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Ex-Post Evaluation Report on the Project for Effective ICT Education at the College of Engineering and Technology, University of Dar es Salaam, Tanzania

한국국제협력단

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This evaluation study was written by the evaluation team led by Dr. Paek from Sangmyung university. The views expressed in this report do not necessarily reflect KOICA's position.

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List of Abbreviations

UDSM(University of Dar Es Salaam)

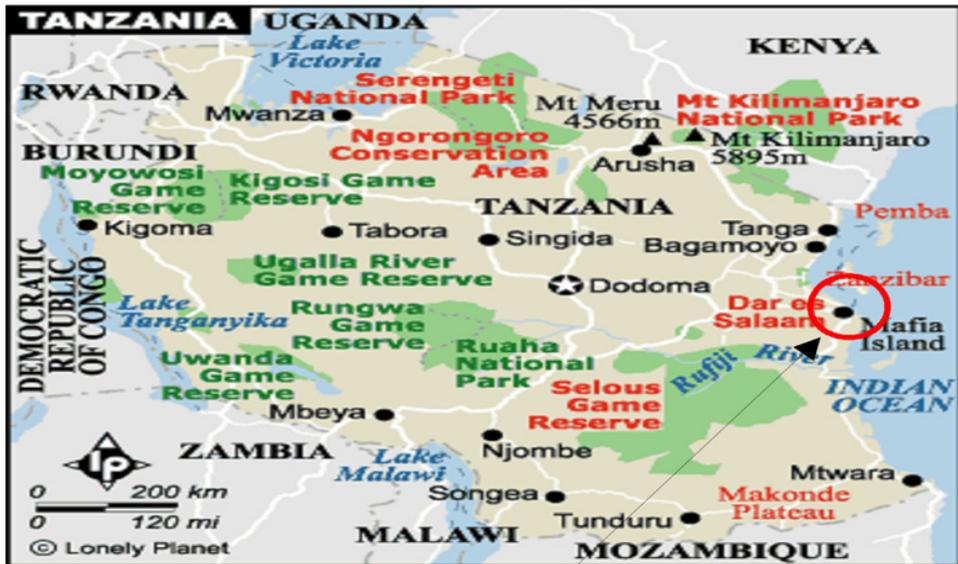
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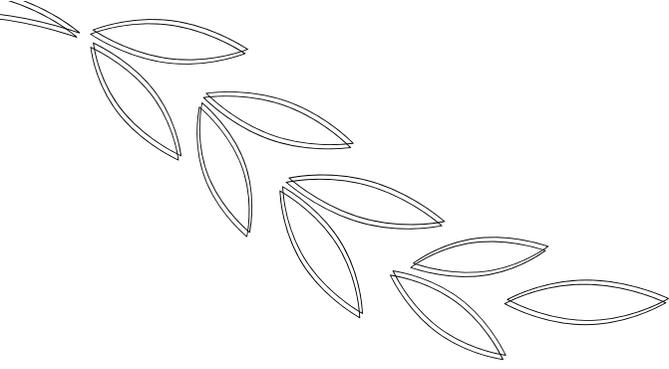
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List of Abbreviations

Abbreviation	Official name
CEBE	Civil Engineering and Built Environment
CoET	College of Engineering Technology
CoICT	College of Information & Communication Technology
CVL	Center for Virtual Learning
ECSE	Electrical and Computing Systems Engineering
FoED	Faculty of Education
GDP	Gross Domestic Product
ICT	Information & Communication Technology
KOICA	Korea International Development Agency
MECHE	Mechanical and Chemical Engineering
OECD	Organization for Economic Cooperation and Development
SICT	School of Information & Communication Technology
TCU	The Tanzania Commission for Universities
UDSM	University of Dar es Salaam
UCC	University Computer Center
UNESCO	United Nations Education, Science, and Cultural Organization

UDSM(University of Dar Es Salaam)





Summary



Summary

This report evaluates the ICT education capacity building project carried out by KOICA at the College of Engineering and Technology (CoET) of University of Dar Es Salaam in Tanzania. Following the evaluation criteria recommended by OECD/DAC, the report focuses on the analysis of the relevance, effectiveness, efficiency, sustainability, and impact of the project .

This will enable us to analyse what aspects of the project has been a success or failure, from which we can derive lessons for similar future projects, and suggest possible improvements, which can be reflected in the future KOICA cooperation project to improve the quality of the cooperation.

In this report, firstly the performance evaluation is carried out to test whether each stage of the project has achieved its goal by devising a logical framework suitable for the nature of the ICT project for higher education. Secondly, the evaluation criteria are developed and the process evaluation has been conducted in order to look at whether the design and execution of the project has been compatible with the system and institution of the recipient country. Accordingly, the collected data is analysed for objective evaluation results.

The project is evaluated overall as successful in terms of its effectiveness and impact. As a results of the project, the training facilities have been improved at the CoET, providing more practical training for students. The facilities are also utilized to run workshops, conferences, cyber education for the general public, contributing to the expansion of the ICT education in general.

The project also partially contributed to bring fund from organizations such as the World Bank for the buildings at the relocated Kijitonyama campus (which is called STHEP - Science and Technology for Higher Education Project, and it is on stage 1), and subsequently, the number of students on the campus is going to increase from 400 to 1200. This shows how the project has contributed to the expansion of the ICT education at the university level.

CoICT(College of Information and Communication Technology) has been newly established at the Kijitonyama Campus secured by the current project, and this is expected to facilitate the concentration of educational capacity and the enhancement of quality of the ICT education.

The issue of sustainability has been examined in terms of finance, policy, technological, and management personnel. Firstly, as the UDSM aspires to be the best university not only in Tanzania, but in East Africa, it has been confirmed that it receives financial assistance from the government as well as other aid organizations including the World Bank.

Another factor in the growth of the ICT related departments is that they have been the main recipients of academic loans. The CoICT and CoET retains skilled maintenance personnel, and receives license support and technological and training support from the UCC (University Computing Center), a UDSM subsidiary company. This has made the project technologically sustainable.

Overall, the aid of equipment and resource for remodeling and ICT training in preparation of relocating to the Kijitonyama campus is evaluated positively in terms of its impact and sustainability.

However, KOICA and/or PMC approached this project from vocational training perspective, not from a higher education perspective. As a result, it has been less effective in invitational training and expert dispatch. As a higher education

institution offering undergraduate as well as graduate programs, the goal of CoET and CoICT is to produce elite workforce to lead industry and education and research sectors. This goal should have been incorporated into curriculum design, material development, and invitational training programs. The future project will greatly benefit from a pre-project survey and consultation with higher education experts regarding the PMC selection.

UDSM did not meet the deadline for remodeling which was supposed to be done by UDSM's budget and this resulted in the delay of the whole project. Engineering experts could have been involved before the completion and played more active role in the capacity building. The project was focused on the areas of IT education (ICT related departments) and IT application education (non-ICT departments). More balanced support would have achieved higher degree of effectiveness.

Table 1 outlines the main results of evaluation based on the five criteria.

<Table 1> Main results of evaluation

Criteria	Questions	Source	Results
relevance	<ol style="list-style-type: none"> 1) relevance of the project to policy, beneficiaries, goals 2) relevance of the project planning 	policy documents, beneficiary interviews	<p>The planning of the project was relevant, but not entirely in tune with the beneficiary's goals. More consultation with the beneficiary was needed in the planning stage.</p>
efficiency	<ol style="list-style-type: none"> 1) Has the project been completed according to the schedule and within the budget 2) Has the distribution of the budget been appropriate 3) Have appropriate methods been employed to execute the project 	policy documents, beneficiary interviews	<p>Overall, primary project activities (facility remodelling and renovation, equipment provision, capacity building of the recipient country) have been efficiently carried out. KOICA also paid the cost of remodelling renovation which was originally to be paid by the recipient country, to meet the deadline for the completion of the project. Measures are needed to prevent the reoccurrence of this kind of risk. The insufficient analysis of the recipient country's needs and tight schedule deterred maximizing the efficiency of capacity building.</p>

<Table 1> continued

Criteria	Questions	Source	Results
effectiveness	<ol style="list-style-type: none"> 1) renovated labs and equipment provision 2) curriculum and training materials development 3) training programs for managers and teachers 4) ICT education infrastructure and ICT application system 	project documents, beneficiary interviews	The target for hardware building (lab renovation and equipment provision) is reached, but meeting the target for soft-power building (curriculum revision) is to face considerable difficulty
sustainability	<ol style="list-style-type: none"> 1) policy-related 2) finance-related 3) administrative-related 4) technology-related 	project/policy documents, beneficiary interviews	On assessing the recipient country's policy, finance, administration, and skilled workforce, the country is judged as highly motivated, and thus the project as sustainable.
impact	<ol style="list-style-type: none"> 1) Expansion and capacity building of CoICT 2) spread of ICT education to other areas 3) Economic impact 	policy documents, beneficiary interviews	The establishment of the CoICT at the end of the project will encourage the spread of ICT education to other areas of Tanzania, and the CoICT is expected to take a leading role.

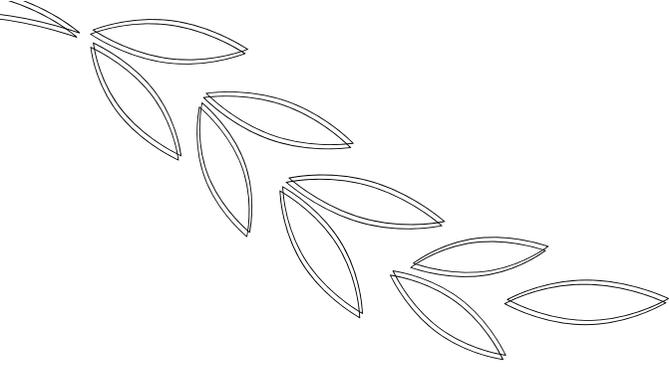
Following are the lessons and insights gained from the evaluation.

First, the current project has been carried out at the time when the recipient country is highly motivated to build ICT education capacity and expand the ICT industry infrastructure. And the infrastructure aid itself has had much wider impact than expected. This highlights the importance of the understanding of the recipient country's situation and needs for any future project.

Secondly, in planning future projects for capacity building for the higher education organizations, it is vital to approach them from the higher education perspective, and to focus on improving infrastructure and building capacity of

recipients from higher education perspective.

Finally, a system for result-based management needs to be designed and sustained in the future. Most importantly, during the planning stage, a plan for managing the outcome of the project should be set up, and the responsibility for baseline-data collection for evaluation criteria should be made explicit. By continuous utilization and revision of the PDM, the management of the project outcome can also be improved and it helps share the outcome with the recipient country for efficient and responsible management.



Outlines of Evaluation



I

Outlines of Evaluation



A. Background to and goals of the evaluation

- The spread of Information & Communication Technology (ICT) is accelerating in developing countries, and training of ICT professionals is becoming increasingly important¹⁾. In response to this, the Korean government is cooperating for ICT development with developing countries.
- In an effort to provide assistance to developing countries, the Korean government is channeling 6.14% of the total aid budget to ICT-related sectors and the figure is shown to be higher than average among the DAC donor countries²⁾.

<Table 2> Distribution of KOICA aid across sectors

Rank	Sector	Total score
1	Education	23
2	ICT	22
3	Environments	21

Source: A Korean model of development cooperation (KOICA, 2010)

- Specially, with the increasing number of Korean and global companies entering the African market, the demand for ICT professionals is expected to increase

1) Research for effective ICT workforce training program of the developing countries(KOICA, 2011)

2) A Korean model of development cooperation: sector specific programs based on Korean experience and comparative superiority (KOICA, 2010)

steadily. With this in mind, a project for ICT education capacity building was implemented at the College of Engineering and Technology of University of Dar es Salaam from 2006 to 2008.

- This report assesses the effects and impact of the ICT capacity building conducted at the UDSM, discusses some of the issues observed during the implementation of the project, and proposes ways to improve the planning, implementation and management of future projects.



■ B. The scope of evaluation

- The evaluation is based on the five criteria recommended by OECD/DAC which are relevance, efficiency, effectiveness, sustainability, and impact of the project outcomes.
- A performance evaluation is carried out to measure how successfully a goal is achieved at different stages of the project and to see how the project has had positive impact on the fostering of first class ICT professionals in Tanzania.
- A process evaluation is performed on the identifying, planning, and implementing of the project in order to examine what impact (positive or negative) the project performance system has had on achieving the project's goals.
- The performance and process evaluations enable to analyze the success and failing points of the project, and to propose how the project performance system can be improved. The findings can be incorporated into policy-making for future KOICA cooperation project, contributing to improving the quality of Korean ODA.



C. Description of the project

1. Outline of the project

<Table3> Outline of Project

		Description	
Project title		Project for effective ICT education at the College of Engineering and Technology, University of Dar es Salaam, Tanzania	
Budget/ Period		2 million USD / 3 years ('06-'08)	
Project objectives		To set up infrastructure for training of ICT personnel at the College of Engineering and Technology, University of Dar es Salaam, Tanzania, and to support IT industry development, and reduction of digital divide	
Project location		Dar es Salaam, Tanzania	
Beneficiary		The College of Engineering and Technology, University of Dar es Salaam, Tanzania	
Project details	donor country	Facility renovation	<ul style="list-style-type: none"> ○ Renovation of 8 ICT Labs
		Equipment provision	<ul style="list-style-type: none"> ○ IT hardware and software ○ Office equipment, A/V, furniture, generator, fiber-optic cable
		Training program	<ul style="list-style-type: none"> ○ Senior faculty course: two weeks, 6 participants ○ Junior faculty course : one month, 7 participants
		Expert dispatch	<ul style="list-style-type: none"> ○ Expert in charge: 1 person, five months ○ Field-specific experts: 3 persons, two months ○ Short visits from the PMC project manager
	Others	<ul style="list-style-type: none"> ○ Project managing budget and reserve funds for preliminary survey, implementation survey, project evaluation 	
	Recipient country	To provide IT lecture rooms, running budget, staff To build fiber-optic cable connection To provide customs clearance and transportation for equipment	
Expected outcomes		Recipient	ICT education infrastructure building and personnel training
Project implementation organization		Donor	KOICA
Recipient country		The College of Engineering and Technology, University of Dar es Salaam, Tanzania	

a) Characteristics of the project

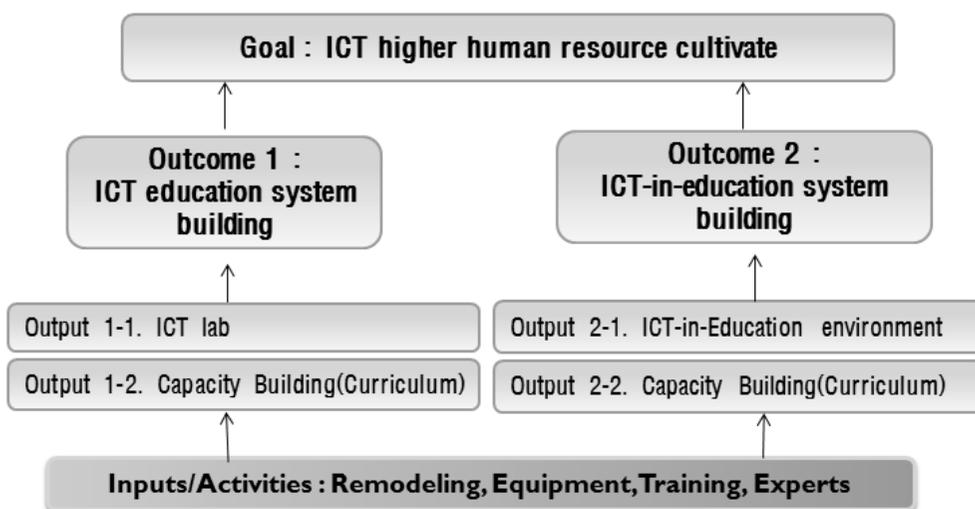
- The project provided computer labs to the College of Engineering Technology (CoET) of the University of Dar es Salaam(UDSM). The direct beneficiaries were the electrical science and computer engineering department (ECSE) which was relocated to the new campus, and the construction engineering department (CEBE) and mechanical engineering department (MECHE) on the old campus.
- Each lab donated to the three departments was built for the two differentiated purposes of ICT education and ICT application training.

<Table 4> Project input

		Center1	Center2
Beneficiary		electrical and computer science engineering department (ECSE)	civil engineering and the built environment department (CEBE), mechanical and chemical engineering department (MECHE)
Location		Kijitonyama Campus	CoET building on the main campus
Input	Equipment	Equipment for PC labs, micro processor lab, and network lab, generator	Equipment for PC labs
	Junior faculty training	2 participants	5 participants
	Expert	2(Computer, Information and communication)	1 (CAD)

b) Logical framework of the project

[Fig. 1] Logical framework of the project



2. Focus of the evaluation

- After the completion of the project, the Tanzanian government went through a restructuring,³⁾ and this changed governmental agencies involved in the project as outlined in <Table 5>.
- ICT-related education at the CoET is divided into two types. ICT is taught as a major subject in ECSE department, while ICT is utilized as a tool to enhance understandings of their major subjects in CEBE department and MECHE department. In this evaluation we analyze these two types of ICT-related education separately.
- As the project was completed, the restructuring of the university was being

3) Ministry of Science, Technology and High Education was restructured into Ministry of Education and Vocational Training, and Ministry of Communication and Science Technology.

planned⁴). According to the plan, ECSE was separated from the CoET, and joined the SICT (School of ICT) to form the CoICT(College of Information and Communication Technology). This resulted in the shift in stakeholder group.

<Table 5> Stakeholder Analysis

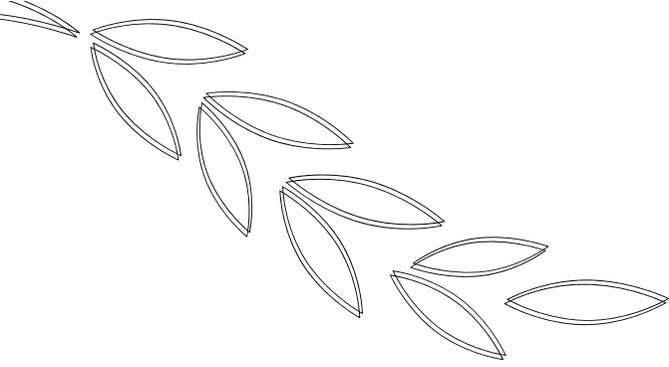
	Interested parties	During the project (2006~2008)	Present (2012.10)	Main Interests	
Directly involved	Government departments	Ministry of science, technology and high education	Ministry of education and vocational training	University capacity building for first class professionals	
	Recipient organization	UDSM		ICT ability enhancement for engineering students	
		CoET	ECSE	CoICT	To provide ICT education as a major subject
			Other	CoET	To provide training for ICT application
Indirectly involved	Students	CoET	ECSE	CoICT	To enhance hands-on practice on ICT
			Other	CoET	To enhance ICT application capacity
	Others	Industry		Employment of high quality ICT professionals	
		-	Ministry of communication, science and technology	Securing of professionals for ICT development	
		-	Other universities	benchmarking of ICT education program	

Data is organized by the evaluation team based on the project reports

- The project was conceived in 2006 before the university restructuring (2008). One focus of the evaluation is to examine how these unforeseen organizational changes affected the project, and how much of the evaluation carried out at the termination of the project completion is still valid.

4) Proposal for Reviewed CoICT Structure(UDSM, 2012)

- The project resource was divided into the center 1 and center 2, and the evaluation is done separately on the CoICT (formerly ECSE) and CoET as the beneficiaries.
- The establishment of the CoICT can be interpreted as a result of the university authorities' recognizing the importance of ICT education, and coincided with the project. In this regard, it is closely examined how the project may have impacted on the launch of the CoICT.



Evaluation Process and Method



II

Evaluation Process and Method



A. Evaluation items and methods

1. Evaluation criteria and items

- The relevance is concerned with how well the project is planned to cater for the donor/recipient country's cooperation policy and development priorities, and how suitable the selection process of input is for the project objectives and the recipient's demand.
- The efficiency criterion is concerned with how efficiently the resource was allocated and turned into the output.
- The effectiveness criterion is concerned with assessing how much of the project objectives was achieved based on the logical framework of the project.
- The sustainability criterion is concerned with how lasting the positive effects of the project are after the completion.
- The impact criterion is concerned with measuring all positive and negative, or intended or unintended effects of the project. In a narrow sense, it refers to any local, social, economic, environmental, and cultural change resulted from the project in continuation of the outcome of the logical framework.

- The gender and environmental criteria are concerned with how the planning, implementation, and evaluation of the project contributed to the gender and environmental mainstreaming.

<Table 6> OECD/DAC's evaluation criteria and key questions

Evaluation Criteria	Key Questions
Relevance	How well the project was planned to cater from the project objectives, and the recipient country's policy and needs and also the donor country's policy? How suitable was the selection of the recipient?
Efficiency	How efficient was the use of resource (time, budget, personnel) given the outcome of the project?
Effectiveness	How effectively were the objectives of facility renovation, equipment provision, curriculum development, and teacher capacity building achieved?
Sustainability	How policy-wise, financially, administratively, technologically sustainable is the UDSM's ICT education facility and equipment or system?
Impact	How did the project contribute to the expansion to the CoICT and capacity building? Did ICT education expanded to other areas of Tanzania? How much of economic impact would be expected from the project?
Gender & Environment	Did the project take account of the issue of gender and equality? Did the project have any impact on the gender and equality? Did the project take account of the environmental factors? Did the project have any impact on the environments?

2. Evaluation methods

- The evaluation team employed various methods following the evaluation procedures as outlined in <Table 7>.

<Table 7> Evaluation contents of evaluation method

Evaluation method		Subject	evaluation contents
literature study		Project related reports	Overall picture of the project
Interview	Korea	PMC, KOICA staff Project evaluator	Information on the project planning and resource allocation, a follow-up on the CoET after the completion of the project
	Tanzania	Ministry of high education ColCT, CoET	Changes at the ColCT/CoET after the project, and the standard of education at the ColCT/CoET assessed by other organizations
		Ministry of Communication and technology, TCU, UCC	Quality of ICT education at the ColCT and CoET assessed by other organizations
Questionnaire		12 ColCT lecturers	Satisfaction levels on the equipment, curriculum, and labs
		38 ColCT students	Satisfaction levels on the labs before and after the project

a) literature study

- literature study forms a basis for interview and questionnaire questions. A variety of domestic and international data was consulted to understand the unique context of the project, and evaluation criteria for higher education that are internationally applied were used.
- The subjects of literature study included a pre-project report, implementation survey report, PMC report, expert dispatch report, invitational training program report, mid-assessment report, end-of-project evaluation report, documents on Tanzania's development strategies and higher education

and ICT development strategies, various educational and ICT indexes, and other donor countries' project reports.

b) Interview

□ Korean participants

- Korean participants are interviewed in order to analyze and compare opinions and suggestions of different parties involved in the project. The key questions were on the project's connection to the Korean ODA policy, KOICA's cooperation policy, the process of multi-party negotiations in project planning and implementation, and the continuity with previous projects. KOICA staff, PMC staff, dispatched experts, and training program staff took part in the interviews.

□ Local participants

- Local project partners and stakeholder were interviewed in order to gather opinions on inputs, activities, and outputs of the project, and the results were compared with those of the interviews with the Korean counterparts.
- Participants included not only the CoET, CoICT, and the Ministry of Education and Vocational Training which were directly involved in the project, but the Ministry of Communication and Technology, Tanzania Commission of University, University Computer Center. And their varying perspectives on the project were analyzed.

c) Questionnaire

- UDSM was supposed to start academic term of 2012/2013 when the evaluation team visited Tanzania. But the Ministry of Education and Vocational Training delayed the date for the start of the term, the questionnaire could not

be distributed during the evaluation team's visit. Interview with students at UDSM could not be conducted neither. The survey was later organized by the CoICT and CoET and sent over.

- The questionnaire was given to teaching staffs and students at the CoICT and CoET. <Table 8> outlines the composition of the respondents.

<Table8> Composition of the questionnaire respondents

			Teaching staffs (18)		Students (96)		
			CoICT	CoET			
Gender	Male		8 (66.7%)	5 (83.3%)	Institution	CoICT	38 (39.6%)
	Female		4 (33.3%)	1 (16.7%)			58 (60.4%)
Degree	Bachelor	Domestic	1 (8.3%)	0 (0%)	Year ⁵⁾	First year	4 (4.1%)
		International	0 (0%)	0 (0%)			17 (17.7%)
	Master	Domestic	4 (33.3%)	1 (16.7%)		Second year	25 (26.0%)
		International	2 (16.7%)	0 (0%)			38 (52.1%)
	PhD	Domestic	2 (16.7%)	2 (33.3%)		Third year	38 (52.1%)
		International	3 (25.0%)	3 (50.0%)			-
Training experience	Yes		2 (16.7%)	1 (16.7%)	Final year	-	
	No		10 (83.3%)	5 (83.3%)		-	

5) 84 among 98 students answered on their school year.



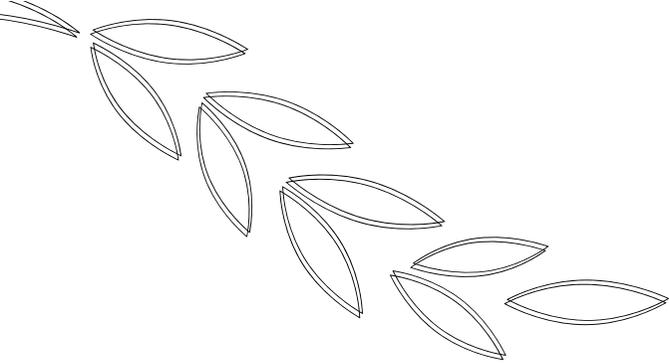
B. Evaluation matrix

○ <Table 9> shows details of the evaluation matrix.

<Table 9> Evaluation Maxtrix for the ICT capacity building for the CoET, UDSM

Evaluation type	Evaluation Criteria	Evaluation questions	Methods				
			Korea		Tanzania		
			D	I	D	Q	I
Process evaluation	Relevance	Was the project consistent with the recipient country's priority policy? Were the project objective and target appropriate? Were the timing, budget, and scale of the project adequate to achieve its objective?	•	•			•
	Efficiency	Was the project completed within the scheduled time and budget? Were human and material resources used to achieve maximum efficiency? Was there a channel for efficient mediation and communication? What were the structural factors undermining efficiency?	•	•			
	Gender	Were gender relations and equality taken into consideration from the planning stage? Was the recipient's gender-disaggregated data obtained? Were there any steps to promote women's participation?	•	•			
	Environments	Were there any activities causing environmental pollution? If so, were they appropriately dealt with?	•	•			•
Performance evaluation	Output	Were facility renovation, equipment support, and capacity building adequately achieved?				•	•
	Outcome	Was the infrastructure for the recipient's ICT education sufficiently established? Was the infrastructure for the recipient's ICT application education sufficiently established?				•	•
	Impact	Did the project contribute to improving ICT education in other universities?			•		•
	Sustainability	Did the recipient country provide necessary personnel and budget after the completion of the project? What are the factors undermining sustainability?			•		•

'D' stands for documents, 'I' for interview, 'Q' for questionnaire.



Results of the Comprehensive Post Evaluation



III

Results of the Comprehensive Post Evaluation

- The evaluation on each stage of the project is carried out based on the logical framework as presented in <Table 10>.

<Table 10> Key evaluation results based on the logical framework

Criteria	Contents		Source	Results		
Input	Repair and renovation, equipment, expert dispatch, invitational training		Project reports, beneficiary interviews	Despite the different forms of ICT education of the two departments, the same input was planned.		
				dept.	Computer	Construction & Mechanical
				Aim of practice	ICT education	ICT application
	Sector	education	training			
Activity	Repair and renovation	Remodeling of the new campus	Project reports, beneficiary, implementation agency data, interviews	<ul style="list-style-type: none"> -Due to the recipient organization's nonfulfillment of the promise, the project was delayed. -The same ICT equipment was provided to ECSE and two other engineering departments(CEBE and MECHE). However dispatched experts were selected primarily to support ECSE department. Provided resource and beneficiaries of the project components were not well matched. 		
	Equipment	Labs and equipment for computer, construction engineering, mechanical engineering departments				
	Expert dispatch	Expert dispatch to ECSE				
	Invitational training	6 managerial level, 2-3 staff level for each department				
Output1 (Labs)	CoICT(ECSE)		Project reports, beneficiary interviews	<ul style="list-style-type: none"> -Labs of the ECSE are used by the CoICT and well-maintained. -Most of the hardware is found to be in good working order, and software is still updated regularly 4 years after the completion of the project 		

<Table 10> continued

Criteria	Contents		Source	Results
	CoET			<ul style="list-style-type: none"> -Labs at the CoET are well-maintained, and a regular update of software is observed. -A number of PCs are set for replacement. Maintenance and repair are judged to be adequately funded by the university.
Output2 (Curriculum)	CoICT(ECSE)		Project and policy documents, beneficiary interviews	<ul style="list-style-type: none"> -No development of new curriculum was initiated by the project. -The existing curriculum is still being run.
	CoET			
Output3 (Teaching capacity)	Teaching capacity building		Implementation agency data, expert consultation, participants interviews	<ul style="list-style-type: none"> -Teaching staff recognized the lab-construction as the main objective of the project, but did not consider that no significant capacity building had been achieved by the project.
Outcome	Improvements of educational environments of UDSM	<ul style="list-style-type: none"> -CoICT campus -CoET labs 	Implementation agency data, beneficiary interviews, economic feasibility analysis, site inspection	<ul style="list-style-type: none"> -All labs at the CoET and CoICT are well-maintained, and maintenance and repair are adequately funded by the university. -Active cooperation with the UCC is maintained and the University ICT education environments are expected to improve constantly.
Impact	Expansion in education of highly skilled ICT professionals		Implementation agency data, participants interviews	<ul style="list-style-type: none"> -Establishment of CoICT Focused assistance to ECSC led to ECSC's capacity building, and contributed to its separation from the CoET, and upgrade to the independent college (CoICT).
				<ul style="list-style-type: none"> -Capacity building for CoICT The establishment of CoICT may be seen as the expression of the UDSM's determination for ICT education, triggering WB's development cooperation project to improve education environments of the CoICT.

<Table 10> continued

Criteria	Contents	Source	Results
			<p>-Expansion of training of ICT professionals In cooperation with World Bank, CoICT is expected to treble the number of students, and this will significantly increase the number of highly skilled ICT professionals.</p> <p>-Tanzanian ICT development ICT infrastructure in Tanzania has been developing rapidly, and highly skilled ICT professionals produced by the UDSM are expected to make a major contribution to ICT development in the country.</p>
	Decline in the ICT application education at the CoET	Participants interviews	<p>-Weakened ICT application education at the CoET Since the launch of the CoICT, the university's ICT education facility is focused on the CoICT</p>



■ A. Relevance evaluation

- Relevance evaluation is part of a process of evaluation which focuses on assessing whether the selection of project inputs is based on the recipient country's development needs, and if valid strategies are employed to meet the needs.
- Relevance evaluation involves assessing if the project is designed to adequately incorporate the recipient country's development policy, and take account of various interested parties' working systems and local contexts in order to facilitate the effective development cooperation.

- Relevance evaluation aims to test the validity of the project design in accommodating the local situation and needs.

1. Relevance evaluation in planning of the project

□ Relevance to the Tanzanian government's development policy

- In the Tanzania Development Vision 2025 (see Table 11), which was the basis for the project launch⁶⁾, ICT development in Tanzania is stated as fundamental to transforming the Tanzanian economy and life of its people, and it requires investment in education.

<Table 11> The Tanzania Development Vision 2025

Promotion of Information and Communication Technologies(ICTs)
Advanced micro-electronic information and communication technologies(ICTs) are central to a competitive social and economic transformation. ICT costs are continuing to fall while their capabilities and resultant profitability enhancements are increasing. These Technologies are a major driving force for the realization of the Vision. They should be harnessed persistently in all sectors of the economy and should be put to the benefit of all social groups with a view to enabling the meeting of basic needs of the people, increasing productivity and promoting competitiveness. The new opportunities which the ICTs are opening up can be harnessed to meet the goals of the Vision. However, appropriate skills and capabilities would have to be put in place. This task demands that adequate investments are made to improve the quality of science-based education and to create a knowledge society generally.

- In 2003, the Tanzanian government proposed a vision for ICT as a tool to reduce poverty and achieve sustainable economic and social development in the National Information and Communication Policy. Accordingly, a plan for the education of ICT professionals was launched (See Table 12). The objective of the project is evaluated as corresponding to this ICT development plan of the recipient country.

6) Basic Plan(KOICA, 2006. p3.)

<Table 12> Blueprint for education of ICT professionals in Tanzania

[Issues]

Tanzania is not the only country with insufficient numbers of skilled and experienced experts in ICT and in other professions that rely on ICT. It is therefore necessary to view Tanzania's human capital needs in the global context. Hard choices must be made between importing needed skills, or slowly nurturing them within the country. Other choices are needed on the priorities of realigning the educational and vocational training pipelines to meet the needs of our labour markets.

In addition, there are new opportunities in applying ICT to enhance education, including curriculum development, teaching methodologies, simulation laboratories, life-long learning and distance education and for teaching of not only ICT, but of all subjects and specializations. If embraced appropriately and supported at all levels, these could transform the country's human capital.

[Policy Objectives]

a) Increase the size and quality of ICT-skilled human resource base in Tanzania.

[Policy Challenges]

- i . Boosting the number of dedicated and qualified ICT professionals.
- ii . Refining the educational system.
- iii . Developing appropriate attitudes, knowledge and skills for ICT initiatives.
- iv . Integration of educational and vocational training opportunities.
- v . Creating appropriate employment and self-employment opportunities and related employment services for ICT and associated professions.
- vi . Creating opportunities for developing multi-skilled operatives and hybrid managers.
- vii . Evaluation and certification of "standard" ICT courses.
- viii . Developing remuneration and incentives packages for ICT-skilled staff with focus on retention schemes for skilled workers and moving from "brain drain" to "brain gain".
- ix . Creating opportunities for job enrichment, productivity, enhancement or wealth creation through ICT.
- x . Creating conducive environment of research and development in ICT.

Source: National Information and Communication Technology Policy(2003)

- The overall assessment of the teaching staff at the CoICT and CoET was that it was adequate to meet Tanzanian needs.

<Table 13>Results of Survey on Project Relevance (Prof.CoICT/CoET)

	Teaching staffs		
	CoICT	CoET	Total
Strongly disagree	0 (0%)	0 (0%)	0 (0%)
Somewhat disagree	0 (0%)	0 (0%)	0 (0%)
Moderate	1 (8.3%)	1 (16.7%)	2 (11.1%)
Somewhat agree	2 (16.7%)	1 (16.7%)	3 (16.7%)
Extremely agree	9 (75.0%)	4 (66.7%)	13 (72.2%)
Total for each item	12 (100%)	6 (100%)	18 (100%)

- Tanzania needs to expedite the expansion of ICT and high quality human resources of ICT which is very important for the development of the country. At this point KOICA's cooperation for high level ICT education is very relevant for the country's development needs.

□ Relevance of Beneficiary Selection

(Beneficiary 1: UDSM)

- At the time of planning this project, UDSM was the number one university for the best students and where the most students entered. It is a national university which started an ICT course for the first time, and it is appropriate that KOICA selected the university to support its ICT field.

<Table 14> Number of Enrolled Students

No	Institute	2006/2007			2007/2008			2008/2009			2009/2010			2010/2011		
		F	M	T	F	M	T	F	M	T	F	M	T	F	M	T
1	UDSM	6274	12119	18393	7572	13584	21156	4765	8101	12866	6118	9946	16064	5866	10744	16610
2	Mzumbe	1341	2133	3474	1466	2071	3537	1783	2305	4088	2239	2933	5172	2533	3194	5727
3	Dodoma	0	0	0	328	788	1116	2568	5991	8559	5899	9222	15121	6540	13036	19576

Source: Universities & University Colleges Facts and Figures(2012)

- Professors, concerned parties of the project estimated the relevance of the project as high.

<Table 15> UDSM Development Plan & Project (Prof. of CoICT/CoET)

	Teaching staffs		
	CoICT	CoET	total
Strongly disagree	0 (0%)	0 (0%)	0 (0%)
Somewhat disagree	0 (0%)	0 (0%)	0 (0%)
Moderate	1 (8.3%)	1 (20.0%)	2 (11.8%)
Somewhat agree	2 (16.7%)	2 (40.0%)	4 (23.5%)
Extremely agree	9 (75.0%)	2	11
		(40.0%)	(64.7%)
total for each item	12 (100%)	5 (100%)	17 ⁷⁾ (100%)

(Beneficiary 2: professor)

- According to the feasibility study, professors of CoET are qualified to teach ICT courses with overseas master and doctoral degrees, but they are not able to teach the practicum course. That is because the school lacks the

7) There was no response from 1 person.

necessary equipment for practice. Therefore, it was appropriate to select professors as second beneficiaries for the project.

□ Evaluation for Selection of Project Purpose

- The purpose of the project has taken shape as it progresses. However, when it changed its purpose, distinct criteria and reasons were not given. It could lead to confusion to concerned parties.

<Table 16> Purpose of the Project at Each Step

reference	purpose of project
basic plan 2006.7 (education/training team 1)	purpose cultivating capable manpower to contribute to the modernization of Tanzania by supporting educational training and equipment to UDSM goals enhancement of educational system to cultivate human resources establishment of educational equipment and facilities at UDSM introduction of our developed skills and base for our business to advance
result of agreement 2006.10 (education/training team 1)	enhancement of UDSM ICT education capacity
RD 2006.10 (education/training team 1)	To support the human resources development system that meets the industrial requirements in Tanzania. To build up capacity for ICT-based education at CoET, UDSM To develop required core competence for ICT education through staff exchange and expert dispatch
program for plan 2006.12 (PMC)	cultivating high-quality human resources of ICT field, support UDSM ICT educational enhancement, contribution to the friendship for both countries
End-of-Project report 2009.7 (PMC)	contribution to the development of ICT and the modernization of Tanzania through support training & facilities at UDSM, guest workshops, expert dispatch
post evaluation report 2009.11 (post evaluation team)	support cultivating high-quality human resources for Tanzania - establishing a basis for high level engineers to be able to use ICT support to decrease the gap between IT industry development and digital industry

- Before the project started, the primary goal was to cultivate high-skilled IT manpower and the main focus at that time was on electronics and computer engineering. But the purpose should also have considered the fields of mechanics and architectural engineering since half of the beneficiaries were from those departments.
- The purpose of the project, based on the End-of-Project report, was to contribute to the modernization of Tanzania IT technology, but it is difficult to determine if Tanzania's IT technology development and modernization is due to this project.

2. Relevance Evaluation of Inputs

- This is to determine if inputs and activities were appropriately planned, in order to achieve the project goals.
- This project started as a feasibility study in July 2006. Experts involved in the study belonged to ICT industry and HRD⁸⁾, so the project seemed to be a type of capacity building project of vocational training center instead of higher education development.
- Without the existence of ICT education experts, the detailed plans for the project, such as type of equipment, the workshop program, and the development of the CoET curriculum did proceed. UDSM is not a training center but an institute of higher education to produce masters and doctorates. Thus, the project should be approached from the standpoint of education and research, the development of curriculum, teaching materials and operational consultation.

8) For the feasibility study, ICT industry experts, professors of HRD field and equipment experts were involved, and for the practice agreement, industry economic experts were involved.

<Table 17> Main Inputs & Plan of Activities

input	activity	main beneficiary
remodeling	kijitonyama campus (ECSE)	dept. of electrical computer engineering
equipment	4 laboratories of the dept. of electrical computer engineering 4 laboratories of the dept. of architectural engineering, dept. of mechanics engineering	dept. of electrical computer engineering dept. of architectural engineering, dept. of mechanics engineering
invitational training	6 people for the senior faculty course (chair of the dept., 2 weeks) 9 people for the junior faculty course (3 people from each dept., 3 weeks)	dept. of architectural engineering dept. of mechanics engineering
expert dispatch	chief expert 5 months CAD, computer, IC 2 months for each	dept. of electrical computer engineering

Source: Post Evaluation Report (Korea Polytechnic Colleges, 2009)

- It was not appropriate to have IT basic education in the executive course (ECSE). This was because no clear distinction was made between ICT education and ICT practical application education.

<Table 18> Invitational training

course	content of workshop
manager course	- IT development trend understanding of advanced educational methodology theory & practice of educational process visit educational institute for IT manpower understanding of Korean culture
executive course (ECSE)	- IT development trend hands-on experience of IT-based educational methodology theory & practice of IT-based educational methodology IT curriculum development visit IT-based educational institute understanding of Korean culture visit concerned organization
executive course (MECHE)	
executive course (CEBE)	

Source: feasibility study report by experts (Dongbu C&I. 2006)

- The beneficiary (UDSM) requested professor level of experts to visit them, but there was no discussion or agreement of the level of professors or from what fields or disciplines.
- As shown below in <Table 19>, it was planned to ask for invitational training by a vocational training agency and not by a commercial company. Since this project is for higher education, it should be considered not where, but which experts are most appropriate to be the trainer. This project was not planned from the perspective of higher education.

<Table 19> from Implementation Agreement

For this project we will approach from the view point of vocational training for invitational training, expert dispatch, technical consultation (building remodelling & equipment provision)
 - vocational training agency will be in charge of invitational training & expert dispatch

Source: implementation survey. p5.

- CoICT laboratories supported by KOICA are appropriately used for theory classes and practice classes. The laboratories are also used for regular classes using multimedia equipments such as beam projector. According to <Table 20>, the number of laboratories is not insufficient. Thus the budget KOICA supported is estimated as appropriate.

<Table 20> Utilization of CoICT Labs

	Semester 1 2011/2012 (hour/week)	Semester 2 2011/2012 (hour/week)	average of use hour (hour/week)	utilization ratio ⁹⁾ (%)
Microprocessor Lab	34	21	27.5	42.3
Networking Lab	19	5	12.0	18.5
General Lab 1	23	21	22.0	33.8
General Lab 2	16	11	13.5	20.8
total	92	58	75.0	grand mean: 28.8%

9) Class hours are considered as 13 hours per day.

- The below table shows the results of relevance evaluation.

<Table 21> Results of Relevance Evaluation

Based on the beneficiary and donor countries' development policy, this project was appropriate. However, it was estimated as not appropriate to plan this project from the perspective of a vocational training center and not to consider both ICT education and ICT practical application education.



■ B. Evaluation of Efficiency

- This is to estimate if the cost was reasonable and if appropriate inputs were used to produce outputs and outcomes.
- The evaluation tried to examine whether the resources such as input, time, budget and manpower were invested as planned and produced the appropriate level of effectiveness.
- The project was to invest \$2,000,000 to enhance CoET and CoICT's capacity for repairing ICT environment, supply equipment, etc. Overall the resources were invested timely and produced planned outputs.
- It can be pointed out that the expert dispatch should have been done after repairing the facilities and supplying the equipment. However, experts were sent before the installation of the equipment, which resulted in the experts being focused on installation and not on enhancing IT capacities.

<Table 22> Results of Efficiency Evaluation

Repairing facilities, supply equipment, enhancing beneficiary country's capabilities were carried out efficiently in general. Especially repairing of Kijitonyama campus facilities which should have been the responsibility of the beneficiary, but KOICA undertook it in the end. It is necessary to consider how to manage this type of risk in future projects. Also expert dispatch should be done after the installation of equipment so that they can concentrate on improving beneficiary's capabilities in IT. It is considered that to support the two areas of ICT education and ICT practical application education was not done in a balanced manner.



■ C. Evaluation of Effectiveness

- This is to assess whether the project accomplished the direct project goals after completion of the project.
- Based on the logical framework, it consisted of the evaluation of outputs such as facilities repairing, laboratory environment, and the development of beneficiaries' capacity in IT.

1. Environment of Practical Training

- Existing laboratories in CoET and the entire building on Kijitonyama campus were remodelled. All the repairing construction was done within the time frame.
- Equipment for computer laboratories was supplied to classrooms and practicum classrooms on the Kijitonyama campus and main campus. Types of equipment needed was discussed beforehand. Three experts from Korea were dispatched to provide training in how to use and repair the equipment.

[Fig 2] view of laboratory



- The survey for students shows that 59% of students are moderately satisfied and 29% very satisfied. Students of CoET are more satisfied than students of ColCT.

<Table 23> Students' Satisfaction about Laboratory

	student		
	ColCT	CoET	total
Not at all satisfied	2 (9.1%)	0 (0%)	2 (2.1%)
Not very satisfied	5 (13.2%)	2 (3.4%)	7 (7.3%)
Moderate	23 (60.5%)	34 (58.6%)	57 (59.3%)
Very satisfied	8 (21.1%)	20 (34.5%)	28 (29.2%)
Extremely satisfied	0 (0%)	2 (3.5%)	2 (2.1%)
total of each item	38 (100%)	58 (100%)	96 (100%)

- 80% of teaching staffs are very satisfied and extremely satisfied with the equipment, but only 15% of students are very satisfied. Students show low satisfaction¹⁰⁾ compared with teaching staffs’.

<Table 24> Equipment Evaluation by Teaching staffs of ColCT

	teaching staffs		
	ColCT	CoET	total
Not at all satisfied	0 (0%)	0 (0%)	0 (0%)
Not very satisfied	0 (0%)	0 (0%)	0 (0%)
Moderate	2 (16.7%)	1 (25%)	3 (18.9%)
Very satisfied	5 (41.7%)	1 (25.0%)	6 (37.5%)
Extremely satisfied	5 (41.7%)	2 (50.0%)	7 (43.8%)
total of each item	12 (100%)	4 (100%)	16 (100%)

<Table 25> Equipment Evaluation by Students

	student		
	ColCT	CoET	total
Not at all satisfied	5 (13.2%)	2 (3.4%)	7 (7.3%)
Not very satisfied	10 (26.3%)	5 (8.6%)	15 (15.6%)
Moderate	17 (44.7%)	42 (72.4%)	59 (61.5%)
Very satisfied	5 (13.2%)	8 (13.8%)	13 (13.5%)
Extremely satisfied	1 (2.6%)	1 (1.7%)	2 (2.1%)
total of each item	38 (100%)	58 (100%)	38 (100%)

10) It seemed that one of the reasons for the low student satisfaction was because 60% of the students already had notebook computers (from the interview with professors).

2. Enhancement of Educational Capacity

□ Expert dispatch

- In order to introduce a practicum curriculum, experts were dispatched to UDSM. The experts included one chief and four each area experts. They were supposed to develop the curriculum and discuss cooperation with industry, but from the interviews, their actual activities were confined to train how to use and repair the equipment.
- During the interviews, senior lecturers reported that the revised curriculum did not meet their expectation, but junior lecturers said they were satisfied, which shows professors's expectations toward the curriculum are different based on their teaching career and status.

<Table 26> Evaluation of Curriculum Improvement by Teaching staffs

	teaching staffs		
	ColCT	CSE	total
Not at all useful	0 (0%)	0 (0%)	0 (0%)
Not very useful	0 (0%)	0 (0%)	0 (0%)
Moderate	2 (16.7%)	1 (25.0%)	3 (18.8%)
Somewhat useful	2 (16.7%)	1 (25%)	3 (18.8%)
Very useful	8 (66.7%)	2 (50%)	10 (62.5%)
total of each item	12 (100%)	4 (100%)	16 ¹¹⁾ (100%)

11) There were no answers from 2 people.

- As shown in <Table 27>, 46% of the total students were moderately satisfied with the practical application class. Especially, as shown in <Table 23> and <Table 25>, CoET students responded with a lower satisfaction about the ICT practice classrooms compared to their satisfaction about the laboratories and equipment.

<Table 27> Satisfaction about ICT Practice class by Students

	student		
	CoICT	CoET	total
Not at all satisfied	1 (2.6%)	6 (10.3%)	7 (7.3%)
Not very satisfied	6 (15.8%)	19 (32.8%)	25 (26.0%)
Moderate	19 (50.0%)	26 (44.8%)	45 (46.9%)
Very satisfied	11 (28.9%)	7 (12.1%)	18 (18.8%)
Extremely satisfied	1 (2.6%)	0 (0%)	1 (1.0%)
total of each item	38 (100%)	58 (100%)	96 (100%)

□ Invitational training

- Invitational training for senior faculty and junior faculty were conducted in Korea Polytechnic IV, Asan campus.
- The total number of trainees was 13, including 7 professors from each engineering area. If it is stipulated in the training agreement that after returning to their country these participants should deliver what they learned, it would have been much better. However these people did not convey what they learned when they returned to UDSM.

<Table 28> Affiliation of Professor Participants in invitational training

course type	num-ber	name	affiliation		
			CoICT	CoET	etc.
profess-or	1	Mussa M. Kissaka	○		
	2	Mighanda M. Manyahi		○	
	3	Lgnas A. Rubaratuka		○	
	4	Burchard R. Bagile	○		
	5	Noel N. Nalitolera		○	
	6	Leonard M. Chamuriho		○	
	7	Tito E. Mwinuka		○	

- Invitational training for lecturers included network, multimedia, mechanics and electronics, and it was estimated that the training level was basic technical education. This was because the invitational training had been planned from the vocational training standpoint.
- Among training programs, field trips to industry and introduction to Korean culture were estimated as positive, but major education was too much about Java and basic courses. It would be better if the invitational training was related to enhancement of IT capabilities along with development of curriculum.

<Table 29> results of effectiveness evaluation

Infrastructure output like remodelling facilities and equipment was effective. But capacity enhancement in IT was not enough, thus, the overall improvement in the practice education system was not sufficient, compared to infrastructure building.



D. Evaluation of Sustainability

- This is to evaluate whether the facilities and the impact of the project had potential to maintain and sustain in the future. This evaluation was done from policy, financial and technical aspects.

1. Political Aspect

- Since the ICT field in Tanzania has developed rapidly, the government has set up a ministry of IT technology and they have established a policy to disseminate and expand¹²⁾ IT education nationwide, which indicates the government has a strong will to develop the IT industry. After the completion of the project, the number of IT high capacity manpower has increased and IT related majors in 4-year universities has also increased since 2009.
- UDSM feels proud to have established the first college in the ICT field and to play a leading role in producing high quality ICT human resources in Tanzania. The current university policy is very encouraging to the sustainability of the project, such as providing future scholarships in the IT field.

2. Financial Aspect

- CoET of UDSM receives much financial support from not only the Tanzanian government but also from the World Bank and SIDA (Swedish International Development Agency), which will further enhance the sustainability of the project.

12) National ICT Development Policy(2003)

[Fig. 3] ColCT Campus under Remodelling by World Bank



3. Operational Aspect

- Operation of the university engineering department requires a high level of faculty capability. That is why the project provided a professor invitational training. Among 6 professors who took the invitational training, only 3 of them are still working at UDSM. Thus in terms of the operational aspect, the sustainability is estimated as low.

<Table 30> Affiliation of senior prof Participants in invitational training

course type	num-ber	name	affiliation		
			ColCT	CoET	etc.
manager	1	Aggrey H. Nzali			died
	2	Godwill D. Mrema		○	
	3	Matern A. Victor			retired
	4	Justinian W. Ntalikwa			Univ. of Dodoma
	5	Nerey H. Mvungi	○		
	6	Paul C. Ndumbaro		○	

- Current state of teaching staffs employment rate at ColCT is shown at <Table 31>. Except for Assistant Lecturers and Tutorial Assistants, only 8-22% of professors who are required are actually employed.

<Table 31> Current Employment Status of Teaching Staffs of CoICT

S/N	Professional Level	Quantity											
		Demand				Current				Deficit			
		CSE	ETE	CVL	Total	CSE	ETE	CVL	Total	CSE	ETE	CVL	Total
1	Professors	8	8	3	19	0	2	0	2	8	6	3	17
2	Associate Professors	10	10	5	25	1	1	0	2	9	9	5	23
3	Senior Lecturers	20	20	8	48	3	2	0	5	17	18	8	43
4	Lecturers	25	25	8	58	8	5	0	13	17	20	8	45
5	Assistant Lecturers	20	20	5	45	15	10	3	28	5	10	2	17
6	Tutorial Assistants	15	15	3	33	21	12	0	33		3	3	6
7	Total Staff	98	98	32	228	48	32	3	83	56	66	29	151

Source: CoICT Succession Plans for Retired Contacted Staff(2012)

- Less than half of the professors hold a Ph. D, and most of these Ph. D. holders have additional administrative positions, so the majority of faculty who are fully engaged in teaching hold a masters degree.

<Table 32> Educational Background of Teaching Staffs of CoICT

S/N	Level of Study	Quantity			
		CSE	ETE	CVL	Total
1	Ph D	6	9	1	15
2	Masters	8	11	3	22
	Total	14	20	4	38

Source: CoICT Succession Plans for Retired Contacted Staff(2012)

- CoICT has made plans to establish a Professional IT Center under the CoICT, and also the establishment of an affiliated organization for research and development. When their plans come true, CoICT will be upgraded to a education and research institute.
- In addition, CoICT have their own development plans. Therefore their sustainability will be very high.

- CoICT professors actively participate in the project from STHEP by the World Bank or other international agencies, so the continued development of sustainability will proceed in the future.

4. Technical Aspect

- This evaluation was made based on the maintenance and repairing of facilities and equipment. Six management personnel are assigned to CoICT and CoET to conduct this maintenance program systematically. Their technical skills are high enough to maintain and repair this equipment, with the exception of highly complicated computer equipment.
- Relating to the intramural network and the purchase of the SW license, UCC, an affiliated company with UDSM, can support, which means the technical sustainability will be very high.

<Table 33> Function and Role of UCC

function	operational support to UDSM for ICT infrastructure and network
role	1) ICT elementary education for professors and students 2) internet service 3) software development & system operation 4) management of university on-line site 5) support of on-line exams & e-learning
current situation	staff members: 190 people number of people who completed ICT elementary education: yearly, 20,000 students and teaching staffs.

(outside of UCC)



(server room)



(classroom)



- As for e-learning, UCC is in charge of the infrastructure support, and CVL which belongs to CoICT, is in charge of teaching contents. This kind of divisional structure is estimated to be appropriate for the professional learning system.
- All the equipment provided by KOICA is operating well except some of the personal computers.
- Some of the expensive machines, such as the 3D Plotter, are not operating due to parts being unavailable locally.

<Table 34> Results of Sustainability Evaluation

Based on the government policy to support ICT and UDSM's ICT education and current situation, the sustainability is very high from the political, financial, operational and technical aspects.



■ E. Evaluation of Impact

- This is a type of performance evaluation to assess the impact of this project.

1. Expansion & Enhancement of Independent CoICT

- During this project, ECSE moved to the TTCL building. ICT related departments within CoET, such as ECSE and SICT, were integrated into CoICT, and CoICT started with 1,200 students in 2011. This established the base for expansion of ICT higher education. This project contributed to the expansion.
- Professors of CoICT evaluated that this project contributed more to the expansion of CoICT than the professors from CoET.

<Table 35> Contribution of CoICT's Extension by Teaching Staffs

	Teaching Staff		
	CoICT	CoET	Total
Strongly disagree	0 (0%)	1 (16.7%)	1 (5.6%)
Somewhat disagree	0 (0%)	0 (0%)	0 (0%)
Moderate	3 (25.0%)	3 (50.0%)	6 (33.3%)
Somewhat agree	3 (25.0%)	2 (33.3%)	5 (27.8%)
Extremely agree	6 (50.0%)	0 (0%)	6 (33.3%)
Total	12 (100%)	6 (100%)	18 (100%)

- CoICT received \$4 million from the World Bank's STHEP (Science Technology for Higher Education Project) and currently in 2012 is proceeding with remodeling and consulting projects(Appendix 4). This project contributed indirectly to the quantitative expansion.
- However, after ECSE was separated from CoET to join CoICT, CoET had some concerns about their downsizing and reduction in support due to the expansion of CoICT.

<Table 36> Evaluation of CoICT's Enhancement by Stakeholder

concerned parties		evaluation of CoICT enhancement
government	ministry of education & vocational training	enhancement of Virtual learning Center, backup WB project
	ministry of IT technology	cultivating high quality of ICT manpower

<Table 36> continued

UDSM	CoICT	enhancement of ICT institute, sustain cooperation with international agencies like WB
	CoET	focus of engineering education, worry about alienation from IT support
	UCC	focus on infrastructure (the more VCL activated, the more increase demand of e-learning infra)
other universities		building capacity from ICT educational competition
industry		enhancement of selection from increase of ICT manpower
students		enhancement of selection of educational environment from university competition

Source: Evaluation Team created based on interviews

2. Expansion of ICT Higher Education to Other Institute

- At the time the project started, only UDSM had an ICT department, so KOICA selected this college for this project. Now there are many universities like Dodoma which opened an ICT department and CoICT at UDSM is still leading other universities regarding ICT education.
- TCU(The Tanzania Commission for Universities) stated that the UDSM CoICT infrastructure was considered as setting up criteria for other ICT departments. Thus, CoICT at UDSM provides appropriate standards and guidance to other universities for the establishment of ICT courses.
- UDSM actively uses laboratories not only for regular classes but also workshops, conferences and cyber education, etc. Also, government organizations including the ministry of health, and NGOs use the laboratories. Thus, the project contributed to the local and government base expansion of ICT (refer to Appendix 1).

3. Economic Impact

- The economic impact from the project is analyzed by comparing the changes in existing costs and benefits.
- <Table 37> shows the analysis method and the results are shown in <Table 38>.

<Table 37> Analysis Frame for Economic Impact

analysis method	① Benefit/Cost ratio ② Net Present Value Method ③ Internal Rate of Return, IRR
cost item	KOICA aid amount, Operation & Maintenance costs, additional cost (calculated value considering price index)
benefit item	change of graduate employment rate before and after KOICA project (income increase subtracts unskilled employee's wage and 30 years employment after graduation. For overseas employment, 10 years working overseas and return to the country and get jobs)
social discount rate, r	refer to Tanzania's current interest rate and other countries' data, apply three types: yearly 8%, 10%, 15%
data used for analysis	<ul style="list-style-type: none"> • expense for operation & maintenance - USDM yearbook (2010/2011) & other data • change of employment rate after KOICA - interview data for professors • employee's labor cost - interview data for professors

<Table 38> Results of Analysis

- ① B/C ratio: r=8% 2.15, r=10% 1.74, r=15% 1.05
- ② NPV: r=8% US\$ 2,852,588, r=10% US\$ 1,760,610, r=15% US\$ 123,634
- ③ IRR: IRR=15.57%

- The results of the B/C, NPV, IRR analyses showed this project had an economic impact. Especially when we include employment of students who completed ICT related courses and contributed to the expansion of technology, the economic impact will be considered to be much higher.



F. Cross Cutting Issues

1. Gender

- In underdeveloped countries, including Tanzania, gender mainstreaming is an important issue especially in terms of the development of women's capacity and their access to higher education.
- Since this project started at the time when the concept of gender mainstreaming was not prevalent, the evaluation of gender mainstreaming is limited.
- According to the TCU's statistics, the number of students entering university has been increasing, including women. However, the women's entrance rate out of the total enrollment was 32% in 2012, with 25% entering the ICT engineering school.

2. Environment

- This project included the remodelling of facilities and the supply of equipment, which means it had less of an environmental impact. Thus, the project did not have a negative influence on the environment. Also, the school is located in a city and there was no problem with water, power and waste disposal.
- For remodelling facilities, an environmental safety system should be considered, and this matter was sufficiently considered.



Conclusion & Recommendations



IV

Conclusion & Recommendations



A. Main Results & Lessons Learned

- This project invested \$ 2,000,000 in UDSM, Tanzania for the purpose of developing and improving their capacity in ICT, remodelling ICT facilities and supplying ICT equipment. This project also partially contributed to UDSM getting an additional \$ 4,200,000 from the World Bank. As a result, the project resulted in a qualitative and quantitative expansion in Tanzania's ICT higher education.
- Even though the project encountered some problems in remodelling facilities, the overall relevance, effectiveness and impact were considered to be very high. As the national highest-rated university in Tanzania, UDSM will continue to receive interest and support from the Tanzanian government, so the sustainability level will be very high.
- The impact of the invitational training program and expert dispatch was considered to be relatively low due to the inappropriateness of experts' specialities to the demands of the project.
- Despite these drawbacks, the project was very meaningful and demonstrated that the provision of infrastructure support such as remodelling and the provision of equipment, can yield a very positive impact when they are combined with the beneficiary's willingness for development.

- The project was approached from a vocational training standpoint rather than a higher education perspective, which resulted in decreasing the overall impact of the project. The ultimate goal for the project was to enhance the capacity of a higher education institute such as UDSM. It could have been more effective if higher education experts rather than vocational training experts had participated in the project.

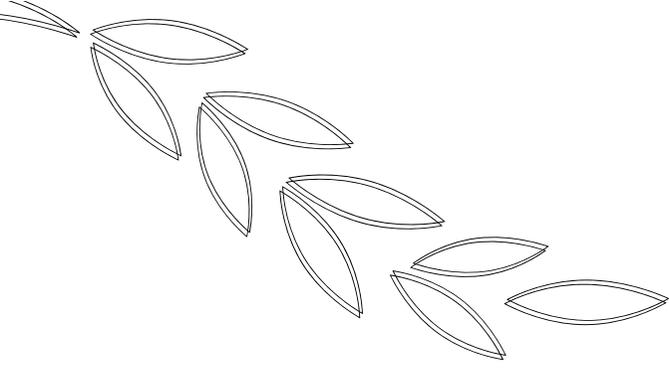


■ B. Recommendations

- It is recommended that goals and project components suitable for the characteristics of the project are to set up. The project should have been focused more from a higher education perspective rather than vocational training. KOICA's goals for higher education are 1)quantitative expansion 2)qualitative improvement 3)change of education system. Since the project's partner was a single university, 1) & 2) could be set up as short-term goals and 3) as a long-term goal. But if change of education system potentially involves a whole university, the recipient country's entire system of educational governance should be taken into account. For future similar projects, it is recommended that the right goals for building and enhancing IT capabilities should be the main priority; the specific demands of local academia and industry should be considered; and the appropriate components for the project should be included accordingly.
- Since UDSM is a university that has both masters degree and PH.D programs, and is an institute of higher education, it might be more effective to utilize higher education experts, rather than to utilize vocational training experts for the purpose of technical consulting, development of curriculum and teaching materials. For a future similar project, it is recommend to send

higher education experts. Also, an invitational program should be designed based on higher education rather than vocational training. Moreover, considering that ICT education and ICT utilization education have different characteristics, different component of project need to be took into account.

- Finally, a system for result-based management needs to be designed and sustained throughout the project. Most importantly, during the planning stage, a system for managing the outcome of the project should be set up, and the responsibility for baseline-data collection for evaluation criteria should be made explicit. By continuous utilization and revision of the PDM, the management of the project outcome can also be improved. It helps to share the management of outcome with the recipient country so they can assist in the data collection process and thereby enhancing efficient and responsible management.



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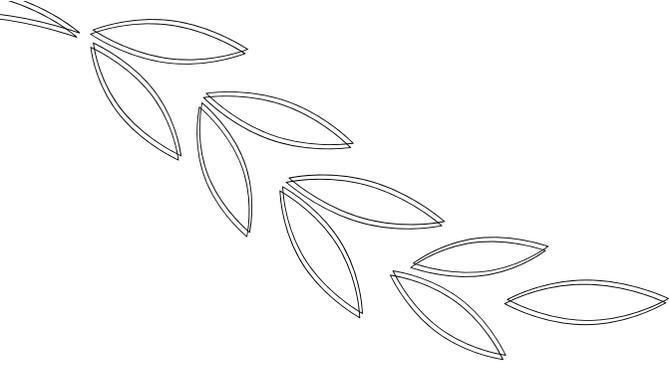
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Appendix

Appendix

Appendix 1. Supported Labs and current status of equipmet

A. CoICT Kijitonyama Campus

<Table A3-1> LAB Name: SERVER ROOM

No	Name of the items	Total Qty	Confirmation (OK)	Damaged Qty	Remarks
1	Printer Server	1	HP XW4400	Working	Working as file server
2	Web Server	1	HP DL380	Working	Hosting Pascal compiler and E-learning system for online testing for pascal programming course
3	Mail Server	1	HP DL380	Working	Local mail server
4	File Server	1	HP DL380	Working	Working as file server
5	Routers switches	4	4 Cisco 2631	working	
6	Computers	31	Hyundai	20 Working, 10 defective	Working out to fix them
7	Air Conditioners	5	3 Plasma Gold plus and 2 SHARP	3 working, 2 defective	Working out to fix it
8	Ceiling fans	4	Evernal	Working	
9	Switches	2	CISCO	Working	D-Link switches
10	Switch cabinets	2	Cisco		
11	Rack Cabinets 19"	3		ok	
12	Ups 5KVA	4	APC	working	
13.	Photocopy machine	1	Digiwox 1033	Defective – control card (PCB)	PCB card was replaced worked for about 6 month and become fault again

<Table A3-2> LAB Name: Microprocessor LAB C2/C3

No	Name of the items	Total Qty	Confirmation (OK)	Damaged Qty	Remarks
1.	Computers	32	Hyundai	Working	
2.	Microprocessor Trainer Kits	30	Chungpa	Working	
3.	Digital Lab Kits	25	Chungpa	Working	
4.	Microprocessor Training Kit Modules	17	Chungpa	Working	
5.	Air Conditioners	4	Plasma Gold plus	2 working; 2 defective	Working out to fix them
6.	Ceiling fans	8	Evernal	Working	
7.	Switches	2	New Cisco switch replaced CISCO donated by KOICA	working	CISCO donated by KOICA became defective beyond repair Replaced with New CISCO switches
8.	Printer	1	HP	Defective	Beyond repair
9.	Scanner	1	HP	Working	
10.	Writing (white) board	1		Working	
11.	Digital Education System	1	Wacom	Working	
12.	Multimedia LCD projector	1	Hustem	Working	
13.	Sliding screen (for projection)	1		Working	

<Table A3-3> LAB Name: General LAB1 C4/C5

No	Name of the items	Total Qty	Confirmation (OK)	Damaged Qty	Remarks
1.	Computers	32	Hyundai	16 Working; 14 defective	Working out to fix them
2.	Air Conditioners	4	Plasma Gold plus	2 working; 2 defective	Working out to fix them
3.	Ceiling fans	8	Evernal	Working	
4.	Switches	2	New Cisco switch replaced CISCO donated by KOICA	working	CISCO donated by KOICA became defective beyond repair Replaced with New CISCO switches
5.	Switch cabinets	2	Cisco		
6.	Printer	1	HP	Working	
7.	Scanner	1	HP	Working	
8.	Auto AC voltage stabilizer (3 phase), 30KVA	1	Mmak	Working	
9.	Writing (white) board	1	-	Working	
10.	Digital Education System	1	Wacom	Working	
11.	Multimedia LCD projector	1	Hustem	Working	
12.	Sliding screen (for projection)	1	-	Working	

<Table A3-4> LAB Name: NETWORKING LAB C6/C7

No	Name of the items	Total Qty	Confirmation (OK)	Damaged Qty	Remarks
1.	Computers	31	Hyundai	25 Working; 5 defective	Working out to fix them
2.	Air Conditioners	4	Plasma Gold plus	3 working; 1 defective	Working out to fix it
3.	Ceiling fans	8	Evernal	Working	
4.	Switches	2	D-Link (replaced CISCO donated by KOICA)	working	CISCO donated by KOICA became defective beyond repair Replaced with D-Link switches
5.	Switch cabinets	2	Cisco		
6.	Printer	1	HP	Working	
7.	Scanner	1	HP	Working	
8.	Auto AC voltage stabilizer (3 phase), 30KVA	1	Mmak	Working	
9.	Writing (white) board	1	-	Working	
10.	Digital Education System	1	Wacom	Malfunction -ing	There is no connection between the overhead projector and the unit but the projector can be used with an external Desktop or Laptop
11.	Multimedia LCD projector	1	Hustem	Working	
12.	Sliding screen (for projection)	1	-	Working	
13.	Network Application Training Equipments – foe WAN/LAN training	4	ED-LAN-4		
14.	Servers	3		working	

<Table A3-5> LAB Name: GENERAL LAB2

No	Name of the items	Total Qty	Confirmation (OK)	Damaged Qty	Remarks
1.	Computers	31	Hyundai	25 Working; 5 defective	Working out to fix them
2.	Air Conditioners	4	Plasma Gold plus	3 working; 1 defective	Working out to fix it
3.	Ceiling fans	8	Evernal	Working	
4.	Switches	2	D-Link (replaced CISCO donated by KOICA)	Working	CISCO donated by KOICA became defective beyond repair Replaced with D-Link switches
5.	Switch cabinets	2	Cisco		
6.	Printer	1	HP	Working	
7.	Scanner	1	HP	Working	
8.	Auto AC voltage stabilizer (3 phase), 30KVA	1	Mmak	Working	
9.	Writing (white) board	1	-	Working	
10.	Digital Education System	1	Wacom	Malfunction -ing	There is no connection between the overhead projector and the unit but the projector can be used with an external Desktop or Laptop
11.	Multimedia LCD projector	1	Hustem	Working	
12.	Sliding screen (for projection)	1	-	Working	

<Table A3-6> LAB Name: INTERNET CAFEÉ

No	Name of the items	Total Qty	Confirmation (OK)	Damaged Qty	Remarks
1.	Computers	31	Hyundai	20 Working; 10 defective	Working out to fix them
2.	Air Conditioners	4	Plasma Gold plus	3 working; 1 defective	Working out to fix it
3.	Ceiling fans	8	Evernal	Working	
4.	Switches	2	D-Link (replaced CISCO donated by KOICA)	Working	CISCO donated by KOICA became defective beyond repair Replaced with D-Link switches
5.	Switch cabinets	2	Cisco		

B. CoET Main Campus

<Table A3-7> LAB Name: Computer LAB 1- Room A319

No	Name of the items	Total Qty	Confirmation (OK)	Damaged Qty	Remarks
1	Computer Sets (Hyundai)	31	12	19	Defective Parts
2	Computer Desks	31	31	0	Ok
3	Lab Chairs	30	30	0	Ok
4	Hanging Ceiling Projectors	1	1	0	Ok
5	Addressing System	1	0	1	Missing USB Key
6	Printer	1	1	0	Ok
7	Scanner	1	1	0	Ok
8	Executive Chair	1	1	0	Ok
9	Projector Screen	1	1	0	Ok
10	Speakers	2	2	0	Ok
11	White Board	1	1	0	Ok
12	Network Switches	2	2	0	Replaced
13	Air Conditioner	2	1	1	Need Service

<Table A3-8> LAB Name: Computer Lab 2 - Room A317

No	Name of the items	Total Qty	Confirmation (OK)	Damaged Qty	Remarks
1	Computer Sets	31	13	18	Defective Parts
2	Computer Desks	31	31	0	Ok
3	Lab Chairs	30	30	0	Ok
4	Hanging Ceiling Projectors	1	1	0	Ok
5	Addressing System	1	1	0	Ok
6	Printer	1	1	0	Ok
7	Scanner	1	1	0	Ok
8	Executive Chair	1	1	0	Ok
9	Projector Screen	1	1	0	Ok
10	Speakers	2	2	0	Ok
11	White Board	1	1	0	Ok
12	Network Switches	2	2	0	Replaced
13	Air Conditioner	2	1	1	To be Serviced

<Table A3-9> LAB Name: CAD Lab - Room A316

No	Name of the items	Total Qty	Confirmation (OK)	Damaged Qty	Remarks
1	Computer Sets	31	24	7	Defective Parts
2	Computer Desks	31	31	0	Ok
3	Lab Chairs	30	30	0	Ok
4	Hanging Ceiling Projectors	1	1	0	Ok
5	Addressing System	1	1	0	Ok
6	Printer	1	1	0	Ok
7	Scanner	1	1	0	Ok
8	Executive Chair	1	1	0	Ok
9	Projector Screen	1	1	0	Ok
10	Speakers	2	2	0	Ok
11	White Board	1	1	0	Ok
12	Network Switches	2	2	0	Replaced
13	Air Conditioner	2	2	0	Serviced
14	Digitizers	31	31	0	Ok

<Table A3-10> LAB Name: Printing Room – Office in Room A316

No	Name of the items	Total Qty	Confirmation (OK)	Damaged Qty	Remarks
1	Computer Set	1	1	0	Ok
2	Computer Server	1	1	0	Ok
3	Executive Chairs	1	1	0	Ok
4	Computer Desks	3	3	0	Ok
5	Air Conditioner	1	1	0	Ok
6	Plotter (A0)	1	0	1	Damaged Parts
7	Photocopy Machine	1	0	1	Damaged Parts

<Table A3-11> LAB Name: Office

No	Name of the items	Total Qty	Confirmation(OK)	Damaged Qty	Remarks
1	Computer Set	3	2	1	Damaged Parts
2	Executive Chairs	3	3	0	Ok
3	Computer Desks	3	3	0	Ok
4	Air Conditioners	3	3	0	Ok
5	Printer	1	1	0	Ok
6	Photocopy Machine	1	0	1	Damaged Parts

C. Use of ICT Labs for extraordinary activities

<Table A3-12> list of programs held in ICT Labs(Kijitonyama campus)

S/N	TRAINER	TRAINING	DATE	LAB
1	OUT-Institution of Education Technology	Development of course materials into learning Management System (LMS)	31/7/2012	General lab 2
2	Ministry of Health and Social Welfare / The International Training and Education Center for Health	TrainSMART, a web based database for tracking and reporting in-service training for health care workers in ZHRCS, Regions and Districts	10-12/7/2012	General lab 2
3	Ministry of Health and Social Welfare / The International Training and Education Center for Health	TrainSMART, a web based database for tracking and reporting in-service training for health care workers in ZHRCS, Regions and Districts	9-11/5/2012	General lab 2
4	Kasumo Design (T) Ltd	CAD-Aid Design using Auto CAD Civil 3D 2012	20-30/3/2012 & 2-6/4/2012	General lab 2
5	OUT-Institution of Education Technology	Workshop on course development in e-learning Management System	8-9/3/2012	
6	UDSM-Center for Virtual Learning	Workshop on the use of e-learning Management System (Module)	12-14/12/2011	
7	Tanganyika Law Society	MaadhimishoyasikuyaMsaada wa Kisheria (Commemoration of Legal Aid Day)	2011-03-12	
8	Ministry of Health and Social Welfare / The International Training and Education Center for Health	TrainSMART, a web based database for tracking and reporting health related in-service training for health care workers in ZHRCS, Regions and Districts	29/11/2011	
9	UDSM-Center for Virtual Learning	Workshop on the use of Module	15-18/11/2011	
10	Ministry of Education and Vocation Training	Workshop on the digital-content evaluation and development of the evaluation framework	14-18/11/2011	

<Table A3-12> continued

S/N	TRAINER	TRAINING	DATE	LAB
11	Beyond Technologies Co.Ltd	Conducting Linux Systems Administration Training and IT Security & Ethical Hacking Training	5-16/12/2011	
12	Ministry of Health and Social Welfare / The International Training and Education Center for Health	TrainSMART, a web based database for tracking and reporting in-service training for health care workers in Zonal Health Resource Centres, Regions and Districts	31/10-1/11/2011	
13	UDSM-Center for Virtual Learning	Workshop on the use of e-learning Management System (Module)	9-11/11/2011	
14	EIFL	Free Open Source Software (FOSS) Training Conference	4-5/11/2011	
15	Ministry of Health and Social Welfare / The International Training and Education Center for Health	TrainSMART, a web based database for tracking and reporting health related in-service training for health care workers in ZHRs, Regions and Districts	15-16/9/2011	
16	UDSM-Center for Virtual Learning	Workshop on the use of Moodle for Lecturers from various departments of the University Dar es Salaam	15-19/9/2011	
17	Tanzania Commission For Science and Technology (COSTECH)	Workshop on how to use TanBIF-GIS Tools for supporting policy and decision making in Tanzania	27-29/7/2011	General lab 1
18	OUT-Institution of Education Technology	Workshop on Research and Evolution in Open and Distance Learning	4-7/7/2011	General lab 1
19	UDSM-Center for Virtual Learning	Workshop on the use of Moodle for Lecturers from UDSM main campus and DUCE	6-8/6/2011	General lab 2
20	UDSM-Center for Virtual Learning	Computer Lab facilities for conducting training	30/5-3/6/2011	General lab 2
21	Tanzania Commission For Science and Technology (COSTECH)	Workshop on how to use IPT to publish checklist and occurrence data	29/4/2011	General lab 2

<Table A3-12> continued

S/N	TRAINER	TRAINING	DATE	LAB
22	UDSM-Center for Virtual Learning	Workshop on the use of Moodle for Lecturers from UDSM main campus and DUCE	18-20/5/2011	General lab 2
23	UDSM-Center for Virtual Learning	In-depth Workshop on the use of Moodle	2-6/5/2011	General lab 2
24	UDSM-Center for Virtual Learning	Workshop on the use of Moodle for Lecturers from School of Education, DUCE and linguistics department	12-14/5/2011	General lab 2
25	Tanzania Commission For Science and Technology (COSTECH)	Workshop on how to use the Integrated Publishing Toolkit (IPT) to publish checklist and occurrence data	30/5-3/6/2011	General lab 1
26	UDSM-Center for Virtual Learning	Computer Lab facilities for conducting training	11-15/4/2011	General lab 2
27	OUT-Institution of Education Technology	Developing Local Talent on Technology	21-25/3/2011	General lab 1
28	Holy kamuzora	Unix System Administration workshop	13-18/3/2011	General lab 2
29	OUT-Institution of Education Technology	Development of course materials into learning Management System (LMS)	14-18/3/2011	General lab 1
30	OUT-Institution of Education Technology	Networking Skills	21-25/3/2011	Network lab
31	UDSM-Center for Virtual Learning	Development of course materials into learning Management System (LMS)	14-18/2/2011	General lab 2
32	OUT-Institution of Education Technology	Driving the development and use of open Education Resources (OER) across all education sectors in Africa	14-17/3/2011	Network lab

D. Class assignment to Kijitonyama Campus Labs

<Table A3-13> Class assignment to Kijitonyama Campus Lab

Semester One 2011/2012 Academic Year															
Day	Lab	TIME													Total Hrs/ week
		7:00-8:00	8:00-9:00	9:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00	19:00-20:00	
Mon	Microprocessor Lab									CS333 [Tutorial]	CS351 [Tutorial]	CS353 [Practical]			6
	Networking Lab											TE 644 [Lecture]		3	
	General Lab 1											TE341 [Practical]		2	
	General Lab 2											TE 342 [Lecture]		3	
Tue	Microprocessor Lab				CS353 [Practical]			CS321 [Practical]				CS 521		9	
	Networking Lab		CS341 [Practical]									TE 657		3	
	General Lab 1		CS353 [Practical]									TE 641		5	
	General Lab2														
Wed	Microprocessor Lab			CS441 [Practical]	CS452 [Tutorial]				CS431 [Practical]	TE441 [Practical]	TE471 [Practical]			9	
	Networking Lab			TE441 [Practical]	TE441 [Practical]				TE441 [Practical]	TE471 [Practical]				8	
	General Lab 1			TE411 [Practical]	TE441 [Practical]				TE441 [Practical]	TE441 [Practical]				8	
	General Lab2						CS431 [Practical]	CS431 [Practical]		CS 680				7	
Thu	Microprocessor Lab								TE413 [Lecture]	TE471 [Lecture]				4	
	Networking Lab										CS 652			3	
	General Lab 1									CS451 [Practical]				2	
	General Lab2										TE 659			3	
Fri	Microprocessor Lab	CS353 [Practical]	CS333 [Practical]	CS353 [Practical]						CS321 [Practical]				8	
	Networking Lab														
	General Lab 1			TE341 [Practical]	TE441 [Tutorial]						EM 602			7	
	General Lab2										TE 342			3	

<Table A3-13> continued

Semester Two 2011/2012 Academic Year															
Day	Lab	TIME													Total Hrs/ week
		7:00-8:00	8:00-9:00	9:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00	19:00-20:00	
Mon	Microprocessor Lab		CS412 [Practical]				TE481 [Practical]		CS342 [Practical]	CS342 [Practical]					8
	Networking Lab														
	General Lab 1						CS172 [Tutorial]			CS 660					3
	General Lab 2						CS172 [Tutorial]			TE 649					3
Tue	Microprocessor Lab									CS 353					3
	Networking Lab									TE 640					3
	General Lab 1									CS 665					3
	General Lab2														
Wed	Microprocessor Lab										MG632				3
	Networking Lab		CS322 [Practical]												2
	General Lab 1				TE313 [Practical]						TE 645				5
	General Lab2										TE 312				3
Thu	Microprocessor Lab								CS342 [Practical]		TE 656				5
	Networking Lab														
	General Lab 1										TE 647				3
	General Lab2														
Fri	Microprocessor Lab			CS172 [Tutorial]											2
	Networking Lab														
	General Lab 1			CS172 [Tutorial]							CS 684				3
	General Lab2										DP 682				3

Code & Course Name			
Code	Course Name	Code	Course Name
CS 321	Introduction to Control Systems Engineering	MG 632	Entrepreneurship Development
CS 322	Classical Control Systems Engineering	CS 665	Computer-Based techniques for Measurement and Control
CS 331	Introduction to Software Engineering	CS 660	Introduction to Computers and Software Engineering
CS 332	Object-Oriented Program Design and Analysis	TE 656	Digital Filters
CS 341	Network Routers and Routing	CS 684	Microcomputers and Microprocessors.
CS 342	LAN Switching	TE 645	Optical Communications
CS 355	Computer Hardware	TE 647	Satellite Communications
CS 333	Computer Operating Systems	TE 649	Television Systems
CS 351	Computer Engineering I	TE 640	Signal Analysis
CS 352	Computer Engineering II	DP 681	Network Analysis
CS 353	Micro Computer Systems I	DP 682	Network Synthesis
CS 354	Micro Computer Systems II	CS 652	Introduction to Computer Communication Theory
TE 342	Digital Electronics for Engineers II	CS 680	Computer Programming
	Electives (Minimum 6.0 Units)	CS 521	Control Systems Engineering
DP 313	Power Electronics I	TE 342	Digital Electronics for Engineers
DP 314	Power Electronics II	CS 652	Introduction to Computer Communication Theory
DP 331	Electrical Power Plants	CS 680	Computer Programming
DP 333	Introduction to Power Engineering I	TE 644	Digital Communications
DP 334	Introduction to Power Engineering II	TE 657	Digital Electronics
TE 311	Analogue Telecommunications I	EM 602	Numerical Analysis
TE 312	Digital Telecommunications I	CS 680	Computer Programming
CS 421	Modern Control Systems Engineering	TE 641	Communication Theory
CS 431	Data Base Systems	TE 657	Digital Electronics
CS 432	Software Testing and Software Management	TE 644	Digital Communications

Code & Course Name			
Code	Course Name	Code	Course Name
CS 451	Computer Engineering III	TE 647	Satellite Communications
CS 452	Microcomputer Systems III		
CS 453	Computer Security		
DP 471	Electrical Safety & Maintenance		
TM 400	Engineering Ethics and Professional Conduct		
MG 445	Entrepreneurship for Engineers		
TE 442	Digital Electronics for Engineers III		
CS 433	Introduction to Artificial Intelligence		
CS 434	Computer Graphics		
CS 441	Wide Area Networking		
CS 353	Microcomputer Systems		
TE 312	Digital Telecommunications		
CS 660	Introduction to Computers and Software Engineering		

E. Class assignment to CoET Campus Labs

<Table A3-14> Class Assignment to CoET Campus Labs

Semester One 2011/2012 Academic Year															
Day	Lab	TIME												Total Hrs/week	
		7:00-8:00	8:00-9:00	9:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00		19:00-20:00
Mon	Computer LAB 1				CS171	CS171	CS452	CS452							4
	Computer LAB 2				EE171	EE171			TE411 TE441	TE471					4
	CAD Lab				CS171	CS171			DP303	DP303					4
Tue	Computer LAB 1							CS171							1
	Computer LAB 2							TE480							1
	CAD Lab		CS241	CS241	CS241	CS241		EE171				CS211			6
Wed	Computer LAB 1		SD212T M201	TR211 WR211	SD212 TR211	WR211			CS171	CS171					6
	Computer LAB 2		CS452						DP311	DP311		CS211			4
	CAD Lab						CS211	CS211	EE171	EE171		CS211 TM201	TR211 WR211		6
Thu	Computer LAB 1		SD212T M201	TR211 WR211	CS171	CS171			CS171	CS171	SD212 TM201	TR211 WR211			8
	Computer LAB 2					EE171			EE171	EE171					3
	CAD Lab				SD212 TM201	TR211 WR211			SD212 TM201	TR211 WR211		CS211			5
Fri	Computer LAB 1				CS171	CS171		CS171		CS171					4
	Computer LAB 2				EE171	EE171		EE171		EE171					4
	CAD Lab				CS171			DP303							2

Code & Course Name			
Code	Course Name	Code	Course Name
CS 171	Computer Programming	TE 480	Programming
CS 241	Computer Engineering	CS 452	Software Engineering
EE 171	Computer Programming	TE 441	Electronics Engineering



Appendix 2. Survey Result

A. Questionnaire(Teaching Staff)

Questionnaire CoET/CoICT Teaching Staff

Code Nr |_|_|_|

Date:

Personal Data and Sociological Background	
1. Gender: ① Male	② Female
2. occupation :	
① Professor	② A/Professor
③ S/Lecturer	④ Lecturer
A/Lecturer ▯ TAs	
3. Department:	
① Computer Science and Engineering	
② Electronics and Telecommunication Engineering	
③ Centre for Virtual Learning	
④ Others	
4. Field you teach:	
① Computer Science	② Computer Engineering
③ Telecommunications Engineering	④ Electronics
⑤ Others	
Educational Backgrounds	
5. Educational level(The degree what you have)	
① Bachelor(in Tanzania)	② Bachelor(Abroad)
③ Master(in Tanzania)	④ Master(Abroad)
⑤ Doctor(in Tanzania)	⑥ Doctor(Abroad)
6. Teaching Experience :	
① Less 2 years	② 2 years~4 years
③ 4 years~6 years	④ More 6 years
7. Did you participated in the training in Korea at 2008?	
① Yes	② No
Skill level (evaluate your skill level)	
8. Theoretical technical skills	
① competent	② not competent
9. Practical technical skills	
① competent	② not competent
10. Theoretical teaching skills	
① competent	② not competent
11. Practical teaching skills	
① competent	② not competent

KOICA Project

12. To what extent is practical curriculum that KOICA improved useful?

- ① Not at all useful
- ② Not very useful
- ③ Moderate
- ④ Somewhat useful
- ⑤ very useful

13. To what extent is teaching methods useful?

- ① Not at all useful
- ② Not very useful
- ③ Moderate
- ④ Somewhat useful
- ⑤ very useful

14. To what extent is this project useful for upgrading theoretical knowledge?

- ① Not at all useful
- ② Not very useful
- ③ Moderate
- ④ Somewhat useful
- ⑤ very useful

15. What do you think of the theological level of the experts from KOICA?

- ① Too low
- ② Adequate
- ③ Too high

16. What do you think of the technical level of the experts from KOICA?

- ① Too low
- ② Adequate
- ③ Too high

17. The project is adequate for the needs of the Tanzania.

- ① Strongly disagree
- ② Somewhat disagree
- ③ Moderate
- ④ Somewhat agree
- ⑤ Strongly agree

18. Training programs in Korea was selected properly to meet the Tanzania's ICT needs.

- ① Strongly disagree
- ② Somewhat disagree
- ③ Moderate
- ④ Somewhat agree
- ⑤ Strongly agree

19. The project is consistent with the UDSM's development plans.

- ① Strongly disagree
- ② Somewhat disagree
- ③ Moderate
- ④ Somewhat agree
- ⑤ Strongly agree

20. This project contributed to the formation of CoICT(from SICT).

- ① Strongly disagree
- ② Somewhat disagree
- ③ Moderate
- ④ Somewhat agree
- ⑤ Strongly agree

21. What do you think needs to be improved at CoET/CoICT?

- ① Expansion of welfare facilities (sports, arts, etc.)
- ② Increase of extracurricular activities for students
- ③ Improvement of education and training facilities
- ④ Others (specify:)

Free comments by the respondent

Do you have any comments or suggestions ?

.....
.....

B. Questionnaire(Students)

Questionnaire CoICT Students

Code Nr |_|_|_|

Date:

Personal Data and Sociological Background	
1. Age :	
2. Department:	
1) Electronics and Telecom Engineering	2) Computer Science and Engineering
3. Grade: 1) 1 st 2) 2 nd 3) 3 rd 4) 4 th	
Motivation of Studying and Satisfaction	
4. How did you select this major (department)?	
1) Parents/family	2) Own choice
3) Friends	4) Relatives
5) Others (specify:.....)	
5. What is your future plan?	
1) Continue to study at graduate school	2) Work in a company
3) Open own business	4) Others (specify :)
6. At what level, are you satisfied with computer labs supported by KOICA?	
1) Not at all satisfied	2) Not very satisfied
3) Moderate	4) Very satisfied
5) Extremely satisfied	
7. At what level, are you satisfied with your theory class?	
1) Not at all satisfied	2) Not very satisfied
3) Moderate	4) Very satisfied
5) Extremely satisfied	
8. At what level, are you satisfied with your practical training?	
1) Not at all satisfied	2) Not very satisfied
3) Moderate	4) Very satisfied
5) Extremely satisfied	
Study Program at CoICT	
To what extent do you agree with the following statements?	
9. Lab facilities and equipments are adequately utilized for studying	
1) Strongly disagree	2) Somewhat disagree
3) Moderate	4) Somewhat agree
5) Strongly agree	
10. Practical training is provided based on students' individual competency	
1) Strongly disagree	2) Somewhat disagree
3) Moderate	4) Somewhat agree
5) Strongly agree	

11. Do you think the CoICT is well known in other universities?

- 1) Not at all known
- 2) Not very well known
- 3) Well known
- 4) Very well known

12. Considering the demands of local industry, curriculum is

- 1) Far advanced
- 2) Appropriate to meet industrial needs
- 3) Curriculum is outdated
- 4) Others (specify_____)

Free comments by the respondent

Do you have any comments or suggestions?

.....

.....

.....

.....

.....

C. Survey Result(Students)

<Table A4-1> Choice of Major Route Per Department

	ETE	CSE	Total
Entering School (Graduate school)	2 (9.1%)	2 (12.5%)	4 (10.5%)
Employment	11 (50.0%)	6 (37.5%)	17 (44.7%)
Business	8 (36.4%)	7 (43.8%)	15 (39.5%)
Etc.	1 (4.5%)	1 (6.3%)	2 (5.3%)
Itemized Total	22 (100%)	16 (100%)	38 (100%)

<Table A4-2> Laboratory Satisfaction Per Engineering Department

	ETE	CSE	Total
Not at all satisfied	2 (9.1%)	0 (0%)	2 (5.3%)
Not very satisfied	4 (18.2%)	1 (6.3%)	5 (13.2%)
Moderate	13 (59.1%)	10 (62.5%)	23 (60.5%)
Very satisfied	3 (13.6%)	5 (31.3%)	8 (21.1%)
Extremely satisfied	0 (0%)	0 (0%)	0 (0%)
Itemized Total	22 (100%)	16 (100%)	38 (100%)

<Table A4-3> Theoretical Education Satisfaction Per Engineering Department

	ETE	CSE	Total
Not at all satisfied	0 (0%)	0 (0%)	0 (0%)
Not very satisfied	2 (9.1%)	0 (0%)	2 (5.3%)
Moderate	15 (68.2%)	11 (68.8%)	26 (68.4%)
Very satisfied	5 (22.7%)	4 (25.0%)	9 (23.7%)
Extremely satisfied	0 (0%)	1 (6.3%)	1 (2.6%)
Itemized Total	22 (100%)	16 (100%)	38 (100%)

<Table A4-4> Equipment Propriety Per Engineering Department

	ETE	CSE	Total
Strongly disagree	5 (22.7%)	0 (0%)	5 (13.2%)
Somewhat disagree	8 (36.4%)	2 (12.5%)	10 (26.3%)
Moderate	7 (31.8%)	10 (62.5%)	17 (44.7%)
Somewhat agree	2 (9.1%)	3 (18.8%)	5 (13.2%)
Strongly agree	0 (0%)	1 (6.3%)	1 (2.6%)
Itemized Total	22 (100%)	16 (100%)	38 (100%)

<Table A4-5> Practice Education Propriety Per Engineering Department

	ETE	CSE	Total
Strongly disagree	10 (45.5%)	3 (18.8%)	13 (34.2%)
Somewhat disagree	3 (13.6%)	1 (6.3%)	4 (10.5%)
Moderate	6 (27.3%)	8 (50.0%)	14 (36.8%)
Somewhat agree	3 (13.6%)	4 (25.0%)	7 (18.4%)
Strongly agree	0 (0%)	0 (0%)	0 (0%)
Itemized Total	22 (100%)	16 (100%)	38 (100%)

<Table A4-6> ColCT Publicity Degree of Educational Environment
Per Engineering Department

	ETE	CSE	Total
Not at all known	9 (40.9%)	3 (18.8%)	13 (34.2%)
Not very well known	11 (50.0%)	1 (6.3%)	4 (10.5%)
Well known	2 (9.1%)	8 (50.0%)	14 (36.8%)
Very well known	0 (0%)	0 (0%)	0 (0%)
Itemized Total	22 (100%)	16 (100%)	38 (100%)

<Table A4-7> ColCT Local Demand Reflection Degree of
Educational Environment Per Engineering Department

	ETE	CSE	Total
Far advanced	1 (4.5%)	0 (0%)	1 (2.6%)
Appropriate to meet industrial needs	4 (18.2%)	7 (43.8%)	11 (28.9%)
Curriculum is outdated	15 (68.2%)	8 (50.0%)	23 (60.5%)
Others	2 (9.1%)	1 (6.3%)	3 (7.9%)
Itemized Total	22 (100%)	16 (100%)	38 (100%)



Appendix 3. Economic Analysis

- Various types of cost and benefit could be considered in education projects, and it has items which are not calculable or are immeasurable by the monetary unit. For General means of economic analysis, these techniques are often used in education investment like Educational Policy Analysis at college, such as Benefit/Cost ratio technique, Net Present Value Method, Internal Rate of Return, and so forth. This project is about the ICT Educational Reinforcement Project, thus cost and benefit should be analyzed only for fluctuating contents.

1. Composition of Cost And Benefit

(1) Cost

Additional cost for Dae es Salaam engineering college by this project is as follows.

- ① KOICA support fund
- ② Fluctuating sum of operating expenses, such as maintenance/management cost (running cost) including faculty personnel expenses after completion of enterprise, the material cost of homemaker practical training, electricity cost, and water expenses, etc.

(2) Benefit

Extra Benefits from this project are divided into direct benefit and indirect benefit. Direct benefits indicate the increase of the income for graduates due to employment rate growth, upwards annual salary sum by the growth of production, and so on. Indirect benefits show the increased production of the field that

graduates are engaged in, Spill-over effect, etc. By this project, the benefits to Tanzania are composed as follows.

- ① The changed increase of employment rate and income of graduates after the project
- ② The changed increase of income by employees who work abroad among the graduates after the project
- ③ The increase of income of graduates who raised productivity after the project
- ④ The increase of production for an industry that employs the graduates and Spill-over effect of related industry

2. Assumption Method of Cost and Benefit

- ① Exchange rate: 1US\$ =1,575.73 TZS(Tanzanian shilling), 1 TZS = US\$ 0.000634628 (Standard Oct 10, 2012)
- ② It is supposed that durable years of goods is for ten years, and period of total cost-benefit analysis is for 30 years.

A. Cost Item

- ③ Operation & maintenance cost: It applies to the expenditure variable fraction in 2009/2010, 2010/2011, and 2011/2012 in comparison with total expenditure operation & maintenance cost of Dae es Salaam engineering college in 2007/2008. Only the increased amount of operation & maintenance cost is considered. and applies to average for 3 years after the project. Then operation & maintenance cost of each year converts into value of money in 2008 by the consumer price index(CPI).

B. Benefit Item

- ④ The change of graduate's employment rate and the increase of income before and after the project are regarded as a benefit. The employment of graduate is divided into employment of foreign industry, internal government organization, private industry, self-employment, etc. It assumes that the income of self-employed is not changed. The employment rate of all graduates and domestic & foreign employment rate applies to data which is given from the interview using questionnaire with professors in their department.
- ⑤ 50% of graduate's production increase by the project is reflected in increase of income. The graduate's income is classified into employee who works in a foreign country, internal industry employee, self-employed. The increase of income by the increase of employment rate and production refers to only a private enterprise employee who is at home or abroad, not to government organization employee and self-employed. It assumes that the whole period getting income is for 30 years after graduation of one man, but employee who works abroad would get a job after working at foreign industry for 10 years.
- ⑥ Graduate's employment rate applies to actual data which is given from the interview with professors in their department in 2011/2012.
- ⑦ An annual income of domestic and foreign industry employee is established as a standard for an estimated figure of expected annual income which is given from the interview using questionnaire with professors in their department.

3. Economic Analysis

A. Benefit/Cost Ratio Estimation

[Estimation of present value of cost and benefit]

- In estimation of cost and benefit, the prices fluctuated widely depending

on the social discount rate. However, it is difficult to measure an accurate social discount rate, thus three cases, 8%, 10%, 15% are applied with reference to the current interest rate of Tanzania and experience data of other countries.

$$\text{Present Value of Benefit(PVB)} = \sum_{t=1}^{t=30} \frac{B_t}{(1+r)^t}$$

$$\text{Present Value of Cost(PVC)} = \sum_{t=1}^{t=30} \frac{C_t}{(1+r)^t}$$

- Estimation of benefit according to social discount rate

(US\$)	Benefit			
	Current price	PVB(r=8%)	PVB(r=10%)	PVB(r=15%)
Sum	17,900,445	5,326,723	4,151,480	2,394,712

- Estimation of cost according to social discount rate

(US\$)	Benefit			
	Current price	PVC(r=8%)	PVC(r=10%)	PVC(r=15%)
Sum	3,278,421	2,474,135	2,390,870	2,271,078

- In case of $r = 8\%$, the current value ratio of cost and benefit:

$$[(\text{Total of current value of benefit})/(\text{Total of current value of cost})]$$

$$\text{US\$ } 5,326,723/\text{US\$ } 2,474,135=2.15$$

- In case of rate $r = 10\%$, the current value ratio of cost and benefit:

$$[(\text{Total of current value of benefit})/(\text{Total of current value of cost})]$$

$$\text{US\$ } 4,151,480/\text{US\$ } 2,390,870= 1.74$$

- In case of rate $r = 15\%$, the current value ratio of cost and benefit:

$$[(\text{Total of current value of benefit})/(\text{Total of current value of cost})]$$

$$\text{US\$ } 2,394,712/\text{US\$ } 2,271,078 = 1.05$$

- Evaluation Criteria: If the number is higher than 1, there is economic feasibility. Benefit/Cost ≥ 1)

- Evaluation Result

Social discount rate $r=8\%$, [present value ratio of benefit/present value ratio of cost] = 2.15

Social discount rate $r=10\%$, [present value ratio of benefit/present value ratio of cost] = 1.74

Social discount rate $r=15\%$ [present value ratio of benefit/present value ratio of cost] = 1.05

As a result of the above estimation, it might be economically feasible for sure.

B. Net Present Value(NPV) Estimation

$$\text{Net Present Value Estimation(NPV)} = \sum_{t=1}^{t=30} \frac{B_t - C_t}{(1+r)^t}$$

- In case of rate $r=8\%$, NPV is as follows:

$$\text{US\$ } 5,326,723 - \text{US\$ } 2,474,135 = \text{US\$ } 2,852,588$$

- In case of rate $r=10\%$, NPV is as follows:

$$\text{US\$ } 4,151,480 - \text{US\$ } 2,390,870 = \text{US\$ } 1,760,610$$

- In case of rate $r=15\%$, NPV is as follows:

$$\text{US\$ } 2,394,712 - \text{US\$ } 2,271,078 = \text{US\$ } 123,634$$

- Evaluation Criteria: NPV > 0 : economic feasibility exists.

○ Evaluation Result

Social discount rate $r=8\%$, net present value = US\$ 2,852,588

Social discount rate $r=10\%$, net present value = US\$ 1,760,610

Social discount rate $r=15\%$, net present value = US\$ 123,634

As a result of the above estimation, it might be economically feasible for sure.

C. Internal Rate of Return(IRR) Estimation

Internal rate of return is evaluated from
$$\sum_{t=1}^{t=30} \frac{B_t - C_t}{(1 + IRR)^t} = 0$$

○ IRR = 15.57%

○ Evaluation Criteria: In case of $IRR \geq$ interest rate, there is economic feasibility.

○ Evaluation Result: Loan interest rate is about 15% a year and deposit interest rate is about 10% each year in Tanzania. Therefore, it might be economically feasible for sure.

D. According to these analyzed results, this project could be judged as an economically feasible project.

4. Synthesis Evaluation

○ ICT Educational Reinforcement Project of KOICA for Tanzania Dae es Salaam engineering college is considered as an economic project in terms of direct income creation and indirect benefits such as an increase of production, Spill-over effect. Consequently, this project is economically feasible.



Appendix 4. World Bank STHEP(Science and Technology fo Higher Eduducation Project)

1. Overview of STHEP

With a vision to develop a modern, competitive knowledge based economy in Tanzania; STHEP was conceived as a seven year program financed by a World Bank loan implemented in two tranches that are flexible and overlapping namely Adaptable Lending Program-1 (APL-1) and Adaptable Lending Program-II (APL-II). APL-1 is expected to be implemented over a 5-year period, beginning in July 2008 and ending in June 2013. Whereas, APL-11 is planned to start in August 2011 and to end in June 2015.

STHEP Project Development Objective is to increase the quantity and quality of higher education graduates, with special emphasis on science, technology, and education, through an improved learning environment.

The long-term STHEP Program Purpose is to enhance Tanzania's capacity to apply knowledge to economic activity by building and strengthening its higher education system. Program is expected to contribute to the NGRSP (MKUKUTA) Cluster One goals of increasing growth by increasing the ability of the tertiary education sector to provide relevant, high-quality graduates, especially in science, technology, and engineering disciplines it is proposed to support the Government's Program through its two flexible and overlapping Adaptable Program Lending (APL) Credits, over seven years.

Most of the funds of the APL1 Credit (US\$ 100 million equivalent) would be devoted to: (a) initial investments in priority science and technology disciplines (b) investments in higher education institutions to enable the supply and employment

of degree-holding secondary school teachers to be expanded and (c) capacity-building for higher education sub-sector oversight and support agencies. Some APL1 funds would also be devoted to preparing a Flexible Financing Facility (FFF), and to preparing for major investments in Information and Communications Technology (ICT) infrastructure and services.

The Project is being implemented under four components namely:

- Component 1A: Investment in priority disciplines for economic growth; aimed at improving capacities of selected few higher education institutions to increase access to quality education in science and technology priority fields
- Component 1B: Expanded capacity for teacher preparation and for graduate studies in education; aimed at training degree holding secondary school teachers in mathematics, science and languages;
- Component 2A: Strengthening key Higher education Agencies and Institutions, aimed at providing relevant equipment and software, training of staff and provision of technical assistance to key Ministries and Institutions offering services to higher education subsector;
- Component 2B: Investment in System-Wide ICT and libraries, aimed at networking all research and Higher Education Institutions and use of ICT for decision making, management e learning and e library management.

Therefore organization of institutions implementing STHEP is within the above clusters and hence as follows;

- Component 1A: Investments in Priority Disciplines for Economic Growth
 - Dar es Salaam Institute of Technology

- Open University of Tanzania
 - Sokoine University of Agriculture
 - Ardhi University
 - University of Dar es Salaam
- Component 1B - Expanded capacity for teacher preparation and for graduate studies in education
 - Dar es Salaam University College of Education (DUCE)
 - Mkwawa University College of Education (MUCE)
 - State University of Zanzibar (SUZA)
 - Open University of Tanzania (OUT)
 - Component 2A: Strengthening Key Higher Education Agencies and Institutions.
 - Tanzania Commission for Universities (TCU)
 - Higher Education Students Loans Board (HESLB)
 - National Council for Technical Education (NACTE)
 - Tanzania Education Authority (TEA)
 - Tanzanian Commission for Science and Technology (COSTECH)
 - Ministry of Higher Education, Science and Technology (MHEST)
 - Ministry of Education and Vocational Training (MoEVT)
 - Component 2B: Investments in System wide ICT and libraries
 - Tanzanian Commission for Science and Technology (COSTECH)
 - Ministry of Higher Education, Science and Technology (MHEST)
 - Ministry of Education and Vocational Training (MoEVT)

2. STHEP subcomponents C1A 1.1

- Name of Institution: University of Dar es Salaam
- Project Title: Science and Technology Higher Education Project

- Project component and number: 1A; ICT Training and Applications in Teaching and Learning at COET - UDSM [C1A 1.1]
- Project objectives
 - To Improve quantity and quality of ICT training
 - To facilitate and enhance teaching, learning, research and consultancy
 - To Increase access to ICT technical education for young Tanzanians
 - To ensure sustainability of ICT usage and its growth
 - To ensure that ICT plays a vital role as a tool for development of Tanzania
 - To develop strong collaboration with ICT industry
 - To Diversify and balance between basic and demand-driven programs
 - To provide staff and students with access points to the network at the CoET-ECSE Kijitonyama Campus To provide access to the ICT facilities and services provided by the UDSM main campus including library services, academic register information system, student web, online learning system, and university websites
- Project funding: 4,186,703 USD
- Project duration: 60 months
- Project activities
 - Staff Training (290,733 USD/ 2 PhD, 2 Masters, and 6 short courses)
 - Improved learning environment (1,677,543 USD for various equipment)
 - Civil works: (2,083, 027 USD for rehabilitation of new campus)
 - Consultancies: (135,400 USD, not part of civil works)
 - Improved /established academic programmes: Review of telecommunications and computer systems engineering programs at undergraduate and postgraduate levels;)

**Ex-Post Evaluation Report on the Project for Effective ICT
Education at the College of Engineering and Technology,
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