on all matters related to research. Internal coordination involves in-house administrative links with researchers in faculties and institutions.

MUHAS has developed a well-organized and active research management process over the past 5-6 years. The Directorate of Research and Publications has become central to R&D. Sida supports the university's research bulletin (actively updated and extensive). There are review boards, an intellectual property rights unit and an office for sponsored projects. The central aspects of research management have a responsible unit and person.

In ARU, administrative organs carry out continuous monitoring of the research progress with quarterly checkpoints. However, students did not always perceive these as formal structures. In summary, research in UDSM and MUHAS is managed by a distinctive line of management responsible for research. In ARU, it is embedded in the academic structure leading the teaching-learning process. UDSM had many years of experience in research management while many of the structures in MUHAS were formed since 2009.

Integration and ownership of research

Research support in UDSM is institutionalised. The Deputy Vice Chancellor for Research and Knowledge Exchange reports to the Vice Chancellor whereas the Director of Research reports to DVC (Deputy Vice Chancellor). Other formal structures (committees) also exist. In MUHAS, research support structures have become integral, inseparable parts of the institution. At ARU, research support structures are also part of the university, but they are complex and lack a focal point. There are a number of qualified and competent key people to do research, but research management is weaker.

At UDSM, researchers develop projects and look for potential funders by themselves. Some of these proposals win funds while others may not. Moreover, UDSM has capacity building programmes in which it provides trainings in how to develop research proposals for winning funds. Research methodology courses are strengthened through reviews and updates in order to inculcate research culture among students and staff. University professors are promoted to higher academic ranks through research and publications in peer reviewed journals. Research in MUHAS is well integrated, but it has been reported that some fields do not have the equipment needed for advanced research. In ARU, there is a broad, widely shared feeling that Sida funding has been the fundamental driver in the transformation of the institution into a research-based university.

In summary, there are many indications of stronger integration of research in the three universities: formation of appropriate research structures, solicitation

of funds for research, researcher training as well research based promotion of academic staffs.

Efforts made to promote the application of research in society

UDSM is playing active roles in promoting the application of research in society. Firstly, it has established a new knowledge exchange office. Secondly, it carries out dissemination workshops, publishes articles, books, pamphlets etc. Thirdly, the Directorate of Knowledge Exchange promotes innovation for use in industry by encouraging incubation, marketing and cluster initiatives. Fourth, research findings are presented to government as a piece of advice to policymaking by researchers, and fifth, researchers also discuss their results directly with villagers and village level governments. At ARU, the university has a consultancy office available for private and public consulting.

Overall, efforts are underway to promote the use of research results in society. In addition, UDSM uses direct contact with villagers and village authorities. ARU is experienced with consultancy services, and very active in consultancy. As a medical university, MUHAS has clear and direct opportunities to apply the results of research and provide community services. Research findings from MUHAS have, for instance, been used to change policies and treatment guidelines for malaria, for national guidelines for prevention of mother-to-child transmission of HIV, and for national HIV vaccine strategic framework.

Career opportunities and incentives for researchers

Academic staff promotion in all the three universities depends on research and publications, although the practices vary in terms of number of publications required and publication channels accepted. In UDSM, student supervision, administrative rewards, participation in local and international conferences, memberships in professional associations are influenced by research. In ARU, there is not only a career track that is systematic and well documented in a manual, but also other career tracks involving government positions, private companies, and private consultancy are all influenced by research. In MUHAS, research is a prerequisite for career advancement, and there are strict guidelines with detailed scoring system for publications. Those are aimed at academic careers, as medical doctors in hospitals benefit little from Ph.D. or from research and publication activities.

Research is also an institutional concern at UDSM. In its strategic plan 2004-2013, UDSM states that the vision of the university is *"...to become a reputable world-class university that is responsive to national, regional and global development needs through engagement in dynamic knowledge creation and application"*. In order to realize this vision, the university has set its core mission as *"... the unrelenting pursuit of scholarly and strategic research, education, training and public service directed at attainment of equitable and sustainable socio-economic development of Tanzania and the rest of Africa"*. Based upon these visions and

missions, the university has developed a research policy and its operational procedures.

Improved capacity to formulate research proposals and submit funding applications

Experiences from UDSM and ARU Universities indicate that capacity building programmes in research proposal writing have influenced the writing and submission of applications. UDSM reports that one reason why it was able to retain its academic staff relates to the improved capacity of staff members to formulate high quality proposals and win projects. According to data from UDSM, consultancy projects grew from 45 in 2005/06 to 94 in 2011/12. More research grants are coming to the university and UDSM reported that consultancy revenues grew from 32.6MTZS in 2005/06 to 723.3MTZS in 2011/12. The volume of proposals increased significantly because of the capacity building programmes supported by Sida.

Similarly, ARU reports that those who have graduated from the Swedish-Tanzanian collaboration have increased the capacity for preparing funding applications. As a downside, it was indicated that the current bureaucratic structures and the amount of red tape around funding applications frustrate researchers and does not encourage participation in competitive research funding calls.

Gender policy

All universities have addressed gender issues on various levels. UDSM has a gender office and policy. The university follows affirmative action to prioritize women when the situation so demands. With reference to selection of female students, official documents indicate that the proportion of female students admitted remained stable and was on average 39% during the period from 2006 to 2011. Over the same period, however, the portion of female finalists at undergraduate level has been increasing from 36% in 2008/09 to a record-high of 42% in 2010/11. Data also indicate that the number of postgraduates has been increasing with the portion of female finalists fluctuating between 31% and 37% in the period under review.

Sida supported postgraduate programmes have contributed to narrowing the gap between female and male enrolments at UDSM although that gap is still wide. A total of 283 students were admitted to various programmes supported by Sida during the current agreement period under consideration. Of this, 78 (28%) were female students. During the same period a total of 43 students completed their studies. Out of the graduates, the total number of female students was 11 (26%).

MUHAS introduced a policy on sexual harassment in 2007. The university has a Gender Unit, which is headed by a senior academic. Affirmative action is in use

for student selection and occasionally used. Ph.D. students in this program had a large number of female students: One 5-member project was female-only. Motherhood, however, poses great challenges due to a lack of remedial measures. Childbirth and maternal ruins inflexible timetables and undermines opportunities to go abroad. For instance, reporting for many donor-funded Ph.D. programs is done by the end of the program, and in many programs maternity does not give an excuse for a degree missing in the statistics.

Also ARU has gender policy and targets at 50/50. Currently, the proportion of female students is 28%. The percentage of women is currently growing, but applicant base is still limited. There has been a special program to update science education for those who did not take science and mathematics in high school and it has been reported that many women students are doing very well in that programme.

In summary, all the three universities have gender policies. Furthermore, in all of them affirmative action is in use, but results are so far limited. Experience from one of the universities suggests that motherhood can be a challenge for post-graduate education.

4.2. RESEARCH MANAGEMENT

The following table provides a summary of the findings pertaining to research management. The findings are elaborated further in the text.

Research management	UDSM	ARU	MOHAS
Relevant policy/strategy documents that guide the development of research projects in place.	WD	DE	WD
Manuals describing the research management and its procedures in place.	DE	DE	DE
System for RBM in place established.	NA	NA	NA
Extent to which RBM is understood and used.	NA	NA	NA
Extent to which planning, monitoring and reporting requirements is well integrated.	DE	DE	DE
Roles/positions in the research management process documented in internal documents.	DE	DE	DE
Extent to which roles and positions in the research management process are known.	DE	DE	DE

Rating: NA – Missing, DE-Developing, WD-Well Developed

Research policy, operational procedures and management guidelines

There are concept notes and agendas for research at UDSM. The second edition of the research policy and its operational procedures was issued in 2008. This

document provides a wide variety of guidelines and strategies in the context of UDSM. Prior to the current document, the first edition of the research policy was issued in the early 1990s. The new research policy of UDSM is formulated within the context of the wider vision and mission of the university. UDSM aspires to become a world-class centre of excellence in research. Key strategies to implement the policy revolve around strengthening research management, sourcing funds and quality management. ARU University also has a large number of research related policies. One of the more recent is concerned with IPR (intellectual property rights). However, those documents are fragmented and not consolidated into a unified document. MUHAS also has a large number of policies for research (some of them are available on the website). The policies were introduced over the years, many of them with Sida support.

UDSM has developed manuals describing research management and its procedures. These documents are not yet completed as they are in the final stage towards approval. For instance, in 2013, the Directorate of Research developed a guideline for research centers of excellence, which was tabled at a senate meeting. Guidelines for research associates and guidelines for postdoctoral scholars have also been prepared under the 'research management' component. The two documents were tabled in the Senate Research and Knowledge Exchange Committee, which was held in October 2013. A concept note for 'UDSM Research Week' has also been prepared and was tabled in the 2nd Senate Research and Knowledge Exchange Committee. MUHAS has its own Research Policy Guidelines and Standard Operating Procedures. The preparation of this document was funded with Sida support. In ARU, there are no manuals describing research management and its procedures, but various protocols. There is a very elaborate and hierarchical system between different levels from department to school (faculty) committee to university senate, and in the system peer reviews and other reviews are done at multiple levels.

The multi-layered checks on research can be viewed from several perspectives within the system of university management including research management. From a top-down perspective, centralized management of research-related processes promises effective and efficient facilitation of research projects, proper information about the institution's current, finished, and planned projects, and a centralized "one-office principle" to avoid bouncing people from office to office. Those promises, however, hardly materialized in this program. In reality, and from a bottom-up perspective, complex bureaucracy and long delays often rendered the effect of research management to be the opposite of what it was intended to be. Instead of supporting and facilitating individual researchers' publishing activities, many staff members and doctoral students felt that complex, bureaucratic, and inefficient structures are restrictive and frustrating. Interviewees from all participating universities raised similar concerns portraying too much red tape obstructing research. Given that research results are made by single researchers and groups of researchers—and given that the role of re-

search management is a supporting role, not enabling role—it is imperative to design funding programs to best facilitate researchers' work and remove obstacles that hinder progress, such as red tape and delays.

Overall, the three universities have developed research policies mainly with Sida support. However, the degree to which these policies are consolidated into a unified document varies with UDSM having a more solid policy manual. Similarly, the development of manuals describing research management and its procedures is in progress in almost all the universities, but this is more fragmented than the policy documents.

Results based management

So far the following three review practices are considered as results based management mechanisms at UDSM: quarterly review reports, annual review reports and quality assurance reviews. Quarterly review reports are required from each academic unit to present its performance to the office of the Deputy Vice Chancellor for Academic Affairs. Annual review reports refer to practices of reporting performance on yearly basis while quality assurance reviews are appraisals carried out by the Office of Quality Assurance. The aim of UDSM is to use RBM as a general management tool, but full transition towards this system has not been achieved. For instance, a results framework with performance indicators has been developed to enhance measurability in Sida support, but it has not been used right from the beginning. The system, including Sida support, lacks clear performance indicators, baselines and targets against which progress can be measured.

The situation is not different in the other two universities. In MUHAS, for instance, RBM was argued to exist, but how it has been implemented in practice is uncertain. Log frames has been applied to older, existing projects, but RBM was started by SIDA in 2008/09. In Tanzania, training was conducted in 2011 and RBM was a post hoc adaptation. Thus, it is not certain if Sida has consistently and persistently required RBM from the start. At ARU, it was remarked that the university was not equipped with RBM from the start. Like in the other two universities, there is an internal system akin to RBM, but not explicitly any RBM system. In ARU, the programme coordinator is well familiar with RBM, but other staff not. It was never taught to the actual researchers.

In summary, RBM requires the conceptual recognition that achievement of results is at the center of carrying out activities. Such an approach has not gone deep down in the institutions. No training programs have been effectively conducted to build competence in how to use RBM. It is mostly done to adjust projects to external requirements.

Perceptions about research management

At UDSM, delays in funding and long bureaucratic procedures are problems in research management. Substantive problems mentioned by students include delays in proposal defence, supervision, lack of finance, theoretical nature of the curricula, lack of courses in some programmes, shortage of facilities and inadequacy in the provision of research methodology courses. With reference to proposal defence, students emphasized the fact that it takes a long time until proposals are defended. Regarding finance, students expressed concerns about its insufficiency both for stipends and research. Some students were also critical of the theoretical nature of the curricula and the lack of knowledge in practice. Students have the view that facilities including computers, Internet and laboratories are not adequately available.

In MUHAS, research management is very well assessed by students as well as researchers. Procurement remains a serious issue. Researchers and Ph.D. students in ARU found research management in many cases to be inefficient, restrictive and frustrating. At the proposal writing stage, multiple layers of internal evaluation take too long time. After winning project funding, the university's and government's financial management procedures and structures needlessly slow down the release of funds, and the inefficiency of those structures is exacerbated by multiple instalments in which finances are released for each project. There are often several months of delays in releasing funds for field research, which may put whole projects to a pause, while donor deadlines remain the same. One researcher complained that reporting of finances may be expected at a point of time when one is still waiting for funds to be released.

The doctoral students commended transparency of funding. Concerning ARU's projects, on the Tanzanian side, the programme was very transparent about the budgets and remaining funds for each of the students. Students could always check how much they have left and what they had used. Funding was also flexible. Funds can be moved between budget lines. Swedish universities manage small amounts of funds for students to be used when they are in Sweden. However, students complained about lack of transparency and reported that they were not well informed about how much they could spend on books, travels, equipment, materials, and other budgeted items.

Overall, research management is in transition. There are significant efforts to make research and researcher training a success in all institutions. However, these efforts have so far not overcome inherent bottlenecks such as delays in transfer of funds, long bureaucratic procedures, approval processes, lack of transparency on how to use funds and inadequacy of infrastructure.

Intellectual property ownership and balance of research and outreach

A good example concerning the management of intellectual property is found in UDSM. There is an intellectual management office created to advise the university on issues related to copy rights, patents, plagiarism etc. The first UDSM Intel-

lectual Property Policy was issued in 2008. UDSM owns intellectual property that is made or designed by its members. Ownership of externally sponsored research is governed by the terms of agreement as approved by UDSM. The researcher can also have the right to ownership in case UDSM opts not to pursue IP protection. Similarly, MUHAS has an IPR unit and intellectual property ownership policies, and a lawyer is planned for the IPR unit. In ARU, how intellectual property ownership is managed in practice is less clear as compared to other two institutions—and as ARU is engineering and design oriented institution, they should have especially clear, practical, and broadly known guidelines for IPR issues.

With reference to the balance between research and outreach, MUHAS reports that there is some consultancy, but not as much as in ARU. However, there is a consultancy bureau at MUHAS for each school as well as a consultancy policy. The University gets 15% of a consultancy contract, and it is mandatory to report it to the planning and finance committee. Consultancy at MUHAS is not yet a significant revenue stream, but rather an expert service for government and public institutions and in many cases only per diem is given. In UDSM, some units are research based and this means they give more time to research and consultancy. Others are teaching intensive and academic staffs are required to dedicate 75% of their time to teaching. Consultancy is an institutionalized system where using university time and property are charged from the consultant. A knowledge exchange office is newly created to promote the utilization and commercialization of research. ARU evaluates staff members annually, and the criteria for evaluation are students' opinions about their teaching, research merits and public service.

In conclusion, management of intellectual property is institutionalized in the formal organisation of the two universities. The universities also have units to commercialize research results. With reference to the balance between research and outreaches, the above findings show that all the three universities have policies demanding consultancies, community services as well as teaching. It is obvious that engagement in research and consultancy as well as other community services are as significant as teaching and training.

Usefulness and impact of Sida support for developing research management

At UDSM, Sida support has been instrumental in developing research management. Three benefits were mentioned: capacity building at advanced degree level, training in research proposal writing and dissemination of research results. With reference to capacity development at Ph.D. level, some in leadership positions at the university are trained with Sida support. Regarding proposal writing it was mentioned that highly trained professionals not only write competitive proposals, but also serve as trainers, reviewers, assessors etc.

In MUHAS, interviewees all agree that Sida support has enhanced the effectiveness of research management. It was learned that Sida was a catalyst in the birth of many policy documents that are used in the university today. Further, it was mentioned that the top administration (vice chancellor, both deputy vice chancellors) were trained with Sida funding. The group of interviewees argued that the top management got their Ph.D.s and if the management has Ph.D. degrees—and especially if they have been active in publication—they understand the university world much better. In ARU, Sida made a direct contribution to consolidate research management by assigning a consultant although the funding didn't have money explicitly for that position.

In summary, Sida's support has been useful and had positive impacts on research management in the three institutions. The usefulness and impact are primarily reflected in the creation of a critical mass providing creative leadership in each of the institutions, particularly in UDSM and MUHAS. It was also attempted to provide technical support directly to research management and this was well received at ARU.

Communication of results to stakeholders

UDSM reports that it has different mechanisms to reach stakeholders (including COSTECH) and ordinary citizens: Workshops, conferences and publications. For instance, the university has presented 198 conference papers, and published 323 articles in journals and 117 research reports in 2011/12. Several academic staff members (particularly in the social sciences) are advisors to government in policy making. The university proudly says that working with the government is one of the best ways to reach the public at large. Apart from this, it is within the research policy document of UDSM to reach citizens with research results in languages that they can understand. According to interviews with the Director of the Research and Publication Directorate, UDSM translates research results into Kiswahili before they are sent or disseminated to the people. Researchers are responsible to present and discuss their findings with villages and village governments as well.

ARU reports that there is no institutionalized procedure for disseminating research to the public and decision makers. COSTECH does not get all the information it needs, and the university website is not kept up to date. One problem, according to an interviewee has to do with attitudes. Faculty members show no interest to list their publications. Thus, lack of dissemination of research results is broadly acknowledged to be a weakness.

The web presence of the three universities is very different. While UDSM, being an old and large institution, has gathered a considerable web presence (Webometrics, 2014), much of its material is out-dated. For instance, at the time of writing this in 2014, the university's Facts & Figures page was six years old, from 2008. The website of UDSM's directorate of research and publication was

inaccessible throughout this study. MUHAS has invested considerably in the usability and clarity of their web pages, yet their content is also out-dated, such as the facts and figures page from 2011. ARU, being a relatively new institution, has not been able to capitalize on their youthfulness: the web pages contain broken links and out-dated information. The management is not well informed about the website being out-dated: One senior manager of ARU recommended reading the university web page for current numbers of publications, which leads one to believe that ARU has not had any publications since 2012, and only five that year, too. It should be discussed if it would be more beneficial to have a minimal website with very limited but up-to-date information than to have a large website that contains misinformation and out-dated information.

MUHAS has an organ for turning research papers into policy briefs. Conferences are used for disseminating results. A public relations officer is responsible for press releases. Due to the nature of the medical profession, research results reach the ordinary citizens through medical authorities, and from there they are disseminated to hospitals, wards, and professionals. Radio and TV play a role. There is, however, a line of nutritional products from the university, done in collaboration with the medical industry.

4.3. RESEARCH FUNDS

The government remains the main source of general funding for universities, but not for research. This situation is expected to continue because the contributions from internally generated funds are not adequate. In 2010/11, the total approved budget of UDSM was 65.7B TZS. The proportion of the total released budget out of this approved budget was 84%. This means there was a gap between the approved and released budgets. Donors have continued to support the university operations and fill this gap, largely in areas of training, research and capital development. The best data on financial performance in UDSM are found in Facts and Figures, a report published by the Directorate of Planning and Finance in July, 2012. This report does not explicitly indicate the proportion of funds allocated for research, but provides the amount of budget allocated for capital development and donors' total operating budget. Based upon this information it was possible to calculate the amount and proportion of donors' budget for research and (research) training as follows.

Budget for research and training from donors operating budget at UDSM, 2007/08-2010/11

Year	Donors capital budget (TZS)	Donor budget for Research and Training (TZS)	Donors total operating budget (TZS)	Proportion in percentage (%)	
				Capital	Research & training
2007/08	350,000,000	6,593,892,000	6,943,892,000	5.05	94.95
2008/09	1,850,000,000	12,038,000,000	13,888,000,000	13.33	86.67
2009/10	0	37,477,601,524	37,477,601,524	0	100
2010/11	8,941,199,862	25,862,205,262	34,803,405,124	25.70	74.30

Exchange rate 1USD= TZS1, 250

The above table indicates that donor budget to research and training from the total donor operating budget in UDSM ranges between 100% in 2009/10 and 74% in 2010/11. UDSM reports that the government approved budget, the funds released by government and the operating budget could vary or may not be equal from year to year. For instance, in 2010/11 the approved budget by government was 65.7 billion TZS whereas the released funds by government to UDSM was only 55.5 billion TZS (84%). Again, out of the released funds, the actual operating budget of the university was 47.7 billion TZS. From this, it is clear that operating budgets are the most actual budgets with which universities accomplish their functions and they can be much less than what has been approved and released. In 2010/11, the total amount of donor operating budget constituted 42% of the total operating budget (82.05 billion TZS) at UDSM. The donor to government ratio in operating budget was 74%. No data was provided with particular reference to allocations for research and training from the total operating budget, but it was possible to calculate the following from the available information.

Research and Training (R&T) Budget from the total operating budget at UDSM (TZS in Millions)

Year	Approved budget by Govern't	Released funds by Govern't	Govern't Operating budget	Donor Operating Budget	Total Operating Budget (government +donors)	% donor support to total operating budget	Donor Budget to R & T	% R & T donor budget to total operating budget
2007/08	34,098	34,098	34,098	6,943	41,042	16.91	6,593	16.06
2008/09	37,591	37,591	37,591	13,888	51,479	26.97	12,038	23.38
2009/10	48,911	48,911	48,911	37,477	86,388	43.38	37,477	43.38
2010/11	65,706	55,325	47,248	34,803	82,051	42.41	25,862	35.31

The above table shows that proportion of budget allocated by donors for research and training out of the total operating budget ranged between 16% in 2007/08 to 43% in 2009/10. In 2009/10 donors' support was totally devoted to research and training, but in other years it has also gone to capital development.

The government budget is allocated to universities in three forms: salary, infrastructure and other costs. Funds for research come from other costs (OC) budget line and it is the responsibility of each university to decide the amount. UDSM has a budget line for research, but the amount varies from year to year and is small. As indicated in the above tables, there is heavy dependence on external donors both for research and capital development. . In the following table the sources of external support are summarized at UDSM.

External Support to UDSM (TZS)

SOURCE	2007/08	2008/09	2009/10	2010/2011
Carnegie [USA]	1,364,966,000	1,049,000,000	1,625,000,000	0
Rockefeller	51,205,000	0	370,000,000	0
World Bank Support	0	5,274,000,000	25,648,407,500	23,024,621,724
NORAD	0	3,150,000,000	3,150,000,000	3,150,000,000
SIDA	4,950,045,000	3,650,000,000	2,169,592,244	3,950,000,000
NUFU	577,676,000	765,000,000	0	0
REDET	0	0	1,478,509,380	1,642,691,000
DANIDA-UDBS	0	0	3,036,092,400	3,036,092,400
TOTAL SUPPORT	6,943,892,000	13,888,000,000	37,477,601,524	34,803,405,124

The above table shows that UDSM is supported by various donors including Sida. In 2010/11, Sida provided 3,950MTZS to UDMS, and this was 11% of the total donor support and 4.8% of the total operating budget of the university. Similarly, Sida support to UDSM in 2008/09 amounted to 3650MTZS, which made 26% of the total donor support and 15% of the total operating cost for this particular year. During interviews, it was from these perspectives that the leaders of UDSM from top to bottom requested the continuation of Sida support.

ARU's experience is similar with UDSM. What makes it different is the amount of funds that the university has explicitly allocated to research from its OC budget. In 2013/14, ARU's budget for OC was 444M TZS. Of this total, about 8% (35.5M TZS) was arguably allocated for research. The following table summarizes ARU's total budget for 2012/13 and 2013/14.

Total budget for ARU 2013/2014(1USD\$=1,250TZS)

Category	2013/14 (TZS) 1\$=	2012/13 (TZS)
Government approved OC	444,435,700	444,435,700
Internally generated income	7,080,000,000	6,316,400,000
Sub total	7,524,435,700	6760835700
Development budget		
Government	2,000,000,000	100,000,000
Consultancy services (part of consultancy income earned)	450,000,000,000	450,000,000
Sub Total	2,450,000,000	550,000,000
Personal emoluments budget		
Personal emoluments (government)	12,313,903,080	9,566,237,000
Total	22,288,338,780	16,877,072,700
Development partners	2,306,683,450	7,456,763,656
Grand total	24,595,022,230	24,333,836,256

The above table shows that in 2013/14, the total budget allocated for ARU was 22.2B TZS. The budget allocated by development partners was 2.3B TZS in the same year. The proportion of donor funds was quite significant and it amounted to 9%. These funds were allocated to capacity building and research projects. Thus, the total budget for research and research training was 2,751,119,150TZS or 11.18% of the grand total. . ARU receives support from different partners and the table below shows the total amount received was 2.3 billion TZS for 2013/14.

Contributions of development partners to ARDHI's budget (2013/14 in TZS)

Description	Amount
ARU sida capacity building	238,000,000
STHEP project	1,336,222,400
Climate change adaptation and mitigating project	342,152,500
CLUVA – Climatic and Vulnerability in Africa Project	23,250,000
ARU – Norad Masters programme studies project	54,250,000
ARU – Periperi U project	188,808,505
Climatic change coastal Dar es salaam	124,000,000
Total Development partner funds (2013/14 budget)	2,306, 683,450

MUHAS is not different in its sources of funding. Up until June 2013, the university reported that it had 74 research projects funded by 41 international partners including Sida, and by September 2013, it had 75 ongoing research projects. The following is details of funds for the above research projects in 2013.

Contributions of development partners to MUHAS (June-Sept., 2013)

Year	Total Received (TZS)	Total over-head (TZS)	Total Re-ceived (US\$)	Total overhead (US\$)	End total re-ceived (TZS)	End Total overhead (TZS)
June, 2013	1, 58,360,723.76	78,397,436.84	1,871,728.74	138,646.57	3,916,490,509.77	246,686,999.97

The above table shows that MUHAS is dependent on donor support for research. Up to June 2013, the end total support it has received from development partners was 3.9B TZS. Compared to ARU in absolute terms, it has obviously received more funds for the academic year under consideration. The university is planning to diversify its income from various sources including land income, investments, services, and polyclinic and health insurance companies.

4.4. RESEARCH INFRASTRUCTURE

The following table provides a summary (ratings with a three word scale from low to high of our findings). The findings are elaborated further in the text.

Research infrastructure	UDSM	ARU	MUHAS
Relevant type of infrastructure has been built with Swedish funding (laboratories, ICT, library etc.)	HI	N/A	HI
Extent to which infrastructure is adequate	AV	LO	AV
Facilities available to all.	AV	AV	AV
Available when needed.	LO	LO	AV
Size of the potential user base for the constructed infrastructure	HI	HI	HI
Extent to which infrastructure is functioning and used.	HI	N/A	AV

Rating: LO-Low, AV Average, HI-high

Type and adequacy of infrastructure

MUHAS reports that Sida has contributed greatly to research infrastructure. Within this programme one of the major foci was e-journal access and library development. At UDSM, it was reported that some subprograms like UDBS, Library Support, Food Security, Rural and Urban Infrastructure Development and Marine Sciences have acquired major equipment and facilities. This includes journals, databases, computers, Internet (university library), laboratories, ICT infrastructure and automation of student record information system.

In ARU, it was reported that this programme did not fund infrastructure development, although some work was still done to increase e-services. In both MUHAS and UDSM, the infrastructure investment has been useful, but still relatively limited. From MUHAS, it was reported that some online journal databases carry

excessively high price tags. During focus group discussions at UDSM, students complained that they have shortages of laptop computers due to delays in procurement. There was also a strong demand from students that the university needs to make their education more practical with more and better laboratories, workshops and internships.

The university admits that some of these inadequacies do prevail. Laboratories, libraries and resources for postgraduate students are insufficient. Reports indicate that connectivity to the Internet is a serious problem in the library. Power outages also disrupt student work. The Directorate of Research expressed satisfaction with the automation of the student record automation system.

It was reported at ARU that infrastructure is lacking (Sida's funding did not extend to infrastructure at ARU). Library is not up to date, computer facilities are lacking, bandwidth is inadequate, and most e-journal databases are not accessible. It was noted that doctoral students had a number of complaints about the dedication and competence of library staff members. Overall, these findings suggest that Sida support is highly recognized in its contributions to research infrastructure development, but a lot remains to be done.

Use and users of research facilities

In MUHAS, the whole university student and staff body are potential users of research facilities although there is not enough capacity to offer services to a large number of users simultaneously. To compensate for that issue, the university gives laptop owning students access to the university wireless network and e-databases are accessible also through people's own laptops when within the wireless network. A virtual private network is planned for remote access to databases from outside the campus. The ICT systems have flaws similar to those in many other Tanzanian universities, Internet is not stable, ICT support is not readily available, local network does not always work, and ICT department does not have a stock of spares, so when something breaks, it leads to a long and tedious procurement process. The library organizes frequent courses for using the available infrastructure and researchers reported frequent and extensive use.

Like in MUHAS, there is a large body of postgraduate students and academic staff using research facilities at UDSM. The number of postgraduate students (Masters and Ph.D.) alone is about 3,000 and all these are potential users. Because of this, there is a huge pressure on the availability of facilities. It should be noted that there are also examples of well functioning facilities. For instance, the infrastructure development at Pangani and Kunduchi centres in Marine Science reported that four circular fish ponds each with a diameter of 3.5 m have been constructed at Pangani Fishermen centre to facilitate fish grow-out. Another success story in the use of facilities comes from the university library. With Sida funds, the library reported that it has subscribed forty five (45) electronic journal databases for 2013 to be used by all universities as members of COTUL, successfully

negotiated for use of e-resources for 98 institutions in collaboration with INASP, selected and customized the Open Journal Systems (OJS) for the Tanzania Journals Online Database and digitized 13 journals. In summary, research facilities serve all the university communities of these institutions and this has put them under heavy pressures of use.

Effects and results of the investments in facilities

At MUHAS, a visit to the library, examination of the web services, examination of infrastructure, and interviews revealed significant and clear progress. Particular commendation should be given to the restructuring and reorganizing of the library services. The library staff has adopted a service attitude that has direct and clear ramifications on user satisfaction. All interviewed long-term users of the library reported substantial improvement over the past 5–6 years. The library project team is highly educated, highly motivated, and clearly proud of their achievements. The changes can partly be attributed to a good combination of management support, right people at the right place at the same time, service attitude, and visibility in the university. Similarly, the library support program is a success story in UDSM. The access it has created for students to a variety sources enhances the likelihood of student graduation on time.

4.5. CONCLUDING REMARKS

During this period of cooperation, there have been significant changes and improvements in institutional capacity. The strengthening of institutional capacities for planning, approval and monitoring of research with various levels of formalization and participation was witnessed. Universities have promoted use of research results in society. Research was transformed into a major tool for career opportunities. Female participation in postgraduate education has improved. Intellectual property ownership in the formal organization of benefitting universities was institutionalized. Universities have shown a great stride towards balancing research, outreach and teaching. Sida support has contributed to create a cadre of technically competent researchers who can write not only award winning proposals, but also influence policy making and assume key positions in both the academia and central government.

There were also challenges. Student selection and admission to local programs were not always competitive and transparent. Such local training programs follow national guidelines and Sida does not decide the selection and admission procedures in the programs. All students who are selected to join the programs do not enrol because of the low stipends. Female participation is challenged by difficulties in combining motherhood and doctoral studies. The capacity of universities for tracking the total number of applications submitted for grants is weak. The practice of awarding funds on the basis of merit and without red tape has not been fully achieved. RBM has not taken roots in the institutions because of lack of competence and preparedness to use it from the start. Research man-

agement is hampered by such bottlenecks as delays in transfer of funds, long bureaucratic procedures, lack of transparency on how to use funds and inadequacy of infrastructure. The integration of planning, monitoring and reporting requirements into the internal structures of universities are very slow. Roles and positions in the research management process are partially documented and, not known to everyone in the universities. Funding of research continued to depend on donor support. Full utilization of financial resources was not achieved. Research infrastructure has also been strengthened, but it is still over used and in short supply.

4.6. COSTECH

Sida and COSTECH signed an agreement to operate a project “Enhancing Management of Science, Technology and Innovation to Foster Contribution to Poverty Reduction and Sustainable Development in Tanzania”. In the agreement, the project is expected to strengthen COSTECH’s capacity and capability to coordinate the promotion, generation, management, and commercialization of research in Tanzania. The agreement was originally from July 2009 to June 2013, but was extended to June 2014

Sida committed originally 17M SEK to the programme. Sida and COSTECH amended in 2010 the agreement to provide additional 6M SEK to accommodate the “Development of Innovation Systems and Innovative Clusters in Tanzania” so the total budget amounts to 23M SEK. The following table provides an overview of incomes and expenditures. COSTECH has only received and spent 50% of its original budget half a year before the programme ends, but it has also spent more than what it has received (110%).

COSTECH’s total budget is nearly 20B TZS. The national target is that 1% of GDP should be used for research. Several figures are used for capturing national research expenditure hovering around 0.2 to 0.3% of total GDP - far from the political target. There is also an ongoing discussion on what to define as “research expenditure”. Should only funds through COSTECH be accounted for or also direct support to ministries and R&D institutions? The question is not yet resolved.

Received from Sida (in SEK)	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	Sub total
Capacity development	1792813					
Cluster		3212502				
Cap dev			3609988			
Cluster			2500000			
Sub total	1792813	3212502	6109988			11115303
Expenditure						
Capacity development		2398153	2181709	2951733	2146871	9678466
Cluster		562380	215002	1273068	590142	2640592
Sub total						12319058

The specific objectives for the Swedish supported project are:

- To enhance capacity for evidence-informed decisions among policy makers and other stakeholders.
- To increase knowledge generation and innovation that address national priorities in research.
- To establish a robust information management system and documentation.
- To raise awareness on science, technology and innovations.
- To meet the expectations of internal and external stakeholders on corporate service.
- To promote the development of innovation and cluster based competitiveness for poverty reduction, wealth creation and sustainable development.

NFAST

COSTECH administers a National Fund for the Advancement of Science and Technology (NFAST) that was launched in 1995. The fund was established for the purpose of providing research grants to national priority areas considered of social economic benefit to Tanzanian society and training of local scientists. The NFAST income grew from 63.4 million TZS at its inception in 1995 to around 12 billion in the last two years, but the amounts received have fluctuated significantly. There has also been a considerable gap between the proposed budget and what was actually received and between what was received and allocated to specific research projects.

Table: NFAST income since its inception

Year	Amount Re- quested (Tshs)	Amount Received (Tshs)	Amount disbursed
1995/96	-	63,400,000	
1996/97	300,000,000	30,000,000	
1997/98	500,000,000	24,000,000	
1998/99	600,000,000	48,000,000	
1999/00	600,000,000	10,500,000	
2000/01	600,000,000	150,181,404	
2001/02	600,000,000	150,000,000	
2002/03	600,000,000	281,266,900	
2003/04	600,000,000	300,000,000	
2004/05	600,000,000	300,000,000	
2005/06	600,000,000	499,999,000	
2006/07	1,000,000,000	368,225,160	
2007/08	1,000,000,000	394,688,820	
2008/09	30,348,896,000		
2009/10	900,000,000	831,718,333	395,878,207
2010/11	30,000,000,000	3,400,132,731	3,547,409,684
2011/12	27,768,769,000	12,682,734,864	12,585,930,549
2012/13	21,479,961,000	12,729,699,664	6,590,865,598
2013/14	16,000,000,000	1,781,686,534	1,781,686,534

According to COSTECH, a total number of 386 people have been supported for their masters degree (231) and PhDs (155) during 2010 to 2013. A total of 115 applicants were chosen for scholarships for 2013/14 period (41 PhDs and 74 MSc degrees).

Achievements

There are a number of achievements that can be attributed to COSTECH's activities over the years including research projects, organisation of scientific meetings, courses, giving awards to innovators and inventors, support to national professional associations and networks, support to scientific activities in schools; contribution to national, regional, and international science bodies and publications. The annual reports provide a summary of activities and mostly results in the form of outputs.

COSTECH has been going through an organisational transformation from 2010. The director and several staff members are new. Staff count has nearly doubled from 50 in 2009 to 90 in 2014. The organisation has become more visible, attracted younger well-qualified staff and started to become more efficient and effective. Based on information from interviews, COSTECH suffers still from a weak reputation as an ineffective and political body, variable and unpredictable funding and a structural ambiguity - being an intermediary with a formal coor-

dination role between a political ministry and all the universities/R&D institutions, but without many opportunities to coordinate and sanction highly autonomous institutions with no desire to being coordinated.

- **Evidence based policy making**

COSTECH has prepared a number of policy briefs on, for instance, the use of fertilisers in promotion of organic farming and climate change in Zanzibar. The papers and selection of topics appear relevant to the development agenda in Tanzania. It is less clear why those topics were selected and how the papers have been used to inform and stimulate a policy discussion in the country. COSTECH has also supported scientists in knowledge translation and how to advance the uptake and use of research in policy- and decision-making. COSTECH facilitated for instance the development of Zanzibar's research agenda.

- **Increased generation of knowledge and technologies addressing national priorities**

COSTECH has been involved in finalising the national research agenda in Tanzania and has hired a NFAST manager for the national research fund.

Support has been provided to a broad range of training courses:

- On how to write fundable research proposals
- Outcome mapping
- Monitoring and evaluation
- Risk analysis
- Use of the research web

Most of the courses have been for COSTECH staff. The courses were found to be of high quality and relevant. However, the mode of training was traditional in the sense that the courses lasted for 3-5 days – bringing the participants out from their regular working environment and sending them back with the expectations that new knowledge would be practiced and systems eventually changed. It is difficult to determine to what extent the training has improved for instance the existing M&E systems and research proposals. The training seems too individually oriented. The internal capacity development could have been more clearly linked to organisational needs and to the solution of specific tasks, e.g. the preparation of a new database, a reporting system or research programme. Most of the trainees were also new and younger staff. If internal staff training should contribute successfully to organisational strengthening, senior staff and managers should also be involved.

We were informed that the research web is functioning and that researchers can submit their applications on line. There is a database linked to the web page for COSTECH with an overview of universities, research institutions, research projects and reports/publications. However, the numbers of projects and publications in the database are small – mostly research and reports linked to NFAST funding. In other words, the database fails its purpose of providing a compre-

hensive and complete national overview of research projects, reports and funding of research in Tanzania.

- **Enhanced quality of research in R&D institutions**

COSTECH has been involved in promotion of renewable energy technologies and knowledge and building links between academic and vocational training institutions. Human resources and infrastructure gaps have been identified in the oil and gas sector. Strategic partnerships between COSTECH and private sector are established.

- **Increased access of information and use of knowledge and technologies**

Media/journalists have been engaged to promote science, technology and innovation. An internal science editor has helped journalists to popularise technical research papers. A documentary was prepared on emerging technologies on the biotechnology to develop vaccines for cassava diseases.

- **Improved corporate services**

Staff have been trained in quality assurance, risk and performance management and more specific technical issues such as oil and gas, bioinformatics, records management and environmental management and planning. Most of the training has been organised in-house using external consultants/resource persons. The more specialised courses have happened in other countries such as US, Nepal, Kenya, and UK.

Three M.A. students and one Ph.D. student were enrolled in more long-term training. The Masters students have finished their studies and returned to COSTECH, while the Ph.D. student has not yet graduated. To use M.A./Ph.D. studies as instrument in strengthening the capacity of COSTECH is a questionable strategy. First, it takes too long time to see the results. There is also a high risk that staff may not return. Secondly, it should be asked whether the role of COSTECH is to provide their staff advanced M.A. and Ph.D. training. Staff should have such formal qualifications when they are recruited and only be offered tailored short-term training - not formal degrees. Such training should either take place at the universities or through NFAST.

4.7. DEVELOPMENT OF INNOVATION SYSTEMS AND CLUSTER PROGRAMME

The Innovation Systems and Cluster Programme in/for Eastern Africa (ISCP-EA) was a university led regional programme starting in 2004 and implemented collaboratively in Mozambique, Tanzania and Uganda. It was coordinated and spearheaded in each of the three countries by Faculties of Engineering/Technology. The main objective was to stimulate, catalyze and promote the development of innovation systems and innovative clusters in Eastern Africa,

and thereby facilitate socio-economic development and poverty reduction. The programme was meant to enable the universities reaching out and have an impact on societal development instead of remaining as “ivory towers”.

The Innovation Systems and Cluster Programme in Tanzania is part of the regional programme. Since its inception, the programme has launched a large number of cluster initiatives in various sectors of the economy including agriculture, food processing, manufacturing, service sector and ICT. Researchers are drawn from the three colleges of the University of Dar es Salaam as well as from Sokoine University of Agriculture, University of Dodoma and the Dar es Salaam Institute of Technology.

COSTECH has been an active participant through membership of the National Steering Committee. The recent restructuring of COSTECH with the subsequent establishment of the Directorate of Innovation, Entrepreneurship and Competitiveness (DIEC) has placed it in a position to coordinate the programme.

COSTECH reports that there are currently 54 cluster initiatives under its support. These clusters are engaged in different types of activities including agriculture, metal works, woodcarving, heritage tourism, mushrooming, small scale fruit and vegetable food processing, seeds, sisal, sea weeds, building construction, educational services, textile handicraft etc. The clusters are supported by national steering committees and an internal team of four experts. Currently, academia drawn from three colleges at UDSM, Sokoine University of Agriculture, University of Dodoma and Dar es Salaam Institute of Technology are participating in cluster initiatives.

Justification of the initiative

Science, technology and innovation (STI) is seen as forming the basis for sustainable economic growth and prosperity in a society through increased productivity and competitiveness, and creation of employment opportunities. STI capacity, embodied in knowledge and well-trained human resources, can help transform economies; enhance productivity and make social sectors more productive and effective. However, the scientific and technological capacity needed for Tanzania to reach its full economic potential is still weak. Continued economic progress will require more and better use of knowledge and more and better qualified human resources for STI development.

Innovation and cluster based competitiveness initiatives are in wide practice throughout the world and have in the past decade proved very successful to sustainable economic growth and development. The importance of promoting knowledge/research based innovation and higher value addition in production is nowhere in the world more critical than in Africa. If African businesses (firms or farms) do not move up the value chain and benefit more from globalization through the creation of new jobs and higher incomes, long term sustainable socio-economic development will be very difficult to attain.

Developments in the global knowledge economy is largely driven by incremental innovation. Supporters of innovation systems acknowledge innovation as an interactive process between universities, public authorities and the business community, that is, the practice of “triple helix”. The triple helix is described as “three institutional spheres (university, industry and government) formerly operated at arms” length, but now increasingly working together with a spiral pattern of linkages emerging at various stages of the innovation process.

The objectives of the programme are to use the expertise and knowledge of university staff:

- To stimulate, catalyze and promote innovativeness among small scale firms and rural farms and within university staff;
- To stimulate, catalyze and promote enhanced competition and cooperation among small-scale firms and rural farms within clusters and sectors.
- To stimulate, catalyze and promote quality and productivity consciousness and pursuit among individuals, firms and farms;
- To stimulate, catalyze and promote the development of a competitive mind-set amongst businesses and small-scale firms producing similar products or services in Eastern Africa generally.

Collaboration with the Scandinavian Institute for Competitiveness and Development

The Swedish cooperating partner is the Scandinavian Institute for Competitiveness and Development (SICD) located at Blekinge Institute of Technology. SICD aims to respond to a demand for a collaboration structure that more sustainably and coherently can support and facilitate collaboration and learning among the Scandinavian triple helix stakeholders, development partners and proponents of innovation and cluster- based competitiveness initiatives in Africa.

Achievements

According to internal reports, there are achievements at several levels:

- Awareness has been created at local and central government levels on the importance and successes of promoting cluster development.
- Cluster facilitators have been trained in collaboration with Tanzania Private Sector Foundation.
- Seed funds for new cluster initiatives have been disbursed.
- Networks have been established nationally and internationally (Nigeria, Mozambique, Denmark).
- A management information system has been prepared for monitoring and evaluation.
- Members of clusters understand better the dynamics of markets, business management, law and environmental protection.
- Clusters have laid the foundation for creation of industrial zones. For instance, in the Mwenge Woodcarving Cluster area, there are several individual producers who collaborate and compete to produce and sale wood made products.

Looking at achievements in particular clusters (Annual Reports), the following are examples⁶:

In the Morogoro Metal Works Cluster:

- Production in member firms increased by 5% over three years while in member artisan (tinsmithery) groups, it increased by 30%.
- Turnover in firms has increased by about 30% while in some groups it has increased by 240%.
- Trust among Cluster members has grown demonstrated by joint procurement of raw materials.
- The cluster is accepted in the Morogoro region as an example of fast track economic growth.
- Land has been secured from the government to be used for cluster members production facilities.
- Export market has been secured.

In the Zanzibar Seaweed Cluster:

- Production of seaweed has increased by 150% over the past three years.
- Production has increased because of better farming techniques.
- Production of seaweed soap has started as part of value addition.
- Turnover from spice soap production has increased by 72% over the past three years.
- Quality of seaweed has improved through use of better species and better drying techniques.

In the Bagamoyo Cultural Heritage and Tourism Cluster:

- 25 tour guides trained at the University of Dar es Salaam.
- Tourism Cluster awareness campaign video and DVD produced.
- Income for cluster member has grown by about 5 % over three years.
- Close cooperation with the Bagamoyo College of Arts and the Bagamoyo municipal council has been established and maintained.

Almost all initiatives have benefited from research institute/university collaboration, however a report mentions that:

- 2/3 of the facilitators view lack of appropriate technology as a major constraint.
- 3/4 of the clusters are struggling to add further value to their products.

⁶ We have not been able to verify such achievements.

- The firms in 3/4 of the clusters have difficulty accessing funds from financial institutions.
- 60% of the facilitators report poor workforce skills.
- Around 2/3 of the initiatives have not yet been successful in securing funding beyond Sida.
- Transport costs and lack of market development are major inhibitors to growth.

The results reported are impressive, but mostly based on internal reporting. There has been no systematic evaluation and collection of empirical evidence from all or a sample of clusters. We have not even come across an in depth case study explaining the evolution and successes of a particular cluster. The clusters are explained and described in a complex academic language. If Sida support to the cluster initiative should continue, a systematic evaluation is required⁷.

We were only able to visit a small sample of clusters and have two observations: First, the level of innovation was low. It was basically support to craftsmen producing traditional artifacts for the national, but mostly international market. If such a cluster should expand economically, a radically different approach to innovation in design, production and distribution will be required. Secondly, it is difficult to understand why and how university staff are the best-qualified experts to support such local craftsmen. Their needs are basic when it comes to technical, managerial and financial skills. Researchers may have a role, but more hands-on consultants could possibly provide more practical help.

⁷ The Sida evaluation (Rath 2012) of Innovation Clusters does not provide sufficient information on the achievements in Tanzania and consists mainly of theoretical reflections.

5 Findings and Conclusions

The previous chapters have explained and analysed the individual components of the research cooperation programme. This chapter goes through the main evaluation criteria and seeks to summarise findings and conclusions for each of them. All major questions in the Terms of Reference have been addressed in the evaluation, but not always adequately assessed due to gaps and limitations in available data and information.

5.1 RELEVANCE

The question about relevance has many facets. The easiest to assess is the compliance with Sida and Tanzanian Government policies and priorities. The research cooperation programme is clearly in line with the Swedish research support policy: Partner countries should be able to better plan, produce and use research in the fight against poverty (Policy for research in Swedish development cooperation 2010-2014). The programme supports also Tanzanian overall development plans and the most recent research policy emphasising the increasing role of research in the socio-economic development of the country (The National Research and Development Policy 2010). The same is true looking at the individual institutions benefiting from Swedish support. With such support, they are able to train researchers – increase the research capacity within each institution and the country, carry out research with short-and long-term effects and contribute to dissemination and utilisation of research. Budgets for researcher training and research are growing slowly, but are still small. Universities still depend almost entirely on external support for research.

The more difficult and lingering question is to what extent Swedish support remains strategically relevant to further growth and development of research in Tanzania? Are the existing activities and outputs consistent with the intended long-term impacts and effects? Would another strategy and approach create higher volume and quality of research? The support has followed the same pattern for a long period of time. Today the Swedish support is to some extent taken for given, filling gaps in existing research budgets, and the support may have lost some of its catalytic and transformative effects. The research environment in Tanzania has also changed as a large number of new players, national and international, have changed the face of university education in Tanzania. The broadly funded Nelson Mandela African Institute of Science and Technology is aggressively hiring staff for graduate and postgraduate education and research, and the

government's earlier show of force in higher education from 2007, University of Dodoma, did the same for undergraduate education.

Most of Swedish support is provided to researcher training – based on the logical assumption that a critical mass of well qualified researchers are required for conducting high quality research, training researchers, competing internationally for research funding, and publishing their results in international, peer-reviewed journals. Research projects are also supported, but mainly as part of Ph.D. training. Funds provided for postdoctoral research is marginal. Research as part of Ph.D. training is and can be of high quality, but it is still a part of training junior researchers. With a focus on quality, innovation and relevance, more funds should be channelled to researchers who already have finished their researcher training and are ready for leading research projects in collaboration in their already established Swedish partnerships. Time may have come for Sida to move from training of researchers to expanding and strengthening research capacity.

The study has found that all universities can and do train researchers (Ph.D.s) without support from Sida, but not at the same level and in all thematic areas as they are now. In doctoral training, quantity should not override quality, which emphasizes the role of Swedish partnerships. In other words, Sida can still support training and quality assurance, but shift the balance towards research. In doctoral training, quantity should not override quality, which emphasizes the role of Swedish partnerships. It is also possible that by increasing opportunities for more senior researchers to do research, incentives are created for individuals to finish their Ph.D. training on time and for the institutions to provide the necessary support. The main incentive in the current programme is to graduate successfully and be prepared for employment either at the universities or in the government – researcher career is a rarer goal. With increased opportunities for research, incentives are linked to opportunities for a more long-term career as a researcher in large programmes.

5.2 EFFICIENCY

Efficiency measures outputs - qualitative and quantitative - in relation to the inputs. Its measurement aims at establishing that the least costly resources are used in order to achieve the desired results. The questions are to what extent activities in this programme were cost-efficient, achieved on time and implemented in the most efficient way compared to other alternatives.

Assessments of efficiency are complicated by the fact that anticipated results and effects were not quantified in detail in advance in a consolidated programme document. The original programme had, for instance, only some numerical targets for training of MAs and Ph.D.s. The overall results matrix is incomplete. As the total number of people expected to be trained was not indicated, it is difficult

to judge if the current achievements are high, medium or low. Sida has not used the results matrix for systematically monitoring progress and achievements. Indicators for measuring changes in institutional capacity are also missing.

Looking at the actual outputs of the programme at the end of 2013, efficiency is low compared to what was planned. On a more positive note, the total number of graduate students enrolled was 202, of whom only 40 have graduated (20%). 159 Ph.D.s were enrolled, but so far only 25 have graduated (16%). Its contribution to building national research capacity is still small.

Institutions	Enrolled		Graduated	
	Masters	Ph.D.s	Masters	Ph.D.s
UDSM	182	120	40	16
MUHAS	11	32	4	9
ARU	6	6	4	0
COSTECH	3	1	3	0
Total	202	159	51	25

On the other hand, there are legitimate reasons for the delays – some beyond the control of the partners. The universities cannot be blamed for the time it takes to channel funds from the Swedish Embassy through the Ministry of Finance to each university. However, there are also delays in internal transfer of funds within each institution. The realism in the planning and preparation of the programme was also insufficient. Ph.D. students were, in several plans, expected to finish in three years while four or five years is a normal target time. There were also delays in recruiting students, so a large majority did not start their studies before 2010 and 2011 and would not be able to complete successfully before the end of 2014 or 2015. In other words, a large majority of students enrolled will most likely graduate, but later than expected.

As explained in chapter 2.1., most of the institutions have only received between 50 to 60% of their original budget and level of expenditure is low. Previous evaluations of Sida's research programmes emphasise that building research capacity is a complicated, long-term process that requires participation, patience and resources. The path to this goal can be very long and winding, but the shift to a more institutional approach has contributed to higher levels of efficiency of implementation. Such observation is correct, but the latter conclusion is difficult to verify.

Improved management and new administrative structures have most likely enhanced efficiency. In addition, Sweden has made efforts to move more of the responsibility for management of financial resources to the cooperating institutions with the risk of delays and that allocated resources become even more underutilised.

Certain efficiency problems have been identified concerning the use of the Swedish academic resource base for capacity development, including difficulties finding relevant partners in Sweden who also have the time and other resources for cooperation. The most commonly used model – the sandwich model – with its many varieties has the advantage of several doctoral students carrying out research in a subject of local relevance, but also the disadvantage in that it often requires considerable training inputs during their period in the home country, which prolongs their period of study.

There are no donor coordination mechanisms in place for external support to researcher training and research in the four institutions – neither among the donors nor initiated by the universities themselves. This was not raised as an issue or perceived problem by any of the institutions – even if there could be considerable gains in more joint meetings, reviews and evaluations, planning and reporting processes.

The cost of sandwich training in this programme, too, can be calculated in various ways. Although such calculation is highly speculative, looking purely at funding spent and number of students enrolled, the price tags in this sandwich program generally fall between 0.5 and 1.5 million SEK per Ph.D. graduate, given that all enrolled students will graduate.

But doctoral programmes can hardly be evaluated by their quantitative cost-efficiency alone: Quality concerns are important for students, too. There was a unanimous consensus of the benefits, worth, and value of the sandwich program compared to 100% Swedish and 100% Tanzanian programs. Students got exposure to different academic environments, they got a “feel” of a different way of working and organizing things independently, as well as influences from different styles of teaching and learning. Students got access to top-class laboratories, e-resources, and experts in an international community. Students got to work with projects with clear relevance for their future work. Students got uninterrupted time without things like work duties, social and family activities, or consultancy work. Students became connected with a network of international students who were in a same situation as they were, all becoming experts in similar fields—and through social media networks, those connections last.

5.3 EFFECTIVENESS

Effectiveness is a measure of the extent to which the programme attains its objectives. The overall objective is to strengthen the national research capacity and improve the quality of research conducted in Tanzania in areas of national relevance to contribute to poverty reduction and the country’s sustainable development.

Effectiveness can be measured against verifiable indicators specified at the be-

ginning of the programme. However, there is not a set of core performance indicators and benchmarks for the programme and only some of the sub programmes have targets for research outputs, such as numbers of masters degrees, Ph.D.s, and publications. Hence, it is difficult to measure to which extent the overall programme objectives have been achieved, yet it can and has been done for individual programmes⁸.

The four institutions' annual reports provide a lot of detailed data and information, but are too long (the UDSM 2012/13 report is 205 pages) and mostly descriptive. It is also a problem that aggregate figures are not presented or they are difficult to find—e.g., achievements for the entire programme period and not only last year—and some achievements are repeated for several years. Hence, it is difficult to monitor and assess to what extent the programme moves in the right direction – if the results are better or worse than planned - and if corrective actions are required. Such a large programme would have benefited from a more robust monitoring and evaluation system.

However, based on document review and interviews major findings about effectiveness are:

- **Training outputs**

The current programme was aimed at strengthening Tanzania's national research capacity, and at improving "the quality of research conducted in Tanzania in areas of national relevance to contribute to poverty reduction and the country's sustainable development". The primary vehicle for strengthening research capacity was support to researcher training, both on graduate (M.Sc. / M.A.) and on postgraduate (Ph.D.) levels. Sida's assessment memorandum (2009-08-26) noted that the initial proposal of universities was to train 174 Ph.D. holders, but as universities were requested to cut their budgets, the goal was reduced, yet the final target number is not found in the available documents.

Already by January 2014, UDSM had been able to get 14% of their 113 enrolled Ph.D. students to complete. The completion rate for MUHAS is similar—28% completed, but with nearly no dropouts reported. Of ARU's six started students, none had completed, but as everyone had finished their Ph.Lic. theses in 2011–2012, all were at least halfway their studies already at that point. The target time for most Ph.D. programmes is four years, but some of the Swedish interviewees

⁸ There are some indicators suggested in the results framework, but it is not a complete list for all programme components, baseline data are missing or questionable and it has not been used for monitoring and reporting.

reported that in Sweden target time is often exceeded. Hence, as in many programmes doctoral students started around 2011, it would be reasonable to expect a large number of graduates in 2015–2016, but that is difficult to establish at this point.

Master's level training programs were another important capacity building component, especially in UDSM. In some subcomponent fields, the available pool of capable master's degree holders was not large enough to initiate postgraduate training. Roughly 20% of the enrolled Master's students in the program completed their studies before January 2014.

- **Scientific results and publications**

Overall, the contribution of Swedish funding to scientific results is considerable. A sizable number of scientific journal articles have resulted from the program. A large number of small research projects have been undertaken, and those have created starting points for further research or publishable research results on their own. The programme has contributed greatly to internationalization of the partner institutions' publication profiles.

Both ARU and MUHAS provided sufficiently organized data about their publishing activity within this program. In their publication counts, universities included peer reviewed journal articles and book chapters where at least one of the authors was a recipient of Sida funding at the time of the article publication. In many fields—such as medicine and some natural sciences—publication numbers were greatly boosted by the multiple-paper Ph.D. thesis format, in which the thesis is a collection of journal articles with a short introductory chapter. In contrast to that, there were fields, notably in ARU, where the primary format of Ph.D. thesis was a monograph—a previously unpublished, stand-alone, book-sized piece of work.

In terms of peer-reviewed publications, the research output of MUHAS was good, albeit unevenly distributed across the subprograms. More than half of MUHAS's 71 publications were produced by one of the smaller subprograms, the malaria sub programme. With only a quarter of MUHAS's budget, ARU's research output of 21 articles was also good even if one does not take into account the less publication-oriented ethos of engineering fields in general. Without multiple-paper theses creating a steady flow of articles from Ph.D. thesis projects, and for a traditional design and engineering school in transition to a research institution, ARU's output is promising, yet not outstanding.

- **Conferences and presentations**

Although conference attendance was active, it was somewhat limited by available funds, while surely not by the available potential. ARU and MUHAS had most reliable data on conference participation through the current program: 21 presentations and 16 presentations, respectively. In order to get permission and

funding to attend a conference, the universities typically required a paper to be presented. The status and value of conferences varies greatly between disciplines, with many engineering fields emphasizing them due to the fast turnover time from submission to publication of proceedings.

5.4 SUSTAINABILITY

Sustainability is concerned with measuring whether the benefits of the programme are likely to continue after external funding has finished. Sustainability can be analysed from four perspectives – academic, institutional, organisational and financial.

The appropriation document from the Swedish Embassy (2009), emphasised that “support will be continued only if the Government through relevant ministries is willing to engage in a dialogue on the role of research and knowledge for Tanzanian development” and “another condition is that the UDSM demonstrates how it is contributing with its own available resources to facilitate the implementation of all components in the research cooperation with Sida”.

The evaluation has found that the academic, institutional and organisational sustainability has been strengthened. There is little doubt that the research capacity in the four institutions would not have taken place to the extent achieved to date without Sida support.

The cooperation has resulted in a higher number of qualified academics and a more supportive research environment. The academic standing of the universities has also been affected positively. Research has increasingly been integrated into national and institutional structures and processes. A research environment and culture are forming in each of the institutions.

Despite significant improvements, funding remains the most critical issue for all the universities. Donor financing does not form a good basis for the maintenance of the quality of research capacity in the long term. Sida and other external donors have been and still are the primary source of funding for researcher training and research. The attempts to supplement donor and government funding with locally raised funds (for example by increasing tuition fees and by regulating and charging a fee on consultancies) have had limited success. Both research and core costs such as salaries are inadequately funded. COSTECH and NFAST have benefitted from increased government support and have increased level of research over the last few years, but the three universities do not receive additional or earmarked funds for research from the government. The individual universities have established separate budget lines for support using internal resources, but they are still small and insignificant.

Successful effects of research cooperation – functioning research capacity – has been described as a gradual development process in three phases. The first phase, which consists of extensive support to academic researcher training and for purchase of certain equipment, generally results in the production of academic theses only. The second phase, in which support to researcher training decreases, but inputs concerning equipment and project financing increase, networking and production become more extensive. In the third phase, the projects are able to prove their strength in the form of independent production. At this point, with their documented productivity, they have also become competitive applicants for research grants and have begun to attract funding sources other than Sida. Sida is then able to begin to cut back on support. We believe that these Tanzanian institutions are still between phase one and two even if there are examples of the third phase characteristics.

In the most recent research and development policy paper (2010), it is suggested that a national research fund should be created and “not less than 1% of the GDP” allocated to such a fund. The fund is meant to replace the existing NFAST and the government will try to attract development partners and private sector to contribute. *“The allocated funds will mainly be used for human resource development, national research programmes and commercialisation of viable research results”.*

5.5 WIDER IMPACT

Wider impact refers to long-term effects resulting from the research programme on social, economic, environmental and other development indicators. The large question is what difference has the research cooperation programme made to Tanzania’s development and poverty reduction⁹?

Previous evaluations of research cooperation have painted a rather gloomy picture of the wider effects. *“Despite the fact that projects and activities, in the judgement of the evaluators, tend to be relevant to the local and institutional context, the results of the projects do not easily find their way to users in society or in the private sector and only incidentally are they directly applied in processes that*

⁹ Previously (before 2008) the main underlying assumption in Sida was that research capacity would be beneficial for development and it was not needed to be proved. The mandate of the research cooperation was only to create the capacity, thus the monitoring focused only on number of PhDs and publications, workshops etc. After 2008, RBM came into focus and changed the way Sida looked at capacity. Capacity and knowledge were seen as useless unless it was used. Thus, partners were asked how their generated evidence based knowledge and analytical capacity was used.

lead to poverty reduction” (Boeren 2006. p.18). The results of research have only been used to a very limited extent in society outside the university world or in the private sector, and only occasionally been applied in operations with a poverty reduction focus. The link between research activities and national poverty reduction has been described as weak. One reason is said to be that Sida has not emphasised enough direct poverty alleviation in the selection of research projects. Another is that that wealth created from increased knowledge does not come instantly, but is an indirect consequence. The evaluation recommended that a more direct link with poverty reduction objectives would be necessary.

The large majority of the research topics in the current programme is relevant to Tanzania’s development and poverty reduction. However, the impact of research on social and economic development and poverty reduction is not only about selecting research topics with apparently high political and developmental relevance. The quality of research is often more important. Low quality research on politically correct topics is often of limited value. However, this evaluation has not assessed the quality of research so this question needs further analysis. We will also emphasise that quality and innovation require a level of uncertainty and risk not supported in applied research.

The research cooperation has also been limited. Hence, the direct impact of such cooperation on national development and broad social processes will also be limited. There has been a visible impact in the provision of trained human resources for government, private, and civic sector employment. The current research capacity in the four institutions would not have existed without Swedish support.

Although there are links with government departments, the impact of research on national policy is less clear. So are the contributions to global scientific debates. However, several departments of the University of Dar es Salaam and the other two universities have functional or consultative links with several government ministries or departments. ARU is involved in policy development, consultancy activities, advisory boards, and professional bodies, but there is lack of knowledge of how extensively research reports are used in policymaking.

This evaluation concludes that:

- All the universities have made deliberate efforts to select and prioritise research projects with high relevance and potential development impact.

- Most of the research projects have a high score on social relevance and utility.
- There are increasing efforts to disseminate and follow up results from research projects.
- Academic staff are recruited to senior government positions and used extensively as advisors to the government.
- Several research projects have a potential direct utility and impact¹⁰, but in most cases the effects are indirect and long-term.
- TheSida financed research contributes to create conditions and support processes that lead to poverty reduction.

The following text box includes a sample of research projects with potential wider impact.

Internal seaweed market and small companies emerging

The Zanzibar seaweed cluster initiative was established in 2006 under the then Innovation Systems and Clusters Programme (ISCP 2003) and Pan African Competitiveness Forum (PACF 2008) both funded by Sida.

After five years of the initiative, the internal market for seaweed has emerged producing, among others, seaweed soaps, body creams, massage oils, juice, cakes, cookies, jam and green vegetables. The usage of the different products has spread from Zanzibar to Bagamoyo, Tanga, Mtwara, Pemba etc. Small scale seaweed semi-processing has improved the value of the produced seaweed from USD 0.25/kgDW to USD 6.2 kgDW (nearly x2500). Small companies using seaweed are also emerging e.g. the Paje Seaweed Centre whose technical support is offered by the IMS (UDSM) and Chalmers University of Technology, Gothenburg, Sweden. Apart from Sida, the centre does also receive financial support from the Swedish Rylanderska Stiftelsen Foundation.

Ecosystem responses to global climate change

Prolonged extensive flooding and the associated salinity fluctuation have been associated with massive mangrove mortality and failure to regenerate in mangrove forests such as Rufiji. The impact of salinity variation induced by flooding and prolonged water logging on growth and photosynthesis were investigated on seedlings of *Avicennia marina*, *Heritiera littoralis* and *Bruguiera gymnorrhiza*. The results show varying ability of *Avicennia marina* and *Bruguiera gymnorrhiza* to acclimatisation and inability of *H. littoralis* to withstand prolonged waterlogging accompanied with salinities $\geq 25\text{‰}$. These results suggest that climate change induced inundation and salinity fluctuation as a result of

¹⁰ There are examples of direct and immediate utility of research, such as research focused on different soil types for cultivation of fruit. Soil samples are collected for testing to identify nutrient, composition and other characteristics so that farmers can know which soil is suitable for cultivation.

storms, flooding and sea level rise could jeopardize the ability of some mangrove species to regenerate and survive, thereby destructing mangrove forest structures and ultimately their ecological functions.

Impact of climate change on shoreline changes/beach erosion

Studies have also been done to assess sea level changes and their impact to coastal communities. Impacts of climate change induced phenomenon in Tanzania coastal communities include significant shoreline change/beach erosion particularly in areas such as the East Coast of Zanzibar, seawater intrusion to coastal aquifers resulting into changes in water quality, shrinkage of mangroves forests, destruction of the coral reefs and seawater intrusion in agricultural areas particularly in Pemba Island.

Poverty, food security and the role of the Marine Science Program

The Program has been fairly successful in promoting finfish and bivalve mariculture in selected coastal communities e.g. in Mtwara, Tanga and Zanzibar. To further improve coastal community accessibility to the generated knowledge and to disseminate well packaged knowledge and technologies, impart skills and values needed to expediently address impediments to freedom from poverty and unsustainable use of resources, the IMS is also committed to transforming the acquired Pangani Fisherfolk Centre (PFC) into a fully functional aquaculture technology / business incubation centre. The Program strongly believes that such platforms provide environments in which governance, academia and industry/business services collaborate. Moreover, in such settings development, transfer, and commercialization of technologies are enhanced. The centre would also contribute to the improvement of one of the attributes signifying S&T and R&D institutional sustainability namely returns to community including the government. Other sustainability attributes include (i) teaching and research management capacity, (ii) mentoring capacity for student success, (iii) excellence in research, (iii) scholarships for innovative research activities, and (iv) interdisciplinary in teaching and research.

Seismic hazard analysis

The preliminary earthquake catalogue of the Northern Tanzania divergence have been compiled as a first stage towards the production of hazard map. The catalogue reveals three distinct periods. The first is before 1963 where most of the recording stations were located in the northern hemisphere. The second period is after the deployment of the WWSSN stations where some stations were established in Africa. The third was the establishment of the Tanzanian seismic network in 1990 and the formation of the regional group as joint effort in monitoring seismic activity along the East African rift system in 1993. Earthquake location accuracies and the reduction in earthquake detection threshold during the three periods will have an impact in the hazard analysis process. Thus different techniques are required before combining the data from the three periods.

From indigenous knowledge to patented method for water purification

In rural areas, where 80% of Tanzanians live, there is a significant lack of clean water:

The water from dams, rivers, and traditional wells is murky and often polluted by human and animal feces. Getting an idea from traditional ways of clearing up brown water using the seeds of a certain plant, Nancy Marobhe—a Sida PhD grant recipient—proceeded to study different seeds that women in rural areas used to clear water. In her laboratory studies, conducted as a part of her doctoral degree at ARU in Tanzania and KTH in Stockholm, she discovered ways of conducting protein purification—treating seed powder to extract active coagulant proteins—by using common equipment and ingredients cheaply available in rural Tanzania. After treatment, the purified seed powder was able to reduce water impurities by 90%–94% with up to 200 times less seed powder than in the traditional method. Dr. Marobhe, who is now the Director of Continuing Education at ARU, received a patent for her method in 2011, and her findings were reported in a number of scientific articles.

6 Future Scenarios and Lessons Learned

6.1 FUTURE OPTIONS

The Swedish research cooperation with Tanzania started already 1977 and has as such been going on for 37 years. The cooperation has changed over time in form and volume, but the focus has been on research and researcher training at public universities with a strong link to Swedish institutions. This evaluation has documented positive results of Swedish support at individual, organisational and institutional levels. Qualified researchers are educated in a broad range of priority areas for Tanzania. Organisational capacities are strengthened at all the four institutions and the socio-economic relevance and impact of research are enhanced. However, the programme still suffers from internal and external inefficiencies and the lingering question is to what extent the same resources could be used more efficiently and effectively in the future to produce higher outputs and stronger impact.

There are no clear answers to such questions, but we will present and discuss options through a number of different scenarios. The scenarios are not necessarily mutually exclusive and a combination of them is possible. The scenarios are of a broad strategic nature. Some more operational recommendations are also included. The question is how to design a more efficient, relevant and high quality programme.

Scenario 1: Focus and concentrate on less partners

The current programme of support is broad and to some extent fragmented – covering four institutions and a wide range of thematic programmes and types of interventions. If the overriding goal is to produce a critical mass of quality researchers and research of high socio-economic relevance and potential impact, this may not be an optimal strategy. It could be better to channel more funds to fewer partners that have the best qualifications and outreach. All universities, faculties, or institutions could apply and compete, and the best qualified would be awarded a contract for Tanzania-led research collaboration with best-qualified Swedish partners.

However, if the programme were more focused, smaller universities and weaker research groups would suffer and the country's research profile may become narrow or distorted. On the other hand, Swedish funds are not that large and the

Government of Tanzania, not Sida, is responsible for maintaining a sufficiently broad and pluralistic institutional structure for research.

Scenario 2: Move from researcher training to research

Swedish development support for research has long been committed to the idea that Ph.D. training is the main foundation. Over the years, confidence in the model seems to have been so high that it has overshadowed the need to examine the long-term effects of such support. Despite 37 years of support to PhD training in Tanzania, no tracer study has been conducted, but one study will soon be completed. It has been a problem – even if we don't know the magnitude of the problem, that Ph.D. graduates perform the same duties before and after graduation, while many end up in administrative, non-research positions. Few become engaged as researchers due to lack of funds to conduct research. In the end, too little high quality research is carried out.

Hence, there are reasons to shift focus and gradually move more resources in the Swedish programme from training of researchers (PhDs) to postdoctoral research. The current support is to some extent taken for granted. Time may have come for a change. Training needs are saturated in some areas in the Swedish supported programme. It is difficult to meet recruitment targets for doctoral trainees and outputs are too low compared to investments. There is also a need to increase the volume of actual research and in particular quality research – not only training.

More and better opportunities and funding for research may attract qualified researchers and help them to remain researchers. Funding of post doc research may increase the quality and possibly also the relevance of research projects. Funding should be available on a competitive basis for the best-qualified candidates from all universities in Tanzania—not only the three included in the present programme.

Disadvantages are that researcher training will suffer and volume of researchers qualified to do research might decrease. Similar to doctoral training, where the funding benefits individuals more than it benefits their universities, postdoctoral programs also benefit individuals, but also research groups, departments, universities, and finally the nation, in a decreasing order of benefits. The overall concern is increased volume and quality of research.

Scenario 3: Support national and university based research fund

The previous recommendation requires a strong independent research fund. Such a fund can be established at either national, university, or faculty level. There is already a national fund in COSTECH. Sida could in principle channel all its research funds to COSTECH for the entire portfolio or for selected thematic areas. Then the Swedish support would have come full circle from originally supporting UTAFITI—the national research fund at that time. Such a national

fund will issue calls for proposals and have a broad coverage¹¹. All qualified researchers from all Tanzanian research institutions would be able to apply. It will also be competitive and only high quality proposals will be funded. An alternative level for locating the fund is per university. In such a situation, the fund would cater for individual researchers within that institution. The third alternative level is a college or faculty. There are arguments in favour and against each of those options.

The idea of promoting a research culture in which conventional standards for managing scientific activities apply, suggests that the fund model should be placed at the research council level. But if ownership by local researchers – not university administrators – is the objective, the fund should be at the lowest possible level. The former presupposes that an effective system is in place in which all parts are seen as interdependent and objective actors. A governance and decision making system perceived as transparent, efficient, professional and fair are required. In the absence of such a system, management easily becomes personalised with criticism of nepotism and inefficiency.¹² A national fund can easily become too politicized. Currently, those concerns are too strong to be ignored and administrative components independent from anything existing may be necessary.

If Sida would consider providing more support to NFAST, it has to be on two conditions: (a) A robust governance, review and decision making system in place, and (b) dedicated qualified personnel working with NFAST. NFAST could for instance be supported with funding and external staff for three years, followed by an evaluation of its efficiency and effectiveness – and a subsequent decision whether support should continue. The other alternative or parallel option is to expand the existing core support to research grants at one or more universities. The systems and procedures for those funds will also have to be reviewed and strengthened.

Scenario 4: Move from institutional reform to research support

The Swedish cooperation has so far targeted four institutions and included organisational and institutional components in the programme. It has been a deliberate strategy to support each university at various levels through multiple

¹¹ See discussion of alternative locations in Hyden (2006).

¹² The Sida guidelines for support to national research development (2008) opens for establishing a National research fund or university research funds as long as "proposals include detailed plans for development of administrative mechanisms, as well as proposer procedures for calls for proposals, selection and assessment of research applications".

means. Sida has played a role in institutional transformation by providing various kinds of support to infrastructure, individual capacity building and research management. However, it can be argued that the transformations are now well underway and to some extent completed. Time has come for Swedish support to change and become more targeted. An option would be to focus more exclusively on doing research and less on supporting the “enabling environment” for research (ICT, library, management etc.)

A broad and multi-faceted programme is often seen as an effective strategy for reform¹³. Sida has also been commended for its strategy. However, the formula should change over time depending on a continuous assessment of needs and opportunities. Institutional reform is to some extent successfully achieved. Time may have come to put reforms into practice by creating demands for higher efficiency and effectiveness. The challenge is to look for and find the “drivers of change”? A strong research culture with high quality researchers and achievements could be such drivers. However, the assumption – that organisational change could be maintained and promoted by focusing and building research capacity, is uncertain.

Direct support to research also alleviates the administrative bloat that too keen focus on administrative structures may cause. When development of administrative functions gets too much attention, administration may become perceived as a value per se—and signs of that are in the air in the four institutions involved. Excessive red tape, bureaucracy, procedures, “follow-up” culture, and arbitrary administrative delays frustrate researchers and discourage research activities. If there is one task left for development of research administration, it is modernizing it to meet the efficiency demands of the 21st century. It is somewhat amazing to see that at the age of Internet, smartphones, and sophisticated information systems, information and request flows in the participating universities are often based on folders that travel from a pile of folders on one desk to the next pile of folders on another desk, and so forth.

With top-down institutional reforms largely complete, the focus can be shifted to bottom-up activities. The ultimate goal of research administration is to enable researchers to do their job, while being well informed about those research pro-

¹³ The combination of direct project inputs with activities within management, infrastructure and strategy development has generated good results within the universities (Eduards 2006).

jects. Supporting research projects directly follows the bottom-up model of development, where active individuals are empowered to pursue their goals by giving them the appropriate means to meet their goals.

Scenario 5: Focus and concentrate on fewer research sub programmes

The current programme includes a broad range of thematic areas from HIV/AIDS, food security and renewable energy to archaeology and linguistics. It covers training of Masters and PhD students, research management, faculty core support and a library project. The first option favoured less partners and the next more exclusive focus on research while this option goes one step further and argues for focusing and concentrating support to selected programme areas of high priority for Sida and the Tanzanian government. The current portfolio is relevant to social and economic development, but the direct relevance to poverty reduction and socio-economic development varies. A future option would be to select one or a few programme areas and make funding available only for those areas.

The downside is again that other non-prioritised programmes will suffer, but higher investments in fewer programmes could increase the potential for higher quality and innovative research.

Scenario 6. Shift emphasis from sandwich to country based training

The evaluation has pointed to several inefficiencies in use of resources. Actual level of cost is another issue. The challenge is to increase level of outputs from the same investment. The sandwich model has been an integral part in the Swedish programme with active cooperation between Tanzanian and Swedish researchers and universities. The model has changed over the years, but most of the PhD training has involved Swedish counterparts. The Tanzanian student has been in Sweden for a period of time, have a Swedish supervisor and graduate either from the Swedish or Tanzanian University. There have been and are several benefits from the sandwich model – academically, but also in creating stronger cultural and individual linkages between Sweden and Tanzania. Such benefits are significant, but often intangible and difficult to measure in monetary terms. From a strictly financial perspective, the sandwich model adds costs. It is more expensive than training PhD students only in Tanzania (see chapter 3.3.), even if international experience and exposure add significant value and significantly improve the quality of graduates and increase their employability for international research collaboration projects.

Experience with sandwich programmes

Several international donors have a long record of supporting capacity building at research institutions in Africa, many with Ph.D. training as a central component (Felleson 2013). There are significant differences among donors in terms of scope, design and ownership of these programmes, arising from different views on how institutional capacity building should be achieved. The principal rationale behind Swedish support has been that each country should have at least one university capable of being a resource for the establishment and expansion of national research and higher education. In keeping with this approach, the training of Ph.D. graduates (using a sandwich program designed to sustain links with the home institution) constitutes a core component in achieving the capacity to formulate and conduct research of high quality and relevance. The sandwich approach is believed to promote capacity building efforts more holistically, moving beyond the individual researcher, by gradually transferring responsibilities, administratively and substantively, from the Swedish counterpart to the partner in the collaborating country. Hence, one important milestone in this approach is the establishment of local Ph.D. programs.

A Sida evaluation in 2003 concluded that “most of the training programmes under the Sida/SAREC cannot be classified as sandwich type, since the candidates return only to teach or to do administrative work and not least attending to other job commitments to secure an adequate income. Too little time is spent on research at home” (Sida 2003:22).

If outputs in terms of number of people trained should increase (with the same level of resources), the sandwich model should be replaced or complemented with more national training or gradually move in that direction. It would still be possible to maintain several elements from the sandwich approach as for instance:

- (a) Invite Swedish professors to Tanzania for giving specialised courses.
- (b) Establish a virtual supervision and support facility for Tanzanian students (e.g. Swedish supervisors providing on-line support to individual students.
- (c) Organise selected targeted exchange visits.
- (d) Support attendance at international conferences.

Sida Research guidelines (2008) state *“In emerging research environments where the major part of the staff is at the early stages of their academic careers, external research cooperation is a must. Sweden has chosen to contribute through the mode of research training known as the “sandwich model”, which shows a better alignment with university strategies than ordinary scholarship programmes as the latter tend to detach the student from the home university for several years”*. However, none of the Tanzanian universities supported are in their early states of academic career structure any longer.

The risks with moving away from sandwich programmes are, firstly, how to find a balance between quantity and quality. The highest throughput will be achieved through fully Tanzanian programmes, but the more international involvement is included, the higher the quality and the future potential of graduates. Secondly, if Swedish expertise should continue to be involved in cooperation, new kinds of incentives for Swedish partners must be developed in order to keep cooperation research-driven and beneficial for both partners in research terms. Third, the central problems with the current programme have not been concerned with too few opportunities for eager doctoral candidates. Quite the contrary, one of the major issues has to do with inability to recruit candidates at all. From that viewpoint, it would make sense to give the enrolled few candidates better financial resources than to increase the number of positions that already goes unfulfilled. If the programme runs at 66% efficiency now, doubling the number of similarly unattractive positions would, *mutatis mutandis*, drop the efficiency to 33%.

6.2 LESSONS LEARNED

There are several lessons learned that emerged during the course of the evaluation. The following are some of the most important.

- **Unsustainability of continued high level of external funding**

Given other competing priorities, the Tanzanian government still gives low priority to provide funding directly to the universities from its own budget. Most funding for research continues to come from external donors. This is not a sustainable solution. The Tanzanian government needs to follow up its commitments and also ensure that the increased support to COSTECH benefits universities more directly. Donors should supplement—not substitute—government funding.

- **Changing national research environment**

There is a rapidly changing environment with more public and private universities competing with the older and more established and with increasing numbers of new highly qualified students and researchers. Similar, there are an increasing number of donors giving grants to doctoral studies. If the overall aim for Sida is to fund more and more high quality research, individual researchers from all universities should be able to compete and get access to funding – based on academic merit. The Tanzanian university sector has greatly developed from the time when UDSM was selected as the focus of donor support. One can imagine the outcry if an external funder for Swedish research would declare that only Lund University can be funded. This development of Tanzania's higher education sector suggests a move from building research capacity at selected universities to supporting promising research projects in any university, or at least changing the balance towards the latter.

- **The need for systematic monitoring and evaluation**

Monitoring and evaluation are necessary tools to inform decision-making, ensure accountability and for organisational learning. Such tools have been weak or missing in this programme. The results framework was incomplete from the beginning. There has been no regular monitoring of key performance indicators for measuring progress and achievements. There have been evaluations of Swedish support to research in Tanzania, but only as part of other broader studies. No tracer studies have been carried out despite the programme's long duration. In other words, such long-term programmes need a much stronger M&E framework – including both internal monitoring of progress and external evaluation of performance.

- **Small projects vs. small sub programmes**

In the current programme a large number of small research projects—a sort of seed money—has given impetus to small steps on a broad front. There is a need for small funding that can give researchers a chance to test their ideas, to prove their capability as principal investigators, and to sow seeds for future generations. But small projects do not, however, enable “wedges” of high quality, pioneering research to dig deep into specific problems, and they do not enable hubs of excellence to emerge. In addition, application and review procedures for the small funds may be downright ridiculous: Some researchers reported writing several dozens of application pages to apply for 50000 SEK grants. In line with international conventions, for such small funds around 5-6 pages should be an absolute maximum to save both researchers' time as well as reviewers' time.

Although the small projects programme has successfully supported bottom-up nurturing of small research projects and plurality of research directions, the same cannot be said of the subcomponents. There is quite some disparity between the subcomponent in terms of their aims, objectives, size, scope, results, effectiveness, and efficiency. While support to small starting grants can be encouraged, there should be a certain lower limit for subcomponent size—say, four person-years of Ph.D. holders, eight person-years of doctoral candidates, or a mixture along those lines.

- **Changing needs and assumptions**

The Swedish programme is built on assumptions that are not any longer valid or that are in the process of change. The notion of research programmes vs. researcher training programmes is important for evaluation of the current program. One interviewee noted, quite correctly, that a Ph.D. programme is an education programme, not a research program, and should not be judged in terms of research output. Another interviewee raised a question about evaluation criteria set for the subprograms. *"When you have a capacity building program, it aims at producing academic capacity. In many universities outreach or societal contribution doesn't contribute to academic capacity, but hard core research does"* (Professor, Stockholm University). Academic capacity is built through research results, and the universities "third mission", the outreach mission, sometimes

slows down academic capacity building if the project is not directly about outreach. Following that line of argument, if research capacity building is not a sufficient goal as such—if societal impact is a crucial element of the programme—then the program should not involve research projects that do not have direct societal elements. But if research capacity building is enough, then the program should not be evaluated by its societal contribution.

- **Flexibility in programmes and programme evaluation**

As academic fields differ greatly from each other, some interviewees suggested that the programme should be more flexible in terms of coursework, time, and the way theses are written. In addition to the aspects mentioned by the interviewees, differences in academic "cultures" extend to the amount of fieldwork, valuation of theoretical and practical results, preferred publication channels (conferences, journals, book chapters, monographs), and different kinds of outputs from Ph.D. studies. (And the Ph.Lic. degree is often not recognized outside the Nordic countries.) For example, two doctoral graduates may be exactly equally successful even if one produced only a Ph.D. thesis and the other one a Ph.D. thesis and 6 journal publications. Furthermore, in some fields conference proceedings constitute a major publication channel and there are conferences that are valued above most journals.

- **Doctoral graduates need career continuity**

Doctoral training is no more than what it claims to be: Doctoral programmes are educational programmes for how to do research. In many countries the years immediately after the Ph.D. degree are the most fruitful years for a researcher's publication track, which is perhaps the single most important aspect of academic career building. When there is a large enough pool of capable Ph.D. graduates, there will need to be mechanisms for further supporting their academic development through research funding.

- **Visions for sandwich programmes**

The vision and definition of a sandwich programme needs to be clarified. While all interviewees were happy with the sandwich programme, there was no consensus on what constituted a "sandwich programme". Some used the term for their students who had visited Sweden for brief periods of time, others considered courses in Sweden to constitute a sandwich program, others used the term for an arrangement where students do a Ph.Lic to a Swedish university and Ph.D. to a Tanzanian university, and yet others used it to refer to a flexible, on-demand system where students can be in either country based on their needs. Some confused sandwich program with a dual degree or joint degree program. Although the benefits from a sandwich program are very clear and tangible, the model itself could be also developed further.

- **Need for decentralized and participatory research management**

Building capacity in creating centralized research management has so far been the focus. However, this multi-layer bureaucracy frustrates researchers and stu-

dents and red tape has to be curtailed by building a transparent short path to competitive research funding. This is possible by empowering lower levels of research management and creating participatory mechanisms in order to control local level favouritisms.

Annex 1: Terms of Reference

Evaluation of Swedish Research Cooperation with Tanzania 2007-2013

1. Purpose

- The purpose of the evaluation is firstly, to analyse and assess the achievements of Swedish cooperation to strengthen the Tanzanian research and innovation systems during the years 2009-2013.
- Secondly, it is expected that the outcome of the assessment will serve as basis for identifying the next steps required for the country to achieve national and institutional sustainability for research.
- Thirdly, it will contribute to “lessons learnt” to the development of the Swedish modality used to strengthen research and innovation systems in low income countries.

The assessment shall be made in the relation to the overall objective of the Swedish Policy and Strategy for research cooperation:

to strengthen and develop research of relevance to the fight against poverty in developing countries¹

including the more specific objective:

Partner countries and regional research actors being able to better plan, produce and use research in the fight against poverty.²

¹ *Research for Development – Policy for research in Swedish Development Cooperation and 2010-2014:10 and Strategy for Sida’s Support for Research Cooperation 2010-2014:20. Government of Sweden 2010.*

² *Strategy for Sida’s Support for Research Cooperation 2010-2014:20-23. Government of Sweden 2010.*

and with relation to the overarching goal of the research cooperation with Tanzania to:

Strengthen the national research capacity and improve the quality of research conducted in areas of national relevance to contribute to the poverty reduction and the country's sustainable development³

2. Background

Sweden was one of the first countries to establish research cooperation with Tanzania in 1977 when support was channeled through the national research council UTAFITI. Since then, the co-operation has undergone adaptations to meet national needs and lead to the prevailing modality of support to research and innovation. The initial support was mainly directed to fund individual research projects. Later the focus shifted to institutional support aimed at building sustainable research capacity, and more recently the emphasis has been placed on national and institutional ownership.

In 1995 University of Dar es Salaam (UDSM) was selected as a key partner for national research capacity building aiming at creating institutional and sustainable research capacity in Tanzania. Since 2007 two new universities branched off from UDSM, Ardhi University (ARU) and Muhimbili University for Health and Allied Sciences (MUHAS). The “new” universities’ areas of research had been prioritized and funded when they formed part of UDSM and therefore Sweden continued the support to these institutions. In addition, Sweden decided to support (Commission for Science and Technology (COSTECH) during the current agreement period. The aim was to enhance national ownership of the research agenda in Tanzania,

In 2003 funds were provided for development of innovation clusters with the main objective to promote the use of research for societal development through strengthening the links between research, innovation and small enterprise development. This support was implemented through a regional program with UDSM as a hub in Tanzania⁴. Since 2009 this support is channeled through COSTECH who also manage the training of the clusters.

The cooperation can be divided into four agreement periods since 1994. The current agreement (July 09-June 14) entails support to: (i) research training (ii) management and administration, (iii) research supporting infrastructure (labs, ICT and library, (iv) research

³ Assessment Memo: Continued bilateral research cooperation with Tanzania 1 July 2009 – 30 June 2013 (program has since then been extended one year to June 2014). Samarbetsstrategi för utvecklingssamarbetet med Tanzania 2006-2010. Utrikesdepartementet.

⁴ The other countries involved in this regional program were Mozambique and Uganda. In 2009 the programs became part of the bilateral cooperation and the national ownership in Tanzania was assumed by COSTECH. The countries, however, continued their regional collaboration through the Pan African Competitive Forum (PACF) being a direct outcome of the previous cooperation.

grants schemes. The research training programs have focused on the areas of health sciences (HIV/TB, malaria, reproductive health and health system research) natural resource management, food security, renewable energy, entrepreneurship and business environment, earth sciences, rural and urban infrastructure, urban planning and construction and languages of Tanzania.

The research training programs are built on international collaboration mainly with Swedish universities. Currently 27 different departments at Swedish universities are involved in the collaboration.

Evaluations of Sida/SAREC Bilateral Co-operation: Lessons Learned⁵ and University and Faculty Research Funds at universities in Mozambique, Tanzania, and Uganda⁶ has pointed out the positive impact and the program contribution to the development of human endowment in the country. A more recent evaluation on Sida's support to innovation within the frame of research cooperation was carried out in 2010⁷

3 Scope of the evaluation

3.1 Historical background

The evaluation will cover the research cooperation period 2007-2013⁸. However, since the research cooperation with Tanzania started in 1977 a brief historical recapitulation of the cooperation is imperative to fully appreciate the changes in research capacity that has occurred with the support of Sweden. It will also take into account the modalities and methodological changes of the cooperation itself and its relative functionality to strengthen the Tanzania research system.

3.2 Results focus

The evaluation will focus on the capacity building aspects of the four institutions involved in research cooperation, University of Dar es Salaam (UDSM), University of Health and Allied Sciences (MUHAS), Ardhi University (ARU) and the Commission for Science and Technology (COSTECH) and their results (output, outcome and impact) in:

⁵ Sida/SAREC Bilateral Co-operation: Lessons Learned. A. Boeren et al. Sida Evaluation 06/17

⁶ *University and Faculty Research Funds at Universities in Mozambique, Tanzania and Uganda*. G. Hydén. Sida Evaluation 06/23

⁷ *Evaluation of Sida's Support to Innovation Systems and Clusters, a Research Cooperation Initiative*. A. Rath et al. Sida Evaluation 2012:5

⁸ There are no more recent evaluations. However, in view of the current agreement period there was an analysis/report commissioned by Sida, *30 years of Swedish-Tanzania Research Cooperation - Advancing frontiers in African development*. 2007. Arne Svensson.

- **institutional capacity** – results in the development of institutional capacity for research - academic and administrative reform, research supporting infrastructure, research management, international research collaboration, efficiency, transparency, quality.
- **the production of scientific results**, its quality and relevance.
- **the impact in society** of building institutional research capacity. Direct and indirect impact: of research results, of research and analytical capacity on policy and of collaborations with public institutions, private sector and civil society organisations

3.3 Sustainability

The evaluation will review efforts made to ensure sustainability both concerning human as well as financial resources. The programme, by its nature, has a sustainability aspect as it aims at developing sustainable research systems. Although financial sustainability and diversity always is on the agenda for dialogue with counterparts, the programme itself does not contain such an element. It rather aims to enable the human capacity at institutions to address issues of financial sustainability. Discussion with researchers and university authorities should include views and efforts to reach self-sustainability, reproduction and retention of human resources as well as achievements in this area.

3.4 Lessons learned and the way forward

The evaluation shall point out lessons learned that could be useful to Tanzanian researchers and institutions in particular. In addition, it will contribute to a general learning process which may impact on the modalities used by Swedish government and Sida to create research capacity in low income countries. The evaluation shall also include a discussion of the way(s) forward to achieve national sustainability in research. This discussion should include the perceptions of the counterparts involved in the cooperation as well as the independent view of the evaluators.

4. Methodology

The evaluation shall follow the OECD-DAC Evaluation Quality Standards and will also be assessed according to these.

The consultants shall:

- Use documentation about the support to research capacity building in Tanzania available at the Embassy of Sweden, Sida and the Tanzanian universities/institutions (memos, applications, progress and audit reports, activity plans, evaluations, self-assessments and other local documents at the universities related to subject matter of this evaluation).
- Interview key persons and groups of informants at all institutions that are involved in/benefiting from research and research related activities supported by Sweden. Also, interviews of groups of persons and institutions outside academia that have collaborated with researchers and/or have benefitted from research results can be interviewed.
- Use methods and techniques to collect data and information needed that are relevant to the purposes of this evaluation.
- Cross-validate and critically assesses the information sources used and the validity of the data using a variety of methods and sources of information.
- Ensure that stakeholders are given the opportunity to comment on findings, conclusions, recommendations and lessons learned.

5. Evaluation ethics

The evaluation must be conducted in a professional and ethical manner. The evaluation process must show sensitivity to gender, beliefs, manners and customs of all stakeholders and is undertaken with integrity and honesty. The rights and welfare of participants in the evaluation must be protected. Anonymity and confidentiality of individual informants shall be protected when requested and/or as required by law.

6. Relevance of the evaluation results

6.1 Formulation of evaluation findings

The evaluation findings must be relevant to the object being evaluated and the purpose of the evaluation. The results should follow clearly from the evaluation questions and analysis of data, showing a clear line of evidence to support the conclusions. Any discrepancies between the planned and actual implementation of the object being evaluated must be explained.

6.2 Recommendations and lessons learned

Recommendations and lessons learned should be relevant, targeted to the intended users and actionable within the responsibilities of the users. In this case the users are Sida – especially with reference to responsible phase out of the cooperation, Research groups – with reference to how they can continue to carry out research, universities-how they can support research internally. The Government of Tanzania – how a government can assume ownership and support the creation of national research and innovation systems. Recommendations are lessons learned and generalizations of conclusions applicable for wider use.

7. Evaluation team

7.1 Composition

The composition of evaluation team should possess a mix of evaluative skills and thematic knowledge and if possible be gender balanced and include professionals from the country or region concerned.

Team member requirements

Team Leader:

- PhD in relevant area with a minimum of 10 years' experience of carrying out research also in low income countries, currently active researcher, with up-to-date record of publications
- Knowledge of sustainable research capacity building.
- Broad knowledge of HE and research management/institutions
- Knowledge of universities in low income countries
- knowledge of Tanzania, and the Sub-Saharan region

Team members:

- At least 2 team members must have PhDs and knowledge of conditions for scientific research in low income countries
- Additional team members must have a minimum of Masters' degrees
- Knowledge of sustainable research capacity building.
- Broad knowledge of HE and research management/institutions
- Knowledge of universities in low income countries
- Experience in assessing research capacity building
- Experience of international cooperation
- Knowledge of Sida and its policies, strategies and methods for capacity building within research and postgraduate education
- Knowledge and experience of results based management
- knowledge of Tanzania, and the Sub-Saharan region

All members:

- Fluency in spoken and written English

7.2 Independence of the evaluation team

The evaluation team shall be able to work freely and without interference. It is assured of cooperation and access to all relevant information.

8. Timeframe and budget

The assignment will be initiated 1 December, 2013 and completed no later than 7 March 2014. Before the assignment starts, inception note shall be submitted to Embassy of Sweden in Tanzania and a meeting with the Embassy shall take place to discuss in further detail the objects and methods for the evaluation. The evaluation is conducted and results shall be made available in a timely manner in relation to the purpose of the evaluation. Un-envisaged changes to timeframe and budget must be explained in the report. Any discrepancies between the planned and actual implementation and products of the evaluation must be explained. The budget cannot exceed 1 000 000 SEK.

9. Reporting

When the mission has been concluded, the major findings, conclusions and recommendations shall be compiled in a report in line with the scope of this evaluation. First, the consultants shall prepare a draft report in English, following the form for Sida evaluation reports, to be submitted electronically to the Embassy of Sweden for comments no later than **14 February 2014**. The major findings and conclusions from the draft report shall be presented and discussed in a seminar with stakeholders and the Embassy.

Three weeks after receiving comments on the draft report a final version shall be submitted to Sida (electronically and in two paper copies). The report shall be written in English in Word for Windows and should be presented in a way that enables publication without further editing. The report shall contain an executive summary and it should not exceed 50 pp (annexes excluded).

9.1 Analysis and content

The report shall answer all the questions detailed in the scope of the evaluation. Where this is not possible, reason and explanations must be provided.

The analysis shall be structured with a logical flow. Data and information shall be presented, analysed and interpreted systematically. Findings and conclusions shall be clearly identified and flow logically from the analysis of the data and information. Underlying assumptions shall be made explicit and taken into account.

The report must distinguish clearly between findings, conclusions and recommendations. The report shall present conclusions, recommendations and lessons learned separately and with a clear logical distinction between them. Conclusions should be substantiated by findings and analysis. Recommendations and lessons learned should follow logically from the conclusions.

The report must contain an executive summary. The summary shall provide an overview of the report, highlighting the main conclusions, recommendations and lessons learned.

9.2 Explanation of the methodology used

The evaluation report shall describe and explain the methods applied and discuss its validity and reliability. It must acknowledge any constraints encountered and their impact on the study, including their impact on the independence of the evaluation. It shall detail the methods and techniques used for data and information collection and processing. The choices should be justified and limitations and shortcomings explained.

9.3 Relevant stakeholders consulted

The evaluation report indicates the stakeholders consulted the criteria for their selection and describes stakeholders' participation. If less than the full range of stakeholders was consulted, the methods and reasons for selection of particular stakeholders are described.

9.4 Incorporation of stakeholders' comments

Stakeholders must be able to make comments before a final report is written. The evaluation report shall reflect these comments and acknowledge any substantive disagreements. In disputes about facts that can be verified, the evaluators shall investigate and change the draft where necessary. In the case of opinion or interpretation, stakeholders' comments shall be reproduced verbatim, such as in an annex, to the extent that this does not conflict with the rights and welfare of participants.

9.5 Transparency of information sources

The evaluation report shall describe the sources of information used (documentation, respondents, literature etc.) in sufficient detail, so that the adequacy of the information can be assessed. Complete lists of interviewees and documents consulted shall be included, to the extent that this does not conflict with the privacy and confidentiality of participants.

Enclosures

Enclosure 1. Evaluations Questions

Enclosure 1. Evaluation Questions

Results in institutional research capacity:

Research capacity

1. Is the research cooperation program consistent with the cooperating institutions policy and strategic priorities for the development of institutional research capacity? Are the research areas selected still relevant to the development of Tanzania (or in the forefront) with special attention to the problems which mainly affect poor people?
2. Assess to what extent the programme has contributed to improved research capacity at the supported universities and in Tanzania. Have a "critical mass" of competent researchers in targeted research areas been created? In which specific fields? To what extent?
3. Which role has the collaboration between Tanzanian and Swedish universities played in the development of Tanzanian research capacity? Has their collaboration changed character over time? Could the collaboration be developed and used in a different way in order to

meet new challenges - taking into account the increased capacity of the Tanzanian researchers and managers?

4. Has the number researchers with a PhD increased? Have the number of active researchers increased?

5. Has the capacity at targeted institutions to formulate research proposals and submit applications increased?

6. Has the capacity at supported institutions to attract national and external research funds increased? In country in total?

7. Has the number of publications increased in international and national scientific journals respectively?

8. Has the number of national MSc and PhD programs increased at the targeted universities? With Swedish support? In country in total?

9. Assess different aspects of the supervision within the program, both regarding the Swedish and Tanzanian supervisors, and compared to respective university as a whole.

10. How many scientific journals can be found in Tanzania? How many are indexed? How many of them are produced by the institutions supported by Sweden?

11. What role has the research grants schemes played to encourage research in Tanzania and what impact have they had in terms of scientific outputs?

12. Have the support enhanced innovative processes and innovative thinking within and outside the institutions supported?

13. Are there proofs of new innovative ideas or ways of working that have emerged as a result of this program?

Research management

14. What impact has the programs had on research management capacity? Assess the quality, efficiency, effectiveness of the research management (including of funds) during the evaluation period.

15. Do universities/institutions have relevant policy/strategic documents that guide the development of research projects and research capacity in a long-term perspective? To what extent has the cooperation contributed to develop an improved strategic environment?

16. To what extent has the programs become integrated into and “owned” by the institutions supported? To what extent has “new” structures that manage research been created and become an established part of the “ordinary” institutional setting?

17. Are the planning//monitoring/reporting requirements of the program integrated into the internal structure of the institutions?

18. Assess the extent to which Result Based Management (RBM) as a tool for planning and monitoring is understood and used at different levels of the institutions. Has the support that Sida has facilitated for RBM been helpful?

19. Do the institutions supported have other ways to Plan, Monitor and Evaluate research activities and research training? What kind of systems do they use?

20. How do the universities select and follow up the PhD and MSc students’ performance? Are there any formal regulations and procedures and are they well-known and publically accessible?

21. Is there any effort by the universities to promote the use of research in society with respect to communication of research and research results, extension services, dialogue with stakeholders, protection of national knowledge production through patents, intellectual property rights etc.

22. Do the universities has any coherent regulation on the ownership, management and exploitation of intellectual property?
23. How does the universities balance research and outreach (external activities such as expert advisors, consultants, and technology transfer etc)?
24. Are there any internal procedures for planning and monitoring research proposals before they are submitted for funding? How is research encouraged and facilitated by the intuitions? Support to develop research applications? Access to research publications? Seminars? Conferences? Support to publish? Management of information concerning research funding opportunities? Capacity development opportunities?
25. Are there any problems with reference to retention of researchers? If so, what are the reasons? Are there any specific efforts made by the universities to retain researchers?
26. What are the career opportunities for researchers at the universities, Is career advancement based on publications? What incentives are there for carrying out research? Is it possible to take sabbaticals to carry out research? Is there a “research funding management” for staff who attracts external funding? How does it work?
27. Are there manuals that describe the research management and its procedures? Are they known and implemented?
28. Are there any work descriptions that defines the roles of each positions/assignment in the research management structure and how they relate to each other?
29. How do researchers and student perceive the research management?

Research supporting infrastructure

30. What are the adequacy, functionality and impact of the research supporting facilities, equipment and infrastructure (laboratories, ICT infrastructure and management, library research and services) to which the program has contributed?

Scientific Results and Quality

31. What are the scientific results? Are there any special outstanding or acknowledged results? Describe them.
32. What are the quantity and scientific quality of the research conducted in terms of publications in international and national scientific journals and presentations on international conferences?
33. Explain the review process of research proposals being done within the programs, both at universities and COSTECH. Assess the ability to improve the quality of this process, if deemed necessary.
34. To what extent has the research cooperation impacted on academic quality within the national PhD and MSc programmes at the universities?
35. What is the assessed academic quality of national PhD programs at the universities with regard to lectures, course work, research outcomes and supervision?
36. Has there been any increase in invitations/participation in international conferences and seminars?
37. What are the procedures for quality assurance and accreditation of MSc and PhD training programs? Who is responsible for quality assurance and accreditation of academic programs (including MSc and PhD programs)?

Impact in society

38. In which ways has the research capacity created had an impact in society in terms of analytical expertise, policy development, collaboration with public (ministries) and private sector and civil society (NGO, social movements, trade unions)? Give examples.

39. Have the cluster initiatives⁹ supported by Sweden enhanced innovative thinking and new ways of working amongst involved partners and organisations?

40. Has the support to clusters improved the situation for the enterprises and the use of research results/capacity in society?

Efficiency

41. Compare the alterations both in efficiency of cost and quality of training between the sandwich program and the local PhD programmes.

42. Has donor coordination been implemented and/or improved? If not, what are the reasons? Could better outcomes have been achieved from the research program through usage of the same resources in a different way?

43. Can current administrative regulations and practices provide a platform for management efficiency?

44. How can research management become more efficient in terms of a) bureaucracy b) managerial capacity c) donor harmonization and alignment?

Effectiveness

45. What is the time needed for doctoral students to complete the sandwich and national PhD-training programs respectively? Do some departments have more difficulties than others? Is there a gender, age difference?

46. The programs have been severely delayed in its implementation. What are the reasons behind this and how could it be prevented in the future?

47. How has the gender policies been implemented and followed up?

48. What impact has the support improved management and reforms had on the research cooperation program?

Sustainability

49. Assess the sustainability of the research systems at the supported institutions. Are they sustainable in human resources i.e. can they produce their own researchers through own research training programs? Are they sustainable in research funding? How does the funding map look like (in time and different sources of funding including national funding)? What are the current strategies for sustainability? Consider especially a possible withdrawal of the Swedish support.

50. To what extent have regional and international long-term research collaborations been established? Have Tanzanian and Swedish researchers within the program benefited from them?

51. In what areas do the supported universities have all preconditions, e.g. critical mass of postgraduate lecturers and supervisors with PhD degrees, recruiting base in form of BA and MSc programs, infrastructure and management capacity to entirely shift from the sandwich model to massive in-house postgraduate training?

⁹ For description of the support to clusters see for ex: "Evaluation of Sida's Support to Innovation Systems and Clusters, a Research Cooperation Initiative". Sida Evaluation 2012:5.

52. What are the main bottlenecks for development of sustainable research institutions at the supported universities and COSTECH?

Annex 2: People Met

UDSM

Agnes Mwabaje, Institute of Resource Management
Amina M. Kabudi, Director, Libraries
Amos E. Majule, Director, Institute of Resource Assessment
Cuthbert F. Mhilu, Associate Professor, College of Engineering and Technology
Esther Ddenje Sichahve, Associate Director Libraries
Esther K. Ishengoma, Senior Lecturer, Business School
Faustin Maganga, Institute of Resource Management
Felix A. Chami, General Coordinator, African Archeology Network
Geoffrey R. John, College of Engineering and Technology
Goodluck C. Urassa, Lecturer and Coordinator Research and Publications
H.R.T. Muzale, Department of Linguistics
J.L. Kingori, Director, Directorate of Planning and Finance
J.R. Ikingura, Director, Directorate of Postgraduate Studies
Luoga, F.D.A.M. Acting Deputy Vice-Chancellor, research and Knowledge Exchange
Makenya Maboko, Deputy Vice Chancellor
Matern Mtolera, Senior lecturer, Institute of Marine Sciences
Morry Kijonjo Administration Officer DPGS
Noella Jonathan Administration Officer, Office of Director of Research
Richard Kangalawe, Director of Research
Shukrani Manya, Earth Sciences
Simon Mwansasu, Institute of Resource Management
Wilson Mahera Charles, Deputy Director DPGS
Wineaster Anderson, Dean, Business School

MUHAS

A. Mwangi Mughwira, Health system research project
Andrea B Pembe, Senior Lecturer reproductive health consultant
Angwara Kiwara, Health system research project
Benard Ernest Sengo, Assistant librarian
Billy Ngasala; Malaria sub group
Daudi Simba, School of Public Health
E. Mwaiselo, Department of parasitology and medical entomology
Eligius Franscis Lyamuya, Deputy Vice Chancellor Academic Research and Consultancy (DVC-ARC)
Ester Innocent; Traditional medicine
Felix Kusums, ICT

Germina Henry Leyna, Health system research project
 Innocent Semali, Health system research project
 J Magadula, Dean Department of traditional medicine
 Joyce Rose Masalu, Directorate of research and publication
 Mainen Julius Moshi, Director of Research and Publications
 Mboni Amiri Ruzagea, Librarian
 Minzi Omary Masiku, Malaria sub group
 Muhammad Bakari, Deputy Vice Chancellor, Planning Finance and Administration
 Muzaalifat Salmi, Reproductive Health sub programme
 Rehema Chande Mallya, Librarian
 Rose Mpembeni, epidemiology and Biostatistics
 Siril Nathaniel, Health system research project and Ph.D. student
 Urassa, D. Dean, School of public health
 Veronica Mgomela, Dean Department of medicine
 William Julius Mviombo, librarian

COSTECH

Ambros Julias, Research Officer
 Flora Tibaruzwa, Director of research and publication/ programme coordinator
 Gabriel Madonga, Research Officer
 Hassan Mshinda, Director General
 Joseph Msuwaki Mbwana, Research Officer
 Namwaka Omari, Senior Research Officer
 Omary Bakari, Director General – SIDO and former COSTECH cluster coordinator
 Pius Daudi Chiledi, Research Officer
 Simon Kasmili Moka, Research Officer
 Yussufu A Laiza, Principal Accountant

ARU

Aldo Lupala, School of Architecture and Design
 Gabriel Kassenga, Deputy Vice Chancellor for Academic Affairs
 Gabriel R Kassenga, Deputy Vice Chancellor, Academic Affairs
 Harriet Eliufoo, Student supervisor
 Hidaya Kayuza, Programme coordinator
 John Lupala, Student supervisor
 Makarius Mdemu, Non Ph.D. researcher
 Nancy Marobhe, Patent Ph.D. researcher
 Riziki Shemdoe, Research and Publication Unit
 W. Kombe, Student supervisor

Ernest Sanke, Engineering and Mining Officer
 Gwakisa Bapala, Education Officer
 Margareth M. Kamba, Asst. Director STID

Ministry of Communication, Science and Technology

Swedish Informants

Chandur Sandarangani, Professor, School of Electrical Engineering, KTH Royal Institute of Technology

Elizabeth Darj, Professor, Department of Women's and Children's Health, Uppsala University

Elizabeth Földi, Department of Economics, University of Gothenburg

Erik Ahlgren, Associate Professor, Energy and Environment, Chalmers University

Gunnel Biberfeld, Professor Emerita, Department of Microbiology, Tumor and Cell Biology, Karolinska Institutet

Inga Britt Werner, Associate Professor, Department of Urban Planning and Environment, KTH Royal Institute of Technology

Karl Johan Bonnedahl, Assistant Professor, Director of Ph.D. Studies, Umeå School of Business, Umeå University

Lars Lindbergh, Umeå School of Business, Umeå University

Laura Downing, Professor, Departments of Languages and Literatures, University of Gothenburg

Lena Mossberg, Professor, Department of Business Administration, University of Gothenburg

Love Ekenberg, Head of Department, Computer and Systems Sciences, Stockholm University

Mats Björk, Professor, Department of Ecology, Environment, and Plant Sciences, Stockholm University

Paul Johannesson, Professor, Computer and Systems Sciences, Stockholm University

Per Nilsson, Umeå School of Architecture, Umeå University

Sverker Molander, Professor, Energy and Environment, Chalmers University

Tommy Andersson, Professor, Department of Business Administration, University of Gothenburg

Annex 3: References

Ardhi University

Ardhi university Sida research report, 2013
Ardhi university, Fact and figures 2010/2011, December 2011
Capacity building for sustainable land development, environmental management and poverty alleviation (2009-2019), Concept paper (2008).
Guidelines and procedures for the assessment of academic staff performance Oct 2009
Productivity of Water in Larger Rice (Paddy) Irrigation Schemes in the Upper Catchment of the Great Ruaha River Basin, Tanzania
Progress report for the reporting period July 2010 – June 2011.
Progress report for the reporting period July 2012-June 2013.
Recast OC Budget for the financial year 2012/13, Council Memorandum no 26.4.3.1
Recast OC Budget for the financial year 2013/14, Council Memorandum no 30.4.3.1
Rural Planning Journal Volume 14. No 1, institute of rural development planning (IRDP)
Understanding community based adaptation strategies to climate variability in fishing communities of Rufiji River basin in Tanzania, African Journal of history and culture, Vol 4(2) 0017-26, March 2012

Muhimbili University of Health and Allied Sciences

Revised concept paper on planned 10 years research programme for 2009-2018. Application for support from Sida/SAREC.
Guidelines on conflict of interest and research integrity.
Consolidated MUHAS progress report 2012-2013. Health research and training.
Consolidated MUHAS progress report 2010-2011. Health research and training.
MUHAS 1st Scientific Conference, Kunduchi Dar es salaam Tanzania, May 2013
MUHAS Prospectus 2011/2013
MUHAS Research bulletin 2009 – 2013
MUHAS annual report 2011 - 2012
Research Bulletin Volume 3, Number 1 March 1999.
Research agenda, June 2011.
Research Policy Guidelines, Aug 2011.
Intellectual property policy and guidelines Aug 2011.

COSTECH

COSTECH Communication strategy User Guide
COSTECH communication Strategy, 2011-2013

COSTECH. Annual Report 2012-2013.

Policy Brief. Promoting the use of research evidence to Poverty Reduction Strategies in Zanzibar. June 2012.

Progress report for the reporting period August 2010 – September 2011.

Progress report for the reporting period July 2011 to June 2012.

Progress report for the reporting period October 2011-August 2012.

Promoting the use of research evidence to inform decision making in Zanzibar, How does R&D contribute to Poverty Reduction Strategy in Zanzibar? (COSTECH 2012)

Strengthening Academic-Government-Industry Interplay Capacity to Support the Development of Innovative Clusters in Tanzania. A proposal. May 2010.

University of Dar es Salaam

A proposal for scholarship support 2009-2018. School of Graduate Studies.

Drivers of change in the socio-economic and political history of Tanzania, A proposal from the Faculty of Arts and Social Sciences.

Empowering the Languages of Tanzania. Department of Foreign Languages and Linguistics.

Facts and Figures 2010/2011, and 2008/2009

General Regulations and Guidelines for Postgraduate Programmes, February 2013

Institute of Resource Assessment, Annual Report 2011/2012

New ICT-Based research programmes for accelerating socio-economic development in Tanzania. A proposal for Sida/SAREC funding.

Renewable Energy. Science and Technology for Rural Transformation and Industrial Development.

Research capacity building and research support to the Faculty of Commerce and Management

Research Management Support. Directorate of Research and Publications.

Research Policy and Operational Procedures, February 2008

Research programme for new phase of Sida/SAREC funding 2009-2018.

Technology Innovation and Clustering for Competitiveness and Poverty Reduction in Tanzania. Department of Engineering Management and Entrepreneurship.

The Earth Science Programme 2009-2013. Department of Geology.

The Food Security Programme 2009-2018. Faculty of Science and College of Engineering and Technology.

The Marine Science Programme 2009-2013.

UDSM – Sida cooperation programme. Progress report July 2012 to June 2013.

UDSM Intellectual Property Policy, 2008

UDSM Research Ethics Policy and Operational Procedures, October 2010

Sida programme documents

Continued bilateral research cooperation with Tanzania 1 July 2009 to 30 June 2013.

Fortsatt forskningssamarbete med Tanzania 2004-2007.

Main achievements during 31 years of bilateral research cooperation (1977-2008).

Sida's assessment and approved budget for the continued research cooperation with Tanzania for the period July 2009 – June 2013.

Stöd til fortsatt forskningssamarbete med Tanzania 1998-2000.

Support to national research development, Guidelines. Edition 2008

Sweden-Tanzania Cooperation

General

Boeren, Ad et.al. (2006). Sida/SAREC Bilateral Research Cooperation: Lessons Learned. Sida Evaluation 06/17.

Eduards, Krister. (2006). Review of Sida's Research Cooperation. Synthesis Report. Sida Evaluation 06/57.

Elsevier (2014). *Scopus*. Retrieved February 11, 2014, from <http://www.scopus.com/>

Fellessen, Måns & Paula Mählck (2013). Mobility and Institutional Change in the Swedish Development Support to Research Capacity Building in Mozambique. Nordiska Afrikainstitutet.

Greenberg, Alan. (2007). Assessment of Comparative Advantages of Swedish ICT Support in Tanzania. Sida Evaluation 07/47-

Hyden, Gøran. (2006). University and Faculty Research Funds at Universities in Mozambique, Tanzania and Uganda. Sida Evaluation 06/23.

Rath, Amitav et. al. (2012). Evaluation of Sida's Support to Innovation Systems and Clusters. A Research Cooperation Initiative. Sida.

Rath, Amitav et. al. (2012). Evaluation of Sida's Support to Innovation Systems and Clusters. A Research Cooperation Initiative. Sida.

Sall, Ebrima et.al. (2004). A Report on an Inventory. Social Sciences in Mozambique, Tanzania, Uganda and Zimbabwe. Sida.

SCImago. (2007). SJR — SCImago Journal & Country Rank. Retrieved January 15, 2014, from <http://www.scimagojr.com>

Sida, November 2011, Establishing a Research University in Honduras

Sida. Research for development. Policy for research in Swedish development cooperation 2010-2014 and Strategy for Sida's support for research cooperation 2010-2014.

The World Bank (2014). *The World Bank Open Data Database*. Retrieved January 15, 2014, from <http://data.worldbank.org/>

United Republic of Tanzania (2010). National Strategy for Growth and Reduction of Poverty II. Ministry of Finance and Economic Affairs.

URAP (2014). *University Ranking by Academic Performance*. Middle East Technical University. Retrieved February 11, 2014, from <http://www.urapcenter.org/>

Veronica B. Gyberg (2013). Aiding science. Swedish research aid policy 1973-2008. Linköping University.

Annex 4: Basic Data and Information

BASIC DATA AND INFORMATION	Sida original Budget	Revised Budget	Received (total in SEK by Jan 2014)	Total Expendi- ture (SEK)	% utilised budget
UNIVERSITY OF DAR ES SALAAM					
School of Post graduate					
Studies	17 780 000,00	17 780 000,00	10 951 637,00	5 625 832,95	32 %
Research Management	1 500 000,00	1 500 000,00	1 075 586,00	1 402 466,23	93 %
Faculty Core Support	5 200 000,00	5 200 000,00	3 314 553,00	3 474 425,11	67 %
Library	7 000 000,00	5 128 000,00	2 955 022,00	2 715 787,43	53 %
Integrated Natural Re- sources Mgt	10 400 000,00	5 738 000,00	4 284 322,00	4 436 386,81	77 %
Food Security	4 200 000,00	3 672 000,00	2 472 769,00	2 205 516,26	60 %
Faculty of Commerce and Mgt	15 200 000,00	7 755 101,00	4 792 922,00	4 115 416,19	53 %
Marine Sciences	17 200 000,00	13 595 900,00	7 760 559,00	11 440 870,19	84 %
Empowering languages	6 100 000,00	5 368 000,00	3 170 064,00	3 731 578,98	70 %
ICT	3 500 000,00	2 344 500,00	1 544 076,00	915 352,84	39 %
Earth Science Pro- gramme	5 900 000,00	5 206 700,00	3 374 208,00	3 275 288,57	63 %
Rural and Urban Infra- structure	1 700 000,00	10 463 000,00	6 078 643,00	no data	no data
Renewable energy	8 600 000,00	5 604 000,00	3 779 318,00	no data	no data
Others	6 810 000,00	753 000,00	753 000,00	9423500	no data
Sub total	111 090 000,00	90 108 201,00	56 306 679,00	52 762 421,55	59 %
MUHIMBILI UNIVERSITY					
Health systems research	4 600 000,00	4 600 000,00	2 582 250,00	2 695 534,00	59 %
HIV/TB	10 400 000,00	10 400 000,00	7 828 631,00	4 629 666,00	45 %
Malaria	5 400 000,00	5 400 000,00	4 009 500,00	4 325 734,00	80 %
Reproductive health	8 000 000,00	8 000 000,00	5 325 232,00	4 164 240,00	52 %
Research capacity strengthening	11 000 000,00	11 000 000,00	8 835 000,00	7 137 597,00	65 %
Library	3 400 000,00	3 400 000,00	2 300 000,00	2 620 894,00	77 %
Sub total	42 800 000,00	42 800 000,00	30 880 613,00	25 573 665,00	60 %
ARDHI UNIVERSITY					
Research projects	11 100 000,00	11 100 000,00	9 760 495,00	9 760 495,00	88 %
Post graduate training	500 000,00	500 000,00	415 405,00	415 405,00	83 %
Research funds&misc	1 200 000,00	1 200 000,00	1 124 100,00	1 124 100,00	94 %

ANNEX 4: BASIC DATA AND INFORMATION

Sub total	12 800 000,00	12 800 000,00	11 300 000,00	11 300 000,00	88 %
COSTECH					
Capacity development	17 000 000,00	17 000 000,00	5 402 801,00	9 678 466,00	57 %
Cluster initiative	6 000 000,00	6 000 000,00	5 712 502,00	2 640 592,00	44 %
Sub total	23 000 000,00	23 000 000,00	11 115 303,00	12 319 058,00	54 %
GRAND TOTAL	189 690 000,00	168 708 201,00	109 602 595,00	101 955 144,55	60 %

BASIC DATA AND INFORMATION	Masters			Ph.D.s			Peer reviewed publication	Presentations in international conference
	Enrolled	Completed	Ongoing	Enrolled	Completed	Ongoing		
UNIVERSITY OF DAR ES SALAAM								
School of Post graduate Studies	29	0	29	24	0	19		
Research Management	0	0	0	0	0	0		
Faculty Core Support	0	0	0	0	0	0		
Library	12	9	3	3	0	3		
Integrated Natural Resources Mgt	27	3	24	3	0	5		
Food Security	5	0	5	0	0	0		
Faculty of Commerce and Mgt	10	0	10	19	5	14		
Marine Sciences	46	19	27	50	11	49		
Empowering languages	24	4	20	0	0	0		
ICT	6	0	6	0	0	0		
Earth Science Programme	4	1	3	1	0	1		
Rural and Urban Infrastructure	4	1	3	7	0	7		
Renewable energy	15	3	12	6	0	6		
Others								
Sub total	182	40	142	113	16	104		
MUHIMBILI UNIVERSITY								
Health systems research	1	0	1	2	0	2	8	2
HIV/TB	1	0	1	10	3	6	39	13
Malaria	3	3	0	6	3	3	44	6
Reproductive health	1	1	0	4	0	4	23	5
Research capacity strengthening	5	0	5	10	3	7	12	
Library							6	15
Sub total	11	4	7	32	9	22	132	41
ARDHI UNIVERSITY								
Research projects								
Post graduate training	6	4	2	6	0	6	10	6
Research funds&misc							11	15
Sub total	6	4	2	6	0	6	21	21
COSTECH								

ANNEX 4: BASIC DATA AND INFORMATION

Capacity development	3	3	0	1	0	1		
Cluster initiative								
Sub total	3	3	0	1	0	1		
TOTAL	202	51	151	159	25	133	92	37



Evaluation of the Swedish Research Cooperation with Tanzania 2009-2013

SWEDISH INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

Address: S-105 25 Stockholm, Sweden. Office: Valhallavägen 199, Stockholm

Telephone: +46 (0)8-698 50 00. Telefax: +46 (0)8-20 88 64

E-mail: info@sida.se. Homepage: <http://www.sida.se>

