

THE ROLE OF UNIVERSITIES
IN INCLUSIVE INNOVATION
Cluster development in East Africa

Edited by
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Contents

List of abbreviations	4
Introduction	
<i>Birgitta Rydhagen and Lena Trojer</i>	5
Chapter 1: PACF and scientific leadership	
<i>Professor Burton Mwamila</i>	9
Chapter 2: Innovation in East Africa. Necessary, desirable, self-evident	
<i>Birgitta Rydhagen</i>	21
Chapter 3: Experience of the Tusife Moyo women cooperative as a member of the Zanzibar Seaweed Cluster Initiative	
<i>Hawa S. Khamis and Tatu J. Fumu</i>	29
Chapter 4: Researcher as cluster facilitator: experience from Mode 2 research	
<i>Flower E. Msuya</i>	35
Chapter 5: When society speaks back. Relevance issues for research in cluster contexts in low income countries	
<i>Professor Lena Trojer</i>	47
Chapter 6: Universities can play enhanced roles in cluster initiatives	
<i>Julius Ecuru</i>	59
Chapter 7: Voices from Katwe Salt Lake Cluster Initiative	
<i>Jennifer Kabarangira</i>	65
Chapter 8: Lake Katwe Salt Cluster	
<i>Balu-Tabaaro</i>	77
Chapter 9: Could aid donor agencies support innovation? Lessons from Swedish aid politics and practices	
<i>Tomas Kjellqvist</i>	81
Further reading and information	97

List of abbreviations

BTH	Blekinge Institute of Technology
CoET	College of Engineering and Technology, UDSM
COSTECH	Tanzania Commission for Science and Technology
IMS	Institute of Marine Sciences, UDSM
IPR	Intellectual Property Rights
ISCP-EA	Innovation Systems and Clusters Programme in Eastern Africa
JICA	Japan International Cooperation Agency
MDG	Millennium Development Goals under the UN
NGO	Non-Governmental Organization
NM-AIST	Nelson Mandela African Institution of Science and Technology
PACF	Pan-African Competitiveness Forum
R&D	Research and Development
SADC	Southern African Development Community
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SCF	SMEs Competitiveness Facility
SICD	Scandinavian Institute for Collaboration and Development
Sida	Swedish International Development Cooperation Agency
SME	Small and Medium Enterprises
TCI	The Competitiveness Institute
UDSM	University of Dar es Salaam
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
USAID	U.S. Agency for International Development
VINNOVA	Swedish Agency for Innovation Systems

Introduction

Birgitta Rydhagen and Lena Trojer

This book is dedicated to the cluster members in East Africa who use mundane technologies in new and innovative ways to improve livelihoods and working conditions in financially limited contexts. In the anthology, we are proud to present contributions from distinguished persons engaged in cluster initiatives in different roles. We acknowledge financial support from Sida u-forsk research project SWE-SP2010-005.

Innovative cluster initiatives are promoted under the umbrella of PACF, Pan-African Competitiveness Forum, in collaboration with SICD, Scandinavian Institute for Collaboration & Development. The ambitions are to boost innovation in small-scale business through Triple Helix processes between groups of businesses, government and research institutions. The processes have been described and discussed in several publications during the latest years. This anthology contributes to the discussion with a specific focus on the role of universities and researchers in the Triple Helix processes in East African cluster initiatives. The authors are active in PACF and/or SICD in different roles – as researchers, government partners or entrepreneurs in cluster initiatives. The collection of texts is a result of a Sida funded research project with a particular focus on the research component of cluster initiatives. The research project forms a smaller and more academic part of the larger collaboration between PACF and SICD – between East African and Swedish innovation partners.

Two points of departure are distinct in the collection. First of all, innovation is understood in its widest sense, including stepwise changes and improvements in daily activities. We argue that support to innovative individuals and businesses must be socially inclusive, in the sense that the most vulnerable actors and local needs are not ignored in favour of market oriented activities and global competitiveness. Nevertheless, dif-

ferent activities will always need to balance between the commercial and international business requirements and the local community context. Secondly, the academic ambitions are deeply embedded in the understanding of knowledge production taking place in the context of application and implication. We regard science as an important part of society, in which robust and context relevant knowledge is collaboratively produced. Those of us who are researchers have consciously become involved in reality producing processes in our respective contexts.

With this ambition, we have invited actors in the cluster initiative sphere to provide their personal and professional experiences of the research component in clusters development. The collection of contributions is presented below.

Professor Burton Mwamila was one of the pioneers in PACF establishment on national, regional and pan-African level. He is presently Vice Chancellor at Nelson Mandela African Institution of Science and Technology in Arusha, Tanzania. He is the chairman of the PACF executive board. In his chapter, he presents the process of establishing cluster initiatives in East Africa under ISCP-EA (Innovation Systems and Clusters Program – East Africa) and PACF. The economic benefits are exemplified. Other positive outcomes both in general and within universities are described. In particular, it is interesting to follow the development of the NM-AIST and the graduate programmes related to innovation and entrepreneurship that has started.

Birgitta Rydhagen is associate professor in Technoscience studies at Blekinge Institute of Technology in Sweden. She is the main researcher in the project on role of universities in cluster initiatives. In her chapter, she goes through a number of theoretical underpinnings of socially inclusive innovation. Although innovation and entrepreneurship are always present, they were formalized and intensified through a conscious shift to Mode 2 knowledge processes within university departments. Environmental sustainability is raised as a particular concern that university actors can bring into the innovation processes.

Hawa S. Khamis and **Tatu J. Fumu**, are active members in the Tusife Moyo Women Cooperative Group in Zanzibar, Tanzania. They are experienced seaweed farmers and active in the Zanzibar Seaweed Cluster Initiative. In Chapter 3, we are given several examples of what the cluster initiative has contributed in terms of business development and increased social and economic security. New farming techniques as well as product development have been pursued in close collaboration with academia.

Flower E. Msuya is a researcher at Institute of Marine Sciences, UDSM, in Zanzibar. She has a long-term commitment to research and development in seaweed farming. She is the facilitator of the Seaweed Cluster Initiative, teacher in the PACF/SICD cluster training team and a member of the PACF national steering committee. She provides insights into the opportunities of combining scientific research with participation in societal development. Her research is clearly Mode 2 and has focused on both participatory farming experiments and incorporation of experts and farmers in production and marketing of various seaweed products. The work has inspired research colleagues to enter into similar research activities.

Professor Lena Trojer is director of SICD and head of research at Department of Technology and Aesthetics, BTH, and holds a chair at the Research Division of Technoscience Studies, BTH, since 1999. From 2004 and onward she has worked in the Swedish collaboration team (became SICD in 2008) for development of innovation systems and cluster initiatives in Africa and later Latin America. Trojer raises the importance of Mode 2 research in co-evolving processes where society and a variety of stakeholders demand active partnership in research processes at all stages. This is relevant in both developed and developing contexts. In the end, a balance between profit and stability for local communities is raised as an important concern in further cluster development.

Julius Ecuru has a doctoral degree in the field of innovation system and development at Makerere University and at BTH. He has long-term experiences in cluster development. Doctor Ecuru is both a researcher as well as assistant executive secretary of Uganda National Council for Science and Technology. His chapter reveals positive trends in economic development in African countries, and in development of higher education sector in these countries. These changes constitute a basis for the success of cluster initiatives that are formed at an increasing rate. The role of universities has not been primarily to conduct research so far, but rather to form the structures for cluster establishment and entrepreneurial thinking. The roles in the triple helix processes are thus still changing in dynamic ways.

Jennifer Kabarangira is treasurer of the board of directors in the Lake Katwe Salt Cluster Initiative in Uganda. She is also a teacher and the owner of salt pans in the lake. Kabarangira presents the cluster she is active in, and she has also collected stories from several cluster members representing different groups in the cluster. It becomes evident that salt production is both the most important source of income and a way of living that is vulnerable in current economic structures. In her chapter, the different time perspectives between business and research become visible, since cluster members expect faster and more concrete results than many research projects provide.

Balu-Tabaaro is a mining engineer with specialization in mineral dressing. He formerly worked at the Department of Geological Survey and Mines Uganda. He retired in 2009 as Assistant Commissioner for Laboratories after 30 years of service. Currently he heads GeoEngineering Technologies, a private company carrying out research and development of engineering materials. He is also chairman of Lake Katwe Salt Cluster Initiative in Uganda. Chapter 8 exemplifies the opportunities of bringing in complex business-related issues into cluster development through the research component. Examples are health, working conditions and environmental protection, which often require collective action and collaboration between outside expertise and local community.

Tomas Kjellqvist is a researcher at the research division of Technoscience studies, BTH. He is former head of the research department at Swedish International Development Cooperation Agency. In the final chapter, he shares his long-term experience of development cooperation, in particular concerning research capacity building. Innovation is related to the concept of evolution taking place through mutations and thus in

partly unpredictable and non-linear ways. Moving innovation into the development collaboration was not a smooth process, but has found its ways through different organisations. The political game in Swedish development cooperation is discussed in relation to collaboration on innovation systems.

Chapter 1

PACF and scientific leadership

Burton Mwamila

Introduction

Clustering is a natural phenomenon which can be optimized to promote economic growth and maximize the economic benefits accruing to cluster members. Informal sector actors often concentrate themselves in clusters with insignificant collaboration and joint learning. Although the individuals or groups of individuals in the cluster are able to make their ends meet somehow, they are unable to grow because of lack of a joint vision. For a natural cluster to grow appreciably, it has to be transformed or transform itself into a cluster initiative, viz. an intervention to instil dynamism in the cluster and make it more innovative. Enhanced innovativeness then enables the cluster to come up with new and/or improved products, processes or services. It also facilitates improved quality, efficiency, cost-effectiveness, etc. and hence achievement of competitiveness and economic prosperity. If a critical mass of natural clusters in the informal sector transform themselves or are transformed into cluster initiatives the impact in form of national economic growth, employment generation and reduction of poverty will be significant.

Clustering is a process of firms and other actors co-locating within a concentrated geographical area, cooperating around a certain functional niche, and establishing close linkages and working alliances to improve their collective competitiveness. Clusters provide an excellent nexus/environment for innovation to thrive from interactive learning among actors, which may be optimized through cluster initiatives. Clusters are building blocks for modern economic development (Michael Porter, 1990). In most developing countries' setting, cluster firms are small and medium enterprises.

A cluster initiative (CI) is an organized effort (intervention) to increase the growth and competitiveness of a cluster within a region, involving cluster firms, government and/or the research community (academia) – the Triple Helix (3H). The intervention is intended to instil dynamism in a cluster and cluster firms, and make them more innovative, competitive, expand business and grow. Acquisition of innovativeness and competitiveness, and expansion of business by a critical mass of such small and medium enterprises may contribute significantly to growth of a nation's economy.

A country's wealth is in direct proportion to the number of its small businesses. In fact, the USA leads the world in terms of small businesses followed by Japan and Europe, and this is reflected in their GDPs. Grand corporations may well employ thousands or even hundreds of thousands of people, but small businesses employ millions – and it is these millions that create the real wealth of nations.¹

Practices show that clustering almost always enhances value-addition and the competitiveness of the businesses operating in clusters. A study carried out in 2003 involving 260 clusters initiatives around the world revealed that as many as 85 percent of cluster initiatives were rated as having increased the competitiveness of cluster firms (Sölvell, Ketels and Lindqvist, 2003).

From TCI Gothenburg to ISCP-EA

The idea to establish the Innovation Systems and Clusters Programme in Eastern Africa (ISCP-EA) was conceived in September 2003 when ten Eastern Africans from Tanzania, Uganda and Mozambique attended the 6th Global Conference on “Innovative Clusters: A new Challenge”, which was jointly organized by The Competitiveness Institute (TCI) and the Swedish Agency for Innovation Systems (VINNOVA), in Gothenburg, Sweden. The focus of the conference was on the development of methodologies and policies for building innovative clusters and innovation systems. The ten Eastern Africans, who were sponsored by Sida, represented the three main triple helix constituents of the national innovation systems in their respective countries led by the academia at the College of Engineering and Technology of the University of Dar es Salaam, Faculty of Technology of Makerere University, and Faculty of Engineering of the University of Eduardo Mondlane. The three academic institutions had been active partners in a Sida sponsored engineering research collaboration project since 2001.

Greatly inspired by presentations and discussions at the 6th TCI Global Conference, the ten Eastern African participants resolved to put to practice what they learnt. It was the desire to see an end to the economic misery and poverty in our Eastern African countries and the belief that innovative clusters can indeed facilitate the same which prompted the East Africans to take that bold step. The Gothenburg conference inspired the participants from Eastern Africa so much that they requested Sida to sponsor the organization of a replica of the conference in and for Eastern Africa. The request was granted by Sida and the 1st Regional Conference on Innovation Systems

¹ PAA Magazine (Tanzania), January- March 2012.

and Innovative Clusters in Africa was held in Bagamoyo, Tanzania, February 18-20, 2004, on the theme "Innovation Systems and Innovative Clusters in Africa". It was a great success and it resulted in the initiation of the Innovation Systems and Clusters Programme in Eastern Africa (ISCP-EA). One unique characteristic of the Bagamoyo conference was its primary intention of coming up with an action plan for the development of innovation systems and innovative clusters in the three African countries, which can also be adapted to the condition of any other African country. ISCP-EA and the three national chapters, namely; ISCP-Tz, ISCP-Ug and ISCP-Mz became operational in 2005.

Since the birth of ISCP-EA in Bagamoyo, February 2004, the following developments have taken place:

1. Five more Regional Conferences were organized - March 2005 in Jinja (Uganda), September 2006 in Dar-es-Salaam (Tanzania), December 2007 in Kampala (Uganda), August 2008 in Maputo (Mozambique), and October 2009 in Dar es Salaam (Tanzania);
2. Start-up National Stakeholders Workshops were organized in each of the three countries - 2004 in Uganda, and 2005 in Tanzania and Mozambique;
3. National Steering Committees were formed in the three countries to oversee implementation of ISCP-EA;
4. Week long training of Cluster Facilitators have been conducted in each of the three countries, on the Development of Innovation Systems and Clusters;
5. Pilot cluster initiatives were launched in 2005/06 - eight in Tanzania and seven in Uganda; and
6. 2nd batch of cluster initiatives were launched in 2007/08 - 11 in Tanzania, 15 in Uganda and eight in Mozambique.

The ISCP-EA was initially a wholly university led regional initiative, which started in 2004 and was being implemented collaboratively in three Eastern African states, namely Mozambique, Tanzania and Uganda. It was initially coordinated and spear-headed in each of the three countries by respective Faculties of Engineering/Technology of the Universities of Eduardo Mondlane, Dar es Salaam and Makerere. The main objective of ISCP-EA was to stimulate, catalyse and promote the development of innovation systems and innovative clusters in Eastern Africa, and thereby facilitate speedy socio-economic development and poverty reduction. The programme was intended to enable the universities to fulfil their mandate of reaching out and impacting on societal development by stimulating, catalysing and promoting generation of solutions to solve problems that confront their respective societies instead of remaining as "ivory towers".

The 49 cluster initiatives which were established in 2005, 2006 and 2007 (in the three Eastern African countries) were evaluated by both the National Steering Committees and the VINNOVA Team in 2007, and the results were very encouraging. The following are some of the observed emerging positive cluster development trends:

1. The volunteer facilitators were clearly appreciating their role:
2. They were well motivated to continue, and they would strongly recommend to their colleagues that they also volunteer to become "cluster facilitators"

3. Between them a considerable effort had been allocated to cluster development - over 2,000 days in a year;
4. Almost all facilitators reported that trust amongst their clusters' stakeholders had improved;
5. There had been an increase in purposeful collaboration and knowledge interactions
6. New activities had taken place as a direct result of the programme;
7. 97 percent of facilitators saw the initiative as making a substantial difference to the competitiveness of their cluster;
8. The growth opportunity for the clusters was observed to be considerable:
9. Many had grown in turn-over at 20-30 percent annually over the last 2-3 years
10. Facilitators saw the opportunity for the growth to rise to 40-50 percent a year for those clusters if all goes well
11. University staff members from different faculties were observed to be working together with a variety of cluster actors, building various capacities while at the same time members of the academia were learning the practical uses of their theoretical knowledge and in the process becoming more effective lecturers;
12. The pool of facilitators and the network of individuals from universities, government and the private sector, interested in innovation systems and clusters, was observed to be growing fast;
13. The programme was acknowledged as one that was gaining wide visibility, and in most cases was successfully influencing politicians, government agencies and NGOs;
14. Facilitators acknowledged the active participation of their National Steering Committees.

The evaluation also observed the following major challenges to continued development of clusters with regard to innovation, productivity and competitiveness are:

1. Demand for scaling-up of cluster initiatives with exemplary performance;
2. Some of the initiatives remained slow moving;
3. Almost all initiatives had benefited from research institute/university collaboration, however:
4. 2/3 of the facilitators viewed lack of appropriate technology as a major inhibitor
5. Some 3/4 of the clusters are struggling to add further value to their products
6. Most firms of the clusters had difficulty in accessing funds from financial institutions
7. Some 60 percent of the facilitators reported poor workforce skills
8. Transport costs and lack of market development were major inhibitors to growth;
9. The facilitators would particularly welcome the opportunity to learn from other facilitators - they were also expecting to receive further training beyond the initial five days;
10. Need for training on general management, business skills, and intellectual property matters among clusters actors so as to turn the cluster firms into real business entities expected to yield high quality products/services that can generate reasonable wealth;
11. Motivating and incentivizing cluster facilitators;

12. Continuous monitoring and resourcing of established cluster initiatives;
13. Mainstreaming innovation and cluster based competitiveness thinking in government and private sector organizations;
14. Expanding engagement with government support agencies.

From ISCP-EA to PACF

It was the successful implementation of ISCP-EA and presentations on the same at subsequent TCI Conferences that inspired the establishment of the Pan African Competitiveness Forum (PACF). PACF was launched on April 16, 2008 as a new continent-wide competence and action centre for innovation and cluster based competitiveness initiatives for national and regional economic development in Africa. The launch of PACF took place at the end of its first and very successful conference in Addis Ababa, April 14-16, 2008. The Conference was organized and sponsored by the African Union (AU) and the Swedish International Development Cooperation Agency (Sida) in collaboration with The Competitiveness Institute (TCI). It was attended by 110 people drawn from business, knowledge institutions, non-government, and government agencies and organizations from 22 African and 10 other countries.

The establishment of PACF was prompted by the desire to see Africa develop sustainably and achieve the Millennium Development Goals within the foreseeable future.

Mobilization towards getting PACF established took place in stages as follows:

- Early 2006 the late Prof. John Bosco Turyagyenda participated in a seminar on “partnerships4competitiveness” organized in Ghana;
- In April 2007 a “Seminar on Pan-African Competitiveness” took place in Addis Ababa with participants from Ethiopia, Ghana, South Africa, Tanzania and Uganda, AU, UNIDO, USAID, JICA;
- In September 2007 proponents of innovation and cluster based competitiveness initiatives in Botswana, Ethiopia, Ghana, Mauritius, Mozambique, South Africa, Tanzania and Uganda convened in Cape Town together with representatives from Sida, VINOVA, USAID, World Bank and SADC;
- In January 2008, a PACF preparatory meeting was held during the All African Leather Fair in Addis Ababa.
- Finally, on April 14-16, 2008 the 1st PACF Conference was held in Addis Ababa.



Figure 1.1. Participants of the Inaugural PACF Meeting, in Addis Ababa, April 14-16, 2008

PACF Vision, Mission, Objectives and Strategies

Vision, Mission and Objectives of PACF

The Vision of PACF shall be; “To be the leader in promoting competitiveness for socio-economic development in Africa through innovation and cluster based initiatives”.

The Mission shall be; “To stimulate, catalyse and promote the development of innovation and cluster based competitiveness for poverty reduction, wealth creation and sustainable development of Africa”.

The objectives of PACF as conceived in Addis Ababa in 2008 were as follows:

1. To stimulate Africa’s competitiveness through enhanced innovation and cluster based competitiveness initiatives.
2. To facilitate mainstreaming of innovation and cluster-based competitiveness initiatives in national, regional and continental business development policies, strategies and programmes.
3. To promote continental and global collaboration and partnerships in the development of cluster initiatives.
4. To provide a platform for knowledge sharing and the building up and expansion of the knowledge base on clusters and cluster based development initiatives in Africa.

On an overall level innovation and cluster-based initiatives aim to increase the number of linkages between stakeholders and the frequency with which the stakeholders engage into collaborative activities. The scope of collaboration targets enhanced knowledge and capacity building that can translate into increased innovation, value addition in production and services, and competitiveness.

The rationale is that the more linkages and collaboration between triple helix stakeholders, the higher the knowledge transfer and the better will be the preconditions for enterprises to innovate, to add value in production and thereby to increase com-

petitiveness. Increased enterprise competitiveness will produce more jobs and higher incomes, thereby spurring socio-economic development and poverty reduction.

By pioneering this kind of collaborative activities in East Africa and by facilitating an overall platform for collaboration and learning on the Pan-African level, it was expected that Sida's commitment to advanced university-led innovation and cluster-based initiatives would meet matching support for similar activities by other development partners in other countries and regions in Africa – thereby making an important contribution towards realizing the objectives of the Paris Declaration on aid effectiveness.

PACF strategies

On the Pan African level the initiative was expected to provide a continental platform for collaboration and learning on facilitation and implementation of innovation and cluster-based initiatives. The programme would serve as a vehicle for dissemination of good practice (in particular the good practice demonstrated by the ISCP-EA in Tanzania, Uganda and Mozambique,). In doing so the initiative was expected to make a significant contribution to add momentum to a large number of innovation and cluster-based initiatives throughout the African continent.

With this, the initiative was further expected to make a push towards mainstreaming of such initiatives into growth and poverty reduction strategies. Also, by seeking the collaboration of governments and development partners throughout the continent, the initiative would respond both to the Paris Declaration on aid effectiveness and Millennium Development Goals (in particular those MDGs that concern poverty eradication and development of global partnerships).

At the 1st Pan African Competitiveness Forum in Addis Ababa in April 2008 the participants agreed to adopt the following strategies:

- Develop and implement knowledge and collaboration services that ensure that PACF is perceived by stakeholders as an effective focal point for exchange of experience; learning; and development of cluster and competitiveness initiatives.
- Develop and implement an effective PACF collaboration structure that supports stakeholders in more effectively realizing individual and joint objectives on competitiveness.
- Support the initiation of new cluster initiatives throughout Africa, potentially as many as 1,000 cluster initiatives, within the foreseeable future, through implementation of a series of competitions at national, regional and continental levels. The design and implementation of the competitions would in part base on lessons and experiences derived from the Swedish VINNVÅXT programme but taking into account cultural and socio-economic realities in the African continent. The competitions were expected to stimulate and catalyse speedy development and mainstreaming of innovation and cluster-based initiatives into economic development strategies in a large number of African countries.
- Collaborate with a number of global partners whose activities are related to research based innovation and cluster competitiveness.

Mainstreaming innovation and cluster-based competitiveness mind-set in government, academia and businesses

One of the objectives of PACF has been to facilitate mainstreaming of innovation and cluster-based competitiveness thinking in national, regional and continental business development policies, strategies and programmes. This has entailed getting all key constituencies, namely government, academia and businesses to appreciate, adopt and embrace innovation and cluster-based competitiveness thinking in their development policies, strategies and programmes. As far as the government is concerned, this has entailed incorporation of innovation and cluster-based competitiveness thinking in key policies, strategies and development plans. For the academia, it has entailed incorporation of innovation and cluster-based competitiveness thinking in the development of training curricular and actual mounting of related training programme. The Nelson Mandela African Institution of Science and Technology (NM-AIST) is already developing Master's and PhD degree programmes to be mounted soon. For businesses, successful mainstreaming of innovation and cluster-based competitiveness thinking should result in change of mind-set in favour of enhanced innovation, co-opetition, and quality consciousness.

Seizing emerging opportunities

Cluster development provides opportunities in areas of policy, enterprise and national competitiveness, academia, local and international collaboration. It is thus important for the existing and new national economic initiatives to incorporate existing cluster initiatives in their planning. For example the planning of Southern Agricultural Growth Corridor of Tanzania (SAGCOT) and its execution would benefit a great deal from consideration of the cluster initiatives in those areas covered by the program.

The scope for review of the current policies related to Science, Technology and Innovation; industrial development and agriculture development, offers an opportunity to rethink development strategies to enhance national competitiveness through cluster based approaches.

Cluster initiatives offer an effective platform for promoting innovation based frameworks focusing on factors integrating enterprise level competitiveness to national competitiveness. This opportunity demands a thorough appreciation of the fact that cluster initiatives are vehicles for realising policy objectives geared towards enhanced economic development and global competitiveness of the national economy.

The current global trend towards knowledge economy offers scope for academia to spearhead not only the quest for new knowledge but also the application of available knowledge to generate new solutions in terms of products and services to address current and future human problems. Cluster initiatives provide academia with opportunities to engage with society and identify challenges in society needing solutions best addressed through knowledge interventions.

Inter-institutional linkages provide opportunities for knowledge exchange and capacity building. Inter-cluster collaboration provides for cross-cluster problem solving with mutual benefits to collaborating cluster initiatives and institutions.

Stimulating further development of CIs

In order to speed up the establishment of cluster initiatives across Africa, the PACF Council has resolved to light 1,000 or more cluster fires across Africa within the foreseeable future. Further, in order to achieve this rather high ambition the PACF Council resolved to adopt a strategy of initiating cluster competitions - "the 1,000 cluster fires competitions". The competitions are expected to stimulate and catalyse excitement and desire, among the various actors, to establish cluster initiatives and hence participate in the same. The competitions are intended to be a permanent feature so as to provide opportunities for and instil hope to losers of winning next time around. This way the competitions will stimulate and catalyse the establishment of more innovation and cluster based initiatives, and therefore enable PACF to achieve the objective of lighting 1,000 cluster fires or more across Africa within the foreseeable future. The 1,000 cluster fires and the spirit of competition instilled onto the cluster initiatives and their proponents will in turn stimulate and catalyse their speedy development. Initially, the competitions will enable the establishment of a solid foundation for the development of local enterprises and their competitiveness. Subsequently, the competitions will stimulate and catalyse the development of a competitive and dynamic local industry. This bottom-up approach is expected, in a very sustainable way, to stimulate and catalyse actual engagement of actors on the ground and thereby result in the creation of jobs and hence contribute to poverty reduction, as well as generate wealth for national socio-economic development.

Research in support of innovation systems and cluster development

So far, cluster development in Eastern Africa and Africa generally has not benefitted much from research even though the initiative has been academia-led. The initial thrust was sensitization and training, and the establishment of cluster initiatives. Research has so far been confined to generating technological solutions to simple problems encountered by cluster firms in the course of carrying out their activities. There are, however, very many issues related to cluster development that need serious research to thrash out. There is thus, obviously room for a much wider scope for research in innovation systems and clusters, including providing answers to the following:

- Achievement of competitiveness through enhanced innovation and cluster based competitiveness initiatives, and what that enhancement entails.
- Modalities of knowledge sharing for optimum results, and the building up and expansion of the knowledge base on clusters and cluster based development initiatives in Africa.

- Seizing the opportunities availed by clustering for transforming the vicious circle on low knowledge base in low income countries into a virtuous circle.
- Promoting innovations through (i) change of mind-set in favour of quality consciousness, productivity and competitiveness; (ii) adoption and embracing of co-opetition; and (iii) abhorrence of complacency and the dependency syndrome.
- How clusters are indeed building blocks for modern economic development in developing countries settings.
- Promoting co-opetition among clusters for mutual benefits and common good.

There are two main challenges which limited the extent of research undertaking on innovation systems and clusters in the case of ISCP-EA and PACF. First, resource mobilization efforts did not succeed to raise the funds needed to embark on significant research undertakings. Diversification of sources of funds for the ISCP-EA and PACF initiatives has not been that successful. Sida has remained the main supporter of the initiatives, and at some point in time Rockefeller Foundation – efforts to tap into the World Bank’s support for higher education, science and technology in Tanzania did not succeed because the consultant chosen did not want to build on what was already on the ground. The second and more serious challenge is the lack of the required pool of competent researchers to carry out the research. To address this deficiency, later proposals for funding have incorporated a research training component. Furthermore, the Nelson Mandela African Institution for Science and Technology (NM-AIST) in Arusha, Tanzania is planning to mount in 2014 a fully fledged graduate programme (Master’s and PhD), with significant coursework components in Innovation, Technology Management and Entrepreneurship (ITME). This mandate is very clearly stipulated in the NM-AIST Charter 2013. The new ITME programme will incorporate training in Innovation Systems, Cluster Development and Competitiveness. The ITME programme is intended to develop the required pool of competent researchers in, among others, scientific and technological aspects of innovation systems and cluster development. It will mark a significant milestone towards effective mainstreaming of cluster development into academia. This is especially so because the Research and Innovation Agenda (RIA) of NM-AIST is driven by the desire to respond to the needs and problems of the society and the industry through multi-disciplinary teams. In this case, working with clusters will be the approach for identifying their needs and problems.

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Chapter 2

Innovation in East Africa.

Necessary, desirable, self-evident

Birgitta Rydhagen

This chapter is an attempt to raise a few of the basic arguments and components of the cluster initiative process currently taking place in East Africa. My practical experience is limited to research visits in two of the first cluster initiatives (CI); Lake Katwe Salt CI in south-western Uganda and Zanzibar Seaweed CI in Tanzania. Examples in the text are therefore mainly referring to the two CI:s, even if a few other clusters are mentioned. I am convinced that the transformation of business and markets in East Africa benefits from PACF activities, not only or primarily because of contribution to national finances and increased competitiveness on a regional or global level, but because PACF efforts aim towards socially inclusive innovation meaning the local business persons and their wellbeing is in focus. This is not self-evident but needs to be considered and actualized in different procedures in order not to fall into the dominant language of competitiveness without social concern (Arocena and Sutz, 2012). Business success is often measured in money, but in the case of cluster initiatives, other aspects such as self-esteem, status, women's empowerment, collaboration and social networks, increased mobility and capacity, health and environmental protection are central. Capacity and awareness to address these aspects simultaneously with increased economic profit and security is a specific asset that should be recognized and valorised internally and externally.

Innovation as a way of living (surviving)

Entrepreneurship is essential, if we by entrepreneurship mean adjusting and improvising both to current and future conditions. This goes for both professional and private

contexts and relates to both the tools and produce and to the methods and tacit knowledge needed to make something work. Disguised in economic and market language, innovation and entrepreneurial thinking is promoted as something innovative and new.

In East African communities, where public social security networks are recent and often inadequate, individuals and households need to be innovative in order to provide necessities for their families in a mix of formal and informal methods. Self-sustenance farming is combined with petty trading of vegetables or food, sewing or building construction, farm labour, domestic work etcetera. A rather modest portion of financial transactions pass through the official system with tax revenues and tax financed services.

As Yesuf and Bluffstone (2009) state, poor farmers in a low income nation live risky lives, since there is no third party that can take on the risk. It is known from different studies that risk taking and risk aversion is correlated to gender (Byrnes *et al*, 1999; Brick *et al*, 2012), to age (Byrnes *et al*, 2009), to socio-economic power (Anderson and Galinsky, 2006), alternative off-farm sources of income (Teklewold and Köhlin, 2011) and to long-term resource security as in land tenure (Teklewold and Köhlin, 2011) or fishing rights (Brick *et al*, 2012). Persons with fewer alternative options and lower level of income security tend to be more risk averse and at the same time have lower engagement in long-term protective measures (Teklewold and Köhlin, 2011) and a lower compliance with regulations (Brick *et al*, 2012). In short, these studies suggest that persons with few alternatives seem to be less willing to take risks, but in reality, they do take risks when they undertake informal income generation without security, over utilize common resources and fail to preserve resources such as soil or fish stocks. This will have consequences when clusters are formed, business is formalized and public requirements become more integrated in the processes.

Mytelka (2000) defined innovation as a process of mastering and implementation of design and production of new goods and services, even such that are already available in other locations or businesses. Lundvall (2007) clarifies this by emphasizing that innovative learning occur both through more formal *science, technology* and *innovation*, and through *doing, using and interaction* in practical situations. As Oyelaran-Oyeyinka and McCormick (2007) state, most innovation is incremental, and in particular in limited economic contexts, small steps are both more viable and preferable since small business can only control modest changes. Therefore, it is also important to note that domestic investments and innovations are more beneficial than foreign investments, which often require advanced technological knowhow and a quick financial turnover that is not available in low-income economies (Fu *et al*, 2011).

Formal and informal business

With the increasing integration into global markets, East African countries and companies as well as individuals and households are gradually becoming more dependent on the public system of doing things. Integrating family business into the formal mar-

ket on local or national level has both advantages and disadvantages for the household level business. On the pro side are infrastructural support, legal recognition and security, and on the con side are for example taxes, license fees and, in some cases, quality standards. For inadequately educated persons, regulatory frameworks, registration procedures and access to official markets are often difficult to appreciate, access and apply.

The challenges of shifting towards formal structures may well relate to the aversion against taking risks as discussed above. Experience of the value of public support is lacking and hence there is reluctance towards bureaucracy. In many cases, an intermediary organization can provide the necessary motivation and capacity for formalizing local business and innovation. National and international standards can for example be translated into local practices, and legal registration often needs formal institutions as back-up (Dhamankar, 2011). Cluster initiatives have shown to increase motivation of formalizing business in similar ways, thus partly functioning as an intermediary organization. The internal motivation has been decisive in the formalization processes.

Clustering between similar businesses in same location has been suggested as advantageous for innovation especially in low-income business contexts (McCormick and Oyelaran-Oyeyinka, 2007). Coopetition is in this context recognized as a conscious mix between cooperation around common issues such as product development, licenses and infrastructure, and around diversification of products between cluster members to reduce competition and increase available products for marketing, and competition for customers between individual businesses.

In Lake Katwe Salt CI, for example, salt has been extracted in informal structures on local level for several decades. The cluster initiative aimed to increase collaboration and address the increasing needs to adjust to national regulations and increasing local and external pressure on the resource. Registration of a company has been a necessary first step in order to apply for mining license for the salt. These legal procedures and formalization of a traditional and local business requires intensified collaboration and support structures provided by PACF Uganda. Local leadership group members witness about the scepticism among salt workers around the purposes of joining a cluster, who will gain from legal registration of business, how enforcement of environmental regulations may hinder or support individual businesses, etc. Self-interest among leaders as well as government representatives is suspected and the building of trust essential and long term process.

Knowledge in the context of application

East African countries are in a situation where demand for formal, academic knowledge has been weak in the communities, and the availability of context relevant knowledge has been limited. However, increasing numbers of students enter into higher education and the education programs integrate locally, thus making more knowledge available for local development needs.

We acknowledge that higher education institutions in East African countries have identified contribution to development and poverty reduction as a central goal, both

in policy and practice. Several universities in different African countries have begun to include social relevance and community service in the education programs and student training (e.g. Kibwana, 2001; Dzisah, 2011; Irawati, 2011; Rath *et al*, 2011b). Higher education can provide opportunities for local development through teachers and medical staff, for example, but also if researchers and lecturers offer their knowledges to local business as one component in collaborative learning, also named Mode 2 knowledge production.

Mode 2 researchers have been evaluated and proven to publish research of the same quality as Mode 1 researchers, according to Clark (2011). Even while we as researchers struggle with career planning and strategic publishing of scientific papers, it is worthwhile to emphasize this statement. Anchoring research questions and methods in social relevance does not hamper scientific productivity but rather transforms it to the benefit of both society and academia.

In Zanzibar Seaweed CI, marine sciences is the knowledge base for innovation in seaweed farming technologies, but the research has also taken on an interdisciplinary and Mode 2 type of collaborative projects with seaweed farmers and an export company. This has influenced the entire Institute of Marine Sciences, where professors and lecturers address and involve local communities to an increasing extent in ongoing research and student work.

In Lake Katwe Salt CI, Mode 1 disciplinary research is taking place regarding the quality of the salt, but linkages with practical applications and local relevance are mentioned by the involved researchers. This has meant that although the characteristics of salt formation and content have been in focus for researchers, they have indicated locally run, simple techniques that could be applied to improve the salt quality within the community of salt workers. However, this has not been developed in collaboration with the cluster yet (2013).

Formalizing innovation through cluster initiatives

In the East African context, as this collection of essays witnesses about, innovation among farms and firms is gradually developing into a more formal process of cluster initiatives in triple helix constellations. Researchers primarily within science and technology have taken a large responsibility in the establishment of clusters as well as the national and regional network and infrastructure to facilitate collaborative learning. Researchers function as facilitators with an independent position in relation to business as well as politics, and they are also driving partners in the collaborative learning processes central in the cluster collaboration.

The cluster initiatives established under the PACF umbrella are mainly addressing local markets although they may enter into regional and international trade in a longer term perspective. Therefore, most issues are of a mundane character and do not require advanced technological development but rather context relevant adjustments of practices and already available tools. The example of Zanzibar Seaweed CI where soap machines

with both manual and electric power supply were provided by College of Engineering and Technology (CoET) at University of Dar es Salaam to suit the conditions in rural Zanzibar. In other cluster groups, soap is made without machines, depending on available resources and tools. The critical factors for success in this case is not advanced soap recipes, but the combination of locally available ingredients with local herbs and the seaweed powder to produce both affordable and attractive soaps for local markets and tourist related markets.

Rath *et al* (2011) identified weak links between university research and clusters, partly related to the character of needed innovations and the resulting weak connections between researchers and business persons. However, there are a few clusters that are more closely related to research needs, including seed development, salt refinement and farming techniques (see Box 1 below). Student projects have had a comparatively larger impact as reported from PACF Uganda, both on learning and examination and on cluster innovation outcomes.

Rath *et al* (2011) also conclude that the cluster activities have had little impact on the research institutions in Tanzania, at CoET for example, while in Uganda, there is a wider understanding of different disciplines being relevant for different aspects of cluster processes. In Rath *et al* evaluation of clusters, one interesting aspect is that the nature of many of the cluster initiatives' needs are "incremental innovations" and that these are suitable for student projects. This is explained by the focus for students on a limited issue and a short time period, which is suitable for the more direct needs and incremental improvements suitable in the early stages of cluster initiatives. Student engagement in cluster businesses may in a next step bring research questions back to university for further research, and could provide an important link in the deepening of relations in the triple helix process. The student involvement is also an important learning process for the students, who as professionals will have a greater insight into needs among potential counterparts or employers.

The role of the researcher is only partly related to research projects. Other input is related to the researcher's ability to overview market opportunities, marketing needs, quality assurance issues, and available methods for reaching next steps in innovation. The engagement therefore needs to be balanced for the researcher in order to give input to the research community as well as the local innovation community. It is obviously a challenge to balance between what is recognized as scientific research, and what is needed in a complex context of business development. Marketing and packaging are difficult matters in most food related clusters, although the core activity in the cluster initiative concerns some kind of farming or food processing. A researcher's ability to take part in knowledge production depends both on the more traditional Mode 1 type of discipline, for example marine sciences, chemistry, poultry etc., and on the capacity to integrate interdisciplinary knowledge challenges in the context of application.

Examples of research in cluster initiative innovations

In evaluation reports by Msuya (2011, PACF-Uganda (2011) and Rath et al (2011), specific comments on research projects were mentioned in a few cluster initiatives:

Tanzania

Beehive CI: die-off in bees was explained by an unsuitable choice of wood for beehives, and the wood was replaced.

Zanzibar seaweed CI: new farming techniques are evaluated and value added products such as soap are tried. Locally appropriate soap machines were produced at College of Engineering and Technology at University of Dar es Salaam.

Bagamoyo Cultural Heritage Tourism CI: research into tourist interests and local knowledge about culture and tourism at Institute of Arts and Culture.

Centre for Agricultural Mechanization and Rural Technology (CARMATECH) CI: design and material adapted to local needs and economic feasibility.

HORTI Tengeru: research into improved seed varieties for horticulture, both farming characteristics and food processing characteristics.

Uganda

Katwe Salt Lake CI: chemists at Mbarara University and Royal Institute of Technology (Sweden) study salt composition, evaporation characteristics and refining methods.

Mechanical engineering students of Makerere University help in the design of machines for e.g. food and leather processing in several clusters.

Second year and finalist students of Business Administration and Entrepreneurship and Small Business Management from Uganda Christian University as well Makerere University Business School together with Interns (waiting graduation) from the School of Social Sciences, College of Humanities were assigned to develop Business Diagnostic tools and conduct the Surveys for all the Cluster initiatives.

Environmental sustainability and social development

Cluster initiatives have contributed to the improvement of women's situation in particular, even if their aim were not in particular gender sensitive. Several of the cluster initiatives engage women entrepreneurs in their role as producers. Women have repeatedly expressed the importance of cluster membership for their social networking, social status in community and economic security. Work was previously being done on individual basis, but cluster involvement has increased the cooperation, for example through sharing of tools and materials, seedlings or temporary loans. Being part of a cluster group increases the income for individuals and it makes them visible as income winners in a more formal position. Zanzibar seaweed CI is an example where women dominate the groups in most communities. In other clusters, male members may have a more dominant position depending on the type of work (e.g. metal work). The combination of continued individual work with cooperation on common issues

strengthens relationships between local business persons which in turn changes the relations between producers and buyers and increases the negotiating powers of the local producers as a group. This is of particular importance to more vulnerable persons.

I am also concerned that the development of cluster initiatives with close links to research and government bodies should enhance possibilities to consider environmental concerns such as pollution from production chemicals, renewable energy sources, conscious application of modern farming methods and evaluation of traditional farming methods to identify the most suitable methods, soil protection to reduce erosion, sustained fertility in soils and waters etcetera. Individual cluster members may have other priorities and may lack knowledge of alternatives and consequences of specific choices. Salt in Lake Katwe is estimated to last for around 40 years at the current harvest rate. Industrialization with larger extraction capacity would reduce the time span for the salt production. Protection of the slopes around the lake reduces erosion and thus the pollution of the lake by soil and mud. These matters have been mentioned by salt workers as matters requiring researcher involvement, both to identify suitable plants and to reinforce regulations by making the issue more formally recognized and prioritized. In Zanzibar Seaweed CI, lower harvests indicate a need to try other farming methods, which is also done currently by the farmers together with the facilitator. This is an intricate link between business interests and ecological conditions. Climate change will add to the need for environmental considerations, since changing rainfall patterns may require alteration of crops or irrigation for example.

Concluding remarks

Clusters are not new, and they are not new in the East African context. People have always come together in groups to address certain common problems, and businesses have, too. However, what we experience in the PACF context is a sincere effort to join the different stakeholders; business, government and researchers in the context of globalizing markets and an increase in knowledge demand and knowledge availability in the local context of application. Researchers are driving forces in this process, although research institutions still need to develop their engagement further in number and approach. Interdisciplinary ambitions facilitate the building of trust and the establishment of joint interest in knowledge sharing. Student project seems to be an important step towards increased understanding and preparedness for the value of cluster research both among cluster members and senior researchers. The broad spectrum of needs is also a call for other research areas, such as economics, management, ecology, public health etc., to be brought into the triple helix process.

Many cluster members fall into risk averse categories and will therefore likely be more interested in small and incremental innovations that they can overview and control. Researchers need to acknowledge such aspects. The wider consideration of long-term environmental conditions will also be the responsibility of others than cluster members.

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Chapter 3

Experience of the Tusife Moyo women cooperative as a member of the Zanzibar Seaweed Cluster Initiative

Hawa S. Khamis and Tatu J. Fumu

Background

Start-up of the cooperative group

The Tusife Moyo cooperative was founded in 1992 in Kidoti village with a registration certificate number 2211/95 of 1995. During its start in 1992, it had 25 members, all of them women. Now it has 20 members, also all of them women. All members of the group are seaweed farmers. In our village we used to farm the two species *cottonii* and *spinosum*, but later, *cottonii* did not grow anymore and we are now farming *spinosum*.

The initial activity of the group - apart from the seaweed farming which is done individually - was agriculture (land-based) farming of crops such as maize, sorghum, peas, chicken peas, cassava, and sweet potatoes. The group continued with this activity until the year 1994 when we decided to hold a meeting and discuss our future development. The agreement of the group members was that the meeting will focus on discussions on how to make more progress in the group so as to combat the increasingly rising costs of everyday life which is the main aim of the group. Also, in this meeting, the committee and members agreed that we should start a soap making activity, producing washing soap so as to increase the income of the group. We started the soap production business in 1995 but we faced much competition on the price of soap from shops that sell lots of soaps. We could not compete with them so we convened another meeting to discuss our prices vs. those of the other sellers. We sought help from the government and thus

we sat with marketing experts from the Department of Trade and discussed ideas of what other means can be used to market our soaps. The outcome of the discussion was an agreement to add spices in the soap to change their usage into bathing soaps which are also used for skin conditioning. We added spices such as cinnamon, lemon grass, langi langi, udi, clove, eucalyptus and sweet basal. We continued with production of spice soaps since then. At that time we did not have competitors, we were the only producers of spice soaps in Zanzibar. We did good business and we also participated in exhibitions such as Saba Saba (The Dar es Salaam International Trade fair) in Dar es Salaam, exhibitions in Dodoma and Zanzibar, and other exhibitions here in Zanzibar.

We collaborated with different institutions where we also receive training on how to run our business. We collaborated with both the government and non-governmental organisations. We continued with our business which was profitable to the extent that we managed to build our own working premise - a four room building. Here we can say that we applied the knowledge obtained in the training on how to run business that we received in 2000. We also got training on how to solve problems such as misunderstandings, the training which was facilitated by the NGO Resource Centre in Zanzibar town. This training was very helpful and we made remarkable business development.

Benefits of being in a group/cooperative and spice soap business include that we are able to use spices that have good aroma that our customers like and also the spices that we add in our soaps are used for medicinal purposes including skin care. Another benefit is that we share the profit by dividing the money according to member participation in the work of producing and marketing soaps. The money obtained is mostly used for family needs.

Joining the seaweed cluster initiative

In the year 2006 we were visited by the Facilitator of the Seaweed Cluster Initiative (Dr. Flower Msuya) who is from the Institute of Marine Sciences, and who talked to us about starting the cluster initiative and becoming members. The Facilitator talked to us about the production of seaweed soap, that seaweed can be eaten and used to make other products. We were very surprised to hear that seaweed can be eaten and used in making soap. She also talked to us about possibilities of farming the higher valued seaweed – cottonii – which was no longer growing in our waters.

Training on deep water seaweed farming

To start with, we were trained on how to farm seaweed the innovative way and we conducted trial farming in the deep water to farm the higher valued seaweed cottonii using floating rafts made of thick nylon ropes in 2006-2007. We conducted trial farming with the expertise scientific experience of the Facilitator, but unfortunately the seaweed was breaking off and we lost the crop. We tried again putting the raft in a nearby area but the result was the same. Our Facilitator then told us that more scientific work will be conducted to see how the seaweed can be farmed. Also when we were erecting the floating rafts we were trained on how to place basket traps under the rafts to catch fish.

We were very happy that we caught fish such as rabbit fish, snappers and so on. In 2010, the Facilitator working with her colleagues from the Institute of Marine Sciences came to conduct another experiment in deep waters using small baskets made of fish net. The seaweed that we wanted, the cottonii, did not grow well but the other seaweed, spinosum, grew well. Our Facilitator told us that more work will be conducted and that we could eventually be able to farm cottonii. We are still hoping that we can farm cottonii so as to get more money. One good outcome of these experiments is that we got the knowledge which we can apply anytime when the researchers tell us how to farm cottonii in deep water.

Training on production of seaweed soap and other products

As members of the Seaweed Cluster Initiative we were trained on how to add value to the seaweed, to use seaweed to make different products, to the extent of eating seaweed and using seaweed for treatment of different ailments. We were first trained on how to produce seaweed soap, again by our Cluster Facilitator who brought an expert in seaweed production from Dar es Salaam. The training was done in 2006 in a workshop. That time we did not know how to grind seaweed and our trainers did not know either. We tried to grind with mortar and paste and also with kitchen blender but it did not work. So we boiled the seaweed and added the liquid into the soap, but we produced seaweed soap. We are also trained on how to make body cream. After failing to grind seaweed, we waited for our Facilitator to help us. Later she came and told us that there has been a donor who will give us machines to grind seaweed and to make soap using machines. She helped us to fill forms that were sent and we got good results. We were helped to get a seaweed grinder, solar drier for seaweed and soap making machines with funding from the SMEs Competitiveness Facility (SCF). Now we grind the seaweed and sell the powder. People purchase the powder from us and use it to make products such as seaweed juice, cookies, cake, jam, salad and other uses.

Three-phase electricity to our building

Through the Seaweed Cluster Initiative we were able to get a three-phase wiring for electricity in our building. We had managed to get a building by our own efforts but we did not have means of getting the electricity until we joined the cluster initiative. We discussed with our Facilitator and the Engineers from Dar es Salaam University who told us that we need three-phase for our machines. In 2008 with the help of the Facilitator we brought an electrician from the Zanzibar Electricity Company (ZECO) to put the three-phase wiring in our building.

Boats for farming and harvesting seaweed

Also after becoming members of the Seaweed Cluster Initiative we received five boats from friends abroad. These we were given after some people had come with the Cluster Facilitator to make a video programme on farming seaweed. At that time we were making trial farming using the baskets made of fishnets. When the video was finished and they had shown it in their country we were told that a donor has seen the video

and will give us five boats. The boats were constructed here in Zanzibar with the help of a member of the Seaweed Cluster Initiative from Kisakasaka village, Mr Juma Vuai Kassim. He helped with construction working with The Facilitator and he brought the boats to us. We now have five boats that we got in 2010.

Other organisations

The Labaika organisation linked us with ACRA-CCS Foundation (Italy) who trained us on how to run groups/cooperatives and how to conduct our business in a profitable manner. ACRA-CCS also provided us with incentive. They also made available an expert in marketing to help us with marketing of our soaps as well as showing us different soap shapes-designs and packaging, all for the progress of our business.

We are thankful to the government and non-governmental organisation for collaboration that has enabled our cooperative group to advance in business. Recently we have started collaboration with the SERTA project which has trained us on a method of farming seaweed by tying the seaweed on stones by using rubber bands. SERTA has also promised to provide boats to help us with transporting the seaweed from the farming sites to the drying sites. SERTA is also in the process of helping to connect our working premise to the national grid so that we will get electricity in our building. We are also thankful to the SERTA project for their collaboration.

Benefits of being members of the seaweed cluster initiative

After joining the Seaweed Cluster we have seen many benefits. One is the fact that we did not know that the seaweed that we farm had uses such as food and medical but now we are using the seaweed for food and medical benefits. Before joining the Seaweed Cluster we only knew that seaweed farming is a business where you sell your seaweed to the buyers and get your cash. But now we are grinding the seaweed and selling for different uses.

We are now selling seaweed powder which we sell at 10,000 sh. per kilo. This is much higher price when we compare to 400 sh. per kilo of dry seaweed that we sell to export companies. Our income has increased much.

We have knowledge on how to produce other seaweed products such as body cream, cookies, cake, salad, and so on. These we can produce and sell to get more cash but for now we concentrate on seaweed powder because it has a lot of market; we are the only producers of seaweed powder in Zanzibar and the Cluster Facilitator says we are the only ones in the whole of Tanzania. People from the mainland also buy the powder from us.

We are communicating with other seaweed farmers who are now members of the Seaweed Cluster in different issues like to get seed when we need or any seaweed product. When we want something we just make a phone call because we know them and they know us. And when other members want seaweed powder they just call us because they know us and we know them.

We also conduct training in different aspects between members of the Seaweed Cluster. For example we trained all other people how to add value to seaweed working with our Facilitator because we were the first ones to be trained. We have also trained other members on how to farm seaweed in deep waters.

We now know and collaborate directly with the department of Fisheries and Marine Resources and especially with the export companies that we did not have direct meetings with before. Now we can go to the Fisheries department and ask for someone that we know because they come to Cluster meetings. There are other departments and organisations that we did know before becoming members of the Seaweed Cluster Initiative e.g. ACRA, SERTA, etc.

We have participated in different exhibitions both in Zanzibar, Tanzania and East Africa. Before becoming members of the Seaweed Cluster we did not participate in many exhibitions but now we have been to a number of them and we have learnt on how to look for them and for funding to participate.

We have much more exposure to different people, groups of people and organisations that we met or who learnt about us through the Seaweed Cluster. Because of this, we have received many trainings that are brought by other organisations who have learnt about us through the Seaweed Cluster Initiative.

We have become trainers of people from different areas in Tanzania and outside Tanzania. There are two ways of the training. First is that we get called to conduct with other people in value addition and deep water farming mostly working with our Facilitator. Second one is that people from different areas come to our premise in Kidoti to learn about seaweed value addition, deep water farming and how to run cooperatives.

Challenges

In our cooperative we are facing the following challenges:

1. Our soaps have no standard/uniform shapes
2. We do not have a logo for our products
3. There is still no reliable markets for our products
4. We cannot use the machines for mixing the soap yet because of electricity - we mix manually but we hope to get this fixed if SERTA will fulfil their promise.

Concluding remarks

Our final opinion is that we are insisting on close collaboration with different institutions and the seaweed export companies so that whatever is proposed for the advancement of our cooperative group is taken care of and will reach us.

Chapter 4

Researcher as cluster facilitator: experience from Mode 2 research

Flower E. Msuya

Abstract

The Zanzibar Seaweed Cluster Initiative was started in 2006 working with seaweed farmers in Zanzibar on innovative farming of the seaweed and value addition. At the start, the cluster initiative had 20 members located in one village in Zanzibar, and now it has about 3,000 members located in over 11 villages in Zanzibar and mainland Tanzania. It is one of the best performing cluster initiatives in Africa. Innovation through value addition has enabled the production of seaweed value-added products by seaweed farmers in Tanzania, producing more than 30 such products. The start and continuous running of the cluster initiative is strengthened by the active involvement of its Facilitator who is a researcher at a university institute (Institute of Marine Sciences, University of Dar es Salaam), bringing her expertise both as the Facilitator and a Researcher to coordinate and ensure strong formation and involvement of the Triple Helix composition of the cluster initiative. This paper discusses the experience of the Seaweed Cluster Facilitator as a researcher and facilitator, taking the reader through the initial training of the researcher, formation of the cluster initiative and triple helix, and the remarkable outcome of the collaboration between a university and the seaweed farmers, depicting the Mode 2 Type of knowledge production.

Introduction

In 2006 the Zanzibar Seaweed Cluster Initiative was started aiming at bringing innovation into the seaweed farming industry which started in 1989 and is among the

three largest industries in the Zanzibar Island of Tanzania. Initial documentations and experiments were conducted during the 1970s and 1980s followed by commercial cultivation in 1989. Currently seaweed is farmed in many areas in Zanzibar and along the coast of mainland Tanzania. The main method of farming is the shallow water-off-bottom-method where seaweed is tied in nylon ropes and stretched between two wooden pegs that are fixed to the bottom (Fig. 4.1). Two types of seaweeds are farmed; *Spinosum* and *Cottonii* scientifically known as *Eucheuma denticulatum* and *Kappaphycus alvarezii* respectively. The two seaweeds are exported to seaweed processors abroad who extract a gel called carrageenan that has a number of applications in various industries including cosmetics, food, medical and textile. In recent years, the world market has been preferring cottonii to spinosum owing to its stronger gel-*kappa carrageenan* compared with the weaker *iota carrageenan* obtained from spinosum. This resulted in price differential between the two species with the former selling at a price that is double that of the latter (about US\$ 0.5 and 0.25 respectively). Unfortunately, starting from around the year 2000 Tanzania has been experiencing the die-off of the higher valued seaweed. This species has failed to grow in many areas where it used to grow well in the past. Most of the seaweed is farmed in shallow waters and the die-off is thought to be as a result of high surface seawater temperatures, fouling, and rapid changes in environmental conditions such as rainfall, temperature, and salinity (Hayashi *et al.*, 2010). Research conducted by the Institute of Marine Sciences in Zanzibar where the author of this chapter works resulted in the introduction of a new technique of farming seaweed –farming in the deeper waters of 1-3m depth during spring low tides. The first experiments were conducted in Bagamoyo, mainland Tanzania, where results showed that the seaweed can be effectively farmed in deeper waters. The technique is also environmentally friendly because it does not involve the use of wooden pegs usually cut from mangroves and land-based plants to be used in the shallow water farming (see Msuya, 2013).

The results of these experiments have been the basis for innovative farming that I, the Facilitator of the Zanzibar Seaweed Cluster Initiative (ZaSCI, www.secitz.com), have been promoting in the Seaweed Cluster Initiative. Having observed that farming the higher valued seaweed in deep waters was possible, I immediately started to apply the research results to solve the problem of the die-off of the higher valued seaweed. Additionally, having learnt about seaweed value-addition, I started to engage seaweed farmers in using the lower value seaweed, spinosum, to produce seaweed value added products. I saw the start of the Seaweed Cluster as the way to link university and the business world i.e. seaweed farmers and exporters while incorporating the government in the Triple Helix model. In 2005 I was trained as a Cluster Facilitator and started the Zanzibar Seaweed Cluster Initiative. The Seaweed Cluster Initiative started in 2006 with one group of 20 members, located in one village, Kidoti, in North West Unguja Island also called Zanzibar, now it has more than 3,000 members located in more than 11 villages Zanzibar and Pemba Islands as well as mainland Tanzania (Fig. 4.2). It is one of the most successful cluster initiatives in Africa. Following my long experience of the Facilitator in research on seaweed farming, instead of she knew straight away that what is needed in the Tanzanian seaweed industry is innovation, incorporating

innovative farming and value addition. The sections below tell about the application of the research in innovations within the cluster initiative including farming technique to combat the problem of seaweed farmers, and production of seaweed products while closely and strongly engaging the Triple Helix model.

Cluster facilitation and innovative seaweed farming

On starting the Seaweed Cluster Initiative, I as the Facilitator had an obligation to train members of the cluster initiative in innovative farming to enable them produce the higher valued seaweed. This is because of the failure to grow of the higher valued seaweed in the shallow water areas where seaweed is commonly farmed. Therefore, I trained the members of the Seaweed Cluster in Zanzibar on how to implement the innovative farming in deeper waters. Farming in deeper waters ensures more stable conditions; less effect of high surface water temperatures, rainfall, fouling etc. The farming technique was adopted by members of the Seaweed Cluster Initiative and trial farming was done by Cluster members in four villages, Bweleo, Kidoti, Chwaka, and Kisakasaka (Fig. 4.2). Results showed that the seaweed can indeed be farmed in the deeper waters and farmers were eager to adopt and farm the seaweed in large scale. However, it was observed that the Indian Ocean around Zanzibar is rough and the seaweed was breaking off when the weather was windy. This became a challenge that hampered the dissemination of the innovative farming technique. It was, again, I, the Facilitator, who had to scratch my head and think of how to overcome this challenge. Research to design devices that can be used in rough seas is the way forward for this challenge. I and my colleagues from the Business component of the Triple Helix of the Seaweed Cluster Initiative (Birr seaweed export company in Zanzibar), and other colleagues from India and Indonesia are planning to work on developing such devices including tube nets. If funds are obtained and the devices are designed and used, members of the Seaweed Cluster Initiative could produce the higher valued seaweed and, thus, increase their financial income.

Cluster facilitation and seaweed value addition

At the beginning of the year 2006 when the Seaweed Cluster Initiative started its activities, the first value added product that I wanted the members to produce was seaweed soap. I knew about seaweed soap being produced in other countries e.g. Asia but I did not know how to go about producing one. I decided to go to the main market in Zanzibar town to look at the spice soaps that I had been seeing around. In one market stall I saw beautiful spice soaps and asked who was producing the soaps. I was told that the producers of the soaps were members of a women cooperative group in Kidoti, northern Zanzibar called “Tusife Moyo” which means “we should not loose heart”. I then decided to travel to the north to meet the women group; I found that they were producing five types of spice soaps. I talked to them about adding another type of soap – the seaweed soap. At first they were surprised and confused wondering if seaweed can be used to make soap. After long discussion they understood but they said that they will have to see the soap to be 100 percent sure.

Following my discussions with the members of the women cooperative, I started to look for someone who knows how to make seaweed soap. During a workshop in Dar es Salaam I talked to colleagues about the issue. One gentleman who was a member of another cluster initiative that was starting up – the Mushroom Cluster Initiative – informed me that he knows how to make seaweed soap, had made seaweed soaps in the past, and was ready to help. In June 2006, I and my co-facilitator convened a workshop to train the members of the women cooperative group to produce seaweed soap; we invited the soap maker to deliver the training. The seaweed was supposed to be added to the soap in the form of powder. However, we all realised that it was not possible to grind the seaweed by using the kitchen blender or pounding in a mortar and paste either. We had to boil the seaweed and use the gel just for workshop demonstrations only. It was again my responsibility as the facilitator to look for a way to grind the seaweed. Again I made a presentation in a workshop and explained that the seaweed cluster needs a machine to grind seaweed. By that time I had already searched in the internet and saw that machines to grind seaweed have disk mills and they were to be imported from other countries. But on discussions with colleague at the workshop we realised that such machines can be formulated or designed at the College of Engineering and Technology (CoET) of the University of Dar es Salaam. In the same workshop also the manager of one NGO called SMEs Competitiveness Facility (SCF) indicated that it is possible to work together through technology transfer and obtain the machines for the seaweed cluster initiative. When I went back to Zanzibar I asked for the application forms from SCF and translated to the women cooperative members and helped them to fill in the forms. To do so we sat with the women in my office at the university research institute and translated the questions from English to Kiswahili for the women to respond and then helped to fill in the forms in English. The application was successful, money was obtained from SCF and the machines were made by CoET. Therefore, in 2008 we were able to grind the seaweed and use the powder to make seaweed soap. It was this year 2008 when the first seaweed value added product – the seaweed soap – was produced and marketed by seaweed farmers in the history of seaweed farming in Tanzania. Production of seaweed soap was followed by training and production of other value added products including the powder, body cream, massage oil, scrubs and foods such as seaweed juice, jam, salad, cake, cookies etc. (Fig. 4.3). The production and marketing of seaweed powder and other products has significantly increased the income of the farmers. Whereas one kg of the raw dried seaweed *spinosum* sells at 400 Tsh. (US\$ 0.25), one kg of seaweed powder sells at US\$ 6.4 and the other products sell for US\$ 0.6-3 depending on the product (see Msuya, 2013 and 2011 for details).

The cluster facilitation process

Looking for a co-facilitator

During the call for start of the seaweed cluster initiative in Tanzania, I faced my first challenge of looking for someone who will be trained to be a co-facilitator. Looking

around Zanzibar seaweed farmers I could not find someone who is working in the seaweed industry who could follow the training in English. I then asked a colleague from the northern mainland Tanzania (in Tanga) who was employed as an extension officer by a seaweed export company and who also held a Bachelor's degree. We were both trained and the co-facilitator attended the first workshop in 2006 but it became obvious that he could not be travelling from Tanga to Zanzibar to facilitate the cluster initiative. I, therefore, faced another challenge of looking for another person to help with the facilitation. Until now I am the only facilitator of the Zanzibar Seaweed Cluster initiative. When the leadership team was formed there was someone who worked with the government as Agricultural Officer and holds a Master of Science. He has since then been a big help in the facilitation.

Starting the cluster initiative

After being trained as a cluster facilitator in 2005, it was a challenge for me to sell the idea of a cluster initiative to the triple helix group and to start the cluster initiative. Many of the people that I talked to considered a cluster initiative to be a project! Whereas farmers thought that this is just like any other project they have heard and seen, it will start and then end when the financial aid is over, from other members of the triple helix it was the question of “what will I get from this”? So the beginning was a bit tough for me but I was lucky that I had worked with seaweed farmers, government officials and seaweed exporters for years. This way it was easier to sell the idea.

I started looking for pioneers by visiting the Department of Marine Resources; Ministry of Agriculture; Seaweed exporters (5 companies); Zanzibar Investment Promotion Authority; Zanzibar Chamber of Commerce, Industry and Agriculture; and so on, specifically starting with people that I had worked or collaborated with in my research work. Convening the workshop in 2006 to try the production of seaweed soap brought people from all the 5 seaweed export companies as well as people from the different departments (it was the first time ever that the staff of the 5 companies had sat in the same room/same meeting). Media people were also invited to this workshop. The airing of the workshop content on television and newspapers sparked the idea of seaweed utilisation in Zanzibar and Tanzania in general. To me this was like “a dream come true” because in my research work I had been wanting to see seaweed value addition taking place in Tanzania.

R&D at the Institute of Marine Sciences in partnership with the seaweed cluster initiative

My involvement as a facilitator of the Seaweed Cluster Initiative while I am a researcher at the Institute of Marine Sciences (IMS) of the University of Dar es Salaam (UDSM) has increased the direct application of research results for community development. Since 2006 when the cluster initiative started, applied research work has increased at the IMS supported/stimulated by the results of seaweed research and innovations with communities in Zanzibar and mainland Tanzania. Researchers at IMS have realised

more and more the importance of applying research results for community outreach work. It is not surprising that even Sida support to IMS (bilateral programme) has focused more and more on community development rather than pure science in recent years. Even the university (UDSM) as a whole has appreciated the involvement of the IMS in seaweed research with communities; IMS received the first prize (certificate) for “Seaweed farming and research” during its exhibition at the Dar es Salaam International Trade Fair this year. This, without doubt has much to do with the involvement of IMS in the Seaweed Cluster Initiative. Although the university has been mostly focusing on the original indicator of success and promotion following research and publications as the most important outcome of a researcher, this is likely to change in the near future owing to these recent events. Any discussion with the leadership and researchers at IMS recently will show the change in people’s attitude towards focussing on research for development. This was not the case e.g. seven years ago when researchers would think more of pure research as the basis and outcome of science.

Indicators of Mode 2 knowledge production in the cluster initiative

From my involvement as a cluster facilitator while I am also a researcher has produced indicators that show the direct interaction between the farmers/processors and the academia resulting in the application of the research ideas and results in the development of the seaweed farming activity. These include the following:

- 1. Application of results of deep water farming.** The results of experimental studies on the deep water farming method in Bagamoyo that I conducted with fellow researchers from the IMS were used by the farmers to farm the higher valued seaweed, cottonii. Although there are still challenges on Zanzibar Island, cottonii is successfully farmed in Pemba Island (see Fig. 4.2) in deep waters. Farmers in Pemba are selling cottonii at 800 Tsh. (~US\$ 0.5) per kg compared with the 400 Tsh. (~US\$ 0.25) obtained from a kg of spinosum. Research is ongoing in Zanzibar Island to look for devices that can be used in the rough sea of Zanzibar. This will be a step forward for the members of the Seaweed Cluster to farm the higher valued seaweed.
- 2. Value addition.** During the 1990’s researchers from the University of Dar es Salaam estimated that for Tanzania to have a profitable seaweed processing industry there should be a production of at least 15,000 tonnes of dry seaweed per year. The estimates were based on importing a processing plant from South Africa. But, even before this amount was reached, members of the Seaweed Cluster Initiative started to process the seaweed by producing the various value added products in 2006 when the production was 7,500 tonnes per year. Such home-based, community-based processing endeavours are stepping stones towards full processing business in Tanzania. I learnt that seaweed processing plants can be made in Tanzania including smaller ones that can process less volumes of seaweed when required.
- 3. Recognition of seaweed research and farming by the university.** The fact that the University of Dar es Salaam recognised the research work collaborating with community in an outreach type of research done by its staff at IMS and gave IMS the first prize for seaweed research and farming, the first ever seaweed farming prize provided by UDSM

shows how effective the IMS collaboration with seaweed farmers and the Triple Helix has been. Research in seaweed at IMS has been ongoing since the 1980's but it is the first time that IMS has received such a prize. This is no doubt the contribution of cluster formation and facilitation by a university-based facilitator whose work has been remarkable to the extent that the university was impressed.

4. **Inter-training between members.** Starting from the first time when the first training on seaweed value addition and innovative farming took place in Kidoti village in 2006, members of the Seaweed Cluster Initiative have continued to train each other on various aspects of farming, processing, and marketing of seaweed and seaweed products. Examples are e.g. the Tusife Moyo Women Cooperative group in Kidoti who have since then trained other members of the cluster initiative in Bweleo, Paje, Uroa, Pemba, etc. on value addition. In the same token, Seaweed Cluster members in Bweleo have trained the members from Chwaka on deep water farming while the Chwaka group has trained Bweleo members on construction of boats made of plastic water bottles. Each of the Cluster groups can successfully be involved in training elsewhere.
5. **Exposure.** What I have seen in the seven years of facilitating the cluster initiative is that members have more exposure to different sources of training, processing, and marketing of seaweed and seaweed products and even funding. As members of the cluster initiative, seaweed farmers have met with people/organisations and groups which have similar interests or who are willing to support the members in one way or the other. An example of a benefit of exposure is that one Seaweed Cluster Initiative group, the Fujoni group that makes seaweed jam, participated in a trade exhibition in Kampala, Uganda and met the Ambassador of Burundi who liked very much and purchased the seaweed jam. He was very impressed and linked the Fujoni group (whose most members are widows) to a similar group in Burundi. Since then there has been strong collaboration between Fujoni group and the widow's group in Burundi. An example of such collaboration is that the Fujoni group attended an exhibition in Burundi and the Burundi group invited the Fujoni group to lunch to discuss their businesses and group activities.
6. **Participation in exhibitions.** My role as the Facilitator has been also to help the members of the cluster initiative to participate in international as well as national exhibitions. This is done in collaboration with other members of the Triple Helix in cluster initiative. For example, during Saba Saba exhibitions (Dar es Salaam International Trade Fair), members of the Seaweed Cluster are invited by the Institute of Marine Sciences to exhibit at the pavilion of the institute. Likewise, through the cluster initiative, members are linked with organisations such as the Tanzania Commission for Science and Technology (COSTECH) who provide support to participate at the Sabasaba. This was done for the Bweleo group and the procedure can be repeated at any time when COSTECH has funds for the purpose. The good thing is that the members now know how to go about (and who to contact) asking for the support.
7. **Seaweed sellers have emerged within seaweed farmer groups.** In the process of running the cluster initiative, some members were able to utilise the contacts, exposure, and experience gained through different meetings, exhibitions, contacts etc. to become seaweed sellers themselves. One lady in Bweleo village (member of the Bweleo group) is purchasing seaweed from farmers and selling to an export company in Zanzibar town. She earns more from selling seaweed than farming her own seaweed (Msuya, 2011). Similarly, two members of the cluster initiative from the Chwaka group have been for some time in the process of acquiring an export license to enable them export seaweed. They, because of the exposure obtained through membership to the Seaweed Cluster, looked in the internet for markets abroad and after getting a buyer they started the

process of looking for the license. Unfortunately, it is taking long because of changes in government leadership terms and corruption. Thus, whereas the seaweed is sold to export companies that have markets abroad, these sellers are selling seaweed in the country or are in a process of getting export license so as to market the seaweed abroad.

8. **Visibility.** There have been a number of people/organisations/departments that have turned up to help the Cluster members, help that was not possible before the idea of cluster initiatives started in Zanzibar. Having read about the Zanzibar Seaweed Cluster Initiative in the Cluster website these groups of helpers learnt about the cluster initiative, its members, and what the members do. In so doing, they came to offer help where possible. These groups/people include e.g. a Germany family, the SMEs Competitiveness Facility (see below), ACRA-CCS Foundation, SERTA (Socio-economic Research and Training Association), and RAA Brandenburg, a regional programme involved in education. Another example is the Kidoti women cooperative group that met people from Twelve Thousand Villages (USA), who have purchased a large volume of soaps from the group. Such visibility would not have been possible if the groups of farmers remained at the same situation that they were since they started to farm seaweed in 1989.
9. **Acquisition of soap production machines.** Through the link between the Cluster Facilitator, IMS and CoET the group in Kidoti obtained seaweed soap production machines. These machines were designed and produced by CoET for the Kidoti group; most of these machines especially the seaweed grinder were designed and produced for the first time for this Seaweed Cluster member group. The transfer of soap making technology and acquisition of the machines and training on the same were funded by SCF, while COSTECH, ISCP (PACF), and IMS partly contributed funds for the training (see Msuya, 2008; Msuya and Kyewalyanga, 2008). Without the collaboration between the Cluster Facilitator, SCF, CoET and COSTECH the machines would not have been designed and produced for a seaweed farmer in Zanzibar.
10. **Acquisition of boats for farming seaweed.** In the process of facilitating the cluster initiative, I was contacted by a media group from Frankfurt, Germany, Paolo Film, who mentioned that they want to make a documentary on women and seaweed farming. They specifically asked if they can film the deep water farming. During the time, I and my colleagues at IMS were conducting a research on the effects of placing floating devices in the water on the environment and, therefore, there were deep water floating systems in Kidoti. Therefore, the group from Germany travelled to Zanzibar and made a documentary about the women farming seaweed in deep waters (copies of the video documentary were sent for the Kidoti group and IMS). This documentary was shown on television in Germany in a programme called Adventure Science. Among the people who saw the documentary was one family. The family decided to give funds for acquisition of five boats for the women to use in farming seaweed in the deep waters. The boats were made by the help of a Seaweed Cluster member from Kisakasaka village, who saw that it was his obligation to help his fellow Cluster members. He volunteered to look for boat makers and made sure that the five boats were made and delivered to the women cooperative group in Kidoti.
11. **Rapidly expanding knowledge of farming seaweed in deep waters.** One of the main results of applied research in seaweed farming is the fact that farming seaweed in shallow waters is increasingly becoming a problem. This is slowly becoming farmers' knowledge. In recent visits to seaweed farming sites, I observed that many farmers are now voluntarily moving their farms to deeper waters. This was observed both in Zanzibar and Pemba. Most of these farmers are either members of the Seaweed Cluster or have heard about deep water farming. When asked why they are doing this they said openly that the sea-

weed grows better in deep waters and that they have learnt this in the Seaweed Cluster. This is a very good outcome considering that people did not really understand the idea of deep water farming and did not think that putting farms in deeper waters will result in good growth of the seaweed. This, coming from the communities themselves, is a big surprise, and satisfaction, to me the researcher and Cluster Facilitator.

Challenges faced

The main challenge that I faced just like many cluster facilitators was to build trust in all levels such as the facilitator and cluster initiative members, between and among members, and within the triple helix. In the first level of the facilitator and cluster initiative members, and as I have mentioned above, people were suspicious of the whole idea thinking that I was bringing a project. Some were more sceptical stating that this, like all other projects, will end with the end of financial help. The other members of the triple helix were suspicious asking themselves whether I had been given a lot of money for the “project” or not and were asking themselves the common question of “what will I get out of this”? After several meetings and discussions the idea became clear to the members and they were more relaxed and eager to get engaged.

Despite my working as a researcher in seaweed farming for many years in Zanzibar, cultural difference was still a challenge when I started to sell the idea and start the cluster initiative, and indeed, it is still a challenge especially when working with people that I have not worked with before. In most cases people from mainland Tanzania who are not from the coastal zone have differences with people from Zanzibar on issues like dressing code, Kiswahili accent, even the extent of mixing with the society. However, my long research experience working with different people and groups of people helped me much. This is mainly because I already had many friends working in the seaweed farming industry including farmers, government officials and exporters.

Conclusion

The ability to link research/university with the business and government in a Triple Helix model and the devotion, hardworking and ability to facilitate, that I the Zanzibar Seaweed Cluster Initiative Facilitator has made the cluster initiative located in Zanzibar, Tanzania, one of the best performing cluster initiatives in Africa. Through my experience as the facilitator and a researcher at a university research institute, the Cluster Initiative depicts the successful application of Mode 2 research type of knowledge production. Innovation in seaweed farming and value addition while applying research results has also raised the financial income of the members of the cluster initiative. The involvement of the researcher as the facilitator has also contributed in changing the mentality of the leadership and researchers people at the institute, and university as a whole, towards the application of research results for community development.

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FIGURES



Fig. 4.1 A shallow water seaweed farm in Zanzibar, Tanzania-note the seaweed lines stretched between two wooden pegs; Photo credit Flower E. Msuya.

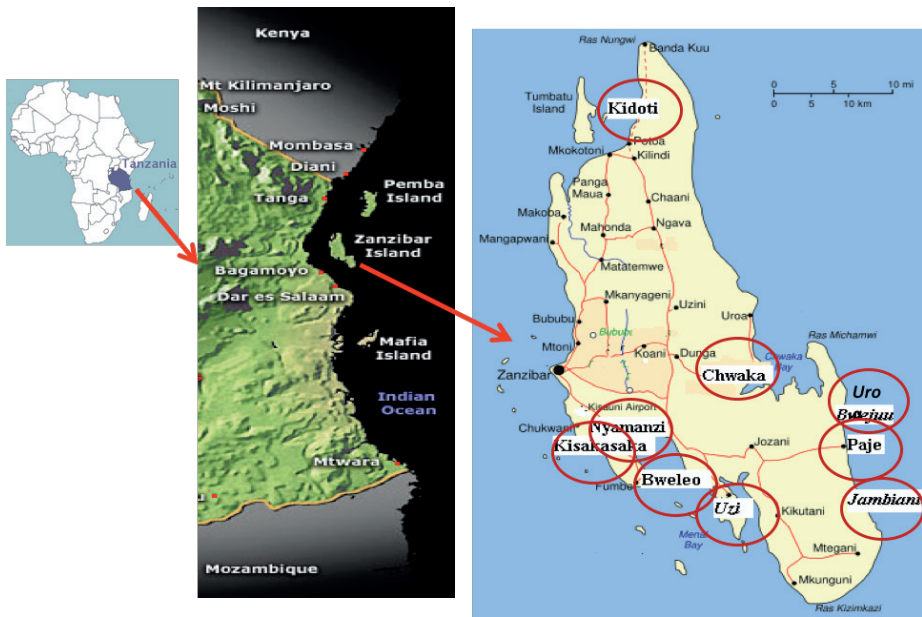


Fig. 4.2 Location map of areas for members of the Zanzibar Seaweed Cluster Initiative.

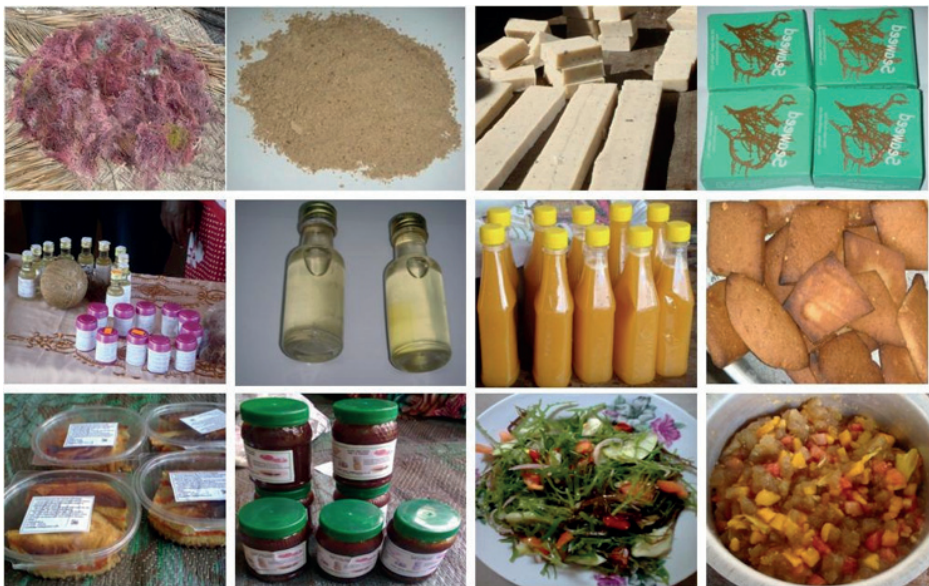


Fig. 4.3 Dry seaweed and seaweed products: powder, soap, body cream, massage oil, juice, cookies, cake, jam, salad, and pudding. Photo credit: Flower E. Msuya

Chapter 5

When society speaks back. Relevance issues for research in cluster contexts in low income countries

Lena Trojer

Universities are relatively neutral bodies/platforms in political contexts that can differ profoundly. Please note relatively. The universities have to manoeuvre strategically, though, in order to be durable. In low income countries with more or less stable political systems the university is a vital asset for social, cultural and economic sustainability and development. The universities in these countries face challenging demands to have their outcomes used in society for economic growth, challenging of more reasons than e.g. in Europe. This means that the “voice of society” in science argues for use of the very limited public resources in ways benefitting the people as soon as possible, if not immediately. Society speaks back in demand for relevant knowledges for survival and better living conditions. This is a strong incentive to find other ways than a dominant linear way of disseminating R&D results, which often takes too long time and is not always efficient or context relevant. In this chapter I will give some aspects on why and how initiatives from universities for trying other models like inclusive innovation and cluster development are relevant, important and have a proved success record.

Society and university initiatives

Technical transfer

Technical transfer is still a dominant concept and practice within the western hemisphere universities. It is a concept of a linear paradigm - knowledges and technologies

are produced at universities and research institutions, transferred with or without IPRs to society with political approval if legislations or the political agenda require, and finally reaching the end user. The linear paradigm seems to prevail at least as long as the traditional, disciplinary (Mode 1) university as well as certain economic-political actors dominate. Some of the impacts are frequently weak relevance to society needs, lack of efficiency, low level of trust within society actors, increased gap between different groups of society, weak capacity for evolving innovations and innovation systems.

In Sweden the technical transfer paradigm has been characterized by weak context sensitivity and the faith in universal solutions. Technical transfer, in the linear mode, from a Swedish situation to contexts of low income countries in e.g. Sub-Sahara regions includes few success stories. These experiences might be one of several reasons why the Swedish aid activities have moved from concrete practice to abstract policy during the last five decades (Kjellqvist, 2013). A technical “transfer” in a non-linear mode and more of technical co-development between actors in high and low income countries call for approaches of “polycentric, interactive and multiactor processes for knowledge production” (Jasanoff, 2003) including technology production.

Society speaks back

In almost every nation there is a notion of economic and sometimes cultural importance, when it comes to the role of universities. Knowledge as the main product of universities creates wealth in societies and stability. Universities can be seen as threats in dictatorships and assets in others and still universities are one of the most stable institutions in societies regardless political situation. In western societies and elsewhere the one, who is paying the bill for universities, is the government, read tax payers. The voices of the latter is increasing in strength or as Nowotny *et al* already 2001 highlighted

In modern times, science has always “spoken” to society; indeed science’s penetration of society is close to being a defining characteristic of modernity. But society now “speaks back” to science. This, in the simplest terms, is what is meant by contextualization. (p. 50)

The twin notions of “science speaking to society” and “society speaking back to science” are obvious. “Society” is requiring and required to take part not only in the input phase but in the whole process (which more likely is non-linear) up to the output and outcomes of results.

I have experienced on a municipal level in a Swedish context how society, represented by the local government, explicitly manifested the need in being involved or at least have an insight in the whole input-operation-output process. The need for this involvement comes from the budgetary process in local government to have local tax resources approved for the input of research funds and infrastructure requests of the university. What the mayor and local government directors need are good arguments for the relevance of this “investment” in order to convince the local parliament to vote in favour of it. For this argumentation to be successful, the mayor of Karlshamn clearly announced, “input is not enough”.

Since tax payers via the government are paying universities, the primacy of identifying the problems to be solved by research and higher education can no longer primarily be in the hands of science only. The loud university voice of “curiosity driven”, free research is losing listeners, more likely in contexts of scarce societal resources. The relevance issue is becoming crucial – research for whom and with what resource priorities.

Co-evolution

Co-evolving processes are important where relevance and contexts of application and implication constitute the essential elements. The frame of understanding co-evolution includes the triple helix concept (Etzkowitz, Leydesdorff, 1997), which gives us some comprehension of the structure of the actors involved. The main actors are universities (knowledge institutions), industry (private sector) and government (on any level). But the triple helix concept does not contribute with the core answer to how the co-evolving/triple helix process is carried out. One answer to the “how” question can be found in the research processes termed Mode 2.

The former Swedish Council for Planning and Co-ordination of Research (FRN) initiated and financed a study that resulted in the publication *The new production of knowledge* (Gibbons *et al*, 1994), where the research process Mode 2 was thoroughly described. Another publication advancing this discussion followed in *Re-Thinking Science – knowledge and the public in an age of uncertainty* (Nowotny, Scott and Gibbons, 2001). Characteristics of Mode 2 includes e.g. context of application, trans-disciplinarity, much greater diversity of sites of knowledge production, highly reflexive, accountability, novel forms of quality control, socially robust knowledge, and context of implication. The strong and hostile reactions from the dominant university (Mode 1) representatives showed that the Mode 2 understandings were and are really touching the raw nerves of the main academic discourse. These Mode 1 representatives are protecting disciplinarity, internally driven taxonomy of disciplines, neutrality, objectivity, context of discovery, hegemony of theoretical or experimental science, and a sharp divide of basic and applied research. But as Gibbons explained, Mode 2 knowledge productions have always existed and Mode 1 is a very efficient specialization of knowledge production. This specialization finds its roots in the scientific revolution in the 1600's (Merchant, 1980).

The co-evolution is not only a hand in hand process between actors within and outside universities. It is an integrating process between Mode 2 researchers, predominantly Mode 1 researchers and partners in society. One example from the Lake Katwe Salt CI (see Rydhagen as well as Tabaaro in this anthology) is given by the issue of salt crystallization. A research team at KTH (Royal Institute of Technology, Stockholm) is working on salt crystallization processes at different international sites. In one of their projects they used Katwe Salt Lake in Uganda as a case. They didn't collaborate closely with the salt extractors at the lake. They took water samples from the lake and brought home for studies at their laboratories at KTH. Their main priority was the basic, disciplinary (Mode 1) research on crystallization frequencies of the salt. The results of their research show the salt crystallizing in sequences/fractions, where the sulphur contain-

ing fraction crystallize first followed by the chloride containing and last the carbonate containing fraction. There are not very distinct borders between the fractions, but as a first recrystallization this first refinement step to remove more of the sulphur containing salt is a great achievement compared to the existing local situation. In order to have a so called table salt for human consumption the sulphur needs to be removed, as the added iodine chemically bonds to sulphur and can thus not be absorbed by humans. A low tech method can be used to detect the sulphur fraction and when the crystallization is about to move over to the wanted chloride fraction. The researchers suggested that the differences could be tasted with the tongue. This example¹ shows how Mode 1 research can be linked to a distributed knowledge production of high context relevance i.e. a Mode 2 approach.

Research support, societal relevance and aid

Academic research and societal relevance

In a Swedish context most of the academic research is performed at the universities. In contrast to nearby countries very few autonomous research institutes exist in Sweden. The system of financial support for research activities at the universities was and still is complex (e.g. SOU 1995:121, SOU 1996:2 Ministry of Education, Sweden). The Parliament decides on allocation of basic (faculty) resources in the budget bill. These resources do not guarantee full salaries for research and higher education staff. External financing is necessary for research projects and programmes. It constitutes a comprehensive part of the economic base for PhD students and academic research staff.

The central agent in Swedish research politics is the research bill presented to Parliament every three or four years. The first research bill appeared in 1981.

Of all the Swedish research bills one stands out, when it comes to research and societal relevance. It is the research bill for the years 1997 – 1999 (Proposition 1996/97:5) titled *Research and society*². The minister responsible for that bill was the minister of education Carl Tham (Social Democrat).

The former minister Carl Tham raised an interesting technopolitical issue in the speech “Research – the key of the future?”³, in which he emphasized our ambivalence to science and technology and the general oscillation between techno-optimism and techno-pessimism that has marked the 20th century and further on. He started from a position of an explicit division between science and politics. He then turned the discussion around and stated that science and technology is ruled by male research communities, markets and political systems in the industrialised world. The Minister

¹ The salt extraction example was presented at a study visit at KTH, Department of Chemical Engineering, 2013 08 28.

² Forskning och Samhälle

³ Key-note speech at the FRN conference March 15, 1995, published in FRN nytt (FRN news) nr 2, 1995

ended his discussion by asking questions about the political content of research. He called for a change in the orientation of science towards social goals and pointed out

My questions are therefore directed to the research community, which has significant influence, and is accordingly political in its nature. Why have we failed to put science on a more clearly social course? Is it reasonable to accept technology as being ruled exclusively by the market? Can we find support among the people for research politics that not only looks for immediate benefits, but also actually contributes to dealing with human problems? Isn't this basically what is demanded? [my translation]

I find the discussions about science in society and society in science from the 90's and onwards important, putting the issue of research and societal relevance more explicit and thus possible to act upon.

Helga Nowotny (1994) emphasized that knowledge seems to be accepted or approved not on the grounds of claims of higher scientific authority but on grounds of negotiations. This comes from a desire of knowledge to be open and sensitive to many interfaces, where contemporary knowledges are created in heterogeneous contexts. She finds that these interfaces or places of knowledge production have one thing in common - they are disordered. Instead of being distinct and separate, they are overlapping. This means we often get contradictions instead of having easy and straight answers. In our professional and daily lives we have to make choices just to be forced to make still other choices. Nowotny finds the world appearing to have been transformed into a labyrinth. If we consider the fast-growing technical sectors such as information technology and biotechnology, numerous paths in the labyrinth of these sectors are there to be chosen among. The choices are not only technical but refer to all uncertainties to be taken into account and be responsible for. Wendy Hollway (1989) states that "science as we know it could only become dominant because it was preferred", and being preferred means strong involvement in political issues.

In East African countries like Tanzania and Uganda the missions of the national public universities are clear and explicit about their role in society. In Tanzania the University of Dar es Salaam, UDSM, states its mission in 2013 as being

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.

The focus of the relevance issue is public service and equitable and sustainable socio-economic development. The needs of the public have thus a broader context than commercial markets only.

This became explicit to me when I participated in the international academic audit of UDSM, Tanzania in 2004. I learned the importance of capacity building for research and education and for the outreach to society and identified needs. The outreach facilities were technical transfer units at UDSM, substantial amount of consultancy and the innovation and cluster programmes (ISCP-Tz) starting in 2004. The consultancy by UDSM research staffs refers to the fact that much of competence needed by firms and organizations was (is) gathered at UDSM. There are other reasons as well such as UDSM allowing some percentage of the work hours for consultancies to increase the

very low salary given by the state in the context of scarce resources. The National Strategy for Growth and Reduction of Poverty, MKUKUTA, conducted a kind of base and frame for the audit mentioned as well as at present time for the outreach functions of UDSM. MKUKUTA forms part of Tanzania's efforts to deliver on its national Vision 2025 and is since 2005 focused on growth and reduction of income poverty; improved quality of life and social well-being; and Governance and accountability.

It is interesting to note that Economic Report on Africa 2013⁴ states the following

Africa's industrialization is likely to take place in a changing globalized economy full of uncertainties. African governments should therefore work together to develop a united vision on how to influence the global economic agenda and, in so doing, shape the outcomes of globalization itself. The time has come for Africa to stop being a bystander to its own destiny. (p 14).

This is argued when

Africa maintained well above global average growth in 2012, despite deceleration in the world economy... West Africa recorded the highest growth followed by East, North, Central and Southern Africa. (p 39)

In Uganda the Makerere University is formulating its mission 2013 as "to provide innovative teaching, learning, research and services responsive to National and Global needs". The overall aim of its research and innovation policy

is to reinforce vigorously the university's status as a major international university that sustains and adds value to the Ugandan culture, to the natural environment and to the economy and society of Uganda and the wider world. The university, therefore, shall put in place a research agenda with priorities that address national and global challenges.

Aid and research

Sweden's Policy for Global Development (PGU) was approved by the parliament in 2003. In 2007 the Swedish government (Conservative at that time) presented a more specific policy for Africa⁵, where it emphasized the importance

to support Africa's own research development, by among other things promoting initiatives aimed at creating fora for collaboration between research, industry and society. This type of network, which is largely lacking, is a prerequisite for African countries to develop research results, conquer new technologies and develop products and solutions.

Sida⁶ is one of few government aid agencies giving long term support to research capacity building in collaboration with low income countries. The mission of Sida is to reduce poverty in the world on behalf of the Swedish parliament and government. Sida contributes to implementing PGU.

During the years 2001 to 2006 I was a member of the Sida research board appointed by the Swedish government. The research unit at Sida at that time was SAREC⁷ responsible among other issues for capacity building of universities in the collaborating

⁴ <http://www.uneca.org/publications/economic-report-africa-2013> (accessed 20140107).

⁵ Skr. 2007/08:67 *Sweden and Africa – a policy for common challenges and possibilities.*

⁶ Swedish International Development Cooperation Agency

⁷ Department for Research Cooperation

countries. My academic position was (and is) as professor at Blekinge Institute of Technology, campus Karlshamn, which is deeply imbedded in an innovation system called NetPort co-owned by the university, local government of Karlshamn and the industry in three specific sectors. The participants of the board were researchers with mainly strict disciplinary backgrounds and came predominantly from old and well established universities in Sweden, some few from nearby countries, and all with extensive experiences of collaboration with low income countries. I felt odd in this board not because of less experience in low income countries but because I was (am) an explicit transdisciplinary, Mode 2 researcher and also as I was the only person coming from a technical faculty. The work in the board and with linked committee obligations was a true learning experience not the least because of all very competent staff members at SAREC.

I volunteered to engage myself particularly in following more closely the SAREC support to the technical faculties in East Africa - Tanzania, Uganda and Mozambique. It was in this context I got involved in SAREC support to the programs of development of innovation systems and clusters (ISCP) starting in 2003⁸. When proposals for these programs was up for decisions at the board I expected a hard discussion and resistance from my board colleagues because of their inter- and transdisciplinary character as well as their radical break with a traditional linear paradigm of use of research results. However, the decisions went smoothly to approval with very few discussions. My understanding of the reason is the well prepared, substantial and precise documents for decision formulated by specific, skilled and experienced SAREC staff members.

The strategy was to take decisions step by step instead of a joint, big program, which was planned from the beginning. This strategy had both its pros and cons. On the positive side was that the concept of innovation, which was new in a Sida context at the actual time, could have time to find its format. The stepwise strategy also facilitated the possibility to handle all uncertainties in a program, which was new of its kind and started in processes not yet known in practice in East Africa. The negative side was lack of needed flexibility in waiting for new decisions, while the program processes accelerated. It later turned out that the reorganisation of Sida with the closing of SAREC and loss of skilled SAREC staff was a disaster for the ISCP. However, the fundamentals for the program in East Africa and from 2008 also in Bolivia were in place and sustainable enough, while Sida funding was integrated with less resources in bilateral research agreements (for Uganda and Bolivia) and in specific arrangement with the Swedish embassy in Mozambique.

Dissolving the linear paradigm

As indicated above the linear model for diffusion and use of research results is in question and about to transform into other procedures in emerging collaborating universities. A different university culture is needed for more immediate benefit to society especially in society contexts with limited resources. This brings us back to the issue of “a new kind of more mature partnership”, that Helga Nowotny (2005) was emphasizing

⁸ For details see http://sids.se/?page_id=2 (accessed 20140107).

and stating “science can no longer expect unconditional support on the part of society for whatever it wants to do, nor unconditional acceptance of its authority”.

It seems easier to dissolve the linear paradigm in low income countries, where the public good is a question of survival more than the commercial benefit of a few.

In order to move from the linear model of knowledge production and as well as of innovation development and evolution, it is not enough to link academic research with private sector and industry. It requires at least three key players, that is university, industry and government, which constitutes the triple helix model presented above. In order to come closer to innovation issues I want to use the general understanding of the Triple Helix model from Triple Helix Research Group⁹

The Triple Helix concept comprises three basic elements: (1) a more prominent role for the university in innovation, on a par with industry and government in a knowledge-based society; (2) a movement toward collaborative relationships among the three major institutional spheres, in which innovation policy is increasingly an outcome of interaction rather than a prescription from government; (3) in addition to fulfilling their traditional functions, each institutional sphere also “takes the role of the other” performing new roles as well as their traditional function. Institutions taking non-traditional roles are viewed as a major potential source of innovation in innovation.

The Triple Helix model is a frame and a boundary object (Star, 1989) on which involved actors can join and find out understandings and roles in always complex contexts and circumstances. That is a big step forward in the process of dissolving the linear paradigm. But it is not enough. As mentioned earlier, the Triple Helix model does not by itself mean that we all know how to work together and develop the integrating process, which brings us to Mode 2 again.

In the discussion concerning Mode 2 and the role of future (and present I would say) universities Arie Rip (2002) argues that

indigenous (and local) knowledge has become important, and creates a challenge to Western-science-as-we-know-it. Underlying world-views are now being articulated, and this raises the question about the world view embedded in Western science. Multi-culturalism is not the answer to this question, but is definitely the site to explore possible answers. The African Renaissance movement, and the official recognition in New Zealand of Maori approaches to knowledge production are two of such sites. Clearly, science in the 21st century will not be like science-as-we-know-it.

One concrete way to test and practice the distributed knowledge production and inclusive innovation as indicated in Mode 2 research is cluster development based in Triple Helix contexts. In other chapters of this anthology a number of these kinds of cluster experiences are presented.

⁹ Triple Helix IX International Conference, “Silicon Valley: Global Model or Unique Anomaly?”, 11-14 July 2011, Stanford University, Human Sciences and Technologies Advanced Research Institute (H-STAR), Triple Helix Research Group www.triplehelixconference.org/the-triple-helix-concept.html (accessed 20140107).

Cluster and innovation system

In the Sida supported cluster development in East Africa and Bolivia cluster initiatives are used. A cluster initiative¹⁰ may be initiated by government or academia or a private sector development agency. Innovation-driven actors from different sectors aim to support renewal and competitiveness in a traditional industry. A decisive factor for the development of the cluster initiative (CI) is cluster facilitation supporting the decision making and collective action among the stakeholders in the CI. The cluster initiative is not the cluster itself. The core of the cluster is the firms, often small and micro firms in East Africa clusters. The CI consists of all the companies and organizations that are linked together – in collaboration and competition – in value creation. The CI is the conscious attempt and activity to mobilize and organize all the actors and resources to make individual companies and firms in the cluster more innovative and competitive.

An integrating process is taking place in successful cluster initiatives. The roles of the actors get increasingly clearer and the integration of different support systems evolves. The integration also means an evolving innovation system including all different actors, on local, regional and/or national level. These parallel processes can be experienced in Uganda at local level (see Chapter 2) but also at national level. In the latter case the results of ISCP-Uganda motivated the Uganda President to support this cluster program during 5 years starting July 2010. The resource originates from the national government budget. This situation is relatively unique for university programs supported in addition by foreign aid. The resource is allocated by the Ministry of Trade, Industry and Cooperatives with a memorandum of understanding between Makerere University, where the cluster secretariat is placed, and the Ministry. A national steering committee for the cluster program includes representatives from the triple helix actors. The Uganda context however implicates a number of challenges such as weak or absent institutions, financial systems etc. In spite of that, the Uganda example constitutes condition for an evolving innovation system needed for a more sustainable situation of socio-economic development.

The experience presented above gives us an example of how “society speaks back” in a constructive way. It is not until concrete and tangible results are demonstrated to the local and national government they become willing to invest. The cluster program with comparably small amount of support from Sida thus constitutes one successful activity giving relevance to the government and society.

Ending remark

Academic research within cluster collaboration is a danger, if it is not deeply anchored in the local context. The danger comes from the context of extremely scarce resources and little space for risk taking, if any, within the cluster. The cluster members in East Africa are mostly poor people with family responsibilities.

¹⁰ See Clusterpedia at http://sicc.se/?page_id=68 (accessed 20140107).

If a resource, vital for the cluster firms, is found to be profitable, chances are that more powerful external actors see opportunities to exploit, buy land or property, introduce more high-tech methods or go into business in ways that do not benefit the local economy and the cluster members. Situations are also such that, when the cluster firms become more profitable, the risk increases for external interests to manipulate the cluster members and take over. This can be observed both in Uganda and Tanzania.

Robust knowledge for socio-economic sustainability and development relies on context sensitivity. In the cluster programs I have been involved in for about 10 years I have experienced numerous examples of genuine context sensitivity and knowledge among participating researchers and students in East Africa and Bolivia. The learning processes born from context specific knowledges are vital for results people can rely on and build their lives upon.

I am grateful to my colleagues and friends at BTH, SICD, Sida and all cluster friends in Africa and Bolivia. I am constantly learning.

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Chapter 6

Universities can play enhanced roles in cluster initiatives

Julius Ecuru

Most countries in Africa are aspiring to achieve middle income status as soon as possible¹. That is to say, they are looking forward to an economic situation where the GNI per capita is between US dollars 1,000 and US dollars 13,000 going by the World Bank's classification of countries (World Bank, 2013). This aspiration might be associated with a widely held view that one of the best ways to fight against and/or eliminate poverty is to increase economic growth (Barro, 1996). Indeed, economic growth in many sub-Saharan African countries has impressively fluctuated between three per cent and six per cent per annum of real GDP in the last decade (World Economic Forum, 2013). This is despite the global financial downturn, which recently affected Europe and North America.

One could also argue that the aspiration for a middle income country status is the respective countries' government response to the growing challenge of creating opportunities for Africa's predominantly youthful population - 70 per cent of the population is estimated to be under 35 years of age (United Nations Population Fund (UNFPA) 2012). Thus, we see overtime an increasing emphasis on developing the private sector as the engine for growth and employment. But it is not just a question of developing the private sector, but one of developing a competitive private sector. This new paradigm of growth has led many policy makers to embrace science, technology and inno-

¹ This aspiration is normally reflected in the national development plans of the countries, and other related policy documents.

vation as the driving force for socio-economic transformation. As I see it, these policy shifts potentially create enormous opportunities for universities to position themselves as centres of research and innovation.

So, how can the university in Africa become a key player in national and regional socio-economic development processes? First, we should acknowledge that universities across Africa are rapidly expanding, more so in terms of student enrolments. Though still very low compared to the rest of the world, university student enrolments in many African universities have almost tripled in the last two decades (Montanini, 2013). However, the outputs have not sufficiently matched the skills demands of the labour market. For this, the university has increasingly been criticised and, new calls have been made not only to produce graduates with skills appropriate for the private sector, but also able to create jobs. It looks like a daunting challenge for the universities, but this can be an opportunity to re-think the role of the university in national and regional development in an era of rapid globalization and competitiveness.

A colleague shared with me his experience after graduating from Makerere University a few years ago. He had developed a formula to turn traditional millet and cassava bread into a value added commercial product while at the university. At that time there were few or none such products in the local market. He said he did not want to look for a job, but wanted to set up his own factory to produce the value added mixed cassava and millet flour. In pursuit of his goal, he teamed up with a food technologist with whom he had graduated the same year. Together they started looking for support to build a factory. At the time, no office existed at the university to help discuss their business idea, or advice on whether the idea was feasible. Being science graduates, they had no entrepreneurship knowledge or skill, as these were not part of their undergraduate curriculum. They approached an association of manufacturers in Uganda, which was also unable to help them. At the national level, there was no organization with programmes to help young potential entrepreneurs like this colleague of mine.

Thankfully, the situation has now changed slightly. Entrepreneurial thinking is permeating universities. For example, some universities have technology transfer policies or offices. It is also common nowadays to come across some offices concerned with research for business in many science and engineering colleges. Most importantly, there are emerging entrepreneurial activities within universities, which I believe are creating new opportunities to translate knowledge (research products) into business ventures. Many universities and university colleges have mission statements bearing the word “innovation”, which I believe indicates their commitment and drive to translate knowledge products into socially tangible goods and services. I see these as positive developments signalling transformations within the university system that will enable universities play an enhanced role in national and regional socio-economic development.

Already, we are beginning to witness the result of these transformations through the university’s active participation in creating innovative business clusters. A cluster, as scholars like Michael E. Porter (Porter, 2000) and C.S Colgan (Colgan & Baker, 2003)

put it, is a concentration of companies and industries in a geographic region that are interconnected by the market they serve and the products they produce, as well as by the suppliers, trade associations, and educational institutions with which they interact. The cluster concept is relatively new in most parts of Africa. For example, it was introduced in eastern Africa around 2003/04, and is being driven mostly by proactive university scientists who view it as a collaborative platform between the university, industry and government actors (Mwamila *et al.*, 2004). These cluster initiatives are modelled around Henry Etzkowitz and Loet Leydesdorff's triple helix of university-industry-government relationships (Leydesdorff & Etzkowitz, 2001; Etzkowitz, 2003). Triple helix has become a central feature of innovation systems² worldwide, especially as it relates to transitions towards knowledge based economies. However, we need to understand more how the triple helix is and can be applied in cluster development initiatives in Africa. For example, as cluster initiatives begin to pick up in Uganda and in eastern Africa, questions have also started to emerge regarding the role of university, government and industry players in the clustering process. In some situations, calls have been made for a separate cluster policy to streamline these relations.

There is no doubt that the university has an important role to play in the clustering process. The question is, "what role?" If we look back a little bit, the structural adjustment process of the 1980's and 1990's in many African countries separated the roles of government, university and private sector. Government was left with the role to provide policy and regulatory support. Universities were to remain with their traditional role of teaching, research and community outreach; while private sector was to do business. Public research organizations were also created and/or given autonomy, for example, National Agricultural Research Organization and Uganda Industrial Research Institute, in Uganda. It was not recommended for public universities and public research organizations to operate businesses. This scenario, of course, conflicts with the triple helix concept and innovation systems approaches, which emphasise co-development between university, industry and government. Moreover, in the triple helix convergence, the roles of government, industry and universities may overlap as long as they all aid in enhancing business growth and competitiveness.

Coming back to the role of the university in the clustering process, I believe, the university needs to embed itself in the cluster community and play the catalytic role to spur innovation. That is, the university should not only be, but also be seen to participate as an actor in the cluster. There are bits and pieces of this "embeddedness" in the on-going clustering processes, but it needs to stand out as the main strategy for the university's involvement in cluster initiatives. So far, the university has played more of the intermediary role, i.e. organizing firms into groups (cluster formation) and facilitating training and other capacity building activities for cluster firms. Such a role is important, and it may be inevitable that the university plays it in the formative stages

² Innovation system as described by Lundvall (Lundvall 2010) is an "open, evolving and complex system that encompasses relationships within and between organisations, institutions and socio-economic structures which determine the rate and direction of innovation and competence building emanating from processes of science-based and experienced-based learning".

of a cluster development initiative. But this role arguably is better played by other actors like industry associations or similar agencies. If the university plays only the intermediary role, cluster firms may continue having unrealistic expectations of their university counterparts. For instance, anecdotal evidence suggests that some cluster firms in Uganda expect the university to wholly finance and support their activities, yet the university itself may have limited resources. When expectations are not met, mistrust normally develops, and the university must make an extra effort to regain trust and keep the cluster alive. However, embedding the university within the cluster encourages organic (from within) growth. The goal would be for the university to establish itself within the cluster and become an active member (actor) of the cluster.

Embedding in the cluster also means the university can play an active role in starting up new businesses, while at the same time assisting existing ones to become competitive. Ultimately it means being able to define the cluster as a sectoral innovation system (Niosi, 2010). That is, the networks of firms, organizations and agents with an interest to produce, use and diffuse specific knowledge types or technologies and/or products, and most importantly, the relationships among the actors, and the norms and standards, which influences the relationships.

Take, for example, a fruit processing cluster in central Uganda. Within this region, there are about 30 micro and small scale fruit processors. What would it mean for the university to embed itself in this cluster? There are many things that can be done; but at the least, the university would map the actors that constitute this cluster community. It would analyse the opportunities in fruit processing. It would also build essential links to study, and jointly with the cluster firms, tackle challenges faced in developing the fruit processing enterprise in the region. The university would establish a cohort within the cluster, which becomes the base for continuous research and technology development to improve cluster products and services. Furthermore, the university would be at liberty (and I would definitely encourage it) to start up new businesses within the cluster. Most of all, the university would, jointly with local governments and municipalities, set up and operate business incubation services to encourage new entrants in the cluster.

In conclusion, universities can play an enhanced and a catalytic role in the clustering process. However, it requires a conceptual reconfiguration of the cluster as a sectoral innovation system, and for the university to progressively embed itself in the cluster communities, where it should then maintain a significant presence.

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Chapter 7

Voices from Katwe Salt Lake Cluster Initiative

Jennifer Kabarangira

Oh our mother salt lake

*What a good and nurturing mother you've been,
You've provided salt to put in our food.
Animals lick and enjoy the salt from you, mother
When we are sent for fees, your salt is sold to pay.
Oh our mother salt lake.
Our parents have got jobs from you, mother
Your salt has educated many who are important in the country
The money from your salt has clothed and fed us to grow healthy
Oh our mother salt lake
You are talked and written about in history and geography
Researches and studies are being carried out
To make the salt from you acceptable internationally
Oh our mother salt lake.
We love and cherish you, mother
We crave to make you our own, mother
We appeal to safeguard you, mother
Oh our mother salt lake.*

(Poem by school children in St Jude Primary School)

Historical background

In the 17th century, salt was one of the most important items that attracted the attention of very many people within Africa. It was regarded such a valuable mineral and was battered for other items like; hoes, clothes, and even guns which were given to the rulers of the time.

Lake Katwe has a circumference of 8 km and 21 streams (springs) around it, which pour in fresh water every day from the surrounding rock. It is located in Katwe Kabatoro Town Council, Busongora County in Kasese District of Western Uganda.

Lake Katwe is a crater lake that was formed as a result of volcanic eruption that caused depression of the earth to form a valley in which the lake is situated.

Salt at Lake Katwe has been extracted and consumed by the people of Uganda since time immemorial. Salt mining in Katwe is one of the Africa's oldest industries still surviving the onslaught of Western Imperialism. It has played an important political and economic role in the history of the western part of the interlacustrine region. It was important to the economy of Bunyoro Kitara during the 18th and 19th centuries and was the basis for the regional and long distance trade in the region prior to the event of the external influence from the East African Coast. The salt in Katwe was the basis of the breakaway of Toro Kingdom from the Kingdom of Bunyoro Kitara.

A story from one of the opinion leaders who attended the first cluster stakeholders meeting

The formation of the cluster was timely although there is a time lag in realizing the dream and the vision the way you call it. When we were in the first stakeholders meeting my question was, *"Aren't you also going to promise castles in the air like most of the so called development partners/ investors have done?"* It is good my eyes have seen several people coming to discuss with us how to; first protect the resource; that is our lake and how to maintain our salt pan and the quality of salt. Incidentally, all those who have done work on our salt in form of research except Lake Katwe Salt Cluster with their Triple Helix Approach, have never turned up to give results. I have tested the salt produced at laboratory level in Makerere University by the academia sector. This was the first indicator to show that from now on our salt will be processed to edible and international standards for consumption.

My wish is that I live to see the cluster realize our dream, let the government, the university and other well-wishers help in speeding up the production of the pure salt.

The involvement of the academia is paramount since there is need to know why the sulphur could not be extracted from our salt. I remember it was SIDA SAREC that championed this, *"Can't it still help this cluster since our enterprise is so dependent on researches and laboratory experiments?"*

The salt lake became the property of the Omukama (leader) of the kingdom Toro after the creation of the kingdom in the 19th century. Between 1929 and 1933, the Indians

and the Arabs living in Katwe and are said to have subverted the administration of the salt lake¹.

The explorer H.M Stanley was the first white man to make a written record of the history of salt exploitation at Lake Katwe during his journey to Africa in the 1875. He also took with him a sample of the salt which was analysed in London and Alexandria (Egypt); the first chemical analysis of the salt. This laboratory test revealed that Lake Katwe contains several important chemicals but deficient of iodine.

It is emphasized that ever since the colonial times; salt production at Lake Katwe has been one of the most important sources of revenue for the entire community and the town council. Just as people in villages own gardens for cultivation, people of Katwe Kabatoro Town Council own salt pans as their gardens through which they acquire total sustainability.

Lake Katwe brine has been tested chemically to be composed of; sodium chloride, sodium sulphate, potassium chloride, hydrogen sulphide, ammonia, sodium carbonate potassium bromide etc.

A salt loaders day at the salt lake

The famous Lake Katwe is a source of a natural salt where investors, laborers, traders and winners alike turn for a living and go each morning as a day breaks. Business at the salt lake begins at 8: 00 a.m. each day. The salt loaders require only energy to labor as they carry salt on their backs to the commercial vehicles that wait for it near the salt pans and the lake. The loaders work as typically casual although they pay an annual market permit to the local authorities.

The business of the loaders depends on the influx of vehicles that come from different parts within and outside Uganda particularly the great lake region where Lake Katwe salt is marketable as food flavor for both human beings and domestic animals.

Therefore loaders wait at the salt lake market or in the town center the whole day and once vehicles come in good numbers, they make their day and go home happily usually at 5:00 p.m. in the evening when the market closes and the salt lake is out of bounds for ordinary people.

The salt loaders are categorized into two categories; loaders for washed grade II and crude grade II. They both have their groups with their objectives well set like in the other organized groups in the salt lake.

Extraction and winning of Lake Katwe salt

The salt in the brine forms different crystals depending on concentration and climatic conditions. The workers extract four different types of salt with different quality.

¹ For more information, see www.katwe-council.com, read 20131211.

Salt grade I (NaCl)

This is naturally formed by evaporation of the surface brine during a very dry season. The salt forms on the surface of the lake and the crystals blown by the wind until they reach the edge of the lake where they are scooped off the surface. This is scooped from the mother lake but has taken many years without forming. The optimum conditions for the formation of grade one are;

1. Plenty of fresh water from the streams and rain.
2. Too much sunshine (severe drought of about three months).

It is therefore very much dependent on the weather conditions.

Salt grade II crude (Kihabule)

This is a by-product obtained during the process of preparation for salt grade II washed. It is the crystals that form before the edible crystals form. This is produced from the mud-lined salt ponds known as salt pans.

Salt grade II washed (Edible)

Produced by evaporation in mud-lined ponds like the crude salt but is formed after the harvest of kihabule crude salt. This is what most of the people target to produce because it is consumed by people in and outside Uganda. They also use it for preservations of hides and skins.

Salt grade III (Rock salt/ Animal lick/Mahonde)

This type of salt is naturally produced in the main lake. It is a double salt containing sodium carbonate and sodium sulphate. It is formed as a result of evaporation and crystallization of the mother lake when the crystals are left in the lake after many years without being scooped. It is detached from the crust by extraction using iron bars. The detached pieces are loaded on trains of ambatch stems rafts and floated to the edge for sale. The rock salt is pried from the bottom of the lake by men using heavy crowbars.

There were two brave women Kaikara Joweria and Maria Mbambu, now deceased, who got engaged in rock salt extraction work but retired after sometime. Mahonde salt extraction may remain a monopoly of male extractors because the brine water in the lake is corrosive and known to be dangerous to the anatomy of the extractors. It is therefore even more dangerous when it comes to the nature of women and that explains why the two women mentioned above could not persist in the activity.

The experience of a salt winner

Salt winning in Lake Katwe is done locally by people who own salt pans around the salt lake while the entire lake is the home of the natural salt products in different chemical grades. The logic of having salt pans is to enclose small amounts of brine to enable the fast formation of salt.

Essentially salt pans produce two types of salt namely; grade II washed (edible) and grade II crude (kihabile) for animals. These pans are individually owned by people who treat them as family property. Therefore, during the dry season when the salt is formed by scientific vaporization, the entire (adult) family, sometimes with the help of paid up workers spend time in the pans to prepare for and during salt production. Paid up workers are women and girls who drop out of school either due to lack of fees or are impregnated while in school.

There are basically two seasons when salt winning is produced and that is the time when salt winners get salt. Incidentally when it is in abundance, the unit price lowers in accordance with the laws of demand and supply. Therefore, salt becomes expensive during rainy seasons when there is low or no salt production from salt pans. The life experience of a salt winner is thus dependent on weather/ climate.

Salt is a chemical compound and the brine is a corrosive material particularly to the bodies of the salt winners. It is common for salt winners to have wounds as a result of bruises caused by contact with salt crystals. Some laborers buy long pair of trousers and pair of socks to avoid the bruises during salt winning. It is also believed that the gasses omitted from the salt brine cause miscarriages among the women salt winners as a result of bending for so long and the biological reaction with their reproductive anatomy. It is believed that some women have become barren due to the same effects.

The cluster is encouraging women to always go for medical check up to assess the state of their uteruses. Most of the winners have joined saving and credit schemes to help them improve on their saving culture and also plan for their incomes effectively.

In conclusion, more social, financial, health and scientific researches should be carried out if we are to address the challenges affecting the different stakeholders in the salt lake once and for all.

Cluster Formation

Lake Katwe Salt Cluster was formed in September 2005 with a vision to “Become the leading producer of high quality Iodized salt in the Great Lakes Region by 2010.” This has not been achieved but we hope to realize the vision since we still apply the Triple Helix Approach.

Objectives

1. Organize miners, create synergies and create enabling environment for extension of technical services.
2. Empower miners to adequately bargain for better prices and increased revenue, employment and alleviation of rural poverty.
3. Refine, iodize and brand the salt for health requirements and international market.

Before the Cluster formation the road around the salt lake had impassable spots that resulted in failure for some of our members to sell their products. As a Lake Katwe Salt Cluster, we engaged Katwe Kabatoro Town council to construct the salt lake road. The road was constructed; all the salt pans are accessible now. Vehicles can load from any stage where the buyers have identified salt of their choice.

The Cluster has been engaged in discussions with different stakeholders to have a strategy of having services at the salt lake improved.

Before the formation of the cluster, salt winners were not assertive enough to engage in discussions on issues affecting them; we kept grumbling and complaining about the services that the council was supposed to provide even when we knew that it was our role to advocate for the right to these services.

When we formed the cluster we became a voice to advocate on behalf of many others. We realized that we had much to do as a local leadership if we wanted improved services, improved quality of salt and access to the market at both local and international levels.

The cluster's approach of using a Triple Helix Approach has been so enterprising that we are seeing much involvement of the academia in carrying out researches. The District environment Officer and the Cluster are trying to find a suitable species of grass which cannot be eaten by animals to be planted around the crater area in order to stop soil erosion from the hillsides to the salt lake.

The discussions carried out by different groups working in the salt lake were able to elaborate on the environmental and health hazards. During the discussions, one of the Swedish researchers on visit elaborated on how rock salt extractors can shift from using a plant (ambatch logs) which is a delicacy of elephants and almost extinct and instead use empty bottles.

Construction of flush toilets and bathing facility for both male and female is ongoing. Women and men who are within the radius of this facility use it after the long day of work.

The shelter was renovated and now salt winners and other stakeholders can shelter from rain and sunshine comfortably.

Most salt winners stock their salt waiting for better prices, they can now raise money for fees and self-sustaining, they are now building houses unlike before where most money was misdirected in none priority activities like boozing and luxuries.

Salt winners are now continuously maintaining their salt pans for better yields and better quality. They are currently cleaning the salt pans throughout the year so that in case the sunny season begins, they are able to produce clean salt and in time.

Salt is considered as a mineral and therefore the lake belongs to Uganda Government as per the constitution. Therefore, in order for the salt winners to mine and extract salt as a raw material without any fear they should acquire a mining license from the

government. In Katwe Kabatoro Town Council 90 percent of the entire community depends on salt winning.

A day of a rock salt extractor

The rock salt extractor wakes up in the morning and goes to the salt lake. With him he carries a five liter gallon of water, a pair of shorts that are light for wearing during the extraction exercise, and patex (a gum which seals iron sheets holes) which is used to seal open wounds so that the brine shouldn't harm them. One of them tells the story, *"After having our meals we get dressed, we wear socks and wrap our legs with old used vehicle tubes to avoid severe injuries, a pair of shorts and then go into the lake to start our work. Rock extraction has a bearing on climatic conditions; during the rainy season extraction is done with difficulty because of the high water level that affects the extractors especially the short ones. This means that short extractors stop doing the work this season. During the dry season, the water level lowers, making it reasonably easy for us to do our work."*

Whereas the amounts of salt extracted in this grade depends the strength of the extractor, there has been established conservation regulations according to which extractors are permitted to go for extraction only three days a week.

The chairperson for the extractors said, *"In our organization we give out small loan to our group members, we contribute to burial expenses and punish those who violate our bylaws. We have constructed our offices using members' contributions. Although we have done all this, we have a challenge of having a sustainable way of having an environmental friendly way of carrying our rock salt from the lake to the shores, we are almost cutting all the ambatch trees from the national park. When the Swedish researchers told us about the plastic bottles canoes, we got excited to learn how to make and use them. The challenge is we need to get either someone to come and teach us how to make them or we are taken for training in Zanzibar, there we can share some experience since they are more experienced in using these types of canoes."*

We do not sell directly to the buyers; we sell the rock salt to the Mawater Women group traders to help them remain in business. Our salt is sold in kilograms unlike the other grades where measurements are done by just approximating.

The Cluster and the group are in the process of inviting the Queen Elizabeth National Park Authorities to discuss how some extractors can be facilitated to be trained in plastic bottles canoes making.

The academia

Makerere University has carried out capacity building training in business management skills. The Cluster has also interacted with the Cluster secretariat for consultation and guidance. Members of the cluster have interacted with other cluster members within the country and from other countries during the experience tours and conferences, which are organized in the country.

Collaboration with Swedish cluster researchers

Through a Swedish research project on clusters, two researchers came to Lake Katwe to carry out a research on the environment impact on the salt lake. During the research, they met several groups; Mawater Mahonde Women Traders, Mahonde Extractors Group, Salt Loaders and Salt Winners. Environment challenges were identified during the interactions:

- Salt pans congestion that caused the blockage of streams and hinders water from flowing into the mother lake. This water refreshes and cools the brine coming from beneath the lake. It has also caused reduction of the surface area of the mother lake causing floods when it rains.
- Grazing of cattle at the hillsides of the salt lake causing the soil erosion.
- Overharvesting of the vegetation for handcraft making.
- Over extraction of the rock salt which is resulting in dilution of the lake brine since the rock and the brine from the natural vents helps in concentration of the water.
- Picking of stones for aggregates around the salt lake.
- Blocking of trenches by throwing mud scooped from the pans and reduction of trench sizes for salt pans expansion causing the blockage of the vents and when it rains, rainy water floods in the salt pans.
- Creation of other vents to supply their salt that has reduced pressure to push brine out of the original vents supplying the mother lake.
- Failure of salt purification and processing that is causing lack of market because the salt has no iodine and is not recommended for human consumption internationally.
- Price manipulation by middlemen depending on salt quality and distance where it is got from.
- Lack of owning the salt legally which is a threat to the salt pans owners in case any investor acquired the license before them which means that they are going to be pushed out. The salt cluster has begun the process of acquiring the license.

When the Swedish researchers came back to disseminate the research findings, the challenges were classified by identifying those that can be addressed locally, by academia, government and private sector. So the cluster is trying to address the issues that are locally coded.

During their third visit, the Swedish researchers went with us to the Ministry of Energy and Mineral resources, Geological Department Commissioner to get acquainted with what is done to enable the Cluster begin the process of licensing.

A story from a member of the Mawater Women Group

Mawater Women Group is a group of women who buy and sell the rock salt. This is what one of the members said when asked how the group is benefiting from the cluster.

- In our group as traders in rock salt we regulate our prices. Most women in our group are honored by their husbands because they are capable of contributing to the family wellbeing.
- Most single mothers in the group have constructed their own houses and live happily. We are happy the cluster, the academia and private sector are working hard to have our salt processed. The cluster has brought rays of hope for the first time.
- I am happy that Katwe salt cluster was introduced; we have had researches being carried out to see how this salt can be purified to the international consumption standards. Although the salt experiment carried out by Makerere and Mbarara Universities could not extract sulphur from the salt, when we tested and also used the salt in cooking, we could not notice that the salt was impure. Therefore if we could have the salt processed and sold at that level meanwhile more experiments continue up to such a time when sulphur is extracted.
- When the Swedish researchers met us they told us how the seaweed cluster uses canoes made from plastic bottles. If the salt extractors are trained to make these boats, the ambatch specie will be saved from destruction. Maybe this is the reason elephants are straying into peoples gardens looking for what to feed on after their delicacy is being encroached on.
- We have noticed how important it is to protect the environment because the sustainability and conservation of this lake determines our stay in business. So the cluster is trying hard to educate the stakeholders on how to protect the salt lake both as an environmental and economic asset.



Figure 7.1. Children at St Jude Primary School, authors of the poem (photo by author).



Figure 7.2 Salt loaders carry salt from the shore as rock or in bags to buyers' trucks (photo by author).



Figure 7.3 Salt winners harvest salt in one of the salt pans (photo by author).



Figure 7.4 Mawater Women Group buy the salt from salt workers and sell it further to external buyers, thus coordinating the salt trade in the community (photo by author).

Chapter 8 Lake Katwe Salt Cluster Initiative

Balu-Tabaaro

Chairman of the facilitator group

Lake Katwe Salt CI was started in September 2005 after an innovation systems and clusters training workshop in Jinja, Uganda. The cluster vision was to be the leading producer of iodised salt in the Great Lakes region. Katwe Salt CI was one of the many clusters chosen, and it was one of the first set of clusters formed in Uganda. The cluster was based on salt brines at lake Katwe (Fig.8.1) situated about 500km west of Kampala.

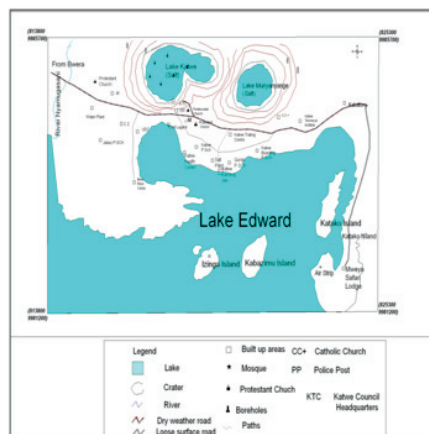


Figure 8.1: Location of Lake Katwe, north of Lake Edward and near the border to Democratic Republic of Congo.

At the lake there are about 12,000 salt workers (70 percent of them women) carrying out salt extraction, salt loading, trading and other peripheral activities. Three kinds of salt are produced using crude technology;

1. Grade I (high quality salt for human consumption). This has not formed for many years.
2. Grade II (for human consumption). This is produced by solar evaporation in man-made mud-lined salt pans and is produced mainly by women under harsh working conditions.
3. Grade III (rock salt) for animal consumption.

Geology of the salt

The salt lake brine evaporates with the following mineralogy

HALITE (NaCl) white cubes

TRONA ($\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$) white glassy crystals which effloresce slightly when dry

BURKEITE ($\text{Na}_2\text{CO}_3 \cdot 2\text{Na}_2\text{SO}_4$) usually fine grained, occur in crusts, often mixed with trona

HANSITE ($9\text{Na}_2\text{SO}_4 \cdot 2\text{Na}_2\text{CO}_3 > \text{KCl}$)

Consequently, using the knowledge gained in the training and using the triple helix concept, a team of facilitators was set up:

The team consisted of Eng. Balu-Tabaaro (Mining Engineer) as chairman and representative of the government (then working for Government in the Department of Geological Survey and Mines), a mechanical engineer to represent Makerere University, (then faculty of Technology), one representative from private sector's Uganda Small Scale Industries Association and a person from the National Council of Small Business Organizations. At a later stage, Mbarara University was brought on board when they showed interest in the project and eventually carried out a lot of work on the characterization of the salt at Katwe and made good work at bench scale level on refining of salt for iodization.

The first activity of the facilitator's team was to visit at Lake Katwe to get acquainted with what was on the ground. This involved carrying out baseline studies on the status of the lake with respect to the activities carried out, the method (technology) used to extract the salt, sell of the products, the number of people involved in the salt extraction industry, the storage and distribution of the salt products, gender and environmental issues.

Before deciding on the intervention, a series of training workshops were carried out. The workshops were meant to organize stakeholders in the salt industry and sensitize them about the cluster concept. After a series of training workshops, and after the stakeholders were fairly sensitized on cluster concepts, a democratic process was carried to elect a local leadership team of nine people to run lake Katwe salt cluster.

One of the early observations by the facilitation team was that salt miners lacked appropriate technology to mine and refine the salt, as indicated in Figure 8.2 below.

Layout of Salt Pans



A woman harvesting salt from a pan



Rock Salt after extraction



Raft for transporting salt ashore made of ambatch; an endangered tree



Figure 8.2: Salt extraction. Photo: Eng Balu-Tabaaro.

They were also working under hostile environment where they had no safety wear especially for the women. Due to poor coordination their products were fetching low prices. There was lack of storage facilities which meant that salt produced was often going to waste, resulting in loss of income. A strategy was then formulated to bring all cluster stakeholders on board with the view of solving the problems affecting them.

The problem of coordination was solved when the cluster leadership group was elected. This eased coordination and mobilisation of cluster stakeholders. The leadership group also helped in passing on knowledge gained through training to the stakeholders.



Figure 8.3: Meetings with Katwe salt miners. Photo: Eng Balu-Tabaaro.

The marketing and bargaining for better prices was enhanced since the cluster could bargain to get better prices for their salt. In some cases, where traders from far did not come to Katwe to collect salt, the cluster hired transport to take the salt to the markets in major towns in Uganda and beyond.

Health and safety issues were partially solved by providing needed training and provision of protective wear such as boots and gloves. The original vision of Lake Katwe Salt cluster was to become the leading producer of iodized salt in the great lakes region by 2010. Though this was a tall order, great achievement was partially obtained through use of triple helix i.e. use of the academia to carry out research and development to improve technologies for the extraction of salt.

Mbarara University of Science and technology as academia under the triple helix concept carried tremendous work that helped in development of better technologies that enabled production iodized salt. They carried out brine sampling on Lake Katwe, carried out chemical analysis of the brine and used the results to establish a regime for refining the salt by mainly removal of the sulphides which were fixing the iodine. Consequently a bench scale method was established and is waiting scale up once funding is available.

Challenges

Initially visits to the cluster site were constrained by lack of funds. This was consequently solved by seed money from Sida. The distance from Kampala to Katwe meant that only few trips could be made by cluster facilitators to Katwe. There was difficulty in introducing the cluster concept to the salt workers. The facilitator team was also limited in their comprehensive knowledge of cluster development skills. There was also absence of formal framework through which Lake Katwe salt miners could operate, however a framework is now in place and licensing is being worked out. But generally a lot was achieved in sensitizing the cluster stakeholders about the benefits of clusters evidenced from the increasing number of people who have signed up to be members.

Chapter 9

Could aid donor agencies support innovation? Lessons from Swedish aid politics and practices

Tomas Kjellqvist

Introduction

Innovation is one of the most used words in current policy documents within the sectors that give or receive aid. The use of the word is indeed multifaceted. At the recipient side, the meaning found in policy documents is more analogue to introduction of new technologies in developing countries. This interpretation is close to how the concept of innovation has been used in some economic theories and in engineering. At the donor side, the concept tends to refer to innovations in the aid methodology rather than to changes in the socio-economic or socio-technologic aspects in the aided developing countries.

Moreover, recent innovations in aid methodology could be seen as counterproductive to innovation in the aided countries. Aid innovations during the last twenty years have been mostly concerned with policy development and economic reforms. At the nearby end of this trajectory, we now see how recent calls for aid effectiveness and results have led to a situation where control and compliance are the main demands from the political and financial authorities. This modus operandi of aid, focused on political planning, control and compliance, contrast starkly to the “g(e)ist” of innovation, where spontaneous, incremental and evolving are keywords alongside with serendipity. This contradiction becomes ever more puzzling considering that job creation, private sector and economic growth are the main “innovations” in the reformulation of the

Millennium Development goals and in the results from the High Level meeting on Aid in Busan 2011.

This paper aims to give a background to the trap that Aid donors have constructed for themselves. The example is the Swedish aid that in the 1970's and 1980's focused on supporting industrial development in partner countries. With the fall of the Berlin wall, focus shifted to aid institutions, policy development and economic reforms, taking steps away from the materialism of real and fixed capital to the immaterial spheres of symbolic capitals. It examines a countermovement in this tendency, where the Swedish research cooperation with developing countries found itself confronted with challenges to convert knowledge capital of the academics into utilities for the benefit of the people in the partner countries. One of the responses to such challenges was the Innovation Systems and Cluster Development program driven by the faculties of engineering at University of Dar es Salaam, Tanzania, Makerere University, Uganda and the Eduardo Mondlane University in Mozambique. The way this program has developed shows that there might be ways out of the donor's trap. It also shows that innovation and learning together in clusters can matter for development.

Some theoretical underpinnings

Innovation systems and developing countries

In the mid-1990's I worked as a desk-officer for the Swedish Research Cooperation with Tanzania. The governmental agency, SAREC, specialized on research cooperation with developing countries had just been merged with the Swedish International Development Authority and with two agencies specialized in technical cooperation and industrial development into Sida, the Swedish International Development Cooperation Agency. Having all these specialized functions under the same roof seemed to be a good idea to the politicians at the time, almost regardless of their political stand.

In reality, the merger was a time of great misunderstandings between different corporate cultures. Many of the discrepancies were polished off by time and by the continuous efforts by management to streamline processes and modalities of work. Research cooperation stood out in two ways, first, it was kept as a unity in one department and, second, there was a separate budget line kept for research. The decision making process was also different: all decisions on research cooperation were to pass a committee of active researchers. The administrative peculiarities certainly annoyed other branches of Sida, but this was not the most difficult conflict that management and staff at the research department had to handle. The usefulness of research in development aid was questioned, both from ideological standpoints, from competing knowledge claims, from differing knowledge demands and from sheer ignorance. This led to confrontations at different levels, also when I and other research officers visited the Swedish embassies and development staff in partner countries.

The questioning and critique of research cooperation seemed very unfair. Just looking at the portfolio of the research cooperation with Tanzania should have proved the

case. It contained research on the efficiency and stability of the power generation and use, and transmissions of the electrical grid, which were central areas to the Swedish aid portfolio. Projects in the sciences were particularly addressing new crops that created income opportunities for vulnerable groups, such as cultivation of mushrooms and seaweeds. The impact of the seaweed cultivation on the situation of women and children were already well documented and the market prospects for mushrooms were indeed promising. Research on barriers for female entrepreneurs influenced Tanzanian policies, and so did research on HIV/AIDS and malaria. However, the innovativeness of many “other” development desk officers when finding arguments against research was astonishing. The administrative discrepancies were probably the main cause, as they resulted in a power conflict. Embassies simply wanted to streamline research cooperation into something that was manageable through their ordinary routines.

There was more to it though. Reluctant to categorize my colleagues’ hostile behaviour as hunger for power, I started to search for rational arguments. Particularly, the example of the seaweed cultivation at Zanzibar proved the case of a knowledge based development. I started to search in the development literature for relevant studies that positioned such experiences in a theoretical framework. I got increasingly frustrated and surprised as it was hard to find references to the role of knowledge in development. Education had been studied from various angles, but very few studies took perspectives below the macroeconomic perspectives linking education in general to economic growth and different aspects of welfare building. Worse though, the trend at the time, set by studies from the World Bank, claimed that higher and vocational education only gave private rate-of-returns, while basic education provided social rate-of-returns (Psacharopoulos, 1981). Hence, higher education could be privatized, with high tuition fees while basic education should be provided for free or to lower fees. This view has been contested, by reality and in literature (Jandhyala, 2007). At the time, the role of research and innovation was not even mentioned in development literature, which is still much the case.

By accident, I stumbled over studies of regional development in the North. That perspective was totally contrasting. Articles tried to drown each other out in praise of the knowledge society and the role that localized higher education opportunities would have on the economics of sub-regions. Central in the studies of the North were the concepts of innovation and clustering, which I immediately recognized from the mushroom and seaweed initiatives in Tanzania, although the apparel and the scale of things was quite different. When digging deeper into the sources, I realized that where development economists failed to give coherent explanations of the miracles of the Tiger economies in South East Asia, researchers on National Systems of Innovations, NSI, actually did their job much better (Lundvall, 1992; Nelson 1993; Edquist, 1999).

In a way, this made me realize that much of my colleague’s ignorance of and indifference to the role of research in development, intertwined with aspirations for power and control, stemmed from a not very helpful development theory. Furthermore, with an increasing amount of development theory coming out of the World Bank rather than independent research institutions, the risk for ideological biases was for real. Research-

ers like Alice Amsden (2007) and Peet (2007) have shown how such biases have played out in politics for industrial development, structural adjustment programs and policy making in the developing countries. In my studies of the Swedish aid politics (Kjellqvist, 2013), I found a successful campaigning from the right wing and liberal parties to align Swedish aid with the Washington Consensus against nations with “socialist” ideas in their development aspirations. So, my colleagues stood betrayed both by development theory and development politicians, in a need to position themselves for careers and, paradoxically, limited liberties within the doxa of liberal aid in the 1990’s and onwards.

The innovation systems theories were real eye-openers to me, and I decided to use them and spread them as part of my work. I did not realize at the time that they were controversial in many ways. First of all, innovation systems theory is to a large extent heterodox in contrast to the neo-classic economic schools, and, hence, not that easy to align with the neo- and neo-liberal economics and politics conveyed in the development community at large. The main critique from the heterodox perspective concerns the neo-classical idea of economic equilibriums. The evolutionary economists behind innovation systems theory instead regard the economy as dynamic, in a constant flux. This set of ideas has been clearly expressed by Nelson and Winter (1982) and Nelson (2005) in their formulation of “evolutionary economics”. They, in turn, based their ideas on Joseph Schumpeter, an economic historian who early criticized the classical economists.

The idea of “evolutionary economics” contrasted “evolution” to “development” in a way that very well reflected my experiences from research cooperation and its outreach into the wider society. Nelson (2005) uses biological metaphors to express the difference. Development resembles the plan that an embryo or seed follows in its growth process, while evolution provides the opportunities for mutations and renewals. The focus on innovations in evolutionary economics emphasizes such dynamic renewals, in Schumpeter’s perspective necessitated by the competition between firms (Schumpeter, 2008).

A similar perspective appears in William Easterly’s (2006) critique of development aid, although differently phrased, as a contradiction between “planners” and “searchers”. Much of the difficulties in reaching results in aid, according to Easterly, could be attributed to the emphasis on plans that, lacking the full picture, have been bound to fail. Easterly urges for another approach where “searchers” get opportunities to look for solutions in incremental learning processes rather than rolling out blueprint solutions. Easterly’s critique provoked reactions and rejections from the development community, with many references to him as an “aid eater”. Amartya Sen (2006) gave a more balanced critical review of Easterly’s book, where he found the arguments for “searchers” convincing, but the outbursts against the planners to be unbalanced and, partially, unfair.

The driver of mutations or innovations in Schumpeter’s capitalist economy is the competition among firms that forces them into a continuous renewal, a process with

winners and losers. In Nelson's evolutionary economy, it is the firms that are able to set up routines for innovation that will be the winners. The constitutive element of these routines is learning. An innovation system is an arrangement of a number of societal actors, related to learning and innovation, and the ways that these actors learn from each other to put together innovations from new combinations of knowledge. In Nelson's world, and most of the other innovations systems scholars, the focus is on technological change.

The perspective that the innovation scholars took up from Schumpeter was that learning, innovation and technological change were active elements in the dynamics of economies. They contrasted this evolutionary approach to mainstream economics, where technology is something that happens to the economy, is taken for granted or invisible in its black box. Learning is most commonly treated with education or "human capital" as proxies, while little attention had been paid to learning as an economic phenomenon. Grossman and Helpman (1991) made serious efforts to include innovation in standard economic models without giving up the claim for equilibrium, which made Nelson merciless in his critique. Furthermore, Nelson (2005) looked back at his previous critique of pre-mature mathematical modelling of innovation practice, and reiterated the need for efforts in making "appreciative theory" where all the potential elements are clearly understood, qualitatively and quantitatively, before endeavouring to make models.

One example of appreciative theory could be seen in Lundvall's (2009) approach to learning, where he distinguishes between two types, depending the origin of the innovations. The first he calls Science and Technology driven Innovation (STI), which is based on research (learning) in labs, on site or in incubators. Expectations are often that it should produce radical innovations, with such innovations as medicines, transistors and microprocessors being the model. In this type, universities, research institutes or corporate R&D departments innovate *for* industry and society. The innovation process is supply driven – commercialization of research findings is in focus. On the demand side, there might be companies looking for commercially beneficial research results in the repositories of research results.

The other type concerned the innovations that grow incrementally, through firms who are Doing, Using (new technology) or Interacting with other companies in the same or connected trade (DUI). In this type it is the learning within and between firms that is in focus. If Universities would participate in such interaction, they would be innovating *with* society rather than *for*. Brundenius et al (Lundvall 2009) have shown that when firms ask for assistance from researchers to their DUI, it is the embodied knowledge (persons, testing equipment) rather than new research projects that they are looking for.

The distinction between STI and DUI is valuable for the analysis of how donor agencies can perceive the opportunities of innovation. At Sida's research department the gut reaction was to embark on the STI type. Experiences from health research and from agricultural research had paved the way for such thinking. But what I had seen

in the Zanzibar seaweed was actually a successful blend of the STI and the DUI types, with the university innovating with the seashore communities at the eastern part of the island.

At other parts of the agency, such as those responsible for agriculture and environment, or industry and infrastructure, one could have expected an interest in DUI. Surprisingly to me, at that time, it was not so. These departments did request for research, but they mixed up their own knowledge gaps with the knowledge gaps within the sectors in the partner countries. Thus, as desk officers in the late 1990's and early 2000's were requested to refocus aid on policy development and leaving the field interventions behind (or to the local actors), the request was for policy relevant research rather than production focused research.

One example. As a service to the other Sida departments, the research department arranged a bi-annual conference presenting results from Swedish development researchers. Participation from the other departments was weak. At one occasion I interviewed directors of departments and heads of divisions about their reluctance to participate. I especially remember the deputy head of the education division glancing through the list of presentations in her field, shaking her head and saying: "All these classroom studies and didactic method development, they are of no use to us – we need to know how to plan education reforms". She was definitely right, that was *her* need, but not necessarily the only need within the partner countries' education systems. The didactic research presented results from a cooperation program with education researchers in several partner countries. All of them deeply involved in the education sector reforms within their respective countries. Was aid becoming alienated from its purpose, contents and practicing partners?

Generally speaking, those of the development aid workers that had been trained in economics had difficulties in finding their way into the innovation school of thought that contrasted too much to their formal training in economics. For those who were not trained in economics at all, innovation might seem attractive as a concept. However, me, as well as them were lacking the full understanding and arguments for connections between innovations and a wider societal development, economic growth and "poverty reduction". Thus, it was hard to explain the effects that such a shift of approach would have. In that situation I resorted to find some guardian angels who believed in what I tried to achieve. I found them within the management of Sida's Department of Research cooperation, with some close colleagues and successively colleagues from other departments volunteered. However, we had to await the right moment in time and the opportunity to try out our ideas in real life projects.

Building innovation systems – enter the Triple Helix and cluster development

In the year 2000, the entire funding system for Swedish research changed. All the previous disciplinary basic research councils were gathered under one roof, thematic research funding from a range of authorities and agencies were combined into two new research councils. Discussions about merging Sida's support to Swedish development

research within any of these constellations ended without action. 13 years later, this move has been accomplished.

The most significant shift, though, was the establishment of an agency for innovation, VINNOVA. The previous agency for industrial development was split. One part concerned with regional and industrial development was merged with other agencies with similar commissions. The VINNOVA part got the responsibility to support innovation oriented research and collaboration between academic and industry.

Innovation was becoming a keyword in Sweden by that time, as a part of the shift to a “knowledge society”. This shift was a response to the financial crisis in the early 1990’s and the harsh structural adjustment that followed during the mid-nineties with close-downs or rationalization of much of the previously glorious manufacturing industry in the mid-sized towns of Sweden. The structural adjustment program had contained major efforts to retrain and educate the most needing groups of the Swedish society. Expectations on the ICT-sector were enormous, the crash of the ICT-bubble in the early 2000’s only attenuated this, and soon a more mature ICT industry was thriving. Expectations were also raised on other new generic technologies, such as bio-tech etc. The main commission to VINNOVA was to position Sweden in new areas of industry through innovations.

VINNOVA used the intellectual tools of the Innovations systems approach paired with efforts to stimulate cluster development. It was clusters like the Silicon Valley that had driven the computer and internet revolutions that stood out as the model to resemble. Michael Porter (1998) became a guru, with his studies on clusters and competitiveness. However, like the studies on National Innovation Systems, Porter and his successors in Swedish academia only advised from studies of industry clusters that had formed through evolution in various regions. For an agency, with the challenge to actually start new competitive clusters, something more concrete, simple and action oriented was required.

The choice fell on the Triple Helix model, launched by Henry Etzkowitz (2002). The Triple Helix is a simplification of the innovation system, only containing three of the possible actors, academia, companies and government. The model prescribes a significant role to the universities, and puts a focus on a long-term collaboration, the intertwining of the helixes in mutually advantageous learning processes. The VINNOVA cluster development program, VINNVÄXT, used the Triple Helix as one of the main guides for programming.

The Triple Helix model has since been criticized for various weaknesses and oversimplifications. Carayannis *et al* (2012) proposed a “Quintuple Helix” to increase the scope of the model, involving media and civil society as the fourth helix and the natural environment as a fifth. This wider model also implies a further shift in the role and behaviour of university research. The Triple Helix built on the shift from Mode 1 research that was mainly produced for the academic society, to a Mode 2 research produced for and with partners in society (Gibbons *et al*, 1994). The Mode 3 research

also implies a closer cooperation over disciplinary borders, to better address problems that involve interactions between society and nature.

The Triple Helix model takes the financial support sector for granted. This has become apparent in the experiences of cluster development in Eastern and Southern Africa and in Bolivia (Please excuse me for moving ahead of my narrative). The financial sector is not involved at all in the knowledge building in the helixes, it is simply supposed to be there and make money available whenever needed in the innovation process. Recent problems of such support delivery could of course be blamed on the financial crisis of 2008, but the problem goes far deeper than that. Following the analyses of David Harvey (2010) and Roubini & Mihm (2010), the financial sector in general has been more focused on innovations of financial instruments, through which they can avoid the risks of involving with slow and unpredictable assets such as fixed capital, labour and technological development.

The laid back position of Swedish risk capital, which seems to prefer the low hanging fruits of privatizing public sector functions such as health and education, has made the call for public interventions in innovation more strong than it had needed to be. After 10 years of VINNVÄXT cluster development, considered as a pilot phase, a second phase of state support to the growing clusters is ongoing.

The need to involve the financial sector in the knowledge helix is very real, making the helix at least sextuple. Thus another fix of the helix model is very much required, not only in Sweden, but particularly when applying it in developing countries where the lack of risk capital for long has been part of the characteristics of “under-development”. Donors could do much more to facilitate the build-up of both intermediary financial functions and in long term stimulation of domestic financial market. During the last fifteen years, there has been aid biases, on the one hand towards micro-credits and micro-enterprises, on the other hand towards macro-financial policy-making. Both of these have left small and medium sized enterprises in a financial vacuum and thereby stalled necessary investments that could have created jobs. Also, the national procurement policies that could have been used to stimulate local entrepreneurs have, under the disguise of free trade and liberalization, most of all benefitted foreign suppliers.

Coming back to the story, in 2003 VINNOVA hosted an international conference on Innovation systems and cluster building. The Competitiveness Institute, TCI, a network for practitioners, policy makers, researchers and business leaders working towards improving competitiveness in regions and clusters, stood as co-arranger. To add something new to the network, the VINNOVA organizers approached Sida to get help to arrange a parallel session on innovation in Africa.

This was one of those moments we had waited for, so our immediate response was positive. At that time, my colleague Maija Lindroos was a desk-officer for a regional program in engineering, connecting the engineering faculties of the Eduardo Mondlane University in Mozambique, the Makerere University in Uganda and the University of Dar es Salaam in Tanzania. We immediately connected to the deans of these faculties and asked them to assign a researcher that could go to the conference in Gothenburg.

We also asked them to send a team together with the researcher, consisting of representatives from the Triple Helix approach. We assumed, rightly, that the invitees did have practical experience of Triple Helix linkages, but less experience in and vocabulary for presenting the results. We therefore offered the assistance of a researcher from the Chalmers Institute of Technology to assist in the writing up of the conference papers.

The participation of our African colleagues in the TCI-VINNOVA conference was a multidimensional eye opener - to the delegations from Africa, to the TCI and VINNOVA, and also for the Sida Research staff delegation that participated. Suddenly there was meat on the bones to the concepts that we previously had played around with. When the African delegates, just after a few months, presented a proposal to arrange a regional conference in East Africa on the topic of Innovation systems and Cluster Development, the process of making the decision was pretty neat.

To make a short-circuit of the continued development, there was a quick take of following the conferences, training of cluster facilitators, seed funding for clusters, the inauguration of the Pan African Competitiveness Forum, all following a smooth track within the Sida Research department bureaucracy. Expected obstacles in the Sida Research committee proved to be almost inexistent. Gradually, as acceptance among more research officers grew, innovation was integrated into the bilateral research programs. More initiatives were supported. A research project on the role of universities, UN-IDEV, in collaboration between the Research Policy Institute at Lund University and several of the bilateral research cooperation partners was one, support to the Globelics network another and support to UNESCO for policy studies on higher education, research and innovation yet one more. Planning of a major regional program with the PACF started, combined with support to the then recently established SICD (Scandinavian Institute for Collaboration and Development hosted by Blekinge Institute of Technology). This support was planned to be a joint support scheme between Sida and VINNOVA.

During this time several attempts were done to spread the word and the responsibilities to the department working with private sector development at Sida. This turned out to be very difficult. Several staff members were personally devoted, but had very limited opportunities to find the funding resources needed within their line of work. Sida's budgeting process for the country allocations was getting increasingly difficult, with long time horizons needed to insert new ideas.

So came Armageddon, at least a particular and localized Day of Doom for the research cooperation. Neo-liberal aid politics and a new director general took previously tensions built-up in Sida to unprecedented levels. A major reorganization took place that scattered the previously coherent research department into country and regional teams, plus a global research team and a vaguely thought idea on the need for a policy team, without financial resources, on research cooperation issues. Principles for decision making and funding allocations that had been maintained from the start of research cooperation in 1975 were eroded over a year's time, leaving much in confusion. Losing control over the budgeting and decision making for the regional research cooperation

made it difficult to continue the preparations for support to the PACF and SICD. One of the regional teams for Africa demonstrated its incompetence in managing research program by delaying and blocking the preparations of a continuation of the UNIDEV program. The Ministry of Foreign affairs imposed a strange restriction that research should not be allowed to occupy more than 15 percent of the total regional budget, and, with some few exceptions, only be allowed to follow the prioritized themes set by the ministry. All the previously honoured principles of researchers in the South setting the agenda for research were gone with the neo-liberal wind.

Another hit on the proud ship, sailing innovations into research cooperation, came with the Swedish government's decision to concentrate Swedish aid to fewer countries. Honduras, Laos, Nicaragua and Vietnam were to be phased out over a five year period ending in 2012. This meant that the ongoing research cooperation had to be prematurely closed down. In Nicaragua there was a recently started program to assist universities to participate in innovation processes. Vietnam was a good candidate for such a program, with a keen interest from the Vietnamese government. The ambitions had to be toned down.

In a similar spirit, in 2008 the Swedish government also commanded Sida to concentrate on fewer topics. The newly established thematic policy departments got to hold the knife. The department for policy on private sector development went ahead and found that one dispensable topic was "innovation systems". I was very surprised, not because they excluded that theme, but because it meant that they were down-prioritizing a theme they had never even thought about. My conclusion was that they simply tried to make the list of "don'ts" look longer than the list of "do's". I also found the decision peculiar in the light of everyone trying to find the comprehensive themes that would allow them to continue business as usual. In Private sector development, the innovation systems approach could have been the single theme that fitted everything else within. It would at least been worth a try.

Living in a catastrophe, you have to save the few things that are most worth to you. I took some measures, making sure that, among the few new recruited staff we were allowed, there were people who could understand the significance of innovation. We made a special call to Swedish researchers for research on the linkage between research and society (to which this book belong), and we commissioned an evaluation of the ongoing and finalized support to innovation. With no support at all, even hostility, for research cooperation and innovation from the Director General and his nearby directors, the strategy was to build vertical alliances. An advisory group within Sida to the evaluation of the innovation support became one of the springboards for a wider anchorage of the ideas.

When the Swedish government presented a new instruction for Sida at the end of 2010, I had already decided to leave the organization. By this time the hostile DG had been sacked, and there was again a new direction. I was pleased to see that the new instruction called upon Sida to find new innovative methods for aid. Even more pleased was I when I found that members of the advisory group to the innovation evaluation

had taken up the relay and proposed to the director general that there was need for a working party on how this should be achieved. The trick was to split the inquiry in two parts, one to look at how Sida could become more innovative in its *modus operandi*, and another to see how Sida could support innovation in the partner countries. I left in good hope that the spirit of innovation would survive, and maybe even thrive.

Political obstacles to learning within aid

The backlash to innovation in the late first decade of the 2000's was mostly due to an unfortunate constellation of events. Reorganization of Swedish aid with its reshuffling of power positions and intrigues, did not make it easy. This must be considered as misfortune. However, I would argue that there are structural and phenomenological barriers for donors to involve in innovation that are much more significant in the long run. Space does not allow me to elaborate too deeply on these, but I will give a briefing of findings from my studies of Swedish Aid Politics concerning technology transfer (Kjellqvist, 2013).

In the text above, I have referred to the controversies between “ordinary aid” and research cooperation. These controversies date back to the 1960's when the UN through UNESCO elaborated the “World Action Plan for Science and Technology for Development”. Few of the developed countries took on this challenge to assist, not only by transferring technology, but also build up the capacities in S&T in developing countries. Canada was the forerunner, and in Sweden the Parliament put hard pressure on the government to find ways of supporting research and research capacity building. A parliamentary inquiry reported in 1973, that the best way would be to gather all research related activities, with a separate funding channel, under the auspices of active researchers. This body could then cooperate with the “ordinary aid”. So the government decided, and defended this position with a continuous parliamentary approval up to the early 1990's. From the start, supported research should be applicable to the needs as expressed by the supported developing countries. None-the-less, the entire parliament, including the ruling parties, voiced strong arguments for the separate track for research from aid.

Another controversy concerned the involvement of Swedish industry in aid. During the 1960's and 1970's the Swedish Right wing parties in the Parliament demanded a much greater role for the Swedish companies in the development cooperation. This was firmly rejected by the Social-democratic governments, who stood by the principle that aid and Swedish export promotion should be kept strictly separate. The Right argued in the Parliament for making use of the knowledge and experience held by Swedish companies, but once in power by the end of the 1970's, the right wing government set up schemes that rather promoted the business opportunities for the larger Swedish companies, mainly in the area of hydropower, forestry and dairy-industries. The Social-democratic governments in the 1980's made various attempts to regulate this system to give the recipient countries the upper hand in the negotiations with the Swedish companies. The resulting system was full of tensions, it was cumbersome and

fragmented. Allocated funds for credits and guarantees were never used to the level of expectations. The system included some knowledge transfer though, but only at the margins of the business oriented transactions.

In the late 1970's and throughout the 1980's, the mid-range parties in the parliament, including the green party at the end of the 1980's, argued for "appropriate technology" to the needs and situation of developing countries. Parliamentary motions for this case argued that Swedish companies, researchers and NGO's needed to learn more about the appropriate technologies, and that institutes or networks should be established. None of these initiatives got the parliamentary approval. The Social-democrats rejected with the arguments that there already existed channels for such activities. What they failed to see was that these channels were separated from each other, and that they could not promote the interactivity, that was requested in the motions, between research, industry and NGO's. They also rejected on the grounds that the bulk of aid funds should be linked to allocations to partner countries, and that Swedish activities mainly should be a result of demand from these. This principle is fair and just, difficult to argue against, but in some cases it has been a barrier to potentially fruitful reorientations of the Swedish aid. In this case the principle hampered a learning process that could have given the pretensions on "demand driven aid" a much deeper meaning, in which technological development and learning grew out of the real needs in the partner countries, not the ones expressed by self-interested government bureaucrats.

The efforts during the 1970's and the 1980's to stimulate knowledge, technological development and industry must be considered as failures. The current Swedish Government, together with the bulk of aid donors and loan providers, are now re-evoking the role of the private sector and industry in the aid supply. There should be good reasons to learn from past mistakes before moving too quickly upon this track. The best working component of the previous system for involving private sector and industry has been the procurement of technology for infrastructures. Yet, this type of programs have perpetuated the dependency on external knowledge, by limiting the range of capacity building to capacities of operation and maintenance. At the same time, infrastructure has been the main arena for corruption and growing odious debts. In addition the technologies provided, have rarely been in line with pretentious speeches about promoting sustainable development. The World Bank's loan schemes for Coal Power Plants instead of promoting renewable energy is but one example. Procurement schemes with rigorous criteria for sustainable development would be a first prerequisite. Credits and guarantees schemes could also be designed with the same purpose. And all of them would need to integrate true capacity building schemes with components that serve independence and capabilities to continue cooperation on an equal footing.

There are also reasons to look more deeply into the actual possibilities for aid to deliver on innovation. The pro-technology biased Swedish aid of the 1960's, 1970's and 1980's almost died away during the 1990's. There were various reasons for that. One pertinent factor could be that the demands from Swedish industry to get a role in Africa became obsolete at the fall of the Berlin wall. Suddenly a major market opened behind the rusted iron curtain. There was also, according to a former Asea Brown Boveri manage-

ment person, a true ambition from Swedish industry to assist in the transition to democracy and market economies. Swedish aid to the former Soviet republics, including Russia, maintained, even geared up the industrial aid. From the 1990's onwards such components almost vanished from the Swedish aid to other parts of the world.

Most of the aid to the Post-cold war world has been directed to economic and political reforms. The set-up of sector programs in Education and Health means that the political reform agenda has come on top over the agenda to actually develop the on-site quality education and health provision. The key instrument of aid has become "policies". In order to direct the on-site activities, governments are requested to write up policies and strategies, which all "partners in development" then should follow. The most apparent problem with this approach is that it is such a good example of "goal displacement" (Merton, 1940). In any bureaucracy, over time the means become the goals, and the actual goals vanish in thin air. Today, the development of a policy would count as a concrete measure of an aid programs success. That is, developing a set of symbols are now often more worth than the materiality that these symbols represent. Too often such policies do not even set out the requirements for their implementation, such as promoting health schemes without securing that there are a sufficient number of doctors and nurses in the country. The risk that aid doesn't get out of the doors at the ministries responsible for the reform is extremely high in the policy oriented aid. Policies have sharply detached aid from the world by coming too much into the focus of the slimmed aid bureaucracy, displacing social responsibilities with compliance to the policy text.

Looking at the history of how the Swedish aid turned into policy aid could be illuminating of the deeper meaning of the shift from material interventions to symbolic policies. One major controversy between the right and the left of the parliament was the support to developing countries that had embarked on the road towards socialism. The right wing parties during the 1970's and 1980's were particularly agonized by the aid to Vietnam and Cuba, but also with the political directions taken by the East African countries. The anti-socialist rhetoric of the parliamentary motions in the mid 1980's is striking, particularly as it assumes anti-democratic standpoints from the political left. There are no parliamentary documents that confirm that the social-democratic or the communist party should have expressed such standpoints. Anyhow, "democracy" became the pivotal point of the political debate on aid, where the liberal party and the (then conservative, later neo-liberal) right wing party expressed their main concern. Putting up human rights as the indicator of democratic development they wanted the Swedish aid goals to put democracy first and foremost. It was also these two parties who first introduced policies – or guidelines as they were first called – in the early 1980's. These guidelines were closely connected to the set of conditions that the right wing wanted to put on the aid recipients. Over time, these conditions became more and more oriented towards the buzz words of the Washington Consensus. Over time, the resistance from the left against these pretensions ceased and by the early 1990's all parties phrase their aid ideas in terms of the need for democracy, human rights, economic reform, market economy, free trade and the rule of law. In the late aid debate in

Sweden no one even bothers to define what is meant by any of these watchwords. They are simply taken for granted.

There is, of course, a close connection between politics and policy. In the Swedish aid, policies are compilations of political conditions or expectations on the aid recipient. In the 1990's donor coordination around policies, and hence politics, became the issue, with further elaborations in the Paris, Accra and Busan declarations. They have all been steps in a streamlining of politics through policies and strategies. There are though inherent dangers in this approach. Chantal Mouffe (2008) warns against the current confusion on policy and politics. This confusion expresses a deeper confusion of government and governance. The first relates to the democratic election of a political direction, clearly expressed as opposing other political directions, in a multi-polar and agonistic world of politics. Mouffe relates Governance to a liberal democracy that is uni-polar, all parties in a political battle agree on the political direction, but may disagree on the "how" to do. This mode of politics is exclusive to alternative political thinking, which may have severe implications. Mouffe points to the rise of fascist movements in Europe as a consequence of the non-formulation of alternatives in mainstream politics. She also warns against tendencies of ruling liberals to fall into totalitarian traps in their uni-polar formulation of politics.

Aid under these political tendencies, during the 1990's and the first ten years of the new millennium, have been directed to set the political institutions right for the developing countries to participate in a globalized market economy. The focuses on politics and trade liberalization have out-crowded the interventions that could have helped the recipient countries to build up their productive sectors, which they would need to participate in the liberal global market on their own terms. The liberal aid model as such marks a clear division of labour between the state and the market. The state should just facilitate for the market, but not intervene. The difference from the previous Keynesian or pseudo-Keynesian mixed-economy models is clear, where the cooperation between private and public sectors have been much more elaborated in intervention programs. There have clearly been examples on how the Keynesian models have been driven into stagnating parastatal enterprises or corporatist economies with high degrees of inefficiency and narrow path dependencies. In a way, the liberal aid models have contributed to break down such detrimental structures. The question is though, if the liberals have managed to build up any type of innovation friendly climate instead?

I would argue that the crucial missed opportunity in the liberal aid model refers to a misunderstanding of what capacity development is about. The condition-oriented policies require a high degree of control, which in turn leads to a goal displacement on a new level. The recent focus on aid efficiency and results requires a sophisticated control apparatus that safeguards policy adherence, non-corruptive measures and good governance of the aid funds. As the latter item, the management of aid funds, becomes the central element the development agenda as such and the development results are sent into oblivion. Too much of the capacity building funded and installed by the donor community focuses on the capacity to manage aid. Too few efforts are made to support the building of a series of general and specialized capacities required in any

country such as engineers, technicians, welders, economists, scientists, teachers, doctors and nurses. Another, linked, misinterpretation is that of institutional capacity, where donors simply forget that institutions are built of the capacities and competencies of people, the skills and knowledges of human beings.

Of lately, there has been a shift in the Swedish aid policy, and also in the inputs to the re-formulation of the MDGs post 2015. A new focus on the productive sectors, with the clear objective to create jobs, is emerging. This goal is a general development goal that is as relevant in the highly automatized production sectors in the North as in the labour-intensive sectors in the South. In the preparatory works of the new Swedish cooperation strategies for Rwanda, Uganda and Mozambique it has been clearly spelt out that the needs for vocational and tertiary education is high and should be prioritized during the coming years. These new directions turn the Swedish aid back to its roots in the 1950's where Sweden supported such activities through the UN and within bilateral projects.

It is very ironic as the Swedish aid minister during the period 2006-2013 started her appointment with furious outbursts against "old fashioned aid", and ended up in propagating for the most old fashioned of all aid incarnations. Hopefully, her successors and those who are to implement the Swedish aid program are more dedicated to learn from previous mistakes and success stories. If so, there would be good opportunities for donors to release the burdens of over-controlling aid. Instead aid should focus on building up the competencies of people. It should also reinstall the trust that these people can innovate and solve their own problems in cooperation with others, within the multitude of Northerners, Southerners, Westerners or Easterners.

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Further reading and information

The organisations involved or mentioned in the different chapters publish news and reports from cluster initiatives and issues of relevance for the theme of the anthology. Below are lists of organisations' websites and reports from cluster initiatives referred to in the book. Several of the reports are available on the SICD website. We have also provided contact addresses to the contributors.

Websites

Africalics; African Network for Economics of Learning, Innovation and Competence Building Systems

www.africalics.org

Katwe Council

www.katwe-council.com

PACF; Pan-African Competitiveness Forum

www.pacfnetwork.org/pacf/

PACF-Uganda

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