



**Mid-term evaluation of the Institutional  
University Cooperation with the  
Nelson Mandela African Institute of  
Science and Technology (NM-AIST)**

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# ACRONYMS

|         |   |
|---------|---|
| ABCD    | Automated Bibliographic Central Documentation   |
| ACDF    | African Capacity Development Foundation   |
| ADF     | Academics for Development (Belgian NGO)   |
| AfDB    | African Development Bank  |
| Ag      | Acting  |
| BTC     | Belgian Technical Cooperation   |
| BuSH    | Business Studies and Humanities   |
| CEO     | Chief Executive Officer   |
| CoE     | Center of Excellence  |
| COSCE   | Computational and Communication Science and Engineering                               |
| COSTECH | Commission for Science and Technology   |
| CREATES | Centre for Research, Agricultural Advancement, Teaching Excellence and Sustainability |
| DAAD    | German Academic Exchange Service  |
| DCs     | Developing countries  |
| DVC     | Deputy Vice-Chancellor  |
| EnSE    | Environmental Science and Engineering   |
| GIZ     | German Technical Cooperation Agency   |
| HOD     | Head of Department  |
| HRM     | Human Resources Management  |
| HWRE    | Hydrology, Water and Resources Engineering  |
| ICSE    | Information and Communication Science and Engineering                                 |
| ICT     | Information Communication Technology  |
| IITA    | International Institute of Tropical Agriculture                                       |
| ITS     | Information Technology Services   |
| IUC     | Institutional University Cooperation  |
| LISBE   | Life Sciences and Bio Engineering   |
| MEWES   | Materials, Energy, Water and Environmental Sciences                                   |
| MCSE    | Mathematics and Computation Science Engineering                                       |
| MoEVT   | Ministry of Education and Vocational Training   |
| MoFP    | Ministry of Finance and Planning  |

|               |   |
|---------------|---|
| NGO           | Non-governmental Organization   |
| NM-AIST       | Nelson Mandela African Institution of Science and Technology              |
| NRM           | Natural Resources Management  |
| P             | Project   |
| PAUWES        | Pan African University Institute of Water and Energy Sciences             |
| PC            | Programme Coordinator   |
| PL            | Project Leader  |
| PM            | Programme Manager   |
| PPP           | Private Public Partnership  |
| QA            | Quality Assurance   |
| SESE          | Sustainable Energy Science and Engineering                                |
| SETI          | Science, Engineering, Technology and Innovation                           |
| SUA           | Sokoine University of Agriculture   |
| TACRI         | Tanzanian Coffee Research Institute                                       |
| VLIR-UOS      | Vlaamse Interuniversitaire Raad – Universitaire Ontwikkelingssamenwerking |
| WB            | World Bank  |
| WISE- Futures | Centre for Water Infrastructure and Sustainable Energy Futures            |

# PREFACE

*In this publication, we present the results of the mid-term evaluation of the VLIR-UOS programme “Institutional University Cooperation with the Nelson Mandela African Institute of Science and Technology (NM-AIST)”. The programme is a long-term inter university programme (IUC) of Flemish universities, funded by the Belgian government. The IUC programme links academic and development-oriented objectives and focuses on the institutional needs of the partner university in the South and demands of its stakeholders.*

*This report describes the findings, presents conclusions, and puts forward recommendations for improvement. The evaluation team consisted of Prof. Dr. Zacharia Masanyiwa and Prof. Dr. Clemens Wollny. This report represents the views of this independent evaluation team and does not necessarily reflect the opinions of VLIR-UOS.*

*All findings and assessments have been presented to the best of our knowledge and international standards for participatory evaluations in the context of higher education and development cooperation. The evaluation team received comprehensive information and documentation from the VLIR-UOS team. We highly appreciate the professional and process-oriented attitude of the entire VLIR-UOS team and the conducive working environment provided at VLIR-UOS office and at NM-AIST.*

*This would not have been possible without the support of many people often working beyond office hours at the partner university. Special thanks go out to the acting Vice-Chancellor for the very clear and open-minded discussions. We thank the programme manager for the excellent support and organisation. The authors would like to thank all contributing interview partners from the academic institutions in the South and in the North, the stakeholders, the farmers and members of communities in Tanzania, and the government representatives in different functions in Tanzania and Belgium. We thank all people who openly presented their views and addressed critical questions. Without the open and frank discussions on an individual or group basis, the evaluation would not have been possible. The organisational and logistical support and the warm hospitality at VLIR-UOS and at NM-AIST made our work enjoyable and smooth. The fieldwork and travel to remote areas provided us with excellent and direct feedback from beneficiaries in rural areas and provided a good overview of applied research. We thank the driver and the accompanying student for their tireless work. We appreciate the contributions and comments made during the feedback and debriefing sessions held in Arusha and in Brussels. We sincerely hope that the mid-term evaluation will contribute to further improving the capacity building efforts and relevant research for development projects addressing high-priority challenges.*

**Prof. Dr. Zacharia Masanyiwa**

**Prof. Dr. Clemens Wollny (team leader)**



# EXECUTIVE SUMMARY

## **The context, challenges and objectives of the evaluation**

The subject of the mid-term evaluation is the first phase of the Institutional University Cooperation (IUC) programme between the Nelson Mandela African Institute of Science and Technology (NM-AIST) in Tanzania and the Flemish partner universities, which are coordinated by the KU Leuven university. The NM-AIST in Arusha was established as a new university with a regional focus in 2010 through the Tanzania Commission for Universities (TCU) and only offers postgraduate programmes. The IUC was the first comprehensive international programme at the young institution NM-AIST. The IUC cooperation with a partner institution covers a period of approximately twelve years with two main programme phases – Phase I (six years) and Phase II (four years) - covering a combined ten years of project execution time. These phases are preceded by a planning and formulating phase and followed by a phase-out (max. two years). The programme supports the partner university in its triple function as provider of educational, research-related and societal services. It aims at empowering the local university as to better fulfil its role as a development actor in society.

The programme commenced officially on 1 April 2013 and Phase I ends in December 2018. The overall objective was “to strengthen the research capacity of NM-AIST academics and staff to carry out state-of-the-art research in the domain of livelihood improvement in the Upper Pangani Basin; and to contribute to the livelihood improvement of people living in the Upper Pangani Basin through sustainable management of water and land resources”. Two thematic projects were planned: Project 1 works on the integrated sanitation and agriculture systems in the sector of agricultural development (Flemish partner KU Leuven). Project 2 addresses issues related to water policy and management (Flemish partner Vrije Universiteit Brussel). Additionally, Project 3 addresses institutional strengthening of NM-AIST through information and communication technology (ICT) (Flemish partner University of Antwerp). The overall budget of the programme is 250,000 Euro per year, 1,500,000 over six years in total.

The evaluation is expected to collect information and data to account for the results towards the needs of internal and external stakeholders and to draw lessons based on the performance of the IUC at programme and project level. The performance of the IUC needs to be evaluated on the basis of the OECD-DAC criteria for development evaluation: scientific quality, relevance, efficiency, effectiveness, impact, and sustainability. In this mid-term evaluation, we gave a particular focus to efficiency and effectiveness, and to the follow-up plan for a possible second phase.

## **Main findings regarding the evaluation questions - General assessment of the programme**

NM-AIST leaders initiated the IUC programme in 2011. During a matchmaking workshop in Belgium in 2012, the partners discussed project ideas and established contact with Northern partners. The planning process resulted in a high degree of initial programme ownership. The formulation of the programme and its logical framework was end goal-oriented, with less attention paid to the process leading to the end goal.

After the launch of the VLIR-UOS programme, NM-AIST attracted an increasing number of medium to large-scale research projects sponsored by international donors and agencies. At present, NM-AIST implements 39 projects, including the VLIR-UOS-sponsored IUC and the VLIR-UOS-supported NSS programme. NM-AIST acquired six new projects in the last few months of 2017. This is an outstanding achievement, but extremely demanding on leadership, administration, and researchers, and leading to the risk that the VLIR-UOS programme may slide down priority within the NM-AIST project portfolio. This, in turn, could affect the implementation of activities.

At NM-AIST post-graduate students and staff require more training, coaching, and mentoring in different areas of teaching and research, which are beyond the capacity and scope of the VLIR-UOS programme. Capacity needs have been partially filled on an individual basis through pre-doctoral programmes at the Flemish universities. However, gaps still remain.

The establishment of the institutional ICT infrastructure is a major and highly visible achievement. ICT activities strengthen learning and research by developing the ICT infrastructure and implementing IT systems that promote production and access to teaching and research materials.

The outreach part of the project is geared towards management of the research findings and an effective transfer to society and industry. The challenge of creating the relevant content and making systems and devices operational, remains.

Overall, the programme is well-linked to the VLIR-UOS country's strategic priorities regarding capacity building and addresses relevant development challenges. The overall rating at programme level ranges from 'excellent' to 'good', taking into account the multiple challenges of the newly established institution.

### **Main findings regarding the evaluation questions - General assessment of the projects**

The project on **sanitation and agriculture systems** deals with two components: agriculture and sanitation. The agriculture component focuses on capacity building through PhD projects on factors influencing banana production in the Upper Pangani Basin and technology transfer to farmers whereas the sanitation component focuses on constructed wetlands. The project is of high relevance and directly contributes to the implementation of the institutional Corporate Strategic Plan (CSP). It responds very well to the needs of the external stakeholders, but could better address gender issues in the specific research projects. Quality of research is ranked as 'good' because some research projects produce intermediate results indicating solutions to identified problems, e.g. in banana production or wetland construction. To date, scientific evidence, however, is lacking. Drafts of scientific papers were submitted to good journals, but require, in some instances, major revision. Supervision issues of PhD students are ranked as 'insufficient' for complex reasons. It was observed, that supervision depends highly on the Northern supervisor(s), and the recruitment of non-suitable candidates resulted in drop-outs. In the past, the scientific role of the co-supervisor(s) appeared to be limited to organisational aspects regarding field work. Recently, measures were taken by NM-AIST to improve the situation in future.

The efficiency of the project regarding intermediate research results on increasing agricultural productivity through more productive and more resilient cropping systems was assessed as generally 'good'. However, research on the improvement of water quality and availability is delayed. Additionally, several planned activities could not be executed and/or were rated as insufficient. It should be emphasised, however, that the project established well-functioning demonstration sites, which is a major achievement.

Interviews with active PhD students show that they experience a major change towards a more focused scientific research attitude. Awareness on competitiveness of internationally recognised research has



increased. They understand that developmental interventions require solid quantitative and qualitative data. Furthermore, the utilisation of intermediate outputs is actively transferred to the real world of farming in a participatory way. Thus, effectiveness is rated as 'excellent' to 'good'.

Sustainability regarding institutional capacity remains critical but 'good'. The financial prospects are also good and complementary projects were won during Phase I.

The project has several specific ideas on how to consolidate the research in Phase II. It plans to include other major crops, particularly maize and legumes in the banana farming system, to focus more on soil fertility, which is a major limitation in all farming systems, and to start a centre of excellence for the banana. The project proposes to separate the sanitation component, which plans to focus on nutrient recycling from constructed wetlands, socio-ecological assessment before upscaling and integration of other systems including industrial waste sewage. The conservation of biological diversity and the maintenance of ecosystem services of natural water bodies is of utmost importance. Any programme without ecology is a recipe for non-sustainable development. Therefore, in Phase II, ecological researchable topics must be maintained and should be given high priority.

The project on **water and people** aims at understanding eco-hydrological processes to develop participatory water allocation tools. The methodology is centred on an integrated spatial model for water resources allocation under present and future conditions. Relevance is 'excellent' because the ongoing research responds directly to the needs and demands for water by the local farming communities. This could be verified through ongoing consultation with local authorities at district level and the Pangani Water Basin Board. Due to significant delays of PhD-based research, which was caused by the limited number of candidates who were available at the start, scientific outputs were marginal to date. The delayed implementation of several planned measures resulted in an overall assessment between 'good' and 'insufficient' with a tendency towards 'insufficient'. However, sustainability prospects look 'good'. It should be mentioned that NM-AIST acquired a complementary and large-scale World Bank-funded project. Therefore, the design of project 2 in Phase II should consider building synergies and complementarity with this project, but should also include an exit strategy.

For Phase II, the project is considering to put more emphasis on the conservation aspects (soil, water, biodiversity), the risk assessment in river catchment areas (factors at different level) before ecosystems services are defined or delivered and linking up with other projects (inculcating stakeholder priorities). It is planned that the hydrological component of project 2 will in Phase II be integrated in a subproject of project 1 on soil and water conservation, this in function of optimal banana farming systems. The hydro-ecological component of project 2 will focus on 'applied aquatic ecology'. The rationale is to build further on the results of Phase I.

The transversal project on **institutional strengthening** focuses on implementing key information technologies and services, building NM-AIST's capacity to deliver teaching and to conduct research that has an impact on society. Measures focus on ensuring that the current ICT infrastructure and services are updated, usage policies are created, and adequate training is provided to technical staff, academics, and students in the optimal use of these resources. The relevance and technical quality of the project was rated 'excellent' under the existing frame conditions. The project team reached all targets. The staff retention situation is critical, but the team could adjust well to challenging conditions. It also established a good link to another IUC, the Mzumbe University.

Overall, the contribution towards institutional strengthening through establishment of infrastructure and its management is assessed as 'excellent'.

With a view to consolidate the project, participants in the South workshop discussed the following ideas and issues: Library: improving the e-learning platform; intensifying public knowledge management, transfer and sharing; increasing library collections (books, journals, e-subscriptions, etc.) and facilitating the development of a policy for project publications. The ICT part of the project emphasises the need to improve internet connectivity through contracting alternative and better ISP providers; to conduct workshops (in-house and stakeholder training), to create awareness on ICT and Library (internal/external stakeholders) and to continue pushing for the development of Community Information Centres and a virtual Science park. In Phase II, specific research questions (e.g. the development of apps) should be addressed and realised through PhD projects supported by scholarships.

### **Conclusions and lessons learned**

The major lesson learnt was that the programme was overly ambitious from the beginning (but in line with the also very ambitious university CSP, covering a period of fifteen years from 2013 to 2027). Future programme planning may need to take into account that other projects and activities start within the planning period and absorb the institution's capacity. Phase I was too end goal- oriented and paid too little attention to the process.

Overall, the intervention logic and sequencing of the projects should be carefully planned and analysed to ensure feasibility. Immediate action should be taken if key assumptions, such as that qualified staff is available, are not fulfilled. The timely implementation of measures requires continuous monitoring of the log frame matrix. Clear indicators and feasible milestones are required in combination with improved flexibility to adjust the initial planning.

The limited role of the local supervisory committees, the pool of potential candidates for PhD research, and writing and presentation skills resulted in significant delays of PhD-related research. In the future, a much more transparent and objective selection process should be introduced for screening postgraduate student applications for the VLIR-UOS programme. A policy paper and guidelines for postgraduate students has been developed by NM-AIST. The partners must ensure its adequate implementation. Prospective supervisors from NM-AIST should be included in the selection of scholarship candidates. The selection and scholarship-awarding team should be equally represented by the contributing universities.

Reporting requirements are mainly directed to the North, and do not help partners in the South. The structure and format of current templates for reporting are tedious and redundant. Qualitative reports that highlight critical issues would be of direct use to all parties concerned.

### **The most important recommendations of the evaluation**

In the report, we present 21 detailed recommendations. The most important recommendations were discussed with the partners in the South and North during the feedback sessions and are listed below:

## Programme and Projects

- i) Provide support to ongoing PhDs to complete or make clear decisions regarding continuation of the project.
- ii) Set new strategic directions in research: The major challenge is to facilitate the coordination of (all) NM-AIST projects.
- iii) Improve communication between Northern and Southern supervisors; empower PhD students.
- iv) Reorganise hydrological components of Project 1 (e.g. 1b sanitation) and P2 (water and people).
- v) P3: Fund an in-house training and staff development programme for technical and support staff.
- vi) Consider strengthening post-doctoral research.
- vii) Implement process-oriented planning
- viii) Pursue synergy with IUC Mzumbe

## VLIR-UOS

- i) Simplify reporting formats
- ii) Improve alignment of guidelines and regulations to needs
- iii) Utilise flexibility of scholarship regulations
- iv) Initiate preparations for a Phase II (strongly recommended)

# 1 Introduction

## 1.1 Background

### 1.1.1 The concept of the Institutional University Cooperation (IUC)

An Institutional University Cooperation (IUC) programme is a long-term institutional partnership between a university in the South and Flemish universities. The IUC cooperation with a partner institution covers a period of approximately twelve years with two main programme phases – Phase I (six years) and Phase II (four years) - covering a combined ten years of project execution time. The programme supports the partner university in its triple function as provider of educational, research-related and societal services. It aims at empowering the local university as to better fulfil its role as development actor in society. The guiding principles of the IUC programme can be summarised under the following topics:

The expected output, outcomes and impact of the IUC programme based on the generic theory of change are outlined in Figure 1.

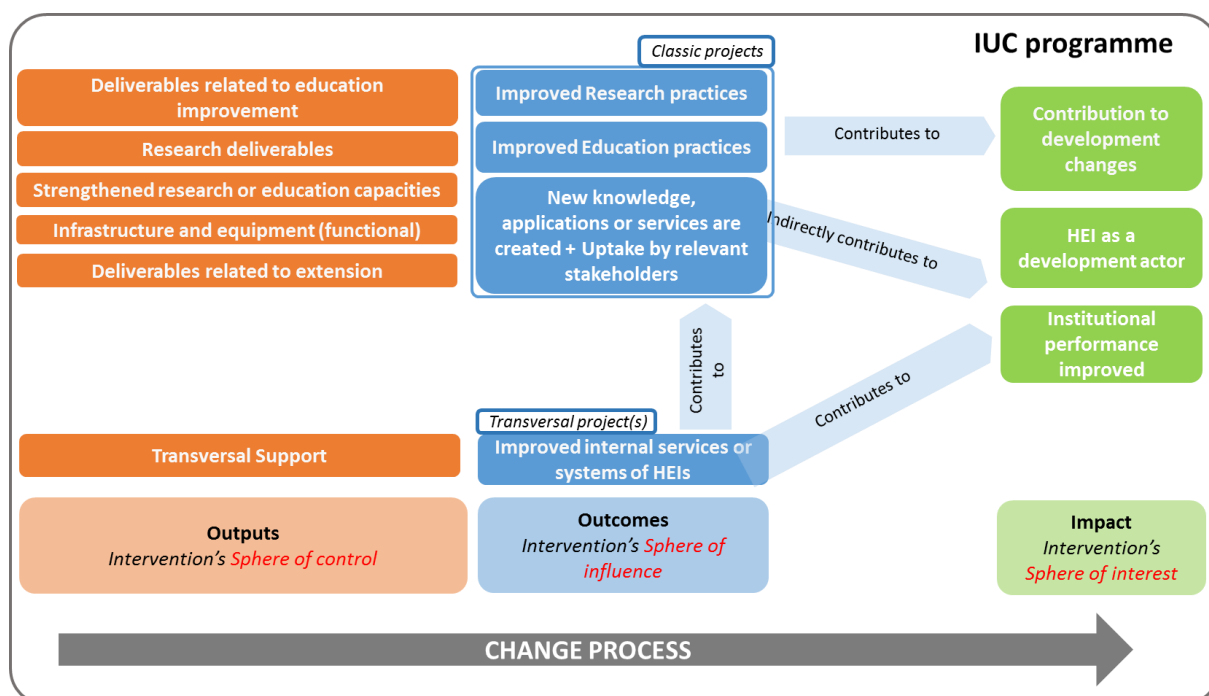


Figure 1 IUC generic theory of change

### 1.1.2 The subject of the evaluation

The subject of the mid-term evaluation is Phase I of the Institutional University Cooperation programme between the Nelson Mandela African Institution of Science and Technology (NM-AIST) in Tanzania and the Flemish partner universities, which are coordinated by the University of KU Leuven. The title of the programme is: 'Sustainable management of soil and water for the improvement of livelihoods in the Upper Pangani Basin'. The programme commenced officially on 1st April 2013 with the overall objective: 'To strengthen the research capacity of NM-AIST academics and staff to carry out state-of-the-art research in the domain of livelihood improvement in the Upper Pangani Basin; To contribute to the livelihood improvement of people living in the Upper Pangani Basin through sustainable management of water and land resources.' The partners planned two thematic projects: Project 1 works on integrated sanitation and agriculture systems in the sector of Agricultural development (Flemish partner KU Leuven); Project 2 addresses issues related to water and people in the area of water sector policy and administrative management (Flemish partner Vrije Universiteit Brussel). Additionally, project 3 directly addresses issues of institutional strengthening of NM-AIST through information and communication technology (ICT) (Flemish partner University of Antwerp).

The annual programme budget was 250,000 Euro. The programme support unit (PSU) administers the programme at the partner university and collaborates directly with the office of the coordinating university KU Leuven on administrative, organisational and financial matters.

## 1.2 The Terms of Reference of the evaluation

**The purposes of the mid-term evaluation are:**

- a) Learning:** about what worked well, what didn't and why. The formulation of the lessons learned will contribute to the quality of on-going and future IUC programmes in terms of the content and management of the programme, including the overall policy framework.
- b) Steering:** support decision-making processes of the IUC (at different levels). The evaluation is used to decide about - and as an input for - the formulation of a second phase.
- c) Accountability:** by independently assessing the performance of the IUC programme (and validating or complementing the monitoring)

The evaluation's **primary objective** is to evaluate the performance of the IUC (programme level and project level) on the basis of the OECD-DAC criteria for development evaluation (+ one additional criterion): scientific quality, relevance, efficiency, effectiveness, impact, and sustainability. The follow-up plan of the programme for the second phase (cf. self-assessments) is also evaluated. The follow-up plan needs to further guarantee capitalisation, exploitation and vulgarisation of achievements of the first phase, sustainability at institutional level (and research groups), and the impact of the university on development processes in the surrounding community, province and eventually in the country.

Next to these standard objectives, this mid-term evaluation also has the following, **specific, evaluation questions**:

To what extent is the research within the IUC programme linked to the civil society and the local industry? See also the motto of NM-AIST: "Academia for Society" and the concept of "community information centres" in the IUC Partner Programme.

Does the support of sandwich PhDs fit into a global and long-term strategy of the university to strengthen and support local PhD schools? (as NM-AIST is a particular university, without Bachelor programmes, focusing on research). The IUC programme is considered as a catalyser to attract new funding from other donors: is this really so? Can this be attributed to the IUC programme?

## 1.3 Context

### 1.3.1 Tanzania development priorities

The provision of education in Tanzania is guided by national macro-policies, plans and strategies, and by education sector policies, programmes and strategic plans. The macro-policies include the Tanzania Development Vision 2025 and the Tanzania Five Year Development Plan of 2016/17 to 2020/21. The national policies/plans are further supplemented by education sector policies and programmes, which include the Education and Training Policy (ETP) of 2014 (see above). Other policies supporting implementation of the ETP are the Technical Education and Training Policy (1996)<sup>1</sup>, currently under review, and the Higher Education Policy (1999)<sup>2</sup>. The latter might be considered to have been subsumed into the ETP 2014. The focus of the sector policies is to transform the education sector into an efficient, effective, outcome-based system, which would facilitate the achievement of the educational goals as envisioned in the Tanzania Development Vision 2025 and the objectives of the Five Year Development Plan 2016/17-2020/21.

The National Development Vision 2025, launched in 1999, is currently the guiding framework for socio-economic development of Tanzania<sup>3</sup>. The three main objectives of Vision 2025 are (i) achieving quality and good life for all; (ii) good governance and the rule of law; and (iii) building a strong and resilient economy that can effectively withstand global competition. These objectives entail that education and training are at the heart of the Development Vision 2025, as the vision further underlines a well-educated and learning society as one of the five main national vision outcomes. The specific goals of the vision to the education sector focus on (a) promotion of universal access to quality basic education, including pre-primary, primary and secondary education; (b) eradication of illiteracy; and (c) expansion of quality tertiary education and training that provides the critical mass of high quality human resources required to effectively respond to and master development challenges at all levels.

### 1.3.2 The higher education system

Historically, a system of higher education in Tanzania was for the first time introduced in 1961. The political and socio-economic reforms that were initiated in the late 1980s enabled the private sector to play a major role in the provision of higher education. Therefore, in 1996 private university institutions started to emerge in Tanzania for the first time and this brought in exponential expansion of higher education in the country. Tanzania started to witness growing public awareness on the importance of education at all levels including higher education. This led to an even more impetus in the demand for higher education access in the country. In recent years, the need to expand higher education capacity for public institutions has become a pressing issue.

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<sup>1</sup> ([http://planipolis.iiep.unesco.org/sites/planipolis/files/ressources/tanzania\\_technical\\_education\\_policy\\_1996.pdf](http://planipolis.iiep.unesco.org/sites/planipolis/files/ressources/tanzania_technical_education_policy_1996.pdf) )

<sup>2</sup> (<http://www.tzonline.org/pdf/nationalhighereducationpolicy.pdf> )

<sup>3</sup> <http://www.mof.go.tz/mofdocs/overarch/vision2025.htm>



The increase in the number of university institutions from four (three public and one private) in 1997 to the current 49 institutions, particularly the private ones, has correspondingly led to a more than 15-fold rise in the national higher education gross enrolment rate from 0.27% in 1997 to more than four percent in 2016. Despite this increase, Tanzania still lags behind in higher education enrolment, with enrolment levels being much below those of the Sub-Saharan Africa average of about 8 percent.

The establishment and running of universities in Tanzania is governed by the Universities Act Number 7 of 2007 (Chapter 346 of the Laws of Tanzania). According to the Act, no person (or institution) is allowed to provide university education in Tanzania unless that person (or institution) has been granted a charter or approval of a charter in accordance with the provisions of the Act. Which means, to be allowed to operate in Tanzania, a university institution must be granted a charter by the President of the United Republic of Tanzania. As the grant of charter is normally a long process, the Tanzania Commission for Universities (TCU) which is mandated to regulate university education in the country allows universities to start operating once they have met the prescribed requirements and have submitted to TCU an acceptable draft charter.

There are 49 university institutions in Tanzania, of which 33 are fully-fledged universities and sixteen are university colleges<sup>4</sup>. Among the fully-fledged universities, twelve are public institutions, which include Nelson Mandela African Institution of Science and Technology, and 21 are privately owned institutions, which are fully private or belong to religious denominations. The universities and university colleges differ in size in terms of physical infrastructure as well as student enrolment, with the privately-owned institutions generally being relatively small, except a few which have an enrolment exceeding 10,000 students. Most of the university institutions are concentrated in Dar es Salaam, Morogoro and Arusha-Kilimanjaro area.

In 2013/2014, the overall student enrolment in universities was 218,959, which translates to a gross enrolment rate of about 4.2 percent. It became apparent that the exponential expansion in higher education has led to compromised quality of the institutions being established and the education to be provided if quality assurance safeguards were not adequate. Therefore, in 1995 the then Higher Education Accreditation Council (HEAC) was established, with the legal mandate to regulate the establishment and subsequent accreditation of private university institutions in the country.

A study carried out in 2014 by the Inter-University Council for East Africa (IUCEA, an institution of the East African Community – EAC responsible for coordinating the development and harmonisation of higher education in the Community) established that although many Tanzanian graduates possess adequate academic knowledge, their ability to apply the knowledge in the job market was limited. The graduates are also perceived to have inadequate soft skills needed for the job market. This study has prompted governments and universities in the EAC member countries to come up with various interventions to address the identified deficiencies of the university graduates vis-à-vis expectations of the job market. Such interventions include skills development programmes conceived at the national level, and curriculum re-orientation by universities to skills development, including putting more emphasis in community engagement in the curriculum and adoption of learner centred pedagogical.

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<sup>4</sup> [www.tcu.go.tz](http://www.tcu.go.tz)

### 1.3.3 Key institutional contextual factors within the partner university under evaluation

The Nelson Mandela African Institution of Science and Technology (NM-AIST) in Arusha was established in 2010 through the Tanzania Commission for Universities (TCU) under the Universities Act No. 7 of 2005 as one of the public universities, but having a Pan-African outlook, aimed at becoming a centre of excellence for world class research and advanced training in relevant scientific and technological disciplines in Sub-Saharan Africa. The institute is modelled along similar institutions that have been established in Nigeria, Burkina Faso and South Africa as a response to a request from several African Heads of State to implement the proposal by the late Nelson Mandela, then President of South Africa, that the World Bank and the African Union work together to create strong Pan-African centres of excellence, based on the Indian Institute of Technology model, in order to foster capacity development in Science, Engineering, Technology and innovation in Sub-Saharan Africa.

The mission of NM-AIST is to deliver and promote high quality and internationally competitive teaching and learning, research and innovation, and public service in Science, Engineering, Technology and Innovation (SETI) leveraging on entrepreneurship for enhanced value addition to people and natural resources, with a view to stimulating, catalysing and promoting economic growth and sustainable development in Tanzania and SSA.

NM-AIST represents a new brand of higher education institutions in Tanzania which focus exclusively on postgraduate training at Master and PhD levels, in combination with cutting edge research in science, technology and innovation by also incorporating relevant humanities and business and entrepreneurship studies, hence strong academia-industry relations. The training programmes and research focus on topical areas relevant to socio-economic development not only for Tanzania, but across the African continent and beyond, with strong emphasis on academic excellence, relevance and applicability. The operational hallmark of NM-AIST focuses on forging strong partnerships with academic institutions and international networks of scientists, technologists and engineers who from time to time serve as visiting professors, scientists or researchers. Currently, life sciences and bio-engineering are being developed to become one of the niche areas of NM-AIST, taking advantage of the immense bio-diversity resources available in the East African region. Other key thematic areas at NM AIST include energy, ICT, mining, environment science and engineering, and water resources. The academic and research focus at NM-AIST is intended to contribute towards stimulating intensified agricultural production and value addition not only to agricultural produce, but also to mineral and other natural resources found in Tanzania and the Eastern African region.

The vision, mission and mandates of NM-AIST are informed by the broader national policy and institutional context, which the university aims to contribute to their realisation. The Tanzania Development Vision 2025<sup>5</sup> identifies five main attributes necessary for the development of Tanzania namely:

- High quality livelihood
- Peace, stability and unity
- Good governance
- A well-educated and learning society
- A competitive economy capable of producing sustainable growth and shared benefits

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<sup>5</sup>United Republic of Tanzania (2000). The Tanzania Development Vision 2025.

The National Strategy for Growth and Reduction of Poverty II (NSGRP II or MKUKUTA II in its Kiswahili acronym)<sup>6</sup> shows the government's commitment to accelerating economic growth and fighting poverty by addressing amongst others education, gender equality and sustainable development, and increased enrolment in higher and technical education to improve human resources capacity in terms of knowledge, skills and efficient deployment.

More recently, the National Five Year Development Plan 2016/17 – 2020/21<sup>7</sup> identifies technology appropriateness as a criterion for driving productivity and to reach the targeted economic growth. Priority is on activities that contribute to development of domestic technological capabilities and deliver win-win solutions on growth, environmental considerations and social considerations. With its strong emphasis being a research intensive university in science and engineering developing processes, products and solutions for industry and society, NM-AIST is strategically anchored to contribute towards achieving these national objectives.

The organisational structure of NM-AIST is provided for in the Universities Act No. 7 of 2005 with the Chancellor as the head of the institution, a Governing Council which is the highest policy organ, a Vice Chancellor as the chief executive officer who is assisted by two deputies. In discharging its academic and research functions, NM-AIST operates through its four schools, namely (i) School of Life Sciences and Bio-Engineering (LisBE); (ii) School of Computational and Communication Sciences and Engineering (COSCE); (iii) School of Materials, Energy, Water and Environmental Sciences (MEWES); and (iv) School of Business Studies and Humanities (BuSH). BuSH plays a unique role of blending together the education and training systems at the institute by incorporating innovation and entrepreneurship knowledge and skills with Science and Engineering, in order to enable the development of solutions that address the various and many needs, problems and challenges confronting the society and industry.

NM-AIST started its operation in November 2011 with 86 post graduate students (56 MSc and 30 PhD), for which the national government through COSTECH (the Tanzania Commission for Science and Technology) provided funds. The World Bank provided 12 million USD, and the African development bank contributed as well. The motto of the Institute is: academia for society and industry, emphasising its ambition to do relevant research. At present, the institution has 178 staff, of which 56 are academic staff (68% male, 32% female), 98 (60% male, 40% female) are administrative staff, and 24 (80% male, 20% female) are technical staff. Out of 178 staff, seven are foreign citizens from various countries. The total number of academic staff required is 125; that means there is a massive deficit of 68 academic staff at present.

NM-AIST is fast growing and received a total of 640 applications for admission (499 Master's and 204 PhD) for 2017/18 academic year. A total of 216 candidates qualified (155 Master's and 61 PhD) and were approved for admission.

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<sup>6</sup> United Republic of Tanzania (2010). National Strategy for Growth and Reduction of Poverty II. Ministry of Finance and Economic Affairs.

<sup>7</sup> United Republic of Tanzania (2016). National Five Year Development Plan 2016/17 – 2020/21. Ministry of Finance and Planning.

Beyond its national role, NM-AIST is also well recognised in Sub-Saharan Africa and increasingly globally. At the commencement of the VLIR-UOS-UOS programme, a number of informal national and international linkages were already established, but there was no substantial or well-funded project with the exception of the African Capacity Development Foundation (ACDF) grant. Lately, the World Bank (WB) funded Centre for Water Infrastructure and Sustainable Energy Futures (WISE-Futures) started operating and held its first international conference end of 2017. Connections have also been established with other WB funded centres in West Africa and to the Pan African University Institute of Water and Energy Sciences (PAUWES). The second Centre for Research, Agricultural Advancement, Teaching Excellence and Sustainability (CREATES) has been established and is connected in a similar manner. CREATES sponsors 20 PhD and 19 MSc students in their first year in 2017. Another new centre on ICT in East Africa (CENIT@EA) is a collaborative project to be hosted at NM-AIST jointly operated by two other East African Universities and four German universities through DAAD. It was launched end of 2017. The business incubation space, the technical training room and the techshop space are being set up in the iTEC building with significant support from South Korea. Science park and technology transfer is a topic at institutional level and various projects should contribute. It is regarded as a challenge to any coordinator of such a programme.

## **1.4 Evaluation methodology**

The evaluation methodology is based on the concept of an 'informed peer review'. The mid-term evaluation follows the general principles for evaluations as defined by OECD/DAC<sup>8</sup>: independence, credibility, participation, usability and transparency. According to these principles, the evaluation is to be carried out by a team of independent experts of the higher education sector, involves various stakeholders: project managers, users/beneficiaries and partners in DCs and the Flemish partners, and includes information for interviewees on processes, instruments and results. The specific challenge of a mid-term evaluation of the given IUC format is to generate sufficient information to allow decision-making for the second phase.

### **1.4.1 Evaluation process (activities undertaken)**

The evaluation was implemented in three phases: an inception phase, a phase of data-collection and a phase of analysis and reporting. During the inception phase an evaluation framework was developed (see below).

Step 1: The document analysis formed the basis for the evaluation process. The following sources were considered:

- General information on VLIR-UOS strategy and programmes;
- Phase I programme and the project;
- Programme and project self-assessment reports
- Other documents provided prior to interviews and mission, e.g. annual reports, website of the institutions etc.

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<sup>8</sup> See <http://www.oecd.org/dac/evaluation/daccriteriaforevaluatingdevelopmentassistance.htm> and <http://www.oecd.org/dac/evaluation/2755284.pdf>

Step 2: Individual face-to-face or Skype interviews of programme and project coordinators of Flemish universities and visiting scientists from the partner institution in the South at VLIR-UOS office in Brussels. The interviews were conducted by the team leader.

Step 4: Development of detailed mission programme and direct communication with the management of the partner university.

Step 5: On-site visit of the evaluation team of NM-AIST from 14th to 23rd February 2018. Presentation of preliminary findings, validation of observations and workshop for Phase II.

Step 6: Report writing and discussion on assessment of criteria within evaluation team.

Step 7: Preliminary findings, validation of observations and results of on-site discussion in the workshop for Phase II were presented by the team leader at VLIR-UOS office Brussels.

Step 8: Final draft of report, quality check and submission to VLIR-UOS for comments.

Step 9: Final write-up after having received comments.

Step 10: Submission of report to VLIR-UOS for publication and dissemination.

### 1.4.2 Data and information collection methods and sources

**Analysis of existing data:** The team used existing documentation and the self-assessment reports. It explored preliminary hypotheses during interviews with the project leaders in Belgium and Tanzania. The team consulted the following secondary sources:

1. Project-specific information on project activities (internal documents)
2. University strategy documents
3. Drafts of follow-up plans for Phase II (cf. self-assessment reports)
4. List of publications and published or submitted papers
5. Conference contributions
6. PhD proposals and progress reports
7. Master's degree curricula
8. Handouts provided at workshops and training sessions, feedback and reports
9. Laboratory and training manuals
10. Programme or project related media reports
11. Relevant information published on websites (Universities, Stakeholders, Government Authorities)
12. Visit of facilities and experimental sites
13. Any other verifiable documents provided to the mission team will be considered, if relevant.

**Assessment of change:** The evaluation team conducted individual and group interviews to obtain a good understanding of the projects, programmes and institutional achievements and challenges. It targeted key informants ranging from top leaders to support staff of the institution, in-depth individual interviews face-to-face or by Skype with almost all PhD students, selected Master students met on-campus, and interviews with project leaders and team members. This approach resulted in a good insight of the level of ownership, intrinsic and extrinsic motivation, willingness to change, and hints of change resulting from exposure to different environments or target groups.

**Triangulation of data and findings:** The focus of the evaluation is on use of qualitative data. The requested summative reporting in the self-assessment reports allows a simple comparison of planned versus realised results. It does not allow informative conclusions or explanation of processes of change. Therefore, the assessment of outcomes was based on the following steps:

1. before the site-visit: mapping all of the key outcomes based on document study and introduction interviews with project leaders
2. through semi-structured interviews and document analysis on-site, important outcomes were recorded and compared to the results of step 1 (this was done daily at the end of each day within the team); if matters were arising the PM was requested to provide additional documents or to arrange for other interviews
3. the outcomes were, whenever possible, further validated or complemented through interviews with internal and external stakeholders; and
4. the most important findings and observations were validated at the level of the programme and research teams in joint workshops on-site and in Belgium, and in a separate debriefing session with the Vice Chancellor.

### 1.4.3 Definition of the evaluation criteria and indicators used

We used a four-point qualitative scale for the assessment of the evaluation criteria at programme and project level. The mission team aimed to provide transparency on how it interpreted the various indicators and information. The scale applies a scoring from one to four (see also ToR). The final report visualizes the judgement of each evaluation criteria of the projects and the programme as follows:

|                           |
|---------------------------|
| 1 = poor/not acceptable   |
| 2 = insufficient/low      |
| 3 = sufficient/good       |
| 4 = excellent/outstanding |
| N.A. – data not available |

We did not apply any scoring in case insufficient data or information could not allow a fair assessment. The scoring was applied to all important indicators and questions: composite questions received a scoring that is the weighted average of the scores of their constituent dimensions. In table 2, we present our evaluation framework.



Table 1 Evaluation framework

| Key Evaluation questions                                    | Programme level   | Project level  |
|---|---|--|
|   | Assessment criteria   | Assessment criteria  |
| 1. <b>To what extent is the programme/project relevant?</b> | The programme objectives contribute significantly to the needs of the university.   | The academic objective of the project is consistent with the university development vision, mission and strategy. Consistency with the Corporate Strategic Plan.   |
|   | Synergy: The programme is supporting the university capacity building process through relevant research, training and outreach activities of the individual projects. | The collaboration among the (three) projects leads to synergy regarding interdisciplinary cooperation.   |
|   |   | Transversal themes (gender, environment, D4D) are considered.  |
|   |   | The project specific development objectives or achieved results are relevant to the needs of the defined target group or sectors.  |
| 2. <b>Scientific Quality</b>                                | To be assessed at project level   | The quality of research is accepted by the scientific communities and stakeholders and published or publishable in peer-reviewed journals.   |
|   |   | The quality of education and training are of high quality. Didactical approach, supervision, and mentoring of post-grad students results in good progress and high demand of students striving for excellency. |

|  |   |  |
|--|---|--|
| <b>3. What is the level of efficiency?</b><br><br><b>How is the programme? How are the projects managed?</b> | Intermediate Results: Delivery of outputs in good time and quality.<br><br>Management, coordination and communication on time and in good quality.<br><br>Input : Output ratio in terms of financial and human resources capacity parameters. | Extent of delivery of intermediate results (outputs) in relation to means and measures in good time and in good quality.<br><br><br>Flexibility of project management to adjust in a changing environment.   |
|  | <b>4. To what extent is the programme/project effective? The extent to which the objectives are expected to be achieved, taking into account their relative importance.</b>   | Academic objectives:<br><br>Overall effectiveness of the programme regarding academic advancement.<br><br>Changes in awareness, knowledge and skills at institutional level.<br><br>Changes in organisational capacity.<br><br>The attainment of specific academic objectives regarding the level and degree to what extent research, teaching and learning, and outreach were enhanced.<br><br>The extent or development of new patterns of change regarding academic attitude and behaviour. |
|  | Development objectives:<br><br>Overall effectiveness of the programme regarding development orientation.<br><br>Changes in awareness, knowledge and skills through use of development relevant outputs.                                       | The direct utilisation of research, training and learning outputs regarding achievement of planned or unexpected development related effects.  |
| <b>5. What are the prospects of continuing the programme based on</b>  | Institutional prospects of capacity and networking:<br><br>Academic recognition of the university at national, regional and international level secured. Post VLIR-UOS-   | Institutional prospects of capacity and networking:<br><br>Situation and prospects of trained academic and non-academic staff: measures for academic and technical staff   |

|  |  |  |
|--|--|--|
| <b>Phase I? If a Phase II is implemented, could a sustainable continuation be expected after the programme has been completed?</b> | UOS-UOS programme themes attract highly qualified staff and external partners.                               | retention in place; involvement and cooperation South-South and South-North (e.g. research programmes addressing or using innovative methodologies and instruments)  |
|  | Coordination and clear leadership of the institution.  |  |
|  | Financial prospects: Ability to attract external funding or co-funding for research oriented programmes.     | Financial prospects:<br><br>Long-term cooperation with Flemish universities and complementary support through joint application to development oriented organisations. Research groups or faculties are competitive to attract external funding. |
| <b>6. Are there indications or results, which could indicate long-term effects (impact)?</b>                                       | First indications of impact at academic level through overall institutional growth resulting in added value. | Scientific community: Critical mass of excellence in specific areas achievable.  |
|  | First indications of impact on development at local or regional level.                                       | Development orientation: Research findings show potential for effective transfer or up-scaling.  |
| <b>7. Is coherence and plausibility given?</b>   | The systematic intervention is plausible and coherent.   | Project teams are aware and realize that a coherent approach and plausible planning in cooperation with other programmes and actors is required to stay competitive in the academic world addressing development related challenges.             |

#### **1.4.4 Avoidance of conflict of interest, limitations and evaluability**

Prior to the evaluation the evaluators signed individually a protocol that they do not have any conflict of interest in providing the service of mid-term evaluation of the IUC programme. In the process of the evaluation it was ensured that there was no direct or indirect influence of any party.

The evaluation was executed as planned. The team could talk to relevant internal and external stakeholders. The quality of the programme planning document and the self-assessment reports contributed to a good understanding of the projects. It enabled the team to obtain an excellent insight in the project and its institutional achievements and challenges, which could be validated and further discussed during the evaluation visit and debriefing sessions on-site and at Brussels.

The evaluability was somewhat limited due to unavailability of adequate logical framework monitoring data especially at outcome level. Another problem was that the initial programme log-framework remained unchanged. The initial programme and log-frame matrix (for programme and projects) served as the main reference. The challenge and key assumption that sufficient qualified personnel would be available was the main cause of missing outputs in Phase I. Causes and problems had to be considered to justify a fair judgement.

There were only a few limitations which should be taken into account when reading the evaluation report:

- a) The ToR and the evaluation framework considered assessing impact. However, one must take into account that the programme is still in its infancy and most of the research results were not yet published, tested or transferred to the field. If possible, any first indications of impact were identified and described.
- b) The evaluation team could not verify all the quantitative data on indicators due to the type of record keeping and limited access to electronically stored information. Instead, the evaluators focused on qualitative assessment of available documents.
- c) The evaluability of activities and outputs was somewhat limited in the start-up phase of the programme due to changes in the programme personnel support and at VLIR-UOS offices.

#### **1.4.5 Quality assurance of the evaluation**

All planning steps and activities were mutually agreed upon with the team of VLIR-UOS and MDF Training and Consultancy agency. The various sources of information and data were checked and triangulated. In the process, we used various instruments to ensure a representative and objective evaluation. For example, the interviews were semi-structured and questions were formulated as open questions. Quality was assured through feedback on the evaluation process through internal team discussions, group meetings with partners, debriefings, presentation and validation of preliminary findings and provision of first draft reports for commenting.

## **1.5 Structure of the evaluation report**

The results of the evaluation are presented in following chapters. Chapter 2 presents the assessment of the IUC programme according to the different OECD/DAC criteria. Subchapter 2.1 describes the results at programme level and in the following three sections the assessments per project are presented. In chapter 3, the conclusions and in chapter 4 the recommendations are described. The annex contains some more information on the ToR (A 1) and the inception report (A 2). The mission programme is presented in A 3 and the list of persons consulted in A 4. The documents, which were used in this evaluation are listed in A 5. A 6 contains the slides of the feedback and planning workshops.

## 2 Evaluation

### 2.1 General overview and assessment

The visibility of the VLIR-UOS programme with Nelson Mandela African Institute of Science and Technology (NM-AIST) is very high in Tanzania. The President of Tanzania mentioned the institutional co-operation in his inauguration speech at NM-AIST as an icon of the new university. The new institute responds to various challenges with gaps in human resources capacity being the major bottleneck. The planning of the VLIR-UOS programme involved many stakeholders, who contributed their ideas and expectations resulting in the submission of a comprehensive and ambitious programme, which was finally approved by VLIR-UOS.

However, the initial funding volume covered three projects and it was too low in comparison to the multiple objectives. NM-AIST's decision to split the programme into two research-oriented projects and one cross-cutting capacity building project reduced effectiveness. Implementation was delayed because of a combination of factors: restrictions regarding recruitment of PhD students from outside of NM-AIST, the need to meet academic standards of the Flemish universities, a rather informal communication structure between partners, and strict hierarchical structures of the Tanzanian University system.

Today, NM-AIST attracts a large number of applications nationally and regionally offering a pool of potentially good candidates. Transparent selection procedures are in place and the VLIR-UOS programme management office is operating efficiently. Confidence of newly hired academic staff is growing, with good intrinsic motivation as a driver of research and ownership. Overall, the ongoing research is of good quality and meets international standards. The VLIR-UOS programme has contributed to build significant institutional capacity and is a driver of change towards solution, process, and product oriented postgraduate research. The VLIR-UOS programme contributed to personal advancement, cultural exchange and learning from each other at the administrative and academic level of the parties involved.

The evaluation report recommends, therefore, to seriously consider the implementation of a second phase addressing management of natural resources through focused research in the area of agriculture and water utilising digital information systems for upscaling. Innovative research and teaching, and adequate outreach should impact food and nutrition security. The conservation of biological diversity and the maintenance of ecosystem services of natural water bodies is of utmost importance. Any programme without ecology is the recipe for non-sustainable development. Therefore, in Phase II ecological researchable topics must be maintained and should be given high priorities.



## 2.2 Evaluation of the programme level

### 2.2.1 General assessment

NM-AIST leaders initiated the IUC programme in 2011. The activity came from NM-AIST, which developed the first ideas and contacted colleagues at SUA, which was a former beneficiary of the VLIR-UOS programme. The matchmaking workshop in Belgium in 2012 facilitated to present and discuss project ideas and to establish contact with Northern partners. The formulation of the programme and its logical framework is end-goal oriented and less process oriented. The planning process indicated and resulted in a high degree of initial programme ownership. After the launch of the VLIR-UOS programme and its establishment, NM-AIST attracted an increasing number of medium to large-scale third party funded research projects sponsored by international donors and agencies. At present, 39 projects are implemented, which include the present VLIR-UOS (IUC) and another one VLIR-UOS (NSS) programme plus six new projects, which were acquired in the last few months of 2017. This is an outstanding achievement, but it is extremely demanding on leadership, administration and researchers. There is also the risk that the VLIR-UOS programme may be not be regarded as of high priority within the project portfolio affecting implementation of activities and absorption of funds in time and according to regulations of VLIR-UOS.

Specific capacity gaps in regard of PhD training have been filled through pre-doctoral programmes of the Flemish universities. At NM-AIST, however, postgraduate students and staff require more training, coaching and mentoring in different areas of teaching and learning, which are beyond the capacity and scope of the VLIR-UOS programme.

The establishment of the institutional ICT infrastructure is a major achievement and highly visible. The planned interventions include: facilitating the production of teaching materials, expanding and developing ICT networks and teleconferencing facilities and strengthening the contribution of Tanzanian universities to societies. All activities geared towards strengthening learning and research are based on developing the ICT infrastructure and implementing IT systems to promote production and access to teaching and research materials.

The outreach part of the project is geared towards management of research findings and their effective transfer to society and industry. The challenge that remains is to provide the relevant content and to make systems and devices operational. More recently, stakeholder consultations initiated by other projects (e.g. CREATES) highlight that a major capacity gap is the currently insufficient innovative teaching approach (experiential, use of pedagogic in higher learning, use of case studies). Faculties (schools) are in the process to revise curricula. The established ICT infrastructure could positively contribute to innovative teaching and learning.

Overall, the programme is well linked to VLIR-UOS country strategic priorities regarding capacity building and addressing relevant development challenges.

## 2.2.2 Evaluation criteria

| Relevance  |   |
|--|---|
| Responding to needs  | <p>Overall, the projects can be rated as 'excellent'. The projects contributed to the implementation of the current Corporate Strategic Plan (CSP). The revision of the CSP is ongoing, but there is no deadline for it.</p> <p>The project objectives contribute clearly to developing research-based solutions. This was verified through farmer and stakeholder consultations.</p>   |
| Synergy  | <p>The acquisition of some new projects is an "outstanding" achievement, which can be attributed to a large extent to the VLIR-UOS programme.</p>   |
| Explanation and comments   |   |
| <p>The programme is highly relevant regarding the need for institutional capacity building. The capacity building efforts of academic staff could not be sufficiently aligned to the actual expansion of the institution (number of students, acquired projects).</p> <p>Stakeholder consultation for curriculum review and research planning processes was done, but systematic documentation is not available.</p> <p>The projects have not yet sufficiently contributed to enhance the publication profile of NM-AIST, partly because all PhD research projects are delayed and none of them has so far published (outputs).</p> <p>VLIR-UOS sponsored PhD research students are on study-leave at the degree awarding university in Flanders. Field work and some laboratory-based analysis is conducted at NM-AIST and supported by a local supervisor. The sandwich scholarship allows for a maximum of 24 months to be spent in Belgium. The cooperation between supervisors, team members, project leaders, and programme coordinators show missing elements of cohesiveness. One contributing factor could be that two projects were merged at the beginning of the programme and, consequently, programme leaders were not fully conversant with some of the topics. Other factors were probably the late recruitment of students and not well-defined selection guidelines before 2016. Concluding, there is need to work towards strengthening joint supervision arrangements (N-S) to ensure efficient supervision.</p> |   |
| Efficiency   |   |
| Intermediate Results: Delivery of outputs in good time and quality   | <p>In terms of efficiency, our overall ranking of the projects is 'good' as substantial state-of-art laboratory facilities and equipment have been established mainly through the VLIR-UOS programme funding. Outstanding achievements are visible and in-use:</p> <ul style="list-style-type: none"> <li>(1) banana macro-propagation unit</li> <li>(2) constructed wetland demonstration facility</li> <li>(3) enhanced ICT infrastructure</li> </ul> <p>However, the achievement of planned intermediate results has been highly variable, with some registering high level of achievement than others. This could be in part due to non-adherence to time frames in academic research and outreach.</p> |

|  |  |
|--|--|
| Management, co-ordination and communication  | The programme is rated as 'good' since it is well managed with no major difficulties since end of 2016                                   |
| Input : Output ratio   | Overall the Input/Output ratio is 'good' in regard of facility and infrastructure establishment (financial means, capacity availability) |
| <b>Explanation and comments</b>  |  |
| <p>Research output, which is almost exclusively built on PhD research, was significantly delayed. The institution expected that key staff in the programme could be retained, but potentially qualified research students were not available on time. In Phase I, it was planned to achieve capacity building through six PhD students (selected staff members on study leave). At present, none of the remaining five students has completed their PhDs. It is expected that within the next two years all five students should have fulfilled the requirements of Belgian universities.</p> <p>The well-established ICT infrastructure is of limited use because content for E-learning, moodle platform, and other platforms/databases is not yet available or uploaded. ICT based outreach activities are not yet possible.</p> <p>Connectivity is a major bottleneck despite the presence of state of the art ICT infrastructure. But, there are possibilities to get another ISP through other projects to address the problem and effectively utilise the currently underutilised high-tech ICT infrastructure.</p> <p>Phase I was end-goal oriented with inadequate process orientation. Management of the programme has to adhere to strict budget regulations, which reduces flexibility and process-oriented adjustments. The comprehensive management manual provides a generally good guidance to programme management, but requires adequate staff and additional training. The programme of NM-AIST had to cope with major challenges regarding human resources. The non-alignment of per diem/ allowance regulations with the rules of the public institutions in Tanzania results in discussions and extra workload. This is a generic problem of all donors/agencies operating in developing countries. The problem found at NM-AIST was the variation handling this issue between the two institutions implementing VLIR-UOS funded projects (Mzumbe and NM-AIST), thus, we request to see the possibilities to harmonise the two.</p> <p>Currently, the programme is functioning well at the organisational level. The steering committee meetings are taking place as scheduled and are adequately reported within and between parties. We identified the following aspects for improvement:</p> <ul style="list-style-type: none"> <li>• Research groups should provide up-to-date list of publications with clear references and status (published, accepted, submitted) and traceable references on any other reports</li> <li>• Access to reports, guidelines and policy documents should be operationalised in a user-friendly way</li> <li>• Follow-up on activities through project management requires a more active communication attitude of research groups</li> </ul> |  |

| <b>Effectiveness</b>   |  |
|--|--|
| <b>Academic objectives</b>   | <p>The projects are rated as 'good' on effectiveness. Individual postgraduate students show commitment and enthusiasm to respective research projects. There is also increasing awareness on competitiveness of internationally recognised research among both researchers and PhD students.</p> <p>PhD researchers experience a major change towards a more focused scientific research attitude being exposed to the partner in the North.</p> |
| <b>Development objectives</b>  | <p>Across the project leaders, researchers and PhD students, there is increased awareness on the importance of outreach and up-scaling of research findings and training. Researchers understand better that developmental interventions require solid quantitative and qualitative data. Thus, the overall rating is 'excellent'.</p>   |
| <b>Explanation and comments</b>  |  |
| <p>Confidence and motivation of key academic staff improved through successful proposal submissions. However, there is a need for paradigm shift from the current more conventional research approach to action and participatory research approaches in order to enhance utilisation of research outputs (processes, products and solutions),</p> |  |

| <b>Sustainability</b>   |  |
|---|--|
| <b>Institutional prospects of capacity and networking</b>   | <p>Sustainability is also rated as 'outstanding'. NM-AIST proved institutional capability to sustain its research agenda through acquiring its current portfolio of projects. This is partly because all third party funded projects rely on the institutional research agenda resulting in synergy and complementarity.</p> |
| <b>Financial prospects</b>  | <p>This is rated as 'good', though there is a need to develop an exit strategy to facilitate continuation of the programme achievements and the collaboration with the Flemish universities.</p>   |
| <b>Explanation and comments</b>   |  |
| <p>Currently, the institution must fill a considerable number of academic vacancies. Therefore, human resources development is a high priority. Coordination mechanism between the partners and inside NM-AIST different departments are currently not up to the task.</p> <p>The long-term donor support is a comfortable position and time should be used to develop strategies and actions how and where to place new proposals to achieve a maximum of synergy. The institutional corporate strategy aims on products and processes beyond the academic research. This would require an organisational set-up and mechanism to feedback profits from projects and consultancies etc. (e.g. to a revolving fund). An exit strategy could also include strategies to utilise research outputs even after the end of the project within and outside NM-AIST, e.g. community outreach activities, banana centre of excellence, community information centres, science park, etc..</p> |  |

| Impact  |   |
|---|---|
| Scientific community  | Intermediate results do not allow an assessment of impact at this stage as research outputs have been delayed.                |
| Development   | Rated as 'good' because individual project activities show possible tangible outcomes, which could have a development impact. |
| Explanation and comments  |   |
| It is too early to assess possible impact on scientific community. However, on development related interventions first indications show potential impact on beneficiaries at a pilot scale (e.g., banana trials and related extension activities). The planned intermediate result to improve food security and access to safe water for the people living in the upper Pangani Basin was over-ambitious and not realistic taking into account prevailing development challenges. The expectations was that surrounding communities and industrial actors would get relevant inputs from NM-AIST and adequate information to enhance their future required timely delivery of outputs and outcomes, which was not the case. |   |

| Coherence  |   |
|--|---|
| Plausibility   | This is rated as 'good' because networking with other institutions/stakeholders is taking place, but its link to the VLIR-UOS programme requires documentation. |
| Explanation and comments   |   |
| The results and solution-oriented research approach is plausible and addresses relevant development challenges. The thematically intended research centres (e.g. CoE Banana) could provide a competitive base for interaction and coordination of stakeholder activities. It is of mandatory importance to support any development intervention through adequate research, which provides qualitative and quantitative evidence. |   |

### 2.2.3 Added value of programme level

Integration is a conceptual strength of the programme, which contributes steadily to the conversion of purely academic output into concrete and applicable research-based results aiming on impact.

The VLIR-UOS programme was decisive to generate further third-party funded programmes. The only exception being the area of life sciences to which the Commission for Science and Technology (COSTECH) provided initial infrastructure. The initial investment and cooperation of NM-AIST with Flemish universities and the formalization of a VLIR-UOS programme sharpened the profile of the young institution. It contributed significantly to attract other international agencies and foundations. The causal link is the requirement that in submitted proposals the applicant (NM-AIST) describes the facilities and resources of the institution. Other donors or partners regarded the establishment of key functions (library, ICT infrastructure, laboratory equipment) as essential to grant new projects or programmes. Besides, VLIR-UOS strengthened the confidence at NM-AIST to draft and compete in other project calls.

The development, testing, and implementation of new tools under African conditions is considered as an added value. This includes also the development of case studies in unique eco-systems, which provide evidence on effects of global changes of climate change.

## 2.3 Evaluation per project

### 2.3.1 Project 1: Integrated sanitation and agriculture systems

#### 2.3.1.1 Description of the project (intervention logic)

Project 1 deals with two components: agriculture and sanitation. The agriculture component focuses on capacity building through PhD projects on socio-economic factors influencing banana production in the Upper Pangani Basin and technology transfer to farmers. The sanitation component focuses on constructed wetlands. The project envisages a holistic approach for sustainable land management in the low-income banana based cropping communities in the Upper Pangani. This was planned both on farm research and construction of demonstration plots (multiplication and field collection of new banana varieties, wetland) on NM-AIST campus. The intervention aims to improve sanitation using constructed wetlands as a water and nutrient recovery for agriculture. The project concepts intend to link agricultural production (the staple food banana was chosen as the pilot crop) as an effort to closing water, nutrient, material, and energy cycles on a local scale. Already selected banana varieties are planned to be multiplied through macro-propagation technology and the field collection intends to demonstrate their agromonic potential.

It is planned to conduct field surveys to identify representative farms for the Upper Pangani Basin to test as a second crop, new bean varieties. The constructed wetland at NM-AIST intends to provide a facility to initiate studies aimed at reducing pathogen loads into the sewage and optimizing the recovery of nutrients for re-use in agricultural activities. The main interventions are research and capacity building activities, training workshops, and on farm trials in farmers' fields and a pilot wetland constructed at NM-AIST. Direct outcomes from the project are trained technical staff, PhD, and MSc students; improved agricultural technologies; a prototype of a constructed wetland to be scaled up in other locations, i.e. communities.

#### 2.3.1.2 Assessment of evaluation criteria

| Relevance                                |   |
|--|---|
| Consistent with Corporate Strategic Plan | This is generally ranked as 'excellent' since the project themes contribute to intended outreach-oriented strategy to develop research-based solutions in sustainable agriculture and sanitation.   |
| Contributing to Synergy                  | Ranked as 'excellent' because the project is designed as an interdisciplinary work programme with links to other research groups. The VLIR-UOS project contributed to the development of the CREATES project, which was granted by WB. The VLIR-UOS project outline and description of the programme was a major input for drafting the CREATES and WISE-Futures proposals. |



|  |  |
|--|--|
| Transversal themes (gender, environment, D4D)  | <p>Sustainable agriculture depends on the concept of recycling inputs and outputs and conserving natural resources. The focus of the project is on the sustainable use of natural resources. Thus, the criterion is ranked as 'good'.</p> <p>However, gender issues were not adequately addressed in both components of the project.</p>             |
| Responding to needs  | <p>Ranked as 'excellent' due to the fact that farmers and stakeholders indicate demand on research results. Consultation with stakeholders and beneficiaries took place although it was not systematically documented. In addition to consultations, secondary data were used to identify the problems and needs within the Upper Pangani Basin.</p> |
| <p><b>Explanation and comments</b></p> <p>The project proposal combined sanitation and agriculture: constructed wetlands remove contaminants from waste water, so farmers have clean water for irrigation in agriculture. There is also interaction between P1 and P2 through a model of banana production and water use which use data from P2. Project staff of P1 benefitted from training in writing skills, publishing, and establishment of infrastructure through P3. P1 was partially involved in first steps regarding development of ideas for the science park. The current conversion to a matrix structure of the institution facilitates interdisciplinary cooperation. Three schools (LiSBE, MEWES and HWRE) are represented in the project.</p> <p>However, the connection between the agricultural and sanitation components of P1 was lost and there was no evidence of networking of the sanitation subgroup. It appears that despite the support from the institutional leadership, the realisation of a common vision on institutional and faculty cooperation requires more time than planned. This contributed negatively to the achievement of synergy during the first years of the project.</p> <p>The overall programme planning considered the transversal theme "gender" in the following way: "Employment of staff in the programme and recruitment of students who shall benefit from the programme shall make sure that gender equality is considered as much as it is feasible. We understand that the number of female students in science and technology programmes is not great, we shall actively encourage female students to apply for the scholarships" (internal programme planning document April 2012, p 20). However, there was no evidence in documentation and on the ground that gender was a factor being considered or addressed in the ongoing research. That is why at project level the ranking is 'insufficient'.</p> <p>NM-AIST approved a policy to allow users from outside the laboratory to analyse soil and water in February, 2018. This could positively support interdisciplinary collaboration with stakeholders.</p> |  |

| <b>Scientific Quality</b>  |  |
|--|--|
| Quality of re-search   | Quality of research is ranked as 'good' because some research projects produce intermediate results indicating solutions to identified problems, e.g. in banana production or wetland construction. To date, scientific evidence, however, is lacking. Drafts of scientific papers were submitted to good journals, but require in some instances major revision. Other drafts are not reviewed yet. The quality of master theses is good: they were accepted by Flemish universities and could be used to write conference contributions (abstracts).   |
| Supervision, re-search training and mentoring  | Overall, this criterion is ranked as 'insufficient' because it depends highly on academic capacity from the Northern supervisor(s). This partially compensated shortage of academic human resources capacity in the South. Further, the ranking of 'insufficient' indicates the strong need to invest in advanced academic human resources in the South. Field work is well organised and supported by the co-supervisor(s) at NM-AIST. The pre-doc training at Flemish universities was a challenge to all PhD candidates, which indicates a strong need. There is still need and high demand for training in writing and publication skills, data analysis and interpretation. |
| <b>Explanation and comments</b>  |  |
| <p>Generally, interaction between PhD and Master students and supervisors in the North and South is good. Research projects are partially affected by involvement of persons at different levels and at different times. This observation points to pay attention to the communication of culture among and between research teams. Quality of research, which is directly attributable to the VLIR-UOS programme is negatively affected by technical, organisational, and managerial challenges (NM-AIST). Main research activities depend on postgraduate students' work supervised by the Northern partner and co-supervised by the research team at NM-AIST. The Northern supervisor(s) provide the main academic input. Mechanisms for information exchange and submission of draft papers or reports vary between the supervisory teams. Communication problems occurred, which required additional consultation efforts. Current PhD students need further empowerment and clear guidance. The original local guidance structure was changed due to fact that the PL of P1 became DVC finances. Now that he has retired from that function and will be active in the project again, the local supervision may improve again. The evaluators are sure that academic personnel of NM-AIST and the Northern partners did their best to solve any upcoming issues. However, issues were observed at different levels and from different perspectives in the South and in the North. Causes and reasons need further attention.</p> <p>The very young institution could not cope with technical difficulties, e.g. in getting banana planting materials on time, or constraints of human resource capacity or academic performance in the first phase. The initial pool for selection of PhD candidates was based on a small number consisted of employed academic and technical staff of NM-AIST and there was little if any competition.</p> |  |

| Efficiency   |   |
|--|---|
| <p>Intermediate Results: Delivery of outputs in good time and quality</p> <p>IR 1</p> <p>Overall, IR 1 is ranked as 'good'</p>         | <p><i>IR1: Agricultural productivity is increased through more productive and more resilient cropping systems:</i></p> <ul style="list-style-type: none"> <li>• <i>Site-specific soil information is updated for the Upper Pangani Basin:</i> Flemish professors and Flemish Master students produced reports and a thesis, respectively (unpublished) in 2014 and 2015.</li> <li>• <i>Agronomical superior varieties of different food crops are identified:</i> A functioning banana macro-propagation unit is established on campus. The planned main research study on banana-bean farming system, which are the backbone for two planned PhD theses are partially ongoing but are significantly delayed. One of the two students dropped-out. The timeline could not be kept and planned outputs are not achieved.</li> <li>• <i>Organic matter recycling is optimized and fertilizer use efficiency is increased:</i> We could validate draft abstracts and papers for submission on this and related topic. It is not clear, however, when papers will be accepted by peer-reviewed journals.</li> <li>• <i>Soil conservation measures are implemented in the Upper Pangani Basin in the selected systems, on the three selected soil types:</i> No information available on-site. No document found.</li> </ul>   |
| <p>Intermediate Results: Delivery of outputs in good time and quality</p> <p>IR 2</p> <p>Overall, IR 2 is rated as 'insufficient'.</p> | <p><i>IR2: Water quality and availability is improved through more rational extraction and more efficient recycling:</i></p> <ul style="list-style-type: none"> <li>• <i>Updating the geological database of fluoride contamination prone areas in the Upper Pangani Basin:</i> We could not find any data nor reports.</li> <li>• <i>Updating technical information on fluoride removal techniques and analysis method:</i> Two master theses were completed at KU Leuven (one student from Tanzania, one from Spain). The planned technical report (2015) could not be traced.</li> <li>• <i>Knowledge on the functioning of constructed wetlands is updated at NM-AIST:</i> The constructed wetland demonstration facility is operational as planned. Team members confirm that samples are collected for practical lab work. The PhD research on design of future wetland systems in the Upper Pangani Basin indicates promising results but should have been completed by 2016 and is two to three years behind schedule.</li> <li>• <i>The potential of phosphorus recycling in conjunction with constructed wetlands is known:</i> The subject is covered by the same PhD student as above.</li> <li>• <i>The potential of constructed wetland technology is explored in the Upper Pangani Basin:</i> We had informal talks with stakeholders, but could not find the planned assessment report.</li> <li>• <i>Socio-ecological effects of the implementation of constructed wetlands are known:</i> We could not trace the draft of the planned feasibility report (to be available end of 2018) on the potential dissemination of wetland water treatment in the Upper Pangani Basin.</li> </ul> |

|   |   |
|---|---|
| Flexibility to adjust to changing environment   | Ranked as 'insufficient' because the initial underlying assumption that qualified personnel are (sufficiently) available and willing to participate in the project was not confirmed. The delayed research work was partially compensated by finding master students from the North (not funded by the IUC programme) and by Master students from Tanzania. |
| <p><b>Explanation and comments</b></p> <p>Two main outstanding achievements are visible and in-use: (1) banana macro-propagation unit and (2) constructed wetland demonstration facility, which cleans the sewage of the hostels and channels the water to irrigate banana plants.</p> <p>The main factor negatively contributing to unexpected overall low performance was the late start and drop-out of one of the three PhD students. Other team members of NM-AIST had no capacity to conduct that same research. The direct involvement of academic staff and students from the North was well supported locally by NM-AIST. This contributed positively to produce research results, however unpublished to date. Several Master students from the North and Tanzania could be found to work on specific aspects of the work programme. In a possible phase 2, it is expected to complete ongoing PhD research projects.</p> <p>Substantial state-of-art laboratory facilities and equipment have been procured through the VLIR-UOS project, including some facilities that are in the field. Portable devices for field work are also available. More recently, other donors have supported the laboratories with expensive modern equipment (World Bank, USAID, African Capacity Building Fund). Overall, all laboratories are well equipped. Students are advised, taught and assisted by a competent technician.</p> <p>The efficiency of laboratory work is negatively affected through delays due to long procurement process of standard consumables. Orders are placed on time, but delivery takes between 3 to 5 weeks. Inadequate availability of technical staff capacity (the laboratory has 3 technicians, from whom currently 2 are on leave and 3 scientists, from whom only one is available). Maintenance and regular service of equipment is inadequate. There is not sufficient training of technicians on new devices. In a possible Phase II training of technicians may need to be considered. Visiting scientists from various collaborating international programmes (incl. VLIR-UOS) assist ad hoc. The laboratory benches and tables were made of inappropriate material (wood material non-resistant to chemicals) and already started deteriorating. Electricity supply is not stable. Stand-by generators have been procured through a different project and are now being installed. In spite of good laboratory facilities, technical constraints (power cuts during analysis of samples) required that some samples had to be shipped to Belgium for analysis.</p> <p>Efficiency of field work of postgraduate students was reported to be negatively affected through current per diem regulations and discussions. Often students cannot obtain receipts for support provided in the field by local people and for accommodation in remote areas. It is very small amount of money, which is required to reimburse local helpers in the field, but students stated that they have to use their per diem out of pocket and cannot claim. It must be clarified that the per diem policy is meant to cover costs and there is also the instrument of service contracts for assistants in the field on top of the per diem so students do not need to pay the research support from the per diem. The donor policy on per diem is very clear. The only real problem encountered was that the implementation of the VLIR-UOS</p> |   |

policy at IUC Mzumbe University is different from NM-AIST. This issue needs to be aligned. Implementation through clear communication and controlling of the use of the appropriate instruments is handled through the programme support unit with no major problems reported by management.

| <b>Effectiveness</b>   |   |
|--|---|
| <b>Attainment of specific objectives</b>   | This is generally 'good' because through successful establishment of facilities, research projects and field trials problem awareness, research content, and behaviour regarding research implementation could be changed positively.   |
| <b>Extent of change regarding academic attitude and behaviour</b>  | Rated as 'good' because PhD students, who successfully completed the Belgian pre-doc programme and are currently continuing their studies, experience a major change towards a stronger scientific research attitude. Their awareness of the competitiveness of international research increased. They understand that developmental interventions require solid quantitative and qualitative data.   |
| <b>Utilisation of outputs</b>  | <p>Rated as 'excellent' because demonstration sites on campus (banana, constructed wetland) and in the field (banana trials) have been established, which attract interest by stakeholders and local farmers.</p> <p>The opportunity to achieve impact through private public partnership (PPP) between NM-AIST and private sector companies exist in the farming sector. NM-AIST established links with a private sector company and local farmers in the banana sector.</p> <p>There are first indications of tangible utilisation of outputs of banana-related research outputs by local farmers, though still on a micro-scale.</p> |
| <b>Explanation and comments</b>  |   |
| <p>Top management of NM-AIST pushes for shift in research paradigm towards solution-oriented research. For verification of the intended change results should be made available and prove that they benefit the society and specific target groups. Publishable research is only a first step. Researchers should then be enabled to upscale and test their processes, products and solutions.</p> <p>There are links with a private well-staffed, small-sized local company, which has established a state-of the art laboratory, experimental sites and commercial farming in banana and several other crops (potatoes, cassava, vanilla etc.). In addition, plant diagnostics and soil analysis are offered on a commercial basis. There is also interest from NM-AIST and the company to cooperate in plant protection, e.g. testing and development of bio-pesticides and botanicals. There is a very high demand from small-scale farmers, commercial farms, and research organisations for new varieties, e.g. high yielding and disease tolerant varieties.</p> <p>The company offers or is open to internships for students and applied field-based research. One PhD student of P1 uses plants for research on campus and in the field. The company also cooperates with IITA on NM-AIST campus through provision of macro-propagated banana planting materials. The company does not pay any per diem to participants of workshops or events, which is a prevalent item of discussion in the public sector. It is positively noted that a culture of topping up or sitting allowances</p> |   |

is not part of the VLIR-UOS policy. Official cooperation could be done through a professional contract agreement with the NM-AIST.

The recently launched CREATES and WISE-Futures projects offer opportunities for synergy and complementary themes emanating from the institution research agenda.

The demonstration and successful implementation of a constructed wetland on campus could result in concrete activities to enhance visibility and awareness among stakeholders. However, effective use of the given showcase is not taking place at the moment.

| <b>Sustainability</b>   |   |
|---|---|
| <b>Institutional prospects of capacity and networking</b>   | The project leader of P1 of NM-AIST has retired, but returned on contract to the university. It is planned that one of the initially two current PhD students will fill his position. The student, however, is expected to defend the thesis as late as at the end of 2019. Overall, the staff situation remains critical. Input from visiting scientists is provided but more researchers on contract are required. Top-leadership and project leadership support is strong. Overall, this criterion is rated as 'good'. |
| <b>Financial prospects</b>  | Rated 'good' because the governmental funding and several complementary new projects secure thematically related activities in the near future.   |
| <b>Explanation and comments</b>   |   |
| <p>Team members and project leaders from both parties are expressing independently from each other their interest and motivation to continue working together. This clear expression of interest is regarded as a positive signal for long-term cooperation.</p> <p>NM-AIST approved a policy to allow users from outside the laboratory to analyse soil and water samples. This could positively support interdisciplinary collaboration with stakeholders and generate income.</p> <p>Institutional recognition of support and technical personnel needs to be enhanced. Training components of support and technical personnel should be foreseen as an incentive in Phase II.</p> |   |

| <b>Impact</b>               |  |
|-----------------------------|--|
| <b>Scientific community</b> | Rated as 'excellent' because there is strong indication in the area of banana research that cooperation with KU Leuven and IITA, which has established a banana breeding centre, will have impact on knowledge generation. There are plans discussed to establish a 'Centre of Excellence' (CoE) in banana research. |
| <b>Development</b>          | Ranked as 'good' because the first local research results in banana based farming systems and use of constructed wetlands are likely to have a potential impact at policy level.   |

| Explanation and comments  |
|---|
| Involvement of the communities (which was not planned for) has started. Farmers are impressed with the banana varieties. Farmers and community leaders are demanding to be trained on improved banana production including soil fertility and irrigation management. There was no active measure of NM-AIST to involve communities at this premature stage of field trials. |

| Coherence  |   |
|--|---|
| Plausibility and competitiveness of scientific approach to address development challenges  | <p>This criterion is rated as 'good'. Responses from stakeholders show that NM-AIST could play a key role in coordinating national solution-oriented research in selected themes addressing development challenges. In particular, the establishment of a CoE in banana production and field demonstration sites for banana production and wetland construction are of interest to beneficiaries.</p> <p>The cooperation with CREATES offers new opportunities to develop new research-based solutions.</p> |
| Explanation and comments   |   |
| <p>There are plans discussed with IITA<sup>9</sup>, a research institution of the consultative group of international agricultural research to cooperate on developing a CoE in Banana research on campus. IITA's main hub for Eastern Africa is based in Dar es Salaam whereas IITA conducts the banana breeding experiments at NM-AIST. Other stakeholders interested in P1 activities are TACRI, Crop Bioscience Solutions, district authorities and communities.</p> |   |

### 2.3.1.3 Assessment of key results area (KRA) project 1

In Table 2, we present a summary of project 1 'Integrated sanitation and agriculture systems' scores per result area.

**Table 2 project 1 scores per result area**

| Key result area                 | Summary of indicators   | Score               |
|---------------------------------|---|---------------------|
| <b>KRA1</b><br><b>Research</b>  | Two scientific articles have been submitted to journals, various others under are still under preparation, conference contributions are under preparation; technical data on soil fertility, erosion and contamination of drinking water have been collected, but are yet to be disseminated and fully utilised | <b>Insufficient</b> |
| <b>KRA 2</b><br><b>Teaching</b> | PhD and Master students were trained on laboratory analysis, experimental planning, and writing skills  | <b>Good</b>         |
| <b>KRA 3</b>                    | One technical guide on how to reuse treated water for irrigation is available but not yet disseminated  | <b>Good</b>         |

<sup>9</sup> <http://www.iita.org/about/research-hubs-and-stations/eastern-africa/>



|   |   |                     |
|---|---|---------------------|
| <b>Extension and Outreach</b>                                       | <p>One technical guide on how beans can conserve the soil is available but not yet disseminated</p> <p>Three banana field trials established at three different ecological locations, two demonstration banana plots at smallholder farms have been established</p>   |                     |
| <b>KRA 4<br/>Management</b>   | Not planned   | N.A.                |
| <b>KRA 5<br/>Human Resources Development</b>                        | <p>Three PhD students admitted. Progress is significantly delayed. Two of these PhD theses are progressing on two research lines (banana-based farming systems and in water sanitation strategies). The third PhD dropped out. Four master theses have been completed.</p> <p>One technician was trained on sample collection and analysis</p>              | <b>Insufficient</b> |
| <b>KRA 6<br/>Infrastructure Management</b>                          | <p>Laboratory equipment for water and nutrient analysis, for some pathogens, fluoride and physical parameters were purchased, installed and used.</p> <p>Constructed wetland for demonstration and applied research purpose established on campus and is functioning</p> <p>Banana macro propagation unit has been established and functional on campus</p> | <b>Excellent</b>    |
| <b>KRA 7<br/>Mobilisation of additional resources/opportunities</b> | The project contributed significantly to the development of a proposal (CREATES) successfully submitted to World Bank (ACE II programme). The volume is six Mio USD and implementation has commenced.   | <b>Excellent</b>    |

#### 2.3.1.4 Assessment of follow-up plan for Phase II

There are tangible concrete ideas for Phase II:

- In agriculture, include other major crops, particularly maize and legumes, in addition to banana
- Focus more on soil fertility, which is a major limitation in all farming systems
- Start a centre of excellence for banana

There are different views on the organisational set-up of P1 in Phase II. Arguments support either the separation of agriculture and sanitation components into two separate projects (initial plan at programme planning) or to continue with one joint project. Currently, some components do not match, but others do and create synergy. Arguments for a stand-alone project are:

- Focusing on other crops which are of high potential in the area i.e. maize and legumes.
- Addressing both production issues and soil fertility.
- From the farmers' perspectives, pests and diseases are an issue that needs attention. Therefore, the research team wishes to consider crop protection based on botanicals and other options in Phase II.

The establishment of a Banana CoE and cooperation with the IITA could enhance synergy in research on banana-based farming systems. Stratification of locations of field trials and farmer led demonstration fields in transects of different areas above sea-level (e.g. 900m to 4000m N.N.) in the Kilimanjaro region is feasible and will enhance relevance of research for potential beneficiaries. The research could include analysis of soil nutrient transfers from the lowlands to the highlands. This very important aspect of intensively utilised and partially eroded land-use was overlooked in the first phase.

In sanitation, awareness on constructed wetlands should be increased among stakeholders and communities. Currently, constructed wetlands exist only in few schools and factories. The idea is to upscale research findings into settlements especially in urban and peri-urban areas where waste water management is a serious problem.

Technically, the use of a drone could be beneficial to identify and find concrete synergies with CoE through capable PhD students. The management of big data from remote sensing would require close cooperation with P3.

Phase II should focus on intensified collaboration within and between teams and stakeholders. An interdisciplinary approach is required to achieve development objectives. It is envisaged that P3 could play a decisive role in outreach and management of research generated knowledge.

Capacity building could further be strengthened through a defined layer of postdoctoral positions and adequate advanced research. In Phase II, there should be the objective of creating innovative research through post-doctorates and returning PhDs.

In summary, the following points were presented and discussed at the workshop:

Aspects of agriculture and sanitation in two different projects

- The Agriculture project 1a should work on:
- Food security issues in collaboration with partners through PhD and possibly postdoctoral research
- Developing production technology on-farm
- Holistic approach through farming systems but keep focus (!)
  - Increase number of crops (maize, legumes)
  - Soil conservation (e.g., erosion)
- Extend project area/study sites beyond the Upper Pangani Basin
- Identify PhD candidates based on quality (possibly new and prospective staff); public call
- CoE banana (possibly in cooperation with IITA)

The Sanitation project 1b should work on:

- Nutrient cycling (constructed wetlands)
- Socio-ecological assessment before up-scaling
- Fluorene contamination, heavy metals issues (resources?)
- Recovery of Phosphorus and other elements (water to be used in agriculture)
- Integrating constructed wetlands with existing sewage systems (municipal councils, city councils) and combining with biogas generation
- Expanding the idea of constructed wetlands to industrial waste (current focus is on human waste)
- Considering WISE-Futures (and eventually CREATES and other ongoing projects)

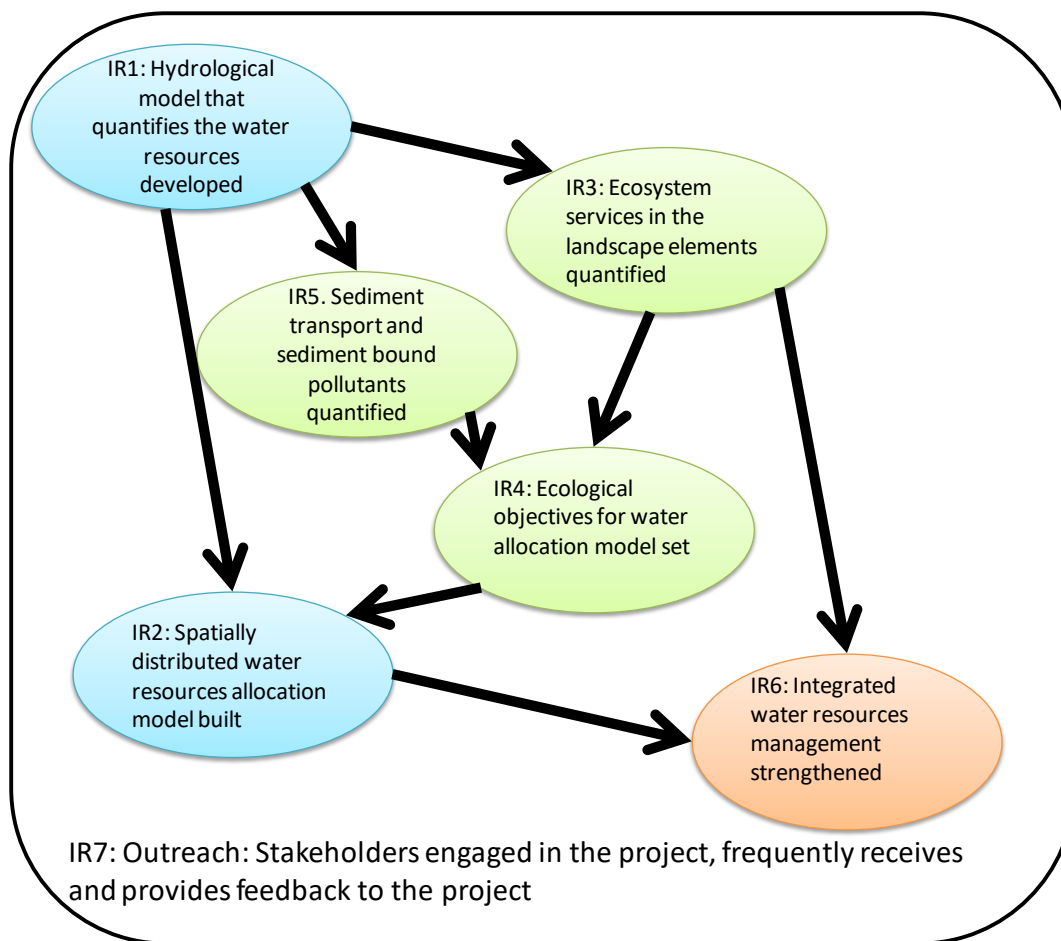
## **2.3.2 Project 2: Water and people**

### **2.3.2.1 Description of the project (intervention logic)**

P2 deals with the complex and interdisciplinary topic, water and people. The project aims at understanding eco-hydrological processes to develop participatory water allocation tools. The methodology is centred on the development of an integrated spatial model for the distribution of water resources under present and future conditions. Integrated means that water demands from people and ecosystems are considered, considering both water quantity and quality, considering full costs and full effects. The spatial dimension accounts for spatial variability and heterogeneity as well as links to land use and spatial planning; and present and future means that population growth, climate change and land use change are considered.

The intervention objectives of the project aim on (1) developing expertise in the field of hydrology and integrated river basin management at NM-AIST, and (2) contributing to improved water resources allocation and management in the Upper Pangani Basin, strengthening existing institutional arrangements.

The planned interventions require research in seven areas, which are presented in Figure 2.



**Figure 2 Project 2 research area**

The project provides information and research results, which are expected to be beneficial for a diverse group of stakeholders and include Pangani Basin Water Board, the district local governments, small - and large-scale farmers in the selected sub-catchment, development agencies, policy makers and Ministry of Water, Water User Associations, river committees, furrow committees, and National Park Authorities.

### 2.3.2.2 Assessment of evaluation criteria

| Relevance                                |  |
|--|--|
| Consistent with Corporate Strategic Plan | Rated as 'good' because the project has contributed to the implementation of the 15 year CSP, which is currently being revised.  |
| Contributing to Synergy                  | This is also rated as 'good' because the competence of the research team of P2 resulted in the successful application of complementary large-scale WISE-Futures project. However, the exchange with other research centres within the institution is not adequately coordinated. We could not identify formalised mechanism of exchange or clear structures of coordination with other research centres. |

|   |   |
|---|---|
| Transversal themes (gender, environment, D4D) | Ranked as 'good' because at project level the themes of P2 are of high relevance because they address critical environmental problems in the area. Gender was considered in selection of PhD candidates (two of the three candidates were women). However, at research level the factor gender is not adequately addressed. |
| Responding to needs                           | Ranked as 'excellent' because the ongoing research responds directly to the issues of water quality and the needs of the local farming communities and other settlers. Relevance was also verified through ongoing consultation with local authorities at district level and the Pangani Water Basin Board.                 |

#### Explanation and comments

The intervention logic of P2 was developed as a follow-up of PhD research of the current project leader in the Pangani Water Basin. The ongoing field-based research builds on previously identified relevant researchable problems. Regulating water use by many disperse users in the basins has proven beyond the reach of the basin water authorities. There is also serious lack of data on water resources availability, use and variation. The infrastructures for hydrological monitoring are inexistent or have been vandalised. The problem of poor network coverage and missing data, thus, affect effective water management in the Pangani Water Basin. Water scarcity arising due to population growth, economic development, climate change and variability, and pollution is on the rise in many parts of Pangani river basin. The problem is being compounded by climate change impacts (increased variability in temperature, evaporation, rainfall, and runoff). The smallholder farmers because of their low buffer capacity (i.e. heavily dependent on rainfed agriculture) are particularly affected the most by the climatic changes. The overall approach of the project is highly relevant to understand the hydrological processes and to develop innovative water allocation mechanism that can ensure equity and sustainability of the limited resources.

We appreciate that a good number of female students were selected in a male dominated academic structure. This could indicate some kind of gender sensitivity resulting in empowerment of women. However, what was not clearly reflected is 'gender as a research question' in PhD research projects.

#### Scientific Quality

|  |   |
|--|---|
| Quality of research                          | Ranked as 'good' because ongoing research from PhD projects was accepted for presentation at international conferences, which indicates good quality. As a follow-up and in fulfilment of the Belgian university regulations, students are requested to draft full papers for submission to peer-reviewed journals. The quality of research is possibly negatively affected through certain inflexibility use of the scholarship scheme.  |
| Supervision, research training and mentoring | Ongoing PhD research is supervised from the North and at NM-AIST. However, scientific writing is a challenge for students. In most cases comprehensive support and intensive interaction is required before papers are acceptable for submission. It is acknowledged that in this project about three almost complete manuscripts were produced that were the result of very intensive supervision and review work. Several issues and problems were reported from various perspec- |

|  |   |
|--|---|
|  | <p>tives and levels regarding the issue of supervision and conduction of PhD projects in general. Contradicting statements indicate that challenges should be addressed.</p> <p>However, this criterion is ranked as 'insufficient' indicating the strong need for capacity building regarding supervision, research training and mentoring of PhD students from the South.</p> |
| <b>Explanation and comments</b>  |   |
| <p>The cooperation and interaction with the supervisory team (North and South) of the ongoing PhD research projects is generally running smoothly. There is, however, considerable variation in regard to the content of message and response time by the individual supervisors. It appears that there are no transparent guidelines regarding communication within and between the supervisory team. This was also found in other projects, but was most expressed in P2. The ongoing research of one of the PhD students attracted two Flemish Master students, who were successfully (co-)supervised by the same PhD student from NM-AIST. Other students at NM-AIST were facilitated through logistical support for field work through P2, but were not recipients of a VLIR-UOS scholarship. Their work was complementary to the thematic topics of P2.</p> <p>There is apparently need to enhance confidence through active mentoring. Students are not completing their PhD thesis in 2018, but work is going well based on reports and interviews conducted. They are afraid that they will not be able to complete under VLIR-UOS. Active PhD students do not understand why students not delivering any result are still supported. The issue of non-performing scholarship recipients was discussed in internal meetings but measures, if any, taken were unclear.</p> |   |

|  |  |
|--|--|
| <b>Efficiency</b>  |  |
| Intermediate Results: Delivery of outputs in good time and quality | <p><i>IR 1. Development of a hydrological model that quantifies the water resources</i></p> <p>A SWAT model was developed by one Master student (from Belgium) under joint supervision of VUB and NM-AIST. Unfortunately, no publications were obtained and the PhD researcher was unable to deliver as planned. Thus, IR 1 is ranked as 'insufficient'.</p> <p><i>IR 2. Building spatially distributed water resources allocation model</i></p> <p>A SEBAL model has been built by one PhD researcher to quantify and map the water consumption in the Kikuletwa Basin. Overall, IR 2 is ranked as 'good'.</p> <p><i>IR 3. Quantification of ecosystem services in the landscape elements</i></p> <p>Part of this work was carried under the framework of a North–South–South project in Usa - Kikuletwa river catchment. Several monitoring sites were located and monitored as part of PhD research. The PhD researcher has collected an eco-hydrological dataset consisting of chemical and biological indicators along the Usa river network and lake Jippe and has developed regression models to identify relationships. The results were written up (though not published yet), while the framework and data processing are finalised for a second article. Overall, IR 3 is ranked as 'good'.</p> |

|  |  |
|--|--|
|  | <p><i>IR 4. Setting ecological objectives for the water allocation model</i></p> <p>This objective was not reached as it was too ambitious. Thus, IR 4 is rated as 'poor'.</p> <p><i>IR 5. Quantification of sediment transport and sediment bound pollutants</i></p> <p>This task was cancelled. This topic should have been covered by an MSc student. However, it appeared to be wise to link the MSc research to the ongoing PhD activities. Therefore, IR 5 is also rated as 'poor'.</p> <p><i>IR 6. Strengthening integrated water resources management</i></p> <p>Not implemented yet. The self-assessment report shows that a water allocation model will be built the coming year (possibly in Phase II) using water accounting methodology. Consequently, IR 6 is rated as 'poor'.</p> <p><i>IR 7. Outreach: Engaging stakeholders to provide and receive feedback</i></p> <p>A SWAT workshop was organised at NM-AIST. The PhD researcher also delivered a training on SEBAL model for twelve students of IUPWARE programme. Overall, IR 7 is rated as 'good'.</p> <p>The overall judgement of IR 1 to 7 is regarded as 'insufficient'.</p> |
| Flexibility to adjust to changing environment  | Ranked as 'insufficient' because there were no measures taken to react or to respond to human resources challenges.  |
| <b>Explanation and comments</b>  |  |
| <p>Facilities for laboratory work and data analysis are now fully available at NM-AIST. Overall, the laboratories for water analysis are equipped with state of art facilities. VLIR-UOS programme heavily invested in procurement of laboratory facilities, most of them later complemented by other donors such as USAID, World Bank and ACBF (see also under Project 1).</p> <p>PhD projects operate in relative isolation. They did not reach tangible results regarding expected research output and capacity building. The focus of PhDs is on interaction with the supervisory teams, but other team members of the project or others are rarely involved. The output of research reports, papers, or conference proceedings are well below expectations. It is questionable by when the PhD candidates will fulfil the requirements for graduation of the Belgian universities. The main negatively contributing factor was the low number of potential PhD candidates at NM-AIST, and the informal, not very transparent and delayed recruitment process. There are apparently substantial difficulties in communicating efficiently on technical issues regarding article writing when supervisor and student cannot meet personally. The link between researcher and student may need to be strengthened. Additionally, expected deliverables may need to be more concisely formulated.</p> |  |



| <b>Effectiveness</b>  |  |
|---|--|
| Attainment of specific objectives   | It is difficult to assess because work is ongoing and intermediate results are still under discussion, thus, rated as 'insufficient'.  |
| Extent of change regarding academic attitude and behaviour  | Rated as 'good' because PhD researchers experience a major change towards a more focused scientific research attitude by being exposed to the Flemish universities. They understand better that developmental interventions require solid quantitative and qualitative data. |
| Utilisation of outputs  | There are concrete plans to organise workshops for stakeholders at different levels to inform and discuss research findings and, therefore, rated as 'good'.   |
| <b>Explanation and comments</b>   |  |
| <p>The project has clearly contributed to building research capacity through acquisition of laboratory equipment (for water, land and marine research) that are currently being used by students and researchers. Human resource capacity of the university will increase because at least two of the three PhD students are faculty and are expected to complete their research work in the foreseeable future.</p> <p>A major indirect and unexpected effect of P2 is its contribution to the conceptual development of the World Bank project WISE-Futures, which will be led by the current P2 leader. The interaction how to consider the WISE-Futures project or how to embed which project and how needs to be carefully analysed and further investigated. The question cannot be answered without an in-depth analysis of the WISE-Futures programme and its human capacity.</p> <p>PhD students are challenged to organise such stakeholder workshops, but delayed research projects, unresolved budgetary issues, and VLIR-UOS programme regulations are considered as constraints.</p> <p>Awareness is high in stakeholders, in particular the Pangani Water Board on challenges, needs and means of implementation of expected research results.</p> |  |

| <b>Sustainability</b>                              |   |
|--|---|
| Institutional prospects of capacity and networking | <p>The institutional capacity of its laboratories in handling samples, conducting experiments has been established and is functioning. The ICT infrastructure will support academic activities and outreach.</p> <p>At the beginning the project assumed that sufficient qualified personnel would be available. This was, however, not the case and the situation has not improved. However, the 2017/2018 application figures of post-graduate students and the number of staff positions to be filled indicate sustainable prospects. Currently, there is also need to identify a new project leader for the possible Phase II. Thus, the project is ranked as 'good' on this criterion.</p> |
| Financial prospects                                | A complementary project of large scale (WISE-Futures) was acquired. The design of Phase II should consider building synergies and complementarity with this project, but also include an exit strategy. Overall, the criterion is ranked as 'good'.   |

| Explanation and comments   |  |
|--|--|
| <p>Most of the current third party funded projects in LiSBE and MEWES are to a large extent a result of the VLIR-UOS project. Most of the goals and objectives of WISE-Futures and CREATES are also spill-overs of P2. Since VLIR-UOS was the first programme at NM-AIST, it helped to build the capacity of researchers to develop high quality proposals. However, there is no direct link visible between the IUC programme of VLIR-UOS and the WISE-Futures project. The announcement<sup>10</sup> of the 2nd International Conference on Water Infrastructure and Sustainable Energy Futures in a Changing Environment on September 12-13, 2018 does not mention VLIR-UOS or the Flemish partner university among its partners or collaborators because no funds from VLIR-UOS were used. There is, however, room to integrate in Phase II the project 2 within the research framework of WISE – Futures or vice-versa. WISE – Futures is an indirect and unexpected effect of P2.</p> <p>There is clear evidence that NM-AIST is continuing strengthening the capacity of its laboratories in handling samples and conducting experiments and tests.</p> |  |

| Impact  |   |
|---|---|
| Scientific community  | No judgement possible because intermediate results do not allow an assessment of impact at this stage.  |
| Development   | No judgement possible because there are some indications of potential impact but overall frame conditions such as population growth in the area, climate change, limited governmental funding, staff capacity of the relevant authorities' masks realisation of impact. |
| Explanation and comments  |   |
| The collaboration in the area of P2 between researchers of NM-AIST and Pangani Water Basin is going on for more than ten years. |   |

| Coherence   |  |
|---|--|
| Plausibility and competitiveness of scientific approach to address development challenges | There is a need to link up with key players in development partners to feed research results into the system. Thus, this criterion has been ranked as 'insufficient' |

<sup>10</sup><http://www.nm-aist.ac.tz/documents/document-gallery/2nd%20WISE-Futures-Futures%20Int%20Conference%20in%20Sept%202018.pdf>

| Explanation and comments   |
|--|
| There is potential to link research team members with other institutions in Africa and internationally, in particular Benin and Ethiopia and the US. The establishment of the two CoE, WISE-Futures and CREATES at NM-AIST further opportunities. The challenges are how to integrate WISE-Futures and how to cover aspects not covered in P2 under VLIR-UOS. The project has good working relations with Pangani River Basin and Water authorities, who worked on various projects even before the VLIR-UOS programme. There is a large number of development agencies, national and international NGOs, governmental institutions and the private sector involved in the target area. This offers an enormous potential to develop a research based lead function. |

### 2.3.2.3 Assessment of key results area (KRA) project 2

In Table 3, we present our summary assessment of project 2.

**Table 3** Assessment of key results area (KRA) project 2: Water and people

| Key result area                                    | Summary of indicators   | Score               |
|--|---|---------------------|
| <b>KRA1</b><br><b>Research</b>                     | Four oral contributions at conference (from which two at high level and internationally) including abstract submissions. Scientific papers are under development for submission to journals. Hydrological data on chemical and biological indicators along the Usa river network and lake Jippe has been collected, though not disseminated yet | <b>Insufficient</b> |
| <b>KRA 2</b><br><b>Teaching</b>                    | Two master students were supervised by PhD students: Field supervision on-site and training in laboratory sample analysis   | <b>Insufficient</b> |
| <b>KRA 3</b><br><b>Extension and Outreach</b>      | One SWAT workshop on campus (20 participants)<br><br>One SEBAL model has been built by one PhD researcher to quantify and map the water consumption in the Kikuletwa Basin.   | <b>Insufficient</b> |
| <b>KRA 4</b><br><b>Management</b>                  | Policy briefs and brochures were planned but could not be realised due to delayed research progress   | <b>Poor</b>         |
| <b>KRA 5</b><br><b>Human Resources Development</b> | Three PhD students were admitted. Progress is significantly delayed. Two of these PhD theses are progressing. The situation of the third PhD student is unresolved.   | <b>Insufficient</b> |
| <b>KRA 6</b><br><b>Infrastructure Management</b>   | Laboratory equipment for water analysis etc. purchased, installed and tested. Technical guidelines or manuals not yet available.  | <b>Insufficient</b> |

|   |  |                  |
|---|--|------------------|
| <b>KRA 7</b><br><b>Mobilisation of additional resources/opportunities</b> | The project contributed significantly to the development of a proposal ("WISE-Futures") successfully submitted to World Bank (ACE II programme). The volume is six Mio USD and implementation has commenced. | <b>Excellent</b> |
|---|--|------------------|

#### 2.3.2.4 Assessment of follow-up plan for phase 2

The project team proposed a cluster of highly relevant ideas ranging from conservation aspects of soil, water, and biodiversity to climate change. Plans for phase II include a risk assessment in the catchment/river systems of pollutants and/or climate and anthropogenic changes as a way of understanding their impacts to biodiversity and ecosystem services (e.g. water provision, food, forage, etc).

Along with this, the team will conduct an (economic) valuation of ecosystem services and generate information for policy and practice. It is expected to link up with other projects (e.g. Royal Belgian Society) to develop and test tools in different catchment areas, and address climate change and emerging conflicts on water issues. Another idea is to look at water quality (pollutants) in the basin.

There is strong need for outreach and interaction and collaborative work with stakeholders. This has been partly realised by the current PhD students. The project ideas need to be structured and more focussed to facilitate a feasible implementation and delivery of results. It should be eventually considered to combine water and people (P2) and sanitation (new Project 1b) into one project. In any case the hydrological components of P1 and the P2 project need to be reorganised. Suggestions are described below. The actual challenge is to identify a new project leader for P2. The main criterion should be competency and organisational/managerial capability. The demanded synergy with other projects (e.g. WISE-Futures) could possibly be achieved through efficient mechanism of communication (regular informal and formal meetings at all academic levels). A leader of another large project should not be tasked to coordinate other large projects. We also recommend assigning one person as an overall coordinator of the IUC programme, who oversees the various projects.

In summary, project team members of P2 highlighted the following topics in the workshop for Phase II:

- Conservation aspects (soil, water, biodiversity)
- Risk assessment in river catchment areas (factors at different levels) before ecosystems services can be defined or delivered
- Linking up with other projects (inculcating stakeholder priorities)
- Synergy with other stakeholders (e.g. Royal Belgian Society to develop and test tools in different catchment areas)
- Effects of climate change – emerging conflicts on water issues; GHG emissions – land use change
- Water quality (pollutants) in the basin

As a follow-up to the matchmaking discussions it was proposed that the hydrological component of this project 2 will in Phase II be integrated in a sub-project of project 1 on soil and water conservation. This is in function of optimal banana farming systems. The hydro-ecological component of project 2 will become a project on 'applied aquatic ecology'. This will build further on results of Phase I and will mainly focus on integrated pest management to control malaria mosquitoes. This project will also focus on the impact of pollution on aquatic systems.

## 2.3.3 Project 3: Institutional strengthening

### 2.3.3.1 Description of the project (intervention logic)

The project implements information technologies and services, and builds NM-AIST's capacity to deliver teaching and conduct research that has an impact on society. Measures focus on ensuring that the current ICT infrastructure and services, which support learning and research, are updated, usage policies are created, and adequate training is provided on the optimal use of these resources. The institute's vision of using academia for society and industries is included in the community outreach component which deals with developing appropriate concepts for science park (outreach to industries), community information centres (outreach to local stakeholders of academic research), and implementing appropriate knowledge management and transfer to prototypes of these concepts.

Key interventions on institutional strengthening are to update and complement existing ICT infrastructure. This includes IT services such as the e-resources management system, the implementation of library information systems, and the smart card and RFID systems. The development of an e-learning portal is another planned intervention. The implementation of the outreach strategy focuses on models and prototypes for reaching the private sector and communities. It envisages prototyping ICT supported science parks and community service centres.

The intervention main objectives are: (1) to enable the institute to deliver better qualified professionals to society based on quality education and research supported by adequate Information Technology and Services, and (2) to enable the institute to offer improved learning and research having more relevant impact on society.

### 2.3.3.2 Assessment of evaluation criteria

| Relevance                                     |   |
|---|---|
| Consistent with Corporate Strategic Plan      | The project is rated as 'outstanding' on relevance because of its high visibility and direct synergy to all schools, research groups, and administration of the institution. The capacity-strengthening project contributes directly to the CSP goals and objectives. |
| Contributing to Synergy                       | Rated as 'outstanding' because the project created significant synergy through improving the library and ICT/ICS facilities, which are of key importance to the functioning the entire institution.   |
| Transversal themes (gender, environment, D4D) | Rated as 'good' because the establishment of ICT facilities provides a solid institutional base for <i>Digitalisation for Development</i> .   |
| Responding to needs                           | The project on institutional strengthening responded clearly to various direct and immediate needs of the institution. Measures were addressing internal challenges only at this stage of the programme, thus, rated as 'good' on this criterion.                     |

| Explanation and comments   |
|--|
| <p>The project focuses on acquiring key infrastructure, implementing information systems, and developing usage policies that will grant access to staff and students to learning and research materials as well as building their capacity to write and publish in journals. This meets the institute's plan to provide excellent education and to conduct internationally recognised research.</p> <p>The project aims to strengthen the institute's capacity to manage research output and transfer it to industries and local communities through ICT, thus, meeting the institute's objective of using academia for society and industries. In particular, the project has contributed significantly to P1 and P2 activities through provision of library facilities (e.g. ABCD System) and ICT devices.</p> |

| Scientific Quality (Technical Solutions)   |   |
|--|---|
| Quality of re-search   | In P3, technical solutions, which contribute to research, are all of high quality, thus, ranked as 'outstanding'. |
| Supervision, re-search training and mentoring  | Rated as 'outstanding' because of the supervision and cooperation regarding intra- and interuniversity work.      |
| Explanation and comments   |   |
| <p>P3 focused on institutional capacity strengthening through improved information technology and services (ITS), knowledge management and transfer. The project did not incorporate a research component, but aimed to support researchers in P1 and P2 and across the university through ICT, library and laboratory facilities.</p> |   |

| Efficiency  |   |
|---|---|
| Intermediate Re-sults: Delivery of outputs in good time and quality | <p><i>IR 1. Research support strategy developed and approved by institute</i></p> <p><i>IT-infrastructure (hardware, network) for researchers improved:</i></p> <p>A lot of high tech new infrastructure and systems have been introduced, but it is difficult to assess the impact because most of them are still underutilised.</p> <p><i>Better access to literature, scientific databases, online resources and support to publishing and exposure are secured</i></p> <p>In the library, own resources have been automated (catalogue, Institutional Rep) and new information sources have become available. The Institutional Repository Policy, has been recently developed, but schools and research groups are yet to deposit their publications, theses/dissertation to the IR. Thus, IR 1 is rated as 'good'.</p> <p><i>IR2. Learning support strategy developed and approved by institute</i></p> <p><i>IT-infrastructure (hardware and software) is improved and better services to lecturers and students</i></p> |

|   |   |
|---|---|
|   | <p>Basic equipment and software/systems have been implemented, but their usage and benefits are not clear yet.</p> <p><i>IT-services (e-mail, websites, e-resources, ILS, IR, MIS) improved/fully implemented:</i></p> <p>Discussions on the right strategy (commercial vs. open source software) and the involvement of another agency promoting a different system initially delayed progress on e-learning development. Decision in favour of an open source software has been made and work has started. Therefore, IR 2 is rated as 'good'.</p> <p><i>IR 3. Outreach support strategy for community and business developed</i></p> <p><i>Science Park model decided on and strategic proposal drafted/approved usage policy developed, staff trained:</i></p> <p>The original Science Park model was changed to a virtual model to be developed for the website. Funding was insufficient, and work is well behind schedule.</p> <p><i>CIC model decided on and strategic proposal drafted/approved usage policy developed:</i></p> <p>The CIC modelling (Apps) are at an infant stage. Overall, IR 3 is rated as 'insufficient'.</p> <p>The overall rating for IR 1 to 3 is 'good'.</p> |
| Flexibility to adjust to changing environment | Rated as 'good' because the project was able to adjust to changing environmental conditions regarding availability of human capacity, hard- and software technological developments and local requirements.   |
| <b>Explanation and comments</b>               |   |



Through the VLIR-UOS project, the library has acquired various e-books and printed books, the ABCD repository software, and library security facilities: bar codes, bar code scanners, etc. The actual challenges in the library are the availability of internet i.e. users cannot access e-resources because of poor connectivity. Additionally, there are few library staff, only four (one PhD and three Diplomas). The library team estimates that about ten positions at different level should be filled. There is still need of training on how to manage the repository ABCD system and some additional facilities, e.g. scanners, detection machine and RFID (self-borrowing and returning machine).

Some databases are only accessible while on campus because they use local IP address e.g. TEEAL and many others subscribed through COTUL. Institutional repository is of little value at present: only very few abstracts of thesis have been uploaded so far. The testing for plagiarism is left to the supervisors, as there is no software at the university. This testing facility should be offered centrally in the library. Currently, the institution is not connected to other libraries in the country, but through ABCD this would be easily possible using the same system (e.g. Mzumbe and others).

The ICT infrastructure has been successfully established, but its actual use is below capacity. The E-mail system is properly working. The Website is updated regularly, if ICT receives official information from communication office. The following systems are operational: Integrated Library System (ILS or ABCD), Institutional repository (IR), Student information system (SMIS), accounting software (Epicor), Human Capital Management Information System (HCMIS) – by President's Office and Public Service Management. The installed moodle platform (open source software) is still not in use and few lecturers have knowledge about it from elsewhere and are using it. Very few lecturers are also using e-learning components.

The ICT resource centre (IRC) does not have a help desk, but is planning to introduce one in future.

The issue of IT security was evaluated: The computers and systems are protected by firewall and anti-virus software, and back-ups are done locally at NM-AIST. Currently, the ICT team is discussing with COSTECH and e-government on arrangements to develop and upscale of back-up system. To improve usability, the IRC is in the process of creating single entry point for all users. An institutional ICT policy is in place.

Open source software, Linux and windows are installed, but the IRC has no institutional license for Microsoft office.

The purchasing of ICT materials posed a major challenge on procurement. Import from Europe classifies for tax- and duty free- exemption in technical cooperation. However, the public university is a national institution and has to apply for each order for tax- and duty-free exemption process to central government, which requires specific knowledge and experience, it is tedious, time-consuming and demotivating for all parties involved.

The team visited Community Information Centres (CICs) in Ghana to learn how they work. It was observed that most of the CICs are supported by the government and are physical centres. The approach of NM-AIST, however, is to develop a mobile app that one staff member is working on now.

The physical Science Park is still an institutional priority, but VLIR-UOS could possibly contribute to a virtual science park. Policy and modelling regarding science park is significantly delayed and remains obscure. There is no staff assigned to the science park model. It could be an opportunity for a possible Phase II.

| <b>Effectiveness</b>  |  |
|---|--|
| Attainment of specific objectives   | Generally, as a result of established the basic research- and learning infrastructure at NM-AIST the potential to utilise current and expected outputs and to facilitate change has significantly improved. Thus, ranking is 'good'.   |
| Extent of change regarding academic attitude and behaviour  | There are some indications of change among researchers at NM-AIST, but because of poor internet connectivity, users cannot access e-resources. The installed learning platforms (e.g. Moodle) are also still not in use. Some of the issues are beyond the immediate sphere of influence of the project personnel. However, the ranking is 'insufficient' on these criteria. |
| Utilisation of outputs  | The outputs are fully established within the university. The problem is that content is not delivered and there is poor connectivity. The demand for further upgrading and other devices, i.e. to support outreach is high. The problem is beyond the direct influence of the project. Unfortunately, the rating is 'insufficient' on this criterion.                        |
| <b>Explanation and comments</b>   |  |
| At the time of the visit of library facilities, we encountered when testing the various systems. There was a browser problem, which prevented any search attempt in the ABCD system. The repository was basically empty. There was no connectivity. It was confirmed that the moodle platform was not in use. WiFi coverage was good across the campus. Most of the students working in the library or at other areas on the campus used their mobile phones to get connected. It was obvious that library staff needs more training on effective use of installed systems. This situation leads to a low assessment grade regarding effectiveness. |  |

| <b>Sustainability</b>  |  |
|--|--|
| Institutional prospects of capacity and networking   | Staff retention of academic and technical support staff is critical. Public service remuneration is not competitive vs. private sector or development agencies. Thus, the project is rated as 'insufficient' on this criterion'. |
| Financial prospects  | Rated as 'good' since the initial relative low budget requires the identification of significant complementary projects and funds to maintain the installed equipment and to update it in regularly.                             |
| <b>Explanation and comments</b>  |  |
| The university is challenged with staff retention problems in the ICT sector. The private and central government demand for ICT competent staff is very high. Consultancies are offered and staff capacity is not sufficiently available for university work. The institutional remuneration and promotion policy is focused on research output and no incentives are provided for developing technical solutions in the service departments. This is considered a threat regarding staff retention. It is also difficult to find highly qualified staff in the region of Arusha. The present situation is characterised by an overload of tasks and responsibilities. The work would require extra duty allowances of the small team of five to six persons. ICT requires personnel being available on short notice in case of problems overnight and on the weekend. |  |

|  |   |
|--|---|
| The positive development is that several other countries or agencies provide specific support to enhance capacity in the ICT sector, i.e. India or Korea. The challenge of coordination and complementarity of integrating different projects is considerable for NM-AIST management.  |   |
| <b>Impact</b>  |   |
| Scientific community   | No judgement possible because intermediate results do not allow an assessment of impact at this stage.  |
| Development  | No judgement possible because there are some vague indications of potential impact through the development of mobile applications, which are not yet operational. |
| <b>Explanation and comments</b>  |   |
| An assessment of impact is not possible at this stage. The Science Park concept is not yet developed. The project planned to achieve national impact by inviting stakeholders and other institutions to workshops and to contributing to the science parks and community information centres. This may encourage them to implement similar activities in various other parts of the country. |   |

|   |  |
|---|--|
| <b>Coherence</b>  |  |
| Plausibility and competitiveness of scientific approach to address development challenges   | Rated as 'good' because there is high potential to link up with other developers, e.g. on the development of mobile Apps in the public and private sector. The sector is very dynamic and competitive. Private Public Partnerships may facilitate development and transfer to potential users. |
| <b>Explanation and comments</b>   |  |
| The project initiated a close cooperation with IUC Mzumbe university. Special focus is given to the introduction of the ABCD library system. The facilities are up-to-date and offer a good potential for up scaled project work. The planned development of apps are main-stream technology in D4D and offer potential to directly address development challenges through coordinated efforts. |  |

### 2.3.3.3 Assessment of key results area (KRA) project 3

In Table 4, we present a summary assessment for project 3.

**Table 4 Assessment of key results area (KRA) project 3: Institutional strengthening**

| Key result area                                    | Summary of indicators   | Score               |
|--|---|---------------------|
| <b>KRA1</b><br><b>Research</b>                     | Not applicable  | N.A.                |
| <b>KRA 2</b><br><b>Teaching</b>                    | Not applicable  | N.A.                |
| <b>KRA 3</b><br><b>Extension and Out-reach</b>     | Three workshops ABCD system to regional Institutions<br>Four consultancies on library automation<br>Cooperation with IUC Mzumbe University has been established and connected to network of universities  | <b>Good</b>         |
| <b>KRA 4</b><br><b>Management</b>                  | Virtual Community Information Centre (CIC) is still in the prototype stage (prototype mobile app for community information has been developed)<br>Virtual Science Park is not in place<br>A basic website with some scarce information has been launched<br>E-learning procedures drafted | <b>Insufficient</b> |
| <b>KRA 5</b><br><b>Human Resources Development</b> | One IRC Training – Networking and security (JIMA – Ethiopia, Regional Institutions)<br>Five exposure visits by Librarians<br>One CIC – Ghana Visit<br>Three Short-term trainings for technical staff<br>On the job training of IRC and library staff in using the new tools               | <b>Insufficient</b> |
| <b>KRA 6</b><br><b>Infrastructure Management</b>   | Eight servers installed (central IT system)<br>Two library servers installed<br>Hard- and software for IRC and Library purchased and installed<br>WiFi switches installed and fully functioning<br>ABCD system installed and functioning<br>1281 E-Books purchased and catalogued         | <b>Excellent</b>    |

|   |  |      |
|---|--|------|
|   | One UPS block installed<br>One drone purchased and delivered (2017)<br>One computer room (library) installed<br>All necessary installation work completed to ensure functioning WiFi and LAN on campus<br>Access to library via website configured<br>Moodle platform installed<br>All institute's members have institutional e-mail, each of the seven units (MCCSE, LSBE, BuSH, MaSE, SESE, WESE, VLIR-UOS/IUC) could develop and update its own institutional website |      |
| <b>KRA 7</b><br><br><b>Mobilisation of additional resources/opportunities</b> | Not planned  | N.A. |

#### 2.3.3.4 Assessment of follow-up plan for Phase II

The focus in Phase II is on the development of CIC Apps. The App(s) will be developed based on P1 and P2 outputs. The idea is to offer one PhD and two or three MSc scholarships based on quality of applicants. Institutional capacity building could be then achieved through a fiveyears binding contract to NM-AIST for scholarship beneficiaries. This can help to address the problem of staff retention in the area of ICT. Expected outputs are publications, conference presentations, and appropriate Apps.

The above ideas are regarded as plausible, but depend on timely and substantial outputs from P1, P2 or other research groups to provide relevant content. It also depends on availability and implementation of an institutional outreach policy.

The team composition and its leadership should possibly be revisited before the next planning phase starts. The team members should be close to the core of the main project content.

In summary, team members mentioned and proposed the following ideas at the workshop:

##### Library

- Improving E-learning platform
- Public knowledge management, transfer and sharing
- Increase library collections (books, journals, e-subscriptions...)
- Platform within institution for sharing knowledge
- Need to get publications from projects (policy pending)

## ICT

- Internet improvement (connectivity); better ISP providers to be contracted
- Workshops (in-house and stakeholder training)
- Awareness training on ICT and Library (internal/external stakeholders)
- Offer PhD scholarship (staff development)
- CIC establishment to be linked with the Indian funded High Performance Computing (needs to be checked – could not be verified that this is a possible fit)
- Science park development

## 2.4 Evaluation of the management of the programme

### 2.4.1 Evaluation of the management by the partner university

The programme is well managed with no major difficulties since end of 2016. Initially, the VLIR-UOS programme had frequent changes of personnel and challenges regarding management aspects. At the time of mid-term evaluation, the overall management was good. Most documents required by the mission team were available for review. There were no negative reports received from administration or academics.

The partners regard the rather tedious reporting structure and provision of all documents as scanned copies to VLIR-UOS/Belgian universities as time consuming and inefficient. Financial accounting is aligned with VLIR-UOS and university regulations and handled in close cooperation by the PM and accounts office of the university. The general financial audit of NM-AIST takes place annually by the Controller and Auditor General (CAG), which looks at all university and project finances. The VLIR-UOS programme keeps a separate bank account in Forex (USD) and national currency. The responsible persons in charge consider the management of the account as easy. The problem of procurement procedures and tax-free exemptions for import of goods remains a challenge. The process to request for duty or tax-free import must be started at least six months before the goods arrive in Tanzania. The request must be submitted to the Ministry of Education and Vocational Training (MoEVT) and from MoEVT it must be transferred to the Ministry of Finance and Planning (MoFP), which is beyond the control of the institution. There is no general tax-free status for universities.

The only problem regarding the per diem issue was the observed variation in handling this issue between the two institutions implementing VLIR funded projects (Mzumbe and NM-AIST), thus, a request to see the possibilities to harmonise the two.

### 2.4.2 Evaluation of the management by the Flemish coordinating university

From 2012 to 2016 the management problems of the programme supporting unit at NM-AIST created challenges to Flemish coordinating university. They required interventions and close monitoring efforts. Since 2016, the management of the programme is aligned with other IUCs of the coordinating Flemish university. The Flemish team on ICT institutional strengthening is considered as relatively weak. Administrative and technical staff of the Flemish coordinating university is not eligible to travel to the partner. There is a need to change this arrangement.

### **2.4.3 Evaluation of the cooperation and coordination between all parties**

Overall, the cooperation regarding managerial and financial issues between all parties in the North and South is good to excellent since 2016. The monitoring of the project is effective with occasional delays due to slow response from projects staff. Financial updates are exchanged on a regular, almost daily basis. The Local Steering Committee (LSC) minutes are distributed to all parties concerned. Central administration and top management is fully informed of what is going on in the programme.

Intensity of communication and exchange of information between project teams at NM-AIST and the Flemish group, however, varies significantly. The exchange between P1 and the Flemish group is characterised by mutual trust and frequent contacts. The intensity of exchanging information between P2 and the Flemish group appears to be at a much lower level. Communication problems were also reported between P3 and the Belgian group.

Internal relationships between PhD students and senior academic staff of NM-AIST may need to be improved in certain cases. Supervisors do not express recognition of ongoing work leading to loss of motivation and lower quality than possible. Professional and subject oriented communication mechanisms between all parties are required. In the past, in some cases traditional status-thinking prevented junior academic staff to conduct field work or hard manual work by him- or herself.

### **2.4.4 Other management issues**

All management issues are described in the relevant chapters.



## **3 Conclusions and lessons learned**

### **3.1 Concerning the programme and its projects**

The major lesson learnt was that the programme was overambitious. This is in line with the very ambitious university CSP covering a period of 15 years (2013 to 2027). Future programme planning may need to take into account that other projects and activities may start within the planning period and will absorb capacity of the institution.

The programme of Phase I was end-goal oriented and there was inadequate process orientation.

The rules and budgetary restrictions of VLIR-UOS-UOS are applicable in well-established institutions such as Mzumbe University, but appear to be less suitable for emerging institutions.

The limited local supervisory capacity and pool of potential candidates for PhD research, and insufficient training and experience on writing and presentation skills resulted in significant delays of PhD related research. A more transparent and objective selection process should be introduced for screening post-graduate student applications and awarding scholarships. Candidates with a disciplinary background, which is not closely related to the field, may need a different pre-training or should not be considered.

Overall, intervention logic and sequencing of the projects should be carefully planned and analysed regarding its feasibility. If key assumptions, such as qualified staff is available, are not fulfilled immediate action should be taken. The key issue is to align research output and content production to establishment of instruments for teaching and learning and outreach. A specific researchable project in the field of ICT could have been useful to develop a better recognition within the programme.

The timely implementation of measures requires continuous monitoring of the log-frame matrix. The programme requires clear indicators with feasible milestones in combination with improved flexibility. Monitoring and evaluation the VLIR-UOS programme should be ideally embedded in the institutional quality assurance and management system.

### **3.2 Concerning the management of the programme**

A comprehensive project management training and intensive selection of suitable candidates is of significant importance to the success of the programme.

### **3.3 Concerning the coordination between all parties**

Apparently, there is a need to develop clear inter-institutional guidelines for the supervisory teams. Students are on staff leave and may not feel fully responsible to integrate. In some cases, performance is below expectations of supervisors or work is significantly delayed.

The selection of candidates for scholarship need to include prospective supervisors from participating institutions. The selection and scholarship awarding team should be equally represented by the contributing universities.

Reporting requirements are directed to the North, and not very useful to the South partner. The structure and format of the current templates for reporting are tedious and often redundant. It would be better to ask for qualitative reports that highlight critical issues rather than detailed and summative reports.

## 4 Recommendations

Overall, the evaluation team recommends discussions on development of a feasible and process-oriented Phase II. The formulation process should start as soon as possible.

### 4.1 Recommendations for programme and projects

#### 4.1.1 Programme level

##### Strategic dimension:

**Recommendation 1:** It is recommended to increase synergy. Because of the large number of other projects at NM-AIST, it is essential to have the right organisational set-up, planned processes of cooperation, and definition of a strategically relevant contribution of VLIR-UOS.

**Recommendation 2:** Contribute to a revised corporate strategic plan. At present, top leadership is highly committed to develop a process, solution, and product-oriented research culture showing impact in the near future. The interdisciplinary matrix structure of schools and centres of excellence should be documented.

**Recommendation 3:** Develop a comprehensive outreach policy. The institution considers solution-oriented transfer of research results as the main pillar of the corporate strategy. The outreach policy should develop a guideline on possible Private Public Partnerships, particularly in agriculture and water sectors (industrial waste) and IT development.

**Recommendation 4:** Intensify cooperation with VLIR-UOS at Mzumbe. The link to the VLIR-UOS programme at Mzumbe University is established and supported by top management from both institutions. There are complementary activities or experiences to be shared. In particular, the action research approach of Mzumbe University could possibly directly contribute to the desired outreach activities of NM-AIST. The cooperation on ICT capacity building with Mzumbe should be intensified.

**Recommendation 5:** Continuously update the website. The current website is not very informative and needs definite attention to be updated. This aspect deserves high priority and continuous monitoring.

**Recommendation 6:** Remuneration and incentives are a major and recurrent topic. NM-AIST should look into this issue, take leadership, develop a transparent policy and align throughout the institution. The underlying problem is that there is no consistent policy of donors and agencies operating in developing countries and a complicated governmental regulation. The VLIR donor policy is clear – this is not the issue here. An institution needs to find ways to offer sufficient and attractive incentives to reduce dependency on donors.

#### 4.1.2 Capacity building through postgraduate research projects:

**Recommendation 7:** Open recruitment of PhD students to the wider public to attract more qualified and competent students. It is recommended to advertise calls at national level and conduct a competitive selection process. The scholarship should be awarded to best fitting person offering top-qualities. A policy paper and guidelines for postgraduate students has been developed. The partners must ensure its use and implementation in a joint effort. The VLIR-UOS policy requires that PhD scholarship candidates are bound to the institution to contribute to capacity building.

**Recommendation 8:** Improve supervision, guidance, and communication with post-graduate students (N-S). Define role of local supervisors and develop a framework for effective supervision and empowerment of (“sandwich”) PhD students and conflict resolution.

**Recommendation 9:** PhD students must be made responsible to report timely to both universities in the North and NM-AIST and stimulate dialogue and debate across the institutions at formal and informal level. Milestones for ongoing research should be set and followed-up. The attendance and active participation of PhD students enrolled at Belgian universities at NM-AIST activities, seminars and events should be compulsory and not voluntary. The format could be public presentations, short science talks or speed date events. Informally, brown bag luncheon or teas are adequate measures. Timely and appropriate decision making in case of non-performance of PhD due to factors beyond the control and influence of the institutions involved is advised. Significant delays are bad examples, which are observed by other students.

**Recommendation 10:** The support of post-doctoral researchers (returning PhD students or existing staff) through specific training (e.g. on outreach and transfer, large-scale project management, action-research, business development, pedagogic and didactical skills etc.) and the formulation of advanced and highly focused research questions complementing ongoing research are recommended options for a Phase II. Support of postdoctoral staff would directly contribute to alleviate staff retention problems, particularly in ICT or private sector or related research.

**Recommendation 11:** Consider a specific module for current or new staff (returning PhDs) on relevant teaching and didactics of higher education to link theory and practice.

**Recommendation 12:** Test innovative methods of research. Action research or upscaling of research projects under field conditions could be new fields of activity.

**Recommendation 13:** Ensure scientific quality of postgraduate theses and any publishable academic work. Currently, the testing for plagiarism is left to the supervisors, as there is no software at the university. This testing facility should be offered centrally in the library.

**Recommendation 14:** Develop and implement guidelines for staff and student exchange and cooperation: Exchange programmes for students from the North should be ethical (not simply taking data collected by southern students to use them for thesis or publications) and based on reciprocal sharing of benefits between partners. The recommendation was formulated based on the observations that there are apparently different subjective experiences and views from the North and the South on the role of postgraduate students in the past. That is why we recommend to set-up a clear guidelines and instructions for the students from the North and the South to avoid misunderstandings in conducting research.

#### **4.1.3 Capacity building of technical and support staff:**

**Recommendation 15:** It is recommended to establish an in-house training and staff development programme for technical and support staff. Laboratory work and ICT support are the backbone of high quality research and new devices require training on handling and maintenance. Staff recognition measures are needed to alleviate staff motivation and retention problems. A staff development programme should consider technical and support staff.

## 4.2 Recommendations for VLIR-UOS

### 4.2.1 Political level

**Recommendation 16:** Facilitate the issue of work and residence permit for visiting academic staff. Academic staff capacity problems can be partially compensated through visiting, adjunct, or guest researchers from other countries. This requires a residence and a work permit, which are issued independently from two different Tanzanian authorities. It happens that a professor receives a residence permit but no work-permit or vice versa. In both cases the person cannot fulfil the assignment. It is proposed to bring this problem to the attention of the Belgian Embassy in Dar es Salaam.

**Recommendation 17:** Improve visibility of the programme in the North. The visibility of the VLIR-UOS programme could be enhanced through supporting the programme coordinators/management with adequate advice and material regarding communication and marketing channels. The rationale is based on the observation that the number of good students and professors willing to cooperate with developing countries and to contribute to capacity building without seeing an immediate reward appears to be limited. This was a strong comment from the academic Flemish group. Better visibility could be achieved through promotion of the VLIR-UOS programmes through various marketing channels.

### 4.2.2 Guidelines and regulations:

**Recommendation 18.** Simplify reporting processes. Reporting format and frequency of project activities and financial matters are tedious, and some information is repetitive and redundant. This includes also the self-assessment reports. For example, the value of scanning all documents of daily operations is understood under the current system, but it is questioned. It is recommended to use random or representative sampling of documents supporting expenditures instead of comprehensive exchange of scanned documentation between Southern and Northern coordination offices. It would be better to use administrative capacity to train personnel, e.g. how to get tax-free import organised or to place tenders efficiently.

**Recommendation 19:** The VLIR-UOS account should be in Euro and Tanzanian Shillings to minimise transaction costs in the possible phase 2.

**Recommendation 20:** Relevant PhD research in science and technology require collection and analysis of field data, which take a significant part of the standard four years scholarship. Currently 50% of this time can be spent in Belgium and 50% in the South. The sandwich package should possibly be handled more flexibly according to the actual needs of the subject of the thesis. The current output of all VLIR-UOS sponsored PhD students of NM-AIST is not as expected by Flemish university standards. (1) We suggest that a joint North/South supervisory committee should review each individual case, agree on a time-line and final budget. The total PhD study time should not exceed four years in total under regular conditions - periods of maternity leave, other duties or assignments, pre-course work should be deducted. Individual cases beyond the control of the student (collection or availability of empirical data over a longer period, delays due to laboratory analysis, slow response of reviewers of submitted papers) could be considered for an extension of up to a maximum of six months (i.e. max. 4.5 years in total). Further, it is recommended (2) to provide more training on writing, presentation and publication skills, and, (3) allow for some more flexibility regarding time allocations to be spent on analysis and writing in direct interaction with the main supervisor in the North or in the South. As a side issue we recommend to check the scholarship package regarding health insurance. PhD students assessed it as insufficient to cover health treatments in Belgium.

**Recommendation 21:** Review policy regarding recruitment of PhD students for an institution with a regional scope. At present the VLIR-UOS policy requires that PhD students should be at the same time staff members and preferably from the same country. The quality of the applicants should be the first criterion and suitable candidates could be offered and bound to an employment contract after completion of studies.

# ANNEXES

## Annex 1: Terms of Reference (Summary of the ToRs)

### Purposes of the evaluation

A mid-term evaluation has 3 different standard purposes:

- 1. Learning:** on the basis of the analyses made by the evaluation team, lessons can be learned about what worked well, what didn't and why. The formulation of these lessons learned will contribute to the quality of on-going and future IUC programmes in terms of the content and management of the programme, including the overall policy framework.
- 2. Steering:** on the basis of the analyses made by the evaluation team, recommendations will be formulated to support decision making processes of the IUC (at different levels). For a mid-term evaluation specifically: the evaluation will be used to decide about - and as an input for - the formulation of a second phase.
- 3. Accountability:** by independently assessing the performance of the IUC programme (and validating or complementing the monitoring), different actors (HEI, VLIR-UOS, etc.) can fulfil their accountability requirements.

### Evaluation objectives

The evaluation's primary objective is to evaluate the performance of the IUC (programme level and project level). This is the basis of every IUC evaluation. Next to this objective, final IUC evaluations also analyse the prospects for the post-IUC period:

A. The performance of the IUC needs to be evaluated on the basis of the OECD-DAC criteria for development evaluation (+ one additional criterion): **scientific quality, relevance, efficiency, effectiveness, impact, and sustainability**. For mid-term evaluations, a particular focus needs to be given to **efficiency and effectiveness**.

B. In case of a mid-term Evaluation: the follow-up plan of the programme for the second phase (cf. self-assessments) is also evaluated. The follow-up plan needs to further guarantee capitalisation, exploitation and vulgarisation of achievements of the first phase, sustainability at institutional level (and research groups), and the impact of the university on development processes in the surrounding community, province and eventually in the country.

Next to these standard objectives, this mid-term evaluation also has the following, specific, evaluation question(s):

C. To what extent is the research within the IUC programme linked to the civil society and the local industry? See also the motto of NM-AIST: "Academia for Society" and the concept of "community information centres" in the IUC Partner Programme

D. Does the support of sandwich PhDs fit into a global and long-term strategy of the university to strengthen and support local PhD schools? (as NM-AIST is a particular university, without Bachelor programmes, focusing on research)

E. The IUC programme is considered as a catalyser to attract new funding from other donors: is this really so? Can this be attributed to the IUC programme?

## Evaluation criteria

As mentioned, the evaluation will use the OECD-DAC criteria (+ a criteria on scientific quality) as criteria to evaluate the IUC: **scientific quality, relevance, efficiency, effectiveness, impact, and sustainability**. Any priorities regarding criteria are mentioned in 3.2.

Below a brief definition of the criteria is provided and the interpretation of the different criteria (at programme level and at project level) is provided through the formulation of a number of questions/descriptors that specify the VLIR-UOS interpretation of the criteria. These descriptors are indicative. It is up to the evaluators to develop a more detailed set of sub-questions to assess the criteria.

The different criteria need to be analysed and assessed by the evaluators. They also need to provide a score for every criterion using a four-point evaluation scale. The scale is as follows:

1 = (very) poor

2 = insufficient/low

3 = sufficient/good

4 = very high/excellent

These scores - expressing in quantitative terms an overall and synthetic yet differentiated qualitative judgement - should facilitate the task of evaluation and should be applied for the IUC programme level and for each project within the IUC programme.

## Programme level

| Criterion         | Descriptors  |
|-------------------|--|
| <b>Relevance</b>  | <p>The extent to which the objectives of a programme are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donors' policies."</p> <p>The extent to which the programme is addressing immediate and significant problems and needs of the concerned partners (institutional) as well as regional and national policy makers, with reference to the MDGs, PRSP and other multilateral policy documents. Synergy and complementarity with other (Belgian) actors. Link with transversal themes of Belgian development cooperation: gender, environment and D4D.</p> |
| <b>Efficiency</b> | <p>"A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results."</p> <ul style="list-style-type: none"><li>• Sufficient "economy" considerations by the programme</li><li>• The use and application of the means earmarked for collaboration.</li><li>• The management of the programme both in Flanders and locally:</li></ul>  |



|                       |   |
|-----------------------|---|
|                       | <p>results-orientation of management; cooperation between all parties involved (between projects and programme level, between projects, within projects, between programme and local university); quality of communication between all parties involved (between projects and programme level, between projects, within projects, between programme and local university); external communication</p>   |
| <b>Effectiveness</b>  | <p>The extent to which the programme objectives are expected to be achieved, taking into account their relative importance.”</p> <ul style="list-style-type: none"> <li>• Overall effectiveness of the programme, taking into account the attainment of specific objectives at project level</li> <li>• Changes in awareness, knowledge, skills at institutional level</li> <li>• Changes in organisational capacity (skills, structures, resources)</li> </ul>   |
| <b>Impact</b>         | <ul style="list-style-type: none"> <li>• “Potential positive and negative, primary and secondary long-term effects produced by the programme, directly or indirectly, intended or unintended.”</li> <li>• Not just actual but also (given time limitations) potential impact.</li> <li>• Added value of the IUC programme for the institutional performance of the university</li> <li>• Policy changes at institutional level? Changes in behaviour at institutional level?</li> <li>• Added value of the IUC programme for the role of the university as a development actor</li> <li>• The extent to which the collaboration has sparked other departments to initiate interuniversity collaboration, joint capacity building, fund raising etc.</li> <li>• The extent to which the collaboration has led to joint developmental activities or similar collaborative models at the regional level</li> <li>• The extent to which the collaboration has raised interest of policy makers and academics, and how the partner university is called upon or is proactively developing collaboration models that could be fed into policy advice</li> </ul> |
| <b>Sustainability</b> | <p>“The continuation of benefits after the programme have been completed.”</p> <p>Financial, institutional and academic sustainability:</p> <ul style="list-style-type: none"> <li>• Co-funding by the partner university (matching funds)</li> <li>• Incorporation of costs into the budget of the partner university</li> <li>• The partner university sets aside funds for operations and maintenance of physical infrastructure</li> <li>• Ability to attract external funds</li> <li>• Ability for full financing or co-financing events, workshops, congresses, mobility, grants, investments, infrastructure</li> </ul>  |

|  |   |
|--|---|
|  | <ul style="list-style-type: none"> <li>• Strengths and weaknesses of the institution in terms of institutionalising the collaboration</li> <li>• Intensification and/or formalisation of interuniversity consultations (North-South and South-South)</li> <li>• Ability to produce joint proposals (fund raising, research)</li> <li>• Collaboration and exchanges outside of VLIR-UOS programme</li> <li>• Curbing brain drain into sustainable brain circulation, installing incentives, “pull factors” against “push factors”</li> </ul> |
|--|---|

## Project level

| Criterion                 | Descriptors   |
|---------------------------|---|
| <b>Scientific Quality</b> | <p>The extent to which a project has a ground-breaking nature and ambition (excellence).”</p> <p>quality of research: the extent to which research - sufficiently involving stakeholders - is cutting edge; extent to which the results have been incorporated in local or international refereed journals</p> <p>quality of education: the extent to which new education practices – developed while sufficiently involving stakeholders - are cutting edge; Extent to which alumni easily get a job which fits their education profile; the number of fellowships acquired from foundations</p>                                   |
| <b>Relevance</b>          | <p>“The extent to which the objectives of a project are consistent with beneficiaries’ requirements, country needs, global priorities and partners’ and donors’ policies.”</p> <p>The extent to which the project addresses immediate and significant problems of the community, looking at the amount of self-finance, demand from state and private actors, the level of transfer of know-how and technology. Synergy and complementarity with other (Belgian) actors. Synergy and complementarity with other (Belgian) actors. Link with transversal themes of Belgian development cooperation: gender, environment and D4D.</p> |
| <b>Efficiency</b>         | <p>“A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.”</p> <ul style="list-style-type: none"> <li>• The extent to which intermediate results (outputs) have been delivered</li> <li>• The relationship between the intermediate results and the means used to reach the intermediate results.</li> <li>• The relationship between the objectives and the means used to reach the objectives.</li> <li>• Efficiency of project management (e.g. the extent of flexibility during implementation)</li> </ul>  |
| <b>Effectiveness</b>      | <p>The extent to which the programme’s objectives are expected to be achieved, taking into account their relative importance.”</p> <ul style="list-style-type: none"> <li>• the degree to which the specific objectives have been achieved</li> </ul>   |

|                       |  |
|-----------------------|--|
|                       | <ul style="list-style-type: none"> <li>• the “use of outputs”</li> <li>• changes in behaviour</li> <li>• the extent to which the university/faculty/department has created the conditions for impact (e.g. by facilitating uptake)</li> </ul>  |
|                       | <p>“Potential positive and negative, primary and secondary long-term effects produced by the project, directly or indirectly, intended or unintended.”</p> <p>Not just actual but also (given time limitations) potential impact:</p> <ul style="list-style-type: none"> <li>• Upscaling of new knowledge/applications/services by communities/governments/organisations</li> <li>• Impact on internal performance of involved academics/departments:</li> <li>• Renewed curriculum functions as example for other universities/departments</li> <li>• The new style of teaching has become a model for teaching (e.g. the systematic use of teaching in combination with laboratory work)</li> <li>• The library has experienced a clear increase in number of visitors</li> <li>• Impact at the level of the private sector : the amount of money earned on the market</li> <li>• The extent to which academics, involved in the project, are called upon by the government for policy advice</li> </ul> |
| <b>Sustainability</b> | <p>“The continuation of benefits after the programme have been completed.”</p> <p>Especially financial and institutional sustainability:</p> <ul style="list-style-type: none"> <li>• measures for staff retention of trained staff</li> <li>• (potential) synergy and complementarity with other actors (e.g. in extension), local and Belgian actors in particular</li> <li>• do the Flemish universities (and university colleges) commit their own university funds to the programme, for instance by giving fellowships or by allowing academics to go to the field ?</li> <li>• personal commitment of academia?</li> <li>• availability funds for operations and maintenance of physical infrastructure</li> <li>• are there joint research projects which are interesting both to the Northern and Southern academics involved ?</li> <li>• do the partner universities also commit their own funds to the programme (matching funds)?</li> </ul>  |

## Actors involved

The following actors will be involved in the evaluation. All of them have an important stake in the evaluation:

- the VLIR-UOS secretariat;
- the stakeholders (both in Flanders and in the partner country) involved in the ongoing IUC co-operation programme;

- the members of the evaluation team;
- the Directorate-general Development Cooperation and Humanitarian Aid (DGD), i.e. the Belgian government administration for international cooperation
- other relevant stakeholders;

## **The evaluation team**

The evaluation is to be undertaken by both members of the evaluation team.

One expert will act as team leader. In this capacity he/she will lead the meetings that have been programmed and will coordinate the report drafting. He/she will be invited to use his/her experience with international cooperation in the field of higher education and research as reference for the evaluation, especially when formulating recommendations for improvement of the global set-up and management

The following expertise need to be represented in the evaluation team:

- International development expertise: knowledge of and experience with processes of development cooperation, capacity building and methodological issues in general and in higher education in particular;
- A solid experience with and expertise in evaluation
- Country expertise: knowledge of and experience in the local context and the higher education and research system.

The following attribute is considered an advantage:

- Academic expertise regarding the core theme(s) of the partner programme such that the academic quality may be assessed

The above fields should be accommodated by the joined and complementary expertise of two external evaluators. These experts should be neutral. This means that evaluators (1) have not been involved in the implementation of the intervention being evaluated (2) and have no contractual relationship, now or in the past, with any of the partners involved with the project/programme under review.

## **The Northern stakeholders involved in the ongoing IUC co-operation programmes**

What is meant by the Northern stakeholders is: all persons from the Flemish universities or university colleges who are involved in one of the ongoing IUC cooperation programme. This means: the top management of the Flemish coordinating university, the Flemish coordinator, the Flemish project leaders and team members, Ph.D. student promoters, the Institutional coordinator for University Development Cooperation of the Flemish coordinating university (the so-called ICOS), the financial officer(s) of the Flemish coordinating university, VLIR-UOS programme officer, students, Belgian development actors, etc.

## **The Southern stakeholders involved in the ongoing IUC co-operation programmes**

What is meant by the Southern stakeholders is: all persons from the partner university and the local government(s) and community who are involved in the respective IUC partnership. This means:

- the top management of the partner university, the authorities at faculty level, the local coordinator, the programme manager, the local project leaders, their deputies (if applicable) and team members, the staff of the local coordinating unit of the IUC programme (secretaries, accountants, ...), the students funded by the programme, the student supervisors and/or promoters, technicians, staff from other donor-sponsored cooperation programmes being implemented at the partner university, etc.;
- representatives from central, regional and local government agencies and from civil society (e.g. local chambers of industry, employers' association, ...), officials of the Ministry of Education and of Foreign Affairs, and of the Belgian Embassy, and others.

## The VLIR-UOS secretariat

The VLIR-UOS secretariat will function as organiser of the evaluation, as well as resource centre for the evaluation team. The evaluation team will be closely assisted by the programme officer of the respective IUC programme within VLIR-UOS (cfr. M&E Policy and VLIR-UOS Evaluation guidelines).

### DGD

The Directorate General for Development Cooperation, will be invited to be interviewed by the evaluation team and, if so desired, to participate in a debriefing meeting with the evaluation team.

## Management of the evaluation

1. Every evaluation is managed as a project, including a governance structure that is set-up for a given evaluation. This structure – the **evaluation reference group** – has three roles<sup>3</sup>, representing three different perspectives. These roles are assumed by the coordinator, a programme officer and the evaluation officer. Their task is to facilitate the evaluation process. The reference group can be expanded at any time in order to ensure one or more of the three perspectives. The evaluation team will be closely assisted by the programme officer of the respective IUC programme within VLIR-UOS (cfr. M&E Policy and VLIR-UOS Evaluation guidelines). The reference group reports to the executive board of VLIR-UOS called Bureau UOS (BUOS), which makes the final decisions (approval report, management response).
2. The evaluation team will be composed by 2 evaluation experts. The evaluation team will receive from VLIR-UOS, apart from basic information on the IUC Programme, a set of documents relating to the respective IUC partnership for the desk study.
3. The Northern and Southern stakeholders of each of the ongoing IUC cooperation programmes have received the formats for the self-assessment reports on 7 September. The reports will have to be submitted to VLIR-UOS secretariat at the latest before 15 December.
4. The partner universities will be invited to draft the programme of the evaluation missions, in consultation with – and taking into account the possible requests formulated by - the evaluation team.
5. The evaluation team (or one of the experts) will conduct interviews in Flanders. The methodology of the evaluation will be refined in consultation with the VLIR-UOS-secretariat
6. The evaluation team will submit an inception report **two week** before the field mission.
7. The field mission will be organised in consultation with the main stakeholders between 12 February and 16 March 2018.

8. At the very end of the mission, the evaluation team will discuss its preliminary conclusions and recommendations at length with the Southern and any present Northern stakeholders.

9. The evaluation team members will submit a draft report **after their return from the mission**. A debriefing will be organised during which the highlights of the evaluation are presented. The draft report will be submitted, for comments, via VLIR-UOS, to the resp. Flemish and local coordinator. It will be up to the two coordinators to coordinate the reactions to this draft report. The evaluation team will decide, given its autonomy, whether or not to take into account the comments received (if major comments are not integrated, this needs to be explained). The final evaluation report is expected **8 weeks** after the field phase.

## Annex 2: Inception report: Evaluation questions

### Evaluation questions

An informed peer-review approach must consider:

- Cross-cutting questions regarding goals and underlying strategy
- The structure and process
- Output and outcomes
- Overall strength and weaknesses

They will ensure that different perspectives of the interviewed persons and groups are captured.

The following evaluation questions addressing the key evaluation criteria will be used for guidance at programme and project level, respectively

The inception report presents selected guiding questions in regard of the evaluation criteria and in regard of interviewed status group.

**Table A 2 Guiding evaluation questions (in addition to the evaluation descriptors presented in the ToRs)**

| Criterion                 | Questions  |
|---------------------------|--|
| <b>Relevance</b>          | To what degree are the research projects relevant to the scientific disciplines and communities?   |
|                           | To what extent do the objectives of the programme/ projects contribute to the strategic goals of the institution?  |
|                           | How and through whom can developmental relevance be strengthened in the future?  |
|                           | To what extent does the development measure target poverty reduction or other key development challenges? Are the projects needs oriented?   |
|                           | Which cross-cutting issues are relevant (considering the actual priority/transversal themes of VLIR-UOS: gender, environment, D4D (Digitalisation4Development), and the private sector)? |
|                           | How well do the objective and measures of the programme comply with the Tanzanian sector strategy on (higher) education and development?   |
| <b>Scientific quality</b> | To what extent are the research groups characterised by academic excellence (quality of research, training, transfer)?   |
| <b>Efficiency</b>         | How are the relationship between use of resources and results being assessed?  |
|                           | Are there efficient M&E measures in place?   |
|                           | Are there any measures that have specific positive or negative effects on achievement of intermediate results?   |
|                           | Are the programme and projects communication measures adequate?  |
|                           | Are any measures inadequate or lacking?  |
|                           | Are the project measures logically planned and goal oriented?  |
| <b>Effectiveness</b>      | To what extent have the specific objectives of the projects contributed to overall effectiveness of the programme?   |
|                           | Which main factors influence goal attainment?  |
|                           | Are changes regarding awareness, knowledge and skills observed?  |



|                                   |  |
|-----------------------------------|--|
|                                   | Are changes in organisational capacity implemented?  |
|                                   | To which extent are changes regarding research culture and actual behaviour (problem approach, action-research, linking theory and practice etc.) occurring? |
| <b>Sustainability</b>             | What is the expected sustainability of the recognised results on the individual, organisational and systemic levels?   |
|                                   | To what degree are the achieved effects at phase 1 sustainable?  |
|                                   | Which steps are planned to secure the sustainability of achieved results?  |
|                                   | Which factors foster and which hinder sustainability?  |
|                                   | To what extent are partners able to sustain positive results without support from the actually supporting agency?  |
| <b>Impact</b>                     | How can the programme achieve impact internally (institutional level) and externally (communities, policies)?  |
|                                   | What contributions can the projects realistically make in phase 2 or in the foreseeable future to providing knowledge solutions to development challenges?   |
|                                   | Which other overarching effects on development impact can be expected?   |
| <b>Coherence and plausibility</b> | Are there any cooperation agreements with other programmes and actors?   |
|                                   | Are there additive or synergetic effects expected and at what level (academic, policy, regional scope)?  |

## Guiding questions target group

The evaluation team will address specific questions at the strategic, structural, process, output and outcome level to different groups of interviewed persons:

### Group 1: Top Management Level (Vice-Chancellor, Deputy Vice-Chancellor, or Directors of strategically important units of the institution)

#### Level of Goals/Strategy

- Relevance of cooperation with universities/institutions from countries in the North as described in the university mission statement
- Compatibility of VLIR-UOS programme with the university's general education/research profile
- Overall importance of the VLIR-UOS programme for the university (and beyond)
- Visibility of the VLIR-UOS programme project within and outside of the university and faculty/department
- The involvement of the different faculties or units at strategic level

#### Structural Level

- Integration of VLIR-UOS programme/project into the university and the faculty/department
- Administrative support of VLIR-UOS programme/project by central units of the university/ faculty/departments (e.g. international office, department for finances and accounting, quality assurance)
- Financial support of VLIR-UOS programme/projects by university or faculty/department

## **Process Level**

- Communication/cooperation with VLIR-UOS programme partners in Tanzania
- Communication/cooperation with VLIR-UOS programme/coordinators with Flemish universities and other stakeholders in Belgium

## **Output/Outcome Level**

Effects of the VLIR-UOS programme/project on:

- education of students and PhDs (quality of training) and professors/staff (e.g. development in bringing together working units, effects on human resources development regarding personal growth, overall capacity building)
- research (e.g. effects on research topics, development in research quantity and quality)
- cooperation (e.g. development of number of partners and quality of partnerships)
- policy analysis and consultancy
- regional development

## **Overall**

- (up to) three major strengths and weaknesses
- Recommendations for a future development of VLIR-UOS programme with special regard to positive and negative factors on attainment of specific objectives

## **Group 2: Users and implementing support staff of the VLIR-UOS programme**

- Individual meetings with Students (post grad only)
- PhDs/post-docs (if available in Tanzania)
- Scientific staff/professors at programme and project level
- Coordinators/administrators at programme and project level
- Programme Support Unit staff
- Any other persons of the institution involved

## **Level of Goal Achievement**

- Motivation to participate in the VLIR-UOS programme/project
- Visibility/awareness of VLIR-UOS programme/projects internally (within the university or faculty/department) and externally (local region, country level, Sub-Saharan Africa etc.)

## **Structural Level**

- Support of institution/faculty/department for participating in VLIR-UOS programme/project (e.g. general information and advice, preparation of document application)
- Funding issues in the context of VLIR-UOS programme/project
- Network partners (e.g. compatibility on a content level, further interesting partners, outreach and community participation)

## **Process Level**

- Communication/cooperation with VLIR-UOS programme partners in Tanzania
- Communication/cooperation with VLIR-UOS programme/coordinators with Flemish universities and other stakeholders in Belgium

- Implementation of measures (activities as described in the various log frame matrices and action plans, efficiency)

### **Output/Outcome Level**

- Quantitative and qualitative effects of VLIR-UOS programme/project on personal development (e.g. career plans, intrinsic motivation driver) in relation to specific objectives and indicators of the logical framework
- Institutional development (e.g. bringing together working units, development in research quantity and quality, development of number of partners and quality of partnerships, quality and quantity of policy analysis and consultancy)
- In detail the specific objectives and indicators of the logical framework will be analysed and assessed. The self-assessment report will be used to clarify or validate observations or findings during the interview, if necessary.

### **Overall**

- (up to) three major strengths and weaknesses of VLIR-UOS programme/project
- Recommendations for a future development of VLIR-UOS program with special regard to positive and negative factors on attainment of specific objectives (academic and developmental) (Phase II)

### **Group 3: Multipliers (Other internal and external stakeholders, potential beneficiaries, target group representative, local and other authorities)**

This is a very important group to obtain feedback regarding potential development impact.

### **Level of Goal Achievement**

- Importance of the VLIR-UOS programme/projects for local and regional development (e.g. consideration of needs and demands)
- Visibility/awareness of the VLIR-UOS programme/project in the region

### **Structural Level**

- Compatibility of VLIR-UOS programme/project with further initiatives and programmes with regard to Local and National Strategic Plans (e.g. possible synergistic effects)
- Potential for additional funding or long-term support of VLIR-UOS programme/project at present and in future

### **Process Level**

- Communication/cooperation with VLIR-UOS programme/project

### **Output/Outcome Level**

Effects of VLIR-UOS programme/project on:

- regional development (e.g. empowerment of locals, infrastructure, community work)
- policy analysis and consultancy (needs and requests, quality of consultancies)
- achievement of SDGs

### **Overall**

- (up to) Three major strengths and weaknesses of VLIR-UOS programme/project

- Recommendations for a future development (Phase II) of the VLIR-UOS programme with special regard to positive and negative factors on attainment of specific objectives

### Annex 3: Mission programme

| Date                    | Morning   | Afternoon/evening  |
|-------------------------|---|--|
| Wednesday<br>14/02/2018 | Travel from Dar/Dodoma to Arusha  | Internal meeting mission team<br>Brief meeting with PM   |
| Thursday<br>15/02       | Briefing PM<br>Adjustment of programme schedule (field trips, stakeholder meetings)<br>Briefing Ag PC and PLs   | Courtesy call to VC Office<br>Tour of facilities: Laboratories, Lecture rooms, Library, Campus facilities for staff and students   |
| Friday<br>16/02         | Face-to-face interview with PL1<br>Group interview with team P1<br>Individual face-to-face interviews with PhD students   | Face-to-face interview with MSc. Student<br>Visit of pilot constructed wetland and banana propagation unit on campus<br>Face-to-face interview with PM<br>Face-to-face interview with VC |
| Saturday<br>17/02       | Skype interview with PhD student currently in Belgium<br>Data analysis and report writing   | Skype interview with PL2 currently in Europe<br>Data analysis and report writing   |
| Sunday<br>18/02         | Field trip to peri urban and rural areas of Arusha<br>Document analysis and report writing (evening)  |  |
| Monday<br>19/02         | Group interview with P2 team members<br>Face-to-face interview PL P3  | Validation of documents and findings<br>Skype interview with PhD student P2  |
| Tuesday<br>20/02        | Face-to-face interview PL CREATES (World Bank Project)<br>Face-to-face interview with Head of Library and Head of Information Resource Centre (IRC)<br>Visit of ICT infrastructure and facilities<br>Visit of library               | Visit of NM-AIST banana experimental site<br>Visit of and interview with CEO of Crop Bio-science Solutions Ltd   |
| Wednesday<br>21/02      | Field trip to (in total 14 hrs):<br>Hai District Council<br>Individual smallholder farms in Machame<br>Experimental site TACRI Lyamungo<br>Pangani Water Basin Board, Moshi<br>Experimental site at Tarakea Secondary School, Rombo |  |
| Thursday                | Debriefing and feedback workshop  | Workshop Phase II  |

|                   |  |                        |
|-------------------|--|------------------------|
| 22/02             | Workshop Phase II  | Workshop consolidation |
| Friday<br>23/02   | Debriefing Vice Chancellor<br>Interview with Admission Officer | Report writing         |
| Saturday<br>24/02 | Departure of mission team                                      |                        |

## **Annex 4: List of persons consulted**

### **Belgium**

#### **Briefing VLIR-UOS**

|                 |                                  |
|-----------------|----------------------------------|
| Herman Diels    | VLIR-UOS Programme Officer South |
| Koen de Koster  | VLIR-UOS Evaluation Officer      |
| Peter de Lannoy | VLIR-UOS Programme Manager       |

#### **Interviews in Belgium**

|                      |  |
|----------------------|--|
| Bart van der Bruggen | Professor, Flemish project promoter, KU Leuven P 1: Sanitation and agriculture (Skype)         |
| Ann van Griensen     | Professor, Flemish project promoter, Vrije Universiteit Brussel, P 2: Water and people (Skype) |
| Luc Brendonck        | Professor, Flemish programme coordinator, KU Leuven  |
| Elise Konings        | Flemish coordinator office (ICOS KU Leuven, since 2016)  |
| Rony Swennen         | Professor, Scientist, KU Leuven P1: Sanitation and agriculture (Skype)                         |
| Egbert de Smet       | Professor, Flemish project promoter, University of Antwerp P3: Institutional strengthening     |
| Roel Merckx          | Professor, Scientist, KU Leuven - P1: Sanitation and agriculture (Skype)                       |

### **Interviews and consultation at NM-AIST**

#### **Central Administration, Central Units and Support Services**

|                    |  |
|--------------------|--|
| Karoli Njau        | Professor, Ag. VC (involved from the beginning 2011)                     |
| Gabriel Shirima    | PhD, Ag VC, Dean, School of Life Sci. & Bioeng. (joined NM AIST in 2015) |
| Himili Mbawalla    | Accountant (handling VLIR-UOS and other accounts)                        |
| Justine Lwekoramu  | Diploma in Laboratory Science and Technology, Laboratory Technician      |
| Tryphone Ntamamilo | Admission Officer  |

#### **VLIR-UOS Programme Support Unit**

|                   |                                 |
|-------------------|---------------------------------|
| Joyce Rugakingila | PM VLIR-UOS Office (since 2016) |
|-------------------|---------------------------------|

#### **Project 1**

|                   |  |
|-------------------|--|
| Patrick Ndakidemi | Professor, Agriculture, PL 1 (sometimes Ag. PC), former DVC (at NM-AIST since 2011), retired, on-contract with NM-AIST |
| Kelvin Mtei       | PhD, Sen. Lecturer, Dept. Environ. Sci., Dept. Sust. Agric. (since 2012)   |
| Anita Rugaika     | PhD Student (since 2013)   |
| Akida Meya        | PhD Student (since 2014)   |
| Mathias Missanga  | M.Sc. Student, 2 <sup>nd</sup> year, Master programme Sustainable Agriculture  |



## **Project 2**

|               |  |
|---------------|--|
| Hans Komatech | PhD, PL 2 (involved since 2011), Team leader of WISE-Futures (Skype)                           |
| Linus Munishi | PhD, Ecology and Conservation, Deputy PL2, (joined NM-AIST 2013)                               |
| Alfred Muzuka | Professor, Earth Science, (joined NM-AIST 2011)  |
| Grite Nelson  | PhD student, 3 <sup>rd</sup> year, (joined NM-AIST 12/2013, VLIR-UOS scholarship 2014) (Skype) |
| Anna Msigwa   | PhD student, 3 <sup>rd</sup> year (Skype)  |

## **Project 3**

|                    |   |
|--------------------|---|
| Michael Kisangiri  | PhD, PL3, HOD Communication Sci. Eng.; Ag Dean, School of Computation and Communication Science and Engineering (at NM-AIST since 2011) |
| Neema Mosha        | PhD, Knowledge Management, Ag. Head of Library (At NM-AIST since 2011).   |
| Joshua Jacob Mushi | MBA in ICT, Ag. Head of Information Resource Centre (IRC) (joined NM-AIST in 2011).   |

## **Stakeholders**

|   |  |
|---|--|
| Reinout Van Vaerenbergh                                     | Embassy of Belgium, Dar es Salaam  |
| Sylvain Vanrie  | Embassy of Belgium, Dar es Salaam  |
| Several Master and PhD Students were met on campus randomly |  |
| Hulda Shaidi Swai   | Prof., Director CREATES, LiSBE, NM-AIST  |
| Anna Treydte  | PhD, Assoc. Prof. Biodiversity, Deputy Leader CREATES                          |
| Wilfred Mushobozi   | Agronomist, CEO of Crop Biosciences Solutions Ltd., Arusha                     |
| David Lekei   | District Agriculture, Irrigation and Cooperative Officer, Hai District Council |
| Bariki Ulomi  | Smallholder farmer, Machame Kilimanjaro  |
| Jubilate Mushi  | Smallholder farmer, Machame Kilimanjaro  |
| Brown Mwangoka  | Hydrologist, Pangani Water Basin, Moshi  |
| Phillipo Patrick  | Hydrologist, Pangani Water Basin, Moshi  |
| Martin Kija   | Headmaster, Tarakea Secondary School, Rombo                                    |
| Feruli Silayo   | Agriculture Teacher, Tarakea Secondary School, Rombo                           |
| Delphina B. Tsaxara   | Agriculture Teacher, Tarakea Secondary School, Rombo                           |

## **Participants Feedback and Workshop Phase 2**

|                   |                   |
|-------------------|-------------------|
| Joyce Rugakingila | PM                |
| Patrick Ndakidemi | PL P1             |
| Kelvin Mtei       | P1, Deputy Leader |
| Akida Meya        | P1, PhD Student   |
| Anita Rugaika     | P1, PhD Student   |

|                  |                    |
|------------------|--------------------|
| Mathias Missanga | P1, Master Student |
| Alfred Muzuka    | P2, Deputy PL      |
| Linus Munishi    | P2, Deputy PL      |
| Neema Mosha      | P3 Member          |
| Joshua Jacob     | P3 Member          |

## Annex 5: List of Documents

### Internal Documents (file name and date)

|  |              |
|--|--------------|
| Format for an IUC PARTNER PROGRAMME (PP) for universities entering Phase I of IUC cooperation NM-AIST- | (April 2012) |
| Annex PP - PROG - 1: Completed Logical Framework Matrix  | (05/12/2012) |
| PP Annex 2 - PROG – Indicative Partner Programme Phase 1 Budget  | (25/10/2012) |
| Annex PP PROG 4-Draft Corporate Strategic Plan   | (15/10/2012) |
| Annex PP PROG 5: The partner university organogram and the IUC Partner Programme                       | (15/10/2012) |
| Annex PP PROG 6-management manual_revised_4.12   | (04/12/2012) |
| Annex PP PROG 7: Job description of programme manager  | (15/10/2012) |
| Self-assessment form IUC mid-term evaluation_PROG_KU Leuven  | (15/12/2017) |
| Self-assessment form IUC mid-term evaluation_PROG_NM AIST  | (19/12/2017) |
| Annual Planning  | (28/12/2017) |
| Annual Reporting   | (28/12/2017) |
| Programme Support Unit (PSU):  |              |
| PP Project PSU Annex 2 to 4 - Logframe_budget_ OP  | (25/10/2012) |
| IUC format phase I_ PSU  | (15/10/2012) |
| PP project PSU Annex 5b CV Flemish coordinator   | (15/10/2012) |
| PP project PSU Annex 5a CV local coordinator   | (15/10/2012) |
| Self-assessment form IUC mid-term evaluation_PROJ-PSU  | (15/12/2017) |
| Project 1 Integrated sanitation and agriculture systems  |              |
| IUC Format Phase 1_project 1_revised_04.12   | (04/12/2012) |
| P Project 1 annex 1b_solution tree_revised_04.12   | (04/12/2012) |
| PPP Project 1 Annex 2 to 4_Logframe_OP_budget_revised_04.12  | (07/11/2012) |
| Self-assessment form IUC mid-term evaluation_PROJ-1  | (15/12/2017) |
| Project 2 Water and people   |              |
| IUC_format for a PP Phase I_project 2_revised_04 12  | (05/12/2012) |
| PP Project 2 annex 1_problem and solution trees  | (15/10/2012) |
| PP Project 2 Annex 2 to 4_Logframe_budget_ OP  | (04/12/2012) |
| Self-assessment form IUC mid-term evaluation_PROJ-2  | (15/12/2017) |
| Project 3 Institutional strengthening  |              |
| IUC format for a PP Phase I_project 3_revised_05.12  | (05/12/2012) |

|   |              |
|---|--------------|
| PP project 3_annex 1b_solution tree                         | (05/12/2012) |
| PP project 3_annex 1b_solution tree                         | (15/10/2012) |
| PP project 3_annex 2 to 4_Logframe_budget_ OP_revised_05.12 | (05/12/2012) |
| Self-assessment form IUC mid-term evaluation_PROJ-3         | (15/12/2017) |
| Reports Workshops   | (15/02/2018) |
| Scientific Outputs  | (15/02/2018) |
| SCMs (Steering Committee Meetings)                          | (15/02/2018) |

### **NM-AIST Documents**

|   |                               |
|---|-------------------------------|
| Corporate Strategic Plan - Final- NM-AIST 2013-2027   | (April 2013)                  |
| Vice Chancellor's Report 19/17 to Council             | (December 2017)               |
| Criteria for Admission to Master' and PhD' programmes | (October 2016, print version) |

### **Others**

Ministry of Education, Science and Technology (November 2017): Education Sector Development Plan (2016/17 to 2020/21) Tanzania

## **Annex 6: Power-point presentation**

## ABOUT VLIR-UOS

VLIR-UOS supports partnerships between universities and university colleges in Flanders and the South that seek innovative responses to global and local challenges.

We fund cooperation projects between professors, researchers and teachers. In addition, we award scholarships to students and professionals in Flanders and the South. Lastly, we contribute to strengthening higher education in the South and internationalising higher education in Flanders.

The information and views set out in this evaluation report are those of the author(s), independent evaluators, and do not necessarily reflect the opinion of VLIR-UOS or the universities/university colleges involved.

VLIR-UOS is part of the Flemish Interuniversity Council and receives funding from the Belgian Development Cooperation.

More information: [www.vliruos.be](http://www.vliruos.be)

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# Management response to mid-term evaluation

## Sustainable use of natural resources to the benefit of the local communities of northern Tanzania - 2018

### Programme level

#### General appreciation

The draft report was distributed to PSU, coordinators and project leaders that had the opportunity to formulate their general appreciation and give some feedback and remarks on the mid-term evaluation and recommendations made. All comments were assembled by the FC and sent in to VLIR-UOS again. The final evaluation report was distributed again to all programme members mentioned above and used to prepare the formulation mission. The FC extracted all positive and negative comments by the reviewers and presented them to set the minds at the start of the formulation mission. It was underlined that in all formulations, these comments and recommendations have to be taken into account. ICOS also presented the 15 general recommendations on programme level.

While the recommendations at programme level were clearly listed, those at project level only occurred in a scattered way in the texts and had to be extracted by each of the project leaders. We considered the report as rather fair, but not well balanced taken mostly comments from the south. This was especially strongly pronounced in the draft version. It was appreciated that several of our feedback comments were taken into account in the final report.

#### Follow-up on recommendations

|   |  |
|---|--|
| <b>Recommendation 1:</b>  | It is recommended to increase synergy. Because of the large number of other projects at NM-AIST, it is essential to have the right organizational set-up, planned processes of cooperation, and definition of a strategically relevant contribution of VLIR-UOS.   |
| <b>Management Response</b> (Agree, partially agree, disagree):              | Partially agree  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b> | Projects in phase 1 were assembled already in a complex way to enforce some synergy within projects (e.g. hydrology + ecology). As a consequence it was perceived as if there was no synergy between the projects by the reviewers. Where it concerns synergy with other projects on campus, as local project leader |



|  | of former project 2 became director of a center of excellence (WISE-futures), some synergy was naturally present.   |
|--|---|
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>   | <b>Implementation stage</b> (not started, underway, completed)  |
| Former project 1 will be uncoupled in a project on sustainable farming systems (P1) and one on water sanitation (P2). Most important is that each project works in a more efficient way towards publishable results. Where synergy can contribute to that output, it will be established.  | As from start of phase 2  |
| The hydrology component of former project 2 will be integrated in the new project 1 to facilitate synergy with the optimization with banana farming systems. Where relevant the hydrology experts will also work in synergy for some aspects of the functioning of aquatic systems (in new P3).  | As from start of phase 2  |
| A new component in the new P4 will be big data acquirement and management of the VLIR-UOS drone that will be used transversally in most projects, a process that will increase synergy.  | As from start of phase 2  |
| All projects will work towards research data of which some might result in products or protocols that can be valorized through the intervention of the technology park. These interactions will foster synergy between research projects and the technology park. The sharing of selected data and methods from the different projects with the local communities will be done through the development of apps in P3. Also this will be an important process of synergy. | Is a continuous process that depends on the nature and timing of the available data produced by the projects.   |
| A forum will be set up that enforces students and supervisors to have frequent meetings and discuss each other's results. This will automatically lead to natural and often unexpected synergies that are more sustainable than enforced synergies.  | The forum was discussed and agreed since long but will enforced to become effective in phase 2.   |
| <b>Recommendation 2:</b>   | Contribute to a revised corporate strategic plan. At present, top leadership is highly committed to develop a process, solution, and product-oriented research culture showing impact in the near future. The interdisciplinary matrix structure of schools and centres of excellence should be documented. |
| <b>Management Response</b> (Agree, partially agree, disagree):   | Agree   |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>  |   |

| Actions Planned /Actions taken + timeframe (action finalised)  |  | Implementation stage (not started, underway, completed) |
|--|--|---|
| Develop apps to facilitate the interaction with the local communities through CIC under P4.  |  | Started   |
| Formulate a separate project P5 i.e Science park (now called Technology park) for incubating of research results and transferring the technology to the industries and agriculture sector in the region. |  | Underway  |
| VLIR-UOS to facilitate policy development and training   |  | Started   |
| Collaborate with other externally funded project for investment in infrastructure for the ScP  |  | Underway  |
| <b>Recommendation 3:</b>   | Develop a comprehensive outreach policy. The institution considers solution-oriented transfer of research results as the main pillar of the corporate strategy. The outreach policy should develop a guideline on possible Private Public Partnerships, particularly in agriculture and water sectors (industrial waste) and IT development.   |   |
| <b>Management Response</b> (Agree, partially agree, disagree):   | Partially agree  |   |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>  | A policy document for a virtual science park (will be called 'technology park' in phase 2) was developed and can be consulted on the website. This document however still has to be validated in a stakeholders meeting.   |   |
| Actions Planned /Actions taken + timeframe (action finalised)  |  | Implementation stage (not started, underway, completed) |
| The finalisation of the policy document.   |  | Should be completed by the end of phase 1.              |
| <b>Recommendation 4:</b>   | Intensify cooperation with VLIR-UOS at Mzumbe. The link to the VLIR-UOS programme at Mzumbe University is established and supported by top management from both institutions. There are complementary activities or experiences to be shared. In particular, the action research approach of Mzumbe University could possibly directly contribute to the desired outreach activities of NM-AIST. The cooperation on ICT capacity building with Mzumbe should be intensified. |   |

|   |   |
|---|---|
| <b>Management Response</b> (Agree, partially agree, disagree):  | Partially agree   |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>   | There were already synergetic actions in phase 1. Not only is the FPL of previous project 3 (now P4) also project leader for an ICT and library project in Mzumbe. We have also trained a PM at Mzumbe. Some of our IT people also went to Mzumbe for app application, something that already resulted in an app on optimal banana farming in Tanzania. |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed)  |
| Synergies should be cost-effective. Mzumbe is quite a distance from NM-AIST and interactions have to be carefully considered. However, it was advised during formulation that, where possible, further synergies should develop in a natural way. Such synergies are mainly to be expected from the P4 and P5, especially as for further app developments and outreach. | Continuous process during phase 2   |
| We will invite management from Mzumbe for the launch where our new activities will be presented.  | Launch of phase 2, probably first week of February 2019   |
| The Mzumbe PSU was consulted for the formulation of new management rules on per diem and km rates (mileage)   | June 2019   |
| <b>Recommendation 5:</b>  | Continuously update the website. The current website is not very informative and needs definite attention to be updated. This aspect deserves high priority and continuous monitoring.  |
| <b>Management Response</b> (Agree, partially agree, disagree):  | agree   |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>   |   |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed)  |
| During formulation it was underlined that it is an important task of the PM to ask frequent information from each project leader to update the website. This is also how this is written out in the management manual.  | This process will already be activated in remaining AP 2018 (first phase) and will next be a continuous process.  |
| <b>Recommendation 6:</b>  | Remuneration and incentives are a major and recurrent topic. NM-AIST should look into this issue, take leadership, develop a transparent policy and align   |

|   |  |  |
|---|--|--|
|   | throughout the institution. The underlying problem is that there is no consistent policy of donors and agencies operating in developing countries and a complicated governmental regulation. The VLIR donor policy is clear – this is not the issue here. An institution needs to find ways to offer sufficient and attractive incentives to reduce dependency on donors.  |  |
| <b>Management Response</b> (Agree, partially agree, disagree):              | Disagree   |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b> | As per NM-AIST Research and Innovation policy, operational procedures require that all research projects contribute 15% of the awarded grant, which is used for overhead/indirect costs and financing seed grant for young researchers. VLIR-UOS does only contribute partly to this because of its own policy.  |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>        |  | <b>Implementation stage</b> (not started, underway, completed) |
| <b>Recommendation 7:</b>  | Open recruitment of PhD students to the wider public to attract more qualified and competent students. It is recommended to advertise calls at national level and conduct a competitive selection process. The scholarship should be awarded to best fitting person offering top-qualities. A policy paper and guidelines for postgraduate students has been developed. The partners must ensure its use and implementation in a joint effort. The VLIR-UOS policy requires that PhD scholarship candidates are bound to the institution to contribute to capacity building. |  |
| <b>Management Response</b> (Agree, partially agree, disagree):              | Partially disagree   |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b> | Candidates for a VLIR-UOS scholarship have to be staff of the partner institute. Staff members are selected on the basis of clear profiles and set criteria. As NM-AIST is developing as a high standard research university, only candidates exceeding a cut-off grading value are selected. Only the fraction of those staff members that doesn't hold a PhD degree is eligible for a VLIR-UOS scholarship. For phase 1, the number of available staff members was very limited. As such maybe candidates were selected that were  |  |

|   | probably not skilled or passionate enough for the particular subject. But this has nothing to do with a rather closed recruitment procedure.  |
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| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed)  |
| As not enough available PhD candidates are present amongst staff on campus, new PhD candidates for phase 2 were recruited on the basis of profiles announced on the NM-AIST website. Candidate lists were checked by all teams and most appropriate candidates were shortlisted and invited for interviews taking place during the formulation mission. | The new selection round was initiated some time before the formulation mission. Selection of students by means of interviews by all team members present was done during the formulation mission. We agree that publicising through the website is still not reaching a wide audience. Further efforts will have to be taken to still announce job opportunities at national level.   |
| <b>Recommendation 8:</b>  | Improve supervision, guidance, and communication with post-graduate students (N-S). Define role of local supervisors and develop a framework for effective supervision and empowerment of ("sandwich") PhD students and conflict resolution.  |
| <b>Management Response</b> (Agree, partially agree, disagree):  | Partially agree   |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>   | Supervision problems are definitely a general problem for all PhD researchers. Several platforms were put in place to improve communication and effectiveness of supervision on phase 1, but were not taken up by several PhD researchers. It is to a large extent a mentality problem of some of the PhD students that lack authority and assertivity. It is true that projects 1 and 2 in phase 1 were assembled in a rather artificial way for budget reasons. This did indeed result in rather complex project structure and diffuse responsibility of project members. |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed)  |

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| Phase 1 projects 1 and 2 that were in fact each the result of the merging of two projects, were now each uncoupled, resulting in three independent projects (P1-P3, as the hydrology component of former project 2 is now integrated in P1). This should result in more streamlined responsibilities and supervisory structures. |  | This new structure was appreciated by the evaluation commission, was accepted by all teams and will be implemented as from the start of phase 2.   |
| Platforms that were installed for frequent communication and discussion sessions amongst PhD students and their local teams will be re-activated.  |  | As from the start of phase 2.  |
| Responsibilities of all team members will be revised and clearly formulated in the management manual.  |  | As from the start of phase 2.  |
| <b>Recommendation 9:</b>   |  | PhD students must be made responsible to report timely to both universities in the North and NM-AIST and stimulate dialogue and debate across the institutions at formal and informal level. Milestones for ongoing research should be set and followed-up. The attendance and active participation of PhD students enrolled at Belgian universities at NM-AIST activities, seminars and events should be compulsory and not voluntary. The format could be public presentations, short science talks or speed date events. Informally, brown bag luncheon or teas are adequate measures. Timely and appropriate decision making in case of non-performance of PhD due to factors beyond the control and influence of the institutions involved is advised. Significant delays are bad examples, which are observed by other students. |
| <b>Management Response</b> (Agree, partially agree, disagree):   |  | Agree  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>  |  |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>   |  | <b>Implementation stage</b> (not started, underway, completed)   |
| Almost all recommendation made here are perfect and needed but are in most cases already installed (see also former point). Milestones and deliverables (conferences and publications) form an essential component of the training students get in the doctoral schools.   |  | Is already implemented   |
| Platforms for discussions were already installed in phase 1 but only used once. They will be re-activated.   |  | Will be reactivated in phase 2.  |

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| <p>We agreed on a maximum duration of 4 years + 6 months for a maximal duration of a PhD, as suggested by the evaluation commission. The only problem is that this is not really gender-equal. For example, during phase 1, 3 of our PhD students gave birth (one student even twice).</p>   |   | <p>This will be already announced during the interviews with candidate PhD researchers during the formulation mission and will be implemented as from the start of phase 2.</p> |
| <p><b>Recommendation 10:</b></p>   | <p>The support of post-doctoral researchers (returning PhD students or existing staff) through specific training (e.g. on outreach and transfer, large-scale project management, action-research, business development, pedagogic and didactical skills etc.) and the formulation of advanced and highly focused research questions complementing ongoing research are recommended options for a Phase II. Support of post-doctoral staff would directly contribute to alleviate staff retention problems, particularly in ICT or private sector or related research.</p> |   |
| <p><b>Management Response</b> (Agree, partially agree, disagree):</p>  | <p>agree</p>  |   |
| <p><b>If recommendation is rejected or partially accepted, report reasons:</b></p>   |   |   |
| <p><b>Actions Planned /Actions taken + timeframe (action finalised)</b></p>  |   | <p><b>Implementation stage</b> (not started, underway, completed)</p>   |
| <p>We entirely agree with this strategy which we hope will be realized in a natural way. As recruited PhD students are at same time staff at NM-AIST, once finished with thesis work they can take up their role as a post-doctoral researcher and lecturer and valorize gained experience in phase 1 in research and education. In the past the FC also attempted to get agreement from VLIR-UOS to recruit post-doctoral researchers from outside the institute but this was not accepted. Post-doctoral researchers indeed do have a crucial function in supervision of PhD students, publishing of research results, organisation of discussion groups, etc.</p> |   | <p>As from the moment that first PhD students promote.</p>  |
| <p><b>Recommendation 11:</b></p>   | <p>Consider a specific module for current or new staff (returning PhDs) on relevant teaching and didactics of higher education to link theory and practice.</p>   |   |
| <p><b>Management Response</b> (Agree, partially agree, disagree):</p>  | <p>Agree.</p>   |   |



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| <b>If recommendation is rejected or partially accepted, report reasons:</b>   |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed)   |
| The integration of returning PhD's in didactical modules is planned to be conducted by the Centre for Research, Agricultural Advancement, Teaching Excellence and Sustainability (CREATES) for the whole institution. VLIR-UOS program shall take the advantage of this and ensure that its graduates follow the program. | Follow-up with CREATES   |
| <b>Recommendation 12:</b>   | Test innovative methods of research. Action research or upscaling of research projects under field conditions could be new fields of activity.   |
| <b>Management Response</b> (Agree, partially agree, disagree):  | agree  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>   |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed)   |
| We agree because this is exactly what we attempt in all research projects. In phase 2 even more attention will be paid on the design of targeted experimental work to complement the field research.  | Was implemented in phase 1 and will be further implemented in phase 2.   |
| <b>Recommendation 13:</b>   | Ensure scientific quality of postgraduate theses and any publishable academic work. Currently, the testing for plagiarism is left to the supervisors, as there is no software at the university. This testing facility should be offered centrally in the library.   |
| <b>Management Response</b> (Agree, partially agree, disagree):  | Disagree   |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>   | The turn-it in software is currently being used for plagiarism tests, as plagiarism is a serious problem. Plagiarism is tested at different levels including at supervisory level. The academic office is responsible to check all submitted dissertations for plagiarism. Regardless of the place where plagiarism is noted there is a stern punishment including discontinuation from studies. Two students have already being expelled because of plagiarism. |



| Actions Planned /Actions taken + timeframe (action finalised)   |   | Implementation stage (not started, underway, completed)  |
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| We will continue checking plagiarism cases and take stern actions to violator   |   | Is already implemented   |
| <b>Recommendation 14:</b>   | Develop and implement guidelines for staff and student exchange and cooperation: Exchange programmes for students from the North should be ethical (not simply taking data collected by southern students to use them for thesis or publications) and based on reciprocal sharing of benefits between partners. The recommendation was formulated based on the observations that there are apparently different subjective experiences and views from the North and the South on the role of postgraduate students in the past. That is why we recommend to set-up a clear guidelines and instructions for the students from the North and the South to avoid misunderstandings in conducting research. |  |
| <b>Management Response</b> (Agree, partially agree, disagree):  | agree   |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>   |   |  |
| Actions Planned /Actions taken + timeframe (action finalised)   |   | Implementation stage (not started, underway, completed)  |
| We agree with this recommendation as this is exactly the structure that was discussed and accepted several times at JSCM's. But there indeed still seems to be some misunderstandings, most probably amongst the PhD researchers that usually hardly participate actively in the meetings. When MSc students from the north come to work in the South, it is under the guidance of a local project leaders and PhD researcher. Research activities are always conceptualised so that they will make an essential part of the PhD activities of the southern researchers. This is the perfect win-win construction that should result in common papers with the PhD researcher as first author. All this is discussed and mentioned in the management manual. It will be repeated with the start of the phase 2. We will also make the PM more responsible to receive students from the north and introduce them to key-players on campus. |   | All measures were discussed several times in phase 1 and were implemented. They will be re-activated during the first JSCM in phase 2. |

| <b>Recommendation 15:</b>   | It is recommended to establish an in-house training and staff development programme for technical and support staff. Laboratory work and ICT support are the backbone of high quality research and new devices require training on handling and maintenance. Staff recognition measures are needed to alleviate staff motivation and retention problems. A staff development programme should consider technical and support staff. |  |
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| <b>Management Response</b> (Agree, partially agree, disagree):              | Agree   |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b> |   |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>        | <b>Implementation stage</b> (not started, underway, completed)  |  |
| Critically analyse training needs of technical and support staff            | Not started   |  |
| Prepare in-house training programme for the different needs                 | Not started   |  |
| Design a motivational or recognition methods/tools (certificate...)         | Not started   |  |
| Carry out the trainings   | Not started   |  |

## Project 1: Sustainable smallholder banana-based farming systems to improve livelihoods of communities in Northern Tanzania, Pangani region

### Follow-up on recommendations

| <b>Recommendation 1:</b>  | Increased synergy with other projects at NM-AIST               |  |
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| <b>Management Response</b> (Agree, partially agree, disagree):  | Agree  |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>   |  |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed) |  |
| In phase II, project 1 has planned for clear links with the other projects within VLIR-UOS and relevant synergy respective existing projects at NM-AIST. To increase synergy between water and soil sciences, the | Not started  |  |

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| water component of the phase 1 project 2 is now integrated in the new project 1. This will also improve efficacy of supervision. In phase 2 interactions will be established with the new project 2, especially as for the water sanitation component. With the new project 3, the impact of applied pesticides in banana farming systems on aquatic ecosystems will be tested. Communication applications to inform the local communities will be developed through project 4, while project 5 will aid in the incubation and valorization of research results for extension purposes. |  |
| P1 has initiated collaborations with the African Centre of Excellence (ACE II) responsible for research in agriculture and nutrition (CRE-ATES)   | Underway   |
| Recommendation 7:   | Open recruitment of PhD student to include a wider public to attract more qualified and competent candidates |
| Management Response (Agree, partially agree, disagree):   | Agree  |
| If recommendation is rejected or partially accepted, report reasons:  |  |
| Actions Planned /Actions taken + timeframe (action finalised)   | Implementation stage (not started, underway, completed)  |
| Recruitment process for the phase II PhD student involved public advertisement made through the institutional website   | Completed  |
| Intensive oral interview was undertaken for each candidate with a panel involving both north and south project members  | Completed  |
| The selection will be done based on the merit as per the defined criteria   |  |
| Recommendation 8:   | Improve supervision guidance and communication with the PhD students (N-S)                                   |
| Management Response (Agree, partially agree, disagree):   | Agree  |
| If recommendation is rejected or partially accepted, report reasons:  |  |
| Actions Planned /Actions taken + timeframe (action finalised)   | Implementation stage (not started, underway, completed)  |
| The roles of supervisors in both institutions were discussed and agreed during the formulation phase and shall be implemented   | Underway   |
| Recommendation 9:   | PhD students must be made responsible to report timely to both universities in the North                     |

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|   | and NM-AIST and stimulate dialogue and debate across the institutions at formal and informal level   |
| Management Response (Agree, partially agree, disagree):   | Agree  |
| If recommendation is rejected or partially accepted, report reasons:  |  |
| Actions Planned /Actions taken + timeframe (action finalised)   | Implementation stage (not started, underway, completed)  |
| It was agreed in principle between the partner institutions that the attendance and active participation of PhD students enrolled at Belgian universities in NM-AIST activities, seminars and events should be compulsory and not voluntary | Underway   |
| <b>Recommendation 10:</b>   | The support of post-doctoral researchers (returning PhD students or existing staff) through specific training (e.g. on outreach and transfer, large-scale project management, action-research, business development, pedagogic and didactical skills etc.) and the formulation of advanced and highly focused research questions complementing ongoing research are recommended options for a Phase II |
| <b>Management Response</b> (Agree, partially agree, disagree):  | Agree  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>   |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed)   |
| It was agreed among the project members that upon completion, the PhD students in phase I shall be actively involved in the phase II activities in terms of outreach and scaling-up as part of their post-doctoral responsibilities         | Underway   |
| <b>Recommendation 12:</b>   | Test innovative methods of research. Action research or upscaling of research projects under field conditions could be new fields of activity  |
| <b>Management Response</b> (Agree, partially agree, disagree):  | Agree  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>   |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed)   |
| The upcoming phase II activities shall involve action research and up-scaling of the project findings under field conditions with farmers   | Underway   |
| <b>Recommendation 13:</b>   | Ensure scientific quality of postgraduate theses and any publishable academic work. Currently, the testing for plagiarism is left to the supervisors, as there is no software at the university  |

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| <b>Management Response</b> (Agree, partially agree, disagree):              | disagree   |
| <b>If recommendation is rejected or partially accepted, report reasons:</b> | The quality of publications at NM-AIST is ensured through plagiarism check by a software ( <i>turnitin</i> ) managed at the institutional level and it is a condition that all articles should be published in science index journals (ASI) of which a list is provided by the institution or other ASI journals found in the index copernicus and claviate analytics journals master list |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>        | <b>Implementation stage</b> (not started, underway, completed)   |

## Project 2: Development of water purification technologies

### Follow-up on recommendations

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| <b>Recommendation 1:</b>  | The sanitation project should work on nutrient cycling (constructed wetlands)   |  |
| <b>Management Response</b> (Agree, partially agree, disagree):  | Agree   |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>                                 |   |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed)  |  |
| This suggestion has been included in phase 2 by considering nitrogen and phosphorus recycling in IR1.       | Starting in year 1 of phase 2   |  |
| <b>Recommendation 2:</b>  | The sanitation project should work on socio-ecological assessment before up-scaling   |  |
| <b>Management Response</b> (Agree, partially agree, disagree):  | Agree   |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>                                 |   |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed)  |  |
| This is taken into account by identifying the barriers impeding the use of constructed wetlands in phase 2. | Starting in phase 2   |  |
| <b>Recommendation 3:</b>  | The sanitation project should work on fluorine contamination and heavy metals issues (resources?)   |  |
| <b>Management Response</b> (Agree, partially agree, disagree):  | Partially agree   |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>                                 | Heavy metals are not considered in the context of the project in order to remain realistic; this is expected as a post-intervention action. |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed)  |  |

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| Fluoride contamination and remediation is defined as a key action for phase 2.   |  | Starting in phase 2.   |
| <b>Recommendation 4:</b>   | The sanitation project should work on recovery of Phosphorus and other elements (water to be used in agriculture)  |  |
| <b>Management Response</b> (Agree, partially agree, disagree):   | Agree  |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>  |  |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>   |  | <b>Implementation stage</b> (not started, underway, completed) |
| See Recommendation 1.  |  | Starting in phase 2.   |
| <b>Recommendation 5:</b>   | The sanitation project should work on integrating constructed wetlands with existing sewage systems (municipal councils, city councils) and combining with biogas generation   |  |
| <b>Management Response</b> (Agree, partially agree, disagree):   | Disagree   |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>  | This is probably unrealistic. Operational principles of classical systems are quite different from the constructed wetlands approach. Integration with other technologies is only to a very limited extent possible; e.g., in particles removal as pre-treatment, or in post-treatment technologies. Biogas formation requires anaerobic conditions, which is not compatible with a wetland.   |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>   |  | <b>Implementation stage</b> (not started, underway, completed) |
| <b>Recommendation 6:</b>   | <p>The sanitation project should work on expanding the idea of constructed wetlands to industrial waste (current focus is on human waste)</p> <p>In sanitation, awareness on constructed wetlands should be increased among stakeholders and communities. Currently, constructed wetlands exist only in few schools and factories. The idea is to upscale research findings into settlements especially in urban and peri-urban areas where waste water management is a serious problem.</p> |  |
| <b>Management Response</b> (Agree, partially agree, disagree):   | Agree  |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>  |  |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>   |  | <b>Implementation stage</b> (not started, underway, completed) |
| The intended use of constructed wetlands is indeed in industrial as well as in community context. The plan for phase 2 is in the identification of barriers impeding the use of constructed wetlands; and then, interaction and advice to interested partners on design and application of constructed wetlands (Intermediate Result 2). |  | Starting in phase 2.   |
| <b>Recommendation 7:</b>   | The sanitation project should work on considering WISE-Futures (and eventually CREATES and other ongoing projects)   |  |

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| <b>Management Response</b> (Agree, partially agree, disagree):   | Agree  |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>  |  |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>   | <b>Implementation stage</b> (not started, underway, completed)                           |  |
| WISE-Futures centre of excellence in Water Infrastructure and sustainable energy is focusing on three main areas namely: Water resources, Water and Sanitation and Sustainable Energy securities. These areas overlaps well with those that are being covered under the phase 2 of the VLIR programme under this project, especially the water treatment technologies. Additionally there are other projects such as FLOWERED in which one of the focus is on materials for defluoridation of water supplies and the other area being the mitigation of fluoride impacts in the cropping and livestock systems of Ngarenanyuki area, North Western part of Mt. Meru, an area that is part of the Pangani Basin. This synergy and overlap will therefore encourage collaborations and supplementation of efforts to achieve the envisaged results with support from the North partners. | Collaborations will start in phase 2, however these other projects are underway already. |  |

## Project 3: Applied aquatic ecology

### Follow-up on recommendations

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| <b>Recommendation 1:</b>  | Need to enhance confidence of the PhD students through active mentoring                          |  |
| <b>Management Response</b> (Agree, partially agree, disagree):  | Partially agree  |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>   | Remote active mentoring is only possible when students respond to emails and adhere to deadlines |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed)                                   |  |
| Mutual responsibilities are emphasized explicitly. More regular feedback moments are planned. Senior PhD students should help support new starters. | Underway   |  |

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| <b>Recommendation 2:</b>  | Active PhD students do not understand why students not delivering any result are still supported |  |
| <b>Management Response</b> (Agree, partially agree, disagree):              | Agree  |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b> |  |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>        | <b>Implementation stage</b> (not started, underway, completed)                                   |  |
| The PhD of students that do not deliver will be terminated                  | completed  |  |



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| <b>Recommendation 3:</b>  | PhD projects operate in relative isolation. They did not reach tangible results regarding expected research output and capacity building. |  |
| <b>Management Response</b> (Agree, partially agree, disagree):              | Agree   |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b> |   |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>        |   | <b>Implementation stage</b> (not started, underway, completed) |
| More links between PhD projects are established                             |   | started  |
| <b>Recommendation 4:</b>  | Better integrate stakeholders   |  |
| <b>Management Response</b> (Agree, partially agree, disagree):              | Agree   |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b> |   |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>        |   | <b>Implementation stage</b> (not started, underway, completed) |
| Two stakeholder meetings are planned for the second phase                   |   | started  |

## Project 4: Institutional strengthening through ICT and informatics

### Follow-up on recommendations

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| <b>Recommendation 1:</b>  | Increased synergy with other projects at NMAIST as well as with other VLIR-UOS projects |  |
| <b>Management Response</b> (Agree, partially agree, disagree):  | Agree   |  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>   |   |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  |   | <b>Implementation stage</b> (not started, underway, completed) |
| In this phase II, project 4 has planned for clear links with the other projects within VLIR-UOS and relevant synergy respective existing projects at NMAIST |   | Not started  |

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| <b>Recommendation 7:</b>                                       | Open recruitment of PhD students to include a wider public to attract more qualified and competent candidates |  |
| <b>Management Response</b> (Agree, partially agree, disagree): | Agree   |  |



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| <b>If recommendation is rejected or partially accepted, report reasons:</b>   |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed) |
| Recruitment process for the phase II PhD student involved public advertisement made through the institutional website   | Completed  |
| Intensive oral interview was undertaken for each candidate with a panel involving both north and south project members. | Completed  |
| The selection will be done based on the merit as per the defined criteria   |  |

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| <b>Recommendation 8:</b>  | Improve supervision guidance and communication with the PhD students (N-S) |
| <b>Management Response</b> (Agree, partially agree, disagree):  | Agree  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>   |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>  | <b>Implementation stage</b> (not started, underway, completed)             |
| The roles of supervisors in both institutions were discussed and agreed during the formulation phase and shall be implemented | Underway   |

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| <b>Recommendation 9:</b>   | PhD students must be made responsible to report timely to both universities in the North and NM-AIST and stimulate dialogue and debate across the institutions at formal and informal level. |
| <b>Management Response</b> (Agree, partially agree, disagree):   | Agree  |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>  |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>   | <b>Implementation stage</b> (not started, underway, completed)   |
| It was agreed in principle between the partner institutions that the attendance and active participation of PhD students enrolled at Belgian universities in NM-AIST activities, seminars and events should be compulsory and not voluntary. | Underway   |

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| <b>Recommendation 10:</b>                                      | The support of post-doctoral researchers (returning PhD students or existing staff) through specific training (e.g. on outreach and transfer, large-scale project management, action- research, business development, pedagogic and didactical skills etc.) and the formulation of advanced and highly focused research questions complementing ongoing research are recommended options for a Phase II. |
| <b>Management Response</b> (Agree, partially agree, disagree): | Agree  |

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| <b>If recommendation is rejected or partially accepted, report reasons:</b>  |  |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>   | <b>Implementation stage</b> (not started, underway, completed) |
| It was agreed among the project members that upon completion, the PhD students in phase I shall be actively involved in the phase II activities in terms of outreach and scaling-up as part of their post-doctoral responsibilities. | Underway   |

|   |   |
|---|---|
| <b>Recommendation 12:</b>   | Test innovative methods of research. Action research or upscaling of research projects under field conditions could be new fields of activity |
| <b>Management Response</b> (Agree, partially agree, disagree):  | Agree   |
| <b>If recommendation is rejected or partially accepted, report reasons:</b>                           |   |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>                                  | <b>Implementation stage</b> (not started, underway, completed)  |
| The upcoming phase II activities shall involve action research and up-scaling of the project findings | Underway  |

|   |  |
|---|--|
| <b>Recommendation 13:</b>   | Ensure scientific quality of postgraduate theses and any publishable academic work. Currently, the testing for plagiarism is left to the supervisors, as there is no software at the university.   |
| <b>Management Response</b> (Agree, partially agree, disagree):              | Disagree   |
| <b>If recommendation is rejected or partially accepted, report reasons:</b> | The quality of publications at NMAIST is ensured through plagiarism check by a software (turnitin) managed at institutional level and it is a condition that all articles should be published in science index journals (ASI) list provided by the institution or other ASI journals found in the index copernicus and claviate analytics journals master list |
| <b>Actions Planned /Actions taken + timeframe (action finalised)</b>        | <b>Implementation stage</b> (not started, underway, completed)   |

## Project 5: Institutional strengthening through Technology Transfer and Outreach Services

### Follow-up on recommendations

N/A; as this is a new project there were no specific comments. However some remarks were made on the science park module in the phase 1 project 3.