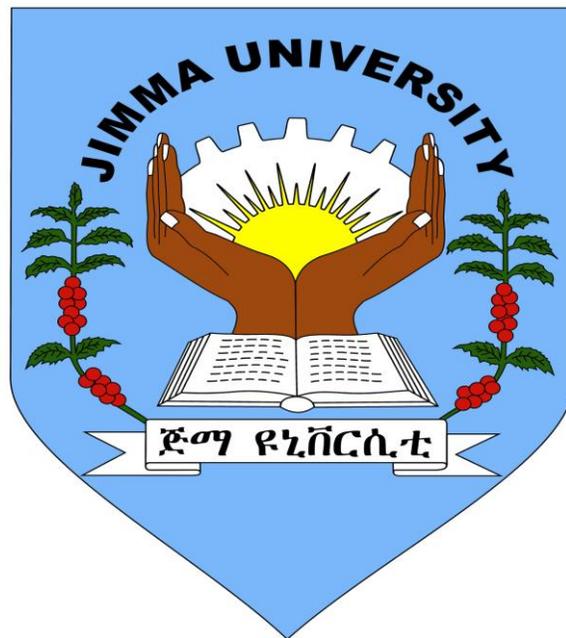




**Proceedings of the Second Annual Research
Conference of Jimma University
Organized by Jimma University
February 17-18, 2011
Jimma, Ethiopia**



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Abbreviations

AASHTO	The American Association of State Highway and Transportation Officials
ACPR	Adequate Clinical and Parasitological Response
AI	Artificial Insemination
AIDS	Acquired Immunodeficiency Syndrome
AMB	Aerobic Mesophilic Bacteria
AMC	Agricultural Marketing Corporation
AMOVA	Analysis of Molecular Variance
ANOVA	Analysis of Variance
APC	Agricultural Producers' Cooperatives
APO	Academic Programs Office
AR	Action Research
ARDU	Arssi Rural Development Unit
ASF	Aerobic Spore Former
ATARC	Adami Tullu Agricultural Research Center
AU	African Union
AVCC	<i>Awraja</i> Villagization Co-ordinating Committee
BE	Biological Efficiency
BECO	Business and Economics College
BLL	Blood Lead Level
BPR	Business Process Re-engineering
CADU	Chilalo Agricultural Development Unit
CBE	Community Based Education
CBTP	Community Based Training Program
CEB	Cement Stabilized Block
CIFOR	Center for International Forestry Research
CNS	Coagulase Negative Staphylococci
CNS-JU	College of Natural Sciences – Jimma University
CPS	Coagulase Positive Staphylococci
CPHMS	College of Public Health & Medical Sciences
CSA	Central Statistic Authority
CSA	Central Statistics Authority
CSEB	Compressed and Stabilized Earth Blocks
CSSL	College of Social Sciences and Law
DLDP	District Level Decentralization Program
DNA	Deoxyribonucleic acid

DOIT-AR	Development Oriented Interdisciplinary Thematic Action Research
DTTP	Developmental Team Training Program
DVCC	District Villagization Co-ordinating Committee
EHT	Egg Hatching Test
EIAR	Ethiopia Institute of Agricultural Research
EMA	Ethiopian Map Agency
FDRE	Federal Democratic Republic of Ethiopia
FRG	Farmers Research Group
GIS	Geographic Information System
GPS	Global Positioning System
GTP	Growth and Transformation Plan
HADS	Hospital Anxiety and Depression Scales
HE	Higher Education
HEIs	Higher Education Institute
HIV	Human Immunodeficiency Virus
ICT	Information Communication Technology
IFLO	Islamic Front for the Liberation of Oromiya
ILCA	International Livestock Centre for Africa
ILO	International Labor Organization
IPM	Integrated Pest Management
IPMS	Improving Productivity and Market Success
IR	Infra Red
ISSR	Inter Simple Sequence Repeats
IT	Information Technology
ITN	Insecticide Treated Bed Net
JICA	Japanese International Cooperation Agency
JIT	Jimma Institute of Technology
JU	Jimma University
JUCAVM	Gima University Collage of Agricultura & Veterinary Medicine
LAB	Lactic Acid Bacteria
LST	Linear Shrinkage Test
MCB	Ministry of Capacity Building
MCE	Multi Criteria Evaluation
MCE	Multi-Criteria Evaluation
MDR	Multidrug Resistance
MFI	Micro Financial Institutions
MFI	Microfinance Institute
MIS	Management Information System

NBP	National Biogas Program
NGO	Non-Governmental Organization
NLDP	National Livestock Development Project
NMR	Nuclear Magnetic Resonance
NSC	Number of Service per Conception
OLF	Oromo Liberation Front
ONRS	Oromia National Regional State
OPC	Ordinary Portland Cement
OSCE	Objective Structured Clinical Examination
PA	Peasant Association
PAVCC	Peasant Association Villagization Co-ordinating Committees
PCR	Polymerase Chain Reaction
PG	Post Graduate Studies
PRR	Parasite Reduction Ratio
PSCAP	Public Sector Capacity Building Program
QA	Quality Assurance
REWA	Revolutionary Ethiopian Women's Association
REYA	Revolutionary Ethiopian Youth Association
RIF	research innovative fund
RLDS	Regional and Local Development Studies
RP-HPLC	Reversed Phase High Performance Liquid Chromatography
RVCC	Regional Villagization Co-ordinating Committee
RWH	Rainwater Harvesting
SDQ	Strengths and Difficulties Questionnaire
SEAD	South Eastern Agricultural Development Zone
SFPC	Semi-Forest Plantation Coffee
SLU	Swedish University of Agricultural University
SNNPR	South Nations and Nationalities Peoples Region
SRP	Student Research Project
SSR	Simple Sequence Repeat
TA	Titrateable Acidity
TLC	Thin Layer Chromatography
TLS	time-location sampling
TTP	Team Training Program
UAAIE	Upper Awash Agro-Industry Enterprise
UK	United Kingdom
UN	United Nations
UNECA	United Nation Economic Commission for Africa

UNESCO	United Nations Educational, Scientific and Cultural Organization
USCS	United Soil Classification System.
UV	Ultra Violate
VLIR-IUC	Vlaamse Interuniversitaire Raad-Institutional University Cooperation
WGCF-NR	Wondo Genet College of Forestry-Natural Resources
WHO	World Health Organization
WLC	Weighted linear combination
WLC	Weighted Linear Combination
WPE	Workers' Party of Ethiopia

Acknowledgments

Welcoming Speech: Dr. Berhanu Belay, Senior Director for Research, CBE and Graduate Studies, Jimma University

Opening Remarks: Dr. Taye Tolemariam, Vice President for Academic Research and Student Affairs of Jimma University

Key-note Address: Ato Legesse Dabessa, Ethiopian Electric Power Corporation (EEPCO), Deputy Manager for Human Resource

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Opening Session

Welcoming Speech

By

Dr. Berhanu Belay

Senior Director for Research, Community Based Education and Graduate Studies

Your Excellency, Dr Taye Tolemariam, V/President for Academic Research and Student affairs of Jimma University

Invited guests

Conference participants

Ladies and Gentle men

On behalf of the 2011 JU Annual Research Conference Organizing committee and on my behalf, it is a great honor and privilege to me to well come each and every one of you to this Annual Research Conference.

Dear participants of the conference

Needless to say, higher Education in Ethiopia is mandated to deliver research, teaching and community services. However, the lion share in terms of budget and time allocation and infrastructure provision is mainly devoted for teaching and learning. The emphasis given for research and community service is dismal. The research undertaking is narrow in coverage, individually driven, fragmented and with little contribution to the overall goal of the institution and the development agenda of the nation and region.

Research is designed to generate or adapt technology, information and knowledge to be used by the end users that could be for the industry, policy makers, farm enterprises etc that fuel the development and transformation agenda of the nation and the region ultimately improving the livelihood of the community. To produce a sound technology, information and knowledge to the

satisfaction of our customers at each level, the research output from the research effort should meet the quality and demands of these customers. The research output is easily adaptive and assimilated, if the technology, knowledge and information are generated on priority needs of the end users at each level.

The quality of research output is also judged on the adoption rate and use of the research output for policy formulation and development of industries, entrepreneurs, farm household, etc at each level. The quality of research is ensured when the research is designed and implemented by incorporating multidisciplinary teams and stretched from end to end. For example, in Agricultural research, research should redress itself to address from farm to fork and this is ensured through placing a multidisciplinary research theme in the need-based technology development of the research agenda. However, our past experience in research design and execution revealed that the research undertaking in Ethiopia is highly fragmented and not designed in multidisciplinary approach. Hence there was no sound impact on the development of the nation and the regions. Recognizing this fact, Jimma University developed a research policy that signifies a multidisciplinary and need based research. This is once again to attest that our University is committed to advance multidisciplinary and demand driven research to reach the demands of the end user in technology and information generation. Our University is also working hard to review and revitalize in the sphere of thematic area development for research to ensure multidisciplinary, demand driven and need based research execution.

Dear participants

The experience in the developed countries and emerging economies of China and India has shown that the post graduate research projects are aligned with the research themes and agenda of the institution, the nation and the region. Post graduate programs have been designed to come up with double outcome that included capacity building and technology and information generation. There is disarray between the research undertaking and teaching and learning program in PG programs in Ethiopia. The research topics of PG programs are not picked from the research agenda of the institution and the national demand. The PG research projects are designed to meet

academic requirements with little contribution in addressing the research problems of the region and the nation. The situation has demanded to reorient PG programs to play a win –win game in terms of capacity building and technology generation and adaptation. The research policy of Jimma University has a space to promote research based PG programs and align the program with research thematic areas of our University.

Dear participants

There are 53 departments and 49 post graduate programs in Jimma University. The staff profile of the university is improving from time to time. The improvement of the staff profile and the diversity of disciplines and programs are opportunities to place and ensure a multidisciplinary research projects in Jimma University. Our experience in the academic and research links with national and international institutions is also an opportunity to advance multidisciplinary research. Our University is committed to tap this great opportunity.

The diversity of disciplines, the existing national and international partnerships and the urgency and demand for multidisciplinary research has compelled us to identify the theme of this year's annual research conference to be **“enhancing a multidisciplinary research: A key to invigorate need based and demand driven research”**. In this conference seven invited and cross cutting papers will be presented and serve as a background and/or lead papers. The background papers are strategically selected to address the theme of the conference. Furthermore, more than 70 papers shall be presented in parallel sessions covering a wide range of disciplines such that: 11 papers in Social Sciences and Law, nine papers in Business and Economics, 13 papers in Natural sciences, 11 papers in Public health and medical sciences, 15 papers in Engineering and technology and 11 papers in Agriculture and Veterinary medicine. As a sequel to our previous endeavor, in this conference the outstanding issues picked in each parallel session and the issues that may need immediate research and development effort shall be presented by the reporters of each college. The presentation is aimed at sharing the deliberations of each of the parallel session and also identifies and plan areas that needed a multidisciplinary research and cement the linkage of colleges, departments and our key stake holders. There shall

be also a general discussion to address cross cutting issues so as to advance research culture and dissemination of the outcomes in Jimma University in the years to come.

Dear participants

The conference has involved participants from different institutions such as Ministries, NGO, private and public higher learning institutions, regional Bureaus and Agencies all having rich experience in research and development. It's my great believe that, we will complement each other to advance economic development through research, teaching and community services. As a sequel of these conferences the proceedings of the conferences shall be produced and distributed to the key stake holders before the next year conference.

Dear participants

May I know call up on Dr. Taye Tolemariam, V/President for Academic Research and Students Affairs of Jimma University to officially open this Annual Research conference of Jimma University.

Thank you



Dr. Berhanu Belay

Senior Director for Research, CBE and Grdauate Studies

Opening Remarks

By

Dr. Taye Tolemariam

V/President for Academic Research and Student Affairs of Jimma University

Good morning, ladies and gentlemen. I am delighted to welcome you to Jimma University Annual Research Conference. Since it was first launched, the Annual Research Conference has become one of the major National forums for researchers and policymakers to exchange their views about issues related to research, policy and development endeavor.

We, at Jimma University, do our best every year to put together the strongest conference program possible, but, it is ultimately the contributions of presenters, discussants, and participants that make our research conference successful. This year's event is a special one, as we are doing this for the second time, the conference with an outstanding program of papers learning from our previous experience and ups and downs.

Jimma University is the national pioneer in community based educational philosophy which is cherished innovative means to make education relevant to societal needs and priority based research to our national development effort.

Besides, in this year conference, we can also have some joy in the achievements of our institutional reform employed over the past year. Thanks to timely and effective research policy implementation undertaken at our university to make our University research based institute with immediate interventions strategies to tackle nation's demand driven researches and debates.

We cannot deny that there will be long-term difficulties associated with research funds, but the Our University is doing its level best to make alternative income generation scheme to encourage our teaching staffs to conduct need based researches in line with the national priority to tackle

problem in the multidisciplinary approach. Surely, we have numerous policy challenges and economic constraints ahead of us, and we need to put the best economic minds to work to help us think through these highly complex problems in order to nurture our research skills and motivation.

Spirited debates, triggered by the national development endeavor and the Growth and Transformation Plan (GTP) over the next five years at our university have created conducive atmosphere for scientific forum and discussion. It is natural that we engage in this healthy debate as we search for the best solutions to overcome the multitude of difficulties coming from lack of scientific understanding. Scientific research which leads to a better understanding and knowledge of environmental issues is vital to protect our fragile environment but also to ensure its safe and sustainable use for many years to come for the present and future generations.

As with previous research forum episodes, there are lessons to be learned. So, what have we learned this time around? One can come up with a number of answers to this question. However, it is fair to say that, one of the most important lessons we painfully learned is that we need to have a much better understanding of the need for further linkages between research and development.

Today, research and development linkages are at the heart of the two-way interactions between the higher education and the national development agenda as a whole. Vulnerabilities stemming from lack of scientific knowledge and skills can amplify macroeconomic shocks, while weaknesses in the real scientific understanding and skills can undermine the stability of the national development in line with the priority need and national development endeavor. Poor linkage between development and research, in turn, can complicate and reduce the speed of national development. As we have witnessed over the past five years, such developments and research linkage in turn, can bring the national development in knowledge based economic system to overcome the quagmire of poverty. This year theme of the research conference is going on under the title “**Enhancing Multidisciplinary Research; a Key to Invigorate Need-based and Demand Driven Research**”. Jimma university is keen in contributing to multidisciplinary

demand driven research in order to bring quality education and national development through disseminating relevant research outputs and technologies to relevant stake holders and academia in Ethiopia and beyond.

I am happy to see that the conference program provides an excellent sample of the innovative research and analyzing problems and link research to development. There is much to be learned from the papers being presented at this conference. As I was going over the conference program in the papers to be present such as:-

- Overview of Research, Consultancy, Community Based Education and Post Graduate Studies Policy of Jimma University
- Integrating Graduate Research to Development Agenda of Commercialization of Smallholder Agriculture: IPMS Experience with Ethiopian Universities
- Promoting Multidisciplinary Research for a Better Impact: Experiences from VLIR-IUC Partnership Program in Jimma University
- Infant and Child Health in Ethiopia: Some Reflections on Patterns and Changes
- Challenges and Opportunities of Modern Technologies in Ethiopia
- Experience in Reorienting Forestry Research and Training in Ethiopia: The Case of Development Oriented Interdisciplinary Thematic Action Research (DOIT-AR) Program at Wondo Genet College of Forestry and Natural Resources

Realization of the university's vision of becoming a national public primer, renowned in Africa and respected in the world cannot be achieved without fostering and nurturing the culture of research and scholarship among its staff and students.

Dear participants,

I would like to reassure you that “research is one of the core activities undertaken in our university”. It fuels our creativity and helps us to stay ahead of the curve. As we have learned from the well developed countries experience and universities in the civilized nations, we will continue utilizing the results of cutting edge research in order to carry forward the momentum of

the national development effort in the next five years Growth and Transformation Plan (GTP). This year's conference is an exciting opportunity to enhance our understanding of important research issues with the help of frontier research papers. So, let me conclude by saying that I am very pleased to see you all here, and I am sure you will have very productive discussions over the next two days, and stay connected to this young and vibrant research university and prominent think tank group.

Finally, let me declare that this Second Annual Research Conference of JU is officially open and I profoundly wish you, and your stay in the historical city of Aba Jifar will be a memorable and enjoyable one.

Thank you for your attention!



Dr. Taye Tolemariam

V/President for Academic Research and Student Affairs of Jimma University

Key-note Address

By

Ato Legesse Dabessa

Ethiopian Electric Power Corporation (EEPCO), Deputy Manager for Human Resource

Your Excellency, Dr. Taye Tolemariam Vice President for Academic, Research and Students Affairs of Jimma University

Conference participants,

Ladies and Gentlemen

It is my great pleasure to give a key-note address on this second Annual Research Conference organized by Jimma University. I am sure that this conference will provide an important platform where researchers, scholars, scientists and policymakers from different institutions involved in can interact, exchange their views and experiences and plan for the best strategies about issues related to research, policy and development endeavor. To this end, I would like to highlight important consideration worth to be taken.

The research works that are currently undergoing and new research lines to be carried out should be targeted in improving the livelihood of the community. The science, methods, methodologies and skills of research in different disciplines have moved very fast and metamorphosed a lot during the past decades. Our university's curricula are poorly represented with the subject of research. Worse those courses in most of our universities are thought by new inexperienced graduate assistants. At this juncture I would boldly say, it is time to think again and again for university officials towards improving the quality of research education and undertakings. This is because there is no development and transformation without research that considers the basic

situation of the end users. Here experience and educational level should get the right place and value and deserves an important consideration. Research assumes greater importance only by its application in the services of mankind. With this spirit of sense, the technology, knowledge and information to be generated should be based on priority needs of the society. The community in which we live is facing a number of problems; to innumerate some of them; health related problems, food insecurity, low economic income, illiteracy, poor infrastructure, inadequate technologies, unclean environment, poor conservation of biodiversity and natural resources unemployment, inadequate and lengthy justice system, intense degradation of the environment, etc form important issues in the present situation of our country.

Jimma University is striving to address all of these problems step by step and this conference addresses some of these issues. I understand resource is limited but today we are better than the recent past to allocate and use efficiently and effectively the limited resources to address these problems. The problems are multiple in their nature and they need also multiple solutions. I believe that it is with this understanding that the theme of the conference, **“Enhancing Multidisciplinary Research; a key to Invigorate Need-based and Demand Driven Research”** was born in the minds of the organizing committee who have tilled and toiled hard during the last few months and have proved their capability today.

Dear participant Researchers!

Research outputs should produce a sound technology, information and knowledge to the satisfaction of the society and also should be easily adaptive and assimilated within the knowledge and skill of the society. Hence, researchers need to work in multidisciplinary approach to meet the quality and demands of these customers. The university has experts in wide areas of specializations. System has to be refined and if need be redesigned and developed to mobilize the limited resources so that multidisciplinary research approach can be implemented to reach the demands of the society.

It is well comed news that the University is committed to advance multidisciplinary and demand driven research to reach the demands of the end user in technology and information generation. Hence, the University has to clearly identify the thematic areas of research in this regard within the context of the five year Growth and Transformation plan (GTP). This annual conference helps to evaluate the area of research undertaking within the University and its importance and impact on the society.

In addition to teaching/learning as a core process of higher education initiations, research should also be taken as one of the core activities undertaking in the University. The University needs to invest in terms of resources and human power to realize these objectives.

Dear participants

The theme of the conference “**Enhancing Multidisciplinary Research; a key to Invigorate need-based and Demand Driven Research**” is well in agreement with the current needs of the society and important lessons and experiences can be learnt from this conference.

This mega event, which has attracted a number of scientists from all over the country, will certainly throw a new light on the focal issues of national significance multidisciplinary research and I am confident that the outcome of the conference will be highly fruitful for the Ethiopia Society.

I convey my good wishes to the organizing committee, participants and Jimma University and wish you grand success in your deliberations and exchange of ideas for strengthening the research and development capacity of the Jimma University and the country at large.

Finally, on behalf of my institution and on my own behalf, I would like to extend the cooperation of my office to work in collaboration with Jimma University for the realization of these shared objectives.

I thank you for your attention!

Thank you



Ato Legesse Dabessa

Ethiopian Electric Power Corporation (EEPCO), Deputy Manager for Human Resource

Section I: Papers on Cross Cutting Issues (Lead Papers)

Overview of Research, Community Based Education and Post Graduate Studies Policy of Jimma University

By
Berhanu Belay*, Abebe G/Mariam, Chali Jira, Waktole Sori and Amare Deribew

**Jimma University, Senior Director for Research, CBE and Graduate Studies*

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Abstract

A policy is a guiding principle to address quality, relevance and internal efficiency and effectiveness. Research, Consultancy, Community Based Education and Post Graduate Studies policy of Jimma University is a road map that directs the research undertaking and dissemination of the research outputs. The policy is broadly aimed at creating enabling environment for Research, enacting need based and quality research, and multidisciplinary research, Institutionalizing research projects and fostering collaborative research linkages. The policy is designed to stimulate the synergy between research undertaking, post graduate studies and community based education, thence integrating research, teaching and service delivery. The policy was drafted by offices working under the office of senior director for research, post graduate studies and community based education and circulated among the concerned offices and amended by the senate and signed by the president and distributed to the University community. The implementation of the policy depends on the coherence and clarity of the set procedures. Policy and procedure together empowers the people responsible in the process with the direction and consistency that need successful process improvement. The implementation of the policy demands concerted efforts for all concerned in research; Community Based Education and Post Graduate Studies. Policy is dynamic in nature which could be amended to accommodate the emerging issues and real situations on the ground.

Policy on Research, Community Based Education and Graduate Studies

1. Background

Jimma University (JU) is a public higher educational institution established in December 1999 by the amalgamation of Jimma College of Agriculture (founded in 1952), and Jimma Institute of Health Sciences (established in 1983). Jimma University (JU) expanded its scope and included Jimma Hospital in 2001. Jimma University has three campuses located in Jimma Town, 355 km southwest of Addis Ababa and encompassing an area of 417 hectares of land. The Main Campus is situated in the neighborhood of the ex-palace of Aba Jifar, now an open museum. College of Agriculture is the second campus mainly devoted to run Agricultural research and training. The new ‘‘ Kito Furdissa campus’’ with 295 hectares of land is planned to accommodate Institute of Technology. Besides, some land in this area is allotted to generate income by running agricultural projects.

Jimma University (JU) recognizes the fact that, a critical minimum level of research capacity and dissemination in the country is a pre-requisite to technology based economic development. In the research and dissemination sphere, the Ethiopian research has to focus on generation, adaptation and transfer of technology, knowledge and information. Therefore, Jimma University has to align its research strategy with technology generation and adaptation. In its very inception, JU has been mandated to address and bring meaningful achievements in training, research and community services.

Jimma University has assessed the internal environment in terms of past performance, analyzed the internal operation, and conducted a mandate analyses. In 2005 Jimma University has also scanned the external environment such as policy environment, political environment, social environment and economic environment. It has also analyzed the stake holders (external and internal) satisfaction on discharging its mandate. The indicators in the analyses revealed poor to good scales in performance. There was no exception in executing the research mandate and it was observed that, the number and quality of research conducted in the university are not to the satisfaction and expectations of the stake holders. The research conducted was in a piece meal approach where program or thematic areas based research was not functional, that has a little success in research output and dissemination of the technologies generated. The volume of research is not only at a decrease but also increasingly became project based, not program based and dependent on individual’s motivation. The research initiation and implementation was not institutionally driven or coordinated and therefore oftentimes did not get registered as a Jimma University research product.

The research undertaking is mainly activity based than process based with no end to end connection. In recognition to the weakness associated to research, extension and dissemination, JU has identified a strategic issue such that “Transforming research capability performance and impact” and has recognized this issue as a core area for transformation. To bring a meaning full transformation in teaching-learning, research and community services, the university is also implementing a business process re-engineering (BPR). The business process re-engineering (BPR) process has also brought research, publication and extension, community based education, post graduates program and consultancy and grants team as one case team on the premise that, these sub-teams/sections are interrelated and there is interest to bring synergy and support among each sub-process teams and transform research and dissemination and in order to contribute to the technology adaptation, expand knowledge and furnish information to the stakeholders. Collaborative and multidisciplinary researches are also weak compared to the size of staff and number of training programs added to each year. As stated in Higher Education, Proclamation 650/2009, the focus of research in Higher Learning Institutions should be geared to promoting the relevance and quality of education and on the country's developmental issues focusing on transfer of technology. Jimma University has to devote the energy and resources to execute research on a defined and core research areas and themes on the basis of the priority needs of the country and the regions in consultation with the stakeholders. The comparative advantages, location advantage and the past good practices in working with a community are also opportunities to function our research mission in a more effective manner. The diversity of disciplines and the huge capacity building endeavor in terms of upgrading staff to a PhD study and the expansion of post graduate studies is also an opportunity to intensify research and dissemination in Jimma University. It has been stated in Jimma university strategic document that, among others there is no research and dissemination policy and strategy. Therefore, this policy document has been prepared to bridge the gap and lay down a policy directions and guide line that will create conducive policy environment to advance research, dissemination, community based education and grant and consultancy services. The policy is also devised to bring synergy between supportive sub-processes for the benefit of discharging the mandates of Jimma University. Jimma University has a strategic plan with a clear vision, mission and mandate. This policy is placed to serve as a tool to advance strategic issues stipulated in JU strategic plan in the area of research, Community Based Education and Post graduate program. The policy is designed to bring a multi-disciplinary and need based research culture, encourage the engagement of all academic staff for research, ensure diversification and proper allocation of funds for research and knowledge sharing among stakeholders to accelerate research based societal development. Jimma University’s Research, Community Based and Post Graduate studies policy is designed to serve the defined purposes as stipulated in Jimma University

strategic plan. It might be necessary to indicate the vision, mission and mandate of Jimma University that will guide to set the policy on the premise that, the research policy should be framed in the context of the vision and mission of Jimma University. The research, Community Based Education (CBE) and Post Graduate Studies (PG) should contribute to full realization of the Vision, mission, goals and objectives of the University's with emphasis on multidisciplinary and need based research and advance research based development.

1.1. Vision

Jimma University aspires to be the leading public premier in the country, renowned in Africa and recognized in the world.

1.2. Mission

Jimma University is a center of academic excellence integrating training, research and service. The University trains higher caliber professionals at graduate and post-graduate levels through its cherished and innovative Community-Based Education (CBE).

1.3. Goals

- Train competent and responsive professionals who can address the community's problems through innovative and practical means.
- Promote the philosophy of Community Based Education (CBE) with the aim of bringing about palpable change in the community through active community participation and inter- sectoral collaboration.
- Contribute to societal development through the training of responsive professionals, through conducting of high-quality relevant research, and professional advocacy.
- Promote the principle of educational equity irrespective of ethnicity, religion, sex and political background.
- Promote women's participation in all spheres of development;
- Strengthen partnerships and linkages with local and international institutions for the purpose of rendering high quality training, applied research and services.
- Develop sound organisational and management systems for the accomplishment of its objectives.
- Promote combat against HIV/AIDS as a core strategic issue in all aspects of the university's activities.

1.4. Philosophy of Jimma University

Community-Based Education (CBE) is a means of achieving educational relevance to community needs and consequently of implementing a community-oriented education program. It consists of

learning activities that utilize the community extensively as a learning environment. The strategies of implementing CBE at Jimma University are designed on three main strategies namely, the Community Based Training Program (CBTP), Team Training Program (TTP) / Developmental Team Training Program (DTTP) and Student Research Project (SRP) which are expected to take up to 20% of the allotted time of the overall curricula namely. Through its Community-Based Educational activities Jimma University is in a better position to train professionals in diverse fields of studies in a community setting, encourage a team approach in treating societal development problems, work with the local communities with greater conviction and undertake problem-based research activities which take into consideration the priority needs of the community. Its long standing experience in community engagement, training and research and the strategic plan of JU are corner stones in placing the research, CBE and PG, Policy to create enabling environment in fostering research and community services.

2. Definition

Research: Research is defining or redefining problems, formulating hypotheses, collecting, organizing and evaluating data, making deductions and reaching conclusions and then carefully testing the conclusions to determine whether they fit the formulated hypotheses. Research in this document includes grant and consultancy, planning and conducting of research, documentation of research output or publication, dissemination of the research output to the end users in a number of venues.

Publication and Extension: It is a process devoted to disseminate technologies, knowledge and information resulted from the research process to the end user.

Consultancy and Grant: An exercise that identifies non-treasury funding sources and secure funds to foster research, services and development and connect professionals and firms which enable a contractual work to be accomplished for income generation and discharging professional responsibilities. .

Graduate Studies: Higher level training program (M.Sc, MA, and PhD and health sub-specialty) that coordinates the execution training and research for the requirement of the degrees. It also regulates the graduate research program to focus in thematic and priority areas of the university.

Community Based Education: A win-win learning process where students use the community as a learning environment and render services to the community through problem identification, prioritization, implementation and evaluation of the interventions in relation to the benefits reached to community and students in the learning process.

Research and Ethical Review Board: A board devoted to review the relevance of research proposals, ethical issues, progress and terminal reports of respective colleges in line with the priority development needs of nation and region and monitor the implementation of the conduct of researches as per the guide lines set forth. Here on a board refers a research and ethical review board.

College: The functional units in university encompassing departments to run research, training and services in their respective fields.

Jimma University: A public university established by government act as stated in proclamation number 63/1999

3. Synergy and Collaboration of Research, Community Based Education and Post Graduate Studies

In the past the research office, Post Graduate Studies, Community Based Education (CBE) were running their functions with a limited linkage and synergy. The research core case team in the business process re-engineering (BPR) process has identified similar activities that are done in each office and put research, Community Based Education and Post Graduate Program under one umbrella. These offices have a lot of common features such that, the research and publication office is devoted to support research and dissemination of research outputs. The Post Graduate Program is engaged in research based postgraduate program in different disciplines. The Community Based Education activity has a research exercise in the first and second year program under Community Based Training Program and research requirement during the senior years which is treated under Senior Research Program. The consultancy and grant office is a new office that has been created and believed to be a back bone and a means to diversify funding research as well as dissemination and advance teaching and learning process. All these functional units have commonalities that have necessitated creating synergy among units. In recognition to this fact the research case team has identified these units to come in one line with a shared vision and benefit each other by pooling resources and knowledge to advance technology transfer, knowledge and information generation. The strategy to bring these functional units in less than one umbrella is to foster a quality education via research based teaching and produce competent professionals who can live and work with community engagement and problem solving exercise and become interventionists and bring a measurable and meaningful improvement in the livelihood of the society. Therefore, it is high time to put this programs and pool resources and knowledge and work for the satisfaction of the customers and ensure synergy. The clustering of related sub-processes requires a clear policy to ensure cost effectiveness and efficiency.

4. The need for policy

Jimma University did not have a research, Community Based Education and Post Graduate studies policy approved by the senate till today. It was stated in JU strategic plan document that, lack of clear research policy and strategy is one of the constraints that curtailed the improvement of the research performance and impact of research out put in the country's development agenda. As a result, the number of research projects and the contribution of the limited research projects to country's development agenda are low. It is also recognized in Higher Education proclamation 650/2009 of Art. 24/4 that "every institution shall issue rules and procedures on research and consultancy standards, code of professional ethics, norms, responsibilities that shall govern its operations and the activities of its academic staff". The same proclamation Art.24/3 enforces that "every institution shall ensure that all and everyone of its academic staff are engaged in study activities based on literature or research focusing on developmental issues". Higher education (HE) proclamation enforces to set a research, consultancy and grants policy to discharge the mandate rendered from the government. The research, Community Based Education (CBE), Post Graduate Studies, policy is vital to address the strategic issues stipulated in JU strategic plan document. Clear policies ensure to monitor and evaluating the functioning of different units which are expanding from time to time. Hence, standardization of operations and clear policies and operational procedures governing research inputs; processes and outputs are critical for an internal efficiency and effectiveness of Jimma University. The research policy has to serve both internal and external customers. It should serve each member of researchers in the University and should meet internal administrative requirements as well as be acceptable and clear to external partners, which may be research collaborators, funding agencies or target customers. Above all JU is a public Higher Learning Institution that is required to have a transparent policy and strategy to discharge its responsibilities. All demanded to lay down a clear and workable policy to advance the transfer of technology, dissemination of knowledge and information to the stake holders and contribute its share in improving the quality of education and address the development agenda of the land. The need for placing a workable policy is vital for Jimma University, on the premise that the Higher Learning Institutions are mandated in the sphere of research to take into account the priority needs of the country and enable the country to solve its challenges and build its capacity through technology transfer in one hand and equipping students with basic knowledge and skills that enable them to undertake further relevant studies and research. The multiple mandate of Jimma University calls for putting in place a coherent and dynamic policy that will bring a meaningful change to the development endeavor of the nation. A clear policy can attract collaboration and partnership and bring resources (material and financial) to run the programs in a diligent manner. The aim of putting together research, teaching and service is to foster discovery, transmit and apply knowledge for development needs of the nation

and this all again requires a clear policy. There are several reasons that policies are established, including, to respond to legal or regulatory guidelines; to resolve a conflict or problem, to recognize the legitimate interest of all parties and overall benefits. The justifications stated above had compelled Jimma University to formulate a policy direction that creates the advancement of knowledge and information to the end users. The Senior Director for Research, Community Based Education and Postgraduate Studies will continue to be responsible for the administration, coordination and implementation of Jimma University the policy. The policy is stretched to address prioritization of research agenda and conducting of need based research to promoting research based graduate studies

5. Guiding Principles for Policy Formulation

The following points serve as guiding principles to lay down research, Community Based Education (CBE) and Post Graduate Studies policy of Jimma University. The guiding principles emanated from the point that Jimma University has been established as one of public and higher education institution and the sources of finance (more than 95%) is from government treasury. It has been given a mandate to promote and transfer knowledge and technology, deliver service to community services. The core guiding principle in research is indicated in Article 24/1 and stating that ‘‘the research in any institution shall be primarily on promoting the relevance and quality of education and on the country's developmental issues focusing on transfer of technology. Article 24/3a has also emphasized the fact that, ‘‘every institution shall undertake research that shall take into account the priority needs of the country and enable the country to solve its challenges and build its capacity through technology transfer, and also research process should equip students with basic knowledge and skills that enable them to undertake further and relevant studies and research’’.

In line with the Higher Education proclamation, Jimma University corporate strategic plan has identified strategic issues in relation to research and dissemination which were emanated from the internal and external assessment of the University's past performance. It states that, ‘‘the transformation of research is a strategic issue in Jimma University aimed at overhauling the organization and management of research undertakings, promoting culture and quality of research and scholarship, promoting staff involvement in research undertaking, increasing quantity, quality and impact of research outputs and creative works for development. The guiding principle in setting the research, community based education (CBE) and post graduate studies (PG) policy is standardization of procedures arose out of the need for coordinated and decentralized research undertaking leading to increase internal efficiency and effectiveness. For setting this policy with the aim of transforming research in Jimma University, improving of the

leadership and management through Business Process Re-engineering has been considered as a guiding principle. The policy is a frame work that fosters governing of inputs, processes and outputs. The policy has been designed to serve the internal and external stakeholders as a guiding principle. The policy has to be clear to external stakeholder either as research collaborators, funding partners or target customers and the satisfaction of the customers this has been also considered as guiding principle in this policy document.

6. General objectives

To develop a policy frame work that enables Research, Community Based Education (CBE) and Post Graduate Studies are supportive to each other, efficient and effective in generation and transfer of information, knowledge, technology and services.

7. Specific objectives

- 7.1. To create enabling environment for staff and students to conduct high quality and need based research.
- 7.2. To mobilize resources for research undertaking through strong linkage and partnership and consultancy.
- 7.3. To disseminate high quality research outputs which enable stakeholders to make sound informed decisions.
- 7.4. To link research, teaching and services thereby improving the internal capacity of JU for making research an integral part of the teaching and learning process.
- 7.5. Encourage internal, national and international collaboration and foster research and disseminate technology, knowledge and information.
- 7.6. To make CBE programs and services effective and responsive to societal needs and to serve and utilize the community as learning environment.
- 7.7. To create conducive environment for the expansion of high quality research based graduate programs in different disciplines.
- 7.8. To make graduate program research innovative, thematic and priority based and problem solving in nature.

8. Strategies

8.1. Multi-disciplinary research and development

The policy recognizes that multi-disciplinary research and development approach contribute to produce packages of recommendations that will foster integrated development. It is also blessing that, Jimma University has different disciplines that enables forming a multi-disciplinary team. The policy distinguishes the need to use this opportunity and involve staff with different

disciplines and experience in mega projects. These ideas could be addressed through the following strategies;

- 8.1.1. Address research and development challenges in an integrated manner and function in multi-disciplinary fashion to bring a package of output and recommendations in line with the need of the community and other sectors.
- 8.1.2. Identify center of excellence and encourage the formation of multidisciplinary research teams/groups.
- 8.1.3. Enact that all academic or research staff member (expatriate or local staff) are actively participating in the research process.
- 8.1.4. Encourage the senior, junior staff and students to be involved in the multidisciplinary research undertaking for ensuring experience sharing and sustainability of research undertaking.

8.2. Periodical revitalization of need based research

The policy recognizes that, resources in terms of skilled human and physical capacity are limited in one hand and the seriousness of the problem and comparative advantage of the university in the other compels to set research priority that can bring a meaningful change and feed to the national development agenda. The following are strategies to address the research priority:

- 8.2.1. The researches agenda and priority of JU shall be based on the national and regional development strategies and relevant international trends and capacity of JU.
- 8.2.2. The researches agenda shall be geared towards technology generation transfer and contribute to the improvement of quality of education and overall development.
- 8.2.3. Departments, colleges and institutes shall formulate the research agenda and priorities that will feed into research agenda of Jimma University and create awareness among staff about the research agenda and priority.
- 8.2.4. The research undertaking shall be based on thematic and priority areas identified and accepted by Jimma University and the stakeholders and funding shall be based on the priority of the research agenda/themes.
- 8.2.5. Jimma University shall ensure that staffs are well involved in the process of defining and reviewing the research agenda through their representatives and all staff shall be aware of the policy.
- 8.2.6. Research proposals or projects have to demonstrate that they are within the approved research theme and priority areas.

- 8.2.7. Research priority shall be reviewed and prioritized in short, medium and long term and revitalized every five years.

8.3. Creating enabling environment for research and dissemination

The policy distinguishes that, a harmonious, transparent and efficient environment is essential to cultivate research undertaking, dissemination and service delivery. It also recognizes that, research, teaching and outreach should be appropriately balanced to ensure efficient creation of knowledge and its transfer that has been supported by a sound enabling environment. Enabling environment will be created through the following strategies.

- 8.3.1. Encourage and support the establishment and maintenance of state-of-the-art central and college laboratories with user guidelines for staff and students researchers.
- 8.3.2. Encourage and support field research sites and link research and development in the field research sites.
- 8.3.3. Develop user friendly guidelines for use of equipment and disposal of such resources.
- 8.3.4. Develop workable and updated guidelines for research proposal review, implementation, Monitoring & Evaluation, dissemination, authorship, research misconduct, and patenting in Jimma University.
- 8.3.5. Develop transparent criteria applied to evaluate research performance of individuals, academic units to offer reward and incentives for researcher(s) and multi-disciplinary research teams on an annual basis.
- 8.3.6. Encourage involvement of young, women and extra-ordinary and innovative researchers and create research innovative fund (RIF) to stimulate researchers.
- 8.3.7. Provide internet and other information communication technology (ICT) facilities for academic and research activities to generate and disseminate knowledge and information.
- 8.3.8. Ensure the accessibility of library resources that facilitate access to national and international literature and to relevant data bases for all disciplines of Jimma University.
- 8.3.9. Support researchers to attend and present papers/posters at national and international conferences.
- 8.3.10. Ensure to maintain the satisfactory staff to student ratios and revisit the existing university senate legislation.
- 8.3.11. Create mechanisms to balance research workload and incentives.

- 8.3.12. Organize short and long term training for all academic and research staff to continually update their skills in research management, statistical methods and analyses, in grant proposal writing, financial management, scholarly writing and dissemination.
- 8.3.13. Mainstream gender and actively involve women and junior staff in research activities.
- 8.3.14. Ensure the employment and switching of academic staff to research staff and enforce all the academic staff are involved in research undertaking.

8.4. Coordination and management of research

Transparent and efficient research management and coordination at each level of the university enhances research output and benefits the university and the community. This will be implemented through the following strategies.

- 8.4.1. Develop multidisciplinary *in-built* planning, monitoring and evaluation system in the research process.
- 8.4.2. Ensure fast research proposal review, funding system and implementation of research projects of staff and students that adds value in the research process without compromising quality of research.
- 8.4.3. Develop mechanism of regular reporting of research outputs to relevant offices and stakeholders that can ensure timely dissemination of research outputs for stakeholders.
- 8.4.4. Link research outputs or innovations with development interventions such as industries and business community.
- 8.4.5. Develop guidelines and sourcing of some research services to hasten timely research kick off.
- 8.4.6. Identify and nurture areas of comparative advantage for research focus that brings regional, national and international reputation and coordination accommodating benefit sharing.
- 8.4.7. Strengthen the research management and coordination function at JU, college and department levels and assume research and ethical review board and editorial board with clear duties and responsibilities.
- 8.4.8. Keep the mix of the Research and Ethical Review Board of colleges to ensure the ethical and technical standards of the research projects and put in place a clear duties and responsibilities for the Research and Ethical Review Board.

8.5 Collaboration and linkage with stakeholders

The policy realizes the importance of collaboration and linkage with local, national and international research and development institutions to broaden financing and share good experiences and link the university engagement with industry and community. The strategy is highlighted hereunder to address the collaboration and linkage.

- 8.5.1. Promote internal, regional, national and international collaboration in research and development where there is a potential benefit for JU.
- 8.5.2. Promote Jimma University via a number of media to attract collaboration with international and national collaborators.
- 8.5.3. Require that external collaborative projects clearly demonstrate the benefits that will accrue to the Jimma University or indicate deficiencies or gaps within the University that necessitate external collaboration.
- 8.5.4. Foster regional, national and international linkage in teaching and graduate studies.
- 8.5.5. Develop guideline for linkage, memorandum of understanding and term of references with regional, national and international collaborative researches and teaching institutions.

8.6 Resources mobilization, diversity and sharing

The policy recognizes the need to increase research dimension through diversification of research funding from internal revenue, government fund, grants and consultancy and international sources. It also realizes the sharing of resources can also bring efficient research undertaking. This can be achieved through the following strategies;

- 8.6.1. Mobilize and share resources from within and outside the university to promote research, CBE and PG programs.
- 8.6.2. Develop guideline for research budget allocation for each college/institute and thematic and priority areas.
- 8.6.3. Engage the private sector to contribute towards research and innovations through contract research.
- 8.6.4. Provide general information including databases on possible sources and modes of research funding on a regular basis.
- 8.6.5. Solicit research funds from national and international organizations, both public and private at individual, departmental, college or institute and university levels.

- 8.6.6. Persuade the government to obtain a rolling budget for research to get a meaningful research output and allow research based post graduate scholarship.

8.7 Management Information System (MIS)

The policy recognizes that, MIS is vital in managing data and information in research, dissemination, service delivery and grants and consultancy. MIS will facilitate accesses to international and national literature and data base. This could be realized through the following strategies;

- 8.7.1. Establish central database and develop guidelines for proper utilization and accessibility of information to the university staff and the general public.
- 8.7.2. Ensure mechanisms of proper documentation and accessibility of information and research outputs at college and university level.
- 8.7.3. Develop mechanisms for *in built* Information Communication Technology for Management Information System to make research process efficient, effective and user-friendly.
- 8.7.4. Familiarize freely accessible data bases and subscribe relevant data bases that will provide information to researchers.

8.8 Institutionalizing of research for sustainability

The policy recognizes the fact that, the research projects in Jimma University are publicized, registered and a necessary support is rendered to ensure sustainability. The institutionalization of projects shall ensure the projects are designed in line with priority research and development agenda of JU and monitor that the resources are used mainly for the benefit of the institution. This shall be realized through measures described hereunder;

- 8.8.1. Set guidelines in strengthening and facilitating the research process from individual level to institutional level within Jimma University.
- 8.8.2. Develop guideline that ensures research ownership to Jimma University and ensure sustainability and monitor and evaluate the projects in Jimma University and collaborative researches with other institutions.
- 8.8.3. Ensure the institutionalization of research projects for sustainability through publicity, multi-disciplinary team for research, transparent initiation and termination of projects.
- 8.8.4. Ensure ownership through developing a guideline on collaborative and sandwich graduate programs.

- 8.8.5. Ensure that all equipment purchased within a research project are the property of JU.
- 8.8.6. Enact that research equipment and other resources acquired during the life of any research project to revert to the University at termination of the project. However, the unit that had these resources should be given priority in reallocation of such research resources when the project is completed.
- 8.8.7. Ensure that all funds obtained through personal initiation of the researchers should be declared to JU and pass through JU review and registration process.
- 8.8.8. Develop and operationlize a policy of tracking of staff research and outputs and document/index logically and disseminate to the end users.

8.9 Emerging and crosscutting issues

There are emerging issues that need attention in research and development endeavor of Jimma University. These issues can not be missed either they need urgent action and contribution or there is an opportunity for funding on a competitive bases. The emerging issues can be addressed in the following ways.

- 8.9.1. Ensure a proactive role for emerging issues and align the research agenda to the emerging research areas.
- 8.9.2. Link cross cutting issues such as climate change, gender, HIV/AIDS and other emerging issues with our research activities.
- 8.9.3. Create a multidisciplinary and inter-institutional linkage to address emerging and cross cutting issues

8.10. Create a platform for dissemination

The policy distinguishes the enhancement of research outputs dissemination as a culture to attain and keep a leading position of JU in research and community services.

- 8.10.1. Require doctoral students in the course of their studies to publish paper (s) in a peer reviewed journal before they graduate.
- 8.10.2. Require staff to publish research findings the journals and/or policy briefs to be used by policy makers and end users at each level.
- 8.10.3. Support and strengthen the Journals hosted by JU and meet the quality requirements of the journal.

- 8.10.4. Encourage and support the preparation of text books, e-learning teaching materials modules and teaching materials to accommodate local data and relevant data sources from the research out put to ensure quality education.
- 8.10.5. Establish a journal club and invite senior staff of JU and guests to deliver seminars on emerging and cross cutting issues to foster debate and sharing of knowledge.
- 8.10.6. Develop guide lines to recognize and reward staff for outstanding performance in research, innovation and publication.
- 8.10.7. Organize annual student research symposium where best researches/ projects of each graduating department are awarded to enhance the sense of competition and foster student research quality.
- 8.10.8. Displayed published articles and libraries and in museum for demonstration purposes and deposited in the university/college library;
- 8.10.9. Organize annual research conferences at university level and college level to foster staff and graduate students research dissemination.
- 8.10.10. Encourage staff to include in their research proposals the activities related to the dissemination of research results.
- 8.10.11. Require a inaugural lecture to Professors that has been conferred the title of a professor in Jimma University.
- 8.10.12. Fix a schedule for Annual research conference in Academic calendar of Jimma University.
- 8.10.13. Ensure the university press is strengthened and publish all the Journals and books produced in JU and also attract some stakes to use the printing press.

8.11 Enhancing Community Based Education

Community based education has been recognized in JU university as a tool to bring a quality education by exposing students to a real life of work. Community based education plays a win-win game, where as students used the community as a learning environment and again assist a community quest to bring solutions at their level of knowledge in participation to the community. This shall be realized through measures described hereunder;

- 8.11.1. Design Community Based Education to suite the respective disciplines to ensure sustainability, ownership and contribute in fostering quality of education and services.
- 8.11.2. Develop a Community Based Education manual that will accommodate the role of each party involved in CBE and outcomes from CBE exercise.

- 8.11.3. Expose the students to Community Based Education Program through out the learning process under the Community Based Team Training, Team Training Program /Development Team Training Program and Student Research Programs.
- 8.11.4. Involve the staff in supervision of the students and update supervision guide lines to staff members.
- 8.11.5. Put in place in-built Monitoring and Evaluation System in executing Community Based Education and develop guide line for Monitoring and Evaluation of Community Based Education.
- 8.11.6. Place a training program on Community Based Education to refresh the existing staff and update the new staff recruited to Jimma University both within the country and outside the country.
- 8.11.7. Work out a Memorandum of Understanding and get a signed Memorandum of Understanding between stakeholders involved in community based education and Jimma University.
- 8.11.8. Create active Jimma University community that could engage in community service and development.

8.12 Fostering grant and consultancy

- 8.12.1. Formulate a guide line for grants and consultancy to foster research and development
- 8.12.2. Use Grants and consultancy as a means to retain staff and diversify research and development funding.
- 8.12.3 Promote consultancies and grants as a means of resource mobilization to support research and development funding.
- 8.12.4. Use Grant and Consultancy as a means to create national and international link in research, teaching and community engagement

8.13 Promoting research based graduate studies

- 8.13.1. Guide and enforce PhD students to publish article(s) in peer reviewed and reputable journals
- 8.13.2. Orient and implement the PG research in line with themes and priorities of JU research agenda.
- 8.13.3. Provide guidelines for supervisors and supervisees during the research process to ensure harmony, quality and timely completion for PG programs.

- 8.13.4. Place a joint appointment scheme to use trained personnel working in research centers, community services and industries in PG teaching
- 8.13.5. Develop a guide line to initiate new graduate programs to meet the human power demand of the country
- 8.13.6. Attract international students and staff to ensure quality of research based Post Graduate Studies
- 8.13.7. Ensure the sufficiency and appropriateness of research methodology courses in the Post graduate curriculum

8.14 Implementation of the policy

- 8.14.1. The policy shall be implemented and reviewed periodically to accommodate emerging issues by the office of Senior Director for Research, Community Based Education and Post Graduate Studies and approved by the senate..
- 8.14.2. This Policy shall apply to on-going and new research projects and written agreements between the university and/or any external organization or individual shall be effected.
- 8.14.3. After adoption of this policy, the office of Senior Director for Research, Community Based Education and Post Graduate Studies and directors working under the office of Senior Director shall be responsible drawing out implementation guidelines and procedures from time to time and implement the policy after approval by the senate.

9. Notification:

The office of Senior Director for Research, Community Based Education and Post Graduate Studies shall create a forum and inform all persons subject to this policy of its terms after its revisit and adoption by senate at regular intervals thereafter.

Kaba Urgessa, President of Jimma University

Signature -----

Date of Commencement: August, 2010

Integrating Graduate Research to Development Agenda of Commercialization of Smallholder Agriculture: IPMS Experience with Ethiopian Universities

By

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Abstract

Ethiopia is an agrarian country where around 95% of the country's agricultural output is produced by smallholder farmers. Hence, the ability of the nation to address food and nutritional insecurity, poverty, and to stimulate and sustain national economic growth and development is highly dependent on the performance of agriculture. Yet achieving higher and sustained agricultural productivity growth remains one of the greatest challenges facing the nation. The production systems in Ethiopia have remained subsistent-oriented, natural resource-intensive and low input-output rain-fed systems. Within this context, market-led agricultural productivity growth is vital. Strategic shift in favor of knowledge – based transformation of smallholder agriculture is equally vital in dynamic demographic, economic and ecological conditions. There is increasing realization that Ethiopia needs new source of growth to propel its economy; and those contemporary challenges in agricultural systems- sustainable management of resource-base, climate change, and global competitiveness- require advanced knowledge to address. Enhancing agricultural knowledge base and facilitating its uptake and productive application is thus crucial. Successful knowledge-based agricultural productivity growth, in turn, requires enhancing capacities at different levels- individual, organizational and systems - for learning and innovation. To that end, the most promising pathway is repositioning and overhauling university academic programs in agriculture and allied disciplines. In particular, graduate programs need due attention to exploit their immense yet untapped potential to make meaningful contributions to development in several ways, both directly and indirectly. From an innovation systems perspective, higher learning institutions along with agricultural education and training system is an important, though

not the only, source of knowledge and innovation. Universities are considered to be the central hub for capacity building and research; and have underutilized research potential and students who are ‘an ever growing sources of new ideas’ and who could be trained and encouraged to become the next generation of innovators and entrepreneurs. It is at graduate level that high level expertise are groomed for guiding policy, research, innovation and general vision for sustainable development. Investing in strengthening graduate programs would have multiplier effects through ‘training-the trainers’ capacity development for sustainability and can make especial contribution to creating and sustaining innovation capacities in agricultural systems. Strengthening the higher learning institutions along with agricultural education and training system entails realigning visions, mandates and practices with changing development agenda and needs of stakeholders. In addition, reforms in higher learning institutions should focus on fostering networks and partnership. Conceiving and implementing educational reform is difficult, complex, and needs nuanced understanding and experiential learning. In this regards, an initiative by Improving Productivity and Market Success (IPMS) of Ethiopian farmers’ project to link research and learning in graduate programs to commodity value chain development may be informative from practical point of view. The purpose of this paper is to make a modest contribution to the on-going discourse in Ethiopia as to how to ensure developmental relevance of graduate programs in agriculture and allied disciplines. Besides reviewing empirical literature, the paper presents and discusses experience of a development project, IPMS, in linking higher learning institutions through graduate research to value chain development and chain actors as well as the benefits of such an arrangement. It also discusses outcomes of the initiative of the project on the basis of qualitative and quantitative indicators. Finally, the authors draw out lessons and suggest some practical and strategic options to enhance the linkage between research and learning in the graduate programs and real- world and-time challenges.

The fulltext of this article can be accessed from the following link:

Tesfaye Lemma Tefera, Azage Tegegne and Hoekstra D. 2011. Capacity for knowledge-based smallholder agriculture in Ethiopia. Linking graduate programs to market-oriented agricultural development: Challenges, opportunities and IPMS experience. ILRI (International Livestock Research Institute), Nairobi, Kenya. 56 pp. Available on WWW at: www.ipms-ethiopia.org/content/files/.../Capacity_4_Knowledge.pdf

Promoting Multidisciplinary Research for a Better Impact: Experiences from VLIR-IUC Partnership Program in Jimma University

By

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Abstract

Generally, disciplinary researches have been at the forefront of generation and dissemination of scientific knowledge, discoveries and innovations. There is no doubt that society has benefited from these advances in many areas of human needs. However, there are societal challenges that may not neatly fit the disciplinary silos that we created for better investigation and understanding of various issues facing the humanity. Tackling these problems require transdisciplinary efforts that involve experts from different background to collaborate in a mutually learning environment. Multidisciplinary research approaches are better positioned to create a complementary interface between sciences and society providing a unique opportunity to address societal problems in an inter-disciplinary manner that involves a number of stakeholders. This process of collaboration itself improves the implementation and sustainability of the solutions brought forward from the collaboration.

Jimma University, being one of major institutions of higher learning in Ethiopia, is highly committed to harnessing research undertakings to address the felt problems of the society. Its educational philosophy of community based education and its commitment to integration of teaching, research and service have given the right backdrop to its efforts of promoting multidisciplinary research in teaching, research and community engagement/services. Although multidisciplinary research is yet at its infancy at Jimma University, some of the recently launched initiatives are quite encouraging and are creating conducive environment for multidisciplinary research. One of these and the most notable initiative is VLIR-IUC Partnership Program.

Launched in July 2007, the Program is the first of its kind in the University both in scope and coverage. It has five thematic research areas, namely, animal health and zoonotic diseases, child health and nutrition, environmental health and ecology, infectious diseases epidemiology and

modeling, and soil fertility; besides there are two crosscutting projects, ICT and library and research coordination, that are designed to support the thematic areas and are also being implemented alongside the major projects. There are about 45 ongoing researches under these thematic and support projects; about 120 academic staff are involved in the research projects and 30 PhD candidates are following their study through the program (four staff have completed masters study in local and overseas institutions). The program is expected to last till 2016 leaving behind human, institutional and infrastructural capacity for teaching, research and service, more importantly, the tradition of multidisciplinary research that is vital for socio-economic development of developing countries like Ethiopia.

To sum up, multidisciplinary research is an important approach in dealing with issues and problems facing the society today. It crosses the traditional disciplinary borders that were created to generate specialized knowledge with limited thought about its application in real-life situation. Multidisciplinary researches significantly improve the quality, acceptance and sustainability of solutions forwarded by research to challenges of the society. But the road to multidisciplinary research is not rosy. It needs careful thought and putting in place disciplinary, institutional and policy arrangements that can lead the effort to fruition. It is of a particular importance in developing countries like Ethiopia where such efforts can improve the quality, acceptance and sustainability of scientific solutions.

VLIR-IUC Partnership Program with its thematic structure and involvement of researchers from various disciplinary backgrounds can be considered as a positive step towards multidisciplinary research. Its multi-faceted capacity building endeavors can significantly contribute to overall institutional transformation of Jimma University. The Program has generated valuable experiences on organization and management of effective collaborative programs between the north and south for mutual benefit of both sides. The knowledge, information and technologies generated through the partnership program can make a significant contribution to socioeconomic development of the country.

Experience in Reorienting Forestry Research and Training in Ethiopia: The Case of Development Oriented Interdisciplinary Thematic Action Research (DOIT-AR) Program at Wondo Genet College of Forestry and Natural Resources

By

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Abstract

Throughout the developing countries forestry training tends to focus on biophysical aspects – silviculture, forest entomology, forest mensuration, forest soils, etc. These are crucial areas for ensuring sustainable forest management but are not sufficient for delivering benefits to people and forests. Increasingly, the focus is changing to incorporating more people-oriented forestry. Experiences in natural resources management research has shown that reducing complex development problem to single disciplinary research question is less likely to solve real world development problems. The need to view interactions between natural and social systems at different levels and the ability to work with both the whole (the environment and the people) and its parts (disciplinary issues) is increasingly recognized. This calls for doing research differently. This requires more social sciences, more policy analysis, more team work, more participatory action oriented research and more focus on recent advances in biophysical sciences (e.g. dynamic modeling, GIS) and on humanities (constructivist epistemology). This new paradigm of research calls for active involvement of major stakeholders, mainly the communities and other development partners, and requires involvement of all in an iterative way during the process of planning, implementation and evaluation.

Seven years ago Wondo Genet College of Forestry and Natural Resources was largely providing training in the classical areas of forestry. Through a Sida-funded program and largely with the technical assistance from the Swedish University of Agricultural University (SLU) and from CIFOR, the College made an attempt to begin the process of transforming its research and

training program through the implementation of a program, known as Development Oriented Interdisciplinary Thematic Action Research (DOIT-AR). The objective of DOIT-AR is to contribute towards improved livelihood and conservation outcomes, to build capacity to do so in the College, and feedback to education and policy in natural resource management. Besides research, the program had also an institutional development component for training staff through creating awareness and interest and also building the capacity of the staff to do research differently. To this effect both formal training (through PhD training) and tailored short term training were conducted in collaboration with the Swedish University of Agricultural Science and CIFOR.

DOIT-AR was designed to be an iterative process for Wondo Genet College, its partners, the community and other stakeholders to combine scientific and local knowledge to addressing identified and pressing problems for which quick and immediate solutions were lacking, by carefully analyzing the problems/under exploited potentials and assessing the capabilities of all parties in determining entry points to improve the situation and thereby have a positive impact on livelihoods and conservation through natural resources related interventions. By jointly identifying and testing test natural resource management based interventions for poverty alleviation, the interest was also to learn from the experience at individual (experts, farmers) and institutional level (institutions engaged in forestry, agriculture and health education, research and extension), to accumulate and build on knowledge and experience in this regard, and to share with others the processes and outcomes for wider replications.

The research component of the program specifically promotes the active involvement of the communities in identifying and testing options to improve their situation. It stresses the need for learning by doing through the combination of scientific and local knowledge through situation analysis, planning what to do (by encouraging actors to develop a road map of action in a form of work packages than specific and details of activities), acting, observing the outcome and reflecting, then planning again until a desired level of improvement is achieved. The research component is supported by facilitation and mediation activities. The facilitation aspect is meant to address issues that no research as such is needed but assistance within the capacity of College could facilitate the implementation of the activities of program with the communities. Activities

under mediation are for issues that the College has neither the technical competence nor institutional mandate to address them, but can help by bringing together responsible actors in view of helping the community to address its problems. Both facilitation and mediation are expected to strengthen the development aspects and impacts of the program.

After consultation with relevant regional bodies, the College decided to select and work on three contrasting sites but close to the college. These pilot learning sites, also called thematic areas, were all within a 50 km radius from the college but facing relatively different set of priorities – farm size fragmentation (around the College), conflict with forest enterprise in accessing and using forests (around Munessa shahaemene), and severe water shortage and crop failures (around Lnagano). After having conducted a base line survey, researchers from Hawassa University (Wondo Genet College of Forestry, College of Agriculture, Health Faculty) and from Swedish University of agriculture were encouraged to submit concept notes. Initially over 35 project proposals were submitted. Later on some 60 university teachers from the three Colleges of Hawassa University did manage to implement over 20 projects.

DOI-AR was expected to deliver at community, staff and institutional levels. At local level, deliverables are those results that stakeholders consider real improvements (e.g. technologies adopted that reduce risk/vulnerability, increase productivity and income, and/or help better manage natural resources). At individual staff level, expected outputs include increased knowledge and skill in experiential learning, system thinking, facilitation, ability to work in a team and capacity to tackle real world problems. Besides, attitudinal change to work with other stakeholders was expected so that researchers would become better managers of change processes. At institutional level it was hoped that the way researches are planned and implemented could be re-oriented, and participatory action research would become a norm in the College. The exercise was also to allow a different way of research management as opposed to the widely known experience of having a research proposal budget clearly written and budgets are stated in a pre-defined proposal format. Ultimately, it was also hoped that experience so gained would be used to influence the curricula and policy development process at Regional and national level.

Implementation of DOIT-AR was faced with a number of challenges. Staff time was a major constraint as teachers in the different colleges of Hawassa University are extremely busy with teaching and administrative assignments. Maintaining the research focus while ensuring immediate developmental impact remained a difficult task for most of the projects in the program. This continued largely unchanged for most projects despite the fact that projects were being continuously assessed and staff trained to ensure that activities of each of the projects in the program are different from government extension undertakings and from NGO development work. Projects of DOIT-AR were not supposed to promote known packages for wider use. They were expected to focus on trying out what works, where and how in addressing complex but pressing problems identified by communities and other stakeholders. But most failed to be engaged in complex topics and ended in doing extension type projects or simply academic oriented simple experiments and surveys. Research activities in the program should not have been merely research undertaking having purely academic purposes, nor are they expected to be simple extension type undertakings of promoting something that is known to work (that NGOs and extension workers are expected to do). They should be researches with sufficient scientific rigor to test for successful outcome on conservation and livelihoods and to facilitate scaling up and out.

Besides time, limited experience of the staff in social sciences and working with rural people in general and in action research in particular was a major bottle neck. The overall weakness in research (review, data analysis and scientific paper writing) also affected the publications output of the program. Thus, despite regular backstopping and training tailored training, achievements in documenting the process and outcome of the DOIT-AR experience in influencing research, education and policy remained much below expectation.

The other challenge is institutional constraint. This is associated with the difficulty to maintain the interest of researchers in action research given the promotion policies of the college that are based mainly on teaching. At individual researcher level, moving away from the tradition of disciplinary research project management has been difficult, at least for some. The readiness of the College to managing this sort of program (its financial and personnel administration) was completely inadequate.

Over the years, we observed growing acceptance and understanding of the program amongst the College staff and management. There has been an increased recognition by the staff for the need to work in team to solve real world problems that farmers face. Slowly, the confidence of the communities in WGCF-NR was also improving. Effective implementation of the program and institutionalization of such a research undertaking could have assisted the efforts of the College to become a national center of excellence in the areas of people-focused management of natural resources in varying landscape mosaics. This in turn will enhance the role the College plays in forestry and natural resources management research and education in Ethiopia.

If the challenges can be addressed and opportunities to do similar research emerge, well planned and executed AR provides an opportunity to redirect research, to incorporate perspectives of stakeholders to make research more relevant, to building capacity to work as a team and to solve real world conservation and development problems by effectively mobilizing knowledge and resources of key actors. Well documented experiences of such processes and outcomes will also facilitate evidence based dialogue to influence policy making and curriculum content.



Some of the Presenters of Lead Papers

Infant and Child Health in Ethiopia: Some Reflections on Patterns and Changes

By

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Abstract

The health condition of infants and under-five children is the most sensitive indicator of socioeconomic development. Recently, Ethiopia has registered improved infant and child health. However, the gains in improved health outcomes are not uniformly shared across the different regions in the country. The main purpose of this paper is, therefore, to shed light on the patterns and changes of infant and child mortality rates in Ethiopia. Using panel data, the results indicate high inter-regional disparities in both infant and child health outcomes. The estimation results reveal that inter-regional variation in infant and child health outcomes is due to significant cross-regional differences not only in health physical infrastructure and human capital but also in urbanization and per-capita public spending on health.

Keywords: Infant and child health; regional disparities; Ethiopia.



Some of the Presenters of Lead Papers

Challenges and Opportunities of Modern Technology in Ethiopia

By

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Abstract

If we explore the trends of past development and co-evolution of man and technology, we will discover that technology not only extends the scope of human action but can also be regarded to act as a key, which can solve all social contradictions. Due to which the world is becoming a technological “Global Village” where Time and Space have no effect on behaviour. Hence, the contemporary world is influenced to a very considerable extent by technology which is creating both recurring and contemporary environmental problems.

- In a very weakly-educated civil society the role technology plays in developing and changing the social structure is enormous.
- Technology is also imperative so as to see a fertile ground for industrial growth and provide a tangible skill that will make change in the societal life.
- The gap between industrialized nations and non-industrialized countries could also be bridged via basic infrastructure and local S&T, which can improve the competitiveness of our technological exports¹.
- Since globalization continues to pose major challenges for us, we need deepen and intensify our “economic” reform² programmes and adapt effective strategies in order not be left behind developmental thinkers³ allege that technology is the most powerful tool of modern times that can offer great hopes of leapfrogging decades of development if put to effective implementation..

¹ There is a need for technology to improve the distinguishing qualities of the traditional export.

² Our major challenge is whether we should undertake technology or development driven approach of economical advancement.

³ World Bank at one time decided that it is development that should be the driving force rather than technology

- Engineering work and technology supply are completely different due to which digital divide/gap is created with severe lack of understanding of technologies.

This article doesn't conclude on determining precarious circumstances of technology diffusion neither does it dwell on listing the problems and constraints but determines the adocity of creating a hazard free human technology. Our logical brains, stuck in the technological world, struggle frantically to justify, rationalize, and explain the distinction between the important/relevant and the irrelevant, the pragmatic and the cosmetic, which has become blurred in this epoch. To overcome such problems, we should take an excursion in to this epoch of technology worldwide, and must implement laboratory based knowledge to come to acceptable decision. The technological sensitization issues that we will dwell with are collective self reliance and development of zest to experiment. As concluding finding and result it attempts to answer technology transfer process quiress such as: What is our place in this technological world? What is the purpose of our developmental endeavor? *What is the potential impact of emerging technologies in view of converting these technologically backward societies?* How can we make the real world of technology to become a globally liable habitat? Should we accept the limitations⁴ that are being imposed upon us? Or should we strive to go beyond them and create something better?

Key Words: Mind ware, hard ware, Soft ware, technological breakthrough, limitations of technology, technology sensitization

⁴ Treating someone as a global partner, while denying once existence in safe and human technological environment... to unearth the sins of the black listed manufacturers for we would discover what type inferior items they have implanted

Section II: Scientific Papers from College of Business and Economics, Jimma University

Service Quality Management Practice: The case of Jimma University

By

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Abstract

This study was conducted to evaluate service quality management practice of Jimma University from the view point of stakeholders' mainly current students, alumni, and staffs. 363 current students, 28 academic staff, and 200 alumni were selected to fill in questionnaires. Moreover, interview with employer organizations, college deans, APO and QA office, research, graduate studies and CBE coordinator offices and analysis of relevant documents were made.

The result of the study revealed that Stakeholders rated tangible, competence, content dimension of JU as of good quality. But, the attitude, delivery and reliability dimension of JU are rated as not of good quality. Regarding improvement; there is a no significant improvement over time in tangible and content dimension of JU. On the other hand, a significant improvement is observed in competence, attitude, reliability and delivery dimensions of JU. The overall service quality of JU is rated as average and there is a significant improvement over time. The study also highlighted a difference in extent of research activity college-wise and the practicality of outreach activities of JU is declining due to number constraints. Moreover, the study shows that quality assurance systems, policies and procedures are not fully in place. To improve the service quality different ways of uplifting competence, attitude, tangibles, content, and delivery and reliability dimensions of quality were recommended.

Introduction

Although Ethiopia possesses a 1,700 years old tradition of elite education linked to its Orthodox church, secular higher education was initiated only in 1950 with the founding of the University College of Addis Ababa. But as the 20th century drew to a close, Ethiopia's higher education system found itself regimented in its management, conservatism in its intellectual orientation, limited in its autonomy, short of experienced doctorates among academic staff, concerned about declining educational quality, weak in its research output, and poorly connected with the intellectual currents of the international higher education community. (Saint, 2004).

Research into service quality management practice from the view point of students, academic staff, administrators, employers and alumni in a higher educational context is somewhat scant in Ethiopian case and none of them has been addressed the specific context of Jimma University.

By looking at the overall sides, the research had been conducted by targeting students in undergraduate and postgraduate programs of the current academic year, academic staff, College deans, alumni and employers in order to uncover service quality management practice in Jimma University.

To this end, with the main objective of evaluating service quality management practice of Jimma University, this research tried to answer the following fundamental research questions:

How do the stakeholders evaluate the service quality of JU?

Are there improvement in overall service quality of JU?

What are the achievement levels so far with regard to research output and outreach activity of JU?

What are the basic activities accomplished so far by APO and QA office of JU in improving and maintaining quality?

What are the basic service quality improvement endeavors of college deans?

What are the potential bottleneck areas in service delivery that need immediate improvement in JU?

Methodology

The study population was limited to students currently attending their education in Jimma University in the regular program both at undergraduate and post graduate levels, college deans and academic staffs, alumni and employers. Jimma University has a total of 15,917 regular students in both undergraduate and postgraduate program. With regard to academic staff the university currently has 1229 instructors.

Yamane Taro (1967) provides a simplified formula to calculate sample sizes. This formula is used to calculate the sample size taking into account 95% confidence level, 5% precision level and total population size.

Hence, the sample size is computed using the following formula:

$$n = \frac{N}{1 + N(e^2)}$$

Where:

n = size of sample

e = maximum tolerable sampling error=5%

N= population size

Consequently, the ultimate figure is computed as:

$$n = \frac{N}{1 + N(e^2)}$$

$$n = \frac{17,146}{1 + 17146(0.05^2)}$$

n= 391 subjects

Data was obtained through self administered structured questionnaire dispensed to current regular undergraduate and post graduate students, alumni, and academic staffs of the university. Structured interview technique was used to uncover information regarding to service quality of the university from the view point of employers, APO and QA office and college deans.

To back up the information gathered from the aforementioned sources, the researcher used secondary data collected through document analysis from public documents such as books, articles and written reports and internet or web sites.

With regard to employers, as it is very difficult to have a complete list of stakeholders of the university, a convenience sampling technique was employed to select potential employers for interview and 10 employer organizations were randomly interviewed.

Nevertheless, since alumni's are hard to capture, time-location sampling (TLS) technique was utilized. In using this technique the researcher first identify possible location that subjects (alumni) are likely to be at and select as much subjects as possible in a definite interval of time. With regard to the sample size for this group the researcher contacted 200 alumni from different organization.

Result

Evaluation of Quality Dimensions of JU

Table 1: Tangibles Dimension Ratings by Students, Alumni and Staff of JU, 2010

Response scale	Students		Alumni		Staff	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly Disagree	9	2.5	4	2.7	-	-
Disagree	38	10.8	16	10.8	2	8.7
Undecided	85	24.1	52	35.1	6	26.1
Agree	194	55.0	71	48.0	15	65.2
Strongly Agree	27	7.6	5	3.4	-	-
Total	353	100.0	148	100.0	23	100.0

Tangibles

The tangibles dimension is used to evaluate the university with respect to the adequacy and sufficiency of physical facilities such as class rooms, dormitories, cafeterias, students clinic, sport

fields, and offices, whether it has modern equipments and facilities, whether the physical facilities of the university visually appealing environment, ease of access and whether the university is good at providing better student support services.

As it is shown in table 1 above , majority of the current students of JU voiced that the JU provides sufficient and modern equipments and facilities, has visually appealing environment , and provide better student support services . Only 10.8% and 2.5% of the current students disagree and strongly disagree, respectively, with respect to tangibles dimension of JU.

Competence

Competence dimension is used to investigate the sufficiency academic staff, theoretical and practical knowledge, qualifications, teaching expertise, and communication skill of academic staff. Moreover, this dimension evaluates the proficiency of the academic staff in updating themselves in terms of knowledge.

Table 2: Competence Dimension Ratings by Students, Alumni and Staff of JU, 2010

	Current Students		Alumni		Staff	
Response scale	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly disagree	9	2.5	7	4.7	-	-
Disagree	50	14.2	32	21.6	-	-
Undecided	93	26.3	44	29.7	8	36.4
Agree	167	47.3	58	39.2	13	59.1
Strongly Agree	34	9.6	7	4.7	1	4.5
Total	353	100.0	148	100.0	22	100.0

The result in table 2 above discloses that about 57% of the current students of JU stated that the university fulfills competence dimension of quality. However, 14.2% and 2.5% percent of the students disagree and strongly disagree respectively with regard to competence dimensions of JU.

On the other hand, around 44% of the alumni explained the achievement of competence dimension by the academic staff. In connection to this dimension, 21.6% and 4.7% of the alumni disagree and strongly disagree respectively.

Again with regard to competence dimension rating, 59.1% of the academic staff believes that JU fulfills the requirement and also 4.5% of academicians strongly agree in this regard. None of the academicians rated disagree and strongly disagree with respect to this dimension.

Attitude

Attitude dimension measures academic staffs' capacity in understanding students' need, their willingness to help, whether they are available for guidance and advice, whether they give personal attention to students, and their level of courtesy.

Table 3: Attitude Dimension Ratings by Current students and Alumni of JU, 2010

Response scale	Students		Alumni	
	Frequency	Percent	Frequency	Percent
Strongly Disagree	28	7.9	11	7.4
Disagree	74	21.0	39	26.4
Undecided	93	26.3	55	37.2
Agree	139	39.4	40	27.0
Strongly Agree	19	5.4	3	2.0
Total	353	100.0	148	100.0

The result in table 3 reveals that current students who rated JU above average with respect to attitude dimension is less than half. That is, 44.8% of students are at least satisfied with attitude

dimension of JU while around 29% of the current students are dissatisfied with regard to attitude dimensions.

On the other hand, the rating of the alumni on attitude dimension is very low too, that is only 29% of the alumni rated JU as good quality in terms of these dimensions. The alumni that rated below average on attitude dimensions account to 33.8 %. In overall evaluation, 40.1% of students and alumni rated this dimension above average. This shows that the majority of the students and alumni rated attitude dimension average and below average. (See appendix table 1A)

Content

Content dimension is used to assess the relevance of curriculum to the future jobs of students, whether it contain primary knowledge /skills, whether it is complete and effective, whether it helps students to develop computer, communication ,analytical, technical ,managerial and team working skills , whether it is flexible and cross-disciplinary.

Table 4: Content Dimension Ratings by Students, Alumni and Staff of JU, 2010

Response	Students		Alumni		Staff	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly Disagree	13	3.7	2	1.4	-	-
Disagree	26	7.4	11	7.4	1	4.3
Undecided	81	22.9	31	20.9	9	39.1
Agree	193	54.7	86	58.1	12	52.2
Strongly Agree	40	11.3	18	12.2	1	4.3
Total	353	100.0	148	100.0	23	100.0

Table 4 vividly disclosed that 66% of the current students rated content dimension of the university above average. On the contrary, the number of current students who rated the content dimension below average is only 11.1%.

About fifty seven percent of the academic staff rated the content dimension above average. Moreover, there is no one among academicians who strongly disagree with this dimension.

Delivery

The delivery dimension of quality measures instructors capacity to give lecture and presentation effectively, capability to focus on learning outcome, receiving proper feedback from students by both management and instructors, fairness of examination , encouraging students and proper sequencing and timeliness.

Table 5: Delivery Dimension Ratings by Current Students and Alumni of JU, 2010

Response scale	Students		Alumni	
	Frequency	Percent	Frequency	Percent
Strongly Disagree	25	7.1	7	4.7
Disagree	66	18.7	44	29.7
Undecided	84	23.8	45	30.4
Agree	154	43.6	51	34.5
Strongly Agree	24	6.8	1	.7
Total	353	100.0	148	100.0

As can be seen in table 5 above, delivery dimension of JU is rated as average by 50.4% of current students and below average by 34.4% of alumni. On the other hand 25.8 % of the current students and 33.4% of the alumni rated this dimension below average.

Reliability

Reliability dimension of quality measures the institutions capability in keeping its promise, match to the goals, giving valid awards, trustworthiness, having fair and firmly enforced rules and regulations, recognizing or awarding good achievers, handling complaints and solving problems. As can be seen in table 6 more than a third of alumni (33.5%) and 53.7% of the current students rated its reliability above average. On the other hand, 21.3% of current student and 37% of alumni rated reliability dimension below average. With regard to reliability dimension rating, the above table shows that 34.8% of the academicians rated it below average. In over all, forty seven percent of students, alumni, and staff rated reliability dimension above average. This implies that

the majority of stakeholders listed above rated reliability dimension average and below average. (See appendix table 1A)

Table 6: Reliability Dimension Ratings by Students, Alumni and Staff of JU, 2010

Response scale	Students		Alumni		Staff	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly Disagree	20	5.7	7	4.8	-	-
Disagree	55	15.6	47	32.2	8	34.8
Undecided	88	25.0	43	29.5	7	30.4
Agree	144	40.9	44	30.1	8	34.8
Strongly Agree	45	12.8	5	3.4	-	-
Total	352	100.0	146	100.0	23	100.0

Discussion

Tangibles

The academic staff who rated JU below average in terms of tangible dimensions stated that the university suffers from serious shortage of instruments and tools for practical demonstration purpose in science stream. Nevertheless, the majority of academicians appreciated the university since it have enough materials and facilities .Especially, with regard to the availability of IT teaching aid and internet services , the academic staff voiced that JU is above head and shoulder of other universities.

Competence

The current students of JU that disagree and strongly disagree with respect to availability of competency dimension pinpoint the following obstructions to quality: huge number of first degree holder instructors, instructors do miss class, the standard of the exam is unpredictable, some instructors are not available for consultation and do not give enough advice on research projects ,most courses are covered by guest lecturers coming from other universities, some

academicians involve in wrong doing by favoring students in grading based on their similarity in ethnic group, religion and personal affiliation interests.

Attitude

Majority of the current students and alumni rated attitude dimension average and below average. Moreover, the chi-square test with regard to attitude dimension depicts a trend of significant improvement in attitude dimension over time.

Content

The alumni rating content dimension as below average mention the following impediments: the curriculum of the university is changed year by year without in depth study especially for extension program, computer skill is not given emphasis, and some of the subjects do not have relevance to the real work settings.

Delivery

The alumni that rated this dimension below average explained that year by year programs at each semester started late and didn't end on time. Moreover, they add that most exams were not asking what knowledge is obtained from the course rather they were a kind of how do you answer my tricky questions.

The current students that rate this dimension as below average pinpoint the following loophole in delivery dimensions:

Teachers do not start and finish courses on time as per schedule

Some teachers teaches shallowly and come up with out of reach exam

Teachers reflect subjectivity in everything they do

There is a problem in providing educational materials such as handout which is costly for the students

JU fail to be governed by the schedule or academic calendar

JU has a serious problem in managing guest lecture program

Reliability

A considerable number of alumni that rated delivery dimension below average outlined the following gap in this quality dimension: there was no responsible person to handle complaints and to solve students' problems, efficiency evaluations filled by students were not taken as worthy, very poor documentation that is, especially unable to keep students grade properly and most students lost their grade, there is a high probability of deceive regarding grade, that is secretaries, instructors and workers somewhere in the registrar can simply adjust grade as they like, the registrar do not prepare and disclose students grade timely, the university is very weak in creating a link with alumni and having proper input/feedback, there is no consistency in decision, cost sharing is very high and it doesn't commensurate with the service provided, JU is exposed to intra-student conflict for a long time and there is a possibility of such turmoil to happen again, hosted too many students than its capacity.

Conclusions and recommendations

Conclusion

The result of the study revealed that Stakeholders rated tangible, competence, content dimension of JU as of good quality. But, the attitude, delivery and reliability dimension of JU are rated as not of good quality. Regarding improvement; there is a no significant improvement/change over time in tangible and content dimension of JU. On the other hand, a significant improvement is observed in competence, attitude, reliability and delivery dimensions of JU. The overall service quality of JU is rated as average and there is a significant improvement over time.

There is a difference in extent of research activity college-wise. Likewise, there is no experience sharing college-wise regarding research activities.

Performance gaps seen in program review with external reviewers, self evaluation exercise, need analysis, satisfaction survey of stakeholders, sharing good practice college-wise.

The practicality of outreach activities of JU is declining due to number constraints. Observed gaps in involvement of external professionals and employers, creating awareness about quality assurance, paying attention to the voice of appropriate stakeholders, quality assurance committee formation, and institutional self evaluation exercise. Quality assurance systems, policies and procedures are not fully in place.

Recommendations

To improve the tangibles dimension:

JU should keep on trying hard to have sufficient and appropriate physical facilities for the staff and the student population to ensure effective delivery of the curriculum.

Physical facilities, which are essential for supporting the teaching-learning activities must be added and upgraded in parallel with number of users

Engineering and general service team process of the university should work with diligence to make sure that tangibles dimension is improved

2. To build up the competence dimension

Every effort must be taken to establish service, development and appraisal policies that are conducive to staff productivity and to ensure that every programme has appropriately qualified and sufficient staffs.

Providing the best affordable working conditions to retain staff, giving incentives, and devising collaborative arrangements with other HEIs to have appropriate guest lectures and related assistance.

3. To make better progress with regard to attitude dimension

Satisfying instructors need , accepting their feedback , refraining from giving them a top down instruction without having their saying, recognizing and awarding them in line with their contribution, keeping a promise to them , maintaining academic freedom, and other similar measures should be there in the ground soon.

4. To enhance the delivery dimension

Use of ICT, problem-based learning and computer assisted learning exposure, practical classes to promote analytical thinking, problem solving, effective communication, use of

computer and digital technology. To this end, appropriate training should be given to instructors on such kinds of teaching –learning methods.

JU should hire sufficient number of educational expertise or who have a considerable experience in effective teaching methodologies and other matters in the wider context of higher education.

5. Linkages with stakeholders outside the university especially alumni and employer organizations should be there.
6. JU should develop a system through which colleges and various units of the institution can share and distribute good practice.
7. JU should set up a QA committee composed of representatives from each college, QA experts and other important stakeholders. Moreover, setting up QA Units College wise will back up and facilitate the quality assurance effort of the university.
8. JU should create a research-active environment and promote a research culture. By doing so, it can improve the quality of education and can attract high calibre academics that engender critical thinking and contribute to knowledge advancement.
9. JU should target out alternative financing sources in funding outreach projects and trimming of other hurdles which undermine the sustainability of such approaches as a teaching mechanism.
10. To fill the gap in reliability dimension:
 - Proper compliant handling mechanism and provide prompt and satisfactory solutions to stakeholders' problems
 - The registrar should keeping students' record safely, declaring their grade report on time , have an appropriate mechanism to track down wrong doing related to students' grade.
 - put in place a vibrant award and recognition mechanisms

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Corporate Entrepreneurship in Meta Abo Brewery S.C

By

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Abstract

Since entrepreneurship is the symbol of business strength and growth, these days, development is more than ever linked to entrepreneurship. This necessity of entrepreneurship is quite significant in already operating large companies (Corporate entrepreneurship) by facilitating and further enhancing their performance and profitability.

The purpose of this paper is to examine the practice of corporate entrepreneurship, in terms of innovation and marketing development, in Meta Abo Brewery.

A structured questionnaire with two stage sampling approach was adopted and data was collected from customers and employees of the company accordingly. To analyze the data, both descriptive statistics like mean, median, mode, standard deviation, and inferential analysis like linear regression and correlation were used.

Concerning the findings, it was found out by the study that corporate entrepreneurship exists in the company under study-Meta Abo Brewery. However, the level of its existence in the company is insignificant. It was proved by organizational variables like work process flexibility, lack of free time for employees to think of new ideas, low level of motivation, lack of new product development and product innovation, inefficient and low quality marketing services; and system view of employees about their organization were significantly affecting the existence and development of innovation in the corporation.

In order to solve the major challenges of the company, allowing employees to make decisions about their work process, letting employees have sufficient time to incubate their ideas, providing rewards contingent on performance, encouraging employees to look at the organization from a broad perspective, practicing new product development and product innovation, and providing efficient and quality marketing services are recommended.

Awareness about Consumer Rights in India in the Globalized Business Environment - An Empirical Investigation of Andhra Pradesh State

By

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Abstract

The consumer has been ill-treated since a long time in the market milieu in developed, developing as well as under developed countries. Consumers are being miserably cheated and misled by the unscrupulous middlemen and the manufacturers of goods and services at large. Certain malpractices like adulteration, under-weighting, supply of inferior quality of goods and services, selling of duplicate goods, misleading advertisement, deceptive sale practices and the like are adopted by the middlemen, traders and manufacturers to get benefit on the cost of consumer. It is continuing still in India with various degrees of exploitation in the entire sphere of trade due to lack of awareness about the consumer rights among the consumers. In India a plethora of legal measures came into force to protect the interest of consumers. In this process the Consumer Protection Act recognizes six specific rights of the consumers i.e., Right to Safety, Right to be Informed, Right to Choose, Right to be Heard, Right to Consumer Education, Right to Seek Redressal. A good number of programmes are organized by the government to educate the consumers regarding their rights at different levels. But still there are consumers totally unaware about their rights because of various reasons like low literacy level, lack of initiation from the government side, lack of interest of consumers, lack of media support, etc.

The present research paper is an attempt to highlight the level of awareness about the consumer rights and the various laws, which are in force to protect the consumer interest in India in general and the state of Andhra Pradesh in particular with a sample investigation of 600 respondent consumers.

Performance Measurement Yardsticks of the Microfinance Sector and their Applications in Ethiopia

By

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Abstract

Micro financial institutions (MFIs) aim at provision of financial services and addressing social concerns. They must be financially viable in order to provide intended services and expand outreach. Thus, it would be necessary to have better measures of performances. This study tried to find out measures of MFIs' financial and social performances. Indicators of social performance have not extensively dealt by literature; yet, the study attempted to address the importance these social measures of performance have on MFIs.

The method of data collection employed is questionnaires and unstructured interview for gathering primary data and published and unpublished materials for collecting secondary data. The data collected were analyzed accordingly. Descriptive analysis method is applied to come up with conclusions made and remedies were also forwarded from results of the study.

A total of 65 samples from top management members of 13 micro-financial institutions were selected to respond through a self-administrated questionnaire and 54 questionnaires were returned back. With an 83% response rate, the data from these main sources were analyzed. Among the financial yardsticks, return on equity is the most widely used (93.36%), followed by yield on gross portfolio and portfolio to assets with frequencies of 83.2% and 79%, respectively. A remarkable result from the usage of financial yardstick is the least attention given to liquidity ratio (34.3%) though almost all of the institutions prepare the liquidity report. Percent of women borrowers (88.71%) and number of active clients (85.9%), among the social yardsticks, are given

the highest priority. Percent of rural clients outreach (54%) and percent of poor clients compared to percent of the poor regionally (43.97%) are not given that much focus though these yardsticks better measure outreach.

Decision makers' attitude with the usage of yardsticks, in general, is positive. They have a strong consensus on the importance of the yardsticks. Social performance yardsticks are given less attention than their financial counterparts. However, the achievement of Ethiopian MFIs social targets is an exemplary one compared with the infancy of the industry. It would be advisable if a complete framework of yardsticks is developed in order to have a better insight of the MFIs' performance and make appropriate decisions. Ethiopian MFIs should upgrade the educational levels of their decision makers through short-term and long-term trainings and scholarships for further education.



**Some of the Participants of the Parallel Sessions of Business and Economics College,
Jimma University**

Section III: Abstracts of Scientific Papers from College of Public Health and Medical Sciences, Jimma University

Knowledge and Behavior Related to Oral Health among Jimma University Health Sciences Students, Jimma, Ethiopia

By

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Abstract

Background: Oral health practice is essential for prevention of dental and other associated systemic diseases. Little information is available on oral health practices among Jimma University health sciences students. This study explores health sciences students, with the respect to frequency and quality of use and socio-demographic distribution of oral health knowledge and behaviour.

Methods: Self-reported questionnaires were distributed to be completed by the participants from Jimma University health sciences students involving the first and second years of the schools of dentistry, health officer and health education respectively. These students were selected at random after having read a consent letter. Three hundred students, (males 206 and 94 females) completed the questionnaires.

Results: 119 (57.6%) males and 53 (52.5%) females scored highly in knowledge of caries. The corresponding rates regarding the knowledge of gingivitis were 102 (49%) and 46 (44%) respectively. Tooth brushing and the use of mefakia (chewing stick) ≤ 2 times a day was confirmed by 117 (56.8%) males and 68 (58.2%) females and by 154 (74.8%) males and 59 (62.8%) females, respectively.

Conclusions: Awareness of oral health issues is high, but specific misconceptions exist. There is gender equality in knowledge and practice of oral hygiene among health sciences students. Mefakia was equally used with toothbrush for oral hygiene practice.

Structure, Reliability, and Applicability of the Amharic Version of the Hospital Anxiety and Depression Scales (Amharic-HADS) in a Community Sample of Orphan Adolescents in Addis Ababa, Ethiopia

By

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Abstract

Background: The HADS were developed as a self-assessment tool to identify anxiety and depression in non-psychiatric hospital departments in patients of age 16-65 years. There is no documented evidence whether it can be useful in younger age groups and illiterate populations. The purpose of this study was to examine the structure, reliability, and applicability in early adolescents in a community sample of orphan adolescents.

Methods: Secondary data which was primarily collected from randomly selected 804 orphans using interview administration of the Amharic –HADS in 2010 in Addis Ababa was used in this study with permission. Confirmatory factor analysis with principal components extraction and oblique rotation ($\Delta=0$) was computed. The number of factors to be extracted was decided using Cattle's scree test. The internal consistency of the scales was assessed using Cronbach's alpha and the correlation between the sub scales was assessed using Pearson correlation coefficients.

Results: In the whole sample (11-18 years), two factors explaining a total of 45.9% of the variance were found. All the items in the scale loaded clearly and strongly to one of the components except anxiety item seven that loaded to both anxiety and depression components with loadings of 0.53 and 0.31 respectively. The depression item number eight has loaded to the anxiety component clearly with a loading of 0.50. In the 11-15 years sub sample, two components were extracted explaining a total of 45.7% of the variance. The anxiety item number seven was found to cross-load to the anxiety and depression components with loadings of 0.48

and 0.34 respectively, and the depression item number eight was found to load only to the anxiety component with a loading of 0.52.

The Amharic-HADS had Cronbach's alpha value of 0.81 and 0.76 in the whole sample of orphans for the anxiety and depression sub-scales respectively. In the 11-15 years sub-sample the corresponding alpha values for anxiety and depression scales were 0.80 and 0.77 respectively. The correlation between the anxiety and the depression subscales were 0.66 ($p < 0.001$) and 0.67 ($p < 0.001$) for the whole sample and for the 11-15 years age group respectively.

Conclusion: Meaningful data was obtained by interviewer administered Amharic HADS starting from the age of 11 suggesting successful applicability of the scale with adaptation made on item eight.

Sexual Practices and their Pattern of Development among Jimma University Students

By

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Abstract

Background: Traditional views of sexual behaviors are frequently changing with changes in the factors influencing them such as socio-cultural forces. Therefore assessing sexual practices that are not part of the tradition is necessary. The objective of this study was to identify the type of sexual practices, their pattern of development, and how the pattern of development exposes students to sexually transmitted infections and unplanned pregnancy.

Methods: A cross-sectional survey was conducted on a sample of 1986 (1612 males, 365 females, and 9 no sex reported) Jimma university students with age ranging from 17-45 years (median = 20) using both quantitative and qualitative techniques in May 2009. Data were collected using a piloted, precoded questionnaire and 6 focus group discussions. Logistic regression and descriptive statistics were computed and qualitative findings were triangulated with quantitative findings. P-value less than 0.05 was considered significant.

Results: Practice of penis to vagina sex, masturbation, kissing, oral sex, and anal sex were reported by 567 (28.9%), 688 (36.7%), 840 (42.4%), 179 (9.2 %) and 83 (4.3%) of the respondents, respectively. Respondents had a two years (one year with condom and one year without) sexual experience before marriage. Sixty percent of those with sexual experience were exposed to sexually transmitted infections and 46.6 % were exposed to both unplanned pregnancy and sexually transmitted infections. Forty seven percent of those who practiced oral sex and 29% of those who practiced anal sex did not consider their acts as sexual intercourse.

Conclusions: University students are high risk groups that need more focused research and concerted health care. The term 'sexual intercourse' should be consciously defined in future use in Ethiopia. Service providers and researchers should address all types of sexual practices.

Key terms: oral sex, anal sex, Jimma

Boy/Girl Friend and Virginty Values, and Stigma Related To Condom among Jimma University Students

By

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Abstract

Background: Individual factors such as the value given to virginty and boy/ girl friend, and stigma attached to condom can strongly affect success in preventing early sexual initiation and in using condom consistently. However, no literature was available in Ethiopia on these issues until the time of this study. The objective of this study was to assess the value given to virginty, boy/ girl friend, and stigma related to condom.

Methods: A cross-sectional survey was conducted on a random sample of 1986 students in May 2009 in Jimma University using both qualitative and quantitative techniques. Data were collected using piloted and precoded questionnaire. Six focus group discussions were conducted. Quantitative data were analyzed using SPSS version 13. Descriptive statistics, ANOVA, and t-test were computed. P-value less than 0.05 was considered statistically significant. Effect size was measured in Eta squared. The qualitative data findings were triangulated with the quantitative ones.

Result: Of 1986 respondents, 1612 (81.2%) were males, 365 (18.4%) were females and 9 (0.4%) with no sex reported. The age of respondents ranged from 17- 45 years with median of 20 years. Virginty value-scores were significantly lower among females ($p < 0.001$, Eta squared= 0.023). In contrast to many males, most females were not concerned about virginty in the focus group discussions. Many respondents of both genders reported that boy/girl friend is very important in campus life. Although the stigma to condom was slightly higher among females ($p < 0.001$, Eta squared= 0.009), most respondents of both genders had a stigmatizing attitude.

Conclusion: Lower virginty value among females with high value given to boy/girl friend shows the liberalization of sex. Liberalization of sex and stigma to condom were occurring together. Sex education providers targeting university students should focus on problems of liberalized unprotected sex in relation to success in life.

Key terms: virginty value, boy/ girl friend value, stigma to condom

Antihelmentic Effects of the Extracts of Selected Medicinal Plants against *Haemonchus contortus*

By

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Abstract

Background: *Haemonchus contortus*, a blood feeding parasite, is notoriously known for causing significant reduction of an efficient production of small ruminants.

Objective: The present work was aimed at investigating the antihelmentic effects of the extracts of eight medicinal plants against *H. contortus*.

Method: *In vitro* experimental study employing the egg hatching test (EHT) was conducted to determine the ovicidal/antihelmentic potential of the extracts of the selected plants against *H. contortus*. The inhibitory concentration in 50% of test organisms (IC₅₀) of the extracts was determined and the antihelmentically superior plant was identified. Furthermore, the major phytochemical profiles of the methanol extracts were screened using chemical methods.

Result: The essential oil and crude methanolic extracts demonstrated inhibitory effects against hatching of eggs at all concentration levels. At the highest concentration (1% v/v), all the essential oils investigated exhibited more than 80% egg hatch inhibition with mean percent inhibition ranging from 81.8±0.6 (*E. kebericho*) to 100±0 (*O. gratissimum* and *R. chalpensis*). Similarly, at the maximum dose of 5mg/ml, the 80% crude methanolic extracts of *O. gratissimum*,

P.abbyssinica and *P.eminii* leaves inhibited 90.5 ± 1.55 , 75.8 ± 0.282 and 78.2 ± 0.848 percent of eggs from hatching respectively. The intensity of egg hatching inhibitory effect of the essential oils was observed to vary in a dose dependent fashion ($P < 0.05$). Among the extracts, the essential oils of *O.gratissimum* (IC_{50} 0.0784% v/v), *R.chalpensis* leaf (IC_{50} 0.0876% v/v) and fruit (IC_{50} 0.0944% v/v) were most active against *H. contortus* egg hatching. Generally, at higher concentration, the efficacy of most the essential oil extracts and methanolic extracts of *O. gratissimum* were comparable to the commercially available antihelmentic, thiabendazole (0.5 μ g/ml).

Conclusion: The result indicated the potential activity and utility of the plants in the control of egg shedding into the environment to prevent infection of new hosts during grazing.

Recommendation: *In vivo* antihelmentic efficacies and toxicity studies of the plants should be established.

Key Words: Haemonchus contortus, Antihelmentic activity, Egg hatch test, IC_{50} , Medicinal plants

Food Insecurity, School Absenteeism and Educational Attainment of Adolescents in Southwest Ethiopia

By

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Abstract

Background: Food insecurity and malnutrition affect not only physical growth and health of children but also their intellectual development school attendance, growth, academic performance, social skills and their future as an adult. Although food insecurity is common in the study area, to what extent it impacts on school attendance and educational attainment of adolescents is not documented. We hypothesized that food insecure adolescents would be more absent from school and have lower grades attained after 1 year compared to their food secure peers.

Methods: We used data of first two consecutive rounds of the five year longitudinal family survey of 2084 adolescents aged 13-17 years from Southwest Ethiopia. Stratified random sampling was used to select adolescents. Regression analyses were used to compare school absenteeism and the highest grade attained after 1 year of follow-up in food secure and insecure adolescents. The analysis was adjusted for demographic factors, reported illness and workload.

Results: Significantly more (28.0%) food insecure adolescents were absent from school compared with their food secure peers (14.6%), $P < 0.001$). Independent of gender, place of residence and household headship, adolescent food insecurity (OR 1.77 [1.34-2.33]), household food insecurity (OR 1.62 [1.27-2.06]), illness during the past one month (OR 2.26 [1.68-3.06]), the highest grade aspired (OR 0.92 [0.88-0.96]), and number days of labor per week (OR 1.16 [1.07-1.26]) were independent predictors of school absenteeism. Similarly, adolescent food insecurity, household food insecurity, illness during the last one month, female sex and rural and semi-urban residence were negatively associated with highest grade attained while, age and the

highest grade intended to be completed were positively associated with highest grade attained ($P < 0.001$).

Conclusions: Adolescent and household food insecurity are positively associated with school absenteeism and lower educational attainment. In food insecure situations girls are more likely to be absent from school. Programs aiming to achieve universal access to primary education in food insecure environments should integrate interventions to ensure food security in adolescents.

Key words: Food insecurity, absenteeism, educational attainment, adolescent, Ethiopia



Some of the Participants of the Parallel Sessions of College of Public Health and Medical Sciences, Jimma University

Objective Structured Clinical Examination (Osce): Examinee's Perception at Department of Pediatrics and Child Health, Jimma University

By

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Abstract

Background: Objective Structured Clinical Examination is one of several methods of assessing the clinical competence of medical students. Though popular in most medical schools globally, its use in Ethiopian medical schools appears limited. The department of Pediatrics in Jimma University is the only clinical program with a relatively long (9 years) experience with this assessment format. The major objective of the study was to evaluate students' perception about the validity, comprehensiveness and acceptability of the test.

Methods: A cross-sectional survey of three successive batches of medical students, who had been examined with Objective Structured Clinical Examination, was conducted and data related to the general conduct, validity, objectivity and comprehensiveness of the test in pediatrics was collected using a structured self-administered questionnaire. Data were entered and analyzed using EpiData version 3.1. The study was conducted in March 2007.

Results: Of 144 eligible medical students, 122 completed the questionnaire representing close to 85.0% of all the students in the 3 batches. Eighty-seven (71.3%) of the respondents reported that clear and adequate instructions were given at each station and 74(60.7%) perceived that the test created a good learning opportunity highlighting their areas of weakness. Moreover, 66(54.1%) also agreed that the exam covered common and relevant topics consistent with stated teaching objectives 71(58.2%). However, a considerable number of them, 53(43.4%), expressed their

experience that examiners at manned stations were intimidating and individual feedback was offered only to a minority, 31(25.4%). Sixty-seven (54.9%) respondents expressed their opinion that the test was fair in assessing knowledge and skills and 87(71.3%) further stated that personality, gender and other attributes of candidates do not affect test scores.

Conclusion: Overall, students' evaluation of Objective Structured Clinical Examination was remarkably encouraging. Nevertheless, the added advantages of the evaluation of medical students can be maximized only if standard procedures are followed in its preparation and timely feedback are offered on the performance of candidates. To this end, we recommend that continuing appraisal and refinement of Objective Structured Clinical Examination be done by the department.

Key Words: OSCE, assessment, evaluation, perception, Jimma University

In-vitro Susceptibility of *Candida albicans* from Oral Cavities of HIV/AIDS Patients, Jimma University Specialized Hospital, Southwest Ethiopia

By

Nasir Tajur

Abstract

Background: *The genus Candida* (yeasts) is considered super infecting microorganism and can lead to oral candidiasis and *periodontitis* especially in immunocompromised patients. The chronic use of antifungal agents, in the treatment of *candidiasis* mainly in HIV/AIDS patients leads to the selection of strain resistant to this therapy. The objective of this study was to evaluate the *in vitro* susceptibility of *Candida albicans* to commonly used antifungal agents in Jimma University Specialized Hospital.

Methods: An experimental study was conducted to determine susceptibility of *Candida albicans* to the commonly prescribed antifungal agents in *Jimma University Specialized Hospital*. The samples were collected randomly from WHO stage III AIDS patients who did not begin *antiretroviral* treatment. The clinical strains (yeasts) were differentiated from moulds using staining technique, and germ tube test was employed to identify *Candida albicans*. Antifungal susceptibility patterns against five different antifungal agents, clinically used drugs, comprising of polyenes (amphotericin B and nystatin) and azoles (ketoconazoles, clotrimazole and fluconazole) were investigated using disk diffusion method.

Results: A total of 77 clinical samples of yeast were collected from non-hospitalized WHO stage III HIV/AIDS patients at ART clinic. About 42 clinical *Candida albicans* isolates were identified after germ tube test. In this study amphotericin B (97.6%) was found to be the most effective drug. Moderate rate of resistance, against Nystatin (11.9%) and clotrimazole (9.5%) was observed. On the other hand, the isolates showed highest rates of resistance against fluconazole (40.5%) and ketoconazole (40.5%).

Conclusion: The *in vitro* antifungal susceptibility testing of *Candida albicans* in this study showed relatively high resistance to commonly used azoles. Strict infection control measures should be taken to decrease horizontally transferable resistance. Additional periodic screening for resistance in all clinical isolates of *Candida Spp.* must be conducted.

Key words: Antifungal agents, resistance, *Candida albicans*, *Southwest Ethiopia*

Section IV: Scientific Papers from College of Social Sciences and Law, Jimma University

A Look into Afan Oromo Spelling Errors and Faulty Translations on Billboards with Special attention to Jimma town

By

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Abstract

Jimma, as one of the popular towns in Oromia region uses Afan Oromo as a working language. As it is the case with most of the commercial towns, sign posts, posters, billboards, etc are among the means of communication and advertisement in the town. Critical observation and careful reading of these roadside and on-wall signs written in Afan Oromo reveal tremendous amount of spelling errors and faulty translations all over the town. This study is confined to billboards in and around Jimma town. The primary source of the data for this research is Afan Oromo writings on billboards in and around Jimma town. To obtain information related to causes of the spelling errors and the faulty translations, interviews have been held with individuals who are engaged in inscribing on billboards. Afan Oromo spelling errors and faulty translations on billboards of Jimma town are categorized under linguistic or structural and orthographic representation. The Linguistic or structural problems identified are phonological, morpho-syntactic, and semantic errors while the orthographic representation problems are incorrect correspondences of Afan Oromo phoneme-grapheme.

Key words: Afan Oromo, billboards, spelling errors, orthography

Introduction

At different times, a variety of scripts including Latin and Arabic scripts and Sabeen syllabary had been used to write Afan Oromo. In the history of choosing scripts for Afan Oromo, 1991 marks a remarkable moment for the language and its present *Qubee Afaan Oromoo*, Afan Oromo alphabet. On September 3, 1991, over a thousand Oromo intellectuals gathered in Finfine (Addis Ababa) and unanimously decided that the Latin script be adopted as *Afan Oromo* script. According to Tilahun Gamta (1992), the decision was made by taking linguistic, pedagogical and practical issues into consideration.

The adoption of *Qubee Afaan Oromoo* from Latin script has created some misconceptions among various non Afan Oromo speaking and Afan Oromo illiterate people in Ethiopia. For instance, they commonly think that *Qubee Afaan Oromoo* is the same as the Latin script or writing Afan Oromo using this orthography is equivalent to using Latin language itself. As a result of this misunderstanding, we see misspellings or misrepresentations of Afan Oromo words in various texts and pieces of writings. This fact can easily be verified by critical examination of Afan Oromo writings on billboards in and around towns of Oromia region. These sorts of writings also reveal wrongly translated words and phrases. Even if Afan Oromo spelling errors and faulty translations are common problems of most towns of Oromia, for this study we selected Jimma town for its peculiarly tremendous amount of the problems. Thus, the research attempts to identify the types of the prevailing errors of billboards written in Afan Oromo in Jimma town and the factors responsible for committing the errors. It also aims to suggest solution that could help avoid the errors, create awareness of the concerned bodies regarding the magnitude of the problems, and suggest techniques of managing the problems. The outcome of this research is expected to, improve Afan Oromo spelling errors and faulty translations on billboards of Jimma town, and pave the way for other researchers who may want to undertake similar researches on various towns in Oromia.

Table 1. Qubee Afaan Oromoo / Afan Oromo Alphabet

a) Vowels

vowel	a	aa	e	ee	i	ii	o	oo	u
IPA	a	a:	e	e:	i	i:	o	o:	u

b) Consonants

Consonant	b	c	ch	d	dh	f	g	h	j	k	l	m	n	n y	p	ph	q	r	s	s h	t	v	w	x	y	z	,
-----------	---	---	----	---	----	---	---	---	---	---	---	---	---	--------	---	----	---	---	---	--------	---	---	---	---	---	---	---

IPA	b	c'	ɕ	d	d'	f	g	h	ɗ	k	l	m	n	ŋ	p	p'	k	r	s	ʃ	t	v	w	t	j	z	ʔ
-----	---	----	---	---	----	---	---	---	---	---	---	---	---	---	---	----	---	---	---	---	---	---	---	---	---	---	---

Methods and Materials

The data for this study are collected from writings on billboards in and around Jimma town. To collect the data we selected ten Jimma University Afan Oromo students and sent them off in pairs to gather all the spelling and translation errors they come across on billboards of selected parts of the town. On receiving the data, we cross-checked them, but this time we engaged ourselves in through taking pictures so as to avoid errors that we ourselves could have committed in copying the writings. But to ease the cross-checking, we first went through the students' data and categorized them according to their similarities. Then, we prepared a checklist based on the groupings of the errors. After that, with the help of the checklist, we took pictures of the erroneous writings. Interestingly, most of the errors in the students' data were simply artifacts; as a result, we replaced almost all their data with that of ours. However, the insight they gave us into the potential errors was invaluable. To find out the possible sources of the errors we held interviews with two most popular people who do inscriptions on billboards of the town. The interviews involved inquiring their levels of education, i.e. whether they have formal education in Afan Oromo, whether Afan Oromo is their first language, whether their role is simply copying the writings or whether they write the advertisements or as to who writes the advertisements for them.

Results and Discussions

The data collected for this study have been grouped into two categories, namely linguistic and orthographic errors. The first section of this part thus presents phonological, morpho-syntactic, and semantic errors, which of course, are not mutually exclusive. The second section deals with the discussion of errors that have to do merely with the use of the Afan Oromo alphabet.

Linguistic or Structural Errors

Under this title, phonological, morpho-syntactic, and semantic errors are discussed. The phonological errors include vowel length and consonant germination, clustering at the beginning and end of words, sequences of more than two consonants word medially and its hypercorrection, sequences of two (differing) or more (similar or differing) vowels word medially, and use of abbreviated words. Under the morpho-syntactic category of errors, lengthening of word final vowels which encode cases, while also changing the structure and thus the meaning of the phrases, fronting names of businesses or the names of the owners, and errors relating to use of

wrong forms of morphemes are discussed. Under the semantic errors, errors relating to choice of words, ordering of the constituents of a phrase, as well as faulty translation are discussed.

Phonological Errors

As one characteristic of language, systematicity tells us that every language has its own system of allowing the arrangement of its basic sounds. As a language with its peculiar phonotactics, Afan Oromo also requires from its writers not only the knowledge of the symbols that represent the basic sounds of the language. It also requires knowledge of the sound patterns of the language. Otherwise, one tends to make errors of the following type.

1. A) DUKKANA MEESHAALIE BARREESSAA AAB

‘Ab Stationery’

- B) FAASHINII HANNAA

‘Hanna Fashion’

- C) BOONE NUYIIS MEESHAALIE IJAARSA GAMMOO FI OFILALII...

‘Bone Nuyis Construction Materials and Glasses...’

- D) DUKKAANA UFFATA DAA’IMANII FI KOOSMOTIIKII

‘Children’s Fashion and Cosmetics’

Note that in Afan Oromo, gemination and vowel length are phonemic. Failure to notice this results in errors of vowel length (a,b) and of consonant gemination (c,d). Specifically, the word ‘dukkana’ as spelt in (a) encodes not ‘store’-the intended meaning, but ‘darkness’, which is totally different. For the word to express store, the /a/ vowel after /kk/ should be lengthened and be written ‘dukkaana’⁵ as in (d). Similarly, in (b) even though the name of the business ‘Hanna’ is not an Afan Oromo word, its correct spelling in Afan Oromo is ‘Haannaa’. Yet, the vowel of its first syllable is so short that it does not express the intended meaning ‘of Hanna’, but rather encodes the meaning ‘of theft’, changing the name Hanna to Theft, and the whole phrase becomes ‘Fashion of Theft’.

The error in (c) is also made with the name of the business *Boone Nuyiis*, and a person competent in Afan Oromo can easily trace the error on hearing the phrase. To be specific, the person can intuitively tell that *boone* ‘he is proud’ and *nuyiis* ‘we are also’ are not compatible because the subject (of the phrase) *nuy* ‘we’ requires suffixing of the first person plural marker *-n-* to the root verb *boon-*. In other words, the sound /n/ should be geminated in order for the phrase to express the intended meaning ‘Proud are we also’. In (d), the problem is on the word *daa’imanii*, which

⁵ *Dukkaana* is a loan word from Arabic which is frequently used in Oromo, especially in the eastern dialect.

encodes the meaning ‘having crawled’, when the intention of the writer was to say ‘of children’. This meaning can be achieved only if /m/ is geminated. The errors in the above examples are due to shortening of vowels (a, b) and failure to geminate consonants (c, d). Conversely, unnecessarily lengthening and geminating the sounds can also result in errors of the following kind.

2. A) DH GAADA

‘DH Gadaa’

B) INTARNAATIONAL KILINIKAA LABORAATOORIEES DAMME JIMMA

‘International Clinical Laboratories Jimma Branch’

The error in (a) above involves unnecessarily lengthening and shortening of the vowels in the first and second syllables of the word *gadaa*, respectively. While *gadaa* refers to the socio-political system of the Oromo people, the wrongly spelt version of this word is far from this sense. The infinitival form of this incorrectly spelt word is *gaaduu*, which means looking for something secretly to inflict harm on them. Vowel length in this word has thus resulted in not only shift of the word’s category (from noun to verb) but also of its sense. In (b), on the other hand, unnecessarily geminating the /m/ in *damee*, among others (because the last vowel has also been shortened), has given rise to the meaning ‘darling or sweetie’, when the intended meaning was ‘branch’.

A further phonotactic error pertains to clustering at the beginning and end of words, which are foreign to the sound patterns of Afan Oromo. Consider the following examples.

3. A) **KLINIKA** GIDDUGALEESSA UNIVERSAL

‘Universal Medium Clinic’

B) MANA MIDHAGINAA **SEMAART**

‘Smart Beauty Salon’

In (a) above, the word *kliniika* has word-initial clustering, and *semaart* in (b) has word-final clustering. In Afan Oromo, /i/ and /a/ mostly serve as epenthetic vowels that often correct the sequences that the Afan Oromo phonotactic does not allow. Accordingly, /i/ is placed between /k/ and /l/ in *kliniika*, in which case the word becomes *kiliniika*. In (b), the error is not only with word final clustering-Afan Oromo has a common way of correcting word-initial sequences of /s/ and /t/, /p/ or other sounds. In other words, words like *stadium* and *sport* are written *istaadoomii* and *ispoortii*, respectively, not by inserting /e/ between the two consonants found at the beginning of the words but by placing /i/ at the beginning of the words. This is to say that in (b) the error is both at the beginning and end of the word *semaart*. It follows then that while the

wrong placement (between /s/ and /m/) of the wrong vowel /e/ can be corrected by deleting it and instead placing /i/ at the beginning of the word, the clustering at the end of smart requires addition of lengthened /i/, in which case the word becomes *ismaartii*. It can be guessed at from the use of /e/ that the word is written by someone whose first language is presumably one of the Semitic languages and who is lacking in the competence of Afan Oromo.

A related error is word-medial clustering of more than two consonants as can be evidenced by examples below.

4. A) MANA MARI**II** DAL**DD**ALA FI WAL**DD**ALEE SEEKTARA JIMMAA

‘Jimma Chamber of Commerce and Sectoral Associations’

B) KIMAA**YOO** PHOO**TO** FI ALE**KTRONICSII**

‘Kimayo Photo and Electronics’

In the words *dalddala* and *walddalee* of example (a) above, we have sequences of two distinct sounds, the second ones of which are geminated, which altogether form three sounds. That of *alektronicsii* in (b) is even clearer in that the three sounds found word-medially /k/, /t/ and /r/ are quite distinct. In the same way that word initial and final clusters are corrected, the epenthetic vowel /i/ is inserted between the sounds that form word-medial clustering. It follows from this that the foreign word *electronics* (b), when written correctly, takes the form ‘*elektirooniksii*’, wherein /i/ separates /t/ and /r/ in *ktr* clustering. The clustering of /l/, /d/ and /d/ in (a), however, can be corrected simply by deleting one of the *d*'s.

Here is how the writer was tempted to make the error. When an obstruent occurs after a sound in a sequence of two sounds, some people tend to exaggerate the sound produced, and as a result add another symbol to show the intensity they felt was involved in releasing the sounds. It would seem that such errors are made by people who speak the language well, but who are incompetent in its writing system. On the other hand, those who are pretty sure that the language does not allow sequences of three or more consonants make yet another type of error that results from hypercorrection. The word *dinagiddee* in (c), for example, in its correct form *diinagdee* ‘economy’ does not need insertion of /i/ between /g/ and /d/. And it can be assumed from his/her use of two *d*'s that the writer had an exaggerated feeling of how /d/ was released, but since he/she is well aware of the fact that three sounds /g/, /d/ and /d/ do not occur sequentially, he/she was urged to insert /i/ between /g/ and /dd/. Similarly, the writer of *elekitirika* in (d), may be because he/she was not sure whether the sequence of /k/ and /t/ are possible, tried to hypercorrect the patterning by placing /i/ between the sounds.

C) WAA**JIRA** MAALLAQAA FI MIS**OOMA** DINAG**IDDEE** MAGAALA JIMMAA

‘Jimma Town Office of Finance and Economic Development’

D) ADDIIS MANA GURGURTAA MEESHAALĒ IJAARSAAFI ELEKITIRIKAA

‘Addis Construction Materials and Electronics’

In addition to the incorrect sequencing of consonant sounds, some errors also exhibited wrong patterning of vowels in Afan Oromo. Even though such errors especially occur in writing foreign words, the following examples evidence the fact that the errors can also be made in writing some Afan Oromo words that have the glottal stop, which according to Oromo orthography is symbolized by apostrophe.

5. A) GURGURTA UFFTAA DHAIMANII HANII

‘Hani Children’s Wear’

B) MANA GURGURTAA UFFATA DAAIMMANI TIIGII

‘TG Children’s Wear’

C) KAAFEE NUUR, SIREEN FI CIREE NIARGAMA

‘Nur Café, Breakfast and Bedrooms Available’

The word that stands for children in examples (a) and (b) was supposed to be written *daa'immanii*, which means ‘of children’, in which case the glottal stop /ʔ/ separates the vowels /a/ or /aa/ and /i/. This is because Afan Oromo does not allow a sequence of differing vowels, be they long or short or a combination of them. The same is true for the word *niargama* ‘is available’ in (c), but there is another preferable way to writing this word—simply writing the focus marker *ni* separately rather than prefixing it to the word. This time we do not use the glottal stop because it is commonly left out at the beginning of words. As can be understood from the following examples, foreign words also pose difficulty for incompetent writers.

D) MANA HUCCUU W/MIKAEEL WEESSAA

‘Woldemikael Wayessa Garments’

E) DR. HABTAAMUU ITIO-AFRIKAAN DIAAGONISTIKII LAABRAATORII OLAANAA

‘Dr. Habtamu Ethio-African Higher Diagnostic Laboratory’

The word *mikael* in (d) is an Ethiopic version of Michael, which in Afan Oromo and other Semitic languages is pronounced as ‘mika:el’. When writing this name using the English alphabet, ‘Mikael’ is the common way of spelling it, but when using Afan Oromo alphabet the same word requires the use of the glottal stop (i.e. Mikaaʔel) just like in its phonetic transcription. Similarly, there are sequences of /i/ and /o/ in *Itio-Afrikaan* and /i/ and /a/ in *diaagonistikii* in example (e). Yet, unlike the previous errors, *Itio-* actually involves a sequence of the vowel /i/ and the semivowel /j/, and *diaagonistikii* has a triphthong which goes /aiə/. And since Afan Oromo does not have diphthongs or triphthongs, the semivowel /j/ and the second vowel in /aiə/ should be symbolized by /y/, which in Afan Oromo is a consonant, not a semivowel (See also

Griefenow-Mewis, 2001). The correct ways of spelling these words thus are *Itiyoo-* and *diyaaginoostikii*.

Similar errors can also be found in writing some Semitic words that have a sequence of two or more vowel sounds. In the following examples, though misled by the English orthography, wherein we can use sequences of two or more differing vowels, the writers seem to have missed the fact that the glottal stop stands as a distinct consonant in Afan Oromo.

F) KAAFFE BAIMNAT

‘Baemnat Café’

G) RADIIET MANA NYAATAA

‘Rediet Restaurant’

Phonetically, *baimnat* and *radiiet* are transcribed as /bə/ɪmnət/ and /rədi/et/. It can be understood from the transcriptions that between the distinct vowels is found the glottal stop, in which case the two words take the forms *Ba’imnat* and *Radi’eeet* in Afan Oromo. In Afan Oromo morphophonemics, sequences of differing vowels are corrected in a number of ways. One mechanism is the one we have already discussed, i.e., the use of a glottal stop. The glottal stop, however, may take different forms as can be understood from the following examples (see also Gragg, 1976).

6. A) ba’uu→bawuu ‘to go out’

B) dhi’uu→dhiyuu ‘to get dark’

As evidenced by these examples, the glottal stop exhibits the tendency of changing to /y/ or /w/ depending on the nature of its neighboring sounds. Sometimes, rather than insertion of the glottal stop, the system employs deletion of one of the vowels. Consider the following examples.

7. A) nama + -oota→namoota

man + plu→men/people

B) bira + itti→biratti

beside+to/at→by

C) bilisa + -ummaa→bilisummaa

free+nominalizer→freedom

D) har’a + -i→har’i

today+nominalizer→today(Nom)

In the above examples, we have sequences of /a/ and /oo/ (a), /a/ and /i/ (b), /a/ and /u/ (c), and /a/ and /i/ (d). But since the system does not allow their co-existence, one of the two vowels has been deleted in the respective words inflected or formed by the coming together of the morphemes.

The next category of errors relates to the use of abbreviated words and phrases. That is, since the Latin symbols adapted for Afan Oromo are pronounced differently from their apparent

counterparts in English, one needs to be very careful in using shortened forms of words. Let us illustrate these by use of the following examples.

8. A) G. M. MEESHAALÉE BIIROO
‘G.M. Stationery’
- B) MANA FOOTOO KOOPPII SVC
‘SVC Photocopy’
- C) WIIRTUU AKSASARY MOBAAYILAA WSM
‘WSM Mobile Accessory Center’

The way G, M, S, V and W are articulated in Afan Oromo is different in that the vowel sound /aa/ is added after every consonant, in which case they take the forms *gaa*, *maa*, *saa*, *vaa* and *waa*. And that of the [C] is even worse because the symbol stands for the palatal, voiceless ejective sound [c’]. In (a), [g] stands for [dZ] not [g] thus magnifying the error. In Afan Oromo, G.M. is pronounced *Gaa Maa*; SVC, *Saa Vaa c’aa*, and WSM, *Waa Saa Maa*⁶. For them to conform to Afan Oromo alphabet, they are supposed to be written *Jii Em*, *Essi Vii Sii*, and *Dabliwu Essi Emmi* respectively. The above errors therefore follow from failure to notice the differences between the articulations of the adapted Latin symbols.

Morphosyntactic Errors

Under this heading we have identified errors that have to do mostly with lengthening of word (usually noun) final vowels. And vowel lengthening means a lot in Afan Oromo (cf. Gragg 1976:184 and Griefenow-Mewis 2001:19). Look at what this phenomenon is capable of in the following examples.

9. A) Caalaan Wallagga-*a* dhufe.
‘Chala came *from* Wollega.’
- B) Ifaan mana qoricha-*a* banate.
‘Ifa opened a store *of* drug.’
- C) Caaltuun warabeessa-*a* summii kennite.
‘Chaltu gave the poison *to* the hyena.’
- D) Kabaan utaale-*e* farda yaabe.
‘Kaba jumped *and* mounted the horse’
- E) Boontuun dhufte-*e* jirti.
‘Bontu has come.’

⁶ Writing WSM in Oromo would make the name funny because *waa saamaa*’ means ‘he who robs something’ or ‘you rob something’.

F) Ejereen callise-*e* dubbisa.

‘Ejere reads silently.’

In the above examples, lengthened final vowels have come to encode cases-ablative (a), genitive (b), and dative (c). In others, it encodes conjunction (d), and a perfect aspect (e), while in (f) it has changed the verb to an adverb. Of these, however, we are interested in the first three wherein vowel length encodes cases. See below how the phenomenon has altered the intended meanings of the phrases.

10. A) GOLGEE MIIDHAGINA MIIMII

Lit: ‘Salon of Mimi’s Beauty’

B) MANA BAREEDINAA ADDA DARDARAA

Lit: ‘Beauty Salon of Men’s Forehead’

The intended meanings of the above examples are ‘Mimi Beauty Salon’ (a) and ‘Unique Beauty Salon of Men’ (b). The error in the first example follows from failure to lengthen the last vowel of *miidhagina* ‘beauty’. The principle here is that in co-occurring words that constitute a noun phrase, if the vowel of the last word is long, the word that precedes it becomes its modifier. This also works for root words whose last vowels are normally long like *Miimii* in example (a). The long vowel on *Miimii* makes the preceding word *miidhagina* its modifier, as a result of which the two words have come to form one constituent whose meaning goes ‘Beauty of Mimi’. If the final vowel of *miidhagina* were made long, this word would make the preceding word *mana* ‘house’ part of it, and the two words would encode the meaning ‘Beauty Salon’, and the whole phrase would express the intended meaning ‘Beauty Salon of Mimi.’ Structurally, the change from the erroneous meaning (i) to the intended meaning of the writer (ii) can be shown as follows using bracket labeling.

i) [NP₂ golgee [NP₁ miidhagina miimii]]

↓

ii) [NP₂ [NP₁ golgee miidhaginaa] miimii]

The error in (b), on the other hand, follows from failure to lengthen the last vowel of *adda* ‘forehead’, which comes to encode ‘unique’ when its last vowel is lengthened. Using bracketing, this change from the unintended to the intended phrasing can be labeled as follows.

i) [NP₃ [NP₂ mana bareedinaa] [NP₁ adda dardaraa]]

↓

ii) ii) [NP₂ [NP₁ mana bareedinaa addaa] dardaraa]

For lexical items ending in consonants, we have to introduce the epenthetic vowel and lengthen it to show the genitive case marker. Otherwise, it would result in the errors of the following sort.

11. KILINIKA ILKAAN KIYYAA

Lit: 'Clinic of Kiya's Tooth'

While the intended meaning was 'Kiya Dental Clinic', failure to introduce (and suffix to the word *ilkaan*) the lengthened form of the vowel /i/ has resulted in the sense given in the gloss. The corrected version of this phrase that encodes the intended meaning would thus be *Kiliniika Ilkaanii Kiyaa*. The shift of meaning from the incorrect phrasing (i) and the corrected one (ii) can be shown using bracket labeling as follows.

i) [NP2 kilinika [NP1 ilkaan kiyyaa]] → [NP2 [NP1 kilinika ilkaanii] kiyyaa]

While the above errors are due to failure to lengthen the vowels that carry the genitive case, errors in the following examples are the result of unnecessarily lengthening the vowels.

12. MANA QORICHAA AADAA BIYYAA

Lit: 'Traditional House of Drug' or 'Drug House of a Country's Tradition'

In example (12), the lengthening of the last vowel on *qoricha* 'drug' has resulted in the unintended meaning provided in the gloss. (In the phrase, *aadaa biyyaa* 'tradition of a country' is redundant in that *aadaa* alone encodes 'tradition', and because the genitive marker on words whose last vowels are long is implicitly there, the same word, i. e. *aadaa* stands for the adjective 'traditional'). The meaning of the intended meaning thus can be achieved only by shortening the vowel on *qorichaa*, in which case it will be 'Store of Traditional Drug', and not 'Traditional Store of Drug'. And the structure of the erroneous phrase (i) and its corrected version (ii) can be labeled as follows.

i) [NP3 [NP2 mana qorichaa] [NP1 aadaa biyyaa]]

↓
ii) [NP2 mana [NP1 qoricha aadaa biyyaa]]

Nevertheless, there are cases wherein lengthening or its absence does not make that much difference. See example below.

13. A) MANA NYAATA ISLAAMAA

Lit: 'House of Muslims' Food'

B) MANA NYAATAA ISLAAMAA

Lit: 'Dining House of Muslims'

In Ethiopia, there are separate restaurants for Christians and Muslims. And in Christian dominated areas of the country, it is common for restaurants that serve Muslim-slaughtered meat to specify themselves. Similarly, in Muslim dominated areas or in areas where there are almost equal number of Muslims and Christians, it is common for stores selling Christian-slaughtered

meat to specify the part of the community they give service to. The above phrases evidence the existence of this truth.

To come to our point, (a) tells us the fact that the specified house serves food prepared from Muslim-slaughtered meat, which is normally referred to as Muslim's food. Example (b), on the other hand, expresses the fact that the restaurant gives service to Muslims, in which case the type of food they serve is understood as that slaughtered by Muslims. Therefore, both ways the phrases give related meanings, and they cannot be considered erroneous. Yet, given the commonly used expression in Amharic *Yə Islaam M }g }b Bet*, wherein the phrase *m }g }b bet* (equivalent to Afan Oromo *mana nyaataa*) stands for 'restaurant', (11b) is more acceptable. Errors relating to vowel lengthening are also evident in the use of the Afan Oromo conjunction *fi* 'and'. When this lexical item joins two nouns or noun phrases, it lengthens the last vowel of the word before it. Missing this process, however, some writers failed to lengthen the vowels as can be seen in the following.

14. A) MANA MARI DALDDALA FI WALDDALEE SEEKTARA JIMMAA

'Jimma Chamber of Commerce and Sectoral Associations'

B) KAAFEE NUUR, SIREEN FI CIREE NIARGAMA

'Nur Café, Bed and Breakfast Available'

Correcting the error in (a) requires simply lengthening the last vowel of *daldala* 'commerce' (thus *daldalaafi* or *daldalaa fi*)⁷, but in cases where *fi* 'and' occurs after a word ending with a consonant like *sireen* 'bed (nominative)' in (b), the system introduces the epenthetic vowel /i/ and lengthens this same vowel. Alternatively, since the /n/ on *sireen* is not part of the root word (it's just a nominative marker which was supposed to be placed after *ciree*⁸), we can delete it and attach the conjunction to the word *siree* to make the whole clause *sireefi cireen ni argama*.

The other morphosyntactic error refers to cases wherein names of businesses are fronted or placed at the beginning of the phrases when they are supposed to be placed at the end. Consider the following examples.

⁷ There are two common ways of writing *fi* in Oromo. That is, some write it separately as an independent lexical item, and others attach it to the word preceding it. On this view, *HAARAMSA MOOBAAAYILLI FIMEESHAA ELEKTIRONIKSI MANA SAAMI* 'Sami Mobile Maintenance and Electronics', wherein *fi* is prefixed to *meeshaa* 'materials' is a wrong way of writing it.

⁸ Note here that the nominative marker is suffixed to the last element of the items (before clauses modifying the subject) that constitute the subject.

15. A) NAA BEEKII⁹ MANA GURGURTAА MEESHAA IJAARSA MANAA

‘Na Beki Construction Materials’

B) BOONTUU OROMIYAA GURGURTAА AGROO KEEMIKAALAA

‘Bontu Oromia Agro-Chemicals’

In Amharic and English, names of businesses, institutions etc. are normally fronted as in the above glosses. The Afan Oromo phrase structure, however, puts the names *naa beekii* and *boontuu Oromiyaa* at the end. The word ordering in the above examples is odd to a native speaker of Afan Oromo because names of businesses are normally understood as representing names of the possessors, and the possessor comes after the possessed in the language (see also Griefenow-Mewis 2001). There also have been identified errors of the following kind that relate to word formation.

16. A) MANA **HAARAMSA** MOOBAAYILLAI SABBAA

‘Saba Mobile Maintenance Center’

B) **HAARAMSA** MOOBAAYILLI FIMEESHAA ELEKTIRONIKSI MANA SAAMI

‘Sami Mobile Maintenance and Electronics’

C) MADINAA **GURGURTII** MEESHAA MANA FI WAGIIRAA

‘Medina Household and Office Furniture’

The words *haaramsa* (a, b) and *gurgurtii* (c) are a bit odd to a native speaker of Afan Oromo because the forms commonly used are *haaromsa* ‘repair’ (literally ‘renewal’) and *gurgurtaa* ‘sale’, respectively (cf. Hinsene, 2007). To be specific, *haaromsa* derives from *haaraa* ‘new’, and *gurgurtii* from *gurgur-* ‘sell’. In its formation, *gurgurtaa* simply adds *-taa*¹⁰ to its root, but that of *haaromsa* is rather complex. The morpheme suffixed to *haaraa* is *-umsa*¹¹, and when the final vowels of *haaraa* (*-aa*) and the initial vowel of *-umsa* (*-u*) come together, the sequence of the sounds [a] and [u] give rise to [aw], which eventually changes to [o] (See also Gragg 1976, Giefenow-Mewis 2001).

Semantic Errors

Under this category, we have treated a range of errors that relate to choice of words, incorrect ordering of constituents of a phrase, as well as those pertaining to faulty translation. By faulty translation we mean incorporating ideas not given in the Afan Oromo versions of the

⁹ Though some speakers lengthen the last vowel on *beeki* /i/as in (15a) above, some avoid it totally when the verbs are in second person singular imperative, even though most Oromo words end in vowels.

¹⁰ This morpheme can also be found in words like *bittaa* ‘purchase’, *amantaa* ‘faith’, *bor-um-taa* ‘the next day’,

¹¹ See *-umsa* in the formation of *beekumsa* ‘knowledge’, *jeequmsa* ‘disturbance’, and *ce’umsa* ‘transition’.

advertisements into the English and/or the Amharic ones, translating names of businesses, and using English expressions in Afan Oromo writings without making any attempts to modify them in a way that conforms to the language. First, let us look at the errors that have to do with diction.

17. A) HOJII HUCCUU **GIRDOO** FI SOOFAA
B) MANA HOJI WORQII **ZAMANAAWII** GIRMAA ABRAHAA
C) MANA **DIMINAA** FI **XIBSII** RE'E
D) KUUSAA HACCUU DODHA FI **CARQII** SALAAM

Of the multiple errors in the above examples, we are interested only in the use of the foreign (Amharic) words *girdoo* 'curtain', *zamanaawii* 'modern', *xibsii* 'fried meat', and *carqii* 'garment' for which Afan Oromo has commonly used equivalents, namely *golгаа*, *ammayyaa*, *waaddii/kalaankala*, and *huccuu*, respectively¹². The errors are presented in accordance with their seriousness, the last one representing the most serious error because it involves carelessness in addition to lack of competence. That is, the Afan Oromo equivalent for *carqii*, which is *huccuu*, is there in the same phrase though incorrectly spelt.

A related category of errors involves inappropriate use of native words. The words in bold in the following examples are all native to Afan Oromo, but the fact that they have not been used in the right contexts makes the constructions erroneous.

18. A) HOJII **RARRO** AWASH
'Awash Leather Works'
B) SAAMUNNAA **XIRAA** MIILLAA
Lit: 'Soap for Horrible Smell of Foot'
C) MANA **FAARFATAA** PHINI'EL
Lit: 'House of Phiniel the Singer'
D) BOONE NUYIIS MEESHAAL IJARSA GAMMOO FI **OFILALII** M/X/IG/ MURTA'E
'Bone Nuyis Construction Materials and Glass (Works) PLC'
E) YAARDISTIIK INTARNASHINAAL KOLLEEJJII BARNOOTA **FAGEENYA**
'Yardstick International College of Distance Education'

¹² The three words in the gloss are taken from Amharic and are adapted into Oromo morphology. Specifically, *girdoo* comes from *garrad* 'cover', from which *maggarradza* 'curtain' derives. The case of *xibsii* and *carqii*, however, is clear because Oromo simply adds long vowels at the end of most foreign expressions ending with consonants or lengthens their vowels if they end with short vowels.

F) MANA *MIIDHAGINA* KONKOLAATAA XEENAA

Lit: 'Tena Car Beauty'

G) JIMMA *ARGAMA* BUNAA

Lit: 'Jimma the Finding of Coffee'

H) FAASTII HOJIIFI HOJJETAA *QUUNNAMSISAA*

'Fast Employment Agency'

In (a), *rarro* (whose correct spelling is *raroo*) is not a generic name for tanned and processed skin-it stands for a specific product of leather, i.e. semi-processed leather that is especially used for covering backs of pack animals. An appropriate equivalent of Afan Oromo for leather is rather *gogaa*, which is neutral with respect to the specific products made from leather (Cf. Hinsene, 2007). *xiraa* (b), on the other hand, is an offensive term that denotes a 'horrific smell'. A euphemistic counterpart of this word, which is schematic for both bad and good smell and which is often wittily used in such contexts is *foolii* 'smell'. In (c), *faarfataa* is an adjective denoting 'singer', and since the intention of the writer was to say 'song', a spiritual one, the appropriate word for the context is *faarfannaa*, in which case the whole phrase would be 'Piniel Music Shop'. Lastly, *ofilalii* (which was supposed to be written *ofilaallii/ofilaallee*, and which literally means 'that which helps to see oneself') 'mirror' is used in (d) as if it represents glass, while the Afan Oromo equivalent for glass, as is also used by Hinsene (2007), is *fullee*¹³. As regards *fageenya* 'farness' in (e), even though the word denotes 'distance', and thus cannot be considered an error in its own right, the specific Afan Oromo word most appropriate for this context is *halaala*¹⁴. The word *miidhagina* 'beauty' is inappropriately used to express 'décor', but *miidhagina* is especially used in expressing the beauty of females, and an appropriate Afan Oromo word for décor is *faaya*, which is commonly employed in the expression of ornaments. The errors in (g) and (h), however, are not due to use of inappropriate words. The words are correct, but they are not correctly used-some linguistic units are missing from the constructions. In (g), for example, there is no word *argama*¹⁵ whose meaning is equivalent to 'origin'. Even though its formation draws on Afan Oromo morphological processes, it simply means 'the

¹³ *The use of this word is striking because it presumably follows from fulla'uu 'to be dug through to the other side', and fullee denotes 'that which lets light through'.*

¹⁴ *The meaning of this word goes way beyond that of fageenya in that it is often used for expressing the situations of lovers who are far apart, in talking of the behavior of someone about whom one has little knowledge, etc.*

¹⁵ *argama* is composed of the morphemes *arg-* 'see', *-am-* 'passive marker (Tolemariam, 2009:99), and *-a* 'nominalizer.

finding’, which is a process. And since the meaning of ‘origin’ encapsulates spatial location in addition to denoting the source of something, we need to add spatiality to this process by use of the locative *itti* ‘at’ and *bakka* ‘place’ or *biyya* ‘country’ also enriching it with *jalqaba* ‘first’ to encode originality. And by slightly changing the structure, we can get the appropriate expression *Jimma, bakka/biyya bunni jalqaba itti argame*, which roughly means ‘Jimma, where coffee was first found’. Almost similarly, the error in (h) follows from the use of *quunnamsiisaa* as if it has equivalent meaning with the Amharic */aggana/* ‘agent’ or literally ‘he who brings together’. For this word to express a meaning equivalent to that of the Amharic, we need to attach the reciprocal *wal* ‘each other’ that could stand as the prefix of the word, in which case it would take the form *walquunnamsiisaa*. Otherwise, the word would profile a one way movement-it would just be taking one to the other, or more specifically, the worker to the job or the job to the worker. The use of the conjunction *fi* ‘and’ necessitates the prefixing of *wal* to the word for the phrase to express the intended meaning. At some level, *walquunnamsiisaa* itself appears to be odd in that it also encodes ‘bringing (people) together for sexual intercourse’. We believe the word *walagarsiisuu* ‘to help see each other’ to be a better usage for this context.

A further category of errors relates to wordiness-the use of more words than necessary to express ideas. See examples below.

19. A) **KUUSAA MANA** KITAABA MEEGGAA DAMEE JIMMA

‘Mega Book Store, Jimma Branch’

B) **MANA KUUFAMA** MEESHAALEE BARREEFFAMA HIWOT

‘Hiwot Stationery’

The phrases *kuusaa mana* (a) and *mana kuufama* (b) are redundant because the commonly used Afan Oromo equivalent for store is *kuusaa*, and the two phrases simply mean *store house*, which is wordy. While the error in (b) is tolerable, the one in (a) is ‘inexcusable’ because the error goes beyond wordiness to changing the meaning of the whole phrase to ‘a store for Mega Book Store, Jimma Branch’.

Another category of errors subsumed under semantics involves the incorporation of ideas not given in the Afan Oromo versions of the writings. The following examples can evidence this fact.

20. A) **KILINIKA ILKAAN KIYYAA**

‘Kiya Dental Clinic’

T’\rs Mənk’əl Mətkəl Məmulat

Lit: ‘Uprooting, Implanting and Filling Tooth’

B) **ISTESHINARI HANAAS**

‘Hanas Stationery and Computer Accessories’

C) HOTEELA YEENYALEENYA

‘Yegnalegna Hotel’

‘Yə K’urs\`na Mə\`\ta Agəlg\`lot Ensət’ allən’

‘We provide bed and breakfast Services’

D) MANA DIMINAA FI XIBSII RE’E

‘Raw and Roasted Goat’s Meat House’

‘Dag\`mə T\`nsa/e’

‘Yə F\`jjəl K’urt’\`nna T’\`bs Bet Kə Bah\`lawi M\`g\`botΣ Gar’

‘Raw and Roasted Meat of Goat with Traditional Foods’

E) RAABSAA HOMISHA B.G.I

‘Tsəhay Abəba T’ək’lala Yə N\`gd D\`r\`dZ\`t’

‘B.G.I Products Distributor’

In (a), the part that expresses the specific services of the clinic-uprooting, implanting, and filling tooth-is not given in the Afan Oromo version. In (b), the Afan Oromo version gives only a part of the service they provide, i.e. about stationery, and about computer accessories is missing. Similarly, the part that specifies the services *Yegnalegna Hotel* provides-bed and breakfast-has been left out in (c). And surprisingly, in (d) and (e), the names of the businesses and parts of the services the firms provide are not given in the Afan Oromo versions of the writings.

The last category of errors involves translation of names of businesses together with the services they provide. Such errors are common in this country, and one good example is that of *Tikur Anbessa Hospital*, which is referred to in English as ‘Black Lion Hospital’. Consider the following example we have observed in writings on signposts in Jimma.

21. A) MANA BAREEDINAA DHIROTAA **EYYEE**

Yes YəwəndootΣ Yəwbət Saaloon’

‘Yes Gents’ Hairdresser’

B) MANA MURAA FI DADHII **BARKUMEE**

‘**Millennium** K’urt’\`nnaa T’ədZdZ Bet’

‘Millennium Raw Meat and Tej’

The name of the business in example (a) *Eeyyee* is an Afan Oromo equivalent of ‘Yes’, which is given in the gloss and in the Amharic version of the writing. It is not clear why they used ‘Yes’ in the Amharic version instead of /awo/, the Amharic equivalent of ‘yes’. The word *barkumee* in (b) is an Afan Oromo equivalent of the English word ‘millennium’, which is used in the Amharic version of the writing.

A related group of errors involves the writing of foreign expressions (especially English) in Afan Oromo orthography rather than translating them into Afan Oromo. See examples below.

22. A) SANITERII TEEKNNO-KOLLEKSHINNE MAAMSAALS

‘Mamsals Techno-Collection Center’

B) IST AFRIIKAA BOOTLIING SHEER KAAMPAANII

‘East Africa Bottling Share Company’

While Afan Oromo has *wiirtuu* for ‘center’ and *kuufama tekinoooloojii* for ‘techno-collection’, the writers did not use them in the Afan Oromo version of (a). Similarly, *waldaa aksiyoona*, the Afan Oromo equivalent of ‘Share Company’ is not used in the Afan Oromo version of (b). As we saw earlier, the only thing we should not translate is the name of a business (*Mamsals* in (a) and *East African Bottling* in (b)), and it is not clear why the English words that do not represent names have been retained in the Afan Oromo versions.

Orthographic Representation Errors

While the errors discussed so far relate to the structure of the language, the ones that have been treated in this subsection have to do purely with its orthographic representation or incorrect correspondences of Afan Oromo phoneme-grapheme. In some advertisements, some parts of the expressions are written in Afan Oromo orthography and some in English, thus resulting in inconsistency of the orthographies used. Consider the following examples wherein the names of the businesses-‘white block’ (a), ‘speed’ (b), ‘universal’ (c), and ‘active’ (d)-are written in English alphabet, while the first halves of the writings are written in Afan Oromo alphabet.

23. A) MANA RIFFENSSA WHITE BLOCK

‘White Block Barberryy¹⁶’

B) FAASHINII SPEED

‘Speed Fashion’

C) KLINIIKA GIDDUGALEESSA UNIVERSAL

‘Universal Medium Clinic’

D) MANA KOMPITARA ‘ACTIVE’

‘Active Computer’

There is a pattern in these errors even though all the words in English alphabet are of English origin. There appears to be a misunderstanding by the writers that English names are written in

¹⁶ *Barberryy* is incorrectly used to refer to ‘Gents’ Hairstylist’, and even sometimes *barberyy* is used even though this use of the word is not found in English.

English alphabet, while English words not serving as names (like *faashinii* (b), *kliniika* (c), and *kompitara* (d)) are written in Afan Oromo alphabet. The case with that of ‘active’ in (d) is a bit different in that the writer, aware of mixing the two languages, has softened the effect by putting the word in inverted commas.

There are also errors involving the incorrect use of vowel and consonant sounds of the language. Let us first consider errors relating to the use of vowel symbols.

24. A) MANA KUUFAMA MEESHAALĒ BARREEFFAMA HIWOT

B) MANA HOJI WORQII ZAMANA AWII GIRMAA ABRAHAA

C) MANA HODHA HUUCU JIMMAA LEGAHAR

D) WIIRTUU AKSAASARY MOBAAYILAA

E) INTERNAATIONAL KILINIKAAL LABORAATOORIEES

In (a), we have the Amharic name *Hiwot*, which a native speaker of Oromo would rather pronounce *Hiiwat*. Similarly, the word *worqii* ‘gold’ in Afan Oromo and Amharic (b) is commonly pronounced either *warqee* or *warqii*. From the correct pronunciations of both words, then, it can be said that the /a/ in both words has been wrongly symbolized by /o/. In (c), /e/ has been used in place of /a/ in the word *Legahar*, whose correct spelling is *Lagahaar*. The errors in the three examples have one thing in common—all errors appear to have been caused by failure to notice the difference between the way an Afan Oromo and a Semitic language speaker pronounces the three words. That is, the latter would use /ə/, while the former would use /a/. The last two examples involve English words, namely, *aksaasary* ‘accessory’ (d) and *laboraatooriees* ‘laboratories’ (e). In the former /y/ is used as if it symbolizes the vowel sound /i/, but this turns out to be incorrect since it represents a consonant sound according to Afan Oromo alphabet. In the latter (e), the sequence of /e/ and /ii/ is really funny because the writer has combined the change resulted by the English plural /s/, i.e. /ies/ with the Oromo long vowel /ii/.

There are also cases wherein consonant sounds of the language have been written using symbols that do not accord with the ways they are used in Afan Oromo orthography. See examples below.

25. A) KOLLEJJII UNIVERSITII ADMAAS

‘Admas University College’

B) KIMAYOO PHOOTO FI ALEKTRONICSII

‘Kimayo Photo and Electronics’

C) MADINAA GURGURTII MEESHAA MANA FI WAAGIRAA

‘Medina Household and Office Furniture’

D) AKKAADAAMII ABFM ...JALMEE JALQABERRA

ABFM Academy...Has Started Registration'
E) **CHUNFA CHUNA**

'Ç'una Juice'
F) GURGURTA UFFTAA **DHAIMANII HANII** **DH/D**
'Hani Children's Wear'

While /u/ represents vowel sound in Afan Oromo orthography, it has been used in (a) to symbolize /y/. Further, in (b) /ph/ is used instead of /f/, and /c/ instead of /k/. What is more, in *waagiraa* /g/ is used instead of /j/ (c), while the reverse is true for *jalmee* in (d). In (e), /ch/ is made to represent the palatal ejective /c/ in both words, and in (f), the Afan Oromo implosive /dh/ is used in place of /d/. There are also borderline cases (involving vowels and consonants) wherein diphthongs or triphthongs as well as combinations of vowels and consonants in English have been misrepresented when writing them with Afan Oromo orthography.

26. A) MOOB**ILII** STAAR **I/AAIYI**

'Star Mobile'

B) Dr. HABTAAMUU **ITIO**-AFRIKAAN **DIAAGONISTIKII** LAABRAATORII OLAANAA
IAIYAA & IOIYO

'Dr. Habtamu Ethio-African Higher Diagnostic Laboratory'

C) INTERNA**ATIONAL** KILINIKAAL LABORAATOORIEES **TIO/SHI**
'International Clinical Laboratories'

The erroneous words in the above examples are all of English origin except Ethio-, the shortened form of Ethiopia. In the word *moobilii* 'mobile' in (a) above, for example, /i/ is used as if it represents the diphthong /aɪ/. The correct spelling of this foreign word is rather *moobaayilii*, in which case the /i/ in the English spelling is replaced by /aayi/. It can be understood from this spelling that Afan Oromo does not have diphthongs, but rather uses /y/ as a consonant, which requires a vowel (such as /i/ in this case) to be articulated (see also Griefenow-Mewis, 2001). Similarly, the shortened form of Ethiopia, *Itio-* in (b) should be spelt *Itiyoo-* in Afan Oromo, though 'Ethiopia' is often pronounced by Oromos as *Itoophiyaa* by leaving out the part that constitutes the diphthong, i.e. /iy/. In the spelling of *Itio*, then, the two consecutive vowels /i/ and /o/ have been used incorrectly in place of /i/ and /yoo/, respectively. Further, in *diaagonistikii* 'diagnostic' in (b), /iaa/ is used as if it represents /iyaa/ because the word is commonly pronounced and written in Afan Oromo as '*diyaaginoostikii*'. Finally, in the word *internaational* 'international' in (c), /tio/ is used as if it stands for /ʃ/. In Afan Oromo, it is the combination of

/s/ and /h/ that is used as a single sign /sh/ as symbolizing /ʃ/, which in English is represented in a number of ways¹⁷.

Conclusions and Recommendations

The Afan Oromo spelling errors and faulty translations on billboards in and around Jimma town are of two major types: structural and orthographic representation. Based on the analysis of the errors and the interview we held with those who do the lettering, we have concluded that the spelling errors and faulty translations have resulted from the writers' lack of competence in writing the language, and the interference of their first language. As they report, most of the writers neither have formal education in Afan Oromo, nor is Oromo their first language. As a result, we find peculiar Afan Oromo spelling errors and faulty translations. As the analysis of the errors reveal, some of the errors have resulted from interferences of Semitic languages, especially Amharic. In addition, as some writers explain some business owners do the writing by themselves because giving it to the competent ones means unnecessary expense. As a result of which they end up making spelling and translation errors. Hence, to improve or deal with these problems, the following measures need to be taken by Jimma Zone's Office of Culture and Tourism in collaboration with the Department of Afan Oromo and Literature at Jimma University.

1. Giving trainings to those who do the lettering for living so as to help them develop their skills of spelling.
2. Giving licenses for the competent ones only.
3. Making laws that prevent unskilled and unlicensed people from writing advertisements.
4. Providing the writers with materials prepared on standardization and naming of concepts and objects newly introduced into the language.
5. Holding discussions with the writers so as to update them with developments pertaining to the language.
6. Setting up a body composed of experts from Culture and Tourism Department (language experts) and Office of Trade and Industry whose duties include, identifying erroneous writings and helping the owners rewrite them correctly.

¹⁷ Depending on the word in which it occurs, we have many representations of the sound /ʃ/ in English. In such words as *nation*, *conscious*, *fascist*, *prima facie*, *associate*, *brochure*, *sugar*, and *share*, for example, this same sound is differently represented thereby evidencing the phoneme-grapheme inconsistencies in the language.

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Some of the Participants of the Parallel Sessions of College of Social Sciences, Jimma University

Implementation of the District Level Decentralization Program (DLDP) to Strengthen Local Development Initiatives: The Case Of ‘Qarsaa’ And Xiro-Afattaa woredas In Jimma Zone (Oromiya National Regional State)

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Abstract

Nowadays there is a trend towards decentralization in a bid to make government organs and decision making channels much closer to the people and to enable people to play the key role towards their own development. In Ethiopia the decentralization process has gone through its own process having followed peculiar steps hand in hand with the introduction of the federal system. Expanding decision making power to the lowest government tiers has become a matter of necessity than choice to enable all nationalities to exercise their constitutionally granted right to self government.

This study is conducted to asses the contribution of District Level Decentralization Program (DLDP) in raising local level participation for development especially in service delivery in two selected woredas in Jimma zone of Oromiya National Regional State. The woredas are selected in consultation with officials based on their performance in implementing the DLDP. Structured and focus group interviews were held with officials at Zonal and woreda level and residents from sample kebeles in the two woredas to collect data for the study.

The study finally revealed that, the DLDP introduced bloc grant transfer empowered the woredas’ to plan their own activities within the limit of the resources available, unlike the centralized budgeting system practiced in the past that was geared less towards specific local needs and demands. Moreover, the program has also effected clear definition of power and functions to woredas that significantly reduced the intervention of the zone in woreda planning

activities. This has further opened more room for the participation of the people in planning and implementation of projects at the local level. The role of sub kebele community structures called 'Gots' in inducing more popular participation is identified in addition to woreda officials frequent contact with the people to discuss on development priorities. The Community participates not only in planning but even also in putting projects in to practice mainly through their labor. However, it is also divulged through the study that development initiative at the local level is challenged by host of factors like; resource scarcity, lack of human resource capacity for planning at woreda level and the community's lack of experience and skill for participation. Therefore it is emphasized that, building woreda level officials capacity through training, exerting efforts towards increasing the resource capacity of woreda governments and nurturing more community participation could further upgrade the effectiveness of the program in raising local initiatives for development.

1. Introduction

Decentralization and empowerment of local units has now a days became a common term and practice especially in the previously highly centralized developing nations. Many complex factors interplay behind such sweeping measures towards disaggregating decision making power nearer to the people. This process involves devolving decision making authority to lower tiers, resource mobilization and allocation and service delivery. It also tries to address such key issues as ensuring political stability, poverty reduction, implanting a system of good governance and building capacity (Worku 2005:29)

One best instance of practical indulgence in to this process is the post 1991 Ethiopia. The federal arrangement implanted and the decentralization scheme practiced is unprecedented in the long history of the country. In the past exercising self rule was mere contemplation and far from being realized for the various nationality groups in the state. The starting of this process is traced back to the transitional period and later on gained constitutional approval with the promulgation of the 1995 constitution. This is what Tegene (2007:1) calls the "first wave of decartelization" where clear division of power is effected between the federal government and the states. This juncture signified the creation and empowerment of regional governments entrusted with executive legislative & judicial powers.

However, tiers below the regional governments were less empowered & practiced limited autonomy albeit the constitution ruled for the institution of self governing lower level entities under states jurisdiction. It is this compelling background that led to the issuance and concretization of the district level decentralization program (the DLDP) in 2001 which again is labeled as the “second wave of decentralization” by Tegene (2007:2).

The program embraces various components and defined objectives which are finally geared to wards raising the power to decide and execute on matters of exclusive interest at woreda level. This study therefore focuses on investigating how the implementation of the program contributed to development initiative activities at woreda level taking two case woredas in Jimma zone. In doing so focus will be laid on some important components of the program like transfer of bloc grants, the independence and capacity for planning, grass root participation in planning & Human resource constraints for planning. The study is conducted with the intended objectives of assessing how the implementation of the DLDP contributed to development initiatives at woreda level and some of the challenges faced in the due course.

Structured and focus group interviews were held with officials at Zonal and woreda level and residents form sample kebeles in the two woredas. In doing so interview schedules of open ended questions were prepared. Separate set of instruments were prepared to guide the discussions at zonal and woreda level administrations and the community groups. The head of the woredas administration and chiefs of other sectoral offices constitute respondents in the woreda administration.

There are a total of nineteen woredas in Jimma Zone. The two woredas are selected in consultation with zonal officials. The criteria used is based on the performance of woredas in implementing the decentralization program. Accordingly one best achiever and another lagging woreda is suggested for this study. Sample kebeles were taken from the case woredas constituting two from ‘Qarsaa’ and one from ‘Xiro-afataa’. Inaccessibility reduced the size of sample kebele in the later woreda. A focus group discussion was held with residents randomly selected from

each kebele constituting six-seven people in each discussion. In addition to the primary data collected analysis is supported with documented sources in the two woredas. The study is a case study of two woredas restricted to specific location. This might not qualify it to be applied for other wider cases. However, it might show some general trends through which other similar case can be assessed.

2. Literature Review

2.1 Federalism & Decentralization the Ethiopian Context

Federalism and decentralization are two sides of the same coin in the Ethiopian federal arrangement. The constitutional pledge on Article 39 (3) that states “every nation, nationality and people in Ethiopia has the right to full measure of self government which includes the right to establish institutions of government” calls for the realization of self ruling scheme to all nationalities setting uncompromising condition to decentralization of power to lower units of government . In cognition and further reinforcement of this provision, article 50 (4) ruled that “Adequate power shall be granted to the lower units of government to enable the people to participate directly in the administration of such units.” This indicates that the federal arrangement from the outset bases itself upon the principles of local self rule without which it cannot realize itself. Moreover, regions are authorized under article 52 (3) “to establish state administration that best advances self government....” putting the need for decentralization on a profound basis.

The diverse nature of the people and the difficulty of granting regional status to all of them is also a compelling reason behind decentralizing state power to lower level units. The federal system can pass the litmus test of entrusting self rule to all nationalities only when decision making power and resources are transferred to lower tiers of governments.

Cognizant of the above provisions under the federal constitutions, regional constitutions incorporated provisions that empower sub-regional levels, specially the woreda for self rule. The constitution of Oromia National Regional State (ONRS) provides for the powers and functions of the woreda level administration. The development functions of woreda (with much relevance to

this study) is provided under article 79 (a) (c) of the constitution. Accordingly woredas are authorized to deliberate up on and approve development plans and programs. Moreover it can also mobilize the local populace for development activities.

Such constitutional & legal background necessitated a detailed program of various components to embrace the district level governments as vital elements of the federalizing process in acknowledging the rights of diverse nationalities to self rule. Hence the DLDP is launched incorporating empowering elements starting from 2001 marking the starting of second wave of decentralization.

2.2 Components & objectives of the DLDP

As of the year 2001 practical moves were well underway to empower the district level governments through the DLDP. The activities of the program are planned for five years term involving crucial phases of enabling, deepening and consolidating. At the beginning it was implemented in the four regions of Amhara, Oromia, SNNPR and Tigray and later introduced to Gambella, Afar, Benshangul and Hareri regional states (Worku, 2005: 31 and Tegere, 2007:26)

Some of the main components of the program include;

Manning and training:- improving human resource capacity

Grass root participation: empowering of the people at the grass root level in planning & decision making

Region woreda fiscal transfer and own revenue enhancement: Allocating financial resources to woreda level administration to promote local development and raising the capacity to raise revenue

Institutional /organizational arrangement: refining the woreda level functional assignment and building efficient organizational structure

Woreda planning and financial control systems:- enhancing planning capacity and setting fiscal framework and resource administration capacity (worku, 2005:30 and Ministry of Capacity Building (MCB), 2002:12)

Among others the document for the program put for ward creation of enabling environment for empowerment, establishing effective institutional arrangement, introducing working systems for proper planning and availability of skilled manpower for planning as the core components of the program (Ministry of Capacity Building, 2002:8)

2.3 Structure, power & functions of woreda administration

The three branches of government at federal and regional levels are replicated at woreda level of government. The woreda has its own legislative body called the council constituting member elected from each kebele in the woreda. The council serves as law making body on powers designated as woreda jurisdiction. The executive bodies or the cabinets emanate from the council elected by the members from the woreda council and chiefs of sector offices. The same council elects its own chair person who automatically qualifies as the head of the woreda government. The judicial branch is filled with judges who are appointed by the regional governments (Tegene, 2007:13)

Keeping this similar pattern in terms of structure each region defines the power and function of lower level tiers under its jurisdiction. Woredas in different regions are more or less vested with the following constitutional powers and functions.

prepare, approve and implement the annual woreda budget

setting certain tax rates (land use, agricultural, income tax..) and collect

Administering fiscal resources at woreda level

Administering primary school health institutions

Construct and maintain low grade rural tracks, water points, and administrative infrastructures.

Managing agricultural development activities and protect natural resources. (World Bank, 2000:19)

Therefore the DLDP is implemented in light of enabling woredas to exercise these set of constitutional powers and functions.

2.4 Description of the study areas

The launching of the DLDP started in Oromiya regional state in 2001. The region has 16 zonal administration constituting 197 rural and 15 urban woredas. Jimma zone is situated in the south western part of Ethiopia, currently constituting 19 woreda administrations. Among these woredas two are selected for this study named as “xiro- Afataa” and “Qarsaa” 64 and 18 kilometers away from Jimma (the zonal capital) respectively.

3. Results and Discussions

3.1 Block Grant Transfer to Woredas

The regional to woreda bloc grant transfer is the main component of the DLDP to bring development initiatives and service delivery closer to the people. The transfer scheme is set to empower the woreda and grass root population to decide on their local development needs. The bloc grant system is started with the launching of the DLDP in 2002 and initially three parameters were employed in designing the formula for financial disbursement among woredas in regions. The formula consisted population size, development level of woredas and generation of own revenue giving different weights to each. Even at this level the regional governments were at liberty to give their own weights to each of the parameters. For instance in the year 2002 the Amhara Region assigned 70%, 20% and 10% for population size, development level & revenue raising effort respectively. On the other hand the Oromiya region assigned 55%, 25% and 15% for the same reserving the other 5% for area (Ministrtr of Capacity Building, 2002:5 Tegene; 2007:2) However later on different regions carried out reform measures on the bloc grant transfer system. The reforms were directed towards incorporating additional criteria other than the three parameters utilized to transfer resources to woredas. Some regional governments like the southern nations, nationalities and peoples took the initiative to implement the unit cost approach to bloc grant transfer. As per this approach woredas plan for their budget based on the service need of each sector offices under them which in simple terms mean expenditure based approach for financial transfer.

The pillar principles in the designing and launching of the block grant transfer systems includes; efficiency, equity, adequacy, transparency effectiveness and non manipulability. Among others

offsetting the vertical and horizontal fiscal imbalance is the most crucial consideration since woredas are at different development level. Establishing an efficient system of utilizing the meager resources available was also taken in to account (Grant formula document for Ormoyia regional government)

Generally regional governments can prepare their own grant transfer formula based on their specific needs and emphasis. For instance the Oromiya regional government, where the case woredas are selected for this study, is currently utilizing the previous three parameters together with the unit cost approach for bloc grant transfer to woredas.

The constitutions of almost all regional governments designate their woreda government with the power to plan and execute their own development projects. The block grant puts the exercise of these functions by woredas in to reality providing them with the necessary resources to initiate and realize their own plans.

The focus group discussion held with woreda and Zone officials confirmed the same. It is indicated that initiating development plans based on local priorities was very difficult before the implementation of bloc grant transfer. Top down budgeting lays very little focus to local needs and overseeing of critical public needs was evident. Plans and budgets were less problem solving geared to address central than local needs and discourage woreda level development initiatives. With the coming in to practice of the bloc grant transfer development plans are initiated at woreda level, by government organs very much closer to the people, and by people who know the top priority needs. The fiscal transfer has also helped the woredas to assert independence for development initiative from other higher level government tiers like the Zones and regions. The woreda officials defined the role of the zone as provider of technical and administrative support with delegated power from the regional

Government. The Zonal government has the power of only suggesting to use the finance more for capital projects and oversee woreda plans to consider regional priorities and strategies. For all practical purposes except these suggestions woredas can plan independently from other levels of governments.

Another important feature of bloc grant transfer in the woredas in Jimjma Zone and the case woredas in particular is its increasing pattern in each fiscal year. This might actually help to take more initiatives for planning and execution with more resources available. It could be more helpful to see the patterns in terms of allocation of grants for the case woredas.

Table 1-Grant transfer for ‘Qarsaa’ and ‘Xiro-Afatta’ Woredas (1998-2001 Ec)

Woredas	Year	Grant Transferred	Percentage increase from previous year
Qarsaa	1998	8,165,410	-
	1999	10,097,969	23
	2000	13,093,835	29
	2001	15,205,045	16.12
Xiroo Afattaa	1998	5,672,226	-
	1999	7,242,452	27.6
	2000	10,636,453	46.8
	2001	12,393,3999	16.5

It is self evident that the rate of transfer is ascending each fiscal year and comparison between the year 1998 and 2001 shows 86.2% and 118.4% rise for ‘Qarsaa’ and ‘Xiro-afatta’ woredas respectively. According to the woreda officials this opened more room for development initiatives in their woreda and to address more public needs and priorities.

Moreover it was reflected that the bloc grant transfer has helped the woredas to generate more own revenue from local sources in two ways. One of the parameter for grant transfer encourages them to generate more revenue because the amount of own revenue generated has implication on the amount of transfer. On the other hand generating revenue itself requires its own resources and the woredas are utilizing some proportion of the finance to improve their capacity for revenue

generation. Since much of the own revenue is utilized by themselves it adds more resources to their annual budget.

Table-2 Own revenue generated by ‘Qarsaa’ and Xiroo-‘Afattaa’ woredas (1998-2001 Ec)

Woredas	Year	Own revenue generated	Contribution to the total woreda budget (%)	Percentage increase from previous year
Qarsaa	1998	1,176,851	12.6	-
	1999	1,538,664	13.2	30.74
	2000	2,225,912	14.5	44.6
	2001	3,414,369	18.3	53.3
Xiroo Afattaa	1998	1,024,899	15.3	-
	1999	1,062,825	12.8	3.7
	2000	1,305,222	10.9	22.8
	2001	2,301,613	15.7	76.3

As depicted in the table the amount of own revenue generated increased each year and shown significant increase in the last two years under consideration. However the contribution of own revenue to the total budget is less significant and shows small amount of change in each year. This implies that increasing own revenue generation would facilitate more independence for development initiative at woreda level and decreases local dependence on the centre for resources. Most of the participants in the focus group discussion at woreda level emphasized that the resource allocated from the region and the development needs of the woredas are incompatible. As a result increasing the capacity for own revenue generation and expanding the revenue bases is indispensable to promote development at the woreda level.

The woreda officials participated in the discussion do have very little knowledge of the transfer formula. However they believe that resource is fairly distributed among woredas albeit some woredas are complaining on the amount of transfer. The regional government allocates the

transfer based on the socio-economic data sent from woredas. So long as the woredas collected the necessary data and properly communicated to the regions they will get what they deserve based on the objective criteria applied for all. In this regard all woredas do not have equal capacity to collect, organize and report the data which affects the amount of revenue they get from the region.

3.2 Development planning at woredas

In the earlier parts it is stated that almost all woredas in the country are designated with planning and execution function through the regional constitutions. As per the provision of the federal constitution under article 50(3) regions are empowered to establish lower level tiers by ensuring democratic participation and empowerment of the local people. However this constitutional pledge was less practiced until the launching of the DLDP in 2001. In the pre 2001 period woredas lacked the actual power, resources and authorities since regional and zonal authorities have controlled the activities of woreda governments. (Tegene, 2007:2) In light of this the DLDP laid focus areas of priorities to enhance woredas capacity in exercising the already constitutionally stipulated powers and functions. Some of the main initiatives that the DLDP carried out to enhance woredas development planning capacity includes; availability of skilled man power for planning, preparing guidelines for financial planning and control and support for direct and vibrant community participation in planning (MCB, 2002:7.8).

Discussions with woreda level officials revealed that the task of planning on matters legally designated to them is exclusively their own authority. Unlike the period before the launching of the DLDP when Zones and Regions prepare woreda budgets and plans, now the woredas fully exercise these activities. Higher level tiers like zones might simply provide with general guidelines to ensure compliance to regional policies and strategies and poverty reduction scheme.

The planning process is found to be similar in both case woredas for this study. The planning is labeled as sectoral planning since each sector office (education, health, agriculture, road, water

etc...) prepare their plan (capital and recurrent) based on their contact with the public. Each sector has to defend its proposed budget before the woreda budget and finance office (also with the presence of cabinet members) and later readjust the plan for any change. Finally the woreda budget and finance office collects plans from each sector and prepares integrated woreda plan for the fiscal year. The final authority to approve the integrated woreda plan is vested on the woreda council. This process is similar with the process that (worku, 2005:41) stated to be applied for all woredas in other regions as per the DLDP document.

Autonomy for planning on matters concerning woredas would undoubtedly enhances development initiatives at woreda level. Because in this process woredas set their own goals, priorities, utilized their budget and implement development projects. However the planning at woreda levels and specially in the case woredas is not without challenges and constraints. Some of the challenges revealed from the focus group discussions are;

Lack of realistic plans or prevalence of over ambitious plan incompatible with the available scarce resources.

Scarcity of finance to address priorities in each sectoral office. As a result capital projects could be cancelled, postponed or finished in more than two years.

Lack of overall understanding of treats and opportunities at woreda level in preparing medium and long term plans.

Less resources allocated to capital expenditure

Human resource constraints in planning.

From among these constraints let us deal with the last two. In both woredas under consideration the proportion of capital budget to recurrent is insignificant given the development need of the people

Table 3- share of capital budget to the total budget in ‘Qarsaa’ and ‘Xiro-Afataa’ woredas (1998-2002 Ec.)

Woredas	Year	Total budget	Capital budget	The share of capital budget to total (%)
Qarsaa	1998	9,342,261	535,850	5.7
	1999	11,636,633	743,760	6.3
	2000	15,319,747,	1,095,230	7.1
	2001	18,619,414	1,844,930	9.9
	2002	21,326,849	1,642,880	7.7
Xiroo -Afataa	1998	6,697,125	262,390	3.9
	1999	8,305,277	-	-
	2000	11,914,675	666,250	5.5
	2001	14,695,012	1,243,380	8.4
	2002	20,698,498	4,708,504	22.7

It is evident that there is suppression of capital budget in both woredas in favor of recurrent budgets and the prospect of allocating more capital budget in the near future is far from being realized given the existing pattern of increase. In ‘Qarsaa’ woreda 81% of the total budget is allotted for salary and 10.6% for other running costs in the year 2002(Ec) and approximately similar proportion is observed in xiro-afataa. Development activities are much more related to capital projects. Given that if the woredas are going to continue with such insignificant proportion of capital budget attaining the aspired for woreda level development initiatives might be a far fetched reality. However this problem is some how resolved with public participation in development activities through human labor and financial contributions since most of the public contribution goes to capital projects.

The nature of capital projects carried out at woreda level focus on primary health care, primary education, water, agriculture and road (small level rural trucks). There are some observed improvements in the quantity of the service delivered in the case woredas.

Table 4- Improvement in service delivery for some selected services (health, education and water) in ‘Qarsaa’ and ‘Xiro-afataa’ woredas (comparison between the year 2002 and 2010)

Woreda	Type of service	Pre-DLDP (year 2002) status	Changes observed (year 2010)
‘Qarsaa’	Coverage of clean water service	15%	35%
	Number of health stations	1	6
	Number of health posts	8	30
	Number of health workers	7	180
	Number of schools		
Xiro-Afataa	Primary education coverage	33.8%	68%
	Number of schools	20	60
	Number of school teachers	154	526
	Health extension coverage	14.8%	93.3%
	Health officer to population ratio	2:100,000	8:100,000
	Senior nurses to population ratio	8:100,000	17:100,000
	Clean water service coverage	0%	28.1%

It might not be feasible to directly attribute all these changes only to the implementation of the DLDP since there are many uncontrolled variables (at least for this study) that could have negative or positive impacts on the services mentioned above. However, one cannot also rule out that some proportion of these changes could be attributed to the implementation of the program given the periodic improvements observed and the practical autonomy vested on woreda level governments.

3.3. Human resources and planning for development

Manning and training is one but very crucial component of the DLDP. From the outset it was recognized that woredas lack sufficient trained man power to exercise the power vested on them. Initiating plans, prioritizing and executing development activities requires qualified personnel. The manning and training component of the DLDP is directed towards increasing the availability of sufficient man power and enhancing professional competence and leadership at woreda level (worku 2005:30). Human resource constraint was the most serious concern towards realizing the DLDP because woredas were facing problems of shortage in terms of qualified man power, low level of skill of existing man power, high staff turnover in some woredas, absence of advanced training system and in appropriate man power placement(PSCAP for Oromiya, 2004:6). Cognizant of this woreda human resource capacity building was imperative if the DLDP has to be put in to action.

The short term solution employed to resolve man power constraints at woredas was transfer of man power from zones and regions to woredas. By the year 2002 woredas have 50%of the required man power and key posts were either vacant or occupied by under qualified professionals (worku, 2005:34). However the transfer process itself went through challenges that reduced its effectiveness in addressing the critical human resource need of woredas. Lack of adequate man power for deployment, budgetary constraint to recruits the required staff, high attrition rate of man power from some woredas and lack of motivation of the transferred staff to work at woredas because of low pay & incentives were some of these challenges (Tegegne, 2007:47)

A case study conducted in Amhara Regional state indicated that there were lack of clear directives governing the deployment process that led to inconsistency. Most of the deployed personal were not well experienced experts but support staffs that could add little value to the decentralization process. More over the deployed personnel favors woreda located in big towns or nearer to big towns that again caused human resource disparity among woredas in disfavor of remote rural woredas (Muhamed, 2007:153-154).

The response from woreda level interviewees confirmed that scarcity of qualified and experienced man power is still the main problem as for as planning and execution is concerned. Confirming the same zonal officials emphasized that woredas Human resource condition is showing improvement in terms of qualify, Quantity and mix over time but still a source of problem to their performance and for equitable development among them. Discussions at woreda and zone level revealed multitude of problems related to planning and initiating development caused by human resource scarcity. Among others they laid due emphasized on;

Lack of wise use of available human & material resources and inability to exploit opportunities & do away with threats

Overseeing important areas of popular concern in planning or shortly problem of prioritization

Unfulfilled plans or plans that failed to address some basic components

Non participatory plans: because of lack of skill to mobilize the people

Over ambitious and unrealistic plans that need to be polished now and again ones it is prepared.

Wastage of resources by allocating excess resource for some areas while others are in scarcity.

Consuming too much time in preparing plans and failure to accomplish preparation of plans in the required time frame.

Woredas have the full mandate to plan their human resource need and employ professional, semi professional and support staff. This was out rightly confirmed by the discussion held with zonal & woreda level officials except that woredas are recommended not to lay too much focus in employing support staffs. However, woredas lack the required capacity and access to employ professional personnel with high level qualification. To deal with this problem they communicate their human resource need to zonal and regional levels who recruit and employ the required man power and dispatch it to respective woredas.

Woredas could not practically utilize the full mandate for personnel employment for two reasons. One is capacity problems and the other is what zonal official labeled as “problem of doing the right thing.” According to them employers at woreda level usually give priority for people whom they know or those who lived or have attachment to the specific locality. To avoid

this the region took the mandate to employ BA holders and above where as the zone employ diploma level personnel and the woreda employs staff required at certificate level.

In addition to employing new staff and personnel redeployment the DLDP commanded the possibility of upgrading the quality of woreda personnel through short and medium term trainings. In this regard woreda officials underlined that it is not usual to allocate budget for training needs because of the meager resources available. Trainings are arranged only if the woreda administration is able to generate extra resources from non governmental organizations or any other means. Sometimes the Ministry of Federal Capacity Building might offer training opportunities for some staff members; however it might not directly address the gap and specifically identified training need at woreda level.

3.4 Community participation in planning

Decentralized governance among other things enables to struck balance between hierarchy and participation in service delivery. Community participation in planning maximizes the possibility of local institutions delivering service in response to the needs and wishes of the recipients. This makes increased community participation in planning and prioritization key element to the successful implementation of decentralization reforms. (World Bank, 2000:5).

In the Ethiopian context citizens' participation in development activities is a constitutionally granted right. In particular Article 43(2) stipulated that "citizens have the right to participate in national development and, in particular to be consulted with respect to policies and projects affecting their community." In line with this the DLDP put forward a clear direction to ensure direct and vibrant community participation both at the house hold and community level, believing that local community caters local needs and preferences for public service in the best way. It also facilitates channels of participation for individual framers and disadvantaged groups at the grass root level (MCB, 2002:7).

The channel of participation illustrated by the DLDP document mentioned local organizational arrangements like sub-kebele, community development teams, village executive committees,

kebele administration development council, kebele assembly and sub-woreda development coordination units. The discussion with woreda officials and sample kebele residents revealed the existence of some of these formal and informal channels for participation.

The officials asserted that the development need of the community is in harmony with the sectoral offices structured at woreda level (education, health, water, road...). Each sector office keeps in touch with the community and arranges community discussion sessions through other sub-structures like the kebele and sub-kebele units called 'Gots'. The outcomes of these discussions enable to decide the priority areas for planning at the woreda level.

It is further commented that plans are prepared at different hierarchies. There are house hold level plans (what to produce, how to produce, land use, sending children to school), sub-kebele 'got' level plan where 30-50 house holds plan about their locality and kebele level plan to harmonize the sub-kebele plans and finally all kebeles dispatch their plans to woredas for consideration.

Discussion with kebele residents revealed that members of the kebele council are people who live within the community. They are part of any opportunity or challenge by the community itself. These people play crucial role in reflecting community needs and demands at kebele level. Moreover, the kebele council has a standing committee of fifteen members. The members of this committee discuss with the community and communicate any need and wish to the kebele council. The residents also testified that woreda administrators frequently appear to discuss with the community even if sometimes discussions are dominated by political issues. However the kebele residents' are not sure as to whether their plan is incorporated in woreda plans for final action and the channels of how these plans are communicated to the woreda. Generally they are in doubt about the weight given to kebele plans at woreda level.

The woreda officials stressed that one of the advantage of planning and execution at woreda level is the sense of ownership and feeling of belongingness nurtured among the administrative body and the local people. The woreda officials should always go to the community to convince them to participate in development activities. For any project undertaken at the local level the human

and financial resources that can be obtained from the community is planned in consultation with the community. The community predominantly contributes in terms of human labor and in most cases the financial estimate of community contribution doubles the total cost allocated for a specific project. Otherwise the woreda budget combined together cannot cover the whole cost of capital projects undertaken at woreda level.

The same is confirmed by discussions held with different community groups. They stated that the community contributes a lot in human labor. The community's roles and contribution is defined in every kind of project affecting its life. However, the community is not usually happy when requested to contribute money which could be attributed to economic status.

Woreda officials and even kebele residents stressed that mobilizing the community for development is not an easy task. It was stated that the main mechanism used is to convince the community in discussion forums at different levels. Among others they identified problems like; community wide dependency syndrome over governments for every need, lack of awareness on the benefits of participation, educational level of the community and in some instances lack of good will contributing for low community participation.

The mechanisms employed to deal with these challenges are multi dimensional as expressed by woreda officials and kebele residents. For one thing efforts are always under way to convince the community for participation through different channels and discussion forums. Among others inter kebele experience sharing (high performers with low and the benefits accrued), approaching elder people and religious cultural heads before approaching the community and convincing the later through such recognized figures are used to instigate more participation from the community. Accordingly there are observable and considerable changes in the level of community participation over time.

In real terms in a society where centralized system of governance has been practiced for long where by administrators in the higher hierarchy believed to know and decide on every

community affairs, instigating active and vibrant community participation could be really a challenging task. However, the people are the key component in the process of decentralization carried out and popular participation should be ensured using every possible peaceful means.

4 Conclusion and recommendations

The historical ramifications of the pre 1991 Ethiopia government systems and state societal relations that failed to slightly recognize the diverse nature of the people made the implantation of federal system a state of necessity than choice. The federal system is an ethnic based one which permits each and every nationality to exercise self government in its own jurisdiction. Establishing regional government to each nationality group however was not the case since more than 80 nationalities exist with in the state. Therefore, more of the nationalities have established their self government at levels below regional governments. Decentralization of power has again become a grave necessity if all the nationalities have to exercise autonomy in their own respect. This setting laid a very strong nexus between federalism and decentralization in the country.

The federal constitution facilitated the playing ground effecting clear division of power between the Federal government and the regions and leaving the task of instituting self governing local units to the later. In line with this almost all regions established their own local structure defining their power, functions and responsibilities. However these local units and specially the woredas did not practically exercise their autonomy until the launching of the DLDP in 2001. The program laid focus in building woredas capacity to enable them exercise their constitutionally granted power.

One of the components of this program is bloc grant transfer to woredas to enable them to prepare and execute their own plans. Unlike the past when priorities are set and budgets are prepared at the higher hierarchies of government, currently plans are prepared in the administrative levels that are very much closer to the people. More over the access to the resource also contributed for grass root public participation in prioritizing development needs. The amount of own revenue generated is also raised because the woredas are able to allocate budget to build their capacity to tap more resources from the public from tax and non tax sources.

The woredas are also actively engaged in planning their own activities. The planning process and views collected from respondents confirmed that woredas prepare and execute their own plan independently using their own structures and man power. Lack of the required qualified personnel however is still a challenge that woreda governments are facing. Observation in the two case woredas has also testified that significant portion of the budget is allocated to recurrent expenditures than capital projects. This could really inhibit practical development initiatives at woreda level since capital projects lead to more expansion of service to the local populace than recurrent expenditures

Building human resource capacity is still a task at stake. The assessment in the case woredas revealed that, though there is an improvement from the past lack of qualified and professional personnel for planning and execution is a challenge posed against woreda level development initiatives. Initiating short and medium term trainings and allocating the necessary budget for the same could help in improving the human resource capacity of woredas.

Wide popular participation in development projects that affect its life is one of the kernel of the Ethiopian federal system. The needs and wishes of the people can be addressed if their participation is ensured in setting priorities for plans and execution. In the case woredas there are multitude of formal and informal channels for public participation and all these channels raised wider community participation in development projects. The people plan such projects with woreda, kebele and sub kebele level bodies and participate in execution. Popular contribution to the realization of development projects is mainly through human labor which in some cases doubles the total projects cost allocated by the woredas. However, wider popular participation is at its nascent stage because of many reasons and especially because the people is short of experience to directly involve in its own affairs. But nurturing the will and interest of the people for participation is the key to achieve development at woreda level given the scarce resources allocated to development projects.

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Villagisation in Arssi, Was it an Agent of Development or Impoverishment?

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Abstract

Villagisation (concentration of rural homesteads in one locality) is often considered as a socialist oriented phenomenon. Actually it cannot only be associated with socialist policies and practices. It took place in many non-socialist countries so to address different problems according to the realities of the concerned states. In Ethiopia it was widely practiced during the Derg times in post-1974 period. Villagisation was one of the controversial state policies which the peasantry were obliged to obey. The state officials claim to bring about provision of socio-economic facilities which could not be delivered because of the former scattered traditional settlements all over rural Ethiopia. The paper attempts to assess whether the Derg provided the socio-economic developments it promised. The work among others attempts to answer questions like did villagisation become an agent of rural development or impoverishment during the period under investigation? Had the Derg implemented it for what it claimed to achieve? It also investigates the course and the consequences of villagization in Ethiopia taking Arssi as a case study. The result of the study would hopefully broaden the scholarly works so far exist on some of the Derg policies which are said to be implemented to achieve development.

Villagization (Establishment of Concentrated Peasant Villages)

Villagization has been studied by a number of scholars.¹ Many of these studies deal with specific areas in Ethiopia and focus on certain aspects of the impacts of villagization. Of these studies, Tadesse Berisso's study focuses on the wider territory of the Guji Oromo, covering 32 villages of different districts in Jamjam *Awraja* of the former Sidamo province, in present south Oromiya region. Many of these studies are empirical studies of the contemporary experience rather than theoretical analyses. They are important sources for this study. Many of them are not, however, historical studies. They are mostly sociological and anthropological studies.

This study attempts to investigate the process and impact of villigization in Arssi in some detail. It also evaluates its relation with other programs of agrarian socialism. The studies so far,

particularly those dealing with Arssi, though conducted by acclaimed scholars (Cohen and Isaksson), do not expose fully the process of villagization and the suffering the rural population endured because of it.²

Villagization, like co-operatives, was a major plank of the military regime's agrarian policy. This was a new scheme which the previous imperial government had not tried in Ethiopia. Villagization could be defined as a government policy of gathering previously scattered habitations into nucleated villages so as to alter the usual rural settlements.³ The villages were called peasants' village (ገጠናዎች ገንዘብ ስጦታ) or simply (ገጠናዎች ገንዘብ). Villagization was similar with resettlement in that both involved concentration of households in one site. Both also involved human uprooting. But there were differences. Resettlement involved relocating rural population from places of their birth to other and usually far off areas; villagization did not involve such drastic relocation.⁴ In Ethiopia, resettlement was adopted in response to the 1984 - 1985 famine. It thus started before villagization. As a result of this famine, peasants from the drought-stricken northern regions of Wallo, Tegray and Gojjam were taken mainly to southern and southwestern regions like Kafa (including Jimma which was then a sub-province within this region), Illubabor, Wallaga, Pawi, Matakal then in Gojjam (now in the Beni Shangul-Gumuz region). There were also security and political considerations behind resettlement. Some peasants from Wallo were also brought to Arssi and Bale provinces. Those translocated to Arssi were not many. They were resettled among the region's peasants in new villages by a strategy called *segsega* (interspersing). Those taken to Bale were many and they were settled separately. This program faced bitter criticism and opposition from inside and outside the country. This was because it was mainly implemented in a compulsory manner. The settlers opposed it owing to their cultural and psychological dislocation while the southerners opposed it because it resulted in the occupation of their land.⁵

Villagization was not a purely socialist or socialist-oriented scheme. It was also implemented by countries that did not pursue the socialist path of development. This shows that villagization came about for divergent reasons or due to the objective conditions of a specific country. In most cases, however, it was a government project rather than that of the villagized population.⁶

The theoretical origin of villagization in Ethiopia lay in the hypothesis that scattered habitations and the age-old traditional form of cultivation were obstacles to rural development. They allegedly also prevented the application of scientific and technological innovation. Dispersed

settlements were blamed for causing soil erosion and misuse of natural resources like forest and wild life. More specifically, the official sources emphasize that villagization could resolve the problems associated with scattered settlements. They also clearly reveal that villagization would contribute a lot to: the proper use of human power, eradication of malaria by spraying chemicals, expansion of socio-economic services, common security against vagabonds and narrowing the dichotomy between rural and urban areas.⁷ These points were particularly emphasized to attract peasants to clustered villages. But some of these assumptions were untenable while some of the problems were not prevalent in the country. For example, malaria infestation was/ is not spread throughout the country.

The traditional settlement was criticized incessantly by high *Derg* officials including the head of the regime, Colonel Mengistu Haile Mariam, and in official documents, along with other policies of the imperial regime. Conversely, its numerous merits were not considered positively. It is known that scattered settlements could avoid congestion of cattle and human population and other adverse consequences of concentration of large number of people in one settlement, which would also create pressure on natural resources like forest, soil and pasture.⁸ Thus, dispersed settlements and small holder peasant farming were denigrated without proper study.

The first mentioning of villagization was in the Ethiopian land reform proclamation of 1975. Article 10(8), detailing the functions of Peasant Associations (Pas), stated: “to undertake villagization programs ”(u)”É’f ¼T>•\uf”““ ¼T>cucu<vf S”Å` □ ”Ç=ðÖ` TÉ[Ó). Next to the rural land proclamation, it was Arssi Rural Development Unit (ARDU) which came up with the idea of villagization in 1976. At the time, it was one of the most controversial propositions. The ARDU proposal stipulates: “Whereby the scattered rural homesteads and villages will be attached to a central location to facilitate the provision of basic services, such as water supply, health services, education and marketing facilities.”⁹ At the time, the document did not get acceptance. But ARDU staff kept on airing views about the necessity of villagization. We can thus conclude that, next to the rural land reform proclamation, ARDU was among those which favored concentration of peasants in central villages. The document might also have provided points incorporated in the guideline the regime later produced when it opted to adopt the villagization program for the whole country as a strategy of agrarian development. However, villagization started spontaneously even before the production of the guideline.

Villagization began in Bale region in 1978 as an independent regional initiative during the Ethio-Somalian war, 1977-1978. Its pivotal aim was security, that is, to defend the local population from Somali invasion. It was also meant to prevent OLF (Oromo Liberation Front) from recruiting members and fighters in the Oromo-inhabited areas of the region.¹⁰ It thus seems that, before it became a nationwide phenomenon, it had its origin in local circumstances rather than a centrally guided program.

Some seven years later, in 1984 a similar expediency led to villagization in Hararge. According to Clapham, it was one isolated incident of the Islamic Front for the Liberation of Oromiya's (IFLO's) targeted attack on Christians which gave rise to a comprehensive villagization of the region.¹¹ These two villagization programs were initiated to meet regional problems and were put into action without any guideline. However, it is likely that the military government had some awareness of villagization from African and world experiences.

The Bale and Hararge villages were thus security villages and they achieved the principal objective they were designed for. But many peasants in Hararge fled to northern Somalia in tens of thousands because of the coercion, unjust and unethical acts that took place during the process of villagization.¹² According to Alemayehu, villagization here moved about 1 million households into concentrated villages in June 1985.¹³

There was no legal basis for the implementation of villagization in these two regions. However, the Arssi-Bale Wabe villages became a model for the villagization process conducted later all over Ethiopia. These model villages were created after the peasants who lived there were evicted from their ancestral land by force in 1977-1979 to evacuate their land for state farms. The houses and other facilities were constructed by government expenditure and efforts. Conditions in these villages were better than the later introduced nation wide villagization program¹⁴

The Process of Villagization in Arssi

The decision to implement villagization was passed in Addis Ababa and subsequently communicated to Arssi's first Workers' Party of Ethiopia (WPE) secretary, who in turn ordered *awraja* first party secretaries. The regional, *awraja* and district villagization committees were given six months to make the necessary preparation. Yet, the PAs and their leaders were given only three months notice and some even shorter than that to name their PAVCCs (Peasant

Association Villagization Co-ordinating Committees) and their sub-committees and to initiate the whole process, including choosing the site, demarcating and giving out parcels of land, getting ready to demolish the houses, porting and rebuilding residences in the new villages.¹⁵ First the time given for PAVCC and the peasantry as a whole was too short to make psychological and material preparation. Secondly, peasants were not sufficiently oriented all over Arssi. Hence, both in its conception and implementation, villagization was purely a government scheme and a few institutions like ARDU. The target population, the peasants, were passive subjects only needed for implementation.

The peasants we interviewed underscore the point that they were forced into villagization by PA (*qebele*) officials and PAVCC, who were backed by district officials, villagization committees and local security forces (militia squads). A large number of informants emphasized that their houses were demolished against their will. Those who tried to resist were tortured by local security forces and campaigners who dismantled their houses in their absence. Others were imprisoned for showing sign of opposition to villagization. According to informants, coercion and campaigning were the basic features of villagization in Arssi.¹⁶

Villagization in Arba Gugu was largely conducted at gun point. The *Awraja* Administrator, Ketema Desta, ordered setting fire to the houses of those who required more time for demolition. In Xanna, Hexosa and Amigna districts, similar steps were taken against those who expressed their resentment against villagization. Only those who expressed to the PAVCC formal acceptance of the program were exempted from such punishment and humiliation.¹⁷ Seeing the fate of those who suffered humiliation, torture and forceful house dismantling, the majority were reduced to passive acceptance of the whole course. But there was no total silence. Many compared it with Agricultural Producers' Cooperatives (APCs), which were also mostly set up by force.¹⁸ Cohen and Isaksson could not, however, see coercion of the peasants in Arssi in the villagization process. According to them, peasants accepted it without any open resistance.

Force was also applied in other regions. In Shawa and Hararge, for example, studies show that compulsion and persuasion were used as mechanisms of carrying out villagization.¹⁹ Tadesse states that, in the former Sidamo region, coercion was employed to move the Guji Oromo peasants to villages and to keep them there. This came about when the Guji put up resistance in different forms.²⁰ Dessalegn also cites cases of force and intimidation in the course of the villagization process in Bale and Harage.²¹

On the other hand Cohen and Isaksson, could not discover the use of force in Arssi apparently because they conducted interview of villagers along with government officials and agents, in front of whom the peasants were too afraid to speak out their minds. They also visited only 16 villages in Arssi.²²

Nationwide villagization campaign was started in 1985. In Arssi the displacement of peasants to villages had been commenced in December 1985 and went on until February 1986. During this first stage of villagization in the region, in over three months span of time , 75% of Arssi's peasants (about 1 million) had been concentrated into 857 villages. The second phase was conducted at exactly the same time after a year, from December 1986 to February 1987. According to informants, the construction process was the beginning of suffering for the peasants. Ladies carried *qaqaa* (ceiling woods smeared in smoke). They were expected to caulk houses as well. Men demolished houses, transported heavy building materials and finally reconstructed the houses. Those designated *adhari* (reactionaries) were forced to carry exceptionally big trunks of woods up to the reconstruction site. Many were thus humiliated, demoralized and degraded during the course of the campaign.²³

Thus, suffering and general anxiety during construction process was visible. A PA was divided into several working teams according to the size of the population. Quota was allocated to each team. These teams were expected to build daily between 10 and 20 houses. Some built only 5 houses. Those who built more houses were appreciated while others were blamed and pressurized to follow suit. There was no worry about the quality of houses; only the number of houses mattered. The building teams did not get food after work. They had to carry with them their provision. Urban dwellers and students near village construction sites were also required to participate in the campaign.²⁴

No one could escape villagization. Former Ethiopian patriots (the *Sema-T'eru* Hamassen), who lived at Malka-Oda on the suburb of Shashamanne town, were forced to join peasant villages. Their settlement was urban like, with well built houses covered with corrugated iron sheets and finely caulked. The patriots were afraid that they would not get better housing if they left their age-old settlement. It was only the intervention of Dabala Dinsa, Shawa Region First Secretary of WPE Committee and Central Committee (CC) Member of WPE, that saved the Malka-Oda

patriots' living centre, now part of Shasamanne town, from disappearing. In the same area, many small rural towns were also threatened with villagization.²⁵



Students on villagization campaign

The peasants' voice was not heard during the villagization process. The PAVCC only followed the order given by DVCC (District Villagization Co-ordinating Committee). This increased the suffering and resentment of the peasantry.²⁶

Peasants usually asked for delay in the demolition of their houses. Many faced outright rejection while some others managed to get what they requested through bribery. Peasants did this to buy time expecting that the future might hold better things for them, i.e. villagization would be stopped.²⁷

What was given precedence by the PAVCC was the number of houses built daily and the speed with which they could complete the villagization of their respective PAs. This would be useful for writing up their reports. Daily reports were expected from the PAVCC, which was dispatched

to DVCC. The latter sent its own summary report to the AVCC (*Awraja* Villagization Co-ordinating Committee) three days a week. The AVCC on its part sent a progress report on the entire *awraja* to the RVCC (Regional Villagization Co-ordinating Committee) once in week. The first secretary of the WPE committee in Asella evaluated the overall progress of the region's villagization.²⁸ This was done largely for media consumption. The report writers dispatched them for fear of sanctions and also to win special favor.

The villages were constructed in a straight line and the houses were also required to be similar in the interest of revolutionary uniformity. Hence, *safara* easily differed from the age-old traditional dispersed settlements that dotted the countryside. The houses were designed in exact geometric grids while their shape was determined by the amount of building materials saved from the dismantling and transporting process. The local environment could also decide the shape of hamlets. Usually, rectangular and circular huts were built in Arssi.²⁹ Doors faced each other along two rows. The new PA villages in Arssi consisted of 250 to 500 houses; each village occupied 40 - 80 hectares, with some big villages covering a larger area. The villages were generally bigger than what they were before the beginning of villagization. Some were even bigger than small towns in the neighbourhood. The size of their population was correspondingly high. It went up to 6000 inhabitants for some villages. This was because 90 - 95% of the PAs were gathered in one village.³⁰ This was in contradiction with official sources, which broke many PAs into two villages. Certain PAs were even merged into one village. This could be seen by the decrease of Arssi PAs from 1,095 before villagization to 1,029 in June 1986. This was particularly true for lowland PAs, which had small households.

They were merged with the nearby highland PAs, which had more households. Some lowland PAs were also merged. This happened in Doddota, Gadab-Asasa and Zuway-Dugda districts in particular.³¹

The standard size of a homestead was 25x40 meters or 1000m². This guideline was strictly followed. As we have already seen, the size of houses varied according to their size before villagization and depending on the materials salvaged from the entire process of dismantling and reconstruction. The speed of the campaign put great constraints on salvaging. Hence, the size of the old houses was usually less than the original house and poorer in quality since they were rebuilt hastily. This was especially true for the numerous thatched roof houses.



A partial view of one of the thatched roof peasant villages in Arssi

The guideline also prohibited new cutting wood for village construction, for fear of the deforestation that would follow. Some informants argue that they were forbidden from using their own eucalyptus trees; but, these trees were cut down by passersby after they were relocated to the new villages.³²

As far as amenities were concerned, under the new villagization scheme, peasants would be provided with schools, clinics, mills, shops, pure water supply, roads and other services. Selashi Mengesha, the number one official in the region, once talked about the provision of electricity and telephone lines if peasants joined villagization willingly.³³ The provision of socio-economic facilities was one of the theoretical justifications for villagization. In many villages these facilities were far from being available. There were only toilets, rudimentary halls for literacy education, mosques, *qebele* offices and open fields next to the offices. Some villages did not even have toilets.³⁴ Even the model Wabe villages failed to fulfill the basic socio-economic facilities. For instance, in Asasa zone, Hurrubba, Wolqixxe and Woqacaffa continued to use river water for sanitation and drinking.³⁵



One of the Waabee concentrated iron roofed peasant villages.
Source: Addis Zaman, T'equent 16/1973 (October 26/1980)

Conditions were worse in remote villages. These villages could not get the necessary amenities. But those set up near major roads got some important facilities. This was true for *safaras* in Hexosa district and others established along the major Asella-Addis Ababa highway and some other feeder roads. Some of these villages have survived to this day as a result. We can mention: Hula-Dawe, Itayya-Shaqi, Haxe, Addo-Gonde, Wacu-Lenca and Shorima in Hexosa district. *Derg* officials often visited these villages as show cases and rewarded their chairmen; they got tap water, schools, clinics and some other facilities. At present, they are supplied with electric light, telephone and other amenities.³⁶ However, the majority of the villages could not even get basic facilities. Some facilities provided could not match the number of people. Consequently, most of the villages set up after 1985 utilized the same resources they used before villagization: water from rivers, forest wood for fire, markets, schools, health centers, etc. Sometimes the whole village used the same river for water and the same forest for fuel consumption. This intensive utilization of renewable and non-renewable sources led to environmental degradation. The alleged objectives of villagization were thus not achieved. The *ujamaa* villages of Tanzania were more successful in this respect. On the other hand, in some peasant villages drinking houses became rampant. A number of peasants spent their time there. This had adverse consequences.³⁷ We shall investigate such impacts in the next section.

Site selection was done by PAVCC. In districts crossed by highways, many villages were brought to the roadside. The committee did this for propaganda purposes so that higher officials could easily visit them. Generally, DVCC approved the sites chosen by PAVCC. Cohen and Isaksson cite no complaints in the 18 villages they studied both in Arssi and Bale. Usually, centrally located sites were selected for peasant villages. What I gathered from Arssi informants is somewhat different. Former villagers assert that the committees for site selection and other issues concerning villagization largely ignored them. According to them, if they were consulted, much better sites could have been chosen.³⁸ In Kofale district, the Wabe villages themselves were built at hilly, barren and marshy areas against their will. In former Menegesha *Awraja* of Shawa, as we can learn from the study of Alemayehu, the same thing happened.³⁹

In parts of Arssi, in Arba Gugu and Cilalo for instance, peasants were brought from lowland areas to settle in highland areas against their will when merging of PAs took place. In Arsi-Nagelle district, nine villages were built next to each other without adequate water resource. No regard was given to availability of water but only for the gentleness of the land. The latter criterion was consistent with the guideline while most other requirements were not considered.⁴⁰ It seems that there was no regard for the guideline itself. According to the guideline, level ground is to be preferred in order to mitigate the rate of erosion and to give sufficient space for gardening. These and other requirements stipulated in the national guideline were not followed in a number of cases. This shows that the implementation of villagization was not always conducted according to the guideline.⁴¹

Impact of Villagization on Land and Agrarian Development

This work, given its scope, does not attempt to identify and analyze all the impacts of villagization. Rather, it tries to assess those especially relevant to land and agrarian development. In fact, analyzing the consequences of villagization is bound to encounter quite a number of imponderables. This is due to the fact that villagization could not be isolated from other policies of the military regime. Besides, temporally, peasant villages had a brief existence in Arssi in particular and throughout Ethiopian in general. In Arssi, they lasted between two and four years from 1986-1990. The Wabe villages, however, lasted for almost a decade.

Most peasant villages were built in a central position in the PA and on plains. These sites were usually exposed to wind erosion. During the dry season, they started to be affected by wind

erosion whereas during the rains they were exposed to water erosion. On the other hand, the earlier scattered homesteads were built mostly on the lee side of hills, rocks, mountains, etc and were thus protected from such hazards.⁴² In the new villages, there was greater danger of wind erosion than that of water erosion. Cohen and Isaksson report that erosion did not occur in the villages they visited. They used deductive analysis rather than empirical observation as far as the impact of villagization is concerned. They projected a list of impacts (long term and short term) rather than recording tangible results. Actually they were in Arssi from December 1 to 14, 1986, i.e. during the dry season. They could not therefore witness erosion as such. Besides, they were also unable to get information on the year's harvest. Peasants were not willing to give them information on sensitive issues like this. The village leadership provided incorrect figures, as it so often did. Harvesting was not also completed in many areas. As a result, Cohen and Isaksson remark that "the process of moving people to villages has in itself no measurable effect on crop production in Arsi."⁴³ But it is a known fact that land preparation for the following crop year takes quite a long time and this could not be done properly because of the villagization campaign. We now know that some peasants even died from the hardship of the campaign and some families remained without bread winners.⁴⁴

Besides, peasants could not get enough space for gardening. Many who, prior to villagization, used to benefit from vegetables could not continue to do so after villagization. Due to lack of space to build extra houses, it was difficult also to have sufficiently big kraals for livestock or to change kraals during the rainy season. This led to congestion of animals and the human population in peasant villages. Many were settled in new localities though not very far from their former homesteads. Such displacement created problem of adaptation for animals and human population. After some months of settlement in the new villages, the death of animals and children became a common phenomenon. This was mainly due to problem of adaptability and congestion for both human beings and animals. Communicable and contagious diseases spread easily in the villages and took away the lives of a large number of animals and children within a short period of time. This was rare before villagization. In some areas, adults were also affected.⁴⁵ A number of studies on villagization cite this problem for other parts of Ethiopia too.⁴⁶ As a result, peasants especially during the beginning of villagization in 1985, sold a large number of animals, as confirmed by South Eastern Agricultural Development Zone (SEAD) and informants.

Some informants also ascribe the death of animals to stoppage of transhumance (*godansa*) after the peasants' concentration in the new villages. Former *godantu* (transhumant) areas became *safara* centers themselves after they were organized into PAs. Other sources cite hyenas eating many animals while trying to reach their homesteads. Weak animals died from the hardship of going between the former pasturelands and the new homesteads. Occasionally peasants killed one another's animals when they found them in their homesteads.⁴⁷ Overgrazing also became common in nucleated villages and caused wind and water erosion. This was the case as peasants kept their herds of cattle, flock of sheep and goats and other animals around their homesteads in the concentrated villages until late in the morning. In the Rift Valley areas, land degradation had already occurred because of the concentration of animals and human beings.⁴⁸ This was a semi-arid area which could be of benefit only because of the earlier pattern of dispersed settlement.

A distance of 3-4 km was common between the farmland and new villages. Such distance meant peasants spent production time carrying their ploughshare and deploying their oxen to reach the farmlands. This was a source of hardship, especially in hilly localities and areas traversed by rivers, streams and gorges. This was the case because the land utilization pattern and the land tenure were not altered. Peasants used for grazing and farming the same land they used before the onset of villagization. More time was spent on the journey to the farmlands and pasturing areas, time that could have been otherwise spent on production. This clearly implied that less time was spent on the major task of production, unlike the pre-villagization times. Moreover, the labour force of children and women could not be utilized effectively as before. Women and girls suffered from travelling between former farming plots and the new homesteads; they were also exposed to rape. Adultery also spread on the way to and fro farmlands. Giving birth on the road became common for women during the *safara* times. This happened as they often went between the farming fields either to deliver food to their husbands and others who were out in the field.⁴⁹

Distance of farm land also exposed crops to birds, pests and thieves. This could have been easily avoided if the farmsteads were near households as was the case before villagization. Loss of dung and manure became the source of pollution in the concentrated villages.⁵⁰ Tadesse conducted a study with the intention of evaluating the socio-cultural, economic and environmental impact of villagization on the Guji Oromo. He discovered that *safara* building was attended mostly with negative consequences.⁵¹ All these factors apparently led to the decline of production and productivity instead of bringing increment.

There was no improvement of extension. Instead it declined during the villagization period in Arssi. SEAD extension workers, sidelining their main duty of servicing extension provision, preoccupied themselves with administrative affairs so as to execute government policies and programs. For instance, they were involved in agitating peasants to implement every government decree and order, such as speedy villagization, payment of contribution for defense, famine, relief, etc. They even collected such contributions and in many other ways worked not only as government agents but also as government cadres. Thus, unlike the CADU/ARDU (Chilalo Agricultural Development Unit/ Arssi Rural Development Unit) period, there was no extension service provision to the peasantry with the intention of increasing production and productivity.⁵² As we have seen, the quality of peasant village households was inferior in most cases to the scattered traditional settlements so common in rural areas before villagization. There was as a result nothing or little in the peasant villages to encourage the peasantry to work hard and boost production.

The majority of peasants were alarmed and shaken psychologically by the displacement from their *qe'ee* (homestead), where they had lived for generations. There developed an Oromo saying which stressed the relationship between the homestead and its owner: '*abbaan qe'ee haga qe'ee gaya*' ('a homestead is as good as its owner'). It was and still is common to hear '*qe'ee warra ebalu*' ('homestead of family of so and so'), meaning, ('Do you know the homestead of the family of so and so?'). He or she could easily be shown the location of the homestead of any important family from a distance.⁵³ This was a region where the Arssi Oromo had lived at least since the 16th century. They had already developed strong cultural, social, economic and psychological ties to their particular localities and the homesteads they used to live in. They considered their homesteads as the origin of not only themselves but also of their ancestors. Contrary to this, Cohen and Isaksson state that, as the population in Arssi had reached there by constant resettlement since the conquest of Menilek, peasants had come to the region too recently to develop strong generational ties⁵⁴ to the land. But what they assert could not apply to the Arssi Oromo, the majority inhabitants of Arssi region. It could be true of the Amhara and the Shawan Oromo communities who had not developed long-lasting attachment to their locality and their homesteads as they had begun settling in Arssi only after Menilek's conquest.

On top of this, in dispersed traditional villages, the Muslims usually had small huts that served as mosques within the homestead. Many families also had mini-huts for youth to pass the night in. These extra-huts could not be built in the new peasant villages for shortage of space in the new

compound. However, mosques were built in peasant villages and congregational Friday prayer was allowed, while the churches remained where they were before villagization program. There were no religious restrictions as such on either Christians or Muslims. But because they had to leave behind the traditional burial sites when moving to the new villages, many villagers felt that they abandoned their beloved dead relatives. They spent considerable energy in carrying corpses to the traditional tombs.⁵⁵

In the new villages, there was infringement on privacy and autonomy of peasants. A number of distant relatives and acquaintances were brought together. Quarrels among children and women, which would usually be followed by conflicts among men, were common incidents. All these factors put psychological and social pressure on the peasantry and reduced their zeal for work.⁵⁶ Thus, the existing social and economic predicaments of the rural population in Arssi were exacerbated rather than being mitigated. Under such circumstances, it would be naive to expect high production and productivity. The already feeble morale and lack of motivation of peasants was extinguished by *safara*. Instead, it led to desperation and gloomy. In quite a good number villages, drinking houses were opened where alcoholic drinks like *t'ella* (local beer) and *aräqè* (local drink with high alcoholic content) were sold. Many in *safara* even feared the outbreak of an epidemic, fire or flood, which would wipe them out. This was also the case in Yayya Gullalle in north Shawa⁵⁷ and possibly in a number of other areas. Peasants in short lost confidence in themselves and the government. Many prayed for the end of *safara* and the government that had introduced it, in spite of the strong pro-government propaganda by the party cadres, MOA agents and other government representatives. To many villagers, *safara* was not a homestead but rather a concentration camp under government surveillance. Some even equated it with a 'prison' of the peasantry. According to these informants, the most hated policy of the *Derg* regime among the rural population, which also caused a lot of hardship and suffering, was villagization.⁵⁸

Yet, peasants conceded that villagization also yielded some benefits. They cite, for instance, the fact that theft and robbery were minimized. Thieves could be apprehended easily as the local security forces took care of the well being of each village.⁵⁹ Some, however, have an opposite version, especially in the abandoned countryside, where robbery, rape and physical assault on travelers became common.⁶⁰ Peasant villages also provided a good venue for social occasions like wedding, mourning, and other gatherings, etc. People could easily come together. This also extended to other social and economic services like carrying labouring women to health centers, extinguishing fire, etc. Mutual economic performances - *dabo*, *wanfala*, *qabachiisa* - were all

reinvigorated. Socio-economic institutions like *iddir* (mutual self-help institution) and *iqqub* (mutual traditional savings) were also benefited,⁶¹ as their members were able to meet on a regular basis more than ever before.

As a government scheme, villagization helped the government a lot to execute its policies. Among others, peasants were easily controlled in Arssi. They supplied grain to the Agricultural Marketing Corporation (AMC) and attempts to evade it were easily traced and prevented. But this was squeezing away the limited surplus from the declining income of the peasantry.⁶² PA leadership could also hunt down the youth for military service and hand them over to government recruitment agencies in the district. PA officials were able to order with ease people for social and economic work that needed collective action. They could also call meetings on a regular basis without traveling too far. As a result of achievements in serving the government, some PA officials were recruited to party membership and richly rewarded. Revolutionary Ethiopian Women's Association (REWA) and Revolutionary Ethiopian Youth Association (REYA) could also accomplish their tasks in *safara* more effectively. Indoctrination of peasants, youth and women was intensified as a result of the conducive situation created by peasant villages.⁶³ The literacy program got greater impetus as a result of the peasantry's concentration in common villages. Peasants built education halls where students who had completed 12th grade went out on campaign to eradicate illiteracy from *Miyazia* 1 to *Hamle* 30 (April 9 to August 6) every year. A lot was achieved in literacy education. Many were able to read and write and learn basic arithmetic. A number of young peasants and their children could join regular government schools to continue their education up to higher levels.⁶⁴ This researcher himself could testify to the success of the literacy education program as he was one of the student teachers in 1987.

We can thus conclude that the political goal of the villagization scheme was achieved much more than others. The economic objective set for it - boosting production and productivity - was not met. On the contrary, the control exerted on the peasantry in concentration villages and the agitation or politicization, which followed could not produce the anticipated result. The Arssi peasants consistently disliked the government in direct proportion to the steady tightening up of control and the incessant propaganda campaign that was not followed by tangible economic gains.

Devillagization

Already before the declaration of the mixed economy in 1990, peasants had started abandoning nucleated villages in various ways. They left them in favour of satellite villages set up first for their animals and then for themselves in their former homesteads. Others fled to urban areas only to suffer from lack of employment. Some went abroad or to regions less affected by villagization. Migration to other regions and abroad was not common among the Arssi Oromo before the *Derg* times. During this period, however, it became one of the last resorts one took to save one's life. The change could not be ascribed only to villagization. A set of factors like military recruitment and APCs also engendered migration. A number of young and productive peasants, especially unmarried ones, went to foreign countries, largely through Kenya, Somalia and Djibouti. Their destinations were mostly Arab countries. This happened in spite of the regime's strong restriction on movement even inside the country, let alone abroad. But many made the move, risking their lives. All this was done in desperation, ready to face what may come if they were apprehended while attempting to flee.⁶⁵

When mixed economy was declared, the peasantry dissolved many villages quickly. It was not only the speed of devillagization that demonstrated its unpopularity, but also the damage done to some of its facilities. In a number of villages, mills, schools and some other facilities were destroyed and vandalized. Other peasants did not even have the time to take the building material. They left the *safara* in a state of euphoria, happy that their wish and dream had come true and their prayers were answered.⁶⁶ Even the model Wabe villagers dispersed to their former habitations just like the other common peasant villagers.

The impact of villagization that we have discussed so far was actually intertwined with other policies and their consequences. Thus, a set of *Derg* policies we have already investigated could be the reason for the negative impact of villagization. Villagization could not be put forward as a solitary factor for a number of adverse effects. One takes into account also the supply of quota to AMC at a fixed and low price, the formation of APCs and their mismanagement, among others. These policies, along with villagization, alienated the *Derg* from the rural majority. Villagization was in fact the most hated policy of the *Derg* regime in rural areas.⁶⁷

Yet, in general, villagization, APCs and other related policies adopted by the *Därg* brought poverty rather than the development that was hoped for and expected. This reality however was not told by the mass media or the peasants themselves at the time for fear of retribution. They rather withstood the hunger, misery and social injustices caused by these policies in the hope that

the future may bring them another time. Rebellion was unthinkable. As was the case under the imperial regime, Ethiopian rulers and governments rode the horse of politics more than that of economic development. Once wedded to politics, policies remain in place without being revised for years, like the words of the Qur'an and the Bible. Revisions of policies are made if they had political benefits rather than for the sake of economic or agrarian development.

NOTES

¹ Among them are Alemayehu Lirensu, "Villagization and Agricultural Production in Ethiopia: A Case Study of two Regions, A Research Report Prepared for the Winrock International Institute for Agricultural Development" *IDR Research Report*, No.41, Addis Ababa, 1992. This work deals with three PAs in Shawa. Tadesse Berisso, "Modernist Dreams and Human Suffering Villagization among the Guji Oromo", in *Remapping Ethiopia: Socialism and After*, eds. Wendy James, Donald L. Donham Eisei Kurimoto et al (Oxford, Athens, Addis Ababa, 2002).

² John M. Cohen and Nils Ivar Isaksson, "Villagization in the Arssi Region of Ethiopia". Report Prepared by SIDA Consultants to the Ethio-Swedish Mission on Villagization In Arssi Region, Swedish University of Agricultural Sciences, International Rural Development Centre, Uppsala, 1987.

³ Paraphrased from Alemayehu, p.1; Christopher Clapham, *Transformation and Continuity in Revolutionary Ethiopia*, Cambridge, 1988, p.175; Bahru Zewde, *A History of Modern Ethiopia, 1855-1991*, Second Edition, Oxford, Athens, Addis Ababa, 2000, p. 263.

⁴ Africa Confidential, "Ethiopia: More Resettlement", Vol. 18, No. 6, 18 March 1987; informants: Tsegaye, Kebede Fesese and Maza Libarge.

⁵ *Ibid*; Bahru (2002), p. 263; *Addis Zämän*, 1 April 1979.

⁶ Tadesse (2002), p. 117; Beyene Doilicho, "Villagization in Selected Peasant Associations in Southern Shewa: Implementational Strategies and Some Consequences" *IDR Research Report*, No. 41, Addis Ababa, January 1992, p. 2. Among non-socialist countries we can mention Italy before 1900 and Russia before 1917 Revolution. Colonial powers also implemented to subdue liberation movements.

⁷ *Addis Zemen*, May 30/1986; see also Beyene, p. 3; Alemayehu, p. 10.

⁸ Alemayehu, p.10; Beyene, p. 3.

⁹ Arssi Rural Development Unit, "Plan for 1976-80" (Asella, 1976), p. 37.

¹⁰ Alemayehu, p.1; Clapham, p.175. In March 1979 already 200 hamlet villages were built accommodating 500,000 people largely supported by government; see *Addis Zemen*, March 20, 1979.

¹¹ Clapham, p.175; Cohen and Isaksson, p. 307.

¹² Africa Confidential, "Ethiopia: Villagisation", Vol. 27, No 12, 4 June 1986, p.7; see also Andargachew Tiruneh, *The Ethiopian Revolution 1974-1987: A Transformation from an Aristocratic to a Totalitarian Autocracy*, 1993, Cambridge, p.367.

¹³ Alemayehu, p.1.

¹⁴ Cohen and Isaksson, pp.v, xii; Clapham p.175. One of my helpful informants, *Obbo* Samuna Rakiso, was district administrator who refused to allow the expansion and establishment of state farms in Kofale district where Ardayta and Gofar were to be operational. He was particularly worried about the fate of small-scale farmers and large

number of the cattle population in the area. As a result of his not cooperating with regional officials on this, he was soon transferred to another district. Subsequently, the translocation of peasants to new villages started in Kofale and Gadab-Asasa districts where established Gofar while Ardayta and Oomoo-Garardellaa state farms were expanded. In Robe and Amgna districts of Xicho *Awraja*: Diksis and Addelle were established in 1970 E.C. and 1972 E.C., respectively. The peasants dislocated were concentrated in the Wabe peasant villages.

¹⁵Cohen and Isaksson, p. 12.

¹⁶Informants: Kebede, Abdo Jilo, Gurmessa Aradda et al.

¹⁷*Ibid*; Tariku Degu, "Transformation of Land Tenure and the Role of Peasant Associations in Eastern Arsi (1974-1991)", MA thesis (AAU, History, 2008, pp. 73-74.

¹⁸Informants in Arssi commonly tell this.

¹⁹Africa Confidential, "Ethiopia: Villagisation," Vol. 27, No. 12, 4 June 1986), p. 7; Alemayehu, p. 15.

²⁰Tadesse, p. 122.

²¹Dessalegn Rahmato, "The Unquiet Countryside, the Collapse of Socialism and Rural Agitation", *Ethiopia in Change and Peasantry, Nationalism and Democracy*, 1994, p. 246.

²²Archive: Robe, "Village Establishment", letter written by Masaranje Abbomsa PA Office to Robe DVCC, 24 79 E.C (11.12.1986); letter of 17.7 79 E.C (26.3.1987) addressed from the same source to same destination.

²³Informants: Laqew Tesema, Muhammad Abu, Abdulqader Golamo, and Abdo. See also Cohen and Isaksson, pp. 19-21.

²⁴*Ibid.*, see also Tariku, p. 74.

²⁵Informants Tsegay Gebre Mikael, Tekle-Giyorgis Jaldo, Muhammad Argo and Bushra Roba. These informants cite many rural towns, which were only saved from villagization by high officials from Shawa including Dabala. Many of these towns are today legally recognized as urban centres and are growing fast. One of these towns is Bishan Guracha town, between Shashamanne and Hawasa (Awasa) towns.

²⁶Informants: Abdul-Qadir, Abdiyo, Kiflè and Muhammad Argo.

²⁷Informants: Bushra, Mummicha Badhasa, Dhekamo Qabato and Gurmessa.

²⁸*Ibid*; Cohen and Isaksson, p.15.

²⁹Clapham, P.176; informants: Hajjo Ensene, Legesse Riqisa, Abdul-Aziz Wahielia and Debebe Gebre Mariam.

³⁰Cohen and Isaksson, p. 29.

³¹*Ibid*, p.37; *The Ethiopian Herald*, July 30, 1986.

³²Cohen and Isaksson, pp. xv,14; informants: Galato Galgalu, Gurmessa and Mummicha.

³³See for instance *Addis Zemen*, 30 November 1985. Lieutenant Selashi Mengesha was first chief administrator of Arssi. Later he became regional COPWE Committee first secretary and subsequently WPE first secretary for Arssi region. In general, he dominated Arssi's political, social and economic affairs for a decade between December 1978 and November 1987. His atrocity is commonly told by oral informants in Arssi.

³⁴Common information in Arssi.

³⁵Dinku Tola, "Changing Land Use Pattern In Gedeb Region: With Special Reference to Ardaita State Farm", BA thesis (AAU, Geography, 1984), p. 69.

³⁶Informants: Irresso Rabo, Gabi Hey'i, Muhammad Haji et al.

³⁷*Ibid*; Cohen and Isaksson, pp. 123-133.

³⁸Informants: Abdo, Baro Datu, Aliyyi K/Tilmo et al; Cohen and Isaksson, p.14.

³⁹ Almayehu, p.14.

⁴⁰ Informants: Tsegaye Abebe, Giske Dinsa, Xiqi Dinqi and H/Qaabatoo Wodeso.

⁴¹ *Ibid*; see Cohen and Isaksson, pp.12-13; Fekadu Jote, "The Impact of Villagization On Rural Development In Salale Region: Case Studies from Yaya Gulale", BA thesis (AAU, Geography, 1991), p. 42.

⁴² Informants: Hayle Wolde Hiwot, Abdurahman Ensene, Kifle Bekele and Ayele Koroso.

⁴³ Cohen and Isaksson, p. 30.

⁴⁴ See footnote No. 108 above.

⁴⁵ Informants: Gurmessa, Haji Gammadi, Laqew Tesema et al; see also Cohen and Isaksson, p.37.

⁴⁶ See Taddesse, pp. 124,129; Beyene, pp. 31-32.

⁴⁷ Informants: Kadija Dhaqabo, Hajjo, Bashir Ensene et al.

⁴⁸ Informants: Gada Morkato, Eda'o Haga and Kalil Kawo; see also Clapham, p.178; Beyene, p. 32.

⁴⁹ Informants: Gurmessa, Abdiyo Ensene, Kadija and Hajjo; See also Taddesse (2002), pp. 123-124; Fekadu, p. 52.

⁵⁰ Conen and Isaksson, p. 48; informants Husen Lembo, Maza and Tsegaye.

⁵¹ See Taddesse, pp. 123-131.

⁵² Cohen and Isaksson, p.47; informants: Aseffa Mekuriya and Lelliso Kawo.

⁵³ Common practice in Arssi and among other Oromo groups and perhaps other Ethiopian societies.

⁵⁴ *Ibid*, Cohen and Isaksson, pp. xi, xvii.

⁵⁵ Common tradition among the Arssi Oromo and other Oromo groups; see also Fekadu, p.46

⁵⁶ Informants: Aliyyi Tolola, Bullo Oria, Gebre-Amlak Guye, Sh/ Qaabatoo Wodeso et al.

⁵⁷ *Ibid*; see Fekadu, p. 61.

⁵⁸ Informants: Kadijaa, Kebede, Galato, Maza et al.

⁵⁹ *Ibid*.

⁶⁰ Informants: Burqa Hirpho, Muhammad Jarso, Laqaw and Xiqi.

⁶¹ Informants: Abdo, Hayle, Debebe and Huseen Wariyyoo.

⁶² *Ibid*.

⁶³ *Ibid*, Tariku,p.76 . A number of villagization merits cited by Alemayehu could not be found all over Arssi, pp. 24-25.

⁶⁴ *Ibid*. I myself took part in a literacy campaign of the 17th round in 1979 E.C. (1986). I taught in Awwaroftu PA of Zuway-Dugda district near Zuway Lake. Peasants and their family members were eager to learn. But with other economic and social responsibilities, it made them busy and they could not attentively follow the education and as could not be fully benefited from the program.

⁶⁵ Informants: Julla Wodajo, Muhammad Hinsene, Maza et al.

⁶⁶ *Ibid*. Many considered the end of concentrated peasant villages and APCs as a miracle that Allah (God) has sent down to save them from extinction.

⁶⁷ Informants: Lelliso, Samuna, Aseffa et al.

The Roles of Information Communication Technologies in Education

Review Article with Emphasis to the Computer and Internet

By

Fisseha Mikire

Abstract

This article discusses the Roles of ICT in education. Information communication technologies (ICT) at present are influencing every aspect of human life. They are playing salient roles in work places, business, education, and entertainment. Moreover, many people recognize ICTs as catalysts for change; change in working conditions, handling and exchanging information, teaching methods, learning approaches, scientific research, and in accessing information. Therefore, this review article discusses the roles of ICTs, the promises, limitations and key challenges of integration to education systems. The review attempts in answering the following questions: (1) What are the benefits of ICTs in education? (2) What are the existing promises of ICT use in education systems of some developing countries? (3) What are the limitations and key challenges of ICTs integration to education systems? The review concludes that regardless of all the limitations characterizing it, ICT benefits education systems to provide quality education in alignment with constructivism, which is a contemporary paradigm of learning.

1. Introduction

ICTs are making dynamic changes in society. They are influencing all aspects of life. The influences are felt more and more at schools. Because ICTs provide both students and teachers with more opportunities in adapting learning and teaching to individual needs, society is, forcing schools aptly respond to this technical innovation. Tinio (2002), states the potentials of ICTs in increasing access and improving relevance and quality of education in developing countries. Tinio further states the potentials of ICT as follows:

ICTs greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and widen the range of opportunities for business and the poor. One of the greatest hardships endured by the poor, and by many others, who live in the poorest countries, in their sense of isolation, and ICTs can open access to knowledge in ways unimaginable not long ago.

In Watson's (2001) description, ICTs have revolutionized the way people work today and are now transforming education systems. As a result, if schools train children in yesterday's skills and technologies they may not be effective and fit in tomorrow's world. This is a sufficient reason for ICTs to win global recognition and attention. For instance, ICTs are dependable tools in facilitating the attainment of one of the Millennium Development Goals (MDGs), which is achievement of universal primary education by the year 2015. Kofi Anan, the former United Nations Secretary General, points out that in order to attain the goal of Universal Primary Education by the year 2015; we must ensure that information and communication technologies (ICTs) unlock the door of education systems. This indicates the growing demand and increasingly important place that (ICTs) could receive in education. Since ICTs provide greater opportunity for students and teachers to adjust learning and teaching to individual needs, society is, forcing schools to give appropriate response to this technical innovation.

Even though ICTs play significant roles in representing equalization strategy for developing countries, the reality of the digital divide- the gap between those who have access to, and control technology and those who do not, make a huge difference in the use of ICTs. This means, that the introduction and integration of ICTs at different levels and various types of education is the most challenging undertaking. Failure to meet the challenges would mean a further widening of the knowledge gap and deepening of existing economic and social inequalities among the developed and the developing countries. Thus, the purpose of this review article is to discuss the benefits of ICT use in education, in the enhancement of student learning and experiences of some countries in order to encourage policy makers, school administrators, and teachers pay the required attention to integrate this technology in their education systems. In so doing, it highlights the benefits of ICT in education, existing promises, and the limitations and challenges of integration to education systems.

2. Operational definition of terms

Information Communication Technologies (ICT) in this review article refers to the computer and internet connections used to handle and communicate information for learning purpose.

E learning: - is a learning program that makes use of an information network- such as the internet, an intranet (LAN) or extranet (WAN) whether wholly or in part, for course delivery, interaction and/or facilitation. Web-based learning is a subset of e learning and refers to learning using an internet browser such as the moodle, blackboard or internet explorer (Tinio, 2002).

Blended Learning: - refers to learning models that combines the face-to-face classroom practice with e-learning solutions. For example, a teacher may facilitate student learning in class contact and uses the moodle (modular object oriented dynamic learning environment) to facilitate out of class learning.

Constructivism: - is a paradigm of learning that assumes learning as a process individuals ‘‘construct’’ meaning or new knowledge based on their prior knowledge and experience (Johassen, 1991).

Learner- centred learning environment: - is a learning environment that pays attention to knowledge, skills, attitudes, and beliefs that learners bring with them to the learning process where its impetus is derived from a paradigm of learning called constructivism.

3. The Benefits of ICT in Education

The uses of ICT is making major differences in the learning of students and teaching approaches. Schools in the Western World invested a lot for ICT infrastructures over the last 20 years, and students use computers more often and for a much larger range of applications (Volman, 2005). Several studies reveal that students using ICT facilities mostly show higher learning gains than those who do not use. For instance, Kulik's (1994) finding across 75 studies in the United States showed the following.

Students who used computer tutorials in mathematics, natural science, and social science score significantly higher on tests in these subjects. Students who used simulation software in science also scored higher. The findings also indicated that primary school students who used tutorial software in reading scored significantly higher on reading scores. Very young students who used computers to write their own stories scored significantly higher on measures of reading skill. Moreover, students who used word processors or otherwise used the computer for writing scored higher on measures of writing skill.

Furthermore, the use of ICTs in education also shifts the learning approaches. As put by (Bransford, Brown, and Cocking, 1999) cited in Volman (2005), there is a common belief that the use of ICTs in education contributes to a more constructivist learning and an increase in activity and greater responsibility of students. This limits the role of the teacher to supporting, advising, and coaching students rather than merely transmitting knowledge. The gradual progress in using computers changes from learning about computers, to learning computers, and finally to learning with computers (Volman, 2005). With respect to introducing ICT technologies in schools, Olson (2000) advises to explore the following questions as bases for in-service teacher education. These are (1) how can the theoretical ideas tested in practice? (2) What does practice say back to these theoretical ideas? (3) How is useful negative feedbacks obtained? (4) What might be substantive talking points about the new processes? What is practical from a classroom perspective? (5) What does talking about the new say about the nature of existing technology? Is it adequate? (6) What scaffold needs for the next stage?

On the other hand, teachers' reluctance to adopt innovations need to be seen in the context of existing technology and commitments. Fullen (1989) cited in Watson (2001) states that change or improvement can happen at schools if teachers understand themselves and understood by others. For instance, many teachers are currently not in a position to make informed judgements on ICTs to support their teaching goals. Clearly a variety of factors still do make using ICT in the curriculum problematic (Watson, 2001). Because of this, the influence of ICT did not bring revolutionary changes at schools. For instance, the National ICT survey in the Netherlands shows that most primary-school students use computers less than once a week and there are still many secondary school teachers who do not use ICT at all (Volman, 2005). Most often, they use computers for drill-and-practice and word processing.

In recent years however, there has been a growing interest to know how computers and internet can best utilized to improve effectiveness and efficiency of education at all levels and in both formal and non-formal settings. As there is a shift of theories explaining learning processes, ICTs become handmaiden for learning activities. Voogt's (2003) description on the major roles, distinguished ICTs as an object for study, an aspect of a discipline or a profession, and a medium of instruction. As a medium of instruction, ICTs fit to realize and implement the emerging pedagogy of constructivism (Davis, 1997; Office of Technology Assessment, 1995; Panel on Educational Technology, 1997; Watson, 1996) in Voogt (2003). Moreover, Voogt (2003) differentiated between traditional learning setting and constructivist approaches. The former considers learning as transmission of knowledge to students, which is the sole responsibility of the teacher. On the other hand, the constructivist approach considers learning as authentic and learner centred. ICT, the computer for example is a great help in the constructivist approach, where one can design simulated and individualized learning environments to students.

ICTs are exerting impacts on pedagogical approaches in the classrooms. Their contribution to changes in teaching practices, school innovation, and community services is considerable. A research review by Kozma (2005) suggests three significant concerns of consideration regarding ICTs impact on education. Firstly, student out comes such as higher scores in school subjects or the learning of entirely new skills needed for a developing economy. Secondly, we should

consider teacher and classroom outcomes such as development of teachers' technology skills and knowledge of new pedagogic approaches as well as improved attitudes toward teaching. Finally, one has to consider other outcomes such as increased innovativeness in schools and access of community members to adult education and literacy. The table below presents comparison of the traditional pedagogy and the emerging pedagogy of constructivism that fits to the use of ICT (particularly the computer and internet) to increase student involvement in learning.

Overview of Pedagogy in the Traditional versus Information Society As adapted by Voogt (2003) from (Voogt & Odenthal, 1997; Wijnen et.al., 1999)

Aspect	Traditional pedagogy	Emerging pedagogy for the information society
Active learning	Activities prescribed by teacher	Activities determined by learners
	Whole class instruction	Small group
	Little variation activities	Many different activities
	Pace determined by the programme	Pace determined by learners
Collaborative	Individual	Working in teams
	Homogenous groups	Heterogeneous groups
	Every one for him/herself	Supporting each other
Creative	Reproductive learning	Productive learning
	Apply known solutions to problems	Find new solutions to problems
Integrative	No link between theory and practice	Integrating theory and practice
	Separate subjects	integration between subjects
	Discipline based	Thematic
	Individual teachers	Teams of teachers
Evaluative	Traditional pedagogy	Emerging pedagogy for the information society

Tinio (2002) describes each of the pedagogic aspects in the table above in terms of implication for ICT use as follows.

Active learning: - ICT-enhanced learning mobilizes tools for examination, calculation and analysis of information in order to provide a platform for student inquiry, analysis and construction of new information. The learners therefore, learn as they do and, whenever appropriate work on real-life problems in-depth. Moreover, ICT makes the learning less abstract and more relevant to their life situations. In contrast to memorization-based or rote learning, that is the feature of traditional pedagogy; ICT-enhanced learning promotes increased learner engagement. ICT-enhanced learning can also be ‘just-in-time’ learning that the learners choose what to learn when they need.

Collaborative learning: - ICT-supported learning encourages interaction and cooperation among students, teachers, and experts regardless of where they are. Apart from modelling real world interactions, ICT-supported learning provides opportunity to work with students from different cultures, thereby helping to enhance learners teaming and communication skills as well as their global awareness. It models learning done throughout the learner’s lifetime by expanding the learning pace to include not just peers but also mentors and experts from different fields.

Creative learning: - ICT-supported learning promotes the manipulation of existing information and the creation of real-world products rather than the duplication of received information.

Integrative learning: - ICT-enhanced learning promotes a thematic integrative approach to teaching and learning. This approach eliminates the artificial separation between the different disciplines and between theory and practice, which characterizes the traditional approach.

Evaluative learning: - ICT-enhanced learning is student-directed and diagnostic. Unlike static, text or print-based education, ICT-enhanced learning recognizes the presence of different learning pathways to explore and discover rather than merely listen and remember.

The discussion above clearly elaborates the role of ICTs in facilitating the pedagogy of schools in the information society. As put by (Davis, 1997; Office of Technology Assessment, 1995; panel of Education Technology, 1997; Watson, 1996) in Voogt (2003), ICT is becoming more fitting to realize and implement the emerging pedagogy of constructivism. Nevertheless, an International study by Pelgrum and Anderson (1999) in Voogt (2003) shows a major obstacle for ICT integration in education and that is the difficulty of integrating computers and internet into classroom practices. Teachers’ lack of competence and enthusiasm to use computers in the

instructional processes also contribute for the difficulty. However, in order to improve, and make optimal use of ICTs, changes in the pedagogic approaches and classroom strategies as well as integrating ICT in teacher training and staff development practices accompanied by teacher motivation schemes are imperative.

Generally, Voogt (2003) describes the following functions of ICT in education.

- ICT as object. It refers to learning about ICT. Mostly organized in a specific course. What is being learned depends on the type of education and the level of the students? Education prepares students for the use of ICT in education, future occupation, and social life.
- ICT as an ‘assisting tool’. ICT is used as a tool, for example while making assignments, collecting data and documentation, communicating, and conducting research. Typically, ICT is used independently from the subject matter.
- ICT as a medium for teaching and learning. This refers to ICT as a tool for teaching and learning itself, the medium through which teachers can teach and learners can learn. It appears in many different forms, such as drill and practice exercises, in simulations and educational networks.
- ICT as a tool for organization and management in schools.

4. Examples of ICT use in Education Systems of Developed Countries

Most of the developed countries have applied ICTs in the 1980s to the level of K-12 education for a variety of reasons, which are still valid. Some of the reasons as discussed by Pedro and et.al (2004), are as follows:

A new society requires new skills

ICTs increasingly pervade every aspect of life (work, learning, leisure, and health). Because ICTs are excellent tools for information processing, the new generation needs to become competent in their use, should acquire the necessary skills, and therefore must have access to computers and networks while at school (Kok, 2007). Schools are information and knowledge holding

institutions. Therefore, ICT should be fundamental information management tool at all levels of an educational system, from classroom to ministries.

A Quest for Quality learning

Schools should profoundly revise present teaching practices and resources to create effective learning environments and improve life-long learning skills and habits in their students. ICTs are versatile, and powerful tools that can help in this purpose and should therefore present in every classroom, library and teacher room. Nevertheless, so far ICT have not provided any large-scale breakthrough in learning improvements even though there are still promises with great potential. Developed nations are using ICT in their education systems. For instance, in the United Kingdom, 'rising of standards' of teaching and learning has become intertwined with the use of ICTs (Watson, 2001). As the UK Minister for Education and Employment states, using digital technology for improving the delivery of education has enormous potential to raise standards and increase employability. To realize this, number of computers in schools increased time after time. "In 1980 an initiative placed one computer in every secondary school; two years later there were 16. In 1990, the average number of pupils per computer in secondary schools was 18; by 1998, it was eight. The Minister refers to this " moving schools into an information age" As Watson (2001: 253) puts it:

We are world leaders in ICT at schools, recognizing its vital importance to the future of all pupils. The figures show clearly the advances we have made in the field. It is an investment, not only in our children and in their lives in the 21st century, but in our country's future as well.

The use of computers at an early age helps students learn ICT skills that help as tools in the education process. For example, 77% of Swiss students reported using a computer several times a week to prepare their courses and assignments. Only 3% reported never using a computer for course preparation. As indicated in the OECD (2002) document, the average number of students per computer is an indicator of students' accesses to new technologies. As some data from OECD (2002) shows, the percentage of students with access to computer varies from 25% in Italy to 90% or more in Canada, Finland, and New Zealand. Computer use also varies between students of primary and secondary schools; where the later generally having greater access. In recent

years, the number of students per computer has been decreasing in the countries mentioned above.

5. Implications of ICT-Enhanced Education for Policy and Planning

There is a common belief that ICTs have significant contributions to changes in teaching practices, school change and innovations, and community services. Thus, policy makers and project leaders should think in terms of input factors that can work together to observe the right impact of ICT in education. Matching the introduction of computers with national policies and programs related to changes in curriculum, pedagogy, assessment, and teacher training is more likely to result in greater learning of students and other out comes (Kozma, 2005). OECD's international survey (2002) of upper secondary schools in 17 countries reveals computer availability for students; use of ICTs by teachers; ICTs activities as a part of student assignment; the role of ICTs in teaching and learning; staff development; co-operation with other schools and organizations; and obstacle to using ICTs in schools and found great variations among the countries with respect to the mentioned variables.

OECD's Education Committee meeting for instance endorsed a proposal for a new activity on ICT known as "Policy Challenges for Education". The meeting intended to identify and evaluate what education policy makers might do to better use ICTs in achieving improved educational out comes. As cited in the OECD Planning Meeting Agenda and Issue Paper (2002: 3), the structure of activity focuses on two broad and related questions as follows:

1. What policies are required to ensure that investment in ICTs leads to educational out comes? This tries to understand how ICT can contribute to greater access to learning; to higher quality teaching; and to improved and more equitable learning out comes.
2. What impact is ICT having upon the operation of educational institutions and upon educational policymaking? This tries to reflect on issues such as institutional frameworks for school management; the regulatory structures for educational institutions and teachers' work arrangements.

The need for linking ICT to education policies requires recognition. In reflecting the importance of technologies, education policies should focus in the following major points (UNDP, 2004):

(1) Education policies have to reflect alternate and new teaching paradigms that ICT can offer in terms of providing a more effective, relevant, and flexible mode of learning for the underprivileged and the general masses.

(2) Policies must take into account the retraining of teachers incorporating use of ICTs in education. Teachers should skilfully redesign learning environments so that students can transfer their newly gained ICT skills to other applications to use in an ICT rich environment.

(3) Most educational policies reflect the need for ICT infrastructure but they left out the need for local educational content. The development of instructional content-ware remains a neglected area, affecting investments in hardware and resulting in a heavy economic and educational loss.

(4) The focus of developing countries should be on how they use ICTs to compensate for the factors that are lacking in education, namely, well-trained teachers and the resources to pay for expensive equipment. The task is to concentrate on technological alternatives that, at low cost, bring to students the imagination and creativity of a few excellent teachers.

6. Promises of ICTs Use in Developing Countries (Reviewed from Kozma (2005) and Hare (2007))

The World Links program

The World Links program is a good initiation in the form of a project, originally managed by the World Bank to place internet-connected computers in secondary schools and train teachers in Africa, Latin America, the Middle East, and South and Southeast Asia. The goal of the program is to improve educational outcomes, economic opportunities, and global understanding for youth using information technology and new approaches to learning. Services provided by the program include:

- Feasibility studies and consultation on connectivity solutions and telecenter management,
- Internet connectivity for secondary schools in developing countries,
- School-to-school partnerships, as well as regional and global partnerships with public, private, and non-governmental organizations,
- Teacher professional development on issues of technology in the context of innovative pedagogy, and
- Workshops for policy makers on coordination of policies and implementation strategies

With the help of the World Links program, many countries are now using ICTs as ways of providing teachers with new skills and introducing innovative pedagogies in the classroom. For example, teachers in Chile acquired familiarity with computers for professional (eg. student marks, parent reports) and out-of-classroom tasks (e.g. searching for educational content on the web and lesson-planning activities). The program also provides 200 hours of teacher training that include an introduction to ICT, use of the internet for teaching and learning, use of tele-collaborative learning projects, integration of ICTs into the curriculum and teaching, and innovative pedagogical approaches. Because of this, majority of teachers and school principals report that teachers trained with computer and teaching skills gained positive attitudes about technology and about teaching. Moreover, some Asian countries such as India, Thailand, and Indonesia realized the importance of ICT integration to their education policies. They are also investing in ICT infrastructure for schools and creating network links of education institutions.

On the other hand, developed countries are now making online education, smart schools, and virtual universities more of a norm. Developing countries are also fast catching. For instance, the Government of India, announced an ambitious program titled ‘Vidya vahini’ that is to create computer laboratories with facilities like internet access, an online library, academic services and web-casting across 60 thousand schools in the country in 2003. Vietnam has also invested to develop a computer based information network system for education called Education Network (EdNet) and improve computer facilities at educational institutions. EdNet is the country’s first step towards developing a computer based information network system for education. Thailand also launched School Net, which has connected 4758 schools throughout the country. School Net Thailand is using the internet to improve the overall standard of education in the country by reducing the gap in quality of education between schools in urban and rural areas. Pakistan invested 5.18 million US dollar to provide connectivity across universities, secondary and primary schools in 2003.

ICTs make curriculum implementation learner-centred with a self-learning environment that enables the student customize his/her own learning experiences. In this respect, Malaysia initiated the concept of smart school, a learning institution with objectives to foster self-assessed, self-

paced, and self-directed learning through the application of ICTs. The Sri Lankan Government also runs several key initiatives connecting 92 education centres across provinces, regions and sectors to the ministry, and developing computer-training centres at 8 hundred selected schools. In Namibia, integrating ICT into education and training systems, issues of access to the local and global knowledge and information found to be important. For this, the education and training sector created the ICT policy for education to enhance the use and development of ICT for education and training. Hence the five distinct development areas for the use of ICT mentioned in the policy are: (1) investigation and development of appropriate ICT solutions, (2) deployment of ICT, (3) maintenance and support of ICT, (4) ICT literacy, and (5) ICT integration.

The policy document also describes the provision and advantages of ICT as follows:

ICT provides a great deal of advantage in the delivery of equitable quality education thereby providing an opportunity to improve the lives of our people. The need to use new technologies to raise the quality and efficiency of education cannot be overemphasized. It is imperative that we expose our children, parents, and teachers to ICT to improve the quality of education and technical proficiency of our human resources, thus leading to increased productivity and accelerated development. We must also prepare our citizens to adapt to the global economy and participate in electronic commerce. In addition, we must provide our children with a greater understanding of other peoples and cultures, thus defending our renewed legacy of peace and tolerance.

Moreover, few of ICTs benefits to the classroom and the education process mentioned in the document are that ICTs:-

- Offer the opportunity for more student-centred teaching,
- Provide greater opportunity for teacher-to-teacher and student-to-student communication and collaboration,
- Give greater exposure to vocational and workforce skills for students,
- Provide opportunities for multiple technologies delivered by teachers,
- Create greater enthusiasm for learning amongst students,
- Provide teachers with new sources of information and knowledge,

- Prepare learners for the real world,
- Provide distance learners country-wide with online educational materials
- Provide learners with additional resources to assist resource-based learning.

Furthermore, the document states ICTs to cover all the technologies used for holding and communicating information and their use specifically in education with overall policy goals of:

- Producing ICT literate citizens,
- Producing people capable of working and participating in the new economies and societies arising from ICTs and related developments,
- Leveraging ICT to assist and facilitate learning for the benefit of all learners and teachers across the curriculum,
- Improving the efficiency of educational administration and management at every level from the classroom, school library, through the school and on to the sector as a whole,
- Broadening access to quality educational services for learners at all levels of the education system, and
- Set specific criteria and targets to help classify and categorize the different development levels of using ICT in education.

Tanzania introduced the use of computers in business and the need to train people to operate them. In response to this, Higher Education Institutes introduced courses in computer science and information technology. Several private training institutions were also established to train computer literacy. In addition, the Tanzanian Government planned and started the supply of computers to secondary schools. By the year 1997 the Ministry of Education and Culture has issued a syllabus for computer studies in secondary schools.

The WoredaNet and SchoolNet in Ethiopia

In the case of Ethiopia's education system, ICT use, particularly the computer and internet is very much limited though there is a clear policy direction. Awareness creation and preparation to use computer and the internet for learning seems promising. The promise founded itself on the launching of WoredaNet, an e-government communication and the ICT strategy, which are the major enablers for the fast development of ICT use in the country (Hare, 2007). The public sector

and the education sector have begun to benefit from Woredanet and the ICT strategy though the accomplishment is not to the perceived standard. The national e-education initiative with implementation strategy of ICT use in education and the subsequent action plans, for example, has come up because of the WoredaNet program.

The implementation strategy of the country, also called ICT for development plan number 6 has three broad categories as described by (Hare, 2007). These are (1) the Ethiopian National School Net initiative that is aimed at networking 500 schools and the utilization of ICTs to facilitate the teaching-learning process at primary, secondary, technical and vocational schools, (2) the National ICTs in Higher Education Initiative that focuses on orchestrating ICTs within universities, colleges, and research institutes to facilitate student learning, research activities, and community services, and (3) the national ICT Education, Training and Awareness Initiative that promotes ICT awareness and literacy, adult education and lifelong learning, and virtual distance learning in the country.

Furthermore, the implementation strategy recognizes ICT as a potential for widening access to education and facilitation for education delivery and training at all levels. Nevertheless, despite the efforts and the strategies in place, there are challenges to coordinate the implementation of the initiatives. For instance, if we consider the second initiative, very few courses from institutes of technologies in universities are in the Moodle (modular object- oriented dynamic learning environments) platform that employs the computer and internet connections to enrich student learning via blended design.

The most challenging condition to implement ICT strategy in Ethiopian schools is inadequacy of existing infrastructures. Even though integrating ICT use in the teaching-learning process was given due recognition in the implementation strategy, only about 40 percent of schools in the country have computers, and most of which are in Addis Ababa, causing a rural-urban divide to equity and access for quality education. Moreover, those schools, which have computers, experience limited or low access to internet connections.

On the other hand, lecturers in higher learning institutes are expected to adopt computers and the internet as a teaching tool. However, computers, network infrastructures and connections are not compatible to the size of enrolled students and existing demands. In addition, teachers do lack the

required skill to match the technology (e.g. Computers and the internet) with innovative pedagogies that benefit students' learning. Many teachers do not have the necessary IT skills and feel uncomfortable, nor do they have the specific training needed to be able to use the new resources in the classroom (Carnoy, 2004). There is still little attempt, that is why the number of students in higher learning institutes using computers and the internet is insignificant. Students' skill of using the technology is also a series challenge that needs the attention of the institutes. Thus, these have implications for the future, to work hard for the benefit of student learning from the use of technologies.

7. Limitations of ICT use in Education

ICT as a modern technology that simplifies and facilitates human activities is not only advantageous in many respects, but also has many limitations. Many people from inside and outside the education system, think of ICT as "Panacea" or the most important solution to school problems and improvements. However, many conditions can be considered as limitations of ICT use in education. The limitations can be categorized as teacher related, student related, and technology related. All of them potentially limit the benefits of ICT to education.

Teachers' attitude plays an important role in the teaching-learning process that utilizes computers and internet connections. Although teachers' attitude towards use of these technologies is vital, many observations reveal that teachers do not have clarity about how far technology can be beneficial for the facilitation and enhancement of learning. Of course, some teachers may have positive attitudes to the technology, but refrain from using it in teaching due to low self-efficacy, tendency to consider themselves not qualified to teach with technology. In this respect, Bandura (1986) describes self-efficacy as "individual's opinion of capabilities to organize and perform courses of actions to achieve particular types of performances." Moreover, as identified by Brosnan (2001), attitude, motivation, computer anxiety, and computer self-efficacy are factors affecting teachers' use of computers in their lessons. Teacher resistance and lack of enthusiasm to use ICT in education may also be another limitation.

Furthermore, many teachers may not have the required IT skills and feel uncomfortable, nor do they have trainings needed to use the technology in their teaching. Unless teachers develop some

basic skills and willingness to experiment with students, ICT use in education is in a disadvantage (Brosnan, 2001).

On the other hand, the limitation of ICT use in education is related to student behaviour. Appropriate use of computer and the internet by students have significant positive effects on students' attitude and their achievement. Nonetheless, it is very common to observe limitations related to student behaviour. Students tend to misuse the technology for leisure time activities and have less time to learn and study. Yousef and Dahmani (2008) described online gaming, use of face book, chat rooms, and other communication channels as perceived drawbacks of ICT use in education, because, students easily switch to these sites at the expense of their study. Internet access at home, for instance, may be a distraction because of chat rooms and online games, reducing the time spent in doing assignments and learning (Kulik, 1994). Therefore, the impact of availability of ICT on student learning strongly depends on its specific uses.

If ICT is not properly used, the disadvantage will outweigh the advantage. For example, while students use the internet, it may confuse them by the multiplicity of information to choose from. As a result, the teacher spends much time to control students from websites unrelated to the learning content. Then, for caution, it is important to identify the major limitations of ICT use in education as related to student behaviour. The various literature in the area, identify the following limitations of ICT use in education as related to student behaviour.

- Computers limit students' imaginations,
- Over-reliance on ICT limits students critical thinking and analytical skills,
- Students often have only a superficial understanding of the information they download,
- Computer-based learning has negative physical side-effects such as vision problem,
- Students may be easily distracted from their learning and may visit unwanted sites,
- Students tend to neglect learning resources other than the computer and internet,
- Students tend to focus on superficial presentations and copying from the internet,
- Students may have less opportunity to use oral skills and hand writing,
- Use of ICT may be difficult for weaker students, because they may have problems with working independently and may need more support from the teacher.

The other limitation of ICT use in education is technology related. The high cost of the technology and maintenance of the facilities, high cost of spare parts, virus attack of software and the computer, interruptions of internet connections, and poor supply of electric power are among the technology related limitations of ICT use in education.

8. The Key Challenges of ICTs Integration in Education

The integration of ICTs in education systems may face various challenges with respect to policy, planning, infrastructure, learning content and language, capacity building and financing. ICT-enhanced education requires clearly stated objectives, mobilization of resources and political commitment of the concerned bodies. Tinio (2002) discusses issues such as analysis of current practices and arrangements, identification of potential drives and barriers, curriculum and pedagogy, infrastructure and capacity building to be considered in the formulation of policy and planning. In addition, it is wise to specify educational goals at different education and training levels as well as the different modalities of ICT use that can facilitate in the pursuit of the goals. Policy makers then, need to know the potentials of ICTs in applying different contexts for different purposes. Other challenging points at the level of policy and planning are identification of stakeholders and harmonization of efforts across different interest groups, the piloting of the chosen ICT-based model, and specification of existing sources of financing and the development of strategies for generating financial resources to support ICT use over the long term.

The infrastructure challenges that may exist are absence of appropriate buildings and rooms to house the technology, shortage of electric supply and telephone lines, and lack of the different types of ICTs. Because of this, one need to deal with infrastructure related challenges before the planning of ICTs integration to education systems.

With respect to challenges of capacity building, we have to develop competencies of teachers and school administrators for the successful integration of ICT in the education system. In fact, one impeding factor of ICTs integration in education systems is the skill gap of people implementing it (Tinio, 2002). For instance, teachers need professional development to gain skills with particular applications of ICT, integration into existing curricula, curricular changes related to its use, changes in teacher role, and on underpinning educational theories such as constructivism/or student-centred learning. Because of this, any attempt of ICT integration in education should

parallel with teachers professional development. The school leadership also plays a key role in the integration of ICT in education. Lack of support from the school administration is also a big challenge. Thus, for the effectiveness of ICT integration, administrators must be competent and have a broad understanding of the technical, curricular, administrative, financial, and social dimensions of ICT use in education.

Furthermore, learning content and language also challenge the integration of ICT in education. Content development is a critical area that educators overlook. In integrating ICT in education, we have to care for the relevance of the learning content to the target groups. With respect to language, English is the dominant language in many of educational software, while English language proficiency is not high in many of the developing countries, and this is one barrier in the integration of ICT to education. Another great challenge is the financing. ICTs in education programs require large capital investment and developing countries need to predict the benefit of ICT use to balance the cost relative to the existing alternatives. Potential sources of money and resources for ICT use programs suggested are grants, public subsidies, fund-raising events, in kind support from volunteers, community support, revenues earned from core business, and revenues earned from ancillary activities (Tinio, 2002). Overcoming the mentioned challenges may help education systems benefit the most from this technology.

Summary and the Way Forward

This review article attempts to answer questions on the roles of ICTs in education, existing promises, limitations and the challenges of its integration in education systems. Information communication technologies are influencing all aspects of life including education. They are promoting changes in working conditions, handling and exchanging of information, teaching-learning approaches and so on. One area in which the impacts of ICT is significant, is education. ICTs are making major differences in the teaching approaches and the ways students are learning. ICT-enhanced learning environment facilitates active, collaborative, creative, integrative, and evaluative learning as an advantage over the traditional method. In other words, ICT is becoming more appropriate in the realization and implementation of the emerging pedagogy of constructivism that gives greater responsibility of learning for students. Several surveys are showing that ICT use in education systems of developed nations has comparatively advanced

than ICT use in education systems of developing nations. In addition, the major promises of ICTs use in education systems of developing countries focus on training teachers in new skills and introducing innovative pedagogies into the classrooms, investing on ICT infrastructure for schools and creating networks among educational institutes, improving overall standard of education by reducing the gap in quality of education between schools in urban and rural areas, initiation of smart school with objectives to foster self-paced, self-assessed, and self-directed learning through the applications of ICTs, and developing ICT policy for education and training. On the other hand, this article discusses the major limitations of ICT use in education as teacher related, student related, and technology related. In addition, the key challenges of ICTs integration into education systems discussed relate to policy, planning, infrastructure, learning content and language, capacity building and financing.

What will be the way forward then? There is a consensus that the development of any country depends upon the quality of education programs offered to citizens. ICTs, despite their known limitations, are believed to be beneficial in this regard. The computer and the internet are especially useful to enhance student engagement in learning and positively impact student performance and achievement. Moreover, their usefulness is more apparent in the 21st century, where the time is an era of information rich that the conventional modes of teaching learning could hardly handle it. The reviewer of this article strongly recommends the mainstreaming of ICT utilization (particularly the computer and internet) in education systems at levels, for they benefit curriculum implementation and enhanced student learning. Therefore, education policy makers, educators and all concerned should evaluate and recognize the roles of ICT in education in order to work for the effective functioning of this technology in their education systems.

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Survey of Research Terms Used in Afan Oromo: With Special Reference to Three Universities in Ethiopia

By

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Abstract

This research is intended to investigate the status of research terms used in Afan Oromo in terms of their standardized level. The researchers' background observation shows that students are using different terms when they write a proposal or the report of their thesis. Having this, the major objective of this research is to survey the research terms used in doing both action and basic research in Afan Oromo in Jimma, Haramaya, and Addis Ababa Universities based on English research terms. However the data collected is limited to the third year Afan Oromo students who had took research courses and teachers in the departments. Moreover, samples of previous research works of graduated students from the departments were analyzed. Thus, instruments like questionnaire, interview, focused group discussion and written document analysis are used to collect data from the primary and secondary sources. Then, the collected data are organized, analyzed and presented quantitatively and qualitatively. According to the interpretation made based on the data analyzed, there is a significant variation in using research terms of Afan Oromo by the teachers and students of target universities. Terms or phrases are not used in standard forms. As a result, there are practical problems like communication gap in research dissemination, student's confusions, teacher's disagreement, and misunderstanding of ideas, low quality of research output and unreadable report, as well as inconsistent research format. Finally, the researchers have proposed that using standard research handouts and manuals as well as working together at central level are key solutions to overcome the problems.

The Oromia Rural Land Dispute Settlement Scheme, So Ambiguous and Expectedly Not Working

By

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Abstract

In a region where a great majority of the population lives in rural areas, rural land disputes deserve a unique treatment. It sounds very reasonable, in such regions, to design a unique dispute settlement scheme for rural land disputes. This is exactly what the Oromia region has done. However, the scheme set up by the region suffers from serious ambiguities, which inevitably makes the scheme not working. Therefore, in this paper an attempt is made to show where the scheme suffers from ambiguities and what evils may result from the ambiguities and how the ambiguities should be addressed. As the scheme is set out under Oromia Rural Land Administration and Use Proclamation No.130/2007, this work is limited to the analysis of this proclamation in light of general principles of alternative dispute resolution.

This paper is divided into **V** sections. Section **I** gives the outline of the scheme. Section **II** pins down the parts of the scheme suffering from ambiguity. Section **III** conjures up the evils resulting from the ambiguities. Section **IV** deals with the way forward. Finally there is a “conclusion and recommendation” section.

Peoples' Beliefs, Attitudes, and Practice in the Use of Insecticide Treated Bed Net (Itn): The Case of Serbo, Nada, and Asendabo Towns

By

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Abstract

Background: The effort made to control malaria seems somewhat under the control of those people living in the malarious areas. Moreover, the tendency seems to shift from cure to prevention as malaria doesn't have effective vaccine or effective drug for mass chemoprophylaxis. In this regard, an attempt was made to see the belief, attitude, and practice of ITN use by peoples of Serbo, Assendabo, and Nada Towns. Researches also indicate behavior of people is highly mediated by their beliefs and attitudes about the action they are going to take-using ITN properly and consistently.

Methods: Samples of 274 people were taken from Serbo, Assendabo, and Nada towns through multi-stage random sampling of lottery method. The response of 264 respondents collected through questionnaire was analyzed and interpreted.

Results: The result shows people do have lower perceived susceptibility to malaria (78.8%), lower perceived severity of the disease malaria (73.1%), lower perceived self-efficacy in the use of ITN (56.4%), higher perceived barriers in the use of ITN (68.9%), and lower perceived benefit of ITN (56.4%). In addition, majority of the subjects (74.6%) were found to have negative attitude towards ITN. Moreover, households mentioned some unintended uses of ITN at home indicating abuse in the use of ITN. These all indicates that the households do have misconceptions and misunderstandings about malaria, negative attitude towards ITN and they don't have firm belief in ITN to protect them from malaria. More or less all subjects know that ITN is one means of malaria protection mechanisms.

Conclusion: These indicate some more concerted effort shall be made to clarify the misunderstandings and misconceptions that blurred the households' belief about ITN and attitude towards it. Added to that, households shall be advised and supervised whether they are using their ITN properly or not. Moreover, awareness rising, reminders, and reinforcements within each household shall be made to enhance ITN proper and consistent use in the fight against malaria.

**Efficacy of Play Therapy in Self-Healing and Enhancing Life-skills of
Children under Difficult Circumstances: The Case of Two Orphanages in
Addis Ababa, Ethiopia**

By

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Abstract

The objectives of the study are to know whether play therapy can facilitate the self-healing process, to improve the academic performance, increase the attentive level, and to ensure self-confidence and esteem of children under difficult circumstances.

Data for this study were the case works of the researcher (for about two years), as a play therapist and Clinical Supervisor. Pre- and post-therapy measures using the SDQ (The Goodman's Strengths and Difficulties Questionnaire-a standardized instrument) were obtained from 17 children (9 females and 8 males) and analyzed. The study used quantitative data as its major source of information even though there were some qualitative data obtained from the direct observation of the children, focus group discussions and interviews with counsellors, social workers, teachers and caregivers.

The results of the study revealed that there was a statistically significant difference between Pre-SDQ and Post-SDQ results showing a reliable improvement of the conditions of the children due to play therapy. That is, matched t-test indicated that the scores difference is statistically significant: $t(16) = 13.94$, $p < 0.05$. Moreover, qualitative data from direct observation of the children, focus group discussions and interview results obtained from counsellors, social workers, teachers and caregivers have supplemented the above quantitative results. Ideas for future interventions were presented and implications about the well being of the children were discussed.

An Analysis of AU's and UN's Response to Sudan's Crisis in Darfur: What Lessons Learned from Burundi?

By

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Abstract

Since the eruption of the horrendous conflict in Darfur that reached its zenith in 2003, a number of diplomatic and military measures have been put in place by African Union, and the United Nation. As the findings of the study show the diplomatic and military attempts taken and put forward by both organizations have not changed to the positive the situation of Darfurians. The study displayed that little or no serious attention had been given by both organizations on the political solution of the conflict. The study concludes the endeavor exerted to persuade Khartoum to stop its heinous act and bring into board with other warring factions for political settlement is limited. Moreover, though the AU and the UN start with good measures and intentions, the problem of implementation is found profoundly. Practically the kinds of measures taken on the ground are slender, if not null.

Section V: Abstracts of Scientific Papers from College of Natural Sciences, Jimma University

Bioactivity of Some Essential Oils Against the Mediterranean Fruit Fly (Ceratitis Capitata) Under Laboratory Condition

By

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Abstract

Mediterranean fruit fly is one of the most important fruit damaging pests worldwide with its origin is believed to be sub-Saharan tropics. It is a major pest in Ethiopian orchards causing annual loss of about 15,000 quintal of orange and mandarin in Upper Awash Agro-Industry Enterprise (UAAIE) above only. Different pest management strategies are currently advised against the pest and the use of bio derived pesticides are known to be widely adopted practical intervention as major components of integrated pest management (IPM) strategies to tackle the med-fly problems in fruit production. Hence, the bioactivities of essential oils from local plants were tested against the adult and immature stages of the fruit fly (*Ceratitidis* sp). Essential oil bearing local plants species were collected from Wondo Genet and Addis Ababa growing areas. Essential oils were produced using hydro-distillation method using Clavenger Apparatus. The repellent action of essential oil extracts of *Chenopodium ambrosioides*, *Laggera tomentosa*, *Schinums molle*, and *Ocimum suave* were tested against the Mediterranean fruit flies in choice bioassay system. Samples of citrus fruits (n=2) were placed in the two bottles separately. Samples in one of the glass bottle was treated with the natural products (100ppm, 150ppm,200ppm,250ppm,300ppmand 500ppm) and while the other jar was not treated (control). Then, air was pumped at a rate of 1.5 litres per minute with regulated air pump into the gas

washing bottles containing activated charcoal for filtration through Teflon tube. The filtered air then passed into the gas washing bottles having different treatments (Essential oil and guava as compared with air and guava). After this set up following the method of Jembere et al. (1995), twenty five adults of Mediterranean fruit flies of mixed sex and age were released into the “Y” olfactometer glass. After 30minutes, the numbers of insects which moved into the untreated (Nc) and treated bottle (Nt) were counted. The result indicated that more than 90%, 85% and 41% of the adult flies were repelled using *C. amrosiodes*, *L. tomentosa* and *S. molle* respectively, using 1000ppm of essential oils. Essential oils extracted from the leaves and succulent parts of *O. suave*, showed no significant difference ($p > 0, 05$) in repellency. To determine the prophylactic effects of each essential oils against immature stages (maggots) six different levels of test concentrations (100, 150, 200, 250, 300, 500 ppm) were studied. Each test preparation was sprayed on pre-infested guava fruits 12, 24, 36 and 48 hours after infestation with three replicates for each period. Number of adults emerged from each cage after 21-30 days were counted and comparison was made with untreated cages to know the efficacy of the oil. The essential oil extracts caused significant reduction in number of progeny (>74% mortality) except for *O. suave*, which caused no significant ($p > 0.05$) mortality in all cases. Thus, products of essential oils both from *C. ambrosiodes* and *L. tomentosa* are found to be future promising botanicals against the Mediterranean fruit fly.

The Prevalence and Antibigram of Salmonella and Shigella Isolated from Abattoir, Jimma Town, Southwestern Ethiopia

By

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Abstract

Foodborne disease due to Salmonella and Shigella are among the major challenges worldwide. Evaluation of the current safety status of foods, including meat and meat products, is a pro-active measure to minimize the possible danger due to associated foodborne pathogens. To this effect, the prevalence and antibiogram of Shigella and Salmonella in meat samples collected from abattoir in Jimma town (Ethiopia) over a 5-month period between December 2009 and May 2010 were evaluated. In total 180 animal samples composed from cattle, goat, and sheep, meat and feces were analyzed for microbial load determination using conventional culture method. Among the samples only Goat faeces sample was not contaminated with Salmonella whereas Shigella was not isolated from any samples. The prevalent Salmonella species were further characterized using API 20E kit. Isolated Salmonella strain was displayed multidrug resistance to several antibiotics including ampicillin, Nalidixic Acid, Streptomycin; Tetracycline, and Chloramphenicol. The present study revealed that despite low contamination rate, foodstuffs particularly beef, chevon and mutton parts could be a potential vehicle for foodborne infections and implementation of preventive measures and consumer food safety education efforts are needed.

Key words/phrases: Prevalence, Antibigram, *Salmonella*, *Shigella*, Meat, MDR

Evaluation of Locally Available Substrates for Cultivation of Oyster Mushroom (*Pleurotus ostreatus*) in Jimma, Ethiopia

By
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Abstract

The potential of using low cost substrates and materials that are commonly considered as wastes for mushroom cultivation has been offering nutritional, commercial, and medical benefit to people in many countries in the world when it is integrated into the existing production system. To this effect, a total of eight locally available substrates and substrate combinations were tested for their productivity and biological efficiency (BE) for cultivation of *Pleurotus ostreatus*. Sorghum grains were steam sterilized at 15 psi for one hour, inoculated with pure oyster cultures, and incubated at ambient temperature (22±2 0C). Similarly, main substrates were steam sterilized at 15 psi for one hour. The main substrates were inoculated with 10% spawn and incubated at ambient temperature (22±2 0C), arranged in a completely randomized design on shelves in the mushroom growing room. Relative humidity of the mushroom growing room was controlled by manually spraying water on the walls and placing open containers filled with water in the corners of the room. Rate of mycelial invasion, times of incubation, time of primordial formation and maturation, pileus diameter and stipe length of matured fruit bodies, number of matures and aborts, fresh weight per flush and total yield were recorded and the data was analyzed using SPSS. The substrate types had significant ($P < 0.05$) effects on the rate of mycelial extension, mean incubation period and yield at 2nd & 4th flushes, number of matured fruit bodies & aborted pinheads, weight of matured fruit bodies, and biological efficiency. Mean durations of pinning-to-maturation were also varied significantly among substrates. The fastest (mean value 0.69cm/day) and the slowest (mean value 0.17cm/day) mycelial extension were realized from sdZcCh (combination of Sawdust of ‘Wanza’, Sawdust of ‘Kerero’, corn cobs & coffee husks) and Ch

(coffee bean husks) substrates, respectively, where mycelial growth in Ch was completely ceased after 15 days. The results revealed that differences in mean incubation periods at the 1st & 3rd flushes, duration of pinning-to-maturation at the 3rd flush, pileus diameter, and stipe length were insignificant ($p > 0.05$) among substrates. The first pinning took 29 ± 2.3 days, followed by 12 ± 6.3 , 7.6 ± 2.3 , and 6.4 ± 2.5 between the 2nd, 3rd and 4th flushes, respectively. Mean durations from pinning-to-maturation ranged from 3 to 5 days. The mean pileus diameter of mushrooms ranged from 3.8-5.2cm whereas the mean stipe length ranged from 1.4-1.9cm. The highest BE was obtained from sdZcCh (77.38%), followed by Zc-corn cobs (55.78%), sd1Ch-combination of sawdust of 'Wanza' and coffee bean husks (55.35%), sd2A-sawdust of 'Kerero' (52.03%), sd2Ch-combination of sawdust of 'Kerero' and coffee bean husks (48.55%), ZcCh-combination of corn cobs and coffee bean husks (43.48%), sd1C-sawdust of 'Wanza' (29.07%). All substrates that gave over 40% BE could be recommended for oyster mushroom cultivation.

Key words: biological efficiency, edible mushrooms, *Pleurotus ostreatus*, spawn, substrates



Some of the Participants of the Parallel Sessions of College of Natural Sciences, Jimma University

**An Account on Taxonomy and Distribution of Old World Bamboo Genus
Oxytenanthera Munro in Africa and Asia**

By

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Abstract

The genus *Oxytenanthera* was first proposed by Munro in 1868 based on an African bamboo *Bambusa abyssinica*. Munro described 5 species under this genus such as *O. abyssinica*, *O. nigrociliata*, *O. albociliate*, *O. thwaitessi* and *O. stocksii* from African and Asian continent. The genus was widely accepted by subsequent workers and added several other genera *Oxytenanthera sinuata*, *O. parvifolia* and *O. bourdillonii*. The bamboo taxonomist faced a great confusion to delimit many of the species described under *Oxytenanthera* from allied genera like *Dendrocalamus* and *Gigantochloa* and some of the species included under the genus *Oxytenanthera* have been transferred in to other genera. The paper tries to describe exact taxonomic position of the genus *Oxytenanthera* among the other old world bamboos with an emphasis on its phytogeographical significance in a new angle. The detailed description, nomenclature and identification keys are also provided.

Wetlands of Ethiopia

By

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Abstract

Ethiopia possesses a great diversity of wetlands, which are widely distributed in all climatic regions of the country. Wetlands of Ethiopia are grouped ten depending on habitat type and biological and physical characteristics. Ecological and socio-economic functions of wetlands are very high, which make them significant at national and international levels. Even if the resource bases of Ethiopian wetlands are not well accessed, it is known that there is high biodiversity in Ethiopian wetlands. From the Rift valley lakes, 206 species of phytoplankton have been identified. Among these, about 10 species are new to science. Wetlands of Ethiopia host a great diversity of plants, zooplankton, >145 fish species and 538 bird species. Because of lack of awareness of the current status of wetlands, and in the absence of any concerted conservation efforts, wetlands of Ethiopia have depleted at an alarming rate throughout the country. Intensive irrigation, expansion of human settlement, over-utilization, pollution, deforestation of catchment areas and conversion of wetlands for various land-uses are main threats to the wetlands ecosystem in Ethiopia. These activities limit the ability of wetlands to maintain ecological, socio-economic and hydrological functions.

Keywords: Ecological importance, Ethiopia, socio-economic functions, wetlands

Microbiological Study of Cassava-Teff Mixed Dough Fermentation

By

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Abstract

Cassava is a staple food in many tropical areas. It has also been cultivated in some parts of Ethiopia. Cassava is drought resistant plant capable of growing in poor soils. However, it contains the toxic substance, cyanide, and deaths have been reported due to improper processing methods. Fermentation is one of the methods being used to reduce the cyanide content besides improving product flavor, aroma as well as safety. Nowadays, fermentation of cassava mixed with teff is practiced in some parts of Ethiopia, including Gamogofa zone, South Nations and Nationalities Peoples Region (SNNPR). This study was designed to evaluate microbiological dynamics, changes in physicochemical parameters, and cyanide content in the course of cassava-teff mixed fermentation. Preliminary information pertaining to cassava-teff mixed dough fermentation was gathered through pre-designed questionnaire. Controlled fermentation of cassava-teff mixed dough was carried out in microbiology laboratory following the information obtained from local communities (traditional fermenters) in the study area. Analysis of microbiological and some physicochemical changes during fermentation were made following standard microbiological methods between November, 2009 and May, 2010. At early stage of fermentation, different microbial groups including aerobic mesophilic bacteria (AMB), Enterobacteriaceae, aerobic spore former (ASF), coliforms, lactic acid bacteria (LAB), staphylococci, yeasts and molds were encountered with varying mean counts. With progress in fermentation period, however, some of the groups showed a progressive decline [AMB, coliforms, Enterobacteriaceae and staphylococci from 7.79 to 5.68, 3.38 to 2.31, 3.03 to 2.06 and 1.75 to 1.49 log CFU/g, respectively] while the counts in ASF, LAB, and yeast showed

progressive increment in the course of fermentation [from log 4.38 to 7.31, 2.46 to 3.72, 1.09 to 2.37, respectively]. The titratable acidity (TA) increased from 1.11% to 2.4% while pH dropped from 6.65±0.74 to 5.30±0.79 in the course of fermentation for 24 hours when the product was ready for baking. Likewise, the mean calculated µg HCN equivalents/gm dropped from 57.0233 + 6.94 to 35.84 + 6.3579. Thus, the cassava-teff mixed fermentation for the making of Ethiopian staple food, 'enjera' has improved the cyanide content of the final product. Change in pH and TA are among the factors that could contribute to the microbial succession in the course of fermentation. It could be concluded that the fermentation of cassava-teff mix for the making of 'enjera' lowers the cyanide content of the raw material improving the nutritional quality of the final product.

Key words: Cassava, Cyanide content, 'Enjera', Ethiopia, Fermentation, 'Teff'.

Electrochemical Study of Human Dental Enamel

By

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Abstract

Previous studies have shown that there are surface potentials in the separate tooth sections and a whole tooth. To confirm the existence of the surface potentials in extracted tooth and research the development of the potentials, the surface potentials between mid-spots of enamel crown's buccal side and tooth root were measured with electrochemical methods. The effects of KCl concentration and acid corrosion were also examined in the present study. All the teeth developed the surface potentials, and when 0.1 mol/L KCl solutions were used, the average surface potential was +20.835.70 mV. The potentials increased along with the ascending of KCl concentration and after being acid corroded. The results of this study suggested that there are also surface potentials in tooth as a whole tissue, and the potentials can be affected by the electrolyte surroundings and are developed mostly by the dental crystal structure and established in the outer layer, an electric double layer. The passage of an electric current through enamel causes degradation and a carious appearance. The fluoride ion minimizes the variations in natural electric potentials and inhibits electric current. These are indications of an electrochemical mechanism of caries formation and the beneficial effects of fluoride.

Key words: - tooth, surface potential, KCl, fluoride ion, electric current, corrosion, electrochemical

Characterization of Selected Natural Products from *Strobilanthes ciliatus* Nees

By

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Abstract

Strobilanthes is one of the most interesting genera in the family Acanthaceae known for its diversified habits, gregarious nature and infrequent but elegant flowering. Out of the 59 species of *Strobilanthes* seen in south India 39 are endemic to peninsular India. *Strobilanthes ciliatus* is one of the species endemic to Western Ghats, India. It is widely used in Ayurveda, the traditional system of medicine in India. Detailed phytochemical investigation on the stems of *Strobilanthes ciliatus* Nees was conducted. The separation of the chemical components was carried out by chromatographic techniques. Two triterpenoids, two sterols and one lignan were isolated. The structures of the compounds were elucidated by spectroscopic methods namely UV, IR, NMR and Mass spectral techniques. The deals with the systematic steps involved in structural elucidation of unknown compounds from *Strobilanthes ciliatus* Nees in detail and also specify the role of such chemical characterization for over exploited medicinal plants.

Therapeutic Efficacy of Chloroquine for Treatment of *Plasmodium vivax* malaria cases in Halaba District, South Ethiopia

By

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Abstract

Chloroquine is anti-malarial drug being used to treat *Plasmodium vivax* malaria cases in Ethiopia. Currently, the emergence of chloroquine resistant strains of the parasite has been challenging the efficacy of the drug. Therefore, the aim of this study was to assess the effectiveness of chloroquine against *P. vivax* strains in one of such malaria endemic areas, namely Halaba district, South Nations and Nationalities Peoples Region (SNNPR), South Ethiopia. A total of 87 participants were enrolled in this study. Only 80 of them complete the 28-days follow-up. Seven of them were dropped from the study due to different reasons. Among those who completed their follow-up, 69 of them were classified under adequate clinical and parasitological response (ACPR). However, the remaining 11 cases were categorized under treatment failure due to recurrence of parasitemia on day 7 (four patients), day 14 (six patients), and day 21 (one patient). The age of all cases of treatment failures were found to be less than 20 years. The load of parasitemia of patients with treatment failure on day of admission (4709.4/ μ l) was higher than day of recurrence (372.37/ μ l). Parasite reduction ratio (PRR) of treatment failure cases was 12.6/ μ l. This report revealed the highest treatment failure (12.6% [95% CI= 0.098 - 0.252]) ever reported from Ethiopia. It signals the spreading of chloroquine resistant *P. vivax* (CRPv) strains to malaria endemic areas of Ethiopia. Therefore, concerned body should take corrective measures to reduce further expansion of the problem.

**Effect of Coffee Management Intensity on Forest Structure and Composition
in South Western Ethiopian Coffee Forests: Implications for Forest Coffee
Conservation**

By

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Abstract

The effect of coffee management intensity on forest composition and structure was studied in Jimma Zone, South Western Ethiopia along three traditional coffee management systems. Species composition and structural data were collected from ninety one plots of size 20x20m. The result indicated that tree abundance, basal area, percent canopy cover and canopy closure were significantly lower in the semi-forest plantation coffee as compared to the forest coffee as a result of intensive management of the forest to maximize coffee productivity. There was also a significant difference between the semi-forest plantation system and the forest coffee system regarding the presence of epiphytes and lianas on the trees. Floristic composition, species density and the structures of the forest has been influenced as a result of conversion of a forest coffee into a semi-forest coffee plantation coffee system. The conservation and sustainable use of the species and their supporting ecological processes within the SFPC and SFC system needs urgent action.

Reproductive Biology in *Plumbago zeylanica* L. : a medicinal plant

By

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Abstract

Plumbago zeylanica L. is an important medicinal plant traditionally used for the treatment of various diseases. Phenology from seed germination via vegetative growth to reproductive development was studied under different growth conditions. Seeds rapidly germinated on a mixture of nursery soil and cattle dung in a ratio of 3:1 filled in pots or on cultivated soil under nursery conditions as a prerequisite for vegetative and flowering phenological studies. Hypogeal germination characterizes the emergence of seedlings. Subsequent vegetative and flowering phenology between glasshouse and nursery field populations showed significant difference ($p < 0.05$) in terms of time, duration and yield. Glasshouse populations completed their phenophases (aseasonally) ($72.3 \pm 1.03\%$) within 133 days (15 March to 20 July 2006) being under controlled conditions while field-grown seedlings extended to 225 days (15 March to 30 November 2006) after seed sowing. Rainy season was the cause for the continuous damage of apical shoots, and consequently stunted vegetative growth of field-grown seedlings. Plant size (≥ 95 cm in height), leaves number (33-38) and seasonal climate (cold season for field-grown populations) were found to be the most eliciting signals for the initiation of flowering buds. 100 ppm GA3 was the most effective for early flowering (i.e., before 6 days) and production of higher number of flowers ($32.6 \pm 1.6\%$) compared to the control ($22.5 \pm 1.33\%$). The mode of reproductive biology appeared to be cross-pollination and showed significant ($p < 0.05$) compared to the control. The final flowering percentage ($95.3 \pm 1.71\%$) and/or seed-set ($89.4 \pm 1.41\%$) were obtained under glasshouse condition compared to the nursery, which dropped as low as 50% in flowering and seed-set. The study found that rainy season, plant size, leave number, low temperature, cross pollination and glasshouse conditions were found to be the most determining factors for the phenology of *P. zeylanica*.

Keywords: Growth regulators, medicinal plant, seasonal climate, plant size, growth environment

Genetic Diversity Analysis of the Wild *Coffea arabica* L. Populations from Harena Forest, Bale Mountains of Ethiopia, Using Inter Simple Sequence Repeats (ISSR) Marker

By

Solomon Balemie

Abstract

Wild *Coffea arabica* L. Plants are a perennial wild species distributed and occur as undergrowth in the Afromontane rainforest of Southwest and South West Ethiopia, which is considered to be its centre of origin and diversification. It has been one of the most important coffee species which contributes over 67 percents as the sources of foreign currency for Ethiopia. But the accelerated and uncontrolled use of the forest in Southern West and Southern East leads to severe deforestation. In spite of their importance the level and distribution of wild *Coffea arabica* L. in Harena has not been extensively examined in depth with molecular markers. The current study conducted in the Harena Forest of Bale Mountain found in the southeast part of Ethiopian. The levels and distribution of within and among genetic diversity of one hundred wild *Coffea arabica* L individuals representing four populations: two from semi-disturbed (Bale-I and Bale-3) and two from undisturbed (Bale-4 and Bale-6) regions of the forest were collected and evaluated with Inter Simple Sequence Repeats (ISSR). A total of nine primers which contains different simple sequence repeat (SSR) were used and tested for PCR amplifications. A total of one hundred thirty seven bands were detected. The number of bands per ISSR markers ranges from ten (10) to twenty one (21), with an averages of 15.2. These were then used to estimate the genetic diversity. Out of the total bands produced, 61(44.53%) were polymorphic and the number of polymorphic bands per ISSR markers ranges from one (1) to ninety (19), with an averages of 6.77. The similarities between individual genotypes were estimated using UPGMA and NJ analysis. The populations were found to be clustered on the basis of their respective origin. The UPGMA cluster analysis showed that the four populations form two major clusters (Undisturbed and semi-disturbed populations together) according to locations from which they collected. The two major clusters further divided in to two corresponding. Analysis of molecular variance (AMOVA) was also made and indicated that population level genetic diversity was relatively high (56.8%).

Shannon's diversity index showed the same patterns and indicated that the within and between genetic diversity of *Coffea arabica* L. populations are significantly different. That is, a considerable proportion (83.6 %) of the total genetic diversity was distributed within populations (i.e., due to differences among individuals within the populations) rather than among populations (16.4%), inconsistent with the predominantly selfpollinating nature of the species. This could be because of gene flow via insect pollinators, seed flow by wild animals, birds and human. Generally on the basis of samples of 137 bands in the four populations, ISSR was able to reveal low to moderate levels and distribution of genetic diversity within and among populations of Harrena Forest of Bale Mountain. Key Words: *Coffea arabica* L, ISSR marker, Hareenna, Intra-regional analysis, Ethiopia.

Section VI: A Scientific Paper and Abstracts from Jimma Institute of Technology, Jimma University

GIS based Accessibility Analysis of Public and Private Health Service Centers in Kirkos Sub-city of Addis Ababa, Ethiopia

By

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Abstract

The study is conducted on Kirkos sub city of Addis Ababa, where there is uncontrolled population growth and lower accessibility to health service centers, upon which the society is found dependent mostly. Besides, a health care system can be called effective once it can be able to maximize proximity. Therefore, this study is designed with the aim to assess the distribution and availability of both public and private health service centers and to simulate new potential locations. To accomplish the objectives of the study primary and secondary sources of data like population density, road, existing health service centers, railway, road, land use, slope and government centers are used. Primary data are obtained using GPS to collect point data and secondary data are obtained from Administrative of Addis Ababa city, tourist guide map and from CSA (Central statistic Authority) Hand Book. All the data has been organized within the GIS environment by creating spatial database (geodatabase) and analysis carried out by setting up parameters for each factors being considered. The relative importance or weight has been assigned using pair-wise comparison method to obtain the relative influence on the analysis. Based on this comparison population was considered as a major influencing factor from all other factors. The result of this project revealed that thirty-five areas get the value of very suitable and have areas ranges from 400 square meters to 354,963 square meters. The minimum area of the suitable polygon fulfills the minimum requirement of the criteria to establish small clinics. The

study largely utilizes the ESRI product Arc GIS 9 with Spatial Analyst, 3D Analyst and Geostatistical Analyst Extensions, especially Spatial Analyst, which is capable of querying data to identify locations that meet sets of criteria combining datasets.

Key words: GIS, Geo-database, Spatial Analyst.

Introduction

A geographic information system is a computer-based tool for mapping and analyzing things that exist and events that happen on earth. GIS technology integrates common database operations, such as query and statistical analysis, with the unique visualization and geographic analysis benefits offered by maps. These abilities distinguish GIS from other information systems and make it valuable to organizations for explaining events, predicting outcomes, and planning strategies. The major challenges we face in the world today economic development, program outcome evaluation, ensuring access to services have a geographic component (Carver 1991).

Background

Health is considered as a crucial component of well being and economic development. (Phillips 1990). Ethiopia has no a vast network of public and private health services

and staffed by a small number of medical and paramedical personnel, and poor locational decisions constrain geographical access to health services and explosive cost of utilization in rural and less developed areas (FDRE Ministry of Health, 2005). Non-availability and/or distorted geographical-distribution are some of the important reasons for poor geographical accessibility not only in Ethiopia, but also throughout the Developing Countries (Freund, 1986 and World Bank, 1993). Therefore, better spatial organization is needed to improve geographical access to health services.

In Ethiopia, both public and private sectors are involved in health care provision. It is important to note that the locational decisions of both types of these services do not correspond effectively to the needs of the population; and locational patterns and functioning of both are also different. It is observed that most of the time

administrative, political and economic factors supersede locational-suitability of new services. Re-location of any service may not be feasible economically, but locational analysis can be used to identify new potential locations.

Study area

Kirkos sub city is one of the sub cities of Addis Ababa and found slightly at the center of the city. It lies between $8^{\circ}58'30''$ north and $9^{\circ}1'30''$ north latitudes and between $38^{\circ}47'00''$ east and $38^{\circ}44'00''$ east longitudes. And the sub city also bounded by Lideta, Arada, Yeka, Bole and Nifas Silk Lafto sub city of the city. Most of the government offices, International organizations like the head quarter of UNECA and AU and business centers are found in this sub city.

Multi-Criteria Evaluations

To meet a specific objective, it is frequently the case that several criteria will need to be evaluated. Such a procedure is called Multi-Criteria Evaluation (as cited in Eastman, 2001). Another term that is sometimes encountered for this is modeling. However, this term is avoided here since the manner in which the criteria are combined is very much influenced by the objective of the decision.

Multi-criteria evaluation (MCE) is most commonly achieved by one of two procedures.

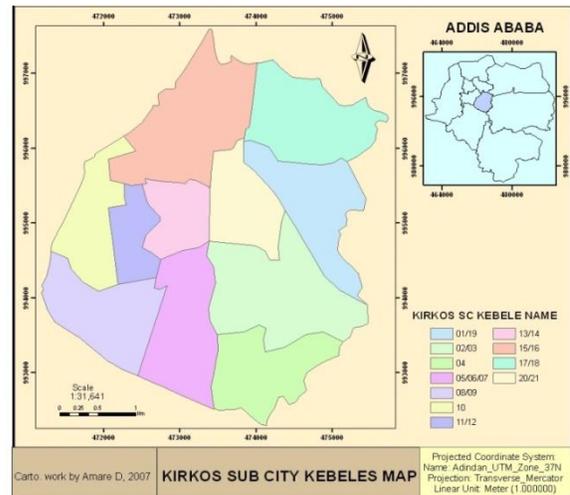


Figure 1 Study area.

The first involves Boolean overlay whereby all criteria are reduced to logical statements of suitability and then combined by means of one or more logical operators such as intersection (AND) and union (OR). The second is known as weighted linear combination (WLC) wherein continuous criteria (factors) are standardized to a common numeric range, and then combined by means of a weighted average. The result is a continuous mapping of suitability that may then be masked by one or more Boolean constraints to accommodate qualitative criteria, and finally threshold to

yield a final decision (Eastman, 2001 and Carver, 1991).

While these two procedures are well established in GIS, they frequently lead to different results, as they make very different statements about how criteria should be evaluated. In the case of Boolean evaluation, a very extreme form of decision-making is used. If the criteria are combined with a logical AND (the intersection operator), a location must meet every criterion for it to be included in the decision set. If even a single criterion fails to be met, the location will be excluded. Such a procedure is essentially risk-averse, and selects locations based on the most cautious strategy possible a location succeeds in being chosen only if its worst quality (and therefore all qualities) passes the test. On the other hand, if a logical OR (union) is used, the opposite applies a location will be included in the decision set even if only a single criterion passes the test. This is thus a very gambling strategy, with (presumably) substantial risk involved.

Materials and Methods

The study largely utilizes the ESRI product Arc GIS 9 with Spatial Analyst, 3D Analyst and Geostatistical Analyst Extensions, especially Spatial Analyst, which is capable of querying data to identify locations that meet sets of criteria combining datasets. Spatial Analyst provides a comprehensive set of tools for exploring and analyzing spatial data, which enables to find a solution for spatial problems. Also IDRSI software was used for pair wise comparison of factors and GPS used for collecting of point data.

The Study was conducted to understand and analyze the location of existing public and private health service Centers and to propose a new sites for these centers to serve the population as an additional health care centers. Using the existing data GIS techniques was used to evaluate and select these sites and different analytical steps were followed. First the geodatabase that containing the necessary data was created, and then multi step different analytical models were created to evaluate and identify suitable site for public and private health service Centers.

Data sources

Primary data are obtained using GPS and used to collect location of public and private health service centers. Secondary data are obtained from different sources. From the Addis Ababa city Government Kirkos administrative boundary, the land use and kebeles was obtained and the tourist guide map of Addis Ababa from EMA (scale of 50,000 and printed in 1986) is used to digitize the road, railway, river, government offices, international organization and others. Data on population size is collected from CSA (Central Statistical agency) Census Book and from Addis Ababa Health Office for the year 2007.

Setting Site Selection and evaluating Criteria

The criteria for selecting suitable site for health service Centers are out lined based on the manual prepared by the Federal Democratic Republic of Ethiopia, Ministry of Health. Some of the criteria were:

Topography/ Location of land

1. It should be gentle slope, which does not contain water pools and marshes so that it is free from

malaria mosquito and breeding of hosts of biting insects.

2. It should not be exposed to flood hazard, away 50 m from river.

Distance of the Hospital from other industries and service providers Enterprise

1. Away 50 m from road and crowded Traffic.
2. Away 100 m from Railway.
3. Industry
 - i. Away 50-100 m from glass work, oil and Soap factory.
 - ii. Away 1 km from Textile and Food factory.
 - iii. Away 3 km from Metal, Mineral and Petroleum factory.
 - iv. Away 2-3 km from Dangerous Chemical and Explosive material producing factory or ware house (FDRE MoH, 2002 and 1997).

Determining the Relative Importance of the Criteria

In the procedure for Multi-Criteria Evaluation using a weighted linear combination, it is necessary that the weights sum to one. In Saaty's technique, taking the principal eigenvector of a square reciprocal matrix of pair wise comparisons between the

criteria can derive weights of this nature. The comparisons concern the relative importance of the two criteria involved in determining suitability for the stated objective. Ratings are provided on a 9-point continuous scale (Satty, 1997)

1/9	1/7	1/5	1/3	1	3	5	7	9
Extremely	Very Strongly	Strongly	Moderately	Equally	Moderately	Strongly	Very Strongly	Extremely
Less Important					More Important			

Pair wise Comparison of the seven parameters based on relevance importance of factor the following pair wise comparison matrix is developed (Table 1). In IDRSI software using a module named Weight the principal eigenvector of the above pair wise comparison matrix was computed and the result (Weight) is described in Table 1.

Table 1 Rating of the Row Factor Relative to the Column Factor and weight.

	Populati	Road	Health	Railway	River	Land use	Slope	Weight
Popu-	1							0.43
Road	1 / 4	1						0.21
Health	1 / 5	1 / 3	1					0.09
Rail-way	1 / 5	1 / 3	1	1				0.09
River	1 / 5	1 / 3	1	1	1			0.09
Land use	1 / 5	1 / 5	1/ 2	1/ 2	1 / 2	1		0.05
Slope	1 / 5	1 / 4	1/ 2	1/ 2	1 / 2	1	1	0.05

Data Preparation and Analysis

In multi criteria decision data that could be included in the analysis should be identified and prepared before the analysis is

performed. In this study, different data sets are selected and pre analysis processes are performed and they become ready for analysis.

Applying the same scale for all measures will give them equal importance in determining the most suitable locations. So values are assigned to classified factor layers on a scale of 0-10, with being the Very suitable 10, suitable 9, moderately suitable 8, less suitable 7 and 0 restricted. This is often referred to as a suitability scale. No data were used to mask off areas that should be out of the sub city. In many cases, constraints will be expressed in the form of a Boolean (logical) map: areas excluded from consideration being coded with a 0 and those open for consideration being coded with a 1 value.

Raster (Cell-based) Spatial Analysis of Boolean Layers

In this analysis the reclassified layers of Ministries and Offices, and Embassies and International Organizations are ready to be combined in order to produce the constraint map. The constraint map has only two values, 0 for restricted and 1 for suitability.

Using a mathematical tool named by Times in Spatial Analyst Extension Arc GIS 9.0 the two layers are combined to drive the constraint map.

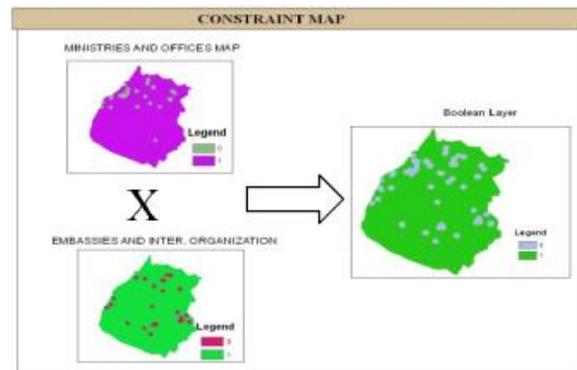


Figure 2 Constraint Map.

Raster (Cell-based) Spatial Analysis of Factor (Weighted overlay) Layers

At this stage factor layers are ready to be combined in order to produce weighted overlay map. If all datasets were equally important, it could be possible to combine them simply; but each map layer is ranked by how suitable it is as a suitable for a new site. Weight factors were applied to layers to assign relative importance of the data using the principal eigenvector calculation.

Therefore the higher the percentage, the more influence a particular datasets will have in the suitability model. Then weighting and combining of the datasets are

performed in Spatial Analyst extension of Arc GIS 9 software in the following way.

[Re-class population Density] * 0.43 And
[Re-class of road] *0.21 And
[Re-class of public and private health service centers] * 0.09 And **[Re-class of railway] *0.09** And **[Re-class of river] * 0.09** And **[Re-class of land use] *0.05** And **[Re-class of slope] *0.05 = Factor Layer**

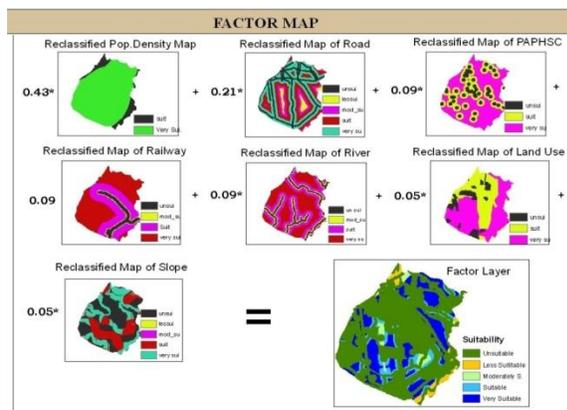


Figure 3 Factor Map.

Creating a suitable map

Scales are ranked synthetic measures of suitability, or preference, from best to worst. It is based on something that measure such as distance to existing health service centers, but in the end it is a subjective measure of how suitable scale must be defined in sufficient detail. The final suitability map

was generated from the Boolean layer and factor layer by excluding industries from the factor layer.

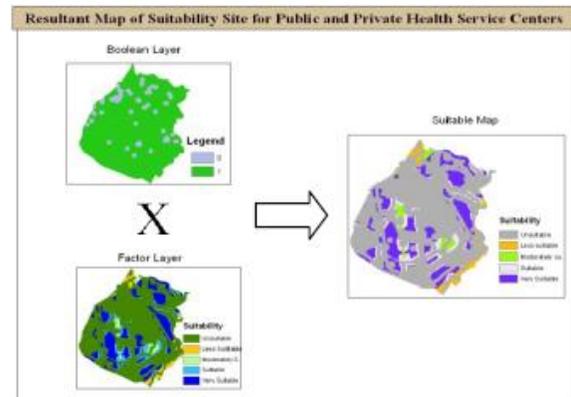


Figure 4 Resultant Map of Suitability.

Results

Accessibility

Accessibility of health centers evaluate based on their proximity to the road. In Kirkos sub city there is a vast network of road from major road to secondary and tertiary road. This vast network of road facilitates the accessibility of the health centers to the people. Generally Health service centers found in the Kirkos sub city are near to the road and make them accessible to the people

Evaluation

According to the criteria set by Ministry of Health, industries buffer was created to

select the new sites beyond the buffer for private hospitals also for public hospital. But the analysis showed that the buffers around the existed industries makes Kirkos sub city totally not suitable for private or public Hospital. So there is no area suitable for private or public hospital.



Figure 5 Road and Health Service Centers Map of Kirkos sub city.

And from the locational analysis of the existed Public and Private Health Service Centers, ten of the health service centers falls on very suitable area, two on suitable, one in moderately suitable and thirty-seven on unsuitable areas.

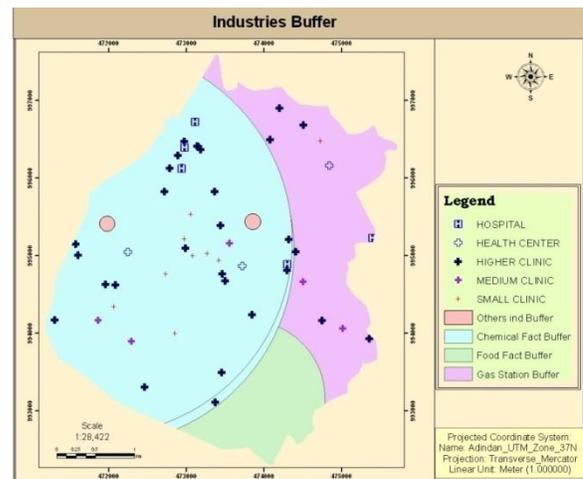


Figure 6 Industries Buffer Map of Kirkos sub city.

This shows that 74 % Of Public and Private Health Service Centers are not meet the criteria sated by Ministry of Health. Locational analysis based on rank of health service center is presented in the following table.

Suitable Site Selection

Creating a suitability map enables to obtain a suitability value for every location on the map. From spatial analysis of Boolean layer and factors layer the output result (Figure 8) can clearly show the suitability of each area for establishing new health service centers according to the previously stated parameters.

	Very	Suitable	Moderately	Less	Unsuitable
Hospital			1	1	3
Health centers	2				1
Higher clinics	5	1			24
Medium clinics		1			4
Small clinics	3				5

Table 2 Evaluation Table.

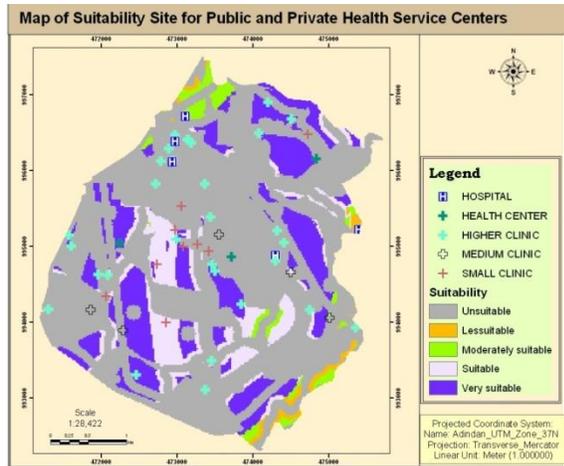


Figure 7 Evaluation Map of Kirkos sub city.

From the analysis thirty-five areas get the value of very suitable and have areas ranges from 400 square meters to 354,963 square meters. The minimum area of the suitable polygon fulfills the minimum requirement of

the criteria to establish small clinics (238-300 m²).

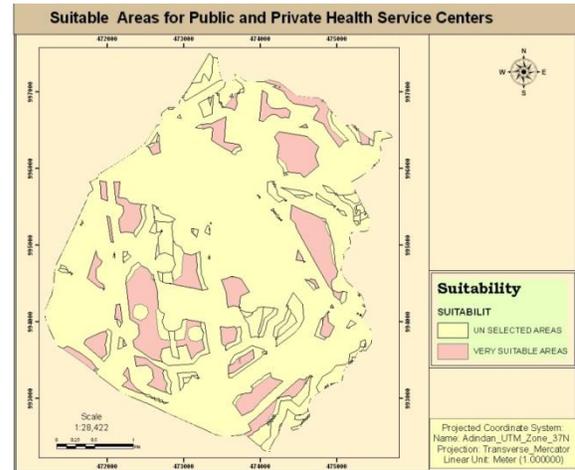


Figure 8 Selected Map of Suitable Area.

Conclusion and Recommendations

Conclusion

This study was conducted with the prime objective of examining availability, spatial accessibility and to simulate new potential locations for both public and private health services in Kirkos sub-city of Addis Ababa. To this effect, basic primary and secondary data have been collected, organized and analyzed, along with the base of this study, geodatabase, substantially created.

When trying to make data more readily available for multi criteria decision making, criteria for selecting suitable site for health service Centers are out lined based on the manual prepared by the Federal Democratic

Republic of Ethiopia, Ministry of Health. In accordance with such criteria and by finding out most important factors and constraints, multi criteria evaluation was earnestly applied to select best suitable health service centers with the involvement of themselves as one factor and in the absence of them.

GIS as tool have been found to be very useful for the management of the geodatabase, interpretation, evaluation and identification of best site for public and private health service centers. Thus with the use of these science and technologies, decision-making will no longer be a problem for the government and investors. During analysis it was observed that 35 best sites identified to establish new health service centers in Kirkos sub city. This study has shown how GIS and Multi Criteria Analysis are important for decision-making, and efficiently utilization of resource and time.

Recommendations

A GIS is a spatial database containing datasets that represent geographic information, a set of transformation tools that derive new geographic datasets from existing datasets and a systematic and powerful tool of analyzing of spatial

datasets. And therefore it is recommended to use GIS as decision support system to utilize resources and time efficiently to solve problems that have a spatial data in order to have a better result. On the other hand considering economical statutes of the local people will make the decision system more reliable.

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Compressed and Stabilized Earth Blocks for Affordable Building

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Abstract

This research project explored the possibility of using local soils for making compressed and stabilized earth blocks, CSEB for the construction of affordable buildings. The blocks were made of local soils with block press machine that delivers a high compressive effort. The blocks were made from local soils with cement and lime applied as a stabilizer. The blocks were tested for dimensional stability and compressive strength. The result obtained proved that cement stabilized compressed earth blocks showed stable block dimension during production, curing and use as well as the highest compressive strength than lime stabilized earth blocks. Moreover, the local soil requires modification with addition of river sand in order to make it suitable for cement stabilization.

Key Words: Compressed and Stabilized Earth Blocks (CSEB), Compressive Strength, Dimensional Stability and Stabilization.

INTRODUCTION

The provision of housing is a challenge around the world, especially in developing countries. The spiraling growth of population, low Gross National Product and the general lack of purchasing power are factors that contribute to the progressive deterioration of the housing situation in developing economies. An impediment to the solution of the problem of housing is the scarcity and/or the high-cost of building materials. Ideally, building materials for low-cost housing must be produced from locally available raw materials. Furthermore, these raw materials must be abundantly available or they should be renewable in nature (Joseph O. and Tariq G., 2008).

The more popular construction materials such as clay bricks and concrete blocks are of good quality but are energy intensive in production, expensive and are usually based on heavy industries.

Provision of housing for developing countries is one of the most important basic needs of low-income groups. It is a very difficult requirement to meet, however, since land and construction costs are mostly beyond the means of both the rural and urban poor. In order to address this issue various governments have undertaken housing schemes that aim to facilitate some form of housing ownership by low-income groups (Adam E.A., 2001).

Due to limited means within developing countries, it is necessary to seek ways to reduce construction costs, especially for low-income housing, as well as adopting easy and effective solutions for their repair and maintenance. Such objectives can be achieved partially through the production and use of cheap yet durable locally available building materials. Ideally the production of these building materials will contribute to improving development objectives of a country by generating local employment, rural development and a reduction of imports (Adam E.A., 2001).

Various traditional construction materials exist in most developing countries which have proved to be suitable for a wide range of buildings and which have a great potential for increased use in the future. One such material is the compressed stabilised earth block, an improved form of one of the oldest materials used in building construction.

Earth as a construction material has been used for thousands of years by civilizations all over the world. Many different techniques have been developed; the methods used vary according to the local climate and environment as well as local traditions and customs. The methods range from the most rudimentary to the advanced one. As a modest estimate it is thought that as many as 30% of the world's population live in a home constructed in earth (Houben & Guillaud, 1994).

There are 12 different recognized techniques used around the world (Houben & Guillaud, 1994). Some of them involves the use of soil alone and others require the use of stabilizers together with the soil. According to Nasly and Yassin, 2009 soil stabilization refers to the modification of soil

properties by adding another material to improve its strength and hence its durability. Soil stabilization has been used widely since the 1920s mainly for road construction. When a soil is successfully stabilized one or more of the following effects will be evident.

- strength and cohesion of the soil will increase,
- permeability of the soil will be reduced,
- the soil will be made water repellent,
- the durability of the soil will increase,
- the soil will shrink and expand less in dry and wet conditions

There are several methods of soil stabilization (Houben & Guillaud, 1994). Some of the major stabilization techniques are

- *Mechanical stabilization*
- *Cement stabilization*
- *Lime stabilization*

The advantages of soil (earth) as building material (Adam E.A., 2001) can be given as follows:

- availability in large quantities
- low or no cost
- easy workability i.e. no special equipment is required
- suitable for construction of most parts of a building
- fire resistance
- high thermal capacity i.e. maintains moisture balance,
- low processing energy input (1% of a produced equivalent cement concrete unit)
- unlimited reusability of the non-stabilized soil
- sustainable resource (unlimited resource used in its natural state).

A traditionally built mud (earth) house or the use of compressed earth blocks made only of unfired earth, displays (Adam E.A., 2001) certain weakness due to:

- Extensive water absorption
- Poor resistance to abrasion and impact
- Low tensile strength
- Low acceptability amongst some social groups

Today, earth building production techniques range from the most rudimentary, manual and craft-based to the most sophisticated, mechanized and industrial. With the 1970s and 1980s there appeared a new generation of manual, mechanical and motor-driven presses, leading to the

emergence today of a genuine market for the production and application of the compressed earth block (Houben & Guillaud, 1994). Compressed and Stabilized Earth Blocks are one of the modern, and mechanized methods of earth building which is the emphasis of this work.

Ethiopia was according to UNDP's annual Human Development Report 2007/2008 rated as the 8th poorest country in the world. A high population growth-rate, an increasing deforestation and a high rate of urbanization can be viewed as the most severe, problems. These problems cause in their turn, independently or, even worse, in combination with other problems and difficulties. These problems are severe and the needs for sustainable solutions are growing. The country is in a crucial move to develop recourses such as water, food, jobs, infrastructure and education (Tadege A. 2007).

Furthermore, the increasing population requires a convenient dwelling and hence there is an immense need for sustainable low-cost dwellings for the population. It is important to develop and present technologies that are easily implemented with the available recourses in the different regions in Ethiopia (Afkari, 2010). One of these technologies recommended by most researchers is the use of earth as a building material.

Problems with the Traditional technique

In Ethiopia the traditional way of house building is based on the use of wood and timber as a construction material. The advantages of such a system are initial costs are pretty small which makes it affordable for low income groups and reasonably locally available.

However, the disadvantages are unfortunately exceedingly dominating. The high wood and timber content in the traditional houses is a great problem which has several side effects; one is that it contributes to the deforestation. It has small life span. See Fig 1.

Currently the cost of conventional building materials and labor is continually on the increase beyond the reach of many Ethiopians. The reasons are high transportation cost, devaluation of currency, inability of production companies to meet demands, uncontrollable price of building materials and over dependence on imported raw materials, technology etc.

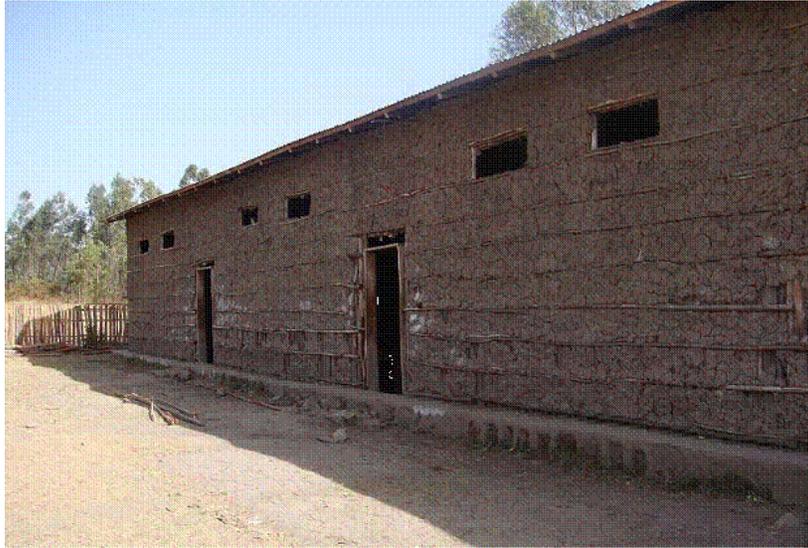


Figure 1: Wooden walled school building which is only three years old

OBJECTIVES

The objectives of this research work were as follows.

- To determine the type of soil stabilizer that is efficient to produce strong and durable earth blocks using a typical local soil,
- To show that earth construction techniques are viable option in regards to satisfying affordable housing demands,
- To bring to the need for affordable housing

MATERIALS AND METHODS

The soil was obtained from the university campus. The soil was excavated and collected from a depth of 120 cm from the surface. It is a reddish brown soil classified as A-7-6 using AASHTO Soil Classification and CL by United Soil Classification System (USCS). The sand employed for modifying the soil texture was obtained from a nearby river called Gilgel-Gibe.

The soil stabilizers used in the research are Ordinary Portland Cement (OPC) and Quick Lime. An action pack block press machine capable of delivering high compaction pressure (3-5MPa) was used to produce the blocks. The water used in the production of the blocks was potable tap water.

Soil Preparation

The procedure applied in preparation of soil prior to block manufacture is shown in the scheme in figure 2. After drying, the soil is crushed and passed through a sieve of 2 mm. The soil has been, through crushing and sieving, prepared with particular care, in order to ensure that the stabilizer or could be uniformly distributed throughout the material. See Fig. 2 and 3.

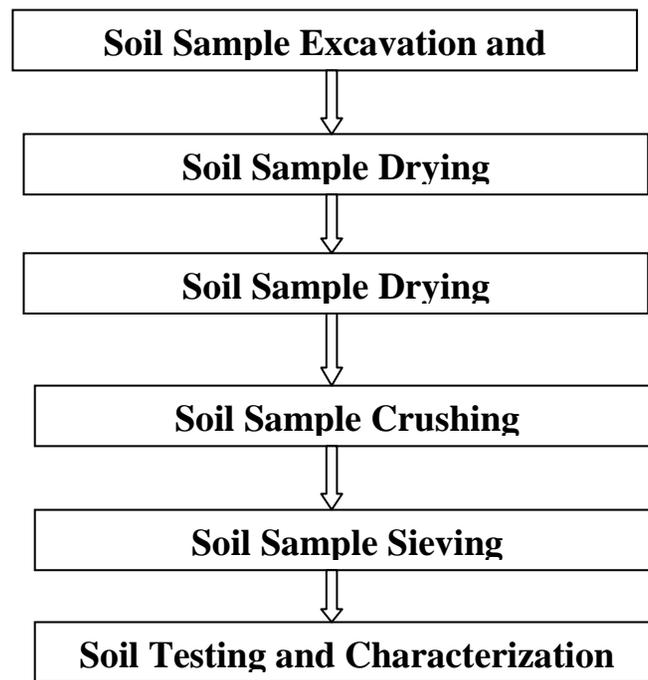


Figure 2: Soil preparation

Soil Testing

Four kinds of soil tests were performed for the purpose of determining the physical properties and attributes of the soil used in the study. The tests or soil characterization was performed after the soil was prepared i.e., excavation, collection, drying, crushing, and sieving.

The main tests conducted include the following.

- Particle size distribution test
- Sedimentation/jar test
- Linear shrinkage test (LST)
- Atterberg limits test



Figure 3: Soil excavation and sieving

Block production

After soil preparation was made, the block production was done. The proportions of soil stabilizers used in the experiment were 7% OPC and 14% lime. The soil prepared was thoroughly mixed with the stabilizer. In the case of cement stabilized CEB, the molding of blocks were made after immediate wet mixing of the two. Whereas, in the case of lime stabilized CEB, the molding of the blocks were made 6hrs after the wet mix was made. Four test blocks were produced from each soil and stabilizer mix. See Figure 4, 5 and 6.

Block Testing

In order to gain knowledge on physical properties of compressed and stabilized earth blocks, tests have been carried out. The results will help to understand the suitability of these blocks as building materials. See Fig 7.

The tests performed include:

- Dry compressive strength
- Dry block density
- Dimensional stability



Figure 4: Soil-stabilizer mixing



Figure 5: Block pressing



Figure 6: Block production

Block tests were made taking in to consideration of the recommended curing periods by different researchers. In these regard the tests were performed as indicated below.

- On Cement Stabilized CEB: after 28days
- On Lime stabilized CEB: after 2 months of production



Figure 7: Block testing

RESULT AND DISCUSSION

The results of this research work are indicated on the following tables.

Soil Tests Results

The four kinds of soil test performed on the natural soil sample planned for use had shown the results indicated on Table 1.

As can be seen from Table 1 the particle size distribution test on the natural soil showed 38% sand, 25% silt and 37% clay soil particles. This test result for the soil showed that the soil is predominantly composed of fine soil particles and it is clayey type of soil. Thus the natural soil was found to be suitable for direct stabilization with lime and requires blending in order to make it suitable for cement stabilization.

Accordingly to sedimentation/jar test result, the amount of coarse fraction was found to be 41.2% and that of fine fraction about 58.8%. This test also confirmed the presence of a large proportion of fine soil fractions than that of coarse fractions. This test result showed convergence with the particle size distribution test. As explained earlier such kinds of soils are stabilized directly with lime and require blending in order to make it suitable for cement stabilization.

Table 1: Results of soil test on natural soil sample

S/N	Test Type	Units	Test Results
1	Particle Size Distribution		
	Gravel	%	0
	Sand	%	38
	Silt	%	25
	Clay	%	37
2	Sedimentation/Jar		
	Coarse fraction (Gravel and Sand)	%	41.2
	Fine fraction (Silt and Clay)	%	58.8
3	Linear Shrinkage	mm	29.3
4	Atterberg Limits		
	Liquid Limit, LL	%	55
	Plastic Limit, PL	%	31
	Plastic Index, PI	%	26

The linear shrinkage test (LST) result showed a linear shrinkage mean value of 28.3mm. This value depicted that the soil has more clay content in its composition (Stulz and Guillaud, 1998). This test result confirmed with that obtained with the particle size distribution and sedimentation tests. The result of this test also showed that the use of lime, rather than cement for direct stabilization would be more effective. Cement would have been required if the shrinkage value had been smaller, signifying a high proportion of coarse fraction in the soil.

Moreover, Atterberg limits test yielded a liquid limit of 55 and a plastic limit of 31 which resulted in the plastic index of 24. The result of this test revealed that the soil is clayey soil (Stulz and Guillaud, 1998), more plastic and composed of large proportion of fine soil particles. The result of this test also converged with the results of the three soil tests above.

Soil Modification/Modified soil/Experimental soil

As soil tests depicted, the natural soil is composed more of fine soil particles and is suitable for direct stabilization with lime. This implies that the soil lacks sufficient proportions of coarse fraction (gravel and sand) for the skeletal frame work and was found to be not suitable for direct stabilization with cement (OPC). As a result, river sand was mixed or blended with the natural soil in order to raise the proportion of coarse fraction and make it suitable for stabilization with cement. As described on the methods and materials section of the paper the natural soil was modified with the addition of 40% river sand.

The properties of the modified soil was also determined by performing the four types soil tests mention above and carried out for the natural soil. The results of soil tests performed on the modified soil are show on Table 2.

The modified experimental soil blended in the laboratory was found to meet critical requirements for suitability with OPC stabilization. The mean linear shrinkage value of 18.2 mm was within the range (15-30 mm) indicating the presence of a sufficient amount of clay. If the shrinkage value had been less than 15 mm, then the soil would have been regarded as having an insufficient amount of clay in it. The sedimentation/ jar test results confirmed that the coarse soil fraction (fine gravel and sand) was about 74.0%, while the fines fraction (silt and clay) was about 26.0%. Both values are within the recommended ranges for soils suitable for stabilization with OPC.

The Atterberg limits test result on the modified soil showed that the PI of 4 which signifies the soil as sandy soil (Stulz and Guillaud, 1998) and thus suitable for direct stabilization with OPC. Moreover, the particle size distribution test results confirmed that soil the modified soil is composed of all the four main soil fractions: fine gravel (1.8%), sand (72.2%), silt (14.6%), and clay (11.4%). The values obtained still fall within the range of suitable soils for CSEB production with OPC as a stabilizer.

Block Measurement and Testing Results

As indicated on the materials and methods section, four block samples were produced from each proposed type of soil stabilization method in the experiment. After the elapse of the recommended curing periods for each kind of stabilizer, the blocks were tasted, examined and the required measurements of size were taken. The results so obtained are shown in the following Tables 3, 4 and 5.

Table 2: Modified soil: Sandy soil

S/N	Test Type	Units	Test Results
1	Particle Size Distribution		
	Gravel	%	1.8
	Sand	%	72.2
	Silt	%	14.6
	Clay	%	11.4
2	Sedimentation/Jar		
	Coarse fraction (Gravel and Sand)	%	77.3
	Fine fraction (Silt and Clay)	%	22.7
3	Linear Shrinkage	mm	18.2
4	Atterberg Limits		
	Liquid Limit, LL	%	19
	Plastic Limit, PL	%	15
	Plastic Index, PI	%	4

Block Size Measurement Results

The sizes of the blocks were measured after the completion of their curing period. The measurements taken were length (L) of the blocks, Width (w) of the blocks and Height (H) of the blocks. Table 3 and 4 shows the results of the block size measurement obtained for lime and cement stabilized CEB respectively.

Block Test Results

Tests performed on the blocks were compressive strength and dry block density. Tables 5 and 6 shows the block test results and associated values obtained from computations on lime and cement stabilized CEB respectively.

Compressive Strength

As mentioned earlier, compressive strength is the most important factor controlling durability. As can be seen from Table 5, the compressed and stabilized earth blocks made with lime stabilization gave an average dry density of 1230.231 kg/m^3 and an average compressive strength 1.852 MPa. Furthermore, as can be seen from Table 6, the compressed and stabilized earth blocks made with cement stabilization gave an average dry density of 1634.852 kg/m^3 and an average compressive strength 2.483 MPa. According to Healthcote, 1991 CSEB with a minimum dry compressive strength of 2 MPa are acceptable by most building codes (Australia, New Mexico Building Code, CRATerre, ILO, UNESCO, and African Regional Standards for Compressed Earth Blocks).

Table 3: Block Size Measurements of Lime Stabilized CEB

Block No	Length, L in mm	Width, W in mm	Height, H in mm	Area, mm^2	Volume, m^3
1	285	138	120	39330	4.72E-03
2	286	138	120	39468	4.74E-03
3	287	139	120	39893	4.79E-03
4	286	138	120	39468	4.74E-03

Table 4: Block Size Measurements of Cement Stabilized CEB

Block No	Length, L in mm	Width, W in mm	Height, H in mm	Area, mm^2	Volume, m^3
1	290	140	120	40600	4.87E-03
2	290	140	120	40600	4.87E-03
3	290	140	120	40600	4.87E-03
4	290	140	120	40600	4.87E-03

In this respect, as depicted on the Table 6, the average dry compressive strength value of 2.483 MPa displayed by cement stabilized CEB was found to be more than minimum dry compressive strength value of 2 MPa recommended by most building codes. Hence, 7% cement stabilized CEB can be conveniently used as an alternative, durable and affordable building materials in Jiima area.

Table 5: Block Test Results of Lime Stabilized CEB

Block No	Area, mm ²	Volume, m ³	Weight, Kg	Maximum Load, N	Dry	Dry
					Block Density, kg/m ³	Compressive Strength, Mpa
1	39330	4.72E-03	5.7	71700	1207.729	1.823
2	39468	4.74E-03	5.84	73400	1233.066	1.860
3	39893	4.79E-03	5.98	74600	1249.175	1.870
4	39468	4.74E-03	5.83	73300	1230.955	1.857
Averages			5.84	73250	1230.231	1.852

Table 6: Block Test Results of Cement Stabilized CEB

Block No	Area, mm ²	Volume, m ³	Weight, Kg	Maximum Load, N	Dry	Dry
					Block Density, kg/m ³	Compressive Strength, Mpa
1	40600	4.87E-03	7.55	98500	1549.672	2.426
2	40600	4.87E-03	8.16	101200	1674.877	2.493
3	40600	4.87E-03	8.33	104300	1709.770	2.569
4	40600	4.87E-03	7.82	99200	1605.090	2.443
Averages			7.97	100800	1634.852	2.483

However, as Table 5 shows the average dry compressive strength value of 1.852 MPa obtained from the test of 14 % lime stabilized CEB was found to lower than the minimum dry compressive strength value of 2 MPa recommended by most building codes. This result suggested that the quantity of lime to be used as a stabilizer may need be increased and/ or the coarse fraction in the soil increased a little higher to impart skeletal frame work of the block and hence its density as well.

Dry Block Density

The other important parameter for earth block makers and researchers is the dry block density. As mentioned earlier it has a direct effect on the strength and therefore durability of earth blocks. Tables 5 and 6 show the dry block density of lime and cement stabilized CEB respectively. As depicted on Table 5 the average dry block density of lime stabilized CEB was found to 1230.231 kg/m³. Also, Table 6 shows the average dry block density of lime stabilized CEB is 1634.852 kg/m³. The result shows that cement stabilized CEB are denser and heavier than that of lime stabilized CEB. This may be due to the fact that cement stabilized CEB have a larger proportion of coarse soil fractions than lime stabilized CEB. Furthermore, the grain size distribution of the raw soil material used in the cement stabilized CEB are uniformly distributed and better compaction can be achieved.

Correlation of Dry Block Density and Dry Compressive Strength

Observing the correlation between dry block density and compressive strength yields a better understanding of the earth block behavior as displayed on Figures 8 and 9. Density trends exhibit similar tendency as strength characteristics and can be described by the power equation. Indeed, compressive strength is a function of dry block density. The result is found to be consistent with the investigation of previous researchers.

As expected the lowest values of dry block density (of 1549.672 Kg/m³ and 1207.729 Kg/m³ for cement and lime stabilized blocks respectively) corresponds to the lowest compressive strength (of 2.426MPa and 1.823 MPa for cement and lime stabilized blocks respectively). Similarly, the highest values dry block density (of 1709.77 Kg/m³ and 1249.175 Kg/m³ for cement and lime stabilized blocks respectively) corresponds to the highest values of compressive strength (of 2.569MPa and 1.870 MPa for cement and lime stabilized blocks respectively).

Dimensional Stability

Deformation of CSEBs is an important property to recognize. Dimensional stability mainly is defined by deformability properties. The deformation of CSEBs can occur instantaneously or progress with time. It includes elastic and plastic response, anisotropy and the change in dimensions and/or damages that occur on the surface of the block. The first two are determined from the unconfined compressive strength test with the help of the resulting stress-strain curve. The last one is determined from the measurement of dimensions and observation of the surface of the block after a fixed period of time.

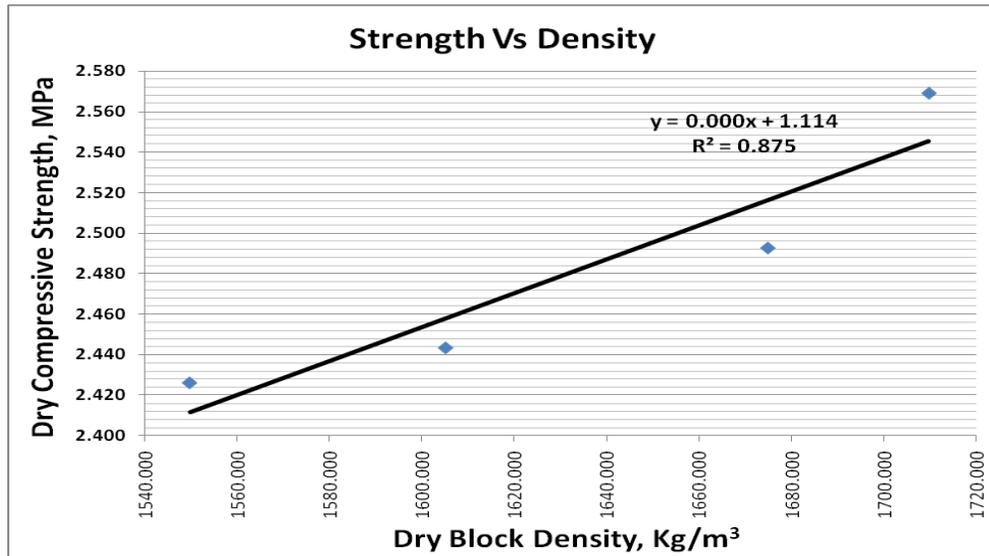


Figure 8: Compressive strength as a function of practical dry block density for cement stabilized CEB

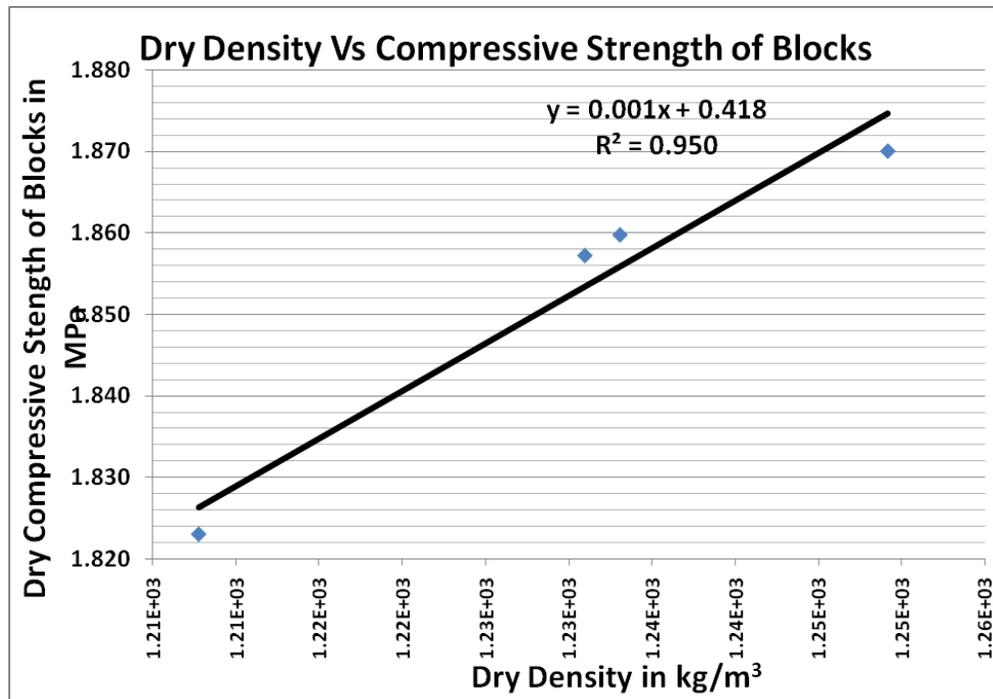


Figure 9: Compressive strength as a function of practical dry block density for lime stabilized CEB

The measurements on block sizes as indicated on Table 3 and 4 revealed that lime stabilized CEB have shown considerable shrinkage/reduction in dimension during curing period than cement stabilized CEB. Furthermore, the extent of damage to the blocks during production and curing was found to be severe on lime stabilized CEB than cement stabilized CEB.



Figure: Surfaces and edges of blocks

CONCLUSION

This research project was based on evaluating local soils to determine their suitability for making compressed earth blocks for use in affordable residential buildings. The main conclusions from this study may be summarized as follows:

- Earth building using CSEB is found to be a modern, scientifically proved and standardized method that is viable option to be used as an alternative low cost material and method.
- The strength of the CSSB is dependent on the type of soil as well as the amount and type of stabiliser used.
- The 7% cement stabilized CEB were found to be more strong and durable as well as fulfilling the code requirements than lime stabilized CEB.
- The cement stabilized CEB showed more dimensional stability than lime stabilized CEB.
- There is a good correlation between dry block density and dry compressive strength.

- As the soil type used in this research work seems dominant soil type in Jimma city, it requires modification in order to use it for stabilizing with cement.

When compressed earth blocks are made as indicated in this project, with local/on-site soils, the cost of building houses can be reduced and made affordable.

RECOMMENDATION

The results of this research work have revealed that compressed and stabilised soil block can be used as an alternative wall making material. Significant cost cut might be achieved in low cost housing projects especially town houses and duplex buildings.

Any interested body can use this material as an alternative wall making material with proper quality control. However, more research work will have to be done to explore the technology in detail and establish scientific evidence and confidence based on the local context.

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Some of the Participants of Parallel Sessions of the Jimma Institute of Technology, Jimma University

Experimental Investigation of Fluidization Dynamics and Characteristics of Coffee Husk for Gasification

By

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Abstract

This paper presents results of the experimental investigation of fluidization dynamics and characteristics of coffee husk for gasification. A two-dimensional fluidized bed test set up has been designed, fabricated and used for cold bed experimental measurements and observation of coffee husk with sand as the bed material. Bed pressure drop and local heat transfer measurements have been made in addition to the coffee husk mixing and segregation characteristics. To characterize the void fraction related data, actual density measurements have also been carried out for coffee husk and sand. A narrow particle size distribution from 500 μm to 600 μm with a mean particle size of 550 μm has been employed. Bed height expansion and bubble growth related measurements have been carried out using bed pressure drop as well as video-graphic recording of the entire fluidization regime at different operating velocities. In addition the cyclone performance and pressure drop characteristics have been obtained. Fluidization characteristics of coffee husk are discussed in detail in the full paper vis-à-vis the appropriate bed particle size, attrition, elutriation and entrainment and mixing zones.

Key words: Fluidized bed gasification, Coffee husk, Fluidization dynamics, mixing characteristics

Measurement of Solar Insolation in Jimma with a Customized Low Cost SetUp

By

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Abstract

A low cost measurement set up has been conceived and fabricated to facilitate local measurements of global and diffuse solar radiation intensity in Jimma, without the need for solar pyrheliometer and pyranometer. A non-contact laser thermometer has been used to precisely measure the incident radiation surface measurement as well as the sky temperature. Time dependent thermo-physical properties have been employed while estimating the natural convective heat transfer coefficients. These measurements have been carried out from dusk to dawn to track the variation of solar insolation parameters which would prove to be handy for optimal design of a range solar collectors in Jimma. Comparisons have been made using the predictions from Bird's model with approximated parameters concerning albedo. The uncertainties associated with the measurement are quantified and the utility of these results are discussed. Some of the sample results are indicated here, while the full results will be discussed in detail in the full paper.

Key words: Solar insolation, local measurement, global radiation, diffuse radiation

Up gradation of Gera-Dusta Microhydro Rural Electrification Scheme

By

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Abstract

This paper reports the details of the upgradation of Gera-Dusta micro-hydro rural electrification project carried out with Jimma University participation for community development. The existing watermill based power unit has been replaced with locally fabricated Cross-flow turbine along with the erection of a penstock section and installation of a forebay. With joint participation of civil, mechanical and electrical engineering departments in conjunction with rural technology center, all the associated components have been designed after water potential assessment and detailed data collection, subsequently fabricated, tested and the project successfully commissioned. The downstream unit of the Gear-Dusta project has been upgraded to 7.5kW from the original rating of 2kW being generated with the highly inefficient water mill based power unit. The details of this whole project are presented and discussed in detail along with the photographs of various stages of the project.

Key words: Micro-hydro power, Cross flow turbine, Local manufacturing, Water Mill, Rural Electyrification

Assessment of the Potential and Challenges of Microfinance Institutions to enable the uptake of Household Biogas in the National Biogas Program of Ethiopia

By

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Abstract

Despite its essentiality in sustaining people's livelihood, modern energy is one of the scarce commodities to rural households. Biogas, a methane rich gas produced by anaerobic fermentation of organic material, is distinct from other renewable energy sources because of its importance in controlling and collecting organic waste materials that, if untreated, could cause severe public health and environmental pollution problems. The earliest biogas digesters in Ethiopia were installed in the 1970s and since then a number of attempts has been made to introduce biogas technology but the wider dissemination has been limited due to different reasons among which lack of financial capacity by rural households takes the upper hand.

This dissertation focuses on the assessment of potential and challenges of Ethiopian Microfinance Institutes (MFIs) to enable the uptake of household biogas in the National Biogas Program (NBP) of Ethiopia. This dissertation met these twin research objectives through an extensive study of relevant literature and the implementation of practical research. The empirical research was carried out through a survey research strategy using semi-structured questionnaire distributed to seven participating MFIs from all the four regional states of the country where the NBP is being implemented.

This research produced a number of key findings: the survey confirmed that Ethiopian MFIs are highly dependent on funds from external sources and they will find it difficult to extend loans for biogas users while satisfying the current financial needs of their clientele; they also lack

human resource capacity to participate in the NBP; they exhibited low level application of modern technologies such as MIS as a result of their limited financial capacity; majority of the surveyed MFIs are not aware of biogas technology and its benefit to the society, the environment and the business opportunity for their own organisation provided through new loan product; even if there is lack of proper infrastructure which could result in higher interest rate for rural households to compensate the resulting higher transaction cost, Ethiopia MFIs are not charging rural clients higher interest rate, they rather vary the interest rate based on the lending methodology, the type of loan products and the repayment period which is the same for all rural, semi-urban and urban clients.

The main conclusions drawn from this research were that without building their financial, human resource and institutional capacity, with their current limited capacity Ethiopia MFIs will find it difficult to participate in the NBP; lack of awareness about biogas technology lead MFIs to think that providing loan for biogas user is a risky business and they put forward a number of pre-requisites and additional guarantee requirement for biogas digesters for the sake of their security; their lack of awareness found out to be a low level problem that could be addressed by continuous training and awareness raising campaigns.

Based on the experience of India, Nepal, China and Bangladesh government role in the early stage of their domestic biogas program, this research has recommended to avail gradually withdrawable fund in a declining basis for the MFIs in order to help them engage in the NBP and build their capacity; another source of fund could be to tap in to the potential of fund from an international NGO; the requirement of an intermediate NGO to address the knowledge gap and facilitate the communication between MFIs and Energy companies is emphasized.

Blood Lead Level and Associated Risk Factors among Garage Workers in Jimma Zone

By

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Abstract

Lead is one of the prevalent toxins known in the environment which accumulates in the living physiology especially in human beings with no known importance. It is released from various sources commonly those very near to mankind day to day activities entering into human body via inhalation, ingestion and rarely through dermal penetration. In adults the main sources of lead poisoning are environmental and occupational exposure whereby the later is more dangerous. The aim of this study was to carry out a comparative cross-sectional study on the blood lead level of garage workers around Jimma town and assess the associated risk factors. The study encompassed 45 garage workers and 41 non-garage workers. Among the 45 garage workers, 27 were welder, 15 painter and 3 workers involved in both job categories. These study subjects were selected purposively whereby individuals engaged in either of the labour of divisions and having experiences of five months and above included in the study. The blood lead level was analyzed using flame atomic absorption spectroscopy. The mean blood lead level (BLL) of the garage workers (19.76 ± 4.46 $\mu\text{g/dl}$) was found to be significantly higher than that of the non-garage workers (11.16 ± 3.55 $\mu\text{g/dl}$) at $P < 0.001$. Among the garage workers the mean BLL of the painters (21.12 ± 5.59 $\mu\text{g/dl}$), had shown higher value than that of the welders (19.19 ± 4.08 $\mu\text{g/dl}$) and those involved in both job categories (17.98 ± 4.93 $\mu\text{g/dl}$) despite statistically not significant ($P\text{-value} = 0.322$). The study also revealed that, among the identified risk factors smoking habit ($P\text{-value} = 0.002$) and “Khat” chewing at the work place ($P\text{-value} = 0.036$) were found to be significantly associated with high blood lead level of garage workers. Furthermore, age ($r = 0.298$, $P\text{-value} = 0.005$) and service year ($r = 0.333$, $P\text{-value} = 0.025$) of the garage workers had shown a positive correlation with blood lead level. Symptomatically, the garage workers manifested being

more prevalent for symptoms of depression, sleep disturbance, wrist drop, tingling and numbness in fingers and hands, nausea and decreased sexual feeling. In conclusion, the outcome of this study has clearly shown that garage workers are significantly affected by lead poisoning as compared to people who are non-garage workers. The blood lead level of the garage workers was also found to be aggravated by the smoking and Khat chewing habits of the workers.

Key words; *Associated risk factors, Blood lead level, Lead poisoning*

Design, Fabrication and Testing of Rotary Enjera Baking Machine

By

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Abstract

In this project a low cost automated injera baking machine has been designed and manufactured by considering the design and material constraints of the previous works. The machine has eight commercial electric injera baking stoves supported by a circular support structure. The structure rotates at 0.3 rpm obtained by a gear reduction system. The batter splashes on the surface of a heated stove in a circular manner by sliding type pouring system, at the time of pouring, to avoid relative motion between the pouring system and the stoves tracking system is developed. The stove cover is opened and closed by a cam mechanism to decrease the number of man power involved in the baking process. Electric power is supplied to the rotating stove through a system called slip ring with grounding system. The machine can be operated by a single person only to remove the cooked injera out of the stove. The machine can produce 160 traditionally accepted injera per hour and it can be increased up to 4000 injera by increasing the structure or the number of stoves.

**Status, Potential and Prospects of Renewable Energy Sources in Jimma Zone:
South Western Part of Ethiopia**

By

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Abstract

Energy is an important element in Ethiopia's development strategy, because it could be a source of foreign exchange and is a catalyst for industrial progress. In order to bring sustainable and equitable development in Ethiopia, the utilization of renewable energy source which can be renewed by nature and whose supply is not affected by the rate of consumption should be promoted.

Though there exist a renewed interest in renewable energy utilization, the country couldn't benefit from its resources. The need to search for renewable, alternate and non polluting sources of energy assumes top priority for self-reliance in the county's energy supply.

The article assesses the available energy that can be obtained from different renewable energy sources, such as wind, geothermal, solar, biomass, hydropower energy and the bottlenecks that inhibit its development. It also presents a detailed overview of the current energy utilization in Jimma zone, south western part of Ethiopia and sub-regions suitable for tapping of these energy sources are mapped which provide a picture of the potential.

Key Words: Energy, Renewable, Sustainable, development.

Fabrication of Nanobiosensors for the Detection of Phenolic Compounds

By

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Abstract

Phenolic compounds are important contaminants in medical, food and environmental matrices. They are highly toxic and are widely used in wood preservatives, textiles, herbicides and pesticides, and released into the ground and surface water. Therefore, the identification and quantification of these compounds are of great importance in environment monitoring. In view of their high toxicity, reliable analytical procedures are required for sensitive determination at low level in various matrices. The most usual determination methods of phenolic compounds are colorimetry, gas chromatography, liquid chromatography, capillary electrophoresis and spectrophotometric analysis. These methods involve complex sample pre-treatment procedures and they are unsuitable for on site or field based analyses. They are expensive, time-consuming, need skilled operators, and sometimes require preconcentration and extraction steps that increase the risk of samples loss. A biosensor is a device for the detection of an analyte that combines a biological component with a physicochemical detector component. Biosensors are powerful tools aimed at providing selective identification of toxic chemical compounds at ultra trace levels in industrial products, chemical substances, environmental samples (e.g., air, soil, and water) or biological systems (e.g., bacteria, virus, or tissue components) for biomedical diagnosis. Combining the exquisite specificity of biological recognition probes and the excellent sensitivity of laser-based optical detection, biosensors are capable of detecting and differentiating big/chemical constituents of complex systems in order to provide unambiguous identification and accurate quantification. The soil bacterium *Agrobacterium tumefaciens* causes formation of the neoplastic disease crown gall on many dicotyledonous plants and on some monocots. The infection results from transfer and integration of a piece of DNA (the T-DNA) from the bacterial Ti plasmid into the nucleus of plant cells. Hence the immobilization of this virA protein to a suitable support material may provide us with a biocompatible and efficient biosensor.

Key words: Biosensors, *Agrobacterium tumefaciens* and Phenolic pollutants.

Section VII: Abstracts of Scientific Papers from Jimma University

College of Agriculture and Veterinary Medicine

Assessment of Farmers' Perception on the Current Artificial Insemination Delivery System in Ethiopia: a Case of Adami Tullu District

By

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Abstract

This case study was conducted in urban and rural areas of Adami Tullu district with objectives of documenting experiences of farmers in using AI service, identify pertinent constraints and suggest options for improving the efficiency of AI delivery system. Results are based on diagnostic survey of 80 sample households and focus group discussions. It was found that majority of the farmers did not get a reliable and consistent AI service due to shortage of AI technician in the study area (71.4%), shortage of input (68%) and communication problem (8.6 %). Farmers also complained for the birth of high proportion of male calves as a result of using AI. Repeated insemination was another constraint raised and it was found out that average number of service per conception was high (2.85). The level of awareness on the major symptoms of heat among farmers was encouraging; however the most accurate signs of heat are less known by farmers. To solve the critical shortage of AI technicians in the study area it is recommended to implement community based AI delivery system. In addition, looking for options of introducing semen sexing technology is suggested to cater for the higher demand created for female calves in Ethiopia.

Key words: Artificial insemination; urban; rural; service per conception; heat detection

Introduction

Improvement of milk production at smallholder level can be achieved, among other means, through the purchase and use of improved crossbred heifers, something that is not feasible for most resource poor smallholder farmers. An alternative strategy is to produce the crossbred heifers in their own herd. The latter is feasible because today most of smallholder farmers own small herds and with the introduction of AI this would provide farmers an opportunity to introduce proven dairy semen to produce better heifers, thereby increase milk production.

Although the use of Artificial insemination has proven to be an effective method for improvement of herd productivity in different parts of the world (Bonadonna and Succi, 1980; Chupin and Thibier, 1995; Vishwanath, 2003), AI delivery in Ethiopia in general and Adami Tullu district in particular faced a major challenge of low conception rate and repeat breeding of inseminated cows. An assessment carried out around Adami Tullu area (ATARC, 2006) on past AI delivery system indicated that the conception rate of inseminated animals was very low (up to 16%). In addition, a recent study by Desalegn (2008) indicated that conception rates to first inseminations in general were poor at the country level ranging from 7.14 to 40.23%. Mukassa-Mugrwa *et al.*, (1991) reported that only 1.6% of the cows, which were served with AI at the Gobe Ranch in Ethiopia, calved annually. Another report indicated that the field AI efficiency in Ethiopia can be set between 2.5 to 3 inseminations per conception (NLDP, 2001) which can be categorized as poor efficiency that needs serious attention for improvement (Nebel, 1998).

In the past research and development endeavors, most researchers neglected the real-life production systems of the vast majority of livestock-keepers in the country. As a result they have given little attention to how improvements can be made in the farmers indigenous systems. This leads to little sustainable impact of past livestock development projects on the livelihoods of the poor. It is believed that, assessing farmers' perception and their experiences in using the AI service is crucial in identification of constraints and designing future improvement options that can readily operates under farmers real circumstances.

This study is conducted with objectives of documenting the responses and experiences of farmers in using AI service, identify pertinent constraints and suggest improvement options in an endeavor towards improving the efficiency of AI delivery system in Ethiopia.

Materials and Methods

Description of the study Area

The study was conducted at Adami Tullu district of eastern Showa Zone of Oromiya region. The total land area of the district is estimated to be about 75,223 ha; of which 36,661 ha is under crop production and 17,113 ha is used as a grazing land. The remaining land is used for different purposes. It has a semi arid climate with an erratic average annual rainfall of 650 mm. The minimum and maximum temperatures are 12 °C and 26 °C, respectively (ATARC, 2003). The total human population of Adami Tullu is about 111,926. Of the total population, 55,969 are male and 55,957 females. About 72% (39,818 male and 40,239 female) live in the rural areas while 31,869 (16,151 male and 15,718 female) dwell in the urban area. There are about 16,479 households of which 740 are female headed and the remaining male headed. The average family size per household is about 9.58 (4.51 female and 5.07 male).

Sampling Procedure and data collection

The study involved questionnaire survey and focus group discussion with farmers. For the survey, stratified random sampling was employed. The district AI users were stratified into urban and rural dairy cattle producing groups. Urban dairy production system was identified by the definition given by Rey *et al.* (1992) which encompasses the production, processing and marketing of milk and milk products that are channeled to urban centers. On the other hand, the rural production system considered those farmers residing in the rural peasant associations of the district whereby agriculture is their main source of income and extensive livestock production system is the most dominant one. Forty households were randomly selected from each stratum from the list of farmers who used AI service delivered. Thus, the total sample size for the district was 80 households.

Structured and open ended questionnaires were prepared to interview farmers. The questioners were pre-tested for appropriateness with a few farmers before the commencement of the actual survey. A single visit formal survey method (ILCA, 1992) was employed to collect the required information from individual farmers.

Focus group discussion with a mixed group of farmers was undertaken at two sites, one representing the rural and the other at urban parts of the study area. Accordingly, a total of 30 farmers were participated in the group discussion among which 9 were women. The basic focus of the group discussion was to identify and rank major constraints of the AI delivery system and collect suggestions that could be used to improve the current AI delivery system. A pair-wise ranking method described by Mikkelsen (2005) was used to rank the identified constraints.

Data Analysis

Both qualitative and quantitative data collected during the individual survey were summarized and analyzed using descriptive statistics of SPSS V12 procedure (SPSS, 1999).

Results

Farmers Perception on AI Delivery System and its Efficiency

Eighty eight percent of the farmers who participated in the Questionnaire survey viewed that, they did not get a reliable and consistent AI service at all. 71.4% of the respondents explained the reason as shortage of AI technician in the study area. There was only one technician who provided AI service all over the district when this study was conducted. In addition, a considerable proportion of the respondents (68%) explained that even if the technician is available, he usually complains about shortage of inputs (liquid nitrogen and semen) to give the service at the required time. Moreover, communication problem (8.6%) was mentioned as additional factor for irregularity of service provision as some farmers particularly those living in rural areas don't have access for telephone services. Lack of the service during weekends and holidays is also mentioned as the other reason for not getting the service as required. The study

has clearly confirmed that majority of the farmers living in rural and urban locations showed dissatisfaction with the overall AI service. Accordingly, 90.5 and 84.5% of rural and urban residents, respectively, were not satisfied by the current AI service delivered.

As far as the means of communication between the farmers and AI technicians is concerned, 71.3% of farmers contend that they call the AI technician when the need arises and 30% of them search the technician either from his home or work place to undertake the insemination. This obviously hindered prompt service delivery and waste the time of the service user and the appropriate time when the cow needs to be inseminated. Farmers desperately indicated that repeated breeding and low conception rate were common problems they face because of delayed insemination. Although few in proportions (5%), some farmers also revealed that they trek their cows more than 20 km round trip to get the AI service. It was also found that only few farmers who frequently use AI service know the telephone address of the technician and incase the telephone is switched off or out of the service area the farmers don't have alternatives to look for options as there is only a single technician in the Woreda. In addition, the situation is worse in rural areas as majority of the farmers don't have access for mobile or landline telephones service to get AI service at the appropriate time. Thus, designing efficient communication system between AI service user and service provider is critical to provide efficient and effective AI service in the area.

Another concern raised by farmers was the irregularity of the service charge asked by the technician for getting the service. The current subsidized payment for getting the service is only 5 Birr per insemination. On the other hand, farmers said that the cost of insemination per cow in the study area varied considerably from farmer to farmer and it ranged from 2 to 45 Birr per insemination. In most cases, those farmers in urban areas pay higher price per insemination. Some farmers complained that if they pay less for the first insemination, they would not get prompt service during the latter times. Accordingly, they boldly surfaced that those who pay more receive immediate attention and prompt service delivery upon request.

In due consideration, irregular service charge that farmers are asked to pay and inequity in quality of service delivery based on the amount of payment should deserve attention and corrective measures should be taken. Farmers should be treated fairly and equally if the intervention is meant to bring visible impact in the production system. Otherwise, the situation may severely frustrate farmers and develop negative attitude against adoption of not only this technology but also loose confidence and refrain from participating in other extension activities as a whole.

Repeated Breeding and Number of Conception per Insemination

Higher number of services per conception was another complaint raised from farmers involved in the questionnaire survey. Accordingly, 75% of the farmers revealed that they have encountered repetition of inseminated cows at least ones. According to the respondents, the average minimum and maximum number of service per conception per cow in the past year was 1 and 5 times, respectively, with an average of around 2.85 times in both locations of the study area (Table 1). Significant difference was not observed in service per conception between urban and rural locations.

Table 1. Mean, standard error, minimum and maximum number of service per conception (NSC) at urban and rural locations of the study area.

Parameters	Location		Overall	Sig.
	Rural	Urban		
Mean	2.89	2.80	2.85	NS
SE	0.24	0.20	0.16	
Minimum	1	2	1	
Maximum	5	5	5	

NS = non significant difference between parameter within the row

Breed Preferences in Using AI Service

The study showed that higher preference is given to crossbred cows in using AI services. Majority of the respondents (63%) used AI service to breed crossbred cows and natural mating

for indigenous cows. Farmers noted that there is a difference in success of AI between the breeds. 75% of the respondents contend that crossbred animals have better conception rate with AI service than their indigenous counterparts. Farmers further explained that heat symptoms of the indigenous cows are difficult to detect compared to cross breed cows.

Sex Ratio of Calves Born Using AI Service

Majority of the farmers in the study area reported differences in sex ratio of calves born when using AI service and natural mating. 78.9% of the respondents complained that more male calves are born than female calves when using AI service. Consequently, some farmers were disappointed and reverted to the use of natural mating looking for female calves. The data obtained through the questionnaire survey regarding sex ratio of calves born in the last three years also supported farmers' complaint. Accordingly, out of the total number of 241 calves born using AI in the last three years period, 53.5% were males and the rest (46.5%) were females. Although, larger data set is required to test the existence of such phenomenon, there is an indication that proportion of male calves is higher than female ones.

Incidence of Dystocia (birth difficulty) in relation to the use of AI

Majority (82.5%) of AI service users in the study area contend that they did not encounter dystocia problem as a result of using AI service. On the other hand, there were still considerable number of respondents (17.5%) who reported birth difficulty in cows conceived through AI. As far as the effect of breed difference in the incidence of dystocia is concerned, 78.6% of the farmers responded occurrence of dystocia in crossbred cows than indigenous cows when served using AI. This finding contradicted with the common understanding that AI results a higher occurrence of dystocia problem in indigenous rather than crossbred cows. This is probably due to the limited experience of the farmers in using AI service for indigenous cattle than crossbred cows. Farmers further viewed that the entire incidence of dystocia (100%) occurred in heifers rather than in cows that conceived through AI. Precaution should be taken not to inseminate heifers having a smaller size and narrow hip bones so as to reduce incidence of birth difficulties.

Heat Detection

Majority (70.9%) of the farmers in rural area said they did not get formal training about heat detection and used indigenous knowledge to detect heat and decide on appropriate time of insemination. Only 29.1% of the respondents got formal training about identification of heat and appropriate time of insemination. Among those who received training, majority (68%) said the training was rendered by research institute, while some of them (24%) said the training was provided by the Woreda office of ministry of agriculture and rural development and Non-governmental organizations (8%). Regarding urban farmers, 89.2% them were un-trained and no extension service as well as expert advices was given to them. Urban dairy producers were generally neglected by the current extension system, though they are the major suppliers of milk and milk products to the urban community. Thus, urban farmers should get attention in future extension systems and they should be beneficiaries of agricultural services provided by governmental and non governmental organizations.

The chi-square test revealed that proportion of non trained farmers who reported the different signs of heat did not significantly differ from those who received training (Table 2). This indicated that although majority of the farmers are not trained on heat detection and other cattle husbandry practices, they are aware of the major heat symptoms displayed by cows on estrus. This may be due to the fact that farmers in the study area rear livestock for a long period of time and indigenous knowledge is well developed and widely applied for rearing livestock.

Mucus discharge is the major heat symptom known by both trained and non trained farmers (Table 2). On the other hand, in both urban and rural parts of the study area, relatively less proportion of farmers know the standing of cows when mounted as one of signs of estrus (Table 2).

Table 2. Proportion of trained and non trained farmers that reported the various signs of estrus in the study area

Heat symptoms	Trained	Non-trained	Overall	X ² -value	Sig.
Mounting other cows	73.9	71.4	72.2	0.05	NS
Mucus discharge	95.7	96.4	96.2	0.03	NS
Bellowing and restlessness	69.6	87.5	82.3	3.59	NS
Swelling and reddening of the vulva	26.1	14.3	17.7	1.56	NS
Decreased feed intake and milk yield	39.1	60.7	54.4	3.06	NS
Standing when mounted	17.4	12.5	13.9	0.33	NS

NS = non significant difference between parameter within the row

Constraints and Improvement Options

During group discussion, farmers mentioned constraints associated with AI service in the district. Accordingly, the relative importance of the mentioned constraints was ranked by the farmers in rural and urban areas as summarized in Tables 3 and 4, respectively. In both areas lack of the AI service when required is the first constraint and it basically emanated from shortage of the technicians in the area, as there is only one AI technician to cover all over the district which is 75,223 ha

During the group discussion, different suggestions were pointed out by the participant farmers to improve the current AI delivery system. Accordingly, selecting a central site for construction of crush where the animals are restrained during insemination and pregnancy diagnosis was one means to reach the sparsely located farmers easily. To improve communication between farmers and AI technicians, farmers should be organized in such a way that they select a volunteer contact farmer who has a mobile telephone to collect information on heat of the selected animals and call the AI technicians some time in the morning. This will make the AI technician organize his trip and cover large number of farmers in a short period of time.

Table 3. Pair-wise comparison result on rank of identified constraints in rural part of the study area

	Repeated insemination (A)	Unavailability of AI service when required (B)	Diseases problem (C)	Shortage of feed (D)	Lack of knowledge of farmers on heat detection (E)	Frequency	Rank
Repeated insemination (A)	-	B	A	A	A	3	2
Unavailability of AI service when required (B)	-	-	B	B	B	4	1
Diseases problem (C)	-	-	-	C	E	1	4
Shortage of feed (D)	-	-	-	-	E	0	5
Lack of knowledge of farmers on heat detection (E)	-	-	-	-	-	2	3

Table 4. Pair-wise comparison result on rank of identified constraints in urban part of the study area

	Repeated insemination (A)	Unavailability of AI service when required (B)	use of un-desired breed during insemination (C)	Shortage of feed (D)	Frequency	Rank
Repeated insemination (A)	-	B	A	A	2	2
Unavailability of AI service when required (B)	-	-	B	B	3	1
Use of un-desired breed during insemination (C)	-	-	-	C	1	3
Shortage of feed (D)	-	-	-	-	0	4

Discussion

The overall assessment indicated that Farmers are deeply disappointed by the current AI delivery system in the study area particularly due to absence of a reliable and consistent service. The major constraints identified in the AI delivery system were unavailability of the service when

required, repeat breeding problem, lack of knowledge on heat detection, disease and feed shortage. Among these constraints the bottle neck problem hindering the success of the AI delivery system in the study area was the lack of the service when required due to the critical shortage of AI technicians in the district whereby a single technician is expected to cover both the urban and rural parts of the Woreda. This phenomenon should be given attention in the future.

The NSC reported by farmers in this study is higher than the report of Desalegn (2008) who found varying values in different regions of Ethiopia: 1.55 in Amhara, 1.7 in Addis Ababa, 1.78 in Oromia and 2.47 in Tigray. Values of NSC reported by the above studies were lower than the findings of the present survey were probably could be due to the exclusion of repeat breeder cows in the mentioned study. The NSC observed at farm level in this study (2.85) is within the range reported by Bacha (2007) (1.7-2.89) but higher than Kaziboni *et al.* (2004) and Abate (2006), i.e. 1.65-1.74 and 2.48, respectively. In general, NSC of 2.3 to 2.8 indicate the presence of moderate problem while more than 2.8 signifies a sever problem (Nebel, 1998) that needs to be addressed.

The complaint of farmers on higher proportion of male calve birth as a result of using AI service and the preliminary observation made in this study which supports this complaint is in accordance with the study by Berry and Cromie (2007) who observed a higher probability of a male birth born when cows conceived through AI. According to the mentioned study there was 1% unit increase in the probability of a male birth following artificial insemination. Xu *et al.* (2000) reported that frozen semen resulted in 1.24–1.66% units more male calves than fresh AI semen. These authors speculated that the difference may be due to the effect of freezing on the survival and function of the X- or Y-bearing sperm and or the subsequent effect on the survival of the embryos after fertilization. Timing of service may also contribute to the difference in secondary sex ratio and the effect vary based on the type of mating used (AI or natural mating). Although a general consensus has not been reached the in scientific literature regarding the effect of timing of service on sex ratio, some studies have reported a higher proportion of female offspring following early insemination (Rorie, 1999) and it predominantly occur with natural

mating than AI. Detailed study should be undertaken to ratify this phenomenon by considering a larger data set through out the country.

In any case, dairy farmers in general have high preference for female birth than the male ones; farmers consider male birth as a great loss in their business and consistently ask the presence of options for having more female births than the male ones. One of the most dramatic technical advances in recent years is the sexing of sperm, which resulted in significantly higher proportion of female calve birth (82%) as compared with (49%) for unsexed semen (Andersson *et al.*, 2006). Therefore, future research and development endeavors should consider this fact and building the capacity of our local scientists in applying this scientific procedure and undertake research in the efficiency of using sexed semen as compared to unsexed semen so as to cater for the great demand created for crossbred heifers in our country.

Efficient and profitable reproductive performance of dairy requires routine but conscientious heat detection and proper timing of artificial insemination as failure to detect estrus (heat) is one of the main factor contributing to low fertility (Gomes,1977). Mucus discharge is the most known heat symptom by farmers; indeed, it is one of the symptoms that can be readily used for cows kept under intensive and extensive systems. Sometimes, however, the mucus does not appear externally until the cow is palpated during insemination and the mucus is expelled. In addition, mucus discharge can appear when cows are pregnant. Hence, this method should be combined with other signs of heat so as to improve heat detection efficiency of dairy farmers. Different research findings indicated that a cow standing to be mounted is the most accurate sign of estrus and it is the most sexually intensive period of the estrous cycle (Gomes, 1977; Peter and Ball, 1995). However, this sign of estrus is less known among farmers in the study area. This may indicate existence of awareness problem among farmers about this vital symptom of estrus. Thus, future trainings about awareness creation on heat detection and accurate time of insemination should focus on vital heat symptoms that are not well known by farmers in the study area. In addition, the training should be according to the management system applied by the trainee farmers.

Conclusions

Farmers in the study area are not generally satisfied by the AI delivery system currently operating. The critical shortage of AI technicians repeatedly mentioned by farmers can be solved by implementing community based AI delivery system. In such a system farmers can select individuals among themselves who becomes AI technician after getting the appropriate training from the relevant institution. The provision of the basic inputs for the community based AI delivery system can be made by governmental and non-governmental organization till the system functions appropriately and finance itself. The efficiency of such a system should be assessed periodically and appropriate measures should be taken if the system fails to operate as required.

The complaints of farmers for higher proportion of male calve birth as a result of using AI should be considered in the future and detailed research should be undertaken by considering larger data set. Moreover, ways of introducing sexed semen technology in our country should be sought in order to cater for high demand created for crossbred heifers. In addition, the gap created in awareness of heat detection should be filled by giving continuous training through considering the actual cattle management systems of the farmers.

Acknowledgment

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Comparative Analysis of Soil Nutrient Balance in the Selected Sites of Gligel Gibe Catchment; Jimma Zone

By

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Abstract

The purpose of this study was to examine the role of farmers' resource endowment to maintain and improve soil nutrients through via nutrient in and out flow analysis. Soil nutrient depletion is one of the major challenges for sustainable agricultural production. Nutrient balance is one of an indicator for the sustainability of agricultural production system. This study assessed the balance of N, P and K at farm level by analyzing the flow of nutrient in to the system through mineral fertilizer (IN1), manure (IN2), nitrogen fixation (IN3), and wet deposition (IN4) and out of the system by crop product (OUT1), crop residue (OUT2), leaching (OUT3), gaseous loss (OUT4), and erosion (OUT5) with Ntmon (Nutrient monitoring) model. IN1, IN2, OUT1 and OUT2 were measured in the field whilst others hard to measure in the field were estimated by using transfer functions. The study was conducted in two locations (highland and lowland) on nine case study farm. The case study farms were selected on the bases of wealth groups (rich, medium and poor) identification through participatory rural appraisal program. The means of CEC (meq/kg), OC (%), N (%), P(ppm), K(mg/kg) and pH generated from laboratory test of the study farms soils were compared by LSD (0.05) test while nutrient depletion rate between and within wealth groups was compared by Duncan multiple test ($p = 0.05$). Also, t-test correlation analysis was employed to determine the relationship of nutrient depletion and locations. Statistical analysis revealed that, high value of soil parameters were observed in the highland due to differences in soil forming factors and land management. But, it was varied among wealth groups. In both

location, none significant ($p = 0.05$) difference was observed for nutrient depletion between wealth groups; strong across wealth groups. Within wealth groups highly significant ($p < 0.01$) differences were observed in both location. Soil nutrient depletion rate was positively correlated ($r = 0.91, 0.88, \text{ and } 0.07$ for N, P and K, respectively) with locations due to difference in mineral fertilizer addition and natural factors such as rainfall amount, soil parent material and landscape. As a result, crop production per unit area was decreasing through the time. Therefore, to increase productivity and ensure sustainable agricultural production, integrated soil nutrient management practice should be adopted.

Keywords: Nutrient flows, Nutrient balance, Wealth groups, Location, Sustainable agricultur

Functional analysis of antagonistic bacteria with activity against *Sclerotium rolfsii*, causal agent of stem rot of groundnut (*Arachis hypogaea* L.)

By

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Abstract

Groundnut is the most economical important food legume which ranks first among the world oil crops in terms of acreage and production. Several biotic and abiotic factors are known to affect the productivity of groundnut among which plant pathogens cause the majority of economic yield losses. *Sclerotium rolfsii* Sacc. is one of the most damaging pathogen which causes stem rot (Southern blight) disease. As it is a soil born pathogen with wide host range characteristics, several management strategies used to control this pathogens were ineffective, costly, or not eco-friendly. However, due to its unique characteristics, use of biological agents (biological control) is a promising strategy especially for controlling soil-born pathogens like *S. rolfsii*. The present study was conducted to investigate the biocontrol activity of antagonistic bacteria against *S. rolfsii* and identify the mechanisms, genes and metabolites involved in the biocontrol activity under laboratory and greenhouse conditions during 2009/10 in Phytopathology Laboratory, Wageningen University, The Netherlands. A total of 16 bacterial strains were evaluated for in vitro and in vivo antagonistic activity. To further identify the genes involved in biocontrol activity, plasposon inserted mutant derivative strains were analyzed and secondary metabolites responsible for antagonism were also identified. Furthermore, unidentified groundnut indigenous bacterial isolates were grouped based on BOX-PCR analysis and representative isolates were identified to species level by 16S rRNA sequencing. The result showed that *Pseudomonas fluorescens* Pf-5, *P. chlororaphis* PHZ24, *P. sp.* C52 and *P. fluorescens* Q8r1-96 and *Bacillus subtilis* were able to effectively inhibit in vitro mycelial growth of *S. rolfsii* H-001. However,

these antagonists did not significantly inhibit sclerotial germination. Moreover, RP-HPLC and TLC analysis and in vitro studies confirmed that the antagonists were able to produce the secondary metabolites cyclic lipopeptides, Phenazines, 2,4-diacetylphloroglucinol, Pyoluteorin and Pyrrolnitrin and some these compounds were responsible for in vitro and in vivo antagonism. Studies on molecular characterization of groundnut indigenous bacterial strains (isolated from groundnut rhizosphere in Vietnam) revealed that diverse bacterial species belonging to different phyla (*Chryseobacterium* spp., *Burkholderia cepacia* and *Bacillus subtilis*) inhabit groundnut rhizosphere. However, mechanisms and/or metabolites involved in antagonistic activity of indigenous bacterial isolates are not known and need to be further investigated. Moreover, studies on structural elucidation of metabolites, molecular characterization and biocontrol efficacy of the indigenous bacterial strains under field condition should be the focus of future studies.

Key words: *Pseudomonas*, Biocontrol, antibiotics, *Sclerotium rolfsii*, stem rot, groundnut

Prevalence of Honey Bee Nosemosis and Pests in Three Districts of Jimma Zone

By

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Abstract

A cross sectional epidemiological study was conducted from November 2008 to March 2009 in Jimma Zone of south western Oromia to determine the prevalence of nosemosis and pests. A total of 292 honey bee colonies in 51 apiaries were selected from three districts of the zone and examined for the presence of nosemosis and pests. The prevalence of nosema during the study was 32.2% and 26 % in modern and traditional hives respectively. There was no statistically significant variation in overall prevalence of nosema infestation between modern and traditional during the study period ($P= 0.264$). However, there is statistical significance of nosemosis between the districts in traditional hives ($p<0.002$); and in modern ($p<0.05$). The modern and traditional hives inspection revealed the existence of 4 different types of honey bee pests and enemies. The total prevalence of pest infestation recorded in traditional hives of the three districts of Jimma zone were 16.8% and the total prevalence of pest infestation recorded in modern hives of the same districts of Jimma zone were 30.8%. The result indicated that nosemosis and pests are important honeybee diseases with high economic significance that affect the productivity of this sector; hence there is a need for establishing a systematic disease control and prevention methods in these areas.

Key words: Jimma Zone, Nosemosis, Pests, prevalence

Isolation and Identification of *Staphylococcus* Species from Ethiopian Cottage Cheese (Ayib) and Raw Bovine Milk in Debre Zeit, Ethiopia

By

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Abstract

In this study, investigation of the presence of *Staphylococcus* and determination of its prevalence and distribution, identification of *Staphylococcus* species and determination of their prevalence and distribution and characterization of the isolates in order to determine their ability in synthesizing coagulase, from Ethiopian cottage cheese (*ayib*) and raw bovine milk samples were conducted from October 2008 to April 2009 in Debre Zeit. Cottage cheese (200), buckets milk of farms (100) and tanks milk of milk collection centers (100) were analyzed. The identification results showed 24%, 33% and 46% prevalence of *Staphylococcus* in cottage cheese, buckets milk and tanks milk, respectively with an overall prevalence of 31.8% (127/400) in the examined foods. The 127 staphylococci isolates were finally identified by their biochemical characteristics for species assignment. They were divided into 4 groups: the first comprised the species *S. aureus* with a total of 28 (7%) isolates the second and third were represented respectively by the species *S. intermedius*, with 28 (7%) isolates and *S. hycius* with 20 (5%) isolates; the last contained 51 (12.8 %) isolates that were found to be coagulase negative staphylococci (CNS). Comparing the proportion of each *Staphylococcus* species isolated to the total number isolates (127) in the current study, CNS was the dominant (40%) followed by *S. aureus* and *S. intermedius* (22%) each and *S. hicus* (16%). The 48 isolates proved to be *Staphylococcus* from cottage cheese samples were tested for species assignment. They were grouped into *S. aureus* with 10 (5%) isolates, *S. intermedius* with 11 (5.5%) isolates, *S. hycius* with 8 (4%) isolates and CNS with 19 (9.5 %) isolates. Comparison of the prevalence of *Staphylococcus* in raw bulk milk samples showed a relatively higher prevalence in tanks milk (46%) than buckets milk (33%). However, this difference was not statistically significant ($p>0.05$). The 33 isolates identified as staphylococci

from samples of buckets milk were tested for species assignment. They were grouped into *S. aureus* with 8 (8%) isolates, *S. intermedius* with 6 (6%) isolates, *S. hycius* with 6 (6%) isolates and CNS with 13 (13%) isolates. The 46 isolates identified as staphylococci from samples of tanks milk were tested for species assignment. They were grouped into *S. aureus* with 10 (10%) isolates, *S. intermedius* with 11 (11%) isolates, *S. hycius* with 6 (6%) isolates and CNS with 19 (19%) isolates. There was no significant difference ($p>0.05$) among these proportion of isolates in both buckets and tanks milk. All the isolates were tested for the production of coagulase to determine their pathogenicity. The prevalence of coagulase positive staphylococci (CPS) in the study were found to be 14.5%, 20% and 27% in cottage cheese, buckets milk and tanks milk, respectively with an overall prevalence of 19% (76/400). The CPS isolated in the present study comprises 60% (76/127) of the total *Staphylococcus* isolates. Comparison of the prevalence of CPS in the raw milk samples collected from two critical points showed a relatively higher CPS prevalence in tanks milk than buckets milk. However, this difference was not statistically significant ($p>0.05$). The high level of *Staphylococcus* isolate found in the cottage cheese and raw milk samples in the present study represent a poor keeping quality and public health risk to the consumer. This suggests the need to implement strict hygienic control measures along the food chain to improve the hygienic conditions during manufacturing, handling, storage and commercialization of cheese and milk in order to guarantee the quality of these highly popular products in Debre Zeit in order to decrease the risk of staphylococcal food poisoning.

Key words: Buckets milk, Cottage cheese, Debre Zeit, Prevalence, *Staphylococcus*, Tanks milk

Honey Market Chain Analysis: The Case of Burie Woreda, West Gojjam Zone, Amhara National Regional State

By

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Abstract

This research thesis examines marketing chain of honey in Burie woreda, West Gojjam Zone, Amhara National Regional State. The thesis report attempts to identify marketing channels, and the role and linkages of marketing agents, analyze the costs and margins for marketing channels and identifying factors that affect the amount of honey supplied to the market in the study area. Burie woreda is one of the potential honey producing areas from West Gojjam Zone. The total honey production of the woreda in 2007/8 was estimated to be 146 tons and this particular study revealed that about 135 tons of the produce which account 92% in 2007/8 was supplied to the market. Structure, conduct and performance model was used to analyze marketing channels and the role and linkages of marketing agents. About 17 major marketing channels were identified in this study. Woreda wholesalers and cooperatives purchased about 34.5 and 23.43% of beekeepers production respectively. The findings of this study suggests that Addis Ababa wholesalers handled large amount of honey purchased and the Concentration Ratio index also confirms that 92.3% of purchased honey was handled by four large wholesale traders at Addis Ababa. Analysis of marketing costs and margins were also used to investigate honey market performance and accordingly this study indicates that high transaction costs and marketing margin were found in the channels starting from rural markets and ending in Addis Ababa markets where multiple actors are involved between the producers and the consumers. Heckman two stage model results indicate that; income from farm and nonfarm activity, beekeeping experience, beekeeping training, apiary visit and access to improved beekeeping equipments were the variables that affect positively the amount of honey supplied to the market by beekeepers in the study area.

Pollen Viability and Fruit Set of Tomato Introgression Lines (*Lycopersicon Esculentum X*) *L.Chmielewskii* as Affected by Moderately High Temperature Regimes

By

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Abstract

Tomato (*Lycopersicon esculentum* Mill.) is one of the most important, widely grown and consumed vegetable crops next to potato in the world. However, the rise of global temperature now a days is becoming the most important problems in all crops including tomato productivity. Thus, breeding for high temperature tolerance is better option to overcome such problems. This study was conducted to identify moderately high temperature tolerant tomato genotypes developed from *L. esculentum* (Moneyberg) x *L. chmielewskii* (La 1840) cross and to elucidate physiological and possibly genetic background of such possible tolerance. To accomplish this, 58 tomato genotypes were subjected to two moderately high temperature regimes, 28/22 °C and 25/19 °C (day/night) one after the other on the same plants in multi-span Venlo-type greenhouse. The experiment was arranged in Randomized Complete Block Design with three replications on rock wool slab. The result showed significant interaction effects between genotype and temperature for pollen germination and fruit set percentage. Fruit set percentage was affected at moderately high temperature regimes in genotypic dependent way. Genotype 1, 5, 7, 12, 14, 16, 17, 44 and 56 performed well in their fruit set at both temperature regimes where as fruit set on genotype 6, 23, 46, 48, 51, 60 and 61 was severely affected especially at 28/22°C. Genotypes which have had higher fruit set percentage also showed higher pollen germination percentage.

This indicated that the reduction in fruit set percentage of the genotypes could be explained by poor pollen germination at moderately high temperature stress. Genotype 56, introgression on chromosome 10+11, was the leading genotype in all parameters considered in this study. This genotype and those performed well can be used under moderately high temperature regimes for production. But, it is important to investigate the links between the phenotype and introgression position to find out genes responsible for the enhanced high temperature tolerance.

Key words: tomato, pollen viability, fruit set, temperature



**Some of the Participants of the Parallel Sessions of Jimma University-College of
Agriculture and Veterinary Medicine**

Study on the Way of Making Plain Wax Foundation Sheet and its Effect on Honey Yield

By

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Abstract

On the objective of making plain wax foundation sheet and its effect on honey yield, the plain wax foundation sheet was made by wood and the effect of this foundation sheet on honey yield was tested. The plain wax foundation sheet was given to the colonies and the colonies were able to construct cells on the plain wax foundation sheet i.e. the combs were completely drawn out. This showed that the honeybees could easily accept the plain wax foundation sheet as that of embossed wax foundation sheet. Honey was harvested from the colonies provided with plain wax foundation sheet and compared with honey harvested from colonies provided with embossed wax foundation sheet and showed no significance difference ($P>0.05$). The cell depth was measured and compared with that of cell depth and showed no significance difference ($p< 0.05$). The cost incurred to buy the casting mold that is used to prepare embossed foundation is about 3000-4000 Eth birr whereas the mold to prepare plain foundation sheet could be made with locally available materials that costs less than 80 Eth.birr. The amount money spent to prepare one frame of plain and embossed wax foundation sheet were calculated and it was found to be 30 cents and 80 cents respectively. In addition with one kilogram of pure beeswax only 8-9 embossed wax foundation sheets can be made whereas this amount of beeswax, 10-12 plain wax foundation sheets can be prepared. Since the honey bees can easily accept plain wax foundation and the honey yield are not significantly different from that of embossed wax foundation sheet ($p>0.05$), a beekeeper could make the plain wax foundation sheet with local available materials such as from piece of wood or plywood and could easily alleviate the problem of casting mold.

**Determinants in Adoption of Rainwater Harvesting Technology to Combat the
Ever-changing Climate Variability in Lanfuro Woreda, Southern Region,
Ethiopia**

By

Aziz Shikur

College of Agriculture and Veterinary Medicine, Jimma University

Abstract

Under the current crop farming system, an adequate volume of food grain could be grown, when the rainfall distribution is fairly even. The grim reality, however, is that the magnitude of rainfall variations in Ethiopia has been scaling up through time. To resolve this problem the Ministry of Agriculture and some nongovernmental organizations have promoted RWH structures, most commonly trapezoidal type RWH. The major concern of this study was, therefore, to identify socio-economic, physical, psychological and institutional constraints & opportunities that could determine the adoption of RWH technology with a special emphasis to trapezoidal rain water harvesting structures. The study was conducted in Lanfuro Wereda, Silte Zone of South Nations Nationalities and People's Regional State. Likert scale was employed to measure the attitude of farmers towards RWH technology. An econometric model, binary logit model, was employed for determinants in adoption of RWH technology. A sum of explanatory variables for the binary logit model was used out of which some variables were found significant to affect the adoption of RWH technology. These are labour availability in man equivalent, indigenous water harvesting experience of the household, distance of market from residence, sex of the household head farm size of the household head, total tropical livestock unit owned, off-farm income of the household head, training in areas of RWH, perception of farmers towards security of land ownership and extension service in areas of RWH. Any effort in promoting RWH practice, however, should consider the social, economic, institutional, physical and technological characteristics for better adoption of the same.

Screening *Arabidopsis thaliana* T-DNA Mutants for Resistance towards *Verticillium dahliae*

By

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Abstract

To investigate for sources of resistance towards *Verticillium* wilt disease, *Arabidopsis*, a model plant, has been used to search for genes involved in the enhanced *Verticillium* resistance which could eventually be used for resistance breeding in tomato. In order to determine genes responsible for the enhanced resistance in these mutants, T-DNA knock-out lines for the genes located in the vicinity of the activation tag insertion site were ordered from NASC, UK. Thus, the objectives of this project were to screen T-DNA knock-out *Arabidopsis* lines (mutants) for resistance towards *V. dahliae* and to determine the position of activation tag insertion site for these two mutants, A3 and A4. About 16 *Arabidopsis* T-DNA mutants were screened for resistance towards *V. dahliae* strain JR2 under greenhouse conditions at Unifarm, Wageningen University, The Netherlands. As an indicator of *Verticillium* disease severity, parameters such as measuring plant height, percentage of diseased leaves, and quantification of *Verticillium* biomass were taken and analyzed. From these screening, mutants M880, M884, P37, P80, M050 and M070 found to be susceptible to *V. dahliae*. This suggests that most likely, the corresponding genes of these mutants could be responsible for the enhanced resistance of the respective activation tagged mutants. On the other hand, P05/3, P45-2, and P60 were as susceptible as the wild type (Columbia-0), which might indicate the role of these genes in *Verticillium* resistance is unlikely. For the other mutants, it needs to be repeated to draw a reliable conclusion. Among the parameters analyzed, plant height is not a good indicator of stunting as none of the T-DNA mutants showed difference when compared to Columbia-0.

Keywords: Activation tagging, *Arabidopsis thaliana*, T-DNA mutants, *Verticillium* spp.

Closing Session

Outstanding Issues in the Parallel Sessions and General Discussion

Chairperson: Dr Azage Tegegne

Presenters: Coordinators of Research, Graduate Studies and CBE of the six colleges

Rapporteurs: Dr. Tesfaye Refera and Dr. Waktole Sori

Date: February 18, 2011.

Presenter 1: College of Social sciences and Law

In the parallel session of this college, there were 11 papers presented. The important recommendable and researchable issues presented were:

1. Language and federalism
2. Conflict management and peace building
3. Governance (Decentralization and development)
4. ICT in facilitating learning
5. Villagization and development
6. Behavior and mental health
7. Poetry and political transformation

The Thematic research areas identified that are trans-disciplinary in nature were:

- Standardization and scientific terms
- Folklore and political transformation
- Conflict management system
- Federalism: decentralization, good governance and local development.
- Psychological development and health system

Presenter 2: College of Business and Economics

In this parallel session, only four papers were presented under the topics:

1. Consumer right issues
2. Comprehensive yardsticks
3. Service quality management
4. Corporate governance

Presenter 3: Jimma Institute of Technology

In this parallel session of the institute, a total of 11 papers were presented in the parallel session addressing different issues; however the important issues were:-

1. Efficient and sustainable utilization of different energy resources (such as Bio-fuel, Hydropower, Solar, Wind and Geothermal) were discussed with respect to their potentials, access, and environment and food security concerns.
2. Mechanism to link staff and postgraduate research with service was discussed. This includes research related to renewable energy in Jimma zone and beyond.
3. Lead pollution and its consequence on environment
4. Affordable building materials such as compressed and stabilized earth blocks and low cost adhesive materials were dealt with respect to cost and durability.
5. Methodologies for processing nano-biosensors.
6. Semi-automatic *Injera* baking machine.
7. The role of GIS for different sectors development.

An invited guest from Ministry of Science and Technology suggested the college to thrive to get funds from external sources. The external sources for research fund can be obtained when the college research is directed towards solving problems related to the society (population, labor, infrastructure, poverty and education), energy, economy and environment. The college showed interest to work in collaboration with other disciplines (to enter into multidisciplinary research), stakeholder and ministries such as Ministry of Science and Technology, Ministry of Water and Energy, etc. It was also noted that the college has developed five years strategic plan and being promoted from college to institute level, hence from now onward called Jimma Institute of technology.

Presenter 4: College of public health and medical sciences

In this parallel session, 8 papers were presented and 50-100 attendees were reported. Among the papers presented the following were the main thematic areas which the parallel session addressed:-

1. Important issues that needs a concerted efforts of agriculturist, social scientist, engineers and health professionals were emanated from this parallel session discussion
2. For health improvement the effect of food insecurity was dealt that has also reflection on school absenteeism that impacts educational attainment. The impact of food insecurity affects by and large female students.
3. Hospital anxiety and depression scale in orphan adolescents
4. Range of sexual behaviors and their pattern of development among Jimma university
5. Virginity value on boy-girl friendship
6. Antihelmentic effects of the extracts of selected medicinal plants
7. Oral health- hygiene

Presenter 5: College of Natural Sciences

In this parallel session 12 papers were presented from 13 abstracts submitted and 25-30 attendees were registered with no guest participant.

Outstanding issues of the parallel session were:

1. Food- security

- Mushroom cultivation and popularization
- Cassava cultivation
- Bamboo cultivation and processing

These were considered as an alternative food source to deal with problem of food insecurity.

2. Biodiversity conservation and bio-prospecting

- Conservation of wet-lands
- Bamboo for erosion management

- Sustainable forest management
- Medicinal plants
- Pre and post harvest pest management

3. Health related issues

- Malaria and drug resistance
- Meat quality and safety
- Dental caries

After the thematic research areas were presented, the college showed interest to work in collaboration with other disciplines in a multidisciplinary approach. The following multidisciplinary researches were proposed:

1. Malaria and dental issues can be addressed with collaborative efforts of natural sciences and Public health and medical sciences colleges.
2. Coffee and forest management (college of natural sciences, agriculture and veterinary medicine and college of social sciences and law).
3. Food safety (College of natural sciences and Public health and medical sciences).
4. Wet land management (college of natural sciences and agriculture and veterinary medicine).

Finally, the college has reported the main constraint in undertaking research in the college as limited budget allocation to conduct meaningful research and the issues of research ownership. The college suggested the way forward to totally decentralize research budget from university level to college.

Presenter 6: College of Agriculture and Veterinary Medicine

In this parallel session 10 papers were presented and 25-35 attendees were registered.

The following were identified as barriers to carryout problem solving multidisciplinary research in Jimma University. Therefore they have listed what can be done to solve the problems.

Jimma University has to:

1. Implement participatory action research
 - Strengthen the link between research findings and the development need of the society
 - Should involve stake holders in problem identification and intervention.
2. Make clear demarcation of research mandate areas by identifying thematic area with in its mandate
3. Graduate study should efficiently utilize the available resources and produce quality outputs.
4. Solicit additional funds to carry out multidisciplinary research project based on the needs of the stakeholders
5. Jimma University should commercialize its laboratories and research resources to create additional fund for further research.
6. Should participate or invite all stakeholders on the annual research conference of Jimma University.
7. Should work on gender main streaming to increase the participation of female researchers in research activities.
8. Should work on advantageous (in terms of location and strategically important) commodities such as beekeeping, coffee, etc. In the presentation it was indicated that production and marketing of bee colonies can be done at JU for JU community. The university can also offer artificial insemination services to the community.

Policy related issues raised by the representative of the parallel session were:

1. Weak communication in science:
 - a) They identified the bottleneck for communication is due to lack of publication handling fee.
 - b) The value given to emerging journal of Jimma University is low that discourages staff involvement in research and publication in emerging journals.
2. The academic promotion rules need to be revised.

General Discussion

After college level coordinators for Research, postgraduate and CBE presented summary of the parallel session in this general meeting, the forum was open for discussion by the chairperson. He emphasized the point that the discussion should focus on the future to make research more problem solver and demand driven.

The chairman invited Dr. Behanu Belay (Senior Director for Research Postgraduate studies and CBE) to comment on the presentations from groups in parallel session.

Dr Berhanu presented general discussion points as follows.

1. The need for collaboration and partnership within and between like:-
 - a) Inter-college
 - b) Intra-college
 - c) Institutional linkage
 - d) Stakeholders
 - e) Media
2. Further needs of JU and great support to research of multidisciplinary nature in the future, indicating JU policy framework also supports multidisciplinary research. However, selected thematic areas needs developing tools and methods
3. The need for and further stimulation of Leadership, individuals, departments, colleges and institutional commitment.
4. The need for identifying and focusing on mandate areas (Jimma, South and southwestern part of the country). This helps in avoiding overlap of research interest on an issue by different institutions that result wastage of national resources
5. The need for capacity building and incentives: time allocation for research undertaking

6. Improvement of research output dissemination mechanism and knowledge management system through:-
 - a) Research and policy linkage
 - b) Knowledge management
 - c) Mass media integration
 - d) Improving skill in dissemination of research outputs
 - e) Timely reporting and sharing of results
 - f) Journals hosted in colleges (creation of enabling environment and distribution)
 - g) Publication of research output in local languages
7. Creation of common data base, data sharing and data archiving between colleges, departments, universities that could help in:-
 - a) Combating plagiarism
 - b) Intellectual property right policy formulation, etc

After Dr. Berhanu's presentation, the following comments and suggestion were forwarded by the participants

With respect to JU research thematic area:

- Thematic areas of research for colleges should be based on policy documents of the country in different sectors.
- JU office of research should work on harmonization of the thematic areas.

With respect to research facility and incentives:

- Every college will have research staff where 75% of their time will be devoted to research.
- For teaching staff, 25% of staff time will be devoted for research work.
- The University should strive to establish strong research laboratory with standard facilities for commercialization. As an example central instrumentation services was indicated.

- In order to implement multidisciplinary research approach, the incentive may not be in terms of money only.
- The incentive system should be carefully developed to prevent emerging of corrupted system.

With respect to role of leadership in multidisciplinary research

- Realization of multidisciplinary research needs leadership and commitment at different stages. Commitment of the leadership is required to accommodate action research and multidisciplinary research.
- Incentive mechanisms for interdisciplinary research and impact driven research should be designed and the University should discourage solo-authorship papers.
- Multidisciplinary research is challenging for the leadership and non-of us have that skill. Qualities such as tolerance, inspiration, etc are needed. There is no system that encourages coaching, leadership and mentor. There should be an incentive system and the cultures have to be nurtured.

With respect to collaboration and partnership issues

- Beyond the collaboration of institutions with university, we should think of incorporating the community by creating a forum like farmer's day, industry day, business day, science day, etc.
- We should not thinking of forging collaboration from immediate advantage point of view. We should emphasis on long term partnership. The partnership should be strong, integrated and cascaded.

With respect to the issue of mandate area to impact area

- The mandate area of JU research is not clearly set. We started with Gilgel Gibe I project. Now the project is expanding and we will also follow its pursuit to Gibe II, III, and IV projects.
- Mandate area – is comparable advantage like Geography. Impact areas of JU are in teaching and its strong influence in health sciences at national level.

With respect to visibility of research output and communication

- We have to learn how to speak to policy makers. We need to publish policy briefs in local languages to communicate our findings with the community.
- We have to establish knowledge management system. The data has to be well organized and presented to convince policy makers.
- To increase visibility of research output, we have to use the media.
- Researchers emphasize technical work and output. The policy makers may not understand and therefore proper media has to be employed for communication.
- The Communication Strategy can be used to:
 - ✓ Establishing common database for research works completed.
 - ✓ Establish agreement with other institutions to share their data base systems.
 - ✓ Use of software to prevent plagiarism.
- In addition to data base, data archiving has to be established.
- Policy for protection of intellectual property helps to prevent plagiarism.

With these deliberations the general discussion was concluded.

Closing Speech

By

Ato Kora Tushune

V/President for Administration and Development

HE Dr. Taye Tolemariam, Vice President for Academic Research and Student Affairs

Esteemed Participants

Colleagues

Ladies and Gentlemen

Research is a vital aspect of academic life and it has become a hallmark of institutions of higher learning. In successful universities research has a synergetic effect of expanding the frontiers of knowledge, enhancing the quality teaching and learning and providing solutions to societal problems.

In many developing countries including Ethiopia these potentials of research in higher education institutions (HEIs) are not realized due to a number of challenges. There is an outdated research organization and management; the institutional environment is usually difficult to attract and retain qualified staff; there is a poorly developed research culture and basic skills of research undertaking and scientific writing; the crushing teaching load of the academic staff has eaten into their precious research time leaving virtually little time for research and scholarly activities; there is lack of sustainable funding and poorly developed research infrastructure; and even worrisome is the paucity of efforts to forge collaboration and work in partnership to bridge the prevailing capacity gaps.

It is the realization of these challenges that has prompted Jimma University to reconsider and fundamental reform its business of research. The incompatibility of its aspiration to become a research-driven university and the prevailing reality on the ground has forced the University to

critically reexamine its research policy and strategies. The traditional fragmented approach to research that had no impact on institutional and societal problems has to give ways to thematic approach that geared towards better impact. The university can no more set research agenda behind closed door in isolation, stakeholders should be partners in identification, conducting and implementation phases of research. It has also realized that conventional disciplinary research is no more a panacea to every problem in the society. Time has now come for research teams to work across disciplinary walls to effectively address societal problems. And working in collaboration and partnership is a way forward in globalized world where everything affects everything else.



Ato Kora Tushune

V/President for Administration and Development

Standing where we are today and anticipating the next annual research conference we all realize that there are rooms for improvement. Generally speaking, however, I hope this conference has contributed to the momentum of institutional research reforms, and strongly believe that the deliberations and conclusions of this conference have tried to address the theme selected for this

conference: *Enhancing Multidisciplinary Research: a Key to Invigorate Need-Based and Demand-Driven Research*. This conference has been an important addition to the common and increasingly louder call for quality and relevance of research in higher education institutions (HEIs) in Ethiopia. The Growth and Transformation Plan (GTP) that aimed at elevating the country to the level of a middle income country has set aside indispensable roles for the higher education sector in general and universities in particular. Universities should play a significant role in seeking solutions to socioeconomic challenges of the country, in development and extension of knowledge and technologies, and in training of competent workforce for the emerging knowledge economy presuppose a sound research capacity at HEIs of the country. Therefore, the theme of this conference pretty well resonates with the national policy of the country in terms of both timing and scope.

Now that we have identified priority areas for action is a positive development by itself. But walking the talk is the ultimate test of our commitment. I hope the results of this conference will be action points for the leaders, managers, researchers and administrators of the University and all participants. I strongly believe sister institutions who have participated in this conference had their share of the lessons to strengthen research in their respective institutions, and collaborators have also picked home-take assignments to strengthen collaboration with HEIs in a spirit of partnership for a mutual benefit and sustainable impact

Finally, in the name of Jimma University and its community I would like to thank all those who came for this conference especially our true friends and allies who travelled all the way to Jimma to be part of this historic conference. Allow me also to express my heartfelt appreciation to the speakers, moderators and rapporteurs of this conference who generously devoted their time to ensure the smooth running of the sessions. Ladies and gentlemen, I hope you all realize the level of efforts that go into the organization of research conference of this scale. The secret of the success of this conference is the hard work and dedication of the organizing team and all relevant office of the University that I cannot list here. Coordinated by Dr. Berhanu Belay, the Senior Director for Research, Postgraduate programs and CBE, this team has taken care of all key

aspects of this conference including the secretarial and communication services, scheduling, logistics, accommodation, venue set-up and documentation activities. Please join me in big hands to acknowledge the contribution of this team and to honor all participants of this conference.

With these brief remarks, I declare that this conference is now officially concluded. Let's remain committed to realizing a research driven university that effectively share its minds with others and meaningfully contribute to socioeconomic development of the country.

I thank you

Annex

List of Participants of the Second Annual Research Conference of Jimma University

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Conference Program

Day 1: 17th Feb. 2011 (General-opening Session)

Time	Activities	Speaker	Venue
8:30-9:00	Registration	All participants	JUCAVM Main Conference Hall
8:30-8:35	Introduction to the Conference Program	Mr Melkamu Dumessa, Director for Public Relation and Communication (JU)	
8:35-8:45	Well-come Speech	Dr Berhanu Belay (Senior Director for Reserach, CBE and PGS (JU))	
8:45-8:55	Opening Remarks	Dr Taye Tolemariam (V/President for Acadamic, Research and Students Affairs, JU)	
8:55-9:00	Key note address		

Section I: Conference Background Papers (Lead Papers)

Day 1: 17th Feb. 2011

Time	Activities/title of the papers	Presenter	Chairperson and Rapporteurs	Venue
9:00-9:15	Overview of Research, Consultancy, Community Based Education and Post Graduate studies of Jimma University	Dr Berhanu Belay	Dr. Kifle Woldemicheal Dr. Tesfaye Refera Dr. Argaw Ambelu	JUCAVM Main Conference Hall
9:15-9:35	Integrating Graduate Research to Development Agenda of Commercialization of Smallholder Agriculture: IPMS Experience with Ethiopian Universities	Dr Azage Tegegne		
9:35-9:55	Promoting Multidisciplinary Research for a Better Impact: Experiences from VLIR-IUC Partnership Program in Jimma University	Mr Kora Tushune, V/President, JU		
9:55-10:25	Discussion			
10:25-10:55	Health break and group photograph	Audiovisual center, JU		Greener area
10:55-11:10	Infant and Child Health in Ethiopia: Some Reflections on Patterns and Changes	Dr Degnet Abebaw	Dr. Abrham Haileamlak Dr. Ketema Bacha Ato Efrem Wakjira	JUCAVM Main Conference Hall
11:10-11:25	Challenges and Opportunities of Modern Technologies in Ethiopia	Dr Berihanu Gizaw H/Mariam		
11:25-11:40	Experience in Reorienting Forestry Research and Training in Ethiopia: The Case of Development Oriented Interdisciplinary Thematic Action	Dr. Habtemariam Kassa		

	Research (DOIT-AR) Program at Wondo Genet College of Forestry and Natural Resources			
11:40-12:30	Discussion			
12:30-2:00	Lunch Break			JUCAVM Staff lounge
2:00-2:10	Introduction to parallel session	Dr. Waktole Sori		JUCAVM Main Conference Hall

Section II: Parallel Sessions

Parallel Session 1: College of Social Sciences and Law, Jimma University

Day 1: 17th Feb. 2011

Time	Activities/title of the papers	Presenter	Chairperson and Rapporteurs	Venue
2:10-2:30	The Verb Morphology of Jijiga Somali	Tibebu Shite	Ato Gashaun Lemessa Alemayehu Haileye Kassaye Ambaye	B ₁ -24
2:30-2:50	Survey of Research Terms Used in Afan Oromo: With Special Reference to Three Universities in Ethiopia	Tariku Sime		
2:50-3:10	The Oromia Rural Land Dispute Settlement Scheme, So Ambiguous and Expectedly Not Working	Birhanu Beyene Birhanu		
3:10-3:30	Implementation of the district level decentralization program (DLDP) to strengthen local development initiative: The case of Kersa and Tiro-Afeta Woredas in Jima Zone	Ermias Admassu		
3:30-4:20	Discussion			
4:20-4:50	Health Break			
Day 2: Feb. 18, 2011				
8:30-8:50	A Review of the Roles of Information Communication Technologies in Education	Fisseha Mikre	Dr. Ketebo Aliye Bayissa Tesfaye Aliyou Wudu	B ₁ -24
8:50-9:10	Peoples' Beliefs, Attitudes, and Practice in the Use of Insecticide Treated Bed Net (ItN): The Case of Serbo, Nada, and Asendabo Towns	Gashaw Tesfa		
9:10-9:30	Efficacy of Play Therapy in Self-Healing and Enhancing Life-skills of Children under Difficult Circumstances: The Case of Two Orphanages in Addis Ababa, Ethiopia	Berhanu Nigussie		
9:30-10:00	Discussion			
10:00-10:30	Health Break			
10:30-10:50	An Analysis of AU's and UN's Response to Sudan's Crisis in Darfur: What Lessons Learned from Burundi?	Alemu Kassa Reta	Dr. Getachew Seyoum Ermias Admasu Gashaw Tesfa	B ₁ -24
10:50-11:10	Villagisation in Arssi: Was it Agent of Development or Impoverishment?	Ketebo Abdiyo		
11:10-11:30	A look into Afan Oromo Spelling Errors and	Amanuel Raga		

	Faulty Translations on Billboards: with Special attention to Jimma town		
11:30-12:30	Discussion		
12:30-2:00	Lunch Break		Staff lounge
2:00-3:00	Preparation for general discussion and health break		Team

Parallel Session 2: College of Business and Economics, Jimma University

Day 1: 17th Feb. 2011

Time	Activities/title of the papers	Presenter	Chairperson and Rapporteurs	Venue
2:00-2:25	Loan Recovery Performance of Development Bank of Ethiopia (a study on the bank specific factors)	Matiwos Kebede	Dr. Shimelis Zewude, Deresse Mersham, and Muluneh Hideto	B ₁ -25
2:25-2:50	Scenarios of Ethiopian Sugar Industry: Problems and Suggestions	Chalachew Almaw		
2:50-3:15	Corporate Entrepreneurship in Meta Abo Brewery	Yared Asamirew D.		
3:15-4:20	Discussion			
4:20-4:50	Health Break			

Day 2: Feb. 18, 2011

8:30-8:50	Financial and Operational Performance of Private and State Owned Commercial Banks in Ethiopia (A comparative study)	Anteneh Gorfu	Asres Abitie, Germew Tekle, and Zelalem G/Tsadik	B ₁ -25
8:50-9:10	Evaluation of Service Quality Management Practice in Jimma University	Zelalem G/tsadik		
9:10-9:30	Performance Measurement Yardsticks of Microfinance Sector and their Applications in Ethiopia	Abiy Getahun		
9:30-10:00	Discussion			
10:00-10:30	Health Break			
10:30-10:50	A Study on the End Use of Borrowings and Follow up made by Commercial Banks in Illubabor Zone	<i>Tadele Mengesha</i>	Bedassa Wolteji, Reta Megerssa and Fikru Gizahine	B ₁ -25
10:50-11:10	Greener Marketing: A Global Perspective on Greening Marketing practice	Nitin Gupta		
11:10-11:30	Awareness About Consumer Rights In India in the Globalized Business Environment –An Empirical Investigation of Andhra Pradesh State	Praveen Kumar Reddy		
11:30-12:30	Discussion			
12:30-2:00	Lunch Break		JUCAVM Staff lounge	
2:00-3:00	Preparation for general discussion and health break		Team	

Parallel Session 3: College of Natural Sciences, Jimma University

Day 1: 17th Feb. 2011

Time	Activities/title of the papers	Presenter	Chairperson and Rapporteurs	Venue
2:00-2:20	Bioactivity of Some Essential Oils Against the Mediterranean Fruit Flt (<i>Ceratitis Capitata</i>) Under Laboratory Condition	Abebe Asale	Ketema Bacha, Tefera Entele and Mitiku Daba	B ₂ -23
2:20-2:40	The Prevalence and Antibioqram of Salmonella and Shigella Isolated from Abattoir, Jimma Town, Southwestern Ethiopia	Anbessa Dabassa		
2:40-3:00	Evaluation of Locally Available Substrates for Cultivation of Oyster Mushroom (<i>Pleurotus ostreatus</i>) in Jimma, Ethiopia	Beje Gume		
3:00-3:20	An Account on Taxonomy and Distribution of Old World Bamboo Genus <i>Oxytenanthera</i> Munro in Africa and Asia	M. Remesh		
3:20-4:20	Discussion			
4:20-4:50	Health Break			

Day 2: Feb. 18, 2011

8:30-8:45	Wetlands of Ethiopia	Gelaye G/Michael	Dejene Ayele, Zenebe Fikrie and Gelana Chibsa	B ₂ -23
8:45-9:00	Microbiological Study of Cassava-Teff Mixed Dough Fermentation	Nigussie Tesemma		
9:00-9:15	Electrochemical Study of Human Dental Enamel	Bayisa Meka		
9:15-9:30	Characterization of Selected Natural Products from <i>Strobilanthes ciliatus</i> Nees	Reneela, P.		
9:30-10:00	Discussion			
10:00-10:30	Health Break			
10:30-10:45	A Study on the Level of Heavy Metals in the Soil and River Waters Around Awash and Addis Ababa Tanneries in Addis Ababa, Ethiopia	Girma	Diriba Muleta , Menberu Yitbarek and Teshome Tefera	B ₂ -23
10:45-11:00	Therapeutic Efficacy of Chloroquine for Treatment of Plasmodium vivax malaria	Tsige Ketema		
11:00-11:15	Effect of Coffee Management Intensity on Forest Structure and Composition in South Western Ethiopian Coffee Forests: Implications for Forest Coffee Conservation	Kitessa Hundera		
11:15-11:30	Reproductive Biology in <i>Plumbago zeylanica</i> L. : a medicinal plant	Balcha Abera		
11:30-12:30	Discussion			
12:30-2:00	Lunch Break			Staff lounge
2:00-3:00	Preparation for general discussion and health break			Team

Parallel Session 4: College of Public Health and Medical Sciences, JU

Day 1: 17th Feb. 2011

Time	Activities/title of the papers	Presenter	Chairperson and Rapporteurs	Venue
2:00-2:20	Young Adult's Risk Perception, Commitment and Practices in Self Protection against HIV Infection: Using Aids Risk Reduction Model in Metu Town, Southwest Ethiopia	Lakew Terefe	Argaw Ambelu, Tsehaineh Kelemu and Shimelis Ololo	Main hall
2:20-2:40	Indigenous Community Insurance (Iddirs) As An Alternative Health Care Financing In Jimma City, Southwest Ethiopia	Shimeles Ololo		
2:40-3:00	Knowledge and Behavior Related to Oral Health among Jimma University Health Sciences Students, Jimma, Ethiopia	Darout I and Wondwossen F.		
3:00-3:20	Structure, reliability, and applicability of the Amharic version of the Hospital Anxiety and Depression Scales (Amharic-HADS) in a Community Sample of Orphan Adolescents in Addis Ababa, Ethiopia	Fentie Ambaw		
3:20-4:20	Discussion			
4:20-4:50	Health Break			

Day 2: Feb. 18, 2011

8:30-8:45	Boy/Girl Friend and Virginty Values, and Stigma Related To Condom among Jimma University Students	Fentie Ambaw	Andualem Mossie, Alemayehu Atomsa and Tariku Belay	Main hall
8:45-9:00	Sexual Practices and their Pattern of Development among Jimma University Students	Fentie Ambaw		
9:00-9:15	Anthelmintic Effects of the Extracts of Selected Medicinal Plants against Haemonchus contortus	Jemal Hussien		
9:15-9:30	Food Insecurity, School Absenteeism and Educational Attainment of Adolescents in Southwest Ethiopia	Tefera Belachew		
9:30-10:00	Discussion			
10:00-10:30	Health Break			
10:30-10:50	Objective Structured Clinical Examination (Osce) Examinee's Perception at Department of Pediatrics and Child Health, Jimma University	Belay Shitu		Main hall
10:50-11:10	Evaluation of the Performance of Carestarttm Malaria Pf/Pv Combo Rapid Diagnostic Test for the Diagnosis of Malaria in Jimma, Southwestern Ethiopia	Zelege Mekonnen		
11:10-11:30	In-vitro Susceptibility of Candida albicans from Oral Cavities of HIV/AIDS Patients, Jimma University Specialized Hospital, Southwest Ethiopia	Nasir Tajur		
11:30-12:30	Discussion			
12:30-2:00	Lunch Break			Staff lounge
2:00-3:00	Preparation for general discussion and health break			Team

Parallel Session 5: College of Engineering and Technology, JU

Day 1: 17th Feb. 2011

Time	Activities/title of the papers	Presenter	Chairperson and Rapporteurs	Venue
2:00-2:15	Experimental Investigation of Fluidization Dynamics and Characteristics of Coffee Husk for Gasification	Venkata Ramayya		B ₂ -25
2:15-2:30	Measurement of Solar Insolation in Jimma with a Customized Low Cost Set Up	Yohannis Mitiku		
2:30-2:45	Up gradation of Gera-Dusta Microhydro Rural Electrification Scheme	Biniyam Abate		
2:45-3:00	Compressed and Stabilized Earth Blocks for Affordable Building	Efrem Wakjira		
3:00-3:15	Assessment of the Potential and Challenges of Microfinance Institutions to enable the uptake of Household Biogas in the National Biogas Program of Ethiopia	Biruk Tadesse		
3:15-4:20	Discussion			
4:20-4:50	Health Break			

Day 2: Feb. 18, 2011

8:00-8:15	Biomass Gasification for Production of Producer gas using Wood chip, Saw dust, Trash papers and Other Agricultural Wastes	Shewangizaw Werkagegnehu	Venkata, Areya and Fissaha Bayou	B ₂ -25
8:15-8:30	Blood Lead Level and Associated Risk Factors among Garage Workers in Jimma Zone	Yalemsew Adela		
8:30-8:45	Computational Modeling of Shell-and-Tube Heat Exchanger	Getachew Shunki		
8:45-9:00	Computational Fluid Dynamics Modeling of Turbine Driven Pump	Yohanis Mitiku		
9:00-9:15	Design, Fabrication and Testing of Rotary Enjera Baking Machine	Solomon Mulugeta		
9:15-10:00	Discussion			
10:00-10:30	Health Break			
10:30-10:45	GIS based Accessibility Analysis of Public and Private Health Service Centers in Kirkos Sub-city of Addis Ababa, Ethiopia	Amare Degefaw	Abrham Goje, Demelash and Yalem Sew Adela	B ₂ -25
10:45-11:00	Design and Manufacturing of Wood Working Machine	Shewangizaw Werkagegnehu		
11:00-11:15	Status, Potential and Prospects of Renewable Energy Sources in Jimma Zone: South Western Part of Ethiopia	Abera Melesse		
11:15-11:30	Fabrication of Nanobiosensors for the Detection of Phenolic Compounds	Moses Jeyakumar Rajesh		

11:30-11:45	Visualization and Representation of Molecular Structure of Xanthosine Methyltransferase Enzyme from Ethiopian Coffee, Using Bioinformatics Tool	Prakash Chandra Mishra		
11:45-12:30	Discussion			
12:30-2:00	Lunch Break			Staff lounge
2:00-3:00	Preparation for general discussion and health break			Team

Parallel Session 6: College of Agriculture and Veterinary Medicine, JU

Day 1: 17th Feb. 2011

Time	Activities/title of the papers	Presenter	Chairperson and Rapporteurs	Venue
2:00-2:20	Comparative Analysis of Soil Nutrient Balance in the Selected Sites of Gligel Gibe Catchment; Jimma Zone	Abebayehu Aticho	Derbew Belew , Siraw Dink F/Yesus and Wossene G/Silassie	B ₂ -24
2:20-2:40	Functional analyses of antagonistic bacteria with activity against <i>Sclerotium rolfsii</i> , causal agent of stem rot of groundnut (<i>Arachis hypogaea</i> L.)	Daniel T. Lopisso		
2:40-3:00	Prevalence of Honey Bee Nosemosis and Pests in Three Districts of Jimma Zone	Mihreteab Bekele		
3:00-3:20	Isolation and Identification of <i>Staphylococcus</i> Species from Ethiopian Cottage Cheese (Ayib) and Raw Bovine Milk in Debre Zeit, Ethiopia	Mekonnen Addis Tegegne		
3:20-4:20	Discussion			
4:20-4:50	Health Break			

Day 2: Feb. 18, 2011

8:30-8:45	Honey Market Chain Analysis: The Case of Burie Woreda, West Gojjam Zone, Amhara National Regional State	Getachew Nigussie	Sintayehu Alamerew, Mohammed Worku and Zekarias Shumeta	B ₂ -24
8:45-9:00	Pollen Viability and Fruit Set of Tomato Introgression Lines (<i>Lycopersicon Esculentum</i> X) <i>L.Chmielewskii</i> as Affected by Moderately High Temperature Regimes	Kassaye Tolessa		
9:00-9:15	Assessment of Farmers' Perception on the Current Artificial Insemination Delivery System in Ethiopia: a Case of Adami Tullu District	Tatek Woldu		
9:15-9:30	Utilization of Starch from Selected Crops as a Partial Substitute for Barley Malt in Brewing Technology	Habtamu Admassu		
9:30-10:00	Discussion			
10:00-10:30	Health Break			
10:30-10:50	Study on the Way of Making Plain Wax Foundatio	Kebede	Mulugeta	B ₂ -24

	Sheet and its Effect on Honey Yield	Debele	Seyoum, Mulatu Wakjira and Shiferaw Mulugeta	
10:50-11:10	Determinants in Adoption of Rainwater Harvesting Technology to Combat the Ever-changing Climate Variability in Lanfuro Woreda, Southern Region, Ethiopia	Aziz Shikur		
11:10-11:30	Screening Arabidopsis thaliana T-DNA Mutants for Resistance towards Verticillium dahliae	Mulatu W. Jalata		
11:30-12:30	Discussion			
12:30-2:00	Lunch Break			Staff lounge
2:00-3:00	Preparation for general discussion and health break			Team

Presentation of important issues from each group and General Discussion, 18th Feb. 2011

Time	Activities	Presenter	Chairperson and Rapporteurs	Venue
3:00-3:10	Parallel session 1	Coordinator	Azage Tegegne, Tsfaye Rafera and Waktole Sori	JUCAVM Main Hall
3:10-3:20	Parallel session 2	Coordinator		
3:20-3:30	Parallel session 3	Coordinator		
3:30-3:40	Parallel session 4	Coordinator		
3:40-3:50	Parallel session 5	Coordinator		
3:50-4:00	Parallel session 6	Coordinator		
4:00-5:00	General discussion on outstanding issues and wrap up	Participants		
5:00-5:10	Closing Speech	Dr Taye T/mariam		
5:10-7:00	Campus tour	Public Relation and communication office		
7:00-10:00	ARC Dinner and Certificate award	Organizers		Alumni Garden