JIMMA UNIVERSITY

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Proceedings of the Third Annual Research Conference of Jimma University

Organized by Jimma University

January 26-27, 2012

Jimma, Ethiopia



We are in the Community!

Proceedings of the Third Annual Research Conference of Jimma University

Theme: "The Role of Research and Extension in the Implementation of Growth and Transformation Plan (GTP) of Ethiopia."

Organized by Jimma University

January 26-27, 2012

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Abbreviations

AAIT	Addis Ababa Institute of Technology
AAU	Addis Ababa University
ADRC	Academic Development and Resource Center
AFB	Acid Fast Bacilli
AHD	Aswan High Dam
AHRI	Armauer Hansen Research Institute
ALERT	All Africa Leprosy Rehabilitation and Training Center
ANOVA	The Analysis of Variance
ANZECC	Australian and New Zealand Environment and Conservation Council
ARC	Annual Research Conference
ART	Antiretroviral Treatment
BDAC	Biological Diversity Advisory Committee Commonwealth of Australia
BECO	Bussines and Economics College
BOD	Biological Oxygen Demand
BPACR	Birth preparedness and complication readiness
CAD	Current Account Deficit
CBD	Convention on Biological Diversity
CBE	Community Based Education
CFA	Cooperative Framework Agreement
CGPA	Cumulative Grade Point Average
CNS	College of Natural Sciences
CPHMS	College of Public Health and Medical Sciences
CRGE	Climate-Resilient Green Economy
CRR	Cash reserve Ratio
CSA	Central Statistical Agency
CSSL	College of Social Sciences and Law
DCB	Double-Covered Broadcast
DNA	Deoxyribonucleic Acid
DRC	Congo Democratic Republic
DSM	Demand Side Management
EE	Energy efficiency
EEA	Ethiopian Economic Association
EEPCO	Ethiopian Electric Power Corporation
ELFORA	(a private agro-industrial company of MIDROC Ethiopia)
EMPI	Exchange Market Pressure Index
ENTRO	Eastern Nile Technical Regional Office
EPA	Environmental Protection Authority
EPRDF	Ethiopian People's Revolutionary Democratic Fron
ESDP	Education Sector Development Program
ESDPs	Entrepreneurship Skill Development Programme

ESLCE	Ethiopian School Leaving Certificate Examination
FAO	Food and Agriculture Organization of the United Nations
FDI	Flow of Foreign Direct Investment
FDRE	Federal Democratic Republic of Ethiopia
FP	Family planning
GCE	Glassy Carbon Electrode
GDP	Gross domestic product
GEQIP	General Education Quality Improvement Program
GERD	Grand Ethiopian Renaissance Dam
GIZ	*Gesellschaft für Internationale Zusammenarbeit*
GNDI	Gross National Disposable Income
GNP	Gross National Product
GNS	Gross National Saving
GTP	Growth and Transformation Plan
H&E	Hematoxylin and Eosin
HAVC	Heating, Ventilation, and Air Conditioning
HDP	Higher Diploma Program
HE	Higher Education
HEIs	Higher Education Institutions
HERQA	Higher Education Relevance and Quality Agency
HESC	Higher Education Strategy Center
HIV/AIDS	Human immunodeficiency virus infection / acquired immunodeficiency syndrome
HPV	Human Papilloma Virus
IAP-WASAD	International Action Program on Water and Sustainable Agricultural Development
ICOWE	International Conference on Water and Environment
ICT	Information and communications technology
IDD	Iodine Deficiency Disorder
IEPDS	Institute of Education and Professional Development Studies
IGCC	Integrated Gasification Combined Cycle
IIRO	International Islamic Relief Organization
ILA	International Law Association
IMF	International Monetary Fund
IPoE	International Panel of Experts
IQPEP	Improving Quality of Primary Education Program
IRG	International Resources Group
JIT	Jimma Institute of Technology
JU	Jimma University
JUCAVM	Jimma University College of Agriculture and Veterinary Medicine
JUSH	Jimma University Specialized Hospital
LDC	logarithm of domestic credit
LNUIWC	Law of the Non-navigational Use of International Water Courses
LPA	Line Probe Assay

LPUC	Logarithm of Public Sector Credit
LRGDP	Logarithm of Real Gross Domestic Product
MANETs	Mobile ad hoc networks
MDGs	Millennium Development Goals
MOE	Ministry of Education
MOFED	Ministry of Finance and Economic Development
MoWE	Ministry of Water and Energy
MRSA	*Methicillin-resistant Staphylococcus aureus*
MTBC	*Mycobacterium tuberculosis complex*
MTOE	Million Tonnes of Oil Equivalent
MWE	Megawatts of electricity
MWL	Muslim World League
NAS	National Academy of Science
NBE	National Bank of Ethiopia
NBI	Nile Basin Initiative
NERC	The National Health Research Ethics Review Committee
NGO	Non-governmental Organizations
NPs	Nanoparticles
OAS	Organization of American States
OWA	Olive oil Wastewater Application
PASDEP	Plan for Accelerated and Sustained Development to Eradicate Poverty
PATH	(an international nonprofit organization that transforms global health through innovation)
PCM	Phase Change Materials
PCR	Polymerase Chain Reaction
PGPR	Plant Growth Promoting Rhizobacteria
PGs	Postgraduate Studies
PPC	Preparatory Program Complete
PPS	Probability Proportional to their size
PTV	Plasma Television
RBC	Red Blood Cells
REB	Regional Education Bureas
REER	Real Effective Exchange Rate
ROA	Return on Assets
RTA	Road Traffic Accident
RUSF	Randomized to ready to use supplementary food
SCBD	Secretariat of the Convention on Biological Diversity
SDPRP	Sustainable Development and Poverty Reduction Program
TB	Tuberculosis
TEIs	Teacher Education Institutes
TQM	Total Quality Management
TST	Tuberculin Skin Test
TVET	Technical & Vocational Education and Training
UNDP	United Nations Development Programme

UNESCO	United Nations Educational, Scientific and Cultural Organization
UNGA	United Nations General Assembly
VCA	Vertex component analysis
VECM	Vector Error Correction Model
VOCs	Volatile Organic Compounds
WCED	World Commission for Development and Environment
WHO	World Health Organization
WRB	World Reference Base for Soils
WWI	World War I

Acknowledgments

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Opening Remarks: Dr. Fikre Lemessa, President of Jimma University

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Opening Session

Welcoming Speech

By

Dr. Berhanu Belay

Senior Director for Research, Community Based Education and Grdauate Studies

Dear Dr. Fikre Lemessa, President of Jimma University

Distinguished guests

Conferences participants

Ladies and Gentlemen:

On the behalf of the third Annual Research Conference organizing committee of Jimma University, it is a distinct honor and pleasure for me to welcome each and every one of you to the third Annual Research Conference. The organizing committee members are drawn from Research, CBE and Postgraduate studies coordinators of our colleges, the external relation office and the administrative supporting teams which were a backbone on logistic issues.

Dear participants

It has become a tradition to organize annual research conference through the participation of key stake holders and produce proceedings of the conference. The ARC has also a space in our academic calendar which signifies the commitment of our university for research and outreach. The organization of the ARC as a routine practice at JU is targeted to share the research outputs to our stake holders and also attract partners and collaborators so as to plan research and development projects under win-win situation. When we initiate the first conference, the realization of the conference was not easy that has taken a lot of effort to bring researchers and supportive team on the same plat form. Now the ARC has become a routine activity and quality of the conference output is improving. We believe more and more effort is required to improve the quality of the exercise

Dear participants

Universities are expected to create a plat form as to disseminate research outputs using a number of venues. The research project with out a dissemination strategy and reach of the society is not worthy to fund. And believe me, no donor is ready to support research project with out clear dissemination strategy and beneficiaries of the research project. Hence, JU is not only organizing the ARC but also organize conferences on relevant and topical issues in collaboration with relevant stakeholders. We trust joint conferences would improve partnership of our institutions and pave the way to complement each other and address societal problems. In this disjuncture I would like to request our collaborators and stakeholders to plan together for a common goal and I can assure you JU is committed to work with our collaborators on agreed principles and goals.

Dear participants

In organizing research conference, a big task that triggered the ARC organizing committee was identifying and naming the theme of conferences and assigning lead papers that suit the premise of the conference. GTP and other topical issues were considered as candidate in thematic areas development. We understand that, GTP has a number of plans for example; the Agricultural productivity is targeted to double. The industry will lead the economy in the completion of the five year plan and the contribution of service and agriculture will leave the place for industry. GTP is the center piece of the Ethiopian government that will lay a foundation where Ethiopian can join middle income countries. The indicators to realize GTP are improving livelihood of the citizens, house hold income, healthy citizens, natural resources management and energy and food secured country. We believe there is no topical issue that we should address better than GTP. Therefore, we recognize the dynamic role of research and extension in contributing the realization of GTP and improve the livelihood of the community. In consideration of the above facts, we brainstormed and suggested the theme of conference to center on GTP. The naming and identifying the theme of the conference was participatory in nature. Therefore, the theme of conference is '' the role of research and extension in implementing of the growth and transformation plan of Ethiopia''. The theme of this conference which is devoted to signify the role of research and extension is thus a gesture of our recognition of the importance of the issue.

We found the theme of the conference is timely and relevant because the theme directs our future research and outreach effort to realize the GTP. The lead papers are deliberately

identified to address the theme of the conference and contain a mix of disciplines such as politics of Abay, Energy self sufficiency and bio-energy, Agricultural innovation and outreach, quality of education, Health interventions, Service delivery and Natural resource management.

Dear participants

Please note that, the discussion in the implementation of GTP will continue and a number of conferences, evaluation forums and research and outreach programs to advance GTP will continue



Dr. Berhanu Belay

Senior Director for Research, CBE and Grdauate Studies

Dear participants

In this conference, we hope the first half day will be devoted to address the lead papers that are closely linked to the theme of the conferences and touch the research and outreach in the areas of water and politics, health, Agriculture, energy, services delivery, natural resources management and quality of education. Furthermore, more than 75 papers will be presented in the syndicate and discussion groups. The syndicates are assigned in college bases but it does not mean you should attend the parallel sessions to your respective colleges. Please feel free to join any of the sessions and for your quick reference which session to attend refers the book of abstract that indicates the title and the abstract of each paper. Like our past conference, the parallel sessions will give as feed back on their deliberations and pinpoint outstanding issues that may need research and development effort. Then we will have a

general discussion on cross cutting issues that may need a concerted effort that may be addressed through research, policy direction, institutional arrangement and development

Dear participants

We invited more than 40 individuals representing their institutions. Therefore, we can see diversity of experiences that we would compliment for the common goal. I trust the partnering institutions have a great deal of experience best and JU is committed to work with our partners for a common goal and under a win-win situation.

Finally, I would like to thank you, the workshop participants; your presence contributes for the success of the workshop. May I then with great respect invite Dr. Fikre Lemessa, President of JU to officially open this conference?

Thanks a lot

Opening Remarks

By

Dr. Fikre Lemessa

President of Jimma University

Invited scholars

Invited stakeholders representatives

Ladies and Gentlemen

I want to underscore that research and development is critical for accelerating economic development of a nation. It is even more critical in developing nations where it is required to allocate meager resources for scientific research, development of technical capabilities of the work force and for raising the skills of the academic staffs at the universities in order to enable them conduct problem solving applied researches to provide solution to the community felt needs.

Jimma University is the national pioneer in community based educational philosophy that carries out both basic and applied researches relevant to development. We need to tackle problems of our community through training professionals and researchers who would be engine for developing the knowledge base essential for a country's economic growth and social development.

We aspire to be one of the research based university in Ethiopia with a motto of "We are in the community" dealing with the societal problems being among the community in the rural villages. We are doing our level best to bring a paradigm shift learning from the society and living with them and addressing their problems rather than living aloof as the ivory town considering ourselves as an intellectual isle. It is my strong belief that these young researchers and university staff are well aware of their mission and vision to help this country realize its national vision and millennium development goal set by the United Nations.

Researches in universities are core components of any country's economic, political and social development systems. Knowledge will be augmented and create productive power when research is the fundamental process and its institutionalization will produce researchers with higher caliber and capable of bringing impact on societal problems.

However, research has been singled out as the missing link in Ethiopia's development and extension activities for a long period in the history of this nation.

Ladies and gentlemen,

Ethiopia can achieve its Growth and Transformation Plan through conducting community oriented problem solving research in all sphere of lives to overcome the burden of our community and to facilitate the growth and transformation plan set by the government in contributing data driven evidence based facts to the national development effort set by the government. That is why the theme of this conference is set to be "The Role of Research and Extension in the Implementation of Growth and Transformation Plan (GTP) of Ethiopia."

I am sure the participants in this conference know better than I do that Ethiopia's research capacity is very limited.

Some of the reasons for this challenge include:

- Limited number of PhD holders who can competently supervise research and mentor young researchers;
- Limited funding in form of scholarships and grants for research;
- Limited capacity to translate the little research that takes place into development outcomes for our people.

Ladies and gentlemen, I want to suggest to you to start thinking how to overcome these challenges through the following measures.

In my view, the first step would be to address the limited capacity for effective use and maintenance of research infrastructure at the various levels including educational institutions.

Research would enhance learning at all levels to increase access and quality of education. I believe that research in general and teaching in particular is so critical for the development of our country.

I note that our research skills develop when we train and mentor young researchers in research methods and proposal writing skills. This is really very important step and encourages research at our university to continue with this annual research conference. This annual conference will go a long way in creating a strong research community and addressing some of the challenges facing our country's research.



Dr. Fikre Lemessa, President of Jimma University

It is my hope that this series of annual research conferences will help to create a strong national network of researchers that will contribute to the national growth and transformation plan of our country.

Finally, I wish you an engaging and successful conference at Jimma University.

Thank you,

Fikre Lemessa (PhD)

President of Jimma University

Jimma, Ethiopia

Section 1: Lead Papers Session

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

Renewable Energy for Growth and Transformation Plan of Ethiopia

By

Demissew Eshete

Senior Energy Advisor, GIZ-Ethiopia, Energy Program

Brief summary

The Growth and Transformation Plan is the short term national development plan for Ethiopia for 2011-2015. The plan has been deliberated on by the public, government institutions and other stakeholders and approved by Parliament on 2 December 2010. The Plan projects rapid growth (11% annual growth for GDP) and transformation (20% annual growth for industry).

The Plan provides targets for sectors and sub-sectors including energy. Energy is given a prominent role in the plan and accounts for 45% of the proposed investment during the period. The energy plan includes targets and strategies for the power sector, for liquid biofuels and for energy efficiency.

This review discusses the role of energy in the plan and issues of integration between the energy plan and plans for the other sectors. The review shows that (a) specific targets in other sectors provide the opportunity for better integration of energy plans with other sectors, (b) there is need for systematic analysis of alternatives for energy services, (c) the policy and regulatory implications of the energy plan, in such areas as financing, regulations, and non-public sector participation must be incorporated within the plan to facilitate its realization.

Introduction

The National Energy Network is a network of government, non-government and private organizations working in the area of sustainable energy in Ethiopia. The Network seeks to promote sustainable energy development and to serve as a national forum for information and experience exchange. The Network organizes periodic forums to discuss key areas for the energy sector; this review is prepared in preparation for such a forum in late March 2011.

The GTP is the short term national development plan for the period 2011-2015; the plan provides goals for each sector and for key industries. Sector ministries have contributed to the development of the Plan and have also aligned their own five-year Strategic Plans with the Plan. The Plan has been deliberated on by government institutions at the Federal and Regional level and also by the donor community. It was finally endorsed by the Parliament on 2 December 2010.

Infrastructure development is one of the key, and in terms of investment the largest, areas addressed in the plan. The energy sector is prominent under the infrastructure development plan. The energy plan within the GTP encompasses the power sector, the liquid biofuels sector and efficiency for biomass energy. The energy sector is dealt with in a wider perspective than in the previous two national plans.

The GTP provides indication of the need for cross sectoral integration in the plan. For the transport sector for instance, it states [5.4.1.1]: *roads are built to facilitate socio-economic development and their planning needs to take into account the needs of these sectors.* This applies equally to the energy sector. Secondly, the energy plan must then be consistent and optimal within the sector. Thirdly, the energy plan must be integrated with key national strategies such as climate resilience, and energy sector strategic goals such as energy security.

This review discusses the issues raised in the previous paragraph and attempts to draw lessons for better integration of energy plans with national development plans in the future. The review has the following objectives:

a. Draw lessons in integration of energy plans into development plans (for subsequent plans),
b. Review the energy component of the plan to evaluate if it meets requirements from other sectors,
c. Review implications of the energy plan for policy and regulatory review,
d. Illustrate the structure of the energy sector at the end of the GTP period, and
e. Identify contributions from the private and non-government sectors for realization of the plan.

The review is organized in five sections: chapter 1 briefly reviews how energy plans are addressed in development plans and chapter 2 summarizes the strategies and key targets of the GTP. Chapter 3 reviews sectoral goals and their implication for energy requirements, chapter 4 reviews the adequacy of the energy plan to meet requirements from the other

sectors, and chapter 5 illustrates the structure of the energy sector at the end of the GTP period. Closing remarks are provided at the end.

1. Brief review of integration of energy in development plans

The GTP covers the years 2011 to 2015 and builds on the preceding two national development plans. There is growing appreciation of the role of energy through the three plans: the scope of the energy plans have expanded, investment in energy infrastructure has increased dramatically, and goals have become ambitious and specific.[1] Energy is now considered an important component in the package of development inputs.

The PASDEP and the GTP have included energy as a major component in the overall plan. In both cases the energy sector is addressed under infrastructure; its role in development is generally taken to be the same as other infrastructure: an important input for facilitating development. The weight the energy sector is given in the development plans can be illustrated by the level of investment in the sector: during the PASDEP period energy infrastructure was allocated 20% of total capital investment (Birr 46 billion) while for the GTP period the plan is to allocate 45% of total capital investment (Birr 107 billion).

Energy plans in both the PASDEP and the GTP have focused on providing access to un-served areas and providing reliable power to the growing industrial and service sectors. The power sector is prominent in both plans where specific targets for generation, transmission and service have been stated; in the PASDEP other energy services are presented less prominently and targets are less specific. In the GTP other energy services are addressed, although less prominently compared to the power sector.

The need for integration of infrastructure plans is recognized in the GTP where the case for it is stated for the road sector. First, the energy plan must be based on the needs from the other sectors not developed independently from them. Second, the energy plan must be consistent within the sector and must also be optimal for the services provided. Third, energy service solutions must be in line with national strategies (such as climate resilience, natural resource conservation, equity and empowerment). The following sections provide an overview of these issues.

[1] In the SDPRP there was barely any mention of energy; in the PASDEP only the power sector was considered; in the GTP the power sector, the biofuel sector and alternative energy were considered.

1.1 Integration across sectors

The fact that energy is a derived demand, demand that arises as the result demand for agricultural and industrial products, for transport and other services, means that it cannot be planned independent of the development in the other sectors. The energy plan must be derived from and be consistent with sectoral development plans. The GTP states specific goals for outputs from agriculture, industry, infrastructure, and transport; the energy plan must be based on these targets. Demand projection based on past trends for specific energy types fails to take account of energy efficiency and fuel substitution effects.

Assessment of the energy requirements for the plan can be an opportunity to review the energy sector as a whole including review of policies and regulations. As an example, priorities for cement production in the GTP opens the policy question of what type of thermal fuel (coal, pet coke, heavy fuel oil, or indigenous bioenergy) is most viable from the economic and environmental points of view; this in turn may raise issues of rationalization of other policies (such as energy prices, transport rates, taxes). Another example is priority for sugar production which not only increases demand for energy inputs to the industry but also increases potential ethanol and electricity production.

The implication of integration at the sectoral level is that energy requirements may need to be reassessed based on the plan. As a starting point simple energy intensity based estimates of demands may be made across the sectors. This will indicate sufficiency of the energy plan to meet requirements from the other sectors; this first estimate can then be modified based on alternative scenarios that incorporate the main energy sector considerations (such as energy security, environmental considerations).

The main steps for assessment of demands based projected sectoral development will include the following:

a. *Develop a database of energy intensities for the main economic sectors*. These include road and rail transport, industry, commercial agriculture. The assessment should consider the various energy forms available to meet the requirements (e.g. diesel or electric traction for rail transport, fuel oil or coal for thermal energy in the cement industry).

b. *Estimate outputs and performance indicators when such data are not directly available from the plan*. This is the case, for example, for freight transport: targets for freight ton-km are not available from the plan but may be estimated from the relationship of GDP and freight transport performance.

- Freight transport demand may be projected using the freight transport elasticity with respect to GDP. Studies indicate an elasticity of about 1.3 for developing countries (Benathan, 1992).

Not all sectors and demands need to be evaluated equally; the focus should be on the most energy intensive sectors and on sectors for which output and performance is expected to change significantly. In the case of the GTP, these sectors include:

- Transport, particularly freight transport by road and rail
- Industry, particularly the energy intensive industries such as cement and mining
- Commercial agriculture, particularly large scale farms
- Energy requirements for the domestic sector (regarding access and energy efficiency)

1.2 Integration and consistency within the energy sector

Energy requirements for particular applications can be met by a variety of energy types and technologies. Choice of a specific energy type and technology depends on relative costs (economic, social, and environmental) and risks of each alternative. In order to evaluate all possible alternatives, energy service requirements may be analyzed on useful energy basis (Figure 1.1). When useful energy analysis is not feasible all possible energy and technology combinations must be evaluated (using their respective energy intensities).

Once first estimates for energy requirements are derived from sectoral plans the energy plan can be optimized through analysis of demand and supply options based on policy objectives (security, access, efficiency, sustainability). The energy plan must be designed to meet these requirements at least cost. When the choice of energy demand and supply options has been made the implication of these choices must be evaluated and regulations and policies may need to be reviewed to facilitate implementation of the choices made.

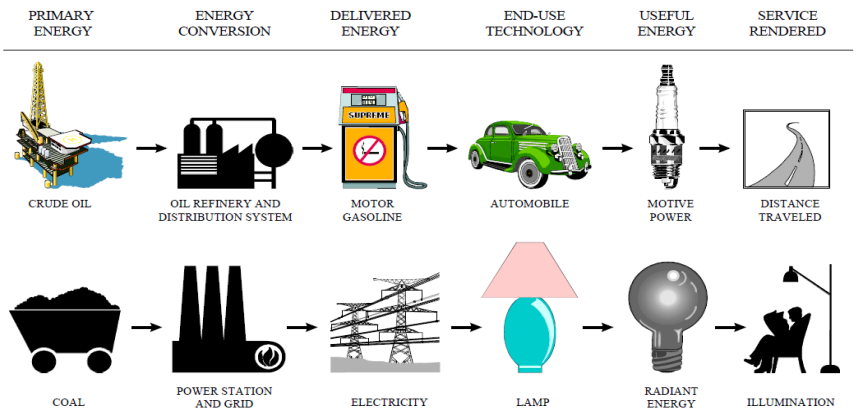
The main steps for ensuring integration and consistency with the energy plan consist of:

a. *Demand projections based on useful energy service (as opposed to delivered energy requirements).* Useful energy based analysis serves to point out that requirements can be met by different demand and supply options.
b. *Estimate of energy requirements based on projected outputs from sectors*. Use the energy intensities together with targets from the plan to project energy demands.
c. *Evaluate costs and benefits of alternative demand management and supply options*. Energy analysis models will be useful for such analysis.

d. *Evaluate implications of choices (e.g. financing, pricing, taxes)*. Once decision is made on the types of energy demand and supply programs to be provided then regulations and policies must be reviewed to facilitate their implementation.

Figure 1.1

The energy supply chain



UNEP/Risoe, 1997.

1.3 Integration at the strategic level

The energy program, in the form of the package of demand and supply projects, must be in line with the overall country strategy. Such strategies may include resilience to climate change, equity and empowerment of women, natural resource conservation and others. The program of activities in the energy plan can then be integrated with plans for other sectors by finding areas of synergy.

> *Synergy has to dimensions: first, individual actions may have multiple impacts, one example is watershed management; second, concurrent application of a package of interventions has more impact than individual interventions.*

Consideration of the second dimension of integration involves thinking how energy might be *integrated with other components* to accelerate the development process. This concept of integration is expressed as follows by a review of integrated energy planning in the Americas (OAS, 1988):

> *This methodology, integrating improved energy inputs with other components of development, results in synergism. In other words, separate inputs, acting simultaneously and in coordination, can have a greater total effect than the sum of the individual components. Identifying opportunities to use energy as a catalytic force to bring about both social and economic development is the underlying goal of the integrated energy development approach.*

The idea is integrating all important inputs for maximum effect.[2]This could be in the form of freeing labour from non-productive activities (through, for example, efficient cooking), then providing income generating activities for freed labour through improved access to electricity for production and learning.

Key actions that may have multi sectoral benefits in the energy and other sectors include watershed management, integrated water resource development, and demand side management. These actions will also contribute to environment sustainability at the local and global levels.

2. Overview of the Growth and Transformation Plan

Ethiopia's long-term vision (2025) is to become *a country where democratic rule, good-governance and social justice reigns, upon the involvement and free will of its peoples; and once extricating itself from poverty and becomes a middle-income economy.* In the economic sector the vision is to *build an economy which has a modern and productive agricultural sector with enhanced technology and an industrial sector that plays a leading role in the economy; to sustain economic development and secure social justice; and, increase per capita income of citizens so that it reaches at the level of those in middle-income countries* (GTP, 2010).

The GTP is the third five year national development plan for Ethiopia since 2000 and covers the years 2011 to 2015. It builds on two previous five year plans (SDPRP for 2001-2005 and PASDEP for 2006-2010). The GTP contributes towards the long term national goal by sustaining the rapid and broad based growth achieved over the PASDEP period. At the end of the GTP period, which coincides with the end year for the Millennium Development Goals (MDGs), all the MDGs are expected to be achieved.

The GTP has seven pillar strategies, these are: (a) sustain fast and equitable growth, (b) maintain agriculture as the driver of growth, (c) increase the role of industry in the economy, (d) expand infrastructure, (e) enhance social development, (f) build human and institutional capacity, and (g) promote women and youth empowerment. Each pillar strategy is built around sector strategies, such as the Agricultural Growth Program and the Industrial

[2] An example for this is irrigation with fertilizer application: an integrated input of both will maximize output; application of one without the other will result in sub optimal or no output.

Development Strategy, which detail implementation strategies. The key targets under each of these pillars are briefly summarized below.

(a) Sustain fast and equitable growth: This strategy centers on rapid economic growth to eradicate poverty and to improve well being. The high level of investment in economic and social infrastructure and services will be further increased. Broad based development will be ensured by continued growth of productivity in the smallholder agriculture sector. The role of industry in the economy will be heightened by new capacity additions for selected industries and by increased utilization of existing industrial capacity.

(b) Maintain agriculture as the driver of growth: The key strategy for the agriculture sector is intensification of marketable products from both small and large farms for the domestic and export markets. This will be achieved through shift to high value crops and focus on high potential areas for increased commercialization of smallholder agriculture, and promotion of extensive large scale commercial agriculture. Increased application of inputs, crop diversity through multi cropping, and watershed management will increase productivity and also build the resilience of the sector to climate change impacts.

(c) Increase the role of industry: The Plan projects expansion of industrial output by 250%. For the medium and large scale manufacturing sub-sector the Plan focuses on building capacity for selected industries (cement, sugar, textiles, and metal) to meet domestic demand and for export. Manufacturing capacity in these industries will increase by 2 to 10 fold current capacity (for sugar and cement respectively). The employment potential in micro and small industries will expand to 3 million.

(d) Expand infrastructure: The main infrastructure development programs during the GTP period are for road, rail, power and irrigation. There will also be additional investments in telecom, urban infrastructure and rural social infrastructure (water supply, health, education). The road network will increase by nearly three times and 2,000km of new railway will be constructed, generating capability for power will grow by four fold, and access to water supply and mobile phones will become nearly universal.

Table 2.1 Gross Domestic Product	Base Year	GTP – Base	GTP – High
Real GDP Growth Projection, AAGR	(2009/10)	(2011-2015)	(2011-2015)
Agriculture and allied activities	6.0	8.1	14.9
Industry	10.2	20.0	21.4
Services	14.5	11.0	12.8
Real GDP	10.1	11.2	14.9
GDP per Capita (Current Market Prices, US$)	401	698	
GDP Distribution by Sector, %			
Agriculture and allied activities	41.0	35.5	41.0
Industry	13.0	18.7	16.9
Services	46.0	45.7	42.2
GDP	100.0	100.0	100.0

(e) Enhance social development: Development of human capital is recognized to be indispensable to increasing productivity at all levels. Access to the basic social services of education, health, water and sanitation will be accelerated during the Plan period thereby meeting the MDGs for the social sector by 2015. For the education and training sector the main objectives are to increase access to education and increase enrolment especially for girls; increase number of teachers and schools; promote TVET's as centers of technology transfer to MSEs; quality assurance for higher education (colleges and universities); and focus on science and technology in higher education. Primary health care and prevention will continue to be the main objective for the health sector. This will be achieved through increased availability of drugs (including increasing domestic production of drugs) and increased number and quality of health workers. In the water and sanitation area the goal is to provide universal access to potable water supply in both rural and urban areas by 2015.

(f) Capacity building and good governance: Institutional development through civil service reform, strengthening civic society, improving effectiveness of the justice system is the key objectives under this strategy. Improving access to information through ICT will be a key instrument to achieving these objectives.

(g) Women and youth empowerment: The objective of this strategy is to increase the application of resources in women and the youth for economic transformation. The increased participation of these groups in the political, economic and social development is expected to speed up the development process and ensure equitable distribution of benefits.

GTP targets that will have significant impact on the energy sector are reproduced in the following table.

Environmental sustainability: the Plan recognizes the need to build a carbon neutral and climate resilient economy in considerations of Ethiopia's vulnerability to climate change and climate variability. Building climate resilience for the economy is considered as a key risk management strategy in the Plan. The Plan also envisages promotion of a low carbon development path for Ethiopia with contributions for greenhouse gas mitigation through the development and utilization of renewable energy and reforestation.

Table 2.2 Main outputs, GTP

	Base (2009/10)	Plan (2014/15)	Energy requirement
Export of Goods and Non-Factor Services (% of GDP)	10.5	31.2	Transport
Imports of Goods and Non-Factor Services (% of GDP)	27.3	45.7	Transport
Agriculture	6.4	7.3	
Agriculture value added (billion Birr)	58.4	86.2	Production, transport
Industry	13.7	21.4	
Sugar production (000 ton)	17,712	42,516	Manufacture
Textile and garment industry export (million birr)	21.8	100	Manufacture
Total capacity to produce cement (million ton)	2.7	27	Manufacture
Metal consumption per capita (kg)	12	34.7	Manufacture
Infrastructure			
Road network (km)	49,000	136,000	Construction, transport
Rail way network (km)	-	2000	Construction, transport
Potable water coverage (%)	68.5	98.5	Power supply
Developed irrigable land (of 5.1 million ha, %)	2.5	15.6	Irrigation
Telephone service coverage within 5km (%)	49.3	90	Power supply
Education			
Gross Primary Enrollment Ratio (1 to 8) (%)	94.2	100	Power supply
Health			
Primary Health Services Coverage (%)	89	100	Power supply

3. Sectoral goals of the GTP and their implication for energy services

Energy is one input to the development process; its planning must account for expected developments in other sectors. The GTP specifies targets at sectoral (GDP growth rates for agriculture, industry, services) and industry level (large scale agriculture, cement industry,

transport infrastructure). These targets can be used to estimate energy requirements which can then be used to plan energy infrastructure and investment.

The GTP projects accelerated growth for all sectors; it also indicates specific strategies such as increased commercialization of agriculture, several fold increase in specific manufacturing industries such as cement and sugar, development of the road and rail infrastructure, and increasing residential electricity customers to 4 million. These strategies point to a more energy intensive path for the future; they also point to more varied use of energy in industry and transport. Shifts already apparent for some industries, such as the use of coal in the cement industry, will further be accentuated; new energy applications, such as electricity for transport, will add to the diversity of the energy sector. The following sections provide indicative assessment of energy requirements in the agriculture, industry, transport and residential sectors.

3.1 Agriculture

The strategic goal for the agriculture sector is to increase production of food crops for the domestic market and high value crops for export. This will be realized by increasing productivity of smallholder farmers and promotion of investment in commercial farming. In the smallholder crop sub-sector production will be enhanced by increasing agricultural inputs, and natural resources management to improve availability and access to ground and surface water. In the livestock sub-sector actions will be directed to water resource development for livestock, improvement of pasture with irrigation, breed improvement, animal health, natural resource management, and livestock marketing. For the commercial agriculture sub-sector the strategy is to promote extensive commercial farming in the lowlands and high value horticultural crops in the highlands.

3.2 Industry

The GTP projects very rapid growth for the industry sector, much faster than the other sectors, therefore increased share in the economy in the future. The strategy focuses on medium and large scale industries to meet local demand and for export and micro and small scale industries for employment. The strategy promotes backward links to agriculture (for agro processing industries such as sugar and textile)

GTP targets	Implications for energy services
▪ Productivity enhancement of smallholder agriculture through improved inputs and natural resource conservation	▪ Increased use of commercial energy for irrigation and processing, ▪ Increased availability and access to biomass energy (forest products and agricultural waste for the domestic and commercial sectors) due to improved productivity of agriculture. ▪ The role of technologies such as domestic biogas is important here: it addresses several of the objectives of the plan including increasing women's engagement in productivity activities, natural resource conservation, and farmers producing their own inputs (such as fertilizer)
▪ Expansion of large scale commercial agriculture (by 3 million ha)	▪ Increased demand for commercial energy for crop production and agro-processing ▪ Potential losses of forests and woodlands due to land clearing; increased availability of crop residues
▪ Develop irrigated area from 2.5% to 15.6% by 2015 (5.1million ha of irrigable land)	▪ Increased energy demand for pumped irrigation

In the medium and large manufacturing sector the Plan focuses on the key industries of cement, sugar, metals and textiles; it also foresees increased capacity utilization in existing industries. According to the plan sugar production will increase two and half times current production, cement production will increase ten fold, textile exports to nearly five fold, and metal consumption will increase by three times.

3.3 Infrastructure services

The goals for infrastructure during the period are to expand access to transport, communication and water services. The goals for transport infrastructure are to expand access to roads in rural areas, introduce rail network for bulk freight transport, and expand air and sea (dry) ports. For the telecom sector the target is near universal access to basic telecom services in rural areas and access to mobile communication for all. For water sector the plan is to build water infrastructure and to implement integrated water resource management to increase access to potable water and for irrigation.

GTP targets	Implications for energy services
▪ New capacity additions in the relatively energy intensive industries of cement, sugar, metal and textiles.	▪ The large share of additional energy demand will be for thermal energy in the cement and sugar industries; there will also be increased demand for electricity from all industries ▪ There are already shifts in industrial energy use in major industries where solid fossil fuels (coal and pet coke) are replacing fuel oil for thermal energy; this shift will be further heightened. ▪ Efficient and cleaner technologies need to be promoted (due to fuel imports; environmental considerations)
▪ Increased capacity utilization in existing medium and large scale industries.	▪ Energy demand will increase substantially because current capacity utilization is only about 50%.
▪ Investment in infrastructure and mining	▪ The main energy requirement in the construction and mining sectors is for earth moving and transport. ▪ Mining of potash from the Afar is expected to commence in 2013. The reserve is several hundred million tons. Energy requirements for extraction will be considerable.
▪ Promotion of micro and small scale industries	▪ Promotion of such industries in rural areas calls for providing access to electricity to them

GTP targets		Implications for energy services
Transport	▪ Reduce access distances to all-weather roads from the present 3.7hours to 1.2hours ▪ Connect all Kebeles by all weather roads; construction, rehabilitate and upgrade 10,000km of trunk and link roads; construct 82,500km of rural and Wereda roads	▪ Expanding transport infrastructure will increase transport services which then increases energy demand ▪ Transport from potash mining will become significant after 2013, possibly adding 10% to 20% to total freight ton-km by 2015. ▪ Motorized transport will replace non-motorized transport ▪ Projected growth of vehicle-km from 9.6 to 12.3 million vehicle km
	▪ Shift a considerable proportion of inland and export and import freight transport onto rail ▪ Reduce transport costs and transit times ▪ Construction of 2,000km of railway	▪ Modal shift from road to rail for freight transport; shift from petroleum to electricity ▪ Possible shift to petroleum pumping[3]
Telecom	▪ Universal access to basic telecom services in rural areas (90% of areas will have access to services within 5km)	▪ energy for rural connectivity; electricity to run more than 10,000 Kebele telecom centers ▪ Solar electricity as the source of power for off-grid Kebeles
Water	▪ Build water infrastructure for increased access to potable water and for irrigation. ▪ Rural potable water coverage (within 1.5km) from 65.8% to 98% ▪ Integrated water resource management (for irrigation, water supply and power generation) ▪ Developed irrigable land (%), 2.5, 15.6 (5.1million ha of irrigable land in Ethiopia)	▪ Energy for water supply and irrigation ▪ Mitigate the impacts of runoff [related to energy such as forestry, watershed management], drought, other natural hazards ▪ Water resource development and security; water supply, irrigation, river basin/watershed management implemented in integration (agriculture, health, mining, energy)

[3] Volumes o oil imports of over 2 million tons a year between two fixed points are likely to be needed for economic investment in a pipeline for the oil imports (National Transport Sector Strategy, National Transport Master Plan Study, 2007, p. 23).

3.4 Education and health

In the social sectors the focus is on expanding services and enhancing their quality. The plan foresees further expansion of education and health infrastructure and increased and equitable access to services. The Plan emphasizes improvement of quality of services for both education and health.

The education sector plan is for equitable access to quality education and to eliminate gender disparity (all girls going to school). Increasing girls' enrolment in schools will have implications for energy in rural areas: it will lower girls' input in fuel acquisition for the home at the same time increasing the burden on women. Key areas where the quality of education can be improved would be through better access to education media through audiovisual services. In the health sector the plan is to increase access to health infrastructure and services. Construction of health facilities will be accelerated and the quality of services from them will be improved.

GTP targets	Implications for energy services
▪ Increased access to health and education infrastructure ▪ Improved quality for health and education services	▪ The quality of services in the health and education sectors can be improved if electricity and other energy services are available ▪ Electricity will be useful for diagnostic equipment, audio-visual education, lighting to extend services to evenings
▪ Promotion of technology transfer centered research, especially in science and technology institutes	▪ Capacity development for management of the energy sector

3.5 Residential energy

Growing incomes and increased access to electricity and liquid biofuels will change energy use in the residential sector. Growing incomes will generally increase energy intensities; it will also increase commercialization of residential energy supply in rural areas. Increased access to electricity and biofuels will have significant substitution impacts on kerosene (lighting in rural areas, cooking in urban areas). Accelerated promotion of energy efficiency and fuel substitution for biomiass fuels may slow down demand for biomass energy.

GTP targets	Implications for energy services
▪ Electrify 2 million new homes by 2015 ▪ Connect 5,183 new towns and villages onto the national grid	▪ EEPCO plans to connect two million homes to the national grid by 2015 thereby doubling its residential customers. Electricity consumption of residential customers will grow substantially as the result (although not proportionally because new rural customers will on average consume less than existing customers).
▪ Produce 195 million liters of ethanol by 2015 ▪ Produce 1.6 m/billion liters of biodiesel by 2015	▪ In the liquid biofuels area the plan to increase ethanol production to 195 million liters by 2015 opens the market for potential applications other than transport. The residential sector can become the main domestic market for ethanol. If only half of the total ethanol or 100 million liters goes to residential cooking 0.2 million households could be served.
▪ Accelerated dissemination of energy efficient stoves and other alternatives (such as biogas)	▪ The plan envisages adding 9 million improved stoves by 2015. This will result in nearly universal access to improved stoves by 2015 as a result of which biomass energy consumption can be reduced drastically.
▪ Natural resource conservation through forestry and physical soil and water protection schemes	▪ Increases availability of forest products including energy in the future
▪ Crop and livestock productivity enhancement	▪ Increases availability of residue for cattle feed which in turn improves livestock productivity; increases availability of residue for energy (from both crop and animal waste).
▪ Harmonization of population growth rate with natural resource support capacity	▪ Slows the growth of demand for biomass energy and improves sustainability
▪ Extend programs that reduce work burden of rural women	▪ Energy efficient stoves will have an important role in reducing women's work burden.

3.6 Gross energy requirements

The following table provides gross indication of energy requirements based on key GTP targets. The estimate is based on projected performance and output in the economic and social sectors and energy demand per unit of output.[4]

4. Review of the adequacy of the energy plan to meet the goals of the GTP

The GTP projects continued high rate of growth for the economy. Energy requirements are expected to grow even faster (elasticity of energy demand with respect to GDP between 0.8 and 2). The outlook is for a more energy intensive economy in the future: commercialization of agriculture, large capacity additions for energy intensive manufacturing industries, mining for potash, and further expansion of the transport infrastructure.

[4] Energy intensities are estimated from historical data for some sectors and from secondary sources (e.g. Teri, 2002).

Table 3.1 Summary of energy requirements based on key GTP targets

Sector	Sub sector	Activities	Target - 2015			Energy	
			Amount	Unit	Main fuel	Unit	Intensity
Agriculture	Large	Development	3	Million ha	Diesel	kg	30kg/ha
		Irrigation	0.8	Million ha	Diesel /electric	kg	na
Industry	Cement	All	27	Mton	Coal/pet coke	kg	1Gcal/ton
	Sugar	All	21.4	'000Ton	Baggase	kg	na
	Metal	All	34.7	kg/cap	Coal	kg	8Gcal/ton
	Construction	Road	87,000	km	Diesel	kg	na
	Mining	Potash	1 (est.)	Mton	Oil/coal/electric	kWh	600kWh/ton
Transport	Road	Freight	13 (est.)	Billion t-km	Diesel	kg	0.2/t-km
	Rail	Freight	1 (est.)	Billion t-km	Electricity	kWh	0.026/t-km
Social	Education	All Kebeles	15,000	P. schools	Electricity	kWh	500
services	Health	All Kebeles	15,000	Health posts	Electricity	kWh	500
(rural)	Water supply	All Kebeles	150,000	Pumps	Electricity	kWh	800
	Telecom	All Kebeles	15,000	Kebeles	Electricity	kWh	20
Households	Electricity	Light, other	2.0E6	Households	Electricity	kWh	700
	Biofuels	Cooking	200,000	Households	Biofuels	kg	300
	Biomass	Cooking	9.0E6	Households	Biomass fuels	kg	-900

This section reviews whether the energy component of the plan is adequate to provide for the targets stipulated in the GTP. It also points out to policy issues that may need to be reviewed to implement the energy plan. The review is based on evaluating integration of the energy plan with the other sectors, within the energy sector itself and with broader country strategies.

4.1 Integration with other sectors

The basis for a good plan is appropriate evaluation of demand for services. The energy plan must therefore be based on sound analysis of energy requirements from all sectors. Such assessment starts with estimating sectoral outputs (services rendered, see Figure 1.1) for the planning period, then using this information with energy requirements per unit of output to estimate energy demands.

The main drawback in the energy plan (the strategic plan of the MWE) appears to be that energy requirements are projected without the type of assessment indicated above. The GTP provides output targets for some sectors (for example, specific manufacturing industries) but does not provide such targets for others (for example, freight transport performance in freight ton-km). These targets should have been used to project energy requirements[5] as a consistency check on the independent projections.

One of the consequences of ignoring sectoral assessments is that specific directions stated in the strategy may not be addressed in the energy plan at all. This is the case for electric rail, for example: the trend based projection fails to include electricity demand for rail in the transport sector while the same trend based analysis fails to see that part of the petroleum based road transport will be moved to rail. Overlooking the sectoral assessment opens the gap for overlooking key trends in the recent past (this is the case, for example, for rapid increase in coal and pet coke use in the cement industry).

4.2 Integration within the energy sector

Integration of the energy plan within the energy sector requires that (a) energy demand be assessed at the useful energy level, (b) demand management and supply options are identified, (c) the economic, social and environmental costs, benefits and risks of the options are evaluated, and (d) the policy implications of alternatives are evaluated. Each of these issues is discussed briefly in relation to the energy plan in the GTP.

a. *Projection energy demand at the useful energy rendered level*

This will build on the sectoral output and performance projections developed in the previous section. Projected outputs and performances (such ton of cement) can be used together with useful energy intensities to estimate aggregate useful energy demand. Final energy demand (delivered energy) will then depend on the end use technologies and fuels used.

Application of this approach to estimate thermal energy demand for cement production will, for example, result in (a) projection of cement output (ton), (b) estimating useful thermal energy requirements (e.g. GJ of thermal energy/ton of cement output), and (c) estimating delivered energy requirements using the fuel and energy efficiency of the technology employed.

[5] Where outputs are not directly provided, as for freight transport, these could be estimated from their association with GDP.

Projection of energy demand outside the above framework, such as demand forecasting for specific fuels based on past trends, will overlook two important considerations:

1. *Opportunities for demand management and supply side efficiency*. Using past trends for projections imply that final (delivered) electricity must grow as in the past whereas this is not necessarily the case if demand side measures and supply efficiency are aggressively promoted.
2. *Structural changes and substitution effects*. It overlooks new additional demands such as electricity for transport thus possibly under estimating electricity requirements. A similar approach to forecasting for petroleum will over estimate demand because it will overlook the fact that part of the freight is now transported by electric rail (also that demand for petroleum fuels for thermal energy is now substituted by coal).

b. Identification of demand and supply side options for services

The full range of options available for meeting energy services must be identified and evaluated before decision is made to promote, regulate or invest in any option. Major categories of options include demand side management, supply side efficiency, grid vs. off-grid supply, public vs. private supply.[6]

1. *Integration of the demand and supply sides*. All options in the demand and supply sides must be identified. Examples for electricity services could be the following: efficiency in end use equipment; reduction of losses in transmission and distribution; supply alternatives in hydropower, wind, geothermal, solar, biomass, power import.
    a. In the energy plan in the GTP, DSM actions are not included; DSM identification studies are, however, provided under the activities of the Energy Agency
    b. Demand side measures for the transport sector, such as regulations for energy efficient vehicles, could be incorporated
2. *Integration of grid and off-grid plans*. Demand is projected for both on grid and off-grid areas – the grid will continuously expand into off-grid areas; the same plan must also address how off-grid areas are to be served before they get connected to the grid.
    a. For electricity, the plan provides generation expansion plans for the grid only; targets for off-grid electricity are not provided in the GTP (there are plans to disseminate 3 million solar home system in the Strategic Plan of the MWE).
3. *Integration across sub-sectors or modes*. This is important for the case of the transport sector where a combination of different modes of transport can be used to provide the same service (e.g. petroleum fuel transport by road truck, electric rail or pumping).
    a. Infrastructure development targets are provided for both the road and rail networks. However, transport performance is not adequately treated (vehicle km is provided, not passenger-km and freight ton-km). Energy requirements for transport are not

[6] Some of the issues raised in this section may be/have been addressed in detailed energy sector (e.g. power sector plans).

estimated. As petroleum imports have major impact on the economy, a more detailed assessment of requirements appears to be warranted.

b. Demand for transport services (passenger-km and freight ton-km) can be estimated from their relationship with GDP (as intensities or elasticities); these aggregate values can then be decomposed by mode of transport which can then be used to estimate energy requirements.

c. Transport demand intensities determine the choice of modes of transport and the technology (and fuel) used within a particular mode. For instance, even when a choice is made to use rail for freight transport an assessment of the volume of transport is required to evaluate whether investment in electric rail is more economic compared to diesel rail.

4. *Integration of public, private and auto-generation options*. Energy supplies may be provided by the public sector, private producers or by users themselves (auto-generation). Opportunities for sharing supply investments among these should be considered.

   a. The energy plan (the power sector sub plan in the Strategic Plan) contains both public and potentially private (mainly for wind power plants) developed/run plants. It also indicates that sugar industries will produce part of their own energy and ethanol for the general market.

   b. Again, an integrated plan would better represent the balance of energy consumption and supply from such industries.

   c. The private sector and non-government organizations can have an important role in the dissemination of distributed renewable energy systems including solar energy products and improved stoves.

c. Evaluate costs and benefits of demand management and supply expansion alternatives.

Demand and supply side alternatives should be evaluated based on their economic, social and environmental costs and benefits. The evaluation can also incorporate considerations such as equity, and energy security and diversity.

1. Evaluation of the costs and benefits of alternatives usually results in the promotion of a package of demand and supply side interventions. Demand side actions are often the least cost options (in the power, transport, or domestic energy sectors) and should always form part of the package of interventions.

   d. A comprehensive assessment of demand side actions is being prepared by the EEA. This will contribute to the inclusion of more demand management projects in the future

2. Equity for access to energy services is addressed through the universal electrification goal and also through expansion of the rural transport network (and motorized transport).

3. Energy security and diversity is expected to improve for the power sector with the addition of wind power plants. Diversity will also improve for transport fuels with introduction of electric rail and increased use of biofuels.

d. *Evaluate implications of choices*

Once decision is made on the types of energy supplies to be provided then regulations and policies must be reviewed to facilitate their implementation. Some of these issues will include financing, taxation and pricing, environmental considerations:

1. *Financing*: investment requirements for the energy plan are high; a review of financing options for the sector (Zenebe and Alemu, 2010) indicates the need to attract private investment into the sector. Existing regulations must be reviewed in light of this and new regulations such as a power Feed in Tariff may need to be enacted for relatively small independent power producers (the case for sugar factories feeding power into the grid, other small producers). Incentives for petroleum distribution into rural areas may also need to be provided.
2. *Taxation and pricing*: in the coming fifteen years the energy sector is expected to change significantly in terms of scale, energy mix and suppler mix. Taxation and pricing regulations may need to be reviewed to send proper signals to users so that overall country strategies, such as contribution to climate change mitigation, are met.
3. *Environmental and social considerations:* the compatibility of the plan with key national environmental strategies
    a. Considerations for the local environment: natural resource conservation, air pollution and health
    b. Considerations for climate change: CRGE, NAMA, NAPA
    c. Social considerations in displacement, exclusion and loss of livelihoods for communities
4. *Promotion (capacity development, awareness development):* very high level of promotion is required to meet the target of disseminating 9 million improved stoves, 3 million solar home systems and other distributed systems. This effort should be shared with the private and non-government sector.

4.3 Integration with overall country development strategies

A set of strategies are adopted in Ethiopia with the view of addressing the key challenges and exploit important opportunities for the country. Some of these strategies include building a climate resilient green economy, empowerment of women, and strategic goals of the energy sector such as energy security. The energy plan must be integrated (compatible with) such strategies. Project interventions proposed in the energy plan are reviewed against some of these strategies:

Building a climate resilient green economy: The energy projects proposed/stated in the GTP (and the Strategic Plan of the MWE) are related to development and promotion of renewable

energy and energy efficiency. The programs proposed in the Plan also make the list of projects identified for climate change mitigation by Ethiopia (EPA, 2010). The proposed projects are therefore compatible with the green development path for the sector. However, there are changes already apparent in the energy sector that the Plan does not address, such as increased use of fossil fuels in industry that will increase emissions from Ethiopia.

Empowerment of women and the youth: This is one of the pillar strategies of the GTP. Integration of this strategy within the energy plan requires improving access to energy. This is achieved by improving access to the household directly and also by improving access to energy for basic services that serve households.

- The energy plan to disseminate improved cook stoves and to increase access to electricity in rural areas contributes to this strategic goal. The improved stove dissemination program has cross sector impacts in agriculture, health and education.
- Energy services may be integrated with development of social infrastructure to improve the quality and reach of services. Universal electrification of rural social infrastructure in health, education and water supply can improve the quality of services in the services and contributes towards improving conditions for women.
- Energy services can be integrated with agricultural services to amplify benefits. The domestic biogas technology provides fertilizer for farmers, and contributes to improving household health; energy systems for water pumping and agro-processing systems can be integrated with agricultural technology dissemination.

Strategic objectives of the energy sector: Energy sector strategies are based on a basic set of strategic goals that guide the development of the strategies. Although strategic goals may vary from country to country some are common to all including energy security, improving access, and sustainability of supplies.

- Energy security is achieved by diversifying energy sources and reducing energy requirements. This is partly addressed in the energy plan because it increases diversity for the power sector (although not significantly as hydropower will still constitute more than 90% of electricity generated) and for transport fuels. The plan also mentions demand management for the power (following completion of an ongoing study) and biomass sectors.
- The energy plan addresses energy access considerations through continued expansion of the universal electrification and the improved cook stove programs.
- The plan puts natural resource conservation and development as part of the agricultural development strategy. This has sustainability impacts on the energy sector through improved sustainability of hydropower infrastructure and forest resources.

5. Structure of the energy sector after the GTP

5.1 Changes in the short term

The energy supply mix will change considerably due to changes in the power, transport, industry, and residential sectors. In the power sector, the near exclusive dependence on hydropower plans may change due to introduction of considerable wind capacity. In the transport sector new transport fuels (electricity and liquid biofuels) will have considerable shares. New industrial fuels such as coal and pet coke now being introduced in cement and other industries will have larger contribution for industrial energy. In the residential sector liquid biofuels may become important cooking fuels.

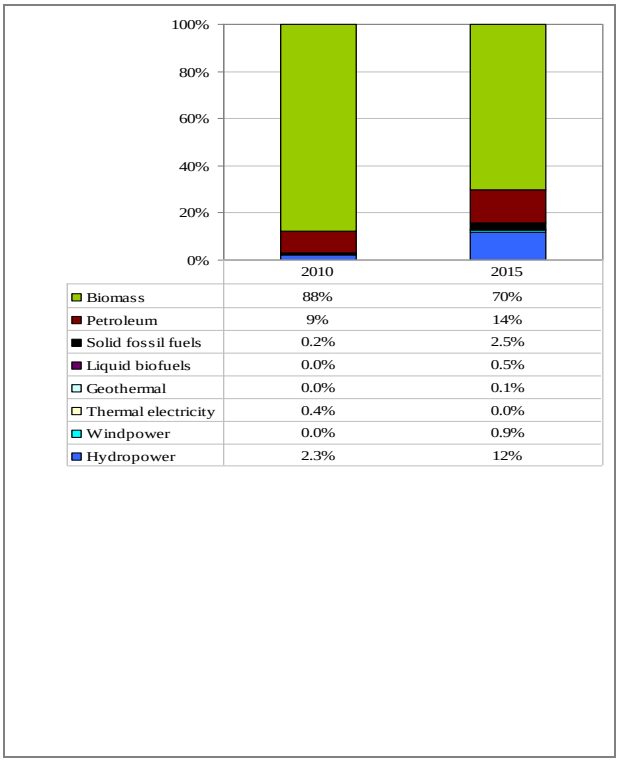
Comparison of supply shares for 2010 and 2015 using some of the major targets for the energy sector show considerable changes: significant reduction of biomass; significant increases for hydropower, petroleum and solid fossil fuels; and introduction of biofuels and wind energy. These changes will have important implications for the environment: improved sustainability of forest resources, reduction of indoor air pollution; potential increase of greenhouse gas emissions due to increased use of petroleum and solid fossil fuels.[7]

The share of energy use by sector and the types of energy used within sectors will also change when the proposed actions are realized. Some of the main changes will include reduced energy intensities for biomass fuels for the household sector, increased use of electricity and liquid biofuels, significant increases in the use of fossil fuels in industry, introduction of electricity and biofuels in the transport sector. The more significant changes are explained briefly:

[7] This disregards reduction in non-renewable biomass use.

Figure 5.1

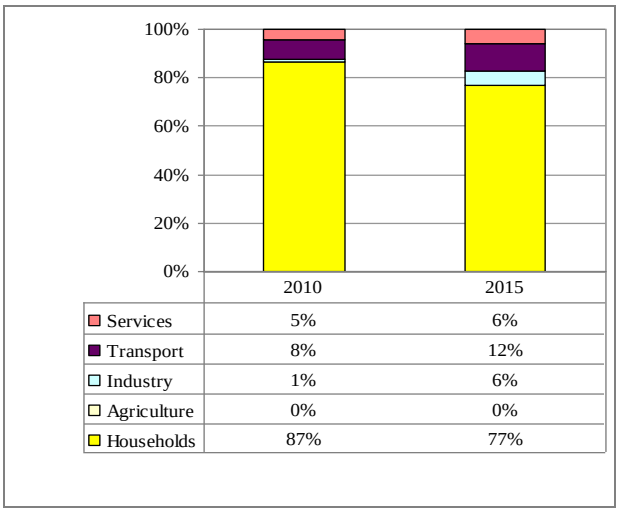
Energy supply by source: 2010 and 2015[8]



Note that the estimate is only indicative, meant to illustrate the scales of the interventions; the estimate is based on targets of the GTP without check for internal consistency.

Figure 5.2

Energy use by sector: 2010 and 2015



a. This will be a substantial headway to establishing sustainability for forest biomass resources in Ethiopia.

   - Rapid dissemination of energy efficiency, especially in rural areas, must therefore be among the top priorities in the plan
   - Biofuels could be an important household fuel at the end of the period (mainly ethanol)

8 The estimates for 2015 are based on 10GW of hydro, 866MW of wind, 195 million liters of ethanol, 3 million tons of petroleum, 0.42 million tons of solid fossil fuels, 9 million efficient biomass stoves (reducing per-capita energy use by half).

- Access to modern energy services, per-capita commercial energy availability, and others

b. *Rapid rise of demand for solid fossil fuels in industry*. Rapidly rising demand for solid fossil fuels, particularly for cement and metal industries, can be expected in the coming five years.

- Increased use of fossil fuels in industry will increase greenhouse gas emissions from the sector; air pollution impacts will also rise.

c. *A more diverse range of transport fuels*. At the end of the GTP period the transport sector will use a more diverse range of energy including petroleum, biofuels and electricity. These changes can be expected only after 2015 since the construction of the rail infrastructure and supply of substantial amounts of biofuels will take some years to complete.

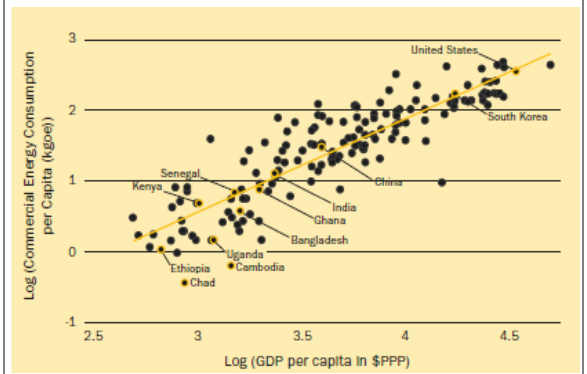
d. *Increased use of petroleum in the agriculture sector*. Energy requirement (mainly for diesel) for irrigation, cultivation and other farm activities will rise due to expansion of large commercial farms. However, the aggregate amount consumed will not be significant compared to other sectors.

5.2 Changes in the long term

Gross estimates of energy requirements in 2025 may be made using one of two approaches. The first is to use the stable association of energy and the economy as depicted in the GDP versus commercial energy consumption relation shown in Figure 4.1. Based on this relationship rise in Purchasing Power Parity adjusted per-capita income from US$900 in the base year to US$4,000 in 2025 will increase commercial energy consumption to about 300kgOe/capita. This is equivalent to 35MTOE in 2015 compared to just 3MTOE in 2010.

Figure 5.3

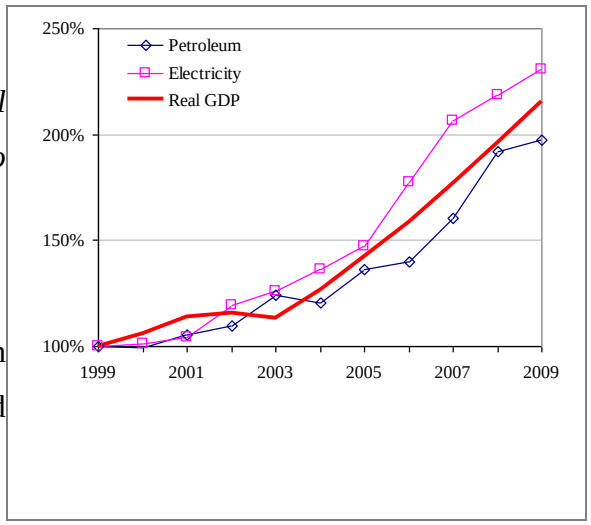
Commercial energy consumption and GDP, 2000.



Note that the relationship between GDP and commercial energy consumption is exponential. The relationship here is shown as linear because units are converted to logarithms for both scales.

Figure 5.4

Rate of GDP growth vs. commercial energy demand growth (normalized to 1999 values)



Note that electricity consumption has been growing faster than real GDP and petroleum at about the same rate as GDP.

Another variant of this approach is to use what is called GDP elasticity with respect to commercial energy to estimate commercial energy demand growth (Figure 4.2).[9] In the current Strategic Plan for the Ministry of Water and Energy, for instance, the elasticity of GDP with respect to electricity demand was estimated at 2.15, meaning that a 1% rise in GDP will increase electricity demand by 2.15%. This implies that annual GDP growth of 11% (GTP base scenario) will result in annual demand for electricity growing by 24%. Similarly, the GDP elasticity with respect to petroleum consumption is estimated at 0.8 to 1.0, implying petroleum demand will grow at around the annual rate of growth for real GDP.

Some of the main implications for the long term include:

a. Requirements for commercial energy may grow by ten fold in the next fifteen years. This has important implications in economic and sustainability terms. Indigenous resources must be developed at an accelerated rate and the balance must be met by imports. Resources available to meet requirements for development of indigenous energy sources and imports will be considerable. The rapid rise in per-capita energy consumption will increase environmental and social impacts.

b. A growing economy requires growing energy services; this means that end use energy services must necessarily grow rapidly but not necessarily final energy. Energy services can be increased without proportional increase in final energy demands. Efficiency is the key – in energy systems, in socio-economic systems (e.g. transport modes, settlement patterns). *For a fast growing economy starting from a low base the opportunities for efficiency can be enormous; lack to institute a policy of efficiency now will result in increasing supply demands in the future* (Johansson and Bradford, 2004). The potential for DSM and EE are substantial in Ethiopia, particularly for the power sector and in transport.

[9] Elasticity is the ratio of % growth in one variable divided by % growth in another. Electricity to GDP demand elasticity of 2.15 means % growth in electricity demand is 2.15 times % growth of GDP.

c. Meeting one of the strategic goals for the energy sector, energy security, requires that Ethiopia accelerates its indigenous resource development to meet energy demands. The current development in the power sector is an example of this. Development in other areas, such as extraction of gas and coal reserves should also be given priority. The energy security goal will also be addressed by shifts towards indigenous resources; an example of this is the shift to electric railway for freight transport.

d. The rate of biomass energy consumption can be expected to grow as fast as population (2.6% per year).[10]This will increase the pressure on natural resources. Energy efficiency and substitution actions for the biomass energy sector must be accelerated and implemented extensively. Such actions should be part of larger natural resource rehabilitation and conservation projects to maximize their benefit.

e. The size and diversity of energy resource development and their use is increasing rapidly. A large proportion of the plan, design, manufacture and supply and service of the modern energy area is undertaken by foreign companies. Local capacity to design, develop and operate increasingly complex energy systems must be developed.

f. Finally, a comprehensive energy strategy is required to meet these challenges. Some of the focus areas could include demand side management (DSM) and energy efficiency (EE), indigenous resource development, natural resource conservation, and local capacity development.

6. Closing remarks

The Growth and Transformation Plan stipulates continued rapid economic expansion with increased role for industry. The Plan projects increased commercialization of smallholder agriculture, rapid expansion of large scale agriculture, with increased application of irrigation and other inputs for both. The Plan also projects continued investment in infrastructure for near universal access to social and economic infrastructure.

The Plan provides specific targets for sectors and industries within sectors which are indicative of energy requirements. The general trend will be a move to a more energy intensive path due to increased inputs and commercialization of agriculture, several fold increased of capacity in key manufacturing industries and mining, and demand for transport services due to increased output and expanding transport infrastructure.

The energy component of the plan envisages increasing capacity for the power sector to 10GW, production and export of US$1 billion worth of biofuels, and promotion of energy efficiency. The proposed energy plan accounts for 45% of the total public investment during

[10] This assumes constant per-capita consumption; growing energy efficiency may be counter balanced with growing per-capita consumption due to growing incomes.

the GTP period. The energy sector is expected to exhibit considerable changes after the plan in access to services, in per-capita commercial energy use, in the diversity of the mix of energy sources and uses (wind power, electric rail, and biofuels).

This review has attempted to provide an overview of the implication of the plan for the energy sector. It has reviewed the adequacy of the energy plan from the perspective of integration with the other sectors and consistency within the energy plan itself. The main findings are summarized as follows:

Integration with other sectors: Energy is one input in the development process; energy requirements must therefore be derived from demands for products and services from the other sectors. The GTP provides targets at the sectoral level; these targets should be used to determine energy demands. The energy demand estimate on which the energy plan is based appears to be made independently of sectoral targets.

Integration within the sector: Several levels of integration are required within the energy plan for consistency. First, energy demand projections must be linked to sectoral outputs as described above, then both demand and supply side alternatives to meet these requirements must be identified and evaluated. The energy plan must address the following.

- Energy demand estimates must be based on sectoral targets (and projections)
- Demand and supply side alternatives must be equally considered
- Integration across modes (grid vs. off-grid, road and rail)
- The benefits, costs and risks of alternatives must be weighed
- Implications for policy must be addressed (regulation, promotion, capacity development)

Integration with overall country strategy: Integration and consistency with overall country strategy in such areas as resilience to climate change, natural resource management, equity in growth, empowerment of women must be ensured for energy actions. The energy plan addresses some of these considerations but ignores some other current trends such as the shift to solid fuels in the manufacturing sector and possible new demands for potash mining in the future.

There will be considerable opportunities for participation of the private and non-government sectors within the energy plan. Opportunities for the sector include power production for the

grid; off grid electrification; production and processing of biofuels; production and dissemination of distributed renewable energy systems; studies, construction and service. For non government organizations possible areas of participation include promotion of off grid electricity, household energy, natural resource conservation, and capacity development.

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Quality Higher Education for Implementation of the Growth and Transformation Plan of Ethiopia (GTP): Requirements and Actual Conditions

By

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Abstract

Ethiopia aspires to stand among middle income countries by 2020-2023, and to achieve the MDG targets by 2015. Equally, whereas expansion of educational provision is a priority, the country seeks to achieve UNESCO's HE standard teacher-student ratio of 1:20 along with improving and ensuring the quality, relevance and efficiency of education at all levels with the purpose to produce knowledgeable, skillful, enlightened, inspired and innovative citizens who can contribute to the realization of its long term vision for national development.

National development is the ability of a country to improve the social welfare of its citizens, not the land. Ethiopia has made unprecedented efforts to expand educational provisions at all levels. The main maxim for the effort is national development. National development is, nonetheless, a result of many conditions (beyond quantitative gains) one of which is the presence of qualified labor force with appropriate skills, disciplines, and commitment- all founded on the provision of quality and relevant education. Particularly, quality higher education (HE) and relevant research are basis for national development as HEIs are places where highly skilled and capable human power is produced. Whatever efforts are made if quality is not there, the gain is solely quantitative. Quantity at the expense of quality is what mislays many countries including ours. This is evident from the practices of estimating the rate of return to educational investment solely from quantity with no or low concern for quality.

This paper, therefore, intends to assess the required and actual conditions for quality assurance endeavors to support implementation of the Growth and Transformation Plan of the country. To achieve the purpose, the paper addresses quality conceptions, conditions, forces; and the magnitude of the relationship between quality higher education and development.

Extensive and intensive reviews of national and international documents related to the issue were made with the purpose to craft some models pertaining to the magnitude of the relationship between quality education and economic development, forces and conditions for quality assurance, sequential steps for instrumental approach to quality assurance, and implications of the observed states to national development.

1. Introduction and the problem

The economic and social development of any nation depends on quality education. This is because, quality education produces quality people. Equally, quality happens by quality people. In underscoring the importance of such thinking, Firdissa (2009a) states:

> It is really innocence to expect quality to happen by people of less quality and from uninformed, not empowered, uncommitted, and poorly motivated staff. Quality does not happen simply by talking about it; rather by working resolutely. Equally we cannot purchase it from somewhere and install as computer wares. It is a process that is owned by the University community, particularly by empowered staffs. This is because, universities are ideal places and university educators are the right people working at the frontiers of knowledge. They are forerunners in the effort to materialize the urging forces for quality: internationalization, moral, professional, competitive, and accountability forces. It is, therefore, imperative to enhance the frontline implementers' empowerment, commitment, sense of shared values, trust and ownership for the reason that the way to quality improvement is through the staff's heart, mind and action in classrooms. By implication, QUALITY DEMANDS QUALITY! (P. 33)

The above quote implies that development depends on the quality of the workforce a country has. This is because national development cannot be separated from the citizens it services. National development is not about the physical country but, people. It deals with the level of a country to improve the welfare of its citizens. It is a result of many conditions one of which is the availability of qualified labor force with appropriate knowledge, skills, and attitudes. These conditions come through quality education. Particularly, quality higher education (HE) and relevant research are the main pillars and at the frontiers of national development as HEIs are places where highly skilled and capable human power is produced for development of the country in general and for the manufacturing industry in particular. Ethiopian policies and strategies have given due priorities to expand educational provisions at all levels. The main

maxim for the effort is national development in line with structure of the economy: services, manufacturing, industry, and agriculture.

But one may inquire: *Which comes first: Qualified (quality) people or quality education?* The answer to this question may be deduced from Figure 1 below.

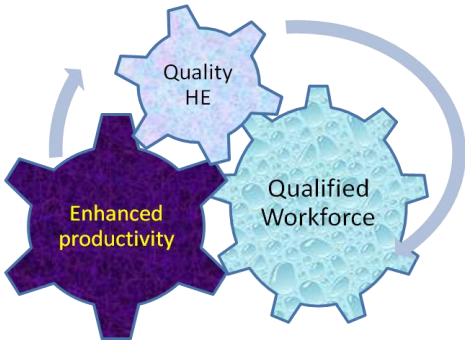


Figure 1: Interdependence of Quality HE, Workforce, and Productivity

Figure 1 shows that quality higher education is catalyst for producing productive workforce. This is a reality if and when the gears move in the right direction. When poor quality workforce is produced, productivity is jeopardised. Current policies strategies in our country imply the interdependence of the three variables shown in the Figure. Though they seem to give due attention to quality, available practices, nonetheless, went astray. This is regardless of the growing recognition that quality has got worldwide and in our country. HE expansion in our country has taken precedence over quality and standard even when compared to other African countries. Though implicitly in most cases, the education system in our country is not to the expected level in quality, efficiency and relevance. Likely reasons and symptoms, among others, could be:

- Cloudy visions, and conceptions about quality that prevails;
- Unclear connection that exists between quality education and economic development;
- Lack of clarity of the necessary conditions for quality;
- Plea and applaud for quantitative gains;
- The move for solving immediate problems rather than working on longstanding people-centered development directions;
- Failure to set clear and specific profiles for students and consequently lack of clear vision of what students would learn or what teachers would teach, or why.

- Fragmentations of efforts to develop necessary skills, attitudes and behavior as there have been more focus towards expansion and less systematic moves for quality.

Particularly in our country, everybody talks of quality, but with little clear understanding of what it is all about. There could be due to two reasons. First, whereas higher education (HE) was introduced to our country in 1950, its expansion is a recent phenomenon. Higher education quality, therefore, is not yet well embedded within the culture as value of all concerned stakeholders and consequently less well conceptualized as it ought to be (Firdissa, 2009).

Second, the concept and the concern for assuring and enhancing quality were developed in the business sector in the Wes for commercial purposes. As things started to change in the western societies as of the late 1980s, however, stakeholders demanded relevant and quality academic programs at higher education institutions. Following the demand, quality has become part and parcel of management system of HEIs- worldwide and also a recent necessity in our country.

Arguably, different stakeholders prioritize the importance of different dimensions of quality according to their perspectives, purposes, and level of understanding. On top of this, the fluidity, elusiveness, complexity, and slippery nature of quality has lent itself to remain nebulous to many people in and outside HEIs.

Because of these and other bottlenecks, the educational system remained superficial to truly transform the country by contributing to solving the problems of the people of the country. Quantitative gains solely serve as surface symptoms for development, but cannot be decisive and requirements for the required development. Whatever efforts are made if quality is not there, the gain is solely quantitative. Quantity at the expense of quality is what mislays many countries including ours. This is evident from the practices of estimating the rate of return to educational investment solely from quantity with no or low systematic concern for quality.

There are a plethora of custodians and programs for quality in our country today. Among others, *Higher Education Relevance and Quality Agency* (HERQA), General Education Quality Improvement Program (GEQIP), Higher Education Strategy Center (HESC), and *Higher Education* Quality Enhancement Institute, ESDPs, GTP, IQPEP, all at national level; and Academic Development and Resource Center (ADRC) mainly at the 9 senior public universities and quality assurance sections at regional education bureaus have agendas in HE

quality. Particularly, HERQA has fostered a profound awareness about the need for HE quality amongst all stakeholders through its publications, audits, and deliberations at different forums. By implication, the eminence of quality education as a valuable return on investment and as a basis for the overall development of the nation has made its way to our country. The quality of the sector, nonetheless, remains the main concern of the time for all.

This paper, therefore, assesses the required and actual conditions for quality assurance endeavors to support implementation of the Growth and Transformation Plan of the country. To achieve the purpose, the paper addresses conceptions of quality; Growth and Transformation Plan (GTP) versus urging forces for quality; particulars of GTP on higher education; objectives of higher education within the GTP framework; implementation strategies; urging forces for quality in the spirit of GTP: internationalization, the moral, the professional, the competitive, and the accountability forces; relationship between quality of education and development (expected and actual conditions); and the bidirectional relationship between quality education and economic development.

Extensive and intensive reviews of national and international documents related to the issue were made with the purpose to craft some models pertaining to the magnitude of the relationship between quality education and economic development, forces and conditions for quality assurance, and implications of the observed states to national development.

2. Conceptions of quality

Though quality is an everyday word of today, there is no consensus on its exact meaning. In fact quality is undefinable concept as it is affected by many variables. It is fluid and contestable. This is due to the fact that quality with its indicators is 'determined by a wider set of criteria which reflects the broadening social composition of the review system'; it becomes a composite, multidimensional concept. Some possible meanings for our purpose can, nonetheless, be derived from the works in the field particularly, Furlong and Oacea (2005); Harvey and Green (1993); Harvey and Knight (1996); and Owlia and Aspinwall (1996), (cited in Firdissa, 2009; 2007a; 2006a, b).

Quality as Exceptional (high standards): performance that is exceptional; attainable only in limited circumstances. This can happen only when very able and brightest students are admitted to the system, mainly in world class universities.

Quality as Consistency (zero defects/errorless): this deals with producing perfection through continuous improvement, among others, by adopting Total Quality Management (TQM) to create a philosophy about work, people and human relationships built around shared values. This definition implies fulfilling ideal standards so entails ideal environment in which all achievements can be measured and verified. This aligns with positivist paradigm which espouses for the belief that the world is definable, fixable, discoverable, predictable, and describable.

Quality as Value for money (return on investment, accountability/efficiency): this is to see quality as the ability to provide value for resources invested and to be publicly accountable for the 'bucks' and for the 'bangs'. It goes with the types of learners joining our universities and the concerns of cab payers, funding agencies and governments. This conception may be popular with today's changing landscape of higher education and the competitive climates for scarce resources, particularly in countries like ours.

Quality as Transformative (an ongoing process that includes empowerment and enhancement of satisfaction): today the world demands adaptive knowledge, skills and attitudes. This calls for enhancing the readiness and capability of HEIs to transform students on an on-going basis and add value to their knowledge and personal development. This aligns with current thinking regarding higher education for the masses, where emphasis is more on value adding *per se* rather than value adding from an already high level.

Quality as Fitness for purpose (fitting customer specifications, needs, and priorities): this sees quality as fulfilling the purposes or missions of all parties involved in and affected by the program and /or the services rendered. This has been adapted in Ethiopia. There, however, is a need to raise a question: *Does the quality of our functions address the needs and priorities of:*

1) *Learners?*
2) *Employers of our graduates?*
3) *Parents?*
4) *The Government?*
5) *The academic community?*
6) *The society at large? How?*

Overall, quality is a common day word but with less precise meaning. Its meanings are purposive, utilitarian, conformance, situational and are consensual. For the purpose of this paper, the conceptions of quality as 'fitness for purpose' and 'fitness of purpose' could be accepted. Implied in the latter conception is 'what the purpose itself needs to be' for transforming the learners for the world of life, work, and competition. The former conception is more of utilitarian and conformance to the requirements, priorities and needs of our customers. In this sense, we need to strive to fulfill the utmost needs of the different level stakeholders of our services.

Whatever conceptions for quality we adopt, academic standards (the level of achievement that a learner has to reach to gain academic award) need to be maintained if we want to sustain our credibility as learning institutions. If not, we may mislay the game for the clients consider us venders not producers of the required knowledge, skills and attitudes and the demands of the world dynamism.

3. Growth and transformation plan (GTP) versus urging forces for quality

3.1. Introduction to GTP

GTP is a medium term strategic framework for the five-year period (2010/11-2014/15). The design of GTP has made use of the lessons and gains of:

1) Sustainable Development and Poverty Reduction Program (SDPRP)- 2002/03 - 2004/05;
2) The Plan for Accelerated and Sustained Development to End Poverty (PASDEP) - 2005/06-2009/10. This was the First Five Year Phase aimed at laying out the directions for accelerated, sustained, and people-centered economic development as well as to pave the groundwork for the attainment of the MDGs by 2015.
3) Growth and Transformation Plan (GTP) 2010/11-2014/15

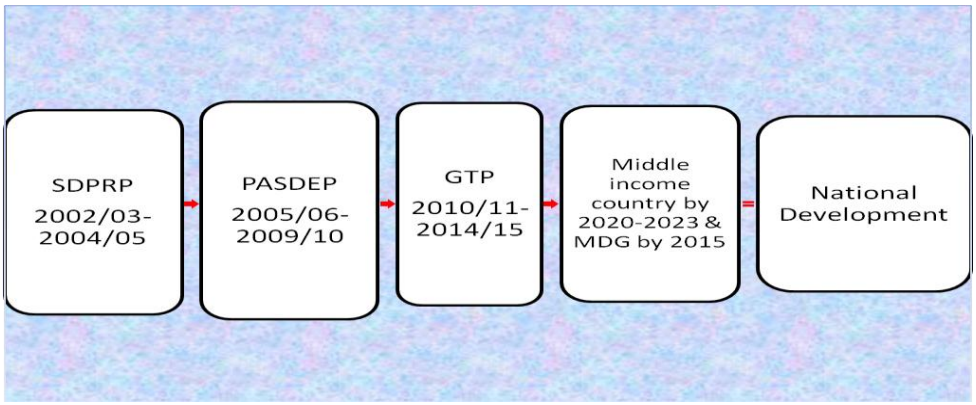


Figure 2: Development Programs, plans/strategies (SDPRP, PASDEP, and GTP)

The most pillar strategy of Growth and Transformation Plan is expanding human capital and improving human development outcomes. AS MoFED (2010) indicates, the main ingredients of this pillar are higher education and adult education, better primary health care, better and closer access to safe water and sanitation facilities, halting the spread of HIV/AIDS and other infectious diseases, better food security and nutrition, and housing conditions. So measures shall be taken, among others:

1) to improve the human resource development;
2) to improve access and quality of education by way of addressing the shortcomings through increasing the number of teachers and schools;
3) to enhance the implementation of the GTP;
4) to strengthen the expansion of higher education with a big push in science and technology;
5) to ensure an effective and efficient education and training system that will enhance quality, efficiency, relevance, equity and access at all levels through performance capacity building, and developing and maintaining competency parameters.

These all gear to produce knowledgeable, skillful, and enlightened manpower for the vision. The GTP document, particularly on *Social Sector Development Plan* has given due space for Education and Training whereby: a) strategic directions, b) objectives, and c) implementation strategies for general education, technical and vocational education and training, and higher education have been presented in detail.

Equally, the *Education Sector Development Program* (ESDP IV) has the goal of producing democratic, efficient, effective, knowledgeable, inspired and innovative citizens who can contribute to the realization of the long term vision of situating Ethiopia in the Middle Income Economy. It focuses on educating and/or training the workforce that is demanded by industry, particularly the growing manufacturing industry, at all levels. The plan has also taken into account the findings of the ESDP III review. Using the review as its basis, ESDP IV has been developed to ensure equitable access to quality education at general, TVET and higher education levels; allowing these sub-sectors to have a strong linkage to, and interrelationship with each other. The key objective over the next five years is, therefore, to ensure the achievement of the MDGs by 2015 (MoFED, 2010).

3.2. Particulars of GTP on Higher Education

As strategic directions**, t**he key priority for higher education during the planned years is ensuring quality and relevance. To this end, the management and administration system of universities are improved and strengthened. Efforts are being made to:

1) Enable the Higher Education Strategy Center and the Higher Education Quality Assurance Agency to achieve their missions;
2) Build the performance and implementation capacity of technology institutes;
3) Prepare teachers in quantity and quality through the implementation of a fully fledged teacher development program;
4) Implement the revised curricula in line with critical issues, such as, instructional process, assessment and examinations and student achievement;
5) Make compatible the education provided at higher education institution level with the quantity, type and quality of the human power demanded by the economy and /or national labor market. This calls for increasing enrolment in graduate and post graduate programs in line with the 70/30 Program by making in place a system to enable universities to raise their own internal incomes, which in turn, will help them promote quality and relevance of education; and
6) Undertake capacity building to improve performance, especially of Science and Technology Institutes and departments in order to make them support the economic development through technology transfer, gearing the research system in HEIs towards the role it plays in the economic growth and development of the country.

It has also become a recent phenomena to periodically and continuous support and monitor higher education institutions with the purpose to enhance their effectiveness, efficiency, and student responsiveness. But the strategies provided within the GTP document do not delineate specifically ways of assuring quality rather than reiterating the need for qualified workforce for the economy.

3.3. Objectives of Higher Education within the framework of GTP

The following are among the objectives of higher education within the framework of GTP:

1) Establish a higher education institution system which focuses on result based management; administration and performance, and that recognizes and scales up best practices;
2) Produce a higher level of skilled and capable human power as per the demand of the development of the country in general and the manufacturing industry in particular;

3) Ensure higher education enrolment that prioritizes science and technology;

4) Assure higher education institutions that have achieved education quality and relevance in accordance with the demands of the economy;

5) Enhance the competitiveness and competency of female students to promote their success and ensure gender equity.

Envisaged implementation strategies accompanying these objectives are the following:

1) Strengthening university leadership by providing training for new candidates of higher and middle level positions;

2) Increasing the intake capacity of all universities especially in science and technology and teacher development programs;

3) Scaling up the professional competence of teachers of HEI by providing them with training related to pedagogy, student assessment, action research etc;

4) Finalizing the new universities under construction; furnishing them with the necessary equipment and guiding them to give priority to science and technology and teacher development programs;

5) Establishing and implementing a system which can promote institutional and teacher competence and expertise in conducting research and adapting technology;

6) Developing and implementing a National Qualifications Framework;

7) Encouraging and supporting all universities to establish well organized and policy guided internal quality assurance systems;

8) Developing a system that can promote the capacity of higher education institutions to undertake graduate tracer studies and analyze employer satisfactions, as a result of which they will be able to revise and improve their curricula;

Developing schemes for the provision of affirmative action for those who need additional support (females, youth with disabilities, emerging regions, etc) such as, special admission criteria, tutorial support and scholarship opportunities (MoFED, 2010).

3.4. Urging forces for Quality and the GTP

We are all in a world whereby some forces act on our existence. Our GTP is not an exceptional to be influenced by inside as well as outside environments. In talking about quality of education for development, we need to consider some forces that, in one way or another, influence the image of our institutions and the intrinsic quality of their major functions-teaching, research, and community services (Firdissa, 2009).

Sallis (2002) has named the forces behind the need for quality as the 'four-quality imperatives': the moral, the professional, the competitive, and the accountability imperatives. He considers these as drivers and motivating forces that challenge any institution to take proactive stance on quality. On top of these, we also should be sentient that we are in the era of globalization- global village, where every life is affected by world development trends. So, the issue of internationalization of our programs is a timely agenda. This makes the forces for quality to be internationalization, moral, professional, competitive, and accountability-oriented in nature. These have been briefed hereunder against the ideas and ideals of GTP, implicitly if not explicitly.

3.4.1. Internationalization Force

Basically universities have international nature. At the same time we are living in a competitive and knowledge-dependent world of economic, social and political panorama. Today education itself is globalized in many of its forms and knowledge has become a commodity. The process of knowledge production, therefore, has to be customized to the world trend if we want to thrive in the complex and pluralistic world. This is because the world is becoming a village of competition whereby universities are affected by the external as well as internal environments. Whether we like or not, every aspect of our life is affected by the world development and trends (Firdissa, 2009).

By implication, we need to take proactive stance to prepare our students for the world of work, life and to be effective and efficient in the global competition. This can be achieved through internationalization our academic/research programs, maintaining their national responsiveness. Internationalization is a strategy to respond to the many demands placed upon us by globalization and as a way for our universities to prepare individuals for engagement in the globalized world. It has exciting opportunities for us. Among others, internationalization enables us to: a) walkup with the world trend and the changing landscape of higher education locally and globally; b) inject our programs with new knowledge, skills and world outlooks; and c) mobilize resources from different corners of the world. The effort of globalizing our programs to support the implementation of the GTP demands:

1) Recapitulation and clear conception of the quality of the functions we render;
2) Revitalizing and formulating quality visions and/or directions;
3) Enhancing empowerment and commitment of the frontline implementers;

4) Making in place appropriate structure for continual improvement process; and

5) Enhancing institutional commitment and overall communication for the vision.

The GTP document, nonetheless, has no any mention of this force rather than reiterating the ways and means to achieve MDG by 2015. We are, therefore, duty bound to redefine, redirect, redesign, and renew our vision, mission, and eon long traditions in line with the demands of the modern world. Handling this new direction involves a shift of mind or attitude regarding learning as lifelong process that is as natural as breathing whenever and wherever we live and work (Firdissa, 2009).

3.4.2. The moral force

It is our (collective and individual) moral obligation to fulfill the minimum needs of our customers and clients (students, parents, employers, the community, and the society). They deserve the best possible quality of teaching, research and services provisions. This for Sallis (2002:3) "is the moral high ground in education and one of the few areas of educational discussion where there is little dissent".

In such moral obligations, we are liable to justify the quality and relevance of our services from the point of view of content, methodology, assessment, research and services. We need to value the life and time of the primary beneficiaries of our services- learners and also consider the institutional and societal demands and requirements with regard to the services we render. In fact, the contents of GTP document imply this force, though implicitly.

3.4.3. The professional force

Professionalism today is not only to be responsible to others but also to truth. On top of this, one may ask: "Is teaching a profession?" It should be clear from the outset that teaching is a profession and teachers are professionals fulfilling the characteristics of: service, theory, practice, judgment, learning from experience, community, uniqueness (Firdissa, 2009, 2007.b).

Inherently, the above characteristics call for: a) employing the most appropriate pedagogic practices; b) ensuring that both classroom practices and the management of the institution are operating to produce the utmost possible quality, standard, and relevant teaching, research and services; and c) demonstrating a professional duty to improve the quality of education in general. One may, nonetheless, inquire the type of professionals we have within the newly established HEIs in the country, an issue of necessary conditions for quality assurance.

3.4.4. The competitive force

As the landscape of higher education is changing locally and globally, the demands for learning different skills and knowledge are high. Consequently, a variety of learner types come to our universities to served. The environment is becoming competitive. But what is our readiness to satisfy the needs of the different types of learners? Are we really ready for the competitive environments?

These are questions that every institution and educator should ask to stay in the world competition. We can meet the challenge of competition by improving the quality of our contents; delivery mechanisms, assessment and feedback systems, and making our programs align with that of the world development and trend. We need to: a) adopt a system of quality management, mainly TQM, and priorities; b) set strategies that clearly differentiate ourselves and our institutions from our competitors-internally and externally; and c) ensure that quality service delivery is the only differentiating factor for us. This calls for taking proactive stance to meet the needs of our customers, which is at the heart of quality services. This is one of the most effective means of facing the competition awaiting us and surviving as winners or equals with the competitors locally and globally. If not, we might be tempted to produce illiterate graduates within the competitive world and consequently forfeit credibility and our professional continued existence in the long run (Firdissa, 2009).

3.4.5. The accountability force

We individually, collectively, and institutionally are accountable to the taxpayers, the learners, the employers of our graduates, and the society at large. We are duty-bound to publicly demonstrate the highest relevance, quality, and standard of our teaching, research and services. Quality improvement, therefore, becomes increasingly important as institutions and staffs strive to achieve greater control over their own internal affairs. Such control is a freedom which has to be matched by greater accountability. Institutions and staffs, therefore, have to demonstrate that they are able to deliver what is required of them – in qualitative and quantitative terms (Sallis, 2002).

The provisions within the GTP document seem to enforce accountability in its general terms. They, nonetheless, are not as such responsive to quality matters by way of motivating individual staff and institutions to strive to demonstrate efforts to meet these imperatives. Failure to meet even one of these imperatives can jeopardize institutional as well as

individual well-being and survival in this competitive and volatile environment. This is because our customers will opt for one of the proliferating competitors. It is, therefore, strategically advisable to inbuilt a mindset that ensuring the quality, relevance and standard of our functions is a necessity, not an option in today's fast-running and changing world.

Particularly we should ensure the learning quality of our students. This can be seen as means and end to fulfill our esteemed individual and collective roles and services. This veracity calls for considering a Quality Framework which puts learners in the center of the teaching learning process (See Figure 3).

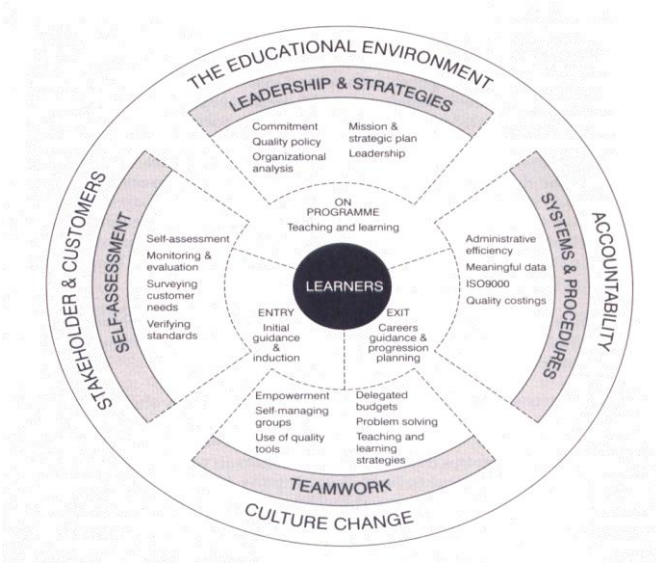


Figure 3: The Quality Framework (Sallis, 2002:139)

Our roles within the Framework are decisive and instrumental. The roles emanate from our values, which in turn are derived from the nature of what constitutes effective and ethical practices. We are, therefore, expected to assess the internal and external environments, accountability requirements, institutional cultures, and stakeholders' and customers' satisfactions with the teaching, research, and services that we render. The case calls for collegial culture, which is a desirable value in HEIs. Practices, however, show that collegiality is alive in words and lethal in practice as system of shared values, beliefs, and respect for each other among academic staffs appear to be limited. The situation seems to gradually make the staffs stand still rather than transforming and showing improvement in line with the fast running world of life and work.

4. Relationship between quality of education and development (expected and actual conditions)

4.1. Bidirectional Relationship between quality education and economic Development

Although growth does not necessarily eliminate poverty, economic growth is a powerful weapon against poverty. Economic growth is generally assumed to be explained largely by stocks of labor, physical capital, and human capital (improvement in the quality of the labor force). Technology is assumed to be part of the growth equation, and the rate of technological change is associated with the availability of highly educated workers. Demographic structure and change support or inhibit economic growth. Economic growth is a means for poverty reduction. For instance, family income tends to be strongly associated with a reduction in the incidence of poverty. Equally, as with education and economic growth, there is a two-way relationship between education and poverty. Family income is strongly positively associated with education attainment, and low earnings of the poor are the result partly of lower human capital endowments and partly of labor market discrimination (Quibria, 1994). Reflecting the association of education and poverty, in the Philippines, data from 97 provinces and cities with provincial status demonstrate that the incidence of poverty was associated with the extent of school participation, frequency of school completion, and level and quality of school staffing (Adams, 2002).

As it is true that advanced education leads to preferred employment, poverty reduces the opportunity for education attainment and acquisition of education outcomes (Adams, 2002). Particularly, quality education and economic development have direct, bidirectional, and strong bond. Quality education is the major driver for development. It therefore becomes a necessity:

1) in today's changes in technology, globalization, and demographics;
2) to muddle through, to survive and thrive within this unpredictable world;
3) in producing a labour force with appropriate skills, disciplines and commitment;
4) to catalyze the means to the end;
5) to create a strong and versatile economy; and
6) to remain competitive and /or to be winners within the competitive world.

Economy at the same time expands educational opportunities. The bond demands that all the programs at all schooling perform well and are in line with the requirements of the economy. The bi-directional and strong bond between the two can be seen from Figure 4.

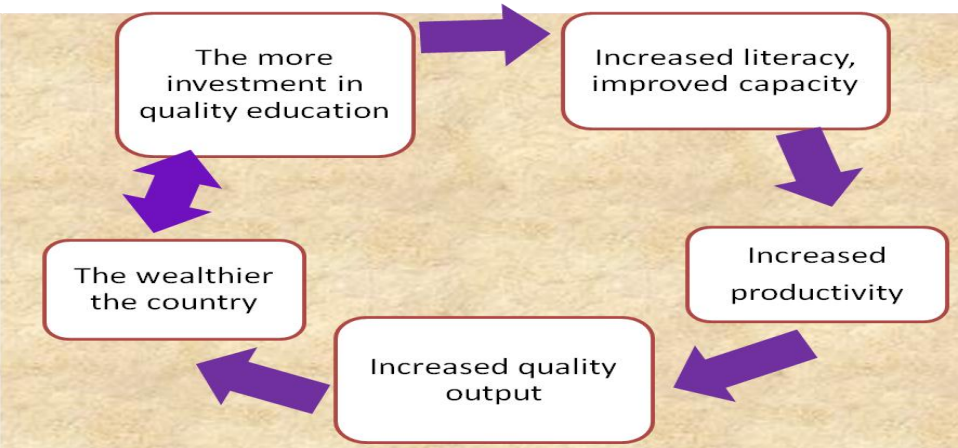


Figure 4: Bidirectional bond between quality education and Development

In today's Ethiopian Education and Training Policy, tertiary level degree provides high level knowledge, skills and disciplines enabling new information to be absorbed faster, unfamiliar inputs and new processes applied more effectively, and many social and institutional barriers to economic growth removed. Studies support the positive impact that education has on economic growth:

A) The Asian Development Bank found a strong positive relationship between the average number of years of schooling and the average annual change in GNP per capita for 13 Asian developing economies.

B) Between 30 and 50% of that part of American output growth that could not be explained by conventional factor inputs were due to the increase in the quality of labor through education.

C) The World Bank (1980) used the 'simultaneous equations' technique to identify the strengths and characteristics of each relationship while allowing for the existence of the other.

D) The rapid growth of the Japanese and South Korean economies owed much to the mass literacy and numeracy achieved early in the process.

The contribution of quality assurance to output growth can be seen in three ways:

1) Through the more varied and better generic skills it bestows on workers;
2) Through the greater research productivity it generates;
3) By contributing to the rate of technical progress or a rise in 'total' productivity by increasing labor and professional quality and productivity.

4.2. Required and actual conditions for quality assurance versus GTP

The last point in the preceding section reminds me of an old proverb that states: *a rising tide lifts all boats. This in turn demands assessing the* required and actual conditions for quality assurance versus GTP as presented in Table 1 below.

Table 1. Required and actual conditions for quality assurance versus GTP

Variable	**Required**	**Actual**	**Consequence**
Adopting Instrumental approach to quality assurance	Clear VMGs	All elements exist. The quality management system, nonetheless, is not as expected	Diffusion of responsibilities on quality matters
Staff qualification	High level knowledge and skills for research, teaching and services. The threshold that demanded by the Ministry of Education is at least 30 %, 50% and 20% of the staff shall have PhD, Masters and first degree respectively	The 9 senior are okay; others under, mainly 2nd & first degree staffs, readiness? e.g. Samara University No PhD MA/MSC =69% BA/BSC = 41%	-employing Diaspora and expatriate who are less considerate and less accessible -under qualified staff
Staff commitment	Harnessed by empowerment	Not as expected	Little considerate effort for quality
Time	Adequate time for preparations, Teaching, research and consultations	Staffs overburdened due to routines, part-time works for pay, unpredictable changes in practices	Little thoughtful considerations for quality Hectic practices
Support services	Adequate and efficient support services	Not as expected	Little accountability and ownership
Understanding and commitment of the top leadership	Good understanding and commitment	few aware and committed, and less well determination to remunerate and support staff	Indifference
Academic merit-based promotions	academic merit rather than conditioned or social connections should prevail	Sometimes conditioned connections govern	Tendency to cultivate social relationship; Prevalence of prejudice
Academic and political freedom	A fair degree	Fair	Ffair
Culture of collegiality	a spirit of respect whereby the behavior of the staffs is directed towards commonly	collegiality is alive in words and little in practice	Little transparency, respect, shared value ends among university community

Variable	Required	Actual	Consequence
	valued ends		
Research and Technology Transfer	Research and action-based technology are needed	Though there are efforts, not systematic	Haphazard ways of doing
Livable Communities	A place where free mind, conscience of the society exists and is exercised	Little conscious effort to create livable communities for staff	Little considerate atmosphere

The GTP document also presents targets for HE whereby MA/MSC teachers shall reach 75% and PhD shall reach 25% by 2014/15.

Other than excluding undergraduate holders, the target gives more space to graduation rate rather than to quality. It is clear from the Table that plea, applaud, emphasis and resources gear towards quantitative gains.

Table 2: GTP Targets for Higher Education

Description of Targets	2009/10	2014/15
1. University teachers (no)		23,000
a. Teachers with second degrees (%)		75
b. Teachers with PhD degrees (%)		25
c. Student –teacher ratio		1:20
2. Annual intake for postgraduate programs (second degree and PhD (no)		16,100
3. The average graduation rate of undergraduate program (%)		93
a. The graduation rate undergraduate programs for females (%)		90
b. The graduation rate undergraduate programs for males (%)		95
4. Gross admission for undergraduate program (70:30 program mix) (no)	185,788	467,000
5. Participation rate of females in undergraduate programs (%)	29	40
6. Participation rate of females in postgraduate programs (%)	10	25

Source: MoFED (2010:89)

5. Conclusions and implications

This paper has addressed Quality higher education for the implementation of the GTP of Ethiopia. It touched up conceptions of quality; growth and transformation plan versus urging forces for quality; particulars of GTP on higher education; objectives of higher education

within the GTP framework; urging forces for quality in the spirit of GTP: internationalization force, the moral force, the professional force, the competitive force, and the accountability force; and relationship between quality of education and development (expected and actual conditions).

Whereas the concept of quality remains fuzzy and elusive, attempts have been made to derive its meanings from different perspectives. It has also been argued that quality is a daily word of everybody but with less precise meaning. Its meanings are purposive, utilitarian, conformance to requirements and purposes, situational and are consensual. It has also been argued that the conceptions of quality as 'fitness for purpose' and 'fitness of purpose' need to be seen in transforming learning and learners. By implication, there is a need to do the right things (substantial/effectiveness) and to do the things right (efficiency and instrumental) with the purpose of empowering stakeholders and transforming the front line beneficiaries of our services- learners for the world of life, work, and competency. It seems logical to formulate the earlier quote: "QUALITY DEMANDS QUALITY" (Firdissa, 2009: 33) as:

$$QO = Q(I_1, I_2, I_3....I_n) + Q(P)$$

where QO is the *quality of the outputs* of university functions, Q(I….n) refers to the *quality of inputs*, and Q(P) stands for the *quality of the processes* by the university in the effort to achieve the objectives of each functions and then realize the overarching goals.

Overall, quality education and economic development have direct and strong relationship. Cognizant of this fact, the Growth and Transformation Plan (GTP) of the country aspires quality education and qualified workforce. Though there are ambitious plans we have, there are hardly any thoughtful, systematic, and deliberate efforts to make in place effective and efficient necessary conditions for quality that accelerate GTP implementation.

The provisions within the document do not delineate specifically ways of assuring quality rather than reiterating the need for qualified workforce. More space has been given to the quantitative gains and/targets. If the quality of teaching, research, and services is poor, the rate of investment in education and the impact of the socially optimal total amount and mixture of educational spending on economic growth will be lower. Moreover, there is no significant emphasis to empowerment, commitment, and motivation factors of the frontline implementers; and no mention about the forces and requirements for quality. This is in addition to the low readiness that many of our HEIs have to satisfy the needs of the different types of learners coming to learn. Therefore, there is a need to use opportunities for quality,

among others, by enhancing the effectiveness and efficiency of GTP implementation; adopting instrumental approach to quality assurance; balancing HEIs enrollment capacity and the staff qualification; and above all giving central place to the learning quality of students, research and the services we render to the community.

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Importance of Research for Conservation of Natural Resources: Practical implications for Sustainable Development in Ethiopia

By

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Abstract

Research is critically needed to support the conservation and sustainable use of biodiversity. Fundamental questions such as the biodiversity in a country, their occurrence, why and where species occur, their function, economic and ecological values of these biological resources, change over time and scientific reasons behind these changes and risks and management options are answered by scientific researches. Research on environment and development is needed for the proper links between population, development and technological implications. To plan any development activity, we need to first understand what has to be planned and how it should be done. That understanding comes from previous research and therefore, research is pivotal in any development endeavor. Environmental challenges are many and complex demanding different approaches that integrate all options that positively contribute to sustainable development. Therefore, there is a high need for government organizations, academic institutions and non-governmental institutions to join hands with an effort to promote demand driven research activities. Research is important to ensure development efforts that are socially desirable and ecologically suitable. Finally, it can be concluded that research is basis and indispensable for conservation of natural resources on which sustainable development is dependent.

Key words: biodiversity, conservation research, sustainable development

Introduction

It has been recognized that there is an inextricable linkages between biodiversity, poverty reduction and sustainable development (CBD, 1992). Biodiversity provides the basic goods and ecosystem services and therefore, is crucial to the reduction of poverty (SCBD, 2012). In other words, biodiversity is significant to reduce poverty, to improve the livelihood of the

poor. It is obvious that the poor are particularly dependent on the goods and services supplied by biodiversity. As a result, development strategies that ignore biodiversity and ecosystem services undermine poverty alleviation and are therefore counterproductive. It is important to note that development and poverty alleviation strategies and programs should prioritize biodiversity.

The conservation of biodiversity is a global responsibility and each nation has a necessary role to play in finding new ways to manage biological resources including identification of what we do not know about biodiversity and the means that will be required to increase and disseminate our knowledge (NAS, 1992). Article 12 (b) of the Convention of Biological Diversity states that Contracting Parties shall promote and encourage research which contributes to the conservation and sustainable use of biological diversity (CBD, 1992).

Genetic diversity of agrobiodiversity provides species with the ability to adapt to changing environment and evolve by increasing their tolerance to frost, high temperatures, drought and water-logging as well as their resistance to particular diseases, pests and parasites. High yielding varieties, important traits for pest and disease tolerance and drought resistance are identified by research. Conservation and sustainable use is of critical importance for meeting the food, health and other needs of humankind. However, increasing demand for natural resources makes the maintenance of healthy, productive and sustainable ecosystems difficult and challenging. Environmental problems are complex and multidisciplinary. Therefore, there is an urgent need to develop and propose solutions to interdisciplinary problems in natural resource conservation with innovative, novel and unbiased research and stakeholder engagement.

Research is a key for sustainable development particularly in enhancing agricultural productivity and in sustaining the natural resource base. Research in the agricultural sciences and natural resources management has an important role in contributing to the achievement of development goals (IRG, 2005). Basic research, research to generate tools and technologies, and research on agricultural development processes combine to form a knowledge-chain continuum leading to development.

Role of Research in Strengthening Natural Resources Conservation

Species overexploitation and habitat loss are the two major global conservation problems (Kideghesho, 2009). Research assists the wise management of natural resources. Research is

also important in identifying the role of traditional management practices in conservation. Management strategies and techniques need to be tailored to particular thematic programs, threats and environments (ANZECC and BDAC, 2001). The three processes – predictive modeling, management and monitoring – form the management loop referred to as active adaptive management. Active adaptive management is best practice management that integrates research and action.

Strengthening natural resources conservation is one of the objectives of the Ethiopian five years Growth and Transformation Plan (GTP). The expected outputs of this objective include:

- Implemented sustainable land use planning and management system.
- Strengthened natural resources (forest) conservation and use.
- Strengthened use of water use and conservation

The other major objective of the GTP is to strengthen biodiversity conservation was the following out puts:

- Collected accessions of biological resources
- Conducted research and assessments on biological diversity
- Increased number of genetic resources conserved both *in-situ* and *ex-situ*

Determination of storage behavior of species, characterization, analysis of change over time and other important issues related to natural resources conservation and sustainable utilization need continued and progressive research.

For effective utilization of resources and also to address gaps, any research should consider previous works in the field and build on those efforts. The kinds of research that need to be promoted include:

1. Demand driven research based on practical problems
2. Multidisciplinary, applied research relevant to policy makers, resource managers, academics and community members

1. Fundamental Questions in Biodiversity Research

By asking some fundamental questions, we can gain direction and appreciate the role of research in conservation and sustainable use of biodiversity (ANZECC and BDAC, 2001):

- What is Ethiopia's biodiversity? Where do our natural resources (biodiversity) occur? When and why? We do not know the country's biodiversity except some data on limited taxa. Even for those already studies there are still many gaps in our knowledge and much need to be done to record and study the Country's flora and fauna. Therefore, there is a high need for biodiversity research in Ethiopia. To generate knowledge on the biodiversity of a country, research should be conducted to address the following priority areas:

    1. Identification and mapping of ecological communities and ecosystems that may be threatened need to be included in a protected area or are poorly understood such as fresh water.
    2. Identification of native species that may be threatened, occur in poorly understood ecosystems or in poorly understood taxonomic groups such as invertebrates, non-vascular plants, fungi, bacteria and other micro-organisms.
    3. Monitor changes in biodiversity in order to detect ecosystem decline, the recovery of threatened species and ecological communities, the outcomes of conservation management actions and the effectiveness of the system of conservation reserves.
    4. Develop biodiversity data and information systems

- How does our biodiversity function? According to ANZECC and BDAC (2001), ecosystem processes purify water, build fertile soils, pollinate plants, control pests, reduce flood damage and break down pollutants. There is a need for better understanding of environmental processes so that we can anticipate the effects of human activity on ecosystems predict the consequences of ecosystem decline and develop improved methods of natural resource management.
- What is the value of our biodiversity? There is a high need to determine **the environmental, social and economic value** of biodiversity components and ecosystem services as these data are important to make informed land-use and land management decisions.
- What is changing and why? Identification of changes over time and driving factors is useful to restore ecosystems and to prevent further damage. Some of the activities that should be undertaken may include:

- Determination and investigation of the factors that present the most significant threat to ecosystems and remnant habitat.
- Determination of the conservation status of species and
- Identification of critical habitats.

Answers to the above listed fundamental questions and others need to be based on the scientific information and knowledge to be generated from research.

2. Role of research in Biodiversity

- Determination of Important traits in Biodiversity. Important traits such as tolerance to high temperatures, drought and water-logging as well as those that contribute to resistance to particular diseases, pests and parasites are determined through research. Furthermore, genes that contribute to high yield are identified through research.
- Taxonomic research– need to correctly identify species. This is critical in biodiversity assessment and documentation.
- Research is important in developing criteria for the identification and configuration of protected areas, biodiversity rehabilitation techniques, population biology, standards for the use of genetic markers, consequences of changed landscape patterns and other environmental change on biological responses, populations and ecological processes
- Conserving, protecting, and characterizing genetic biodiversity cannot be done without scientific research with established standards
- Research may be needed in order to:
  - identify and monitor species and their habitats, genes, ecosystems and ecological processes,
  - determine distribution, characteristics, conservation status, and ecological relationships of species,
  - list threatened species and communities, and to update surveys,
  - determine changes overtime (dynamics),
  - support the recovery of threatened species and ecological communities,
  - develop methodology and determine baseline biodiversity data, and
  - undertake diversity assessment and interactions,

Furthermore, research is needed to provide answers for the following:

- description and map of ecosystems,

- an assessment of the value of biodiversity,
- tools to support community decision-making, and
- an evaluation of the outcomes of on-ground action and guidance in adapting management strategies.

3. Research in Agriculture

Agriculture is the single biggest threat to the global environment, through the loss of biodiversity, ecosystem services and global warming, and at the same time the key to human wellbeing in all societies. Agriculture is the main driver of habitat loss, with over 40% of Earth's natural forest cover already gone since agriculture began some 11,000 years ago (Aitken, 2011). According to this note, three quarters of this loss was over the last two centuries. Forests were felled at a rate of approximately 13 million hectares per year for the period 2000 to 2009. Yet, 1.2 billion people rely on forests for their livelihood and more than 2 billion, a third of the world's population, still use biomass fuels such as firewood to cook their food and heat their homes. Important research topics that should be considered for conservation and sustainable utilization of agrobiodiversity include:

1. High-yielding disease/pest tolerant varieties for crops
2. Improving animal production systems, with integrated supplemental feed/pasture/crop and nutrient management.
3. Participatory demand driven studies with poor farmers to identify and tackle their key problems which could include, for example, inadequate seed varieties, or losses of livestock per year
4. Enhancing resilience to climate change and potential mitigation measures.

4. Research in Forest Science and Management

Reports show that 80% of our land biodiversity lives in forests and therefore habitat loss is directly equated with species loss (Aitken, 2011). Furthermore, loss of forests means a loss of carbon sequestration and storage potential and the release of gigatonnes of stored carbon.

Ecophysiological experiments provide an understanding of the relationship between growth and the factors influencing growth, such as resource availability and environmental conditions (Pretzsch, 2009). Research is important in forestry as forest research looks at the total life span of a tree or stand thereby gathering data on growth and yield of the wood volume in discrete time intervals. According to Pretzsch (2009), long-term records from

forest growth and yield science are needed to support the validation of ecophysiological findings, to scale-up these findings from a plant organ to the plant or stand level, and then to develop applicable generalizations.

Conservation Research and Data Handling

NAS (1992) pointed out that to advance our understanding of successful conservation strategies and methods, the following actions are needed:

1. Site specific research that advances the understanding of ecosystem composition, structure, and function; to use this knowledge to link basic and applied research, sustainable land use and development, and the conservation of biological diversity; and to provide baseline data for environmental monitoring. Progress toward truly sustainable land use systems requires information on the effect of management options on the ecosystem dynamics, and this information can be gained only through long-term research.
2. Research that focuses on the application and further development of the methodologies and principles of conservation biology. It important to note that testing and comparing conservation methodologies may enable us to elucidate principles that can be more widely applied in a given ecosystem.
3. Research on strategies for the sustainable use of biological diversity. According to Article 2 of CBD (1992), sustainable use is defined as the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations. This implies that current human needs should be met without degrading the resource base for future generations.

It has been noted that the challenge of biodiversity research entails not only the gathering of information, but its management, application, and communication (NAS, 1992). Ethiopia has no systematically organized data on its natural resources in general and biological diversity in particular. There is high need to conduct coordinated and focused, demand driven research. Furthermore, conducting analysis of existing scientific knowledge about Ethiopia's biological diversity and identifying knowledge gaps and research priorities. Identifying areas of biodiversity research that have national priority is another important issue to be considered.

Establishment of national data base, application of research results and communication with all relevant stakeholders is important aspect to be considered in research, conservation and development endeavors.

Management options

ANZECC and BDAC (2001) pointed out that management actions are selected following on-ground observations or sophisticated modeling. Biodiversity conservation targets need to be developed for each management option. Management strategies and techniques used in conservation areas and production systems need to be monitored to measure how effectively they meet the targets, maintain ecosystem processes and reduce adverse impacts on native ecosystems. Ecologically sustainable management techniques are urgently needed for agriculture & pastoralism in order to conserve native biodiversity and maintain ecosystem services.

Conclusion

Biodiversity is essential to maintaining and sustaining the living networks and systems that provide humanity with health, wealth, food, fuel and the vital services that life depends upon. NAS (1992) pointed out that biodiversity is a basic determinant of the structure and function of all ecosystems and provides the foundation on which the future well-being of human society rests. Therefore, research must be expanded and strengthened to improve our understanding of biodiversity, its conservation, and its role in building sustainable human societies.

Identification and monitoring of changes in ecosystems, ecosystem processes, ecological communities and species, identification of threats to biodiversity conservation, making data and information accessible, developing and evaluating conservation management strategies and practices, developing educational materials are all directly linked to research and cannot be done without research. Besides, research plays a pivotal role in providing scientific advice to different stakeholders and decision makers.

Therefore, there is a high need to strengthen research in the natural resources sector. It is obvious that quality of research depends on the people and institutions that perform it. Hence, due attention should be given to research capacity building. Building capacity of researchers and research institutions as well as using research data in planning and decision making positively contributes to natural resources conservation and sustainable development.

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Prospects and Prognosis of Cooperation in the Nile Basin in the 21st Century

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1. Introduction

The Nile is world's longest river. It stretches 6825 km across 35 degrees latitude, covering an area of 3.3 million sq. km in 11 countries with current population of 396 million. The Rivers Abbay, Baro-Akobo and Tekeze[11] emanate from the same water tower of Ethiopia in the eastern sub-basin. The Rivers Nzoria, Kagera and Semliki, and the Lakes Victoria, Albert, George, Edward and Kyoga take their rise from the heart of Eastern and Central Africa, connecting half a dozen countries of the Equatorial Lakes Region. The two head water systems perennially replenish the Nile in its journey to downstream in the desert.

The Nile Valley is one of the oldest places on earth which housed renowned civilizations, ancient polities, kingdoms and, empires. The communities and countries in the upstream and downstream of the Nile have always been and permanently bound together by the shared waters; and millions owe to the river their present livelihoods and future prosperity. Indeed, the Nile has always been part of the natural ecology, economic life, cultural heritage as well as an integral part of the histories of the riparian societies and nations. It is for this reason that the late Cheikh Anta Diop explained in his seminal work known as *The African Origin of Civilization*: *Myth or Reality?* (1974: 56) that "those in the mouth and those in the source as well as those in the middle of the course of the Nile were bound in one and drew their life and civilizations from the same source". Diop further finds that "the Nile is not only the home of the most ancient human race but also of the primitive civilization of human kind".

[11] In Sudan the river Abbay is known as Blue Nile, Baro-Akoba as Sobat and Tekeze as Atbara.

Notwithstanding the rise and fall of ancient and recent empires; in spite of the fact that the political boundaries were drawn and redrawn; notwithstanding the contemporary divides on regional, confessional, cultural or ethnic lines the Nile River faithfully continues to replenish the societies and the countries both in the upstream and downstream expanses, as much as the flora and fauna in the terrestrial and aquatic environs of the Nile continue to adorn the basin as it has always been the case along its entire course. For this reason the Nile is a binding force throughout the historical ages and across the entire basin.

It goes without saying that Egypt, Sudan and Ethiopia can immensely benefit in the areas of environmental protection, economic development, legal/ institutional harmonization and mutual security by enhancing mutually beneficial and collaborative development engagements through joint and multipurpose water resources development activities. The Grand Ethiopian Renaissance Dam (GERD) which is being undertaken by Ethiopia, for instance is a significant hydraulic work in the upper stream of the Nile. GERD can serve as a huge source of hydropower energy with annual capacity of 6000MW. This can be gridded up to the energy systems of the downstream countries, thereby accruing benefit both to Ethiopia and downstream countries. If the 20th was marred in interstate squabbles and by upstream-downstream tensions, the 21st century should have the unutilized and infinite opportunities for cooperation and greater opportunity for mutual confidence and common prosperity.

2 A Historical Overview

Prior to the coming of the European colonialism to the Nile basin, Egypt was under Turko-Egyptian rule which replaced the Mamluke regime in 1805 under the potent ruler Mohammed Ali Pasha. The regime's modernization drive was premised on a geopolitical expansion of Egypt into the upper Nile. The Turko-Egyptian invasion of Sudan in the 1820's and the subsequent rule of northern Sudan was an essential aspect of Egypt's geopolitical expansion into the upper Nile basin. Hence, Mohammed Ali Pasha and his successors (1820's-1885) spared no effort to expand Egypt's control on Nile's upstream. However, Egypt's aspiration to control further upstream Nile was effectively thwarted by Ethiopia. The evidence of this was the total defeat of the invading Egyptian forces by the Ethiopian army under Emperor Yohannes IV at the battles of Gundet and Gurah which took place in northern Ethiopia in 1875 and 1876, respectively.

Britain colonized Egypt in 1882 due to Egypt's financial insolvency to the British creditors[12] as much as to seize the opportunity for geopolitical control of the strategically positioned northeastern Africa, including the Nile basin. On the other hand the Turko-Egyptian occupation of Sudan was temporarily abolished in 1885 by the Mhadist Rebellion of Sudan, which had emerged in the early 1880's. Britain teamed up with its subject government in Egypt and reinvaded Sudan in 1899, thereby establishing a joint colonial regime of Anglo-Egyptian Condominium over Sudan. As a result Britain protected its own colonial interest in Egypt and gained a geopolitical control further up stream on the Nile. Britain occupied Uganda and Kenya in late 1890's, among others, to safeguard the source of the Nile. She also controlled Tanganyika (now Tanzania) under the rubric of 'Mandate of the League of Nations', following Germany's defeat in WWI. One should also note that another European colonial power in the person of King Leopold II of Belgium expanded his colonial possession from Congo to Burundi and Rwanda, also following Germany's defeat in WWI. Hence, The question of sovereign ownership of the Nile by Sudan, Uganda, Kenya, Rwanda, Burundi, DRC and Tanzania was foreclosed due to the colonial occupation of these riparian countries. Notwithstanding Italy's occupation of her northern province of Eritrea by 1890, Ethiopia maintained her sovereignty in the Nile basin. Ethiopia, therefore, remained the bastion of independence in the Nile basin and in the entire continent. Until the end of colonialism in the Nile basin in 1960's Ethiopia was the sole voice of the upstream interests and the only power which continually warded of the downstream hegemony of the falling and rising powers.

Those European powers which had established their colonial control in the Nile basin entered into various water agreements among themselves and with downstream Egypt. The major agreements included the following: the 1891 Anglo-Italian agreement[13], the 1906 Anglo-Franco-Italian Tripartite Agreement[14], the 1925 Anglo-Italian Accord[15] and the 1929 Anglo-

[12] Egypt was heavily indebted to British lenders on the money she had borrowed for the construction of Suwez Canal (completed in 1869) and for the expensive war Egypt waged against Ethiopia during 1875-1876.

[131313] The April 15, 1891 Rome Protocol between Great Britain and Italy on the demarcation of their respective spheres of influence in East Africa.

[14] The December 15, 1906 London agreement between Great Britain, France and Italy concerning Ethiopia in the event the ailing Emperor Menilik II dies. It was envisaged that Great Britain would secure the control over the Ethiopian Basin of the Nile.

Egyptian Exchange of Notes (Britain recognizing the historical and natural rights on the Nile waters for Egypt). The colonial and post-colonial agreements actually became a full course of geopolitical discord against Ethiopia.

On one hand Ethiopia unequivocally defied the geopolitical control of the Nile waters by Egypt or European imperial powers, whether by invasion or by treaty. On the other hand she gave assurance that the downstream riparians would not be denied from receiving the flow of the rivers from Ethiopia. The evidence of this is very clear in the terms of 1902 agreement between Ethiopia and Britain. In that agreement Ethiopia accepted not to put up structures to obstruct the flow of Nile head waters to downstream[16]. This indicates that Ethiopia does not intend to deny water to the downstream countries. This does not, however, imply that Ethiopia would not allow herself to use the waters that flow out across her borders. Furthermore, Ethiopia denounced the 1906 Tripartite Agreement, and protested against the 1925 Anglo-Italian secret accord.

More importantly, Ethiopia had rejected colonial domination altogether. The following evidences are clear example of this: In 1887 the Ethiopian forces annihilated the invading Italian forces at Dog'Ali near the Red Sea coat. The 1895-96 anti-colonial resistance of Ethiopia culminated in the renowned anti-colonial victory at the Battle of Adwa in 1896. The 1935-41 famous anti-colonial and patriotic resistance of Ethiopia resulted in the victory against the fascist Italian occupation. Ethiopia also unequivocally rejected the post colonial agreements which excluded her and which contravened with the country's sovereign interests on the waters of the Nile. The cases in point are that Ethiopia rejecting the 1929 Anglo-Egyptian agreement and the 1959 Egyptian-Sudan 'full utilization of the waters of the Nile' agreement.

With the aim of resolving the longstanding problem of the Nile waters, Ethiopia jointly established the Nile Basin Initiative (NBI) together with the states in the Nile basin, in February 1999. This was a new departure and an interim mechanism under whose facilitation

[15] The December 14/20, 1925 Rome Exchange of Notes between the United Kingdom and Italy concerning the Obtaining of concessions for the construction of a Dam over Lake Tana and a Railway Line Passing through Ethiopia from Eritrea to Italian Somaliland.

[16] See article III of the Treaty Between Ethiopia and Great Britain on the Delimitation of the Frontier between Ethiopia and Sudan (15 May 1902; ratification was exchanged in Addis Ababa on15 October 1902).

the riparian states to proceed and achieve a *modus operandi* of equitable and reasonable utilization of the waters of the Nile course. The implicit intention of the commitment was one of realization of coming of age where the colonial and post-colonial water hegemony should be done away with as a thing of the past. This new era of cooperative venture was premised on:[17] (1) the recognition of the rights and obligations of each riparian State to the Nile water resources; (2) the acceptance of the need to foster an all inclusive co-operative framework for the development, management and sharing of the Nile waters for the benefit of all; and (3) affirmation of the desire of the riparian nations to set up a new transitional mechanism to advance a Strategic Action Program for the Nile.

The new Cooperative Framework Agreement (CFA), which has been negotiated during 1999-2010 and signed in May 2011 does establish the principle of 'equitable and reasonable' utilization and management of the waters of the Nile to all riparian countries. Under the auspices of Nile Basin Initiative (NBI) and with the relentless facilitation of Eastern Nile Technical Regional Office (ENTRO), and with the signing of CFA, the Nile Basin is coming out of the lingering state of non-cooperation characterized by upstream-downstream tensions over the utilization and management of the waters. Enhancing shared benefits on the inalienably shared Nile waters is indicative of the prospects of cooperation among the 11 riparian nations[18] of the Nile basin in the 21st century.

3. Geopolitical Imperatives of Cooperation in the Nile Basin

The Nile Basin comprises one third of Ethiopia, a huge part of Sudan[19], the cultivated and settled corridor of Egypt, the whole of Uganda, parts of Kenya, Tanzania, Burundi, Rwanda, Congo Democratic Republic (DRC), Eritrea and South Sudan. Hence, the waters of the Nile are not only the integral part of the countries but also signify the strategic unity of all the riparian countries. The table bellow explains each riparian country's territorial expanse in the Nile basin.

[17] The details are in "The Agreed Minutes of the Council of Ministers of the Nile Basin States", signed on 22 February 1999 in Dar es Salaam, Tanzania.

[18] South Sudan is the 11th Nile riparian state following her independence in July 2011.

[19]Since January 2011 Sudan is partitioned into two countries-North Sudan and South Sudan. Large chunks of both countries lie within the Nile Basin.

Nile riparian countries & area in the basin

Riparian country	Basin area, km^2	% of basin area
Sudan	1,933,300	63,64[20]
Ethiopia	356,900	11,75
Egypt	277,500	9,03
Uganda	238,900	7.86
Tanzania	120,300	3.96
Kenya	50,900	1.68
DRC	21,700	0.71
Rwanda	20,800	0.69
Burundi	13,000	0.43
Eritrea	3,500	0.12

Source: United Nations Environmental Program (2002), *Atlas of International Freshwater Agreements*, UNEP, Nairobi, P.40.

In terms of water volume, 86% of the waters of the Nile originate in Ethiopia. The six Nile Equatorial Lakes regional riparian countries contribute the remaining 14%. On the other hand Egypt and Sudan are net recipients and users of the largest amount of the Nile waters. All the riparian countries have inalienable juridical equality of rights and obligations in the basin despite the graphical difference of territorial expanses as can be seen in the figure herein above, or in spite of the amount of the contribution to the water volume. But none of the stated differences should prejudice the juridical equality of the riparian nations. The basic assumption is that the riparian nations have juridical rights to the shares of the water resources, notwithstanding the geographic position or relative quantity of the water flowing from or passing through the countries. The ownership question and the issue of right of use of the share water resources are the basis for cooperation and mutual benefit among the riparian countries. The more the utilization of the water resources is intensified nationally, the more urgent will it be the need for upstream-downstream collaboration. This inextricably needs establishing inter-state environmental, economic, institutional and security regimes as geopolitical imperatives for sustainable utilization, management and protection of the shared Nile waters.

[2020] South Sudan was part of Sudan until the former became an independent state in 2011.

3.1 Environmental Imperative

For quite some time the international community has been alarmed by the ever-increasing scarcity of fresh water resources, which call for a serious mitigation task sooner than later (FAO, 1995: 4). It is no surprise, therefore, that the concern and debate has focused on water issues during the past two decades. The UN system sponsored the International Conference on Water and Environment (ICOWE) in Dublin in January 1992. The conference appealed for an innovative approach to the assessment, development and management of fresh water resources across the world.

The Dublin Conference further provided policy guidelines for the Rio Conference on Environment and Development, which was subsequently held in June 1992. The Rio Conference, in turn, recommended a reform of fresh water policy throughout the world. That was followed by the World Bank's comprehensive water policy of 1993 which defined new objectives. Then, again FAO established an International Action Program on Water and Sustainable Agricultural Development (IAP-WASAD). In the same way the UN Specialized Agencies, International and Local Non-governmental Organizations and Bilateral Assistance Agencies have all been busy actively taking part in programs related to fresh water resources. The dictum 'water is life' is a commonplace nowadays. Indeed water is an immediate and essential part of our environment. It goes without saying that any serious program on the mitigation of the impacts of climate change has to address the issues relating to fresh water.

Renowned authorities in the field of water resources, like Thomas and Hwlett (1993: 19) supported and welcomed the Rio perception about the place of water in our environment, and optimistically viewed the new and fast expanding movement about management and protection of fresh water. In the absence of basin-wide environmental management of the waters of the Nile the governments in the basin have developed comprehensive fresh water resource policies within their respective countries. The central objective of developing national water policies has been to utilize the nationally available fresh water as basic resource for socio-economic development[21]. The national water policies most commonly

[21] See for example the National Water Policy of The United Republic of Tanzania (2002) especially pp. 12-18, 24 and 44; and The Water Resources Administration Policy of The Federal Democratic Republic of Ethiopia - Amharic (1999) pp. 17-32.

focused, *inter alia*, on water for: domestic supply, agriculture, industry & mining, energy, etc. It is important to note that the national water policy documents included the need and commitment for cooperation on their trans-boundary waters. However, there were no legal obligations or institutional mechanisms in place to jointly develop the shared waters between riparian countries. Hence, unilateral and nationally confined planning and development continued unabated.

On the other hand, environmental security can only be safeguarded through collaborative efforts of states, primarily by developing shared principles and rules, common procedures and institutions for the shared water basins. The consequences of environmental degradation and resource scarcity cannot be confined within national borders, but will inevitably affect all parties in the basin one way or another. For instance, unmitigated erosion in an upstream country will result in silt accumulation in the reservoirs constructed in a downstream country. The case in point is that the large quantity of sediment carried by Abbay /Blue Nile and Tekeze /Atbara rivers has already created serious problem of soil erosion in upstream Ethiopia and silt accumulation in downstream Sudan. In upstream Ethiopia land cover is removed by seasonal soil erosion and carried downstream to Sudan. Silt accumulation in the downstream dams in Sudan and Egypt is a result of loss of land cover through erosion in upstream Ethiopia. The soil erosion in the upstream basin negatively affects both upstream and downstream counties. Cooperation of the two countries is an indispensable modality for mitigating the trans-boundary environmental hazard, namely, erosion in the upstream country and silt accumulation in the downstream country.

There is a growing realization that environmental security will not be achieved through military action. One important reason for this is that national territorial boundaries and natural resources boundaries may not be the same. Historically, national boundaries might have been evolved through political processes which might have included military means. But natural resources such as rivers or fresh water lakes may cross the political boundaries between two or several countries. Thus, any one state cannot and should not claim to be the authority over trans-boundary waters. Understandably, fresh water is a fundamental source for life and requires special attention. In general terms, lest the environmental security of all parties be in jeopardy, states in an eco-geographical region will have to create a sustainable form of cooperative environmental security. The key issue here is to understand the limits to the carrying capacity of a particular environmental asset (in this case fresh water), and to

know how best to utilize, manage and protect it sustainably now and for future times. This again requires an inter-riparian consideration towards how best to cooperate on the utilization, management and protection of the shared environmental property in the best interest of all riparian communities and countries.

3.2 Economic Imperative

The countries in the Nile basin have been engaged in planning and developing their water resources in response to the increasing demand for socio-economic development, especially to mitigate food shortage and to overcome the recurrent drought and increasing aridity. The riparian nations increasingly feel duty bound to their societies and to develop the natural resources including the Nile waters within their respective territories. The national water development sectors most commonly focus on: 1) domestic water supply, 2) livestock, 3) agriculture, 4) industry, 5) mining, 6) energy, 7) fisheries, 8) environment, 9) wildlife 10) forestry and bee keeping and 11) navigation. These areas of focus are elaborated in the national water policy documents of the countries in the basin.

On the average more than 62 percent of the population of the Nile basin lives in the rural areas. For the more urbanized Egypt and Kenya the rural population is 58 percent and for those less urbanized countries of Uganda and Ethiopia is 88 percent and 84 percent, respectively. On the international index of development the Nile basin countries rank way below the half way on the scale. Somewhat better faring, Egypt and Kenya rank 101 and 128, respectively out of 169 countries, while DRC, Burundi and Ethiopia are at 168, 166 and 157 ranks, respectively (UNDP Human Development Report for 2010).

The essence of the economic imperative to shared water management is efficient use of the available water resources at a given time and under a given environmental circumstance. According to Loures *et al*., (2009: 5) 50 per cent of world's accessible fresh water is consumed by humans, and that the remaining is not readily usable. They further explain that "water shortages already affect two billion people in over 40 countries" (Loures *et al*: 2009), and that "the world's 263 international watercourses contain key freshwater supply and sustain rich ecosystems in 145 countries". From the foregoing we can observe that shared water systems are dominant phenomenon in the world's natural resources scene. Therefore, an economic management of trans-boundary water resources can best take place at a basin-wide, sub-basin or regional level. This, in turn, should be guided and enhanced by capability,

accountability and responsiveness of the riparian countries based on legal basis and institutional framework. That is why the economically beneficial development on trans-boundary waters should take a political economy approach. But this is not same as market driven valorization of water resources like other ordinary commodities. Nor is it to be perceived in an ordinary sense of equity.

The concept of sustainable development of water resources was first mentioned by the World Commission for Development and Environment (WCED) in its report "Our Common Future" (1987). The report then viewed the environment and development in a unified manner, suggesting a new approach to economic growth in general and water resources development in particular, one in which the criteria should be 'meeting the needs of the present generation without compromising the needs of future generations'. This concept has been widely accepted. Hence, according to the World Bank Report (1992a: 8), meeting the needs of the present generation implies an essential aspect of sustainably meeting the needs of subsequent generations. That is why the shared waters of trans-boundary regimes should not be subjected to apportionment in counts of barrels or cubic meters. When an annually fixed amount of water apportioned to countries or persons in each country the resulting dividend will be a diminishing numbers of whatever units of water. The idea of sustainable development of shared waters for the present generation and generations to come is entirely different all together.

Equitably sharing the limited water resources efficiently with the application of environmentally sound technology is the essence of the new concept. This suggests that the economic goals must be adjusted to ecological possibilities, and modified accordingly. The basic tenets of sustainable water use and management rest on equitability, efficiency and ecological integrity. Decreasing the rate of evaporation, mitigating soil erosion and preventing flood occurrences can be taken as key elements of efficiency and ecological integrity of water development in general and trans-boundary waters in particular.

The economic management of water is possible both at national and cross-national levels. Two ways of cross-national water management can be suggested: recycling or quality renewal and 'virtual' water transfer. With regard to the first one, the quality of water lost during its use upstream can be restored. An example of this would be the desalination of the Colorado River by the United States of America in Mexico. Due to the extensive irrigation

use of the waters of the Colorado River within the United States, the river loses its natural quality by the time it reaches Mexico. The second type of transfer relates to virtual water in a form of quantity transfer. In keeping with the economic value of water, countries may opt to buy food grains at economically advantageous prices if water resource development is too costly, or if it is politically or otherwise impossible to develop water resources in one's own national territory. This scheme, in fact, can be planned at a cross-national level through collaborative planning, and by using the comparative advantages of different countries. The Nile basin countries will have to pursue this method in a cooperative framework.

There is unabated population growth invariably in all Nile basin countries. The total population as at 2008 estimate is 396 million. According to population projections, by 2025 and 2050 the Nile basin countries will have 566 and 875 million people, respectively. Thus, the population pressure, rural life circumstances and the deep poverty structure will continue to push the societies of the Nile basin to continued dependence on the exploitation of natural resources, primarily land and water resources. And the governments in the Nile basin are increasingly forced to make the available water resources into their national development strategies and planning.

A careful observation into the case study research analyses carried out by Nile Basin Research Program of Bergen University (2007-2010) reveals that the nine riparian countries of the Nile covered in the study have stepped up their water resources development in what they believe necessary for the overall socio-economic development. For instance, Tanzania has embarked on the Kahama Project of Lake Victoria since 2003. Among others, the project aims to draw 80 million l/d from Lake Victoria for 450,000 people until 2017 and to increase the service at 120 million l/d for one million people by 2027 (Ngowi, 2010:62-65). Similarly the Ethiopian case study finds that the country aims to develop irrigation projects from 197,250 ha in 2002 to 440,946 ha by 2016 (Yacob, 2010: 271). The Toshka Diversion in Egypt and the Merowe Dam in Sudan have already been operational.

3.3 Institutional Imperative

The search for establishing legal framework for managing water utilization is not new. Upstream and downstream users must agree on the legal/institutional mechanisms to allocate the responsibility, obligation and benefit over the water resources that are shared. Unfortunately, in Third World countries riparian agreements are often complicated due to the

colonial past, or due to non-existence of judicious agreements. The World Bank's operational Policy (of 1956 as modified in 1964 and 1985) served as an indirect inducement on riparian countries to enter into water management agreements (Krishna, 1998) which required that riparian nations to agree amongst themselves as a prerequisite for receiving investment support on their trans-boundary water resources. As a matter of principle international law professor Chazournes (1998) encourages riparian countries to avoid conflict over trans-boundary waters and to enter into negotiated agreements. Indeed, establishing legal mechanisms in the first place and integrating cross-border cooperation between riparian nations greatly depend on ingenuity and wisdom of the political actors and diplomatic negotiators.

In other words, establishing and maintaining legitimate and sustainable solutions for shared water resources requires short-term sacrifices which may involve some modification on current use in the interest of long-term benefits. The reason behind this assumption is to make agreement on clearly laid rules and procedures so that future cooperation and continued interaction will be sustainable. From this consideration the Nile downstream countries of Sudan and Egypt are expected to choose the long term benefit and sustainable peace and development in the Nile basin instead of hanging onto the status quo which is refuted by international practice and rejected by other riparian nations in the Nile basin itself. As elaborated in detail by Waterbury (2002) the growing trend is that in many areas of the world trans-boundary agreements have created amenable conditions for upstream-downstream cooperation. There are clear indicators that riparian countries increasingly opt for cooperation on trans-boundary water use and management. Although a global water law yet to take shape it is hoped that the increasing number of trans-boundary water agreements shows the dominance of that trend. If conditions for global water law will ripe sooner, whether a global water authority will be established and how soon will it be materialized is a matter of opinion.

Specific basin-focused treaties are, traditionally, a practical arrangement by which the riparian countries can bring together a set of effective legal instruments for mitigating and solving disputes that might arise over shared water resources. Such agreements often provide for the establishment of joint river commissions. In some cases, the commissions merely have advisory functions. But in other cases they may have decision-making authority. The achievements of joint river commissions may vary greatly in different river basins. Schulte-

Leidiz (1992) explains that the well functioning Rhine Commission and its decision-making mechanism. River commission of the Senegal is extensively explained by Haddad and Mizyad, (1996) and the river commission of Indus by Alam (1998) and Mehta (1986).

Supra-national water institutions in the shape of an international law have been evolving, but as can be expected, quite slowly. These may generally be envisaged as efficacious in addressing the interests of communities in basin countries. The first of these attempts is the Helsinki Rules-HL- of 1966, on the uses of the waters of international rivers (International Law Association, 1967). The International Law Association produced the Helsinki Rules. Some provisions by the ILA, however, caused controversy as to their meaning and interpretation. The provisions, for example, which embody the notions: "reasonable" and "equitable" utilization of the shared water resources. But this concept has been accepted and incorporated in UN Convention on International Watercourses of 1997. Some states prefer the concept of 'international watercourse' to 'international drainage basin' in view of their perceived national strategy of dealing with other co-riparian countries.

The second attempt on the codification of international water resources law is the UN Convention on the Law of the Non-navigational Use of International Water Courses-LNUIWC-. It was adopted by the UNGA-Resolution of 21 May 1997, with a vote of 103 in favor, three against and 27 abstentions (Loures, *et al*., 2009). The great significance of the UN Convention is that it aims to shift international water disputes from contests of power to fair rights and mutual obligations. The responsibility of each state is inherent in the provisions: to use water resources efficiently and to avoid depriving or damaging the interests of co-riparian states. The International Law Commission is an autonomous body, which was entrusted by the UNGA resolution to promote international water law. Actually the commission had been working on this task since 1970. It is noteworthy that the two principles in the convention, the one of 'equitable use' and the other of not causing 'appreciable harm' are in a way similar to the other two doctrines, namely, the doctrine of 'absolute territorial sovereignty' and the doctrine of 'absolute territorial integrity'. The upstream countries maintain the doctrine of 'absolute territorial sovereignty' and the principle of 'equitable use', while the doctrine of 'absolute territorial integrity' and the principle of 'no appreciable harm' are upheld by downstream countries.

From a historical point of view doctrines are extensions of traditional national security interests, and they are manifest sovereign rights. Conventions are an attempt to create supra-national legal frameworks within which riparian countries relate to one another as regards the utilization and management of shared water resources. The efficacy conventions depends on the willingness of riparian states to accept them and to be bound by them. Doctrines and conventions exist, but riparian states have yet to negotiate with one another on the best terms that enable conventions to become mutually acceptable legal and institutional framework. For instance, the Nile riparian nations negotiated the Cooperative Framework Agreement adapting concepts and legal parameters from the UN Convention so long as replicable to the context of the Nile basin.

Concluding from the foregoing legal and institutional frameworks are the necessary condition for guiding and regulating inter-riparian cooperation over the utilization of the shared water resources. Furthermore, that existing doctrines and conventions do not yield cooperative behavior among co-riparian states without being negotiated and framed in explicit agreements. A negotiated legal/institutional framework is established as reference point and guiding principle when riparian states relate to one another in their activities of water resource development within individual countries or between one another.

3.4 Security Imperative

Trans-boundary waters should be taken as permanent factors for establishing inter-state cooperative system, which would serve as a mechanism for mutual security regime of the shared water basin. Cafrisch's (1998: 3) remark that "trans-boundary waters form natural units, and they should be treated as such" will have to be taken seriously. In a more recent statement Dr. David Grey[22] made the following remark in reference to the Nile basin: "There is dispute and conflict in the region, but cooperation and integration between nations are powerful alternatives within and among them"[23] According to him, in the Eastern Nile Basin "The Joint Multipurpose Programs can address these needs and make major contributions to

[22] World Bank's Senior Water advisor for Africa and South Asia.

[23] 'A Note on the Report of the Scoping Study Team to the Eastern Nile Council of Ministers' Blackmore and Whittington (2008). Opportunities for Cooperative Water Resources Development on the Eastern Nile: Risks and rewards, Final Report: An Independent Report of the Scoping Study Team to the Eastern Council of Ministers

achieving food security, sustainable livelihoods, access to electric power, industrial growth and inward investment and regional security".

Many studies show that there is a positive relationship between resource scarcity and conflict. But this is mainly attributed to the growth of population, structural dependence on agriculture, and the expansion of agricultural activities as a leading sector, especially in economically less developed countries, such as those in the Nile basin. Fresh water is widely conceived as vital natural resource, and nations have increasingly vied for greater control over it. The tension over water becomes more acute when the riparian countries develop the waters unilaterally and without transparency with other riparian states.

There are two contending views with regard to trans-boundary water security. One view perceives that the increased competition over fresh water resources inevitably entails conflict between riparian nations. For instance, Thompson (1978: 62-71) perceives that the increasing water scarcity will become a cause of future conflict. Arthur Westing (1986: v) asserts that human history is an account of resource wars. Falkenmark takes the scenario even further and sees water as a factor of international dispute and conflict formation in the future. Gleick (1993a: 79) contends that fresh water resources are objects of military campaign and conquests as long as they provide economic and political strength to nation states. Buthros Buthros Ghali[24] predicts that "water will be a source of international conflict"[25].

The other school of thought views water resources as arena for future cooperation and establishing common security regime. This view underpins geopolitical necessity of cooperation because the riparian countries are bound by environmental necessity. Diop's observation of the Nile situation is pertinent here. He wrote that "… the areas of the upper Nile provided the two sources of life, i.e., heat and humidity, which are ever present in the upstream, and they are the continuous condition for the replenish of the bounteous Nile waters received in the downstream" (1974: 56). Elise Boulding (1993, 202), for instance, explains, at a rather simplified level, that water flows like everything else in nature. No state boundary, no barbed wire, no wall can stop water from flowing along its natural course, from

[24] Buthros Buthros Ghali was former minister of state of the Egyptian Foreign Ministry, and Secretary General of the UN during early 1990's.

[25] This was quoted in Waterbury, 2002: p. 9. Dr. Buthros Buthros Ghali was also UN Secretary General during ealy 1990s.

the source to its final destination. Boulding's observation underscores that water does not know state boundaries, but only its natural course. In the same vein, Iza and Stein (2009:8) advise that "In order to coordinate upstream-downstream water allocations and uses, and to maintain healthy ecosystems throughout the watershed, it is necessary to work at the river basin level. When setting a river basin institution a clear mandate, a long term strategy, and the organizational structure must be established".

According to Elhance (1999: 4-5) for instance, there are 215 shared river basins around the world of which 57 are in Africa, 35 each in North and South America, 40 in Asia and 48 in Europe; and that 65 per cent of continental Asia, 60 per cent of Africa and 60 per cent of South America are covered by shared water basins. Because water knows no boundary riparian nations are bound to share rights and obligations over the shared waters amicably and keeping the best interest of all countries in the shared basin. According to Elhance (1999: 5), three hundred treaties have been signed on shared waters across the world between riparian countries, and more than three thousand treaties bare provisions relating to water questions.

In response to the growing importance of cooperation on shared water resources, riparian states and multilateral agencies have elevated the issue of shared water resource management to a new level of diplomatic engagement, as Dolatyar and Gary (2000: 7) explain. There is ample evidence of riparian states that have already made successful efforts in reaching agreements of some form or other. Canada and the United States on Columbia river; India and Pakistan on Indus river; Senegal, Mauritania, Mali and Guinea on Senegal river; Mali, Nigeria, Niger, Guinea, etc. on Niger river; Vietnam, Cambodia, Laos, etc. on Mekong river can be cited as the examples in point. Similarly, the Nile basin nations have signed the Cooperative framework Agreement-CFA in 2011 which enables the riparian nations to establish a Nile Basin Commission as permanent institution.

As Wenger and Mockli (2003: 25) argue "security and development find common ground". Indeed inter-state security has a relaxing effect on riparian states and encourages them to opt for mutual cooperation on shared water resources. Future conflict prevention should, as a matter of fact, be sought through more active engagement in adopting alternative and mutually beneficial ways and means of water utilization and management, especially at the inter-state level. In that regard, Wenger and Mockli (2003: 41) further explain that conflict prevention will have to be approached as a long-term process, involving the goals of

providing systemic interaction, establishing the structure and addressing the immediate issues at stake.

Learning from the two schools of thought, and on the basis of historical observation, the existence and mutual support of national and regional level capacity of the riparian states will likely determine how soon and with what terms cooperative mechanisms can be established. Secondly, a successful negotiation and establishment of treaty regime in the Nile basin will likely rid the protagonist riparian states from mutual insecurity perception in the 21st century. Hence, the water security of some countries cannot be maintained at the expense of national interest of other nations.

In this regard, a serious mistake in the Nile basin has been the perception which has been long held by the downstream riparian countries that their welfare and security can be safeguarded by controlling or monopolizing the Nile waters which are otherwise shared and bound to be cooperatively used, managed and protected. Actually, it goes without saying that a water security of one nation cannot be maintained without the water security of other riparian nations. This has been the core matter of the contention in the Nile basin between upstream and downstream countries over a century now. Indeed the central theme of the on-going dialogue and negotiation between Nile riparian nations aims to establish a mutual security regime through establishing legal and institutional mechanism for the Nile waters. This is then, not only the most appropriate procedure but also the inevitable trend for the 21st century hydropolitics of the Nile basin in as much as to any trans-boundary basin in the world. In this regard, Yacob (2007: 240) asserts that once the riparian countries are in a process of cooperative interaction and when such interaction is imbedded in a legal and institutional framework, then each riparian country becomes indispensable and permanent partner and ally to the other co-riparian countries.

Thus, the interests and benefits of the riparian countries and all stakeholders thereof should be viewed as infinite and achievable objectives beyond 'drops of water'. It can be envisioned that through harmonizing the trans-boundary interactions numerous other activities including trade, cultural, scientific, technical, activities deepen and made mutually beneficial. Then the suspicion, fear and mutual insecurity are bound to subside, and give way to cooperation, mutual support and I riparian alliance.

4. Prospect of Cooperation

Riparian countries can obtain numerous benefits from cooperation on shared waters. As discussed earlier in section three above such benefits broadly include: joint environmental protection, cooperative economic development and mutual security. Many more common benefits can be obtained from upstream-downstream cooperation, which would further include constructing reservoirs in the upstream locations where evaporation rate low and the capacity to generate hydroelectric power is high. Similarly an upstream dam would increase water flow and irrigation potential in the downstream course, while eliminating seasonal flood hazards and silt accumulation. In fact several research findings support the above assumptions as will be discussed herein below.

Mason (2004, 149) found out that "most people interviewed in Sudan felt that the country can only gain by Ethiopia having dams on the 'Blue Nile'[Abbay], i.e., a series of dams (in downstream Sudan), like Rosaries and Sennar … would then be regulated". His findings further confirm that dam construction in upstream Ethiopia would reduce the dangers of flood and silt accumulation in the Sudanese reservoirs. Mason's (2004: 146) conclusion is that "Safeguarding water for Egypt and Sudan for irrigation depends on the water development upstream". From this perspective the construction of Aswan High Dam -AHD in the midst of the Sahara desert appears to have been driven by political consideration and without due regard to its environmental pitfalls, having no bearing for upstream-downstream benefits accruable from the shared waters.

The on-going Grand Ethiopian Renaissance Dam - GERD project in the Abbay gorge in Ethiopia is environmentally better alternative to AHD or to any other dam in the climatically hot downstream locations, whether that be in Egypt or Northern Sudan. In effect the GERD serves the interests of Sudan and Egypt in several ways, including: (1) regulate and increase seasonal water flow (2) increase safety of dams in the downstream locations by trapping silt (3) control flood by regulating water flow and (4) conserve water by protecting it from excessive evaporation.

Ethiopia's proposal for dam projects in the upstream indeed goes back to 1920's. There have been repeated efforts to construct reservoirs in upstream Ethiopia in 1950's & 1960's and up to now with open possibility of cooperating with downstream countries. For instance the Abby basin study of 1958-1964 was aimed for mutual benefit for upstream Ethiopia and the two downstream Sudan and Egypt (Yacob, 2007). Rejecting the cooperative and evidence

based option which Ethiopia had presented, Egypt and Sudan went ahead to develop their own and environmentally untenable water projects. AHD in Egypt as well as Kashm El-Ghirba and Roseiries Dams in Sudan were constructed not heeding to Ethiopia's upstream project options which were identified during the 1958-1964 Abbay/Blue Nile study program. Actually the negative consequences of the unilaterally developed downstream dams are quite evident. For instance, the former Minister of Water Resources and Irrigation of Sudan, Mr. Kemal Ali publicly admitted that 60% of Kashim El-Ghirba Dam, 40% of Roseiries Dam and 60% of Senar Dam are filled up with silt accumulation[26]. Similarly, In spite of its huge dead storage, the fate of AHD is not any different than the Sudanese dams in the long run.

The new GERD Project will have immense benefit on the shared Abbay/Blue Nile River basin for the three Eastern Nile riparian countries - Ethiopia, Sudan and Egypt. Economic and environmental benefits are accruable from upstream-downstream cooperative programs and joint projects designed with the consideration of comparative advantage to the three countries. It serves as a concrete case for environmental protection and clean energy development. It would mean laying down a building block for mutual security regime in Eastern Nile basin. Common security in Eastern Nile Basin is linking regional security with collaborative development of the shared waters. Trans-boundary waters require a concept of common security on collaborative use, management and protection of the shared waters. As Boulding (1992: 202) argues, common security on trans-boundary water course goes beyond the traditional definition of security where the state is the defender of the nation and the citizenry within the state boundaries.

The benefit of linking peace and development means a shift from military preparedness to diplomatic preparedness. Ethiopia hosted two Egyptian delegations recently during (April - May 2011). The first of these comprised various public personalities headed by persons who are involved in the new Egyptian popular uprising since January 2011. Three presidential hopefuls are in the delegation. The second delegation was headed by the Prime Minister of the Transitional Government of Egypt. Both delegations aimed to understand if Ethiopia's GERD will have a negative impact on Egypt's water supply. The Ethiopian Government has assured both delegations that Egypt as well as Sudan will benefit from the dam in many folds

[26] Opening statement during International Conference on Hydropower, organized by Sino Hydro-consult, March 31, 2011, Addis Ababa.

and that there will not be any significant negative impact to be caused because of the construction of GERD. In view of building confidence and encouraging the downstream countries into partnership, the Ethiopian government further initiated the establishment of International Panel of Experts (IPoE) comprising experts from the three countries and independent international experts for scrutinizing any negative impacts of GERD Project.

Ethiopia has offered to take necessary measures to mitigate any negative impacts that might arise from the construction of GERD. The IPoE has been keenly engaged in the review task of the GERD Project for its technical standard or for any possible negative impacts. By doing this the Ethiopian government has immensely contributed for confidence building, common security as well as cooperative enterprise on the shared water resources of the Nile. It goes without saying that the Nile basin has immense possibilities for cooperative development and mutual security regime. What has come out of the ten year negotiations for CFA as well as what has been achieved from the exercises with Subsidiary Action Programs and Shared Vision Programs of NBI can be taken as very important indicators for positive prospects for cooperation and shared benefits in the Nile basin (Yacob, 2011). It will be ever more difficult for Egypt and Sudan to keep themselves away from signing CFA without being isolated in the Nile basin[27]. The tide of cooperation has forcefully on from the upstream and the two most downstream countries can no longer deter that trend of change. It is brutally true that all the water flow received in Sudan and Egypt is outside their territories and from the upstream countries. Under the unfolding circumstances in the Nile basin Egypt and Sudan do not seem to have better options than signing the CFA for maximizing their national benefits alongside the rest of the Nile riparian nations (Yacob, 2010: 172-175).

5. Conclusion

A sustainable cooperation in the Nile basin is conceived as crucially important factor for deriving mutual benefit from collaborating in the areas of environmental protection, economic interaction, legal/institutional framework and regional security. A successful negotiation and establishing common interest regime will help make a shift away from mutual insecurity perception to one of confidence building, mutual trust common security

[27] Burundi, Ethiopia, Kenya, Rwanda, Tanzania and Uganda have signed CFA in May 2011. DRC earlier adopted the document but not yet inked her signature on the document. Egypt and Sudan rejected to sign the instrument.

atmosphere. Instruments and procedures to be imbedded in the formal agreements and institutional mechanisms can serve as a basis for a long-term common security establishment. The slow pace of cooperative mechanism in the Nile basin can be explained by insufficient national level capability and rather low leverage from regional system on the question of accountability and responsiveness. Developing regional institutions having capability, accountability and responsiveness will positively influence cooperative behavior of individual riparian states.

It is about time now for the Nile basin governments to work towards a viable cooperation beyond the doctrines of absolute territorial sovereignty or absolute territorial integrity. A mutually acceptable cooperative engagement among the riparian nations should be a necessary condition for enhancing development in each country and achieving the much desired peace, mutual security and prosperity in the Nile basin. The mutual satisfaction envisioned in the process of NBI's Shared vision and subsidiary action programs will have the chance to engender long term cooperation provided that the riparian nations of the Nile give it a serious consideration for environmental, economic, security and legal/institutional imperatives of cooperation.

The resounding value of the joint commitment of the Nile Council of Ministers 13 years ago, accepting 'To achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile basin water resources' should be kept alive in spite of the recent upstream-downstream stand-off on the signing of the CFA Instrument. The un-phenomenally large consortium of international community which has generously supported the Nile negotiations still has a room to hold the clout and influence for going forward with establishment of the much belated governance for the Nile basin. In any case, the upstream-downstream negotiations must follow the ideas of unity, integrity and continuity. Where unity implies equality, equitability, mutual interest, and mutual benefit; integrity implying linkage, recognition, trust, confidence in one's nation and others; and continuity explains predictability, legality, institutionalization, and benefit sharing. The Ethiopia's GERD initiative in particular and the overall basin wide initiatives from the level of joint multipurpose projects to negotiations for the Cooperative Framework Agreement are strong indicators for cooperative prospects in the Nile Basin.

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Health Research Policy and Strategy in Ethiopia

By

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Abstract

Contribution of Ethiopia to global scientific and technological research evidence both in quality and volume, unlike the past has been insignificant. The oldest and the 1st health research publication which was on Malaria; conducted by Italian researchers appeared on The Lancet a century ago. Hence modern research in Ethiopia is about a century old.

Health is the product of a complex social and environmental system that requires research and development spanning many fields-not simply the product of the presence or absence of disease and the medical ability to prevent and treat it. Evidence based health care approach is reliant on research evidence. National health care needs generation of research evidence that is effective, but also appropriate, feasible and meaningful to specific population, culture and settings.

However, both in pre-and post Italian invasion research played no significant role in health development of the country except in limited agricultural subsectors. Government and public attention to research have been quite minimal. No clear, holistic and legislated health research ethics, policy, strategy, resources, priority setting mechanisms and enforcing relevant regulations depicting governance and management existed in Ethiopia. Hence health research has been by and large external instead of domestic donor driven, not local or national problem based. Over all health research out put to date does not exceed 15000 publications in reputable journals. However compared with neighboring countries it is low both in quality and quantity. Its impact overlooked and has not been feasible to policy and decision makers as well as the community, except in the academia.

Recent expansion and strengthening of higher education is a reflection of strong government commitment that needs to be applauded and aggressively supported by all national and international stakeholders and partners. The role of research in higher education in particular

and in knowledge lead present global economic order in general, has become unequivocally essential above and beyond publication and shelving to realize the multifaceted development programs of present Ethiopia, making research a necessity rather than luxury.

Therefore research evidence generation, synthesis, transfer, utilization has become more essential than ever before in present Ethiopia in order to successfully implement the ongoing multidimensional National Growth and transformation Program launched a year ago. All ongoing health development programs of the country require research evidence based robust health policy, strategy, research and ethics review systems and priority setting mechanism as well as practice, planning, action etc. in order to mitigate health and health related problems by promoting ethically sound essential national health research throughout the country to eventually develop health and improve the quality of life of all Ethiopians.

Key words*: Research, policy, system, strategy, ethics*

Research and Outreach Highlights of Jimma University: Challenges and Opportunities to advance research and extension

By

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Abstract

Jimma University which was created through the amalgamation of Jimma College of agriculture and Jimma institute of Health Sciences is mandated to advance teaching, research and community services. However, the focus in terms of financial, time allocation, human power placement and infrastructure development for research and community services is decimal. A little focus for research and community services has been felt as a missing link in Jimma University. Hence, we need to advance research in Jimma University to deliver our mandate such that produce research outputs to the community and enhance teaching and learning. There are limited research grants from internal and external sources and the research fund sources are mainly from the external sources (80 %) and internal sources (25%). The total budget devoted from treasury in relation to the total budget of the university is with the range of 0.04% in 2004 to 1 % in 2011. The number of staff involved are only 20% of the total academic staff that could be as principal or co-investigators. Most of the studies are survey type including in natural science fields attributed to poor laboratory facilities. The number of publications produced in international and national peer reviewed journals is 75 papers per year, given a good number of staff. There are more than 1300 staff employed in Jimma University in which 60% of the staff are Msc and above in academic qualification and expected to run research projects. There are situations which have impaired not to advance research in its full scale. The senate legislation which stipulates 75% and 25 % for teaching and research involvement has not been enforced; the University has not attracted research funds from outside and inside sources. The staff profile to advance research and the researching capacity of staff is so limited to attract competitive grants. There are also opportunities to improve the research endeavor of Jimma University. The staff profile in all

disciplines, the number of partners willing to work with JU, the number of sandwich PG programs, the launching of research based M.Sc and PhD programs, the research facilities and the motivation of staff to participate in research is improving which has opened a venue to advance research.. Hence, research undertaking in Jimma University is not a choice but a must to do exercise. Therefore, the capacity of staff should be improved through organizing customize training, avail the infrastructure for research and place motivation mechanisms for outstanding researchers and enhance partnership through win-win situation to advance research and extension in Jimma Uniersity.

Key words: **Jimma University**, **Research**; **dissemination**; **funding**



The discussion Session on some of the Lead Papers

Innovation Systems Perspective and value Chain Analysis in Agricultural Research for Development: Of Help to the Ethiopian Research for Development Community to Effectively Contribute to the GTP?

By

Berhanu Gebremedhin (PhD)

ILRI

Abstract

The environment in which agricultural discovery and innovation occurs has been constantly changing with resultant significant influences on the organization and the social processes of discovery and innovation. As a result, there have been significant paradigm shifts in agricultural knowledge generation, dissemination and utilization. Currently, the knowledge generation, dissemination and utilization processes within the agricultural sector are guided by four complementary and mutually reinforcing concepts and principles: the innovation systems perspective (ISP); value chain approach; impact orientation; and research for development (R4D). Impact orientation and R4D are implicit in the concept of ISP. A major challenge confronting the agricultural research for development (AR4D) community in general and the Ethiopian research system in particular, is how to integrate these different concepts in the design, implementation and evaluation of AR4D. However, an operational model that integrates ISP and value chain approach into AR4D is lacking. This paper is an attempt to develop such an operational model. The paper also addresses the potentials and challenges faced by the Ethiopian AR4D community in the integration process in order to live up to the expectations of the country's Growth and Transformation (GTP) plan.

Key words: Innovation Systems Perspective, Value Chain Analysis, Growth and Transformation (GTP) plan

Capability for Renewable Energy Mix and Bio-fuel Production is Crucial to Drive Ethiopia's Development Engine

By

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Abstract

As Ethiopia is striving to join middle income countries in the coming 10 to 20 years, the country has to make sure that it supplies growing demand of energy to run the agriculture machinery and emerging manufacturing industries. That demands steadily and continuously growing production of energy at economic and affordable cost for actors of the economy. The energy demands are two forms: electricity and fuel (solid, liquid and gas). At present, Ethiopia's electric energy production is mainly from hydropower. It is planned to produce up 10,000 MW in the coming 10 years. The hydropower energy production is the cheapest. But the supply of such energy is affected by drought. Drought is one of the serious problem the country has to confront every three to four years; actually, with the climate change due to global warming, when and where the drought will strike is becoming unpredictable. Thus, it is important to reduce 100 % reliance on hydropower for electricity and develop a right energy mix with other renewable energy source the country is endowed with such as wind, solar and geothermal. This ensures supply of electric energy need of the industry. Thermal energy required for its industry is dominated by imported fossil fuel which is a taking a toll on the foreign currency earning of the country. To ensure sustainable productivity of Ethiopian industries, it is important to substitute with locally producible fuel from renewable resource and supplement with available non-renewable source when required. The country can optimally use its land for its production bio-energy input and food to feed itself. Since the production of fuel that substitutes gasoline and diesel requires advanced technologies, the county it has to make sure that it has built the capacity to produce, operate and maintain production machinery from biomass to usable fuel so that it will be able produce the fuels at competitive price and in sustainable fashion.

Section 2: Parallel Sessions

Parallel Session 1: Organized by Jimma University - College of Agriculture and Veterinary Medicine

Taenia saginata/ cysticercosis: Prevalence, Risk Factors and Cyst Viability Study in East Shoa, Ethiopia

By

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Abstract

This study was conducted from September 2004 to April 2005 East Shoa Oromia Regional State (Debre Zeit, Mojo and Dukem) with the objective determining the prevalence of Cysticercus bovis by retrospective and active abattoir survey at export, municipal and co-operative abattoirs and to assess the risk factors for *Taenia saginata* infection and *bovine cysticercosis* in the study areas through a house hold questionnaire survey. In the analysis of a retrospective meat inspection official meat records from ELFORA, Mojo and Luna abattoirs showed of the 44, 461 inspected 2127 (4.8%) were found to be infected with *Cysticercus bovis*. The over all prevalence abattoirs was 3.1%, 2.6% and 8.9% for Mojo, ELFORA and Luna abattoirs. The rates of infection in the heart, head and shoulder in the three abattoirs were 2.6%, 3.25% and 1.5% respectively. Analyses of the active abattoir data investigation revealed from a total of 1292 randomly selected bovine carcasses examined 253 (19.5%) were found positive for Cysticercus bovis infection. The prevalence of C. bovis at each abattoir during the study period were 17.9% ,13.6%, 19.2% and 27.6% for Mojo, ELFORA, Dukem and Luna abattoirs respectively, there is a significant variation in the prevalence between the four abattoirs ($P < 0.05$). A statistical significant different in the infection proportion between the age groups of ≤ 2½ year and > 2½ years was observed ($\chi 2 = 15.78$, $P = 0.000$. OR = 0.532, CI = 0.391 – 0.730), however there is no association between sex and prevalence of C.bovis ($\chi 2 = 0.302$, $P = 0.588$, OR = 1.1; CI = 0.760 – 1.625). The most frequent locations of the cysts among the inspection sites during this study were, tongue (56.9%), heart (33.2%), shoulder (32.4%), masseter muscle (24.1%), liver (4.74%) and lung (0.7%), 91.1% of the infected animals had single cysts. Most of the calcified cysts are recovered from heart (50.8%).

An Assessment of the Financial Performance of Private Commercial Banks in Ethiopia, The Case of Some Selected Banks

By

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Abstract

Commercial banks are the most important financial intermediaries. They intermediate between the savers of funds and users of funds. Today in Ethiopia, there are many private commercial banks serving the public and contributing their part in the growth of trade, commerce and agriculture and most importantly to the boost in the economic development of the country. A longitudinal research design was employed in order to have a full picture of the financial performance of private commercial banks selected for this study purpose. Private commercial banks such as Dashen Bank, United Bank, Wegagen Bank, Bank of Abyssinia, Lion International Bank, Cooperative Bank of Oromia, Awash Bank and Nib Bank were the focus of the study. Relevant data were gathered with the use of secondary sources from the respective banks understudy and also from NBE. It was found that Dashen bank performed poor in respect of the credit risk ratios as compared to the other private commercial banks understudy. This could be evidenced from the fact that the CRRs are far from the requirement of 10% set by NBE. On the other hand, the ROA (return on assets) ratios of all the private commercial banks considered above are not satisfactory owing to the managerial inefficiencies of the banks. Moreover, among the private commercial banks operating in the country, Dashen bank provided a huge amount of loans and advances to the various economic sectors. For instance in 2008/09, the bank extended a total of Birr 4.4 billion as a loan to the different economic sectors, which was by far exceeding the sums extended by other banks. Besides, the bank received a large deposit from the various sectors of the economy as compared to other private commercial banks. To the contrary, Awash International Bank had the largest number of branch networks in the various parts of the country; this makes it the leading private bank in Ethiopia in terms of branch network. In the face of various challenges in the banking industry private commercial banks have managed to increase their market share. As a result to stay in the market private commercial banks should introduce new and modern banking technologies enhancing the banking service delivery.

Key words: commercial banks, deposits, financial ratios, loans, branches

Revisiting Ferrolysis Processes in the Formation of Planosols for Rationalizing the Soils with Stagnic Properties in WRB

By

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Abstract

Planosols have been recognized as a Major Soil Group right from the beginning in the legend of the FAO/Unesco Soil Map of the World. Also in WRB system it maintained that position at Reference Soil Group level on the account that a major pedogenetic process, ferrolysis, is underlaying the severe stagnic properties that characterize this group. With the introduction of Stagnosols in WRB in 2006, it appears that a serious overlap has been introduced at Reference Soil Group level. This paper aims to throw new light on the genesis of Planosols, drawing from new soil surveys conducted in the south-western Ethiopian highlands. Representative soil profiles were sampled and analyzed for their physico-chemical, mineralogical and micromorphological properties, and a hypothesis has been forwarded to explain the formation of these Planosols. The conclusion is that it is highly unlikely that 'ferrolysis' can be called upon to explain the genesis of Planosols in the Ethiopian highlands, and an alternative geogene hypothesis is put forward to explain the formation of these duplex soils. As Ethiopia is one of the mainstays of Planosols, it is suggested that WRB rethinks its strategy on soils with stagnic properties as there is room for rationalization in view of a generally felt overlap between Planosols and Stagnosols. WRB could rationalize by sub-dueing either the Planosols or the Stagnosols to a lower level.

Keywords: Planosols, Ferrolysis, Stagnic properties, Stagnosols, WRB

Validation of a Species-specific Primer for Identification of *Heterodera schachtii* and Screening actin Gene for Species-specific Primer Design

By

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Abstract

The sugar beet cyst nematode is the major pest of sugar beet crop, affecting both quality and quantity. To develop and apply species-specific management options, one of the most important needs is the correct identification of the nematode species. Polymerase Chain Reaction (PCR) based on species-specific primers by DNA analysis have been developed for several *Heterodera* spp that reduce diagnostic time and costs. So, validation of species-specific primer of ITS-rDNA and exploring actin gene for species-specific primer design was conducted on 33 *Heterodera* species to discriminate *H. schachtii* from others. Identification was made using morphometrics and morphological characters and latter confirmed by sequencing the ITS-rDNA regions of the nematode populations. The results showed that 20, 6, 3, 2 and 2 populations were identified as *H. schachtii, H. betae, H. avenae, H. latipons* and *H. filipjevi* respectively. High nucleotide sequence similarity was observed between *H. schachtii* and *H. betae*, as dissimilarity was less than one percent and only five nucleotide consistent differences out of 1036 positions. The species-specific primer SHF6, designed for *H. schachtii*, combined with the universal primer (AB28) did not detect 50% of the populations. This indicates haplotypes species-specific primer designed is not found in all *H. schachtii*, as result it didn't allow to conclude that the designed primer can detect properly and consistent genetic markers for targeted species. Similarly, despite several report about use of actin gene for phylogenetic study, the coding region was not discriminating between *H. schachtii* and *H. betae*. So for beet cyst nematodes, actin gene is not useful for species identification or species-specific primer design.

Key words: *H. betae, H. schachtii,* ITS-rDNA, molecular techniques, species-specific primers.

DNA Fingerprinting and Genetic Relationship of Sorghum [Sorghum bicolor (L.) Moench] Released Lines

By

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Abstract

DNA fingerprinting is a DNA-based identification system that relies on genotypic differences among individuals. DNA fingerprinting for varietal identification has become an important tool in plant breeding and germplasm management. Molecular markers have been successfully applied in estimation of varietal distinctiveness and relatedness of commercially important crops, registration of new varieties, resolution of disputes related to varietal ownership and control of seed purity.

However, studies on DNA fingerprinting of released sorghum lines in Ethiopian and their genetic relationship has not been done to date. Therefore, this study was conducted to identify the unique DNA fingerprints of released lines and to determine their genetic relationships thereby to develop a data base for the identification of the lines using their unique DNA finger prints and identify lines for possible crossing among them based on their genetic similarities or dissimilarities.

Twelve sorghum released lines were genotyped using 39 SSR markers. The SSR analysis showed that 11 of the released lines could be identified by 28 positive and 4 negative unique alleles. The analysis also showed that the average number of alleles per loci was 3.85 and the PIC value ranged from 0 to 0.88 with an average of 0.53. Genetic dissimilarity among the lines ranged from 0.326 to 0.839 with an average of 0.672 and the genotypes were grouped into five clusters. The DNA data base generated could be used for proper identification of lines, control of infringement and determine seed mixtures. The information on genetic relationship can be used to plan crossings among the lines for development of hybrid sorghum varieties.

Key words: Sorghum, DNA fingerprinting, Varietal Identification, Genetic relationships

Effects of root symbionts and PGPR on the reproduction of root-knot *Meloidogyne incognita* and on the growth and enzyme activity of pea

By

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Abstract

The effects of root symbionts (*Aspergillus awamori* and *Glomus mosseae*) and plant growth promoting rhizobacteria (PGPR) (*Pseudomonas putida*, *Pseudomonas alcaligenes* and *Paenibacillus polymyxa*) were studied alone and in combination in glasshouse experiments on the growth of pea, enzyme activity (peroxidase and catalase) and reproduction of root-knot nematode *Meloidogyne incognita*. Application of *A. Awamori*, *G. intraradices* and PGPR caused a significant increase in pea growth and enzyme activities of both nematode inoculated and uninoculated plants. *A. awamori* was more effective in reducing galling and improving the growth of nematode inoculated plants than *P. alcaligenes* or *P. polymyxa*. The greatest increase in growth, enzyme activities of nematode-inoculated plants and reduction in galling and nematode multiplication was observed when *A. awamori* was used with *P. putida* or *G. mosseae* than the other combination tested. Percentage root colonization was higher when AM fungus inoculated plants were treated with *P. putida* both in presence and absence of nematode.

Keywords: Catalase; Glomus; Meloidogyne; Peroxidae; PGPR

Biocontrol Potential of *Paecilomyces lilacinus* Against the Root-knot Nematode (*Meloidogyne incognita*) on Tomato Plant (*Lycopersicon esculentum*)

By

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Abstract

A pot experiment was conducted to evaluate the biocontrol potential of *Paecilomyces lilacinus* against the root-knot nematode, *Meloidogyne incognita* under green house condition at Department of Botany, Aligarh Muslim University, Aligarh, India. The treatments were comprises of 1) C-Untreated control; 2) T_1-inoculation *M. incognita* alone; 3) T_2-in combination with *P. lilacinus* one week before; 4) T_3-simultaneous inoculation; 5) T_4-inoculation after one week and 6) T_5 inoculation after two week after nematode inoculation. The data were recorded on plant length, fresh and dry weight, number of leaf per plant, number of flower and fruits per plants. Number of galls, egg masses, and final population was also estimated. Inoculation of $2000J_2$ of *M. incognita* caused the significant reduction in various plant growth parameters and yield compared to untreated control. Use of *P. lilacinus* caused a significant increase in the growth and yield of tomato plants inoculated with *M. incognita.* Application of *P. lilacinus* one week before nematode and simultaneous with nematode inoculation was more effective than other treatments. A significant enhancement was found in growth and yield of tomato and good percentage of eggs and nematode populations were parasitized by *P. lilacinus.*

Keywords: *Lycopersicon esculentum*; *Meloidogyne incognita*; and *Paecilomyces lilacinus*

Current Status and Future Prospects of the Endangered Sheko Breed of Cattle (African Bos taurus) in Ethiopia: A Review Paper

By

Tatek Woldu and Abegaz Beyene

Abstract

Sheko breed is one of the Ethiopian indigenous cattle breeds which represents the last remnants of Africa's original Bos taurus cattle that were probably the first to be domesticated in eastern Africa. The geographical distribution of Sheko cattle is mainly restricted to Bench Maji Zone and partly in the adjoining parts of Kaffa and Shaka Zones of south west Ethiopia. The breed is valued for its milk yield, adaptation and exhibit superior trypanotolerance than any other indigenous cattle populations found in Ethiopia. Despite the unique chatarcterers and attributes of the breed, there is a shrinkage in effective population size of the breed. The population estimate of the breed by the year 1999 was about 31,000, However, another estimates by the year 2007 indicated that the population size declined to 4040 a more recenet estimates reported the population of the breed as low as 2400 heads. Strong physique and aggressive temperament of Sheko cattle for the herders as well as indiscriminate crossbreeding and replacement mainly with thoracic-humped zebu cattle were among the reasons for declining trend of the breed. Different phenotypic and genetic studies revealed that Sheko breed is characterized by high levels of genetic diversity and several unique alleles which are vital for future conservation and sustainable utilization of genetic resources. Although this unique breed is currently facing a clear risk of extinction there are no organized and visible efforts targeted for saving the breed from extinction. In addition, information is lacking on productive and reproductive performance of the breed. The current Artificial Insemination service and introduction of Borana cattle breed by the office of ministry of agriculture and rural development into the home area of sheko breed will exacerbate the extinction of the breed. Finally, it is recommended to generate information on productive and reproductive potential of the breed under different management system and designing In situ conservation schemes within their production environments.

Key Words: Sheko breed, bos taurus, genetic diversity and conservation,

Experimental Polymerase Chain Reaction to Improve the Detection of *Mycobacterium bovis* from Cow's Milk

By

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Abstract

A series of experimental study was carried out at the Armauer Hansen Research Institute, Addis Ababa, Ethiopia to improve the detection of Mycobacterium *bovis* from cow's milk. The first experiment was undertaken to see the possibility of detecting *M. bovis* from cow's milk directly by PCR without DNA extraction followed by the spiking experiment to determine its lowest titer of detection. Then three methods of milk treatment (Chelex-proteinase K; C18-Carboxypropylbetaine and immunomagnetic separation) were tested and their results compared. Each treatment has been repeated five times. ATCC 19210 strains of *Mycobacterium bovis* and raw milk from tuberculosis free dairy cattle were used for the spiking experiments. Authentic milk samples were collected from known tuberculosis infected dairy cattle to test the performance of the results of the experiments in detecting the organism from milk of naturally infected cow. Our results showed the possibility of detecting M. *bovis* by PCR directly from milk. Chelex proteinase K treatment of milk samples was demonstrated to be a better alternative, and it was advantageous in being fast, cheap and effective over other DNA extraction methods. Treatment of milk with C18- Carboxypropylbetaine and immunomagnetic separation greatly increased the sensitivity of detection of M. *bovis* by PCR both in the spiked and in the authentic milk samples. Finally, the results of this Experimental study could be further optimized to be used for a relatively better detection of *Mycobacterium bovis* from cow's milk by PCR in the diagnostic tests of *M. bovis* from herds with bovine tuberculosis.

Key words: *Mycobacterium bovis*, milk, cattle, spiking experiment, PCR, IMS-PCR

Evaluation of the Potential Impacts of Climate Change on the Hydrolgy and Water Resources Availability of Didessa Catchment, Blue Nile River Basin, Ethiopia

By
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Abstract

This study was carried out in Didessa watershed, which is situated in the south-west part of Abay River Basin. Due to great importance of the basin by economic and social criteria, it was important to undertake a research to evaluate the potential impacts of climate change on the water resources availability. In this study because of lack of availability of data it was difficult to consider the whole catchment, only the upper Didessa catchment was considered for the study which was taking the outlet gauging station at near Arjo town (9981km^2). Future Climate change scenarios of precipitation and potential evaporation were developed using output of dynamically downscaled data of ECHAM5 (GCM) under A1B emission scenario condition for 2030's (2031- 2040) and 2090's (2091-2100). The projected climate variable showed an increasing trend from the 1991-2000(base period) level. The monthly mean minimum and maximum temperature shows an increasing trend. It is estimated that the average seasonal and annual potential evaporation in the watershed for 2030's might increase up to 5.2% and 4% respectively and in 2090's the average potential evaporation might increase up to 15.85% seasonally and 12.66% annually. Besides, at 2030's it is exhibited that the average seasonal precipitation might increase from 12.14% up to 62.79% and annually 30.22%. The maximum increment is observed during spring while the minimum in autumn. In the other time horizon, in 2090's the average seasonal precipitation might vary from -10.29% up to 25.29%, maximum increase in autumn, where as reduction is projected during spring season. These changes of climate variables were used as input to the HBV hydrological model which was calibrated (R^2=0.601) and validated (R^2=0.61) with historical data to investigate the potential impacts of climate changes in the catchment. The simulation results obtained from the investigation indicated that there was a significant variation in the seasonal and monthly flow in both future period scenarios. At 2030's seasonally as well as monthly positive incremental change is observed, during the main rainy season (summer) the percentage changes might reaches up to 157%.At 2090's the average monthly flow only during the month of April showed 12% reduction, in the rest of the months a great increment is exhibited, the average seasonal flow also showed a significant increment during summer, 136% in respect to the base period. Hence, in Didessa watershed, runoff is likely to increase in the future.

Keywords: A1B, Climate change, GCM, ECHAM5, HBV, Scenario.

Parallel Session 2: Organized by College of Business and Economics, Jimma University

Assessing Indicators of Currency Crisis in Ethiopia: Signals Approach

By

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Abstract

The study utilises the signals approach developed by Kaminsky et al. (1998) in assessing currency crisis in Ethiopia over the time frame January 1970 to December 2008. Three crisis episodes were identified by the Exchange Market Pressure Index (EMPI) over the study period; the first October 1992 to September 1993, the second March to June 1999 and the third October to November 2008. The article tried to see the behaviour of different macroeconomic indicators of currency crisis in a 24 month signalling window. According to the results, relatively more indicators picked up the first crisis as compared to the latter two. From the three category of indicators used (current account, Capital account and domestic financial sector indicators), none of the indicators in the Capital accounts category were significant according to the noise-to-signal ratio rule. One possible explanation for this might be the weak integration of the Ethiopian economy with global capital markets.

Key words: Currency crises, financial crisis, early warning systems, signals approach, Ethiopia

Introduction

Given the destructive nature of currency crises, it becomes important to examine cautionary signals that precede a crisis and better prepare beforehand. Kaminsky et al. (1998) suggested a non-parametric method, known as the signals approach to foresee banking and currency crisis. It makes an ex-post study of the behaviour of various macroeconomic indicators and tries to see if the indicators show an unusual behaviour prior to a currency crisis, as compared to their normal behaviour. The indicators will be categorized as showing 'unusual' behaviour

when they cross a certain threshold. These thresholds are calculated as a certain percentiles out of the distribution of the indicators which minimize their noise to signal ratio.[28] A composite index is then developed out of the ensuing signals and it is, in turn, converted to conditional crisis probabilities. The signals approach to currency crisis will be applied to this case study in a series of steps. Initially, a 'currency crisis' will be defined and introduced. In this regard, the Exchange Market Pressure Index (EMPI) will be brought in and calculated. In the following part, specific indicator variables will be specified and their signals will be extracted. Then, the results will be analysed and interpreted. Finally, a composite index of currency crisis will be developed from the specific indicators.

Crisis Definition

Kaminiskt et.al (1998, page 15) define currency crisis as "a situation in which an attack on the currency leads to a sharp depreciation of the currency, a large decline in international reserves, or a combination of the two". [29] The exchange market pressure index (which is the measure of currency crisis) is, thus, composed of both exchange rate and international reserve variations.

An Index of Exchange Market Pressure

Suppose we denote that;

E_t= The exchange rate at time t (birr/USD)
R_t= Foreign reserves of a nation at time t (in USD)
$\sigma_{\delta R}$ = The st. dev. of the rate of change of foreign reserves
$\sigma_{\delta e}$ = The st. dev. of the rate of change of the exch. rate
Then the index of exchange market pressure EMPI can be given as;

$$EMPI_t = \delta_{et} - \left(\frac{\sigma_{\delta e}}{\sigma_{\delta R}}\right) \delta_{Rt}, \text{ where } \delta e_t = \left(\frac{e_t - e_{t-1}}{e_{t-1}}\right) \text{ and } \delta R_t = \left(\frac{R_t - R_{t-1}}{R_{t-1}}\right) \quad (1)$$

As can be seen from the above equation, the changes in exchange rate are positively associated with the EMP index. The changes in international reserves are, however, negatively related to the index. According to the EMPI, a currency crisis is supposed to happen when the index exceeds *m* standard deviations beyond its mean. That is, a currency

[28] For an explanation of Noise-to-signal ratio see section (3.2). see also See Edison, 2003 and Kaminsky et al., 1998

[29] Kaminisky et.al (1998) also state that a 'crisis' defined in such a way captures both successful and unsuccessful attacks on the currency of a nation. Further, it also captures speculative currency attacks not only under fixed exchange regimes but also under other exchange rate regimes. See also Dahel (2001), Edison (2003) and Pend and Bajona (2008).

crisis is said to happen when the index goes beyond a given threshold. If we designate the mean of the index with μ_{EMPI} and the standard deviation of the index with σ_{EMPI}, $m \in$ IR+, we could formally describe a currency crisis as;

$$\textit{Crisis in time } t = \begin{cases} 1, \text{ if } EMPI_t > \mu_{EMPI} + m\sigma_{EMPI} \\ 0, \text{ otherwise} \end{cases} \qquad (2)$$

As can be seen from equation (2), a dummy variable will be used to summarize the crisis phenomena in binary digits. The dummy will assume a value of 1 when there is a crisis and 0 when there is none.

In this study, the months in which the index is at 1.5 standard deviations or more above its sample mean value are labelled as cases of currency crisis or speculative attacks. [30] The threshold benchmark of 1.5 standard deviations is also used in various studies since it gives good estimation of a currency crisis, see Eichengreen et al. (1996), Feridun (2007) and Herrera and Garcia (1999). [31] The threshold value is, thus, determined as:

$$\textit{Threshold}_{EMPI} = \mu_{EMPI} + 1.5(\sigma_{EMPI}) \qquad (3)$$

In cases where the index crosses the threshold multiple times, an exclusion window of 12 months will be used to avoid counting one crisis as multiple crises. Thus, there has to be a minimal gap of one year between two separate incidences of a currency crisis. [32]

The crisis indicators

In their study, Kaminsky et al. (1998) used 15 core macroeconomic and financial indicators, namely; real exchange rate, exports, stock prices, ratio of M2 to international reserves, output, excess M1 balances, international reserves, M2 multiplier, ratio of domestic credit to GDP, real interest rate, terms of trade, real interest differential, imports, bank deposits and the ratio of lending rate to deposit rate. Due to lack of data, this study will not include the indicators 'industrial output' and 'stock prices'. Yet, industrial production in Ethiopia is rather low and constitutes small share of GDP. Further, the indicator 'stock prices' is not relevant as there is no stock market in the country yet. The data on the 13 indicators used in this study was gathered from IMF's International Financial Statistics (IFS). It constitutes

[30] That is m =1.5 in equation (2)

[31] See footnote 29 for more explanation on the EMPI threshold used in this paper

[32] See Feridun (2007)

monthly values of the set of indicators.[33] All variables are used in twelve month percentage changes, except those noted otherwise. The information regarding the indicator variables and their description is given in Table-1.

Table-1 Description of computations on the Indicator Variables

Indicator Variable	Description	How is the indicator used?
Real exchange rate:	Determined from nominal exchange rate (IFS line 00ae) by adjusting for relative consumer prices (IFS line 64).	measured as % deviation from its trend
Imports:	IFS line 71_d	12-month % change
Exports:	IFS line 70_d	12-month % change
Terms of trade:	Global Development Finance & World Development Indicators. Monthly terms of trade was interpolated from annual data.	12-month % change
Reserves:	IFS line 1L.d.	12-month % change
M2/reserves:	Determined by converting M2 (IFS lines 34 plus 35) from local currency (i.e. birr) into dollars (using line 00ae) and then dividing it by reserves (line1L.d)	12-month % change
Real interest rate differential:	The difference between domestic real interest rate and the real interest rate in the United States.	% difference
M2 multiplier	Given as the ratio of M2 (IFS lines 34 plus 35) to base money (IFS line 14) [34]	12-month % change
Domestic credit/GDP:	Determined by deflating domestic credit (line 32) by consumer prices and then dividing it by real GDP (line 99b.p.). Monthly real GDP was interpolated from annual data.	12-month % change
Domestic real interest rate	Determined by deflating deposit rate (IFS line 60l) by consumer price inflation (IFS line 64)	percentage
Lending-deposit rate ratio	Determined by dividing lending rate (IFS line60p) by deposit rate (IFS line 60l)	ratio
Excess M1 balances:	Determined by deflating M1 (IFS line 34) by consumer prices (IFS line 64) and then subtracting an estimated demand for money from it. The demand for money, in turn, is estimated from a regression of real M1 balances on real GDP, consumer price inflation, and a linear time trend.	millions of nominal currency -birr
Bank deposits:	Determined by deflating deposits (IFS line 24 plus 25) by consumer prices (IFS line 64).	12-month % change

Just like the crisis index, the binary signals from individual indicators (1 = warning signal and 0 = none) are defined by a certain threshold level for each indicator variable. Table-2 summarises the explanations regarding the thresholds used for each indicator. Those indicators which tend to rise before the start of a crisis (such as imports, real interest rates and domestic credit) will have an upper (higher than average) threshold. On the contrary, those indicators which tend to decline before the start of a crisis (such as real exchange rate, exports and bank deposits) will have a lower (lower than average) thresholds. The exact

[33] See table-1 for the list of 13 indicators used in this study. Also see the Appendix in Peng and Bajona (2008) and Kaminsky et al. (1998) page 20

[34] IFS= International Financial Statistics (International Monetary Fund). See also Appendix in Peng and Bajona (2008, page 20)

thresholds (percentile) of the indictors used in this study are taken from Edison (2003).[35] These values are given in columns 7 and 8 of table-5. The threshold percentile used for exports, for instance, is 10%. This means that the indicator will be issuing a signal if its year-on-year growth is in its lowest 10% of observations.

Table-2 Description of Thresholds of the Indicator Variables

Category	Indicator	Tail	Comments
Current account indicators[36]	Real exchange rate	Lower	Large negative shocks to exchange rate (i.e. the overvaluation of the real exchange rate)
	Imports	Upper	Rapid rise in Imports (a weak external sector)
	Exports	*Lower*	Rapid decline in exports (a weak external sector)
	Terms of trade	*Lower*	Big negative shocks to exchange rate and exports (and, hence, terms of trade) leads to loss of competitiveness of local businesses. This may at times lead to recessions.
Capital account Indicators[37]	Foreign reserves	Lower	Sustained Loss of foreign reserve
	M2/ reserves	Upper	Expansionary monetary policy and/or rapid fall in reserves
	Real interest rate differential (Domestic/foreign)	Upper	Large interest rate differential which might lead to reversal of capital flows
Domestic Financial sector Indicators[38]	M2 multiplier	Upper	Fast growth of credit
	Domestic credit/GDP	Upper	Domestic credit normally expands before a crisis and then contracts in later date. Since we are interested in events before crisis, we take the upper threshold.
	Domestic real interest rates	Upper	Presence of high real interest rates might show a liquidity crunch in an economy. Further, speculative attacks are often dealt with by rising real interest rates
	Lending/deposit interest rates	Upper	Lending rates normally appear to go up before a crisis. Yet, rising lending rates show the decline in loan quality.
	Excess real M1balances	Upper	Loose monetary policy (excess liquidity) might lead to a currency crisis
	Bank deposits	Lower	Banks lose their deposits as crisis starts to hit the economy
Real sector[39]	Industrial production	Lower	A recession (decline in industrial output) often leads financial crises.
	Equity indices	Lower	Burst of asset price bubbles (such as the US housing market bubble in 2007) often lead financial crises

An indicator will issues a warning signal about the likely occurrence of a crisis when it crosses its threshold within a particular period called 'signalling horizon/window' of 24 months. [40] A signal will be treated as a 'good signal' whenever it appears within the

[35] Edison's (2003) study is an expansion of kaminsk etal.'s (1998) study. Edison added 8 more countries to the 20 countries used by kaminsk etal.

[36] see table-2 in Heun (2004, page 25); also see Dornbusch et al. (1995)

[37] Edison (2003),Kaminsky and Reinhart (1999)

[38] Edison (2003); McKinnon and Pill (1994); Krugman (1979); Goldfajn and Valdes (1995)

[39] Edison (2003), See also Gorton, 1988 and Calomiris and Gorton, 1991 (cited in Heun 2004, page 25)

[40] The '*signalling horizon*' is a time period just before the start date of the currency crisis over which the behaviour of the indicator variables will be observed for their predictive power. In most studies a 24 month period before the start date of the crisis is used as signalling window (see Kaminsky, 1998; Edison, 2003; Peng and Bajona, 2008). This study also uses a 24-month signalling window. However in some studies various ranges of periods have been used. For instance, El-Shazly (2002) used 6-months; Feridun , 2007 used 12-months; Brüggemann and Linne (2002) used 18-months.

signalling horizon and a 'false signal' or 'noise' otherwise. Table-3 summarizes the signalling possibilities and, thus, the performance of the indicators.

Table-3 the performance of an indicator

	Crisis within 24 months	No crisis within 24 months
Signal issued	A	B
No signal issued	C	D

Note: The table summarizes the possible outcomes of an indicator variable. Cell A represents a good signal while cell B represents a noise or false alarm. Also note that entries C and B would be zero for a perfect indicator (i.e. a perfect indicator only has cell A and D).

If an indicator is faultless, it will give only good signals i.e. cell *A* and Cell *D* > 0 and Cell *B* and cell *C* = 0, in table-3. However, this is hardly the case in reality. Therefore, Kaminsky et al. (1998) introduced a threshold which will minimize the ratio of false signals to good signals i.e. (B / B +D)/ (A/ A+C), which they called the 'noise-to-signal ratio'. This measure will help to assess the effectiveness of the individual indicators. If the noise-to-signal ratio is below one, the indicators will be taken as significant. If the ratio is above one, the indicator will be considered insignificant and, thus, dropped. One may also, otherwise, use signal-to-noise ratio (i.e. the reverse measure). In that case, the ratio will be less than unity for a bad indicator and above unity for a good indicator. Generally, the higher the signal-to-noise ratio from unity, the better will be the performance of the indicator.

The Composite crisis Index and Probabilities of a Currency crisis

Composite Index

The main objective behind the use of the composite index is to merge the signals from the particular indicators in a comprehensive manner. As Kaminsky et al (1998) note, this study will define the composite index as a weighted average of the signals from individual indicators. The signals from the indicators will be weighed by the noise-to-signal ratio of the respective indicator. To formally define the index; suppose the signals from indicator *j* in period *t* are given as $S_t^j \in \{0, 1\}$ and the noise-to-signal ratio of indicator *j* are given as ωj, the weighted composite crisis index will be given as;

$$Kt = \sum_{j=1}^{n} \frac{1}{\omega j} St^j \qquad (4)$$

The smaller the noise-to-signal ratio (below unity), the better the indicator performs. This is so because the weights are the inverse of the noise-to-signal ratio. Further, as the index is a

positive sum of the signals, there will be a higher probability that a currency crisis will occur if larger number of indicators are signalling.

Probabilities of a Currency Crisis

The probability of the currency crisis is derived from the composite index. It is calculated by watching how frequently a crisis follows a particular value of the index within 24 months (see also Edison, 2003; Peng and Bajona, 2008; and kaminisky et.al, 1998). We may formally define the conditional probabilities of a currency crisis as;

$$Pr\,(C_{t}^{n}{}_{,\,t+24}\,|k_t = j) = \frac{\text{Months with } k=j \text{ and a crisis within 24 months}}{\text{Months with } k=j} \qquad (5)$$

Given k_t (the composite crisis indicator at time t) is equal to *j*, $Pr\,(C_t^n{}_{,t+24}|k_t = j)$ gives the conditional probability of a currency crisis in the time interval of [*t*, *t* + 24 months]. The assignment of probabilities (likelihoods for an occurrence of currency crisis) to each values of the composite crisis index is a sample based process. Given that this is a single country case study, there is no adequate observation to derive the probabilities. Thus, the currency crisis probabilities used in this study are taken from the multi – country study by Edison (2003). The probabilities of currency crisis associated with various values of the composite index are given in table-4.[41] Edison's results are more comprehensive since it expands the 20 country study by Kamnisky et.al (1998) in to a 28 country study (see Edison 2003).

Table-4 Composite Index and Crisis probabilities

1.2-3	.17
3-5	.25
5-7	.32
7-9	.33
9-10	.43
10-11	.51
11-12	.49
Over 12	.50

Source: Table 9 in Edison (2003)

[41] See table-3 in Edison (2003)

The Results and discussion

Figures-1 and 2 show the exchange market pressure index (EMPI) for the period January 1970 to December 2008.[42] The study uses two time periods discretely due to major changes in exchange rate policy, the first from January 1970 to June 1995 was a period of fixed exchange rate regime while the second from July 1995 to December 2008 was a period of managed floating exchange rate regime. [43] The EMPI picked one crisis episode (October 1992-September 1993) in the fixed exchange period and two brief crisis episodes (March-June 1999 and October-November 2008) in the floating exchange regime.

Figure-1 Exchange Market Pressure Index (Fixed exchange)

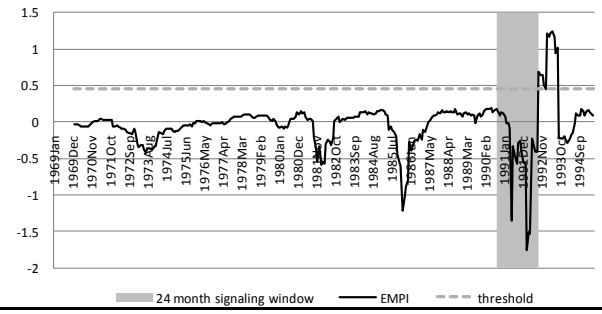
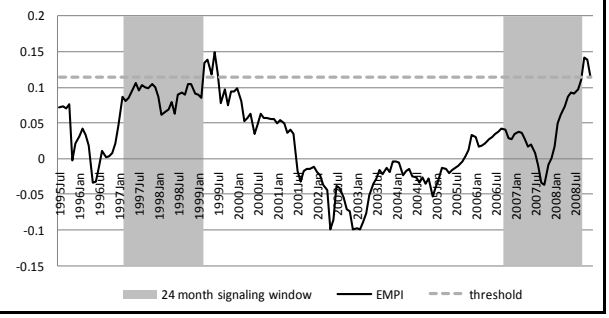


Figure-2 Exchange Market Pressure Index (Managed float)



[42] The crisis episodes are identified by the months for which the EMPI is above the dotted threshold line, in figures 1 and 2. The 24 months preceding the onset of the crisis would be the signalling window.

[43] Ethiopia officially unified the official exchange rate on 25 July 1995 (NBE, 1995 page 2 and IMF, 1996 page 169, also cited in Schuler, 2005). When both time periods are considered together the EMPI captures only the 1992-93 crises. However, various studies note that the EMPI will not have the same nature under various exchange rate regimes. See Stavarek, 2010 and Van Poeck et al., 2007. The EMPI is composed of changes in exchange rate less the changes in reserves, where the latter is weighed by the ratio of standard deviations of the two (See equation (1) in section 3.1.1). Thus it is evident that the EMPI will be derived basically from the movements in reserves in the case of fixed exchange rate regime and from a combination of changes in exchange rates and reserves in managed floating system. Currency crisis definitions by EMPI will, therefore, become dependent on the exchange rate regime, apart from other factors.

Currency crisis definitions by EMPI depend also on the level of the threshold used. Various studies use threshold levels that range from one to three standard deviations from the mean. For instance, Kaminsky etal. 1998; Edison, 2003; Youngblood, 2003 and Eichengreen etal., 1997 used 3, 2.5, 2 and 1.5 standard deviations respectively as thresholds. However, as various studies showed (see Kamin etal., 2001, Lestano and Jacobs,2007 and Ari, 2008), different thresholds might come up with different crisis dates and different number of cases classified as 'currency crisis'. In this study a threshold level of the mean plus 1.5 standard deviations have been used. Studies such as Eichengreen et al. (1997), Herrera and Garcia (1999) and Feridun (2007) have also used this threshold. When a threshold level of 3 standard deviations is used, only the 1992-93 crisis was identified. At a threshold of 2 standard deviations, only two crises were identified (the 1992-93 and 1999 crisis). Generally the choice of the thresholds depends on identifying ideal number of crisis. If the threshold is too low, there will be more episodes identified as 'crisis', some falsely. If the threshold is too high, too few crisis will be identified, i.e. only the most extreme cases.

The 1992-93 crisis definitely bases itself in domestic developments. Going over the historical records, on 1 October 1992 Ethiopia devalued its currency (birr) by 100% from an exchange rate of 2.5 birr/dollar to 5birr/dollar.[44] The devaluation was part of a package of economic reforms to start moving away from socialism (Schuler, 2005). The 1999 crisis overlaps the time of the Ethio-Eritrean border clash. The big cost of financing the war and its big ripple effects on the overall economy (investment, trade and tourism) might explain the timing of the currency crisis. Yet, it also roughly corresponds to the 1997-99 Asian financial crisis. As Ernest H. (1998) and many others argue, the impact of the Asian financial crisis and its worldwide repercussions were felt in African nations directly and indirectly. Some channels of the impact included the slowing down of GDP growth, declining world commodity prices, loss of key Asian markets for African goods, decline in foreign direct investment and foreign aid.[45]

The 2008 crisis overlies the late 2000s global financial crisis. Like many other countries, Ethiopia has suffered from this crisis. The economy has again experienced shocks through falling foreign direct investment, trade, remittances and aid. Exports of commodities (coffee, horticulture, hides, cereals, cotton, sugarcane etc.) declined following the decline in global demand. Similarly, remittances fell as unemployment in the western nations rose. This brought severe shortages of foreign reserves which forced the government to ration foreign exchange. As Getnet (2010) explains, gross domestic investment declined to 20.3% of GDP in 2008/09, from about 24% of GDP in the preceding four years. Even overall GDP growth itself declined from 10.8% in 2008 to 8.7% in 2009.

All indicators are given as annual percentage changes except for four indicators, namely; excess M1 balances (given in millions of nominal currency), deviation of the real exchange rate from trend (given in percentage terms) and the three interest rate variables i.e. real interest rate differential, domestic real interest rate, lending-deposit rate ratio (which are also given in percentage terms)

The performance of the 13 indicators and their thresholds are summarized in Table-5.

Columns (2, 3, 4 and 5) of table-5 sum up the information about the signals in the 24 months preceding crisis episodes (signaling window). The sixth column gives the total signals

[44] NBE (1993) cited in Schuler (2005)

[45] IMF's projection for Africa's growth was slashed down by a percentage point in 1998, from 4.6 to 3.6 percent due to the Asian financial crisis (see Ernest, 1998).

received in the overall period under consideration, i.e. Jan 1970 to Dec2008.[46] Columns 7 and 8 show threshold levels as percentiles and values of the indicator. Column 9 shows the Noise-to-signal ratio for this study while the last three columns show the results from other studies, for the sake of comparison. Taking the first variable in the table (i.e. M2 multiplier), we see that the indicator gave no signals during the 24 month signaling window preceding the 1992-93 crisis. The indicator, however, gave 13 and 5 signals in the signaling windows of the 1999 and 2008 crisis respectively. What this means is that, the indicator has been in its highest 85 percentile (its threshold) 13 and 5 times respectively during the signaling window for each crisis.[47]

During the signaling window for the 1992-93 crisis, four variables, namely; M2 multiplier, domestic credit/GDP, real interest rate differential and domestic real interest rate failed to cross their thresholds, hence didn't make any signal. Further there was no data available for the indicator 'terms of trade'. The rest of the indicators (8 out of 13) were crossing their thresholds for various months and, hence, making signals ranging from 3 signals (excess M1 balances, reserves and M2/reserves) to 13 signals as by exports. Two indicators, deviation of real exchange rate from trend and lending-deposit rate ratio, had sustainably crossed the threshold during the whole of this signalling window i.e. 24 months. [48]

[46] Note that an indicator produces a signal when it significantly deviates from its normal trend (i.e. it changes from 0=normal state to 1, which is a signal)

[47] Note that the study used the 12-month growth rate for most indicator variables (see table-1 for more explanation)

[48] If we say 'an indicator issued 3 signals' it means that the indicator crossed its threshold three times in the 24 month signalling window.

Table -5 Results from the signals approach

Number of signals in preceding 24 months			Total signals (Signalling window)	Total signals (Signalling & tranquil periods combined)	Threshold		Signal-to-noise ratio	Noise-to-signal ratio[49] (Comparison to other studies)			
1992	1999	2008			Percentile	Value		This Case study	Edison (2003)		Kaminsky et.al (1998) Multi country study
									Mexico case study	Multi country study	
0	13	5	18	71	85	14.69	1.87	0.54	N/A	.86	.61
0	6	0	6	94	80	8.94	0.38	2.67	N/A	.75	.62
3	0	0	3	47	90	107.52	0.38	2.67	.1	.52	.48
12	0	6	18	47	10	-7.75	3.41	0.29	10.9	.94	1.2
13	3	0	16	47	10	-37.91	2.84	0.35	1.02	.6	.42
6	0	0	6	47	90	66.25	0.81	1.24	.55	.88	1.16
N/A	4	0	4	20	10	-15.37	1.38	0.73	N/A	.93	.77
3	0	0	3	47	10	-45.97	0.38	2.67	.86	.53	.57
24	0	0	24	47	10	-47.39	5.74	0.17	0	.26	.19
0	0	0	0	47	90	143.09	0	N/A*	N/A	1	.99
3	0	0	3	47	90	6501.03	0.38	2.67	.19	.55	.52
0	0	0	0	94	80	19.96	0	N/A*	N/A	.66	.77
24	0	0	24	95	80	2.41	1.86	0.58	3.4	2.7	1.69

N/A= not available

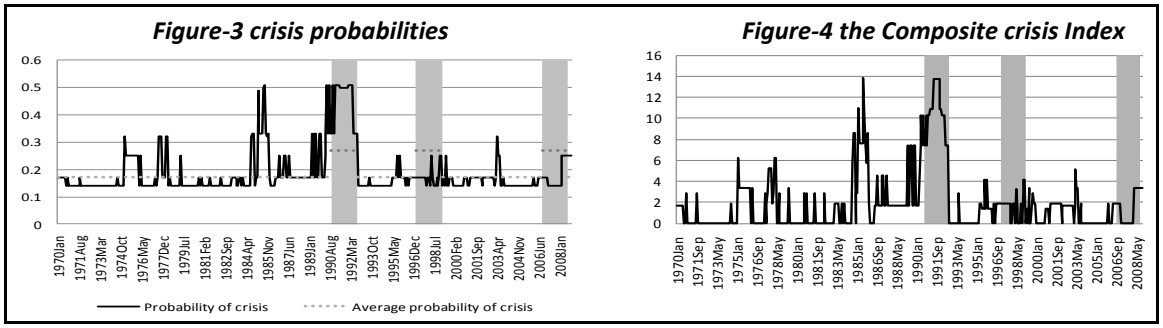
N/A*= not available due to division by zero

During the second signaling window, 9 of the 13 available indicators didn't emit any signal at all, i.e. none of them crossed their thresholds. The rest four indicators made signals ranging from 3 as by exports to 13 by indicator M2 multiplier. During the third and latest signalling window, only 2 of the 13 available indicators made signals. Indicator M2 multiplier crossed its threshold 5 times while indicator Bank deposits crossed its threshold 6 times.

[49] There are 468 months in the dataset (Jan 1970 to Dec 2008). 72 months (24months X 3 crisis) belong to the signalling window. The rest (396 months) are tranquil periods. The total signals received from an indicator in the 3 signalling windows (72 months) are given in column 5 of table-5. The total signals received from an indicator in the whole study period (468 months) are given in column 6 of the table. Suppose: A=column 5; B=Column 6 – column 5; C=72-A and D=396-B, Then the 'noise-to-signal ratio' can be given as (B / B +D)/ (A/ A+C). In the case of indicator 'M2 multiplier' for instance, A=18; B=53 (i.e. 71-18); C=54 (i.e. 72-A) and D=343(i.e. 396-B). Thus, noise-to-signal ratio will be (53/(53+343))/ (18/(18+54)) ≈ 0.54 (see table-2 and the subsequent explanation in section 3.2 for more clarification)

In accordance with the Noise-to-signal ratio principle (where the ratio has to be less than 1.0), six indicators (M2 multiplier, bank deposits, exports, terms of trade, deviation of real ER from trend and lending-deposit rate ratio) appear to be significant. Three indicators (M2 multiplier, bank deposits and exports) picked at least two of the crises. None of these indicators was good enough to signal all the three crises. This is basically so as a small number of indicators signalled the 1999 and 2008 crises. Another thing to note is the nature of these indicators. They were all either current account indicators (deviation of the real exchange rate, Exports and terms of trade) or domestic financial sector indicators (M2 multiplier, Bank deposits and Lending-deposit rate ratio).[50] None of the Capital account indicators considered in the study (Foreign reserves, M2/ reserves and Real interest rate differential) were good indicators based on the noise-to-signal ratio rule.

Figure-3 gives the probability of currency crisis for the country under the period of consideration. As we can see from figure-3, there has been broad range of periods where the probability of the currency crisis has been high.[51]



The case studies made by Edison (2003) on Mexico and Peng and Bajona (2008) on China also show that out-of-sample probabilities are rather jagged. The results showed high crisis probabilities in pre-crisis periods and sometimes in 'normal' periods where the probabilities should be low. Edison (2003), however, showed that the average crisis probabilities were higher in the pre-crisis signaling window compared to rest of the time.[52] This holds true for this case study also, as we see from figure-3. The average crisis probability in the signaling window (0.27) is slightly higher than the average crisis probability in the normal period (0.17). Since the analysis with the crisis probabilities derived from the composite index does

[50] See table-2 for more information

[51] see table-4 as to how the probabilities are constructed

[52] See Edison, 2003:page 32

not give a clear image we may rather look at the raw picture. That is, we may look at the evolution of the value of the composite crisis index itself.

As we can see from figure-4, the composite index's periods of elevated value clearly overlaps at least with the signaling window of the 1992-93 crises. However, the composite index values in the latter two signaling windows were not as such exceptionally high. This is due to the fact that relatively more indicators produced signals in the signaling window of the 1992-93 crisis compared to the signaling windows of the 1999 and 2008 crisis. Since the composite index is the summation of the signals (weighed by inverse of the noise to signal ratio); the larger the number of indicators that signal, the larger will be the value of the composite index.

There are two basic rationalizations that may follow the results. One would be to accept the results and look for justifications. The other would be to challenge the findings. The possible justification is the nature of the Ethiopian economy itself. With undeveloped capital markets and loose integration to the financial world, local developments might explain more about currency crises than external factors. The first crisis was of domestic origin and was at the crossroad of major economic policy shifts in the country. It was also followed by major devaluation in the currency. For this reason it was picked by more indicators. The latter two crises (specially the one in 2008) have possible external roots and align with times of international crises. Given the country's loose integration with the financial world; these crises were not easily picked by the indicators. Further, the fact that capital account indicators failed to be good indicators might strengthen this argument. As we would expect, good indicators for such an economy will be indicators of the domestic financial sector. And if there is still a financial contagion from global economic turmoil, it would mainly be reflected through the current account indicators (such as exports).

Despite being a useful methodological tool in analyzing currency crisis, the signals approach has its flaws. One key weakness has to do with the statistical problem of defining crisis. In the signals analysis, first the crisis episodes have to be identified by the exchange market pressure index (EMPI) and then the behavior of the indicators in the time window is analyzed. However, as various studies show, there is no concrete way of doing so. Setting the index threshold low or high may come up with more or few crisis episodes. For instance, the 1992-1993 was picked even at higher thresholds (3 standard deviations above the EMPI mean) while the latter crises were picked only by modest thresholds (1.5 standard deviations above the EMPI mean). Different studies make use of different thresholds, making the

problem more puzzling. Thus, it could be possible that the latter two crises were just statistical definitions. And even if they were not, they were not as significant as the 1992-93 crisis. Yet, what is interesting to see is that the indicators have made more signals in the case of this crisis as compared to the latter two.

Conclusion

In this study, the signals approach (introduced by kaminisky et al, 1998) was used to see as to what extent key macroeconomic indicators anticipate currency crisis in Ethiopia. The study was an ex-post investigation of the indicators as 'currency crisis' has to be first defined by the exchange market pressure index, EMPI. The index puts together exchange market depreciation along with movements in international reserves. According to the index (and the 1.5 standard deviations above the mean threshold), three crisis episodes were noted; October 1992-September 1993, March-June 1999 and October-November 2008.

The first crisis aligns itself to domestic developments while the latter two somehow match periods of international crises. There were relatively more indicators signaling the first crisis compared to the latter two.[53] Thus, the composite index and the out-of-sample crisis probabilities were quite high in the period preceding the first crisis. Out of the 13 indicators used, M2 multiplier, bank deposits, exports, terms of trade, deviation of real ER from trend and lending-deposit rate ratio were good enough to use according to the noise-to-signal ratio. Their extreme values were more or less aligned with the signaling windows preceding the crises.

The signals approach to currency crisis can be one integral tool in the development of an early warning system for a crisis. By analysing past currency crises in a country or set of countries and the behaviour of financial indicators in the period before the onset of the crises, the approach derives key lessons. Policy makers, monetary authorities and financial agents may, in-turn, use these lessons to take precautions as important financial variables start showing 'unusual' behaviours that were historically observed prior to crises burst. In short, the signals approach might help to design a good financial early warning system which could, in turn, help to design effective macroeconomic policies.

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[53] Only 4 and 2 indicators (out of 13 indicators) made signals in the 1999 and 2008 crisis respectively, compared to 8 in the 1992-93 crisis.

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Macroeconomic Determinants of Current Account Deficit in Ethiopia

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Abstract

Current account balance is typically used as one of the main leading indicators for future behavior of an economy and is part of the everyday decision process of policy makers. This study aims at examining the empirical links between current account deficit and macroeconomic variables in Ethiopia. To this end, we collected macroeconomic data on gross national savings, real output (GDP), budget deficit, exports, real effective exchange rate, and black market premium by drawing on annual time series data for the period 1973/74-2008/09. We have adopted recent econometric techniques to separate the long run and short run effects of the study variables.

The major findings include current account deficit in Ethiopia is moderately persistent in the long run. A rise in real domestic output growth generates a larger current account deficit. On the other hand, increases in national savings rates have a significant negative effect on the current account both in the long and short run. Budget deficit affects current account deficit positively or there is "Twin Deficit" in Ethiopia. The increase in exports is associated with significant reduction in the current account only in the short run. Nevertheless, depreciation of (decrease in) real effective exchange rate generates a strong statistically significant reduction in current account deficit only in the long implying the short run impact of real effective exchange rate provides evidence in support of J-curve effect. Finally, foreign currency restrictions do not limit the expansion of the current-account deficit in the long and short runs.

The findings of the study imply that there is a need for sound macroeconomic policies and strategies that improve the competitiveness of Ethiopia's exports in the long run; reduce budget deficit; and improve the effectiveness of foreign exchange control.

Keywords: Current account deficit, Dynamic model, ECM, "Twin Deficit", J-Curve

1. Introduction

The global pattern of external imbalances in general and severe macroeconomic crisis in developing countries in recent years have once again underscored the need for a clear understanding of the temporary and structural factors underlying a country's current account position. In spite of the relatively extensive body of theoretical literature on the subject, there are only few comprehensive cross-country studies that empirically analyze the effect of macroeconomic variables on the current account deficit while country specific studies on developing countries are missing. This lack of country specific empirical evidence is surprising given the fact that the position of the current account balance is typically used as one of the main leading indicators for future behavior of an economy and is part of the everyday decision process of policy makers.

There is extensive literature about the internal and external determinants of current account deficits in developing countries that slow down their economic growth. Among the internal factors output growth, gross national savings, and fiscal policy are the major ones. The external factors on the other hand involve the exogenous shocks to exports, exchange rate policy, international and individual country's specific trade and related policies, world interest rate, and protective policies of countries through tariff and non-tariff barriers (Caderon *et al*, 2002; Kraay and Ventura, 1997; and Milesi-Ferreti and Razin 1997).

Ethiopia is a least developed country that runs persistent current account deficit (CAD) mainly triggered by trade deficit. The country has never experienced surplus current account balance in its history except for the years 1972/73 and 1973/74. Recent macro data used in this study indicates that average current account deficit as a ratio of GDP was 1.23 percent between 1970/71 and 1979/80. It has increased to 5.98 percent for the period 1980/81 to 1989/90 but decreased to 5.25 for the period 1990/91 to 1999/2000. What is worrisome is that average current account deficit as a ratio of GDP has reached 12.72 percent for the period 2000/01 to 2008/09 indicating 142.46 percent increase compared to the previous decade. The above stylized facts for Ethiopia imply that current account deficit has reminded sever both on pre and post reform period of 1992. .

The objective of this paper is thus to provide an exhaustive characterization of the empirical linkage between current account deficit and a broader set of macroeconomic variables, proposed by theoretical and empirical literature, in Ethiopia. More specifically, the study attempts:-

- To examine the time series characteristics of the data used in the study
- To analyze empirically the magnitude and direction of the effect of selected internal and external macroeconomic variables on the current account deficit in Ethiopia both in the long run and short run.
- To draw some policy implications that may help policy makers in designing a macroeconomic policy measures to improve the country's current account deficit.

This paper is organized as follows. The next section presents a brief review of theoretical and empirical literature. Section three describes the data set, the econometrics methodology used to analyze transitory and permanent effects, and the findings of the study. The final section concludes the study.

.2. Literature review

According to the intertemporal approach, the current account deficit is the outcome of forward-looking dynamic saving and investment decisions driven by expectations of productivity growth, government spending, interest rates, and several other factors. Within this framework, it has been stressed the role of the current account balance as a buffer against transitory shocks in productivity or demand (Sachs, 1981; Obstfeld and Rogoff, 1995; Ghosh, 1995; Razin, 1995).

One of the main lessons learned from this literature is that the impact of policy changes may vary according to the nature, persistence and timing of such changes. With respect to their nature, shocks may be country-specific or global. This is important since the literature finds that the latter tends to have a smaller impact on current account deficits than the former (Glick and Rogoff, 1995; Razin, 1995). Similarly, the persistence of the shocks, whether transitory or permanent, may produce a different response of the current account balance. For instance, a permanent productivity shock may widen the current account deficit as it may generate a surge in investment and a decline in savings (given that it causes consumption to rise by more than gross output). On the other hand, transitory productivity shocks may move the current account into surplus as there may be no investment response to a purely temporary shock (Glick and Rogoff, 1995; Obstfeld and Rogoff, 1995).

In the context of a real business cycle model, the intertemporal approach has been widely used to evaluate the impact on the current account balance of fiscal policy (Frenkel and Razin, 1996), real exchange rate (Stockman, 1987), terms of trade fluctuations (Greenwood,

1983; Mansoorian, 1998), capital controls (Mendoza, 1991) and global productivity shocks (Glick and Rogoff, 1995; Razin, 1995). In assessing the effects of these variables, the RBC literature has been careful to recognize that dynamic general equilibrium models imply the existence of simultaneity between the current account deficits and its determinants.

In line with the above arguments Kraay and Ventura (1997) and Calderon *et al.* (2002) noted that the impact of the increase in national saving rate (wealth) on the current account deficit depends largely on the trade off between whether the increase in wealth (savings) leads to greater increase in domestic capital (investment) or the increase in savings exceeds investment at home so that a portion of it can be invested abroad. Thus, it will worsen the current account deficit of a country in the former case while improves in the latter case.

Chinn (2005) and Chinn and Ito (2005) observed that the US budget deficit is the most important factor in the economy's external imbalance In support of this argument, Joseph and Steven, (2005) noted that at its simplest, the current account balance is equal to saving minus investment, so any expansion of budget deficit that lowers public saving can also lowers current account balance or worsen the current account deficit. Taking into account the endogenity of private saving and investment decisions, fiscal expansion boosts domestic spending, pushing domestic interest rates up relative to foreign rates, attracts foreign investors thereby widening the current account deficit. Moreover, Truman (2004), Gramlich, (2004), and Mann (2002) noted that an increase in the budget deficit, i.e., a reduction in public saving, ceteris paribus lead to a reduction of net savings of the economy, and hence widening of the current account deficit. They described this positive relationship between budget deficit and current account deficit as "Twin Deficit"

The movement in volume of export appears to have correlation with relative prices. In theory, movements in real effective exchange rate are negatively correlated with the growth in real exports. An increase in the real effective exchange rate means a real appreciation of the domestic currency, which makes exportable items costly. If the real exchange rate appreciates the demand for our exports is likely to fall. As a result, it will worsen trade balance and the current account deficit. The reverse is likely to occur if the real exchange rate depreciates (Truman, 2004).

The empirical findings of (Kraay and Ventura, 1997) for developed and developing countries show three important facts consistent with economic theory. First, there exists strong correlation between savings and income, which is consistent with the notion that some

portion of shocks to transitory income will be saved in order to smooth consumption overtime; second, there is strong negative relationship between savings and current account deficit; and third favorable income shocks lead to outward investment of debtor (developed) countries 5.6 percent of GNP and in creditor (developing) countries were 15.2 percent..

One of the comprehensive cross-country empirical studies on the determinants of the current account balance includes the study by Debelle and Faruqee (1996). They use a panel of 21 industrial countries over 1971-1993 and an expanded cross-sectional data set that includes an additional 34 industrial and developing countries. Their paper attempts to explain long-term variations and short-run dynamics of the current account by specifying cross-section and panel data models, respectively. They find that the fiscal surplus, terms of trade and capital controls do not play a significant role on the long-term (cross-sectional) variations of the current account, while relative income, government debt and demographics do.

Furthermore, with the purpose of estimating short-run effects, Debelle and Faruqee estimate both a partial-adjustment model with fixed-effects and an error-correction model (to account, respectively, for the possibilities of stationarity or non-stationarity of the ratio of net foreign assets to GDP). In both cases, they found that short-run changes in fiscal policy, movements in terms of trade, the state of the business cycle, and the exchange rate affect the current account balance. But for Truman, (2004), Cline (2005), and Chinn and Ito (2005) budget deficit is an important factor in the U.S. economy's external imbalance.

3. Data, Model Specification, Estimation Technique, and Results and Analysis

3.1. Data source and description

We use annual time series macroeconomic data over the period 1973/74-2008/09. We obtained all the data from National Bank of Ethiopia (2009/10) secondary source. In order to ensure adequate implementation of our econometric methodology the following are the key variables used.

Income, Current account, and Saving: The measure of income employed to construct and normalize the current account balance, gross national saving, exports, and budget deficit is Gross National Disposable Income (GNDI). This corresponds closely to the concept of total income available for consumption and saving of national residents and is equal to gross national product (GNP) plus all net unrequited transfers from abroad. Gross national saving

(GNS) is computed as GNDI less consumption expenditure and Current account balance is net goods and service plus net private transfers.

Exports and output growth: Exports as a ratio of GNDI are used as a proxy for the degree of openness. The growth rate of Real GDP is a proxy for economic growth.

Budget Deficit: At its simplest, fiscal deficit is government revenue minus expenditure. Following, the findings of Cline (2005) and Chinn and Ito (2005) the U.S. budget deficit as an important factor in the economy's external imbalance it is included in our model.

Real effective exchange rate and Black market premium on exchange rate: Real effective exchange rates expressed in log form are used in the model as Caldron *et al.*,(2000) did for developing countries. We also used the black market premium on exchange as a measure for capital and current account restriction following Dooley and Israd (1980) because employing this variable is particularly important in empirical analysis that uses annual time series data. It is also a proxy for financial liberalization measures. It is expressed as log (1+BMP).

3.2 . Econometrics Model Specification

The response of current account deficit to changes in economic variables depends primarily whether those changes are transitory or permanent. The key identification assumption is that all the variables are stationary, or more specifically, that they follow mean-reverting process. In short, the model used in this study is designed for time series data and is characterized by; first, it is dynamic, since it allows for independent effects from the lagged current account deficit and second, it allows the identification of permanent and transitory on the current account deficit.

In regression analysis involving time series data, if the regression includes not only the current but also the lagged (past) value of explanatory $(X's)$ and dependent (Y) variables, it is advisable to use a multivariate dynamic model called autoregressive distribution lag (Gujerati, 1995) Thus, the autoregressive distribution lag model is represented as

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 X_t + \beta_3 X_{t-1} + E_t \text{ ---------- (1)}$$

As reviewed in the literature part there are a number of determinants of that affect the current account deficit of a country. Our model also considers the inertia property of the current account deficit by allowing for an independent effect from its lagged value and is akin to the model used by Calderon *et al.* (2000) in estimating determinants of current account deficit in

Developing Countries. In contrast, however, our model does not include the term of trade (TOT), balance of payment, and international interest rate, external indebtedness, and world economy due to unavailability of data. Therefore, the permanent effect regression equation is given by:

$$CAD = \beta_0 + \beta_1 CAD_1 + \beta_2 GDPg + \beta_3 GNS + \beta_4 BD + \beta_5 EXP + \beta_6 \ln RER + \beta_7 \ln(1 + BP) + E_t \quad \text{--- (2)}$$

Where,

CAD = Current account deficit as a ratio of Gross National Disposable Income (GNDI) is the dependent variable

$GDPg$ = Growth of real domestic product (RGDP)

GNS = GNS = Gross National Saving as a percentage of GNDI

BD = Budget deficit as a ratio of GNDI

EXP = Export plus import of goods and services as a percentage of GNDI as a proxy for degree of openness

RER = Real exchange rate in log form

$(1 + BP)$ = Black Market Premium in log form, as a proxy for foreign exchange control

ε_t = Error term

Based on available theoretical literature the first four variables in the model are called internal determinants of current account deficit. The expected sign for persistence of current account deficit coefficient (measured by lagged CAD) in an economy, real output growth (RGDPg), and budget deficit to GNDI, that is β_1 and $\beta_2 > 0$. Moreover, an expansion of budget deficit will have positive effect on current account deficit (or $\beta_4 > 0$) by boosting production, lowering public saving or pushing domestic interest rates up relative to foreign rates. However, the expected sign of coefficients gross national savings (GNS) coefficient is negative; that is $\beta_3 < 0$, implying an increase in gross national savings will improve current account deficit.

On the other hand, fifth to seventh variables are regarded as external determinants of current account deficit. The expected sign of exports on current account deficit is ambiguous. That is the increase in exports either due to the prosperity or output growth in industrial nation, liberalization measures, or diversification measures will have negative impact on current

account deficit (or $\beta_5 < 0$) implying an increase in exports will reduce current account deficit (Calderon *et al.,* 2000). On the other hand, according to Milesi-Ferreti and Ranzi, (1996) it seems that while an increase in exports from one year to another lowers current account deficit through direct effect on trade balance, having a large export sector also indicates an improved capacity to repay external debt and thus, leads to expansion of current account deficit or The opposite of the above conditions will have positive effect (or $\beta_5 > 0$).

The expected sign of real effective exchange rate depends on the exchange rate regime the country experiences. According to the Marshal-Lerner condition and Mundel-Fleming model, appreciation of (increase in) real effective exchange rate will discourage export and encourage import and hence will worsen the current account deficit (in such a case $\beta_6 > 0$) where as current account deficit improves (reduces) with devaluation measures ($\beta_6 < 0$).

Finally, the expected sign of the coefficient of black market premium is negative ($\beta_7<0$). This is because controls of foreign exchange manifested in lowering the size of BMP will reduce the current account deficit by directing illegal exporters to the official market channels and increasing the country's competitiveness in international market.

3.3 Estimation technique

According to Gujerati, (1995) many economic time series data subjected to the problem of non-stationary. That is when non-stationary variables are used in regression, they result in spurious regression, which means that when regressing one non-stationary time series variable on another time series variable one often obtains a very high R^2 although there is no meaningful relationship between them.

Harris (1995) also noted that most macroeconomic variables can be non-stationary and show trending overtime at level. One can, however, difference the variables in order to make them stationary. If the variables become stationary through differencing, they are in the class of difference stationary process. On the other hand, if they are detrended, they are trend stationary. In short, prior to conducting regression among variables concerned, the time series or stochastic characteristics of the data should be examined. This involves Unit root test or exploring the time series property of the variables using the standard Dicky-Fuller (1981). The two tests to be performed are in the following form:

$$Y_t = \beta Y_{t-1} + \mu_t \text{ ---------- (3)}$$

Where, μ_t is error term. Equation (3) indicates the first order regression in Y at time t regret in its value at time $(t-1)$. If the coefficient of Y_{t-1} is in fact equal to one or $(\beta = 1)$, we face what is known as the unit root problem, i.e. a non-stationary situation. In other word, it is a pure random walk model. Thus, this involves testing whether the finite sample data used for each variable exhibits stationary or non-stationary trend along a constant mean and/or trend first by including a constant only and then by including both a constant and a time trend using Augmented Dicky-Fuller (ADF) test. Unlike DF, the ADF test is based on the regressions run in the following forms. Inconsistency

$$\Delta Y_t = \alpha_1 + \beta Y_{t-1} + \mu_t \text{ ---------- (4)}$$

$$\Delta Y_t = \alpha_1 + \alpha_{2t} + \beta Y_{t-1} + \mu_t \text{ ---------- (5)}$$

Where, t is the time or trend variable and Δ denotes change. Equation (4) adds a drift, and equation (5) introduces both a drift and a time trend. In each case the null hypothesis is that $\alpha = 0$, that is, there is a unit root. The null hypothesis (H_0) is thus a series contains a unit-root (non-stationary) against the alternative hypothesis (H_1) a series is stationary (deterministic trend).

After checking the order of integration of variables in the model we proceed to the estimation of our model. First, the long run parameters is estimated using dynamic modeling by imposing one lag length to all the variables in the model. Next, the Vector Error Correction Model (VECM) is estimated by saving the residuals of the long-run equation using the Hendry general-to-specific reduction method of the insignificant variables to obtain parsimonious short run parameters. Diagnosis tests on the estimation technique are also performed at each stage of reduction to check parameter consistency as suggested by Harris (1995).

3.4. Results and Analysis

3.4.1. Time series characteristics of the Data

The unit root test is conducted for seven variables on their level and first difference. The only variable stationary at its level is the growth rate of real GDP. However, Haris, (1995) noted that if some variables are stationary at their level they will also be stationary in their first difference. The DF statistics result in Table 3.1 shows that the null hypothesis of a unit root is rejected for all variables with a drift term (constant). However, when a trend is included the

null cannot be rejected for lag one of log of real effective exchange rate (REER) at 5 percent significance level. This indicates that including the trend does not improve the stochastic nature of the data. Therefore, we conclude that the variables are integrated of order one or I(1).

Table 3.1 Unit root tests for order of integration, at Levels and First Difference

Variables	**At Level**		**Differenced**		
	Constant only	**Constant & Trend**	**With Constant**	**Constant & Trend**	
CAD/GNDI	-1.056	-2.887	-7.540**	-7.414**	
RGDPg	-6.324**	-6.138**	-9.567**	-9.477**	
GNS/GNDI	-2.344	-2.499	-4.306**	-4.478**	
BD/GNDI	-2.459	-2.180	-5.359**	-5.548**	
EXP/GNDI	-2.103	-2.219	-4.246**	-4.155*	
Log (REER)	-0.4067	-2.212	-3.553*	-3.541	
Log(1+BMP)	-1.330	-3.310	-6.066**	-6.029**	
TIME SPAN	**1975/76 - 2008/09**		**1976/77 – 2008/09**		

*Where ** and * are critical values at 1% and 5% level significance.*

3.4.2. The Long Run Current Account Deficit Equation

The long-run regression was conducted using model (2). The summary of results for long run regression is presented in Table 3.2 below. The coefficient of the lagged current account deficit as a ratio of GNDI is positive (0.58) and statistically significant when estimated at 1 percent level significance. The finding is consistent with the Calderon *et al.* (2000) suggesting that moderate persistent of current account deficit will worsen the current account deficit in the long run in any country.

Real domestic output (GDP) growth has the effect of enlarging the current account deficit due to increase in imports. Nevertheless, the coefficient is neither robust nor significant. That is a 1-percentage point rise in GDP leads to an increase of about 0.1 percentage point in the current account deficit. This is consistent with the argument that larger current account deficit brings about poorer growth performance in the long run than in the short run.

Table 3.2 Long run estimation results of Current account deficit

Dependent variable: Current account deficit (CAD as a percentage of GNDI)

Observation: Time series data for the period 1973/74/1973/74-2008/09

Estimation technique: OLS

Variable	Coefficient	Std, error	T- Value	t- probability
Constant	8.52930	4.18970	2.036	0.0517
Lagged CAD/GNDI	0.57649	0.15403	3.743	0.0009
RGDPg	0.10196	0.06892	1.479	0.1506
GNS/GNDI	-0.28948	0.12044	-2.404	0.0234
BD/GNDI	0.15163	0.18921	0.801	0.4299
EXP/GNDI	-0.31156	0.25404	-1.226	0.2306
Log (REER)	0.81940	0.32008	2.560	0.0164
Log (1+BMP)	-0.7200	0.48616	-1.481	0.1503

R^2 = 0.758577 F(7,27) = 12.12 [0.0000] \sigma = 1.96647 DW = 2.24

RSS = 104.4093653 for 8 variables and 35 observations

Diagnosis test:

AR 1- 3 F(3, 24) = 1.5274 [0.2329]

ARCH 3 F(3, 21) = 0.085351 [0.9673]

Normality Chi^2(2)= 4.4453 [0.1083]

Xi^2 F(14, 12) = 0.37538 [0.9582]

RESET F(1, 26) = 2.641 [0.1162]

Note: Since CAD has a negative connotation the signs of coefficients are discussed relative to this notion.

The impact of a rise in gross national saving to GNDI is robustly negative and statistically significant at 5 percent significance level in Ethiopia, implying it contributes to a decline in the current account deficit. According to the estimated coefficient reported in Table 3.2, the effect of an increase in gross national saving by 1 percentage point leads to a fall in current account deficit by about 0.29 percentage points.

Budget deficit is having the expected positive sign implying there is simultaneous fiscal and current account deficit (or twine deficit) in the long run. Though insignificant, a 1 percent increase in fiscal deficit will lead to the increase in the current account deficit by 0.15 percent in Ethiopia.

The finding of our long run estimation also reveals that the impact of exports as a ratio of GNDI on current account deficit is negative but statistically insignificant. An increase in the ratio of exports to GNDI ratio of 1 percentage point leads to the decline in the current account

deficit by 0.31 percentage point. The economic implication is that since Ethiopia being one of the poorest nations in the planet which depends heavily on the export of very few agricultural products with low price and income elasticity does not contribute much to the decline in the current account deficit of the country from time to time. This is also the outcome of poor structural transformation for diversification of exports in Ethiopia to improve its external imbalance.

We found a significant relationship between real effective exchange rate and current account deficit that is consistent with the prediction of the Marshal-Lerner condition and Mundel-Fleming model. A depreciation of the domestic currency (that is, a fall in the real effective exchange rate) has the result of reducing the current account deficit. According to the long run model estimator, a 1% depreciation of the real exchange rate leads to a current account deficit reduction of 0.82 percentage points in the long run by deteriorating the term of trade and hence Ethiopia's competitiveness in international trade.

Controls on the exchange rate manifested through the size of the black market premium have no significant effect on the current account deficit. Though insignificant, the effect is economically great. That is a 1% increase in the size of black market premium has the effect of increasing current account deficit by 0.72 percentage point.

The results the coefficient of determination (R^2), indicate that 76 percent of the growth in per capita income is explained by the variables included in the regression. The overall significance (F-test) also established all variables are jointly significantly different from zero at 1 percent significance level.

3.4.3 The Short Run or Error Correction Model (ECM)

The results reveals that all macroeconomic variables included in the dynamic short run model all except national savings and exports of goods and services are insignificant in affecting the current account deficit of Ethiopia.

The persistent of current account deficit is much higher in the short run (0.94) than in the long run (0.58). However, the size of lagged real domestic output growth seems to be smaller and statistically insignificant when accounted for difference in the short run (0.02 versus only 0.1 in the long run). Furthermore, the larger the coefficient of real GDP in the short run implies that if the increase in growth were solely of a temporary productivity surge then it

would export more and hence more improvement in the current account position (Glick and Rogoff, 1995).

The impact of lagged gross national saving to GNDI ratio on current account deficit in the short run is also negative 0.28 (slightly lower than the long run coefficient of 0.29) and statistically significant. The practical implication of the result is that when a short-run movement in the current account deficit is needed public saving is effective policy option from the Ethiopian context for public saving is much higher than private saving.

In the short run, both the level and lagged exports to GNDI ratio have significant impact in improving the current account deficit. That is a 1 percentage increase in exports of goods and services to GNDI ratio reduces the current account deficit by 0.72 an 0.82 percent respectively. This implies that a temporary increase in export relative to GNDI has the effect of lowering current account deficit most likely through its effect on the trade balance as in Caldron *et al.* (2000) argument. Moreover, it also implies that as an agrarian economy an increase in export of agricultural products due to good weather in the previous year or transitory increase in the demand for Ethiopia's export by developed world will have strong effect in reducing current account deficit.

However, budget deficit has a relatively larger positive impact in the short run than in the long run (0.21 versus 0.15). Although the effect is economically small a 10 percent depreciation of real effective exchange rate leads to a reduction in current account deficit only by 0.2 percentage point in the short run. The short run impact of real effective exchange rate provides evidence in support of J-curve effect. Nevertheless, a 1% temporary restriction of foreign exchange decreases current account deficit in Ethiopia by 0.13 percentage point.

The saved residual from the long run estimation (error correction term) has the correct negative sign in the short run. In other words, the speed of adjustment has also a negative sign and its magnitude is not greater than unity. It implies that 76 percent of the disturbance in the short run will be corrected each year. The coefficient of determination (R^2), indicate that about 82 percent of the current account deficit is explained by the variables included in the regression. The overall significance, F-test, also established all variables are jointly significantly different from zero at 1 percent significance level.

Table 3.3: Short run estimation results

Dependent variable: Current account deficit as a percentage of GNDI (CAD)

Observation: Time series data for the period 1973/74 -2008/09

Estimation technique: OLS

Variable	Coefficient	Std, error	T- Value	t- probability
Constant	0.62343	0.65711	0.949	0.3522
ΔCAD/GDNI_1	0.94414	0.10846	8.705	0.0000
ΔRGDg_1	0.023495	0.044966	0.522	0.6061
ΔGNS/GNDI_1	-0.27579	0.12683	-2.174	0.0398
ΔBD/GNDI	0.21473	0.16242	1.322	0.1986
ΔEXP/GNDI	-0.71531	0.26582	-2.691	0.0128
ΔEXP/GNDI_1	-0.81836	0.28483	-2.873	0.0084
ΔLog (REER)	0.01660	0.01508	1.101	0.2819
ΔLog(1+BMP)_1	-0.12540	0.07540	-1.663	0.1094
ECT_1	-0.76445	0.23476	-3.256	0.0034

R^2 = 0.817428 F(9,24) = 11.939 [0.0000] \sigma = 1.78918 DW = 1.79

RSS = 76.82787177 for 10 variables and 34 observations

Diagnosis test:

AR 1- 3 F(3,21) = 0.52046 [0.6728]

ARCH 3 F(3,18) = 0.44207 [0.7258]

Normality Chi^2(2) = 0.37969 [0.8271]

Xi^2 F(18, 5) = 0.31358 [0.9690]

RESET F(1, 23) = 0.49561 [0.4885]

Besides, the multivariate system diagnostic test of the residuals (shown in the lower block of Table 3.2 and Table 3.3) also indicates that both the long run and short run models have the desirable property of OLS estimation. For instance, the LM test for serial autocorrelation does not provide any indication of the presence of serial correlation in the residual of real per capita income function. The result of hetroscedasticity test of the residuals also does not show evidence for autoregressive conditional hetroscedastic errors. This indeed is not surprising, since hetroscedasticity is not much problem in time series (Green, 1997).The Jarqu-Bera tests of skewness and kurtosis of the residuals revealed normality implying the absence of outliers

in the data. The REST test provides no indication that the functional form of the long run and the ECM are inappropriate.

4. Conclusions

Current account deficit has reminded sever in Ethiopia both on pre and post reform period of 1992. This study attempts to examine the empirical relationship between the current account deficit (as a ratio of GNDI) and the main economic variables proposed by theoretical and empirical literature in Ethiopia, which is a credit constraint country like any other developing countries. To this end we adopted a multivariate dynamic model. Our sample consists of annual time series macroeconomic data for the period over 1973/74-2008/09. The findings are generally in conformity with both theory and empirical results for other developing countries. Our main findings are:

- The persistence of current account deficit has significant positive effect only in the long run.
- The domestic real output growth does not have significant effect on the current account of Ethiopia both in the long and short run.
- Change in national saving rate contributes to a significant moderate decrease in current account deficit both in the long run and short run. This is consistent with the notion that for heavily-indebted countries that have larger saving rates exhibits lower current account deficits.
- Both the long run and short run results reveal that the past three and half decades have witnessed the current account deficit and budget deficit were moving in the same directions. That is a strong surge in the Ethiopian fiscal deficit together with a continuous deterioration (increase) in the current account deficits indicates "Twin Deficits" in Ethiopia.
- An increase in exports of Ethiopia lowers the current account deficit (likely through its direct impact on trade balance) significantly only in the short ran. This signals that larger exports of agricultural commodities whose price and income elasticities fluctuate substantially do not guaranty loss of competitiveness in the international trade in the long run.
- Depreciation of real effective exchange rate generates a strong statistically significant reduction in current account deficit in the long run. Nevertheless, its impact is economically small and statistically insignificant in the short run. The short run

impact of real effective exchange rate provides evidence in support of J-curve effect

- Both permanent and temporary restrictions on foreign exchange or controls to international capital flows have no effect on the current account deficit. In other words, foreign currency restrictions do not limit the expansion of the current-account deficit in the short or long runs.

Many open questions remain. We believe that the fact that we do not detect any robust link between budget deficits and current account deficit developments, but find a seminal role for national savings and real effective exchange rate, is an important result that puts into perspective the current experience of Ethiopia economy with Twin Deficits. Our results imply that either there is no causal relationship through which budget deficits are an important driving force behind current account deficit developments, or alternatively, at least that this relationship is not sufficiently stable over time. Understanding better the precise nature of this relationship, and possibly its variability over time, is an issue we leave for future research. In particular, a natural extension of the model is to better distinguish between adjustments in the budget deficit that come from a change in government spending or in taxes using quarterly data after liberalization. Moreover, the relevance of foreign exchange control in reducing post liberalization external imbalance needs further investigation.

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Some of the Participants of the Parallel Session organized by College of Business and Economics

Determinants of Foreign Direct Investment in Ethiopia

By

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Abstract

This study entitled "determinants of foreign direct investment in Ethiopia" found on the key factors that determines the inflows of foreign direct investment in a country during the period of 1992-2010. This study was developed with the objective of investigating the major determinants of foreign direct investment in Ethiopia for the period of 1992-2010. To achieve the aim of the study, seven explanatory variables: market size and growth, openness, macroeconomic stability infrastructure, human capital, growth of domestic investment and lagged FDI was regressed against the flow of foreign direct investment. In this study both primary and secondary data collection methods were used. The secondary sources of data for the study were collected from the Ethiopian Investment agency, World Bank, IMF, and NBE. Moreover, in order to support the secondary data, additional information was obtained by primary data gathering tool through conducting unstructured interview with macroeconomic experts. Finally, the gathered information was analyzed by descriptive, correlation and ordinary least squared analysis methods. The major findings of the study indicated that market size, openness, government expenditure, employment level, foreign debt, human capital, telephone line, gross fixed capital formation, growth of domestic investment and lagged FDI were major significant determinants of FDI inflows in to Ethiopia. From these variables market size, government expenditure, employment level, human capital, overall infrastructure development, and growth of domestic investment were motivating factors while openness, foreign debt and telephone line were constraints for the inflows of FDI. However, market growth and inflation found to be insignificant determinant for the inflows of FDI in to Ethiopia. The study also recommended that the country is supposed to formulate appropriate policies that can exploit emergent and undiscovered market of the country, develop job training programs, formulate policies that highly promotes internal source of government revenue and also increasing the capacity of secondary schools and higher institutions enrollments so as to attract more FDI than the past. Finally, this study was limited to time series regression analysis of a country. Thus, further researchers are suggested to investigate on similar topic at country level or major economic sector specifically by considering cross sectional or panel data regression analysis techniques.

The Causal Relationship between Bank Credit and Economic Growth in Ethiopia Timeseries Analysis

By

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Abstract

This study empirically examines the causal relationship between bank credit and economic growth in Ethiopia. It can be one of the country specific (time series) evidence concerning the relationship between bank credit and economic growth. The study covers quarterly data from the period 1998 to 2010 which are about 52 observations. In this examination, Granger causality with VECM methodology along with impulse response and variance decomposition analyses are carried out by using selected bank credit and economic growth indicators. The variables are the natural logarithm of real gross domestic product (LRGDP), the natural logarithm of domestic credit (LDC), the natural logarithm of private sector credit (LPRC) and the natural logarithm of public sector credit (LPUC). Stationary tests, selection of optimal lag length and Cointegration tests are also undertaken before the estimation of the models.

The results of the analysis reveal that the model formed with the natural logarithm of domestic credit (LDC) and the natural logarithm of real GDP (LRGDP) does not have a significant causal relationship in the short run but causality directed from economic growth to bank credit in the long-run. Model formed with the natural logarithm of private sector credit (LPRC) and natural logarithm of real GDP (LRGDP) reveals a bi-directional causality between bank credit and economic growth in both the short-run and long-run. Finally, the model formed with the natural logarithm of public sector credit (LPUC) and the natural logarithm of real GDP (LRGDP) does not have a significant relationship in the short run but has a causal relationship directed from economic growth to bank credit in the long run.

Practicability of Public Procurement Principles: Evidenced from Public Universities of Ethiopia

By

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Abstract

Reforms in public procurement directives of the country aimed at bringing in justification for expenditure of taxpayers' money in public service giving bodies through principles enhancing integrity in procurement system. However, the extent of attention given by public bodies for each principles and their respective implementation rarely assure attainment of value for money collected from taxpayers. Closely linked to this view, this study was conducted with the main objective to examine "practicability of public procurement principles in public universities of Ethiopia. Specifically, it has an objective to show the relationship among public procurement principles including professionalism, transparency, accountability, and integrity that expected to enhance value for money in terms of their significance level.

To comply with the objective, the study was conducted using quantitative research type. The appropriate data were collected from procurement officials of the selected public universities. Primary data were collected through self administrated questionnaire and unstructured interview. In order to know the international practice of the targeted procurement principles, different public procurement literatures were reviewed. To come up with the result, correlation and regression analysis method was employed.

The study found that the right practicability of the procurement principles has a positive relationship among each other (independent variables) and with integrity (dependent variable) that supposed to enhance value for money with considerable significance variations. Developing procurement professionalism through development of human capital and informational capital, and development and application of procurement ethical standard is most significantly considered to assure integrity in public procurement. That should followed by making the workforce accountable for their assignment, which is supported by appropriate control need to be improved.

Key words: public procurement, professionalism, accountability, transparency, Integrity, and value for money

Determinants of Capital Structure: A study of Selected firms in Ethiopia

By

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Abstract.

The paper investigates the determinants of capital structure in a setting where firms have thin market to raise long term finance. The evidence from Ethiopian firms suggests that the determinants of capital structure identified in the western context are able to explain much of the variation in financial leverage. The result also shows that the Pecking Order Theory (POT) better explains the financing behavior of Ethiopian firms.

Financial Leverage: A study of Selected Ethiopian Companies

By

J. Ravi, Samuel Kifle and D. Prabhakara Rao

Abstract

Studying seventy eight large tax payer organizations over three years (2005 to 2007) it is found that firms which operate in an economy where there is no organized stock market, Financial Leverage is negatively correlated to performance of firms measured by book value ratios of Return on Asset, Operating Margin and Profit Margin. Furthermore, the evidence shows that a firm's Leverage is positively correlated to Sales turnover and sales growth though the relationship is weak.

Role of HR Managers and HR Specialists in Ethiopian Organizations

By

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Abstract

The shifting role of the HR department towards a more strategic function is of major importance in the ever-changing business today. The HR role has expanded and the strategic nature of HR management has changed significantly in recent years. This study examines the role of HR managers and specialists in Ethiopian organizations based on Ulrich's HRM Four-Role Model. The various roles examined are strategic partner, administrative expert, employee champion and change agent. The study employed a cross-sectional survey in which self-administered questionnaires were designed and distributed to 385 sampled respondents in different organizations. From manufacturing and service sectors in the country 385 respondents were selected by using the formula ($n = \frac{Z^2 p(1-p)}{e^2}$) in case of unlimited population. The tools utilized to analyze the collected data are quantitative in nature including Pearson correlation, independent sample test, multiple regression and repeated measure ANOVA to test the variables.

The result showed that from the role played by Ethiopian HR managers and specialists' administrative expert role obtained highest mean score and stood first followed by employee champion role and the change agent role and the strategic role ranks third and forth respectively.

The results of the study also confirmed that HR demographic factors (level of education and benefits) significantly correlated to strategic partner role of HR managers but work experience and field of study are not. Although only strategic partner and change agent are significantly related to firm performance, administrative expert obtained highest mean score followed by employee champion. Other findings of this research show that HR managers are lack of knowledge and competency to play an important role as a strategic partner and agent for change.

Key words: HR managers & specialists, organization performance, strategic partner, administrative expert, employee champion, change agent.

Parallel Session 3: Organized by College of Natural Sciences, Jimma University

The Bio-Physco-Chemical Study of the Dede Stream Drinking Water of Jimma Town

By

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Abstract

This study mainly focuses on the investigation of Bio-physco-chemical nature of drinking water of Jimma town supplied from the Dede stream found in kebele 05. The study also focuses on the related cross-section study of the stream. The entire part of the stream was divided into 3 parts and sample water was taken 2 times at different time intervals, specifically 3AM and 12pm. From the results of the study the water sample taken from site 1 was colorless and odorless, the dissolved oxygen of the water was high, the Biological Oxygen Demand (BOD) was low, and the number of fecal coliform and entrobacteraceae was low relative to site 2 and 3. On the other hand the water sample taken from site 2 and 3 had bad odor, gray color and highest number of fecal coliform and entrobacteriaceae, but the number of fecal coliform and entrobacteriaceae vary with respect to different time intervals. The pH of the waters of all sample sites was found in the range between 6.5 and 8.00. In the cross-section study 130 family heads of kebele 05 participated to answer the questionnaire and the head of each cafeteria of Jimma University were interviewed and the result showed that lack of attention from concerned government bodies, inappropriate waste discharge of Jimma University and lack of awareness of the community are the major reasons for the pollution of the water and as a result the local communities are affected by schitosomiasis, skin disease and related water born diseases.

Keywords: Dede stream, BOD, Drinking water pollution, and water born diseases.

Wetlands of Ethiopia: A Review Article [a]

By

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([a] This paper was presented on the Second Annual Research Conference of Jimma University, February 17-18, 2011, Jimma University)

Abstract

Ethiopia possesses a great diversity of wetlands, which are widely distributed in all climatic regions of the country. Wetlands of Ethiopia are grouped into 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 the absence of any concerted conservation efforts, wetlands of Ethiopia have been depleted at alarming rate throughout the country. Intensive irrigation, expansion of human settlement, over-utilization, and 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.

Introduction

Ethiopia possesses a great diversity of wetland ecosystems as a result of formation of diverse landscapes subjected to various tectonic movements, a continuous process of erosion, and human activities. The different geological formation and climatic conditions have endowed Ethiopia with vast aquatic resources such as wetland ecosystems of 12 river basins, 8 major lakes and many swamps, flood plains, and man made reservoirs with a total annual surface runoff >110 billion cubic meters (EFAP, 1989). With the exception of costal and marine-

related wetlands, all forms of wetlands such as alpine formation, riverine, Lacustrine, Palustrine and Flood plains are represented in Ethiopia (Yilma Delelegn and Geheb, 2003).

The Ramsar Convention (Article 1.1) defined wetlands as: "areas of marsh, fen, peat land, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide doesn't exceed six meters" (http://www.ibc-et.org). In addition, the convention (Article 2.1) provides that wetlands: "may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six meters at low tide lying within the wetlands." In the Ethiopian context marshy areas, swamp lands, flood plains, natural and artificial ponds, volcanic crater lakes, high mountain lakes, upland bogs, rivers, aquifers and dams are treated collectively as wetland ecosystems.

Different estimates have been given regarding the total area of wetlands of the country. According to some individuals, the total area of wetlands may be greater than 2% (22,500 km^2) (Seyoum Mengistou, 2006). However, Hillman (1993) estimated that Ethiopian wetlands cover a total area of 13,699 km^2 (1.4%) of the country's land surface. The distribution of wetlands is uneven, with the south western and western parts such as Illubabor and Gambella taking the major share, and isolated pockets of marshes and swamps dispersed in the north and central parts of Ethiopia.

Wetlands are very important aspect of the environmental resource base of Ethiopia (Mengistu Wendafrash, 2003). They produce a range of ecological and socio-economic benefits in their natural state, which contribute to the well being of rural communities and the environmental security. However, wetlands are often seen as "waste lands" that have no value and are converted by drainage to allow agriculture or grazing, in most of the developing part of the world.

Major river and lakes systems together with the associated wetlands are fundamental parts of life interwoven into structure and welfare of natural ecosystems (Smith, 1995). Wetlands are productive ecosystems that can play an important role in the socio-economic developments of human societies if effectively utilized on a sustainable basis (Wood, 1999).

This paper attempts to address classification, ecological and socio-economic importance, biodiversity, conservation status and threats of wetlands in Ethiopia as well as to recommend possible solutions for wetland conservation.

2. The Classification of Wetlands of Ethiopia

2.1 Classification based on location of the associated water systems

According to Yilma Delelegn and Geheb (2003), wetlands in Ethiopia can be classified based on the location of associated water systems into the following categories:-

1. **Lacustrine** (lakes and associated wetlands) -wetlands are situated in topographic depressions or many in dammed river channels (Mitsch and Gosselink, 2000).
2. **Palustrine** (marshes, swamps and bogs) - are non-tidal wetlands usually dominated with trees and shrubs, emergent mosses or lichen (Mitsch and Gosselink, 2000).
3. **Riverine** (rivers, streams and associated wetlands) – riparian wetlands along rivers, streams (Mitsch and Gosselink, 2000).
4. **Alpine formation** (Lake at top of high mountain) - wetlands that influenced by glacial characteristics.
5. **Floodplains (**alluvial plains, rice fields and the like) - arise as a result of seasonal submergence by spill over from rivers, lakes and other water bodies, and remain dry for varying portion of growing season (Mitsch and Gosselink, 1993).

2.2 Classification depend on drainage systems of lakes& rivers (local level)

Wetlands of Ethiopia are classified at the local and more specific level in to ten groups (Hughes and Hughes, 1992; Leykun Abunie, 2003). However, this classification method mainly depends on rivers and lakes drainage systems. This classification is not complete, because it doesn't contains list of all wetlands of Ethiopia. In addition, it doesn't copy with many different forms of wetlands such as alikaline and fresh or seasonal. At local level wetlands of Ethiopia classified as follow:-

1. Lakes and the associated Wetlands of the SW Rift valley

- Lake Ziway, Langano, Abijata and Shalla, Lake Awassa and Chelekleka, Lake Abbayya, Chamo and Chew Bahir, and Lake Turkana

2. The Lake Tana and associated Wetlands

- Lake Tana, Fogera flood plains and Dembia flood plains

3. The Ashenge and Hayk lakes

4. Wetlands of the Bale Mountains

- Numerous alpine lakes including Garba Guracha and Swamps and flood plains

5. Wetlands of the western highlands

- Keffa Zone-Ghibe and Gojjeb and Illubabor Zone swamps

6. ***Lakes and Swamps of the Awash River System***

- The upper Awash Valley- Dillu Meda and Aba Samuel, The Lake Beda Sector, The Gewane lakes/ swamp complex, The Dubti, Afambo and Gemari lakes/ swamp complex, and Lake Abe and Delta.

7. Lakes of the Afar Depression

- Lake Afrera, Lake Asale and Dallol Depression.

8. Western River Flood plains

- Alwero, Baro, Akobo and Gilo, Chomen and Fincha swamps, Dabus swamp and Beles flood plain.

9. Lakes of bishoftu

- Hora, Babogaya, Zukala, Green, Bishoftu, Horak kilole, Chitu

10. Artificial Impoundments and Micro Dams

- Koka, Fincha, Melka-Wakena and other hydropower dams, Municipal and other reservoirs like dams, aquifers and wells.

3. The Importance of Wetlands

According to Dixon (1999), wetland values are best understood in terms of their intrinsic condition (biological, chemical and physical), which allow them to carry out their distinctive functions and generate products. The functions comprise those natural processes that sustain economic activities and fortify ecological integrity which include ground water discharge and recharge, flood control, water purification, sediment trap and nutrient retention, habitat for migratory bird and other wildlife. Socio-economic importance of wetlands include recreation, cultural values, water supply for domestic and livestock, provision of reed for floor covering and thatching materials, and medicinal plants. Besides this, wetlands can provide food, fuel wood, wildlife, fisheries, hydroelectric power supplies, forage and agricultural resources as additional products. Wetland attributes are closely intermeshed with the ethical and aesthetic values that human beings attach to them (Roggeri, 1995).

During famine and food insecurity periods people rely heavily on wild plants from wetlands and the associated areas (Wood, 1999). Among others, non-cultivated plants such as species of *Discorea* sp. *Eerythocarpus* sp., *celtistek* sp., *Tamarindus indica, Echinochloa* sp., *Ficuss sur, Carrisa edulis, Cordial africana, Gardenia ternifolia, Citrus auriantifolia* and *Ipomea aquaficai* are used for human food in Baro-Akubo, Omo and Awash Valley (Zemede Asfaw, 1975 as cited in Wood, 1999; Yilma Delelegn and Gheb, 2003). Species of plants used for human medicine include *Achyranthus aspera, Asporagus africanus, Acokanthera schimperi* and *Celasia trigyna*. Of the 208 plant species recorded from Cheffa swamp 54 are identified

to be for used food by humans, 79 as medicine and 31 as veterinary medicine (Yilima Delelegn and Geheb, 2003).

Wetlands play critical role in regulating the movement of water within water sheds as well as in global water cycle (Mitsch and Gosselink, 1993). Wetlands store precipitation and surface water and then slowly release the water into associated surface water resources, ground water, and the atmosphere. Wetland types differ in this capacity based on a number of physical and biological characteristics, including landscape position, soil saturation, and the fiber content/degree of decomposition of the organic soil, vegetation density and type of vegetation.

Wetlands play biological cycling and storage by sinking or transforming, organic compounds nutrients and metals. Wetlands may also act as filter of sediments and organic matter. The values of wetland functions related to biological cycling and storage include water quality and erosion control.

Wetlands are among the most productive ecosystem in world (Mitsch and Gosselink, 1993; UNEP, 2000). Immense varieties of species of microbes, plants, insects, amphibians, reptiles, birds, fishes, and other wildlife depend in some way on wetlands.

Wetland plants play an integral role in the ecology of the watershed. Wetland plants provide breeding and nursery sites, resting areas for migratory species, and refuge from predators (Mitsch and Gosselink, 2000). Decomposed plant matter (detritus) released into the water is important food for many invertebrates and fish both in the wetland and in associated aquatic systems.

4. Biodiversity of wetlands in Ethiopia

The wetlands of Ethiopia are formed from fresh, alkaline, small and large, permanent and seasonal water systems that provide different ecological niche to various species of both plant and animals. Diversity of aquatic invertebrates is high in wetland of Ethiopia. Some of the diversities from wetlands include the following groups:-.

4.1 Phytoplankton

According to EWNHS (1996), Bishoftu crater lakes dominated with *Microcystis- aerginosa* and *Spirulina platensi* (Green Lake). In lake Hayk, a number of species are listed and some of them are *Microcystis* spp., *Phormidium* spp., *Sutirella* spp., *padiastrum* spp., *Amphora* spp.,

synedra sp., *Nitzchia* spp. and *Gyrosigma* sp. (http://www.ibc-et.org). Intensive studies done on Rift Valley lakes reported 206 phytoplankton species. Among these about ten species are new to science (Elizabeth Kebede and Humber, 1989).

4.2 Invertebrates

Copepodan

120 copepod species have been described from Africa. Among these about 73 species have been documented from Ethiopian water bodies (Seyoum Mengistou, 2006). Ecological and taxonomic studies on copepods have been carried out since the 1980's and are quite widespread (Kassahun Wodajo and Amha Belay, 1984; Fernando *et al*., 1990). The most common calanoids are *Paradiaptomus africana* in the rift valley and crate lakes and *Thermodiaptomus galebi* (Seyoum Mengistou, 2006). Cyclopoids are the diversified copepods with over 50 described species and four endemic, including *Afrocyclops sparus*, *Ectocyclops mixtus*, *Neocyccyclops affinics* and *Thermocyclops ethiopiensis* (Seyoum Mengisstou, 2006).

Cladocera

Are cosmopolitan small crustaceans that are important food for many aquatic consumers. The genus *Daphnia* is one of the best-studied animals in the temperate countries (Seyoum Mengistou, 2006). 60 Cladocerans species are reported in tropics (Fernando, 1980). According to Seyoum Mengistou (2006), a total of 22 Cladoceran species have been recorded from Ethiopia, the most common genera are *Alona*, *Bosmina*, *Ceriodaphnia*, *Diaphanosoma*, *Moina*, *Macrothrix*, *Simocephalus*, *Pleuroxus* and *Daphnia*.

Rotifera

Despite of their small size, Rotifers have been studied in Ethiopia seventy years ago. About 76 species of rotifers have been documented from Ethiopia (De Ridder, 1987).

Green and Seyoum Mengistou (1991), done the most comprehensive study on Ethiopian Rotifera from various water bodies sample. A total of 100 species of Rotifers were recorded, with two endemic (*Brachionus dimidiatus* and *Lecane Zwaiensis*). According to Seyoum Mengistou (2006), generally Rotifer community in Ethiopia is dominated by four genera: *Brachionus* (17 species), *Keratella* (5 species), *Lecane* (13 species) and *Monostyla* (10 species).

Ostracoda

Ostracods are small meroplanktonic crustaceans that resemble bivalve clams. A total of 23 species have been screened in Ethiopia from the Literature (Seyoum Mengistou, 2006).

Martens (2002) reported the Ostracods in the Zwai-Shala-Awassa basins and described 15 sub (species) in 10 genera. Earlier, Martens (1990) had reported moderate levels of endemicity in genus *Lymnoythere* (5 endemic sub species), with each lake having its own endemic sub species- *L. thomasi thomasi*, in lake Zwai, *L.t. Langanoensis* in Langano, *L. barosi barosi* in Abijiata, *L.b. shalaensis* in lake Shala and *L.b. awassaensis* in Lake Awassa.

9 genera and 13 species of Ostracoda reported from Ethiopian Lakes (Lowndes, 1932). Nine new species were recoreded in six genera including *Stenocypris* (4), *Comphocythere* (2), *Oncocypris* (1), *Stenocypris* (1), *Cypronotus* (1) and *Cypretta* (1).

***Ephemeroptera (mayflies*)**

Of the 19 families of Ephemeroptera known world wide, about 10 families have been recorded from Ethiopia (Seyoum Mengistou, 2006). According to (Harrison and Hynes, 1988) Baetidae are diverse group with over 10 described species, with about half being new to science.

Lubini (1998) as cited in Seyoum Mengistou(2006), identified 12 species of Ephemeroptera from the Semien mountain streams, 5 of which were from Baetidae and 2 were new species. The most common genera encountered are *Baetis, Atropltilium, Afrocaenis, Caenis* and *Chlorotherpes* sp. (Seyoum Mengistou, 2006).

Odonata (dragon flies and damsel flies)

The adult of dragon flies (suborder Anisoptera) and damsel flies (sub order Zygoptera) are common around rivers and lake shores. Of the 8 families in Anisoptera world-wide, 3 families have been recorded in Ethiopia-Aeshnidae with 3 species (*Aeshna, Anax* and *Cynacantha*).

Libellulidae with 7 species (*Mesociothemis, Ortheretum, Brachythemis, Acisoma, Trithemis, Palpopleura* and *Zygonyx*) and one *Gomphidae* (Seyoum Mengistou, 2006).

Among diverse world-wide 17 families of Zygoptera, 4 families have been reported from Ethiopia (Seyoum Mengistou, 2006).

***Chironomidae (*Midges/lake flies)**

Chironomids cosmopolitan mosquito-like flies which are quite common around lake shores. Four subfamilies are the most common in Ethiopia, such including-Chironominae, Diamesinae, Orthocladinae and Tanypodinae. According to (Seyoum Mengistou, 2006), Orthocladinae are the most diverse with 9 species-*Cricotopus*, *Cornoneura*, *Nanocladius*, *Cordiocladius*, *Paratrichocladius*, *Pheocricotopus*, *Tretenia*, *Parametrocnemus*, and *Thienemanniella*, followed by Chironominae with 7 species-*Dictrotendipes*, *Nilodrum*, *Parachironomus*, *Polypedilum*, *Einteldia*, *Tanytarsus* and *Rheotanytarsus* and the Tanypodinae with 6 species-*Ablabesmyia*, *Procladius*, *Larsia*, *Conchopelopia*, *Nilotanypus* and *Parameriana*. Diamesinae may have disappeared several years ago with the Ethiopian glaciers (Harrison and Hynes, 1988).

4.3 Plants

The wetland flora diversity is high in Ethiopia. For example, ninety-fives species of wetland plants were collected from Illubabor swamps (Zerihun Woldu and Kumelachew Yeshitela, 1999). Of these 27 were wetland- dependent, 51 were wetland- associated and 7 were non-wetland species, Two of them are endemic. The most common species inhabiting the Rift valley lakes (Ziway, Abbayya, Chamo and Awassa) are S*cirpu* spp., *Cyperrus* spp., *Typha angustifolia*, *Paspalidium geminatum*, *Potamogeton* spp. and *Nymphaea coerulea*. *Elchornia crassipes* occurs in Koka dam along AwashRiver and in Gambella along Boro and Gilo Rivers. In addition, varieties of riverine vegetation are identified along Awash River (Mitiku Tiksa *et al*., 2003). According to (Bayafers Tamene, 2000 as cited in Yilma Delelegn and Geheb, 2003), 208 plant species are recorded from cheffa wetland.

4.4 Fish Fauna

There are about 145 species of fish in Ethiopia. Of these, at least 39 are endemic. Fish resources of the country are currently utilized mainly for food. Sport fishing is also practical. The fish fauna of Ethiopia is a mixture of Nilo-Sudanic, East African, and Endemics (Roberts, 1975; Stiassny and Abebe Getahun, 2007). The Nilo-Sudanic forms are represented by a large number of species found in the Baro-Akobo, Omo-Gibe, and Abay drainage basins. The southern Rift valley (Lake Abbayya and Chamo), and the shebele-Genale basins also have elements of these forms (Roberts, 1975). The Nilo-Sudanic forms are related to West African (Nichols and Griscom, 1917; Nichols, 1918; Boulenger, 1975).

East African forms are found in the northern Rift Valley lakes (Lake Awassa, Ziway, Langano), the highland lakes (e.g. Tana and Hayk) and associated river systems, and the

Awash drainage basin. The highest species diversity is record from Baro basin, followed by Abay, Rift Valley lakes, Wabi-Shebelle and Omo-Gibe basins (http://www.ibc-et.org).

4.5 Avifauna

Among the species of wetland fauna, the most widely explored, scientifically studied and appreciated are birds (Carp, 1980). Many wetlands are renowned because of their birdlife. Around 12% of all African bird species are found in and around wetlands (Mafabi, 1995). According to Lemlem Sissay (2003), about 538 bird species are dependent on Rift Valley lakes for different purposes.

There are two categories of water birds: wetland specialists and generalists. Wetland specialists are wholly dependent on wetlands habitats, and can not survive without them (Urban, 1991; Airnature, 1999; Mengistu Wendafrash, 2003). Ducks, gulls, waders and cranes are wetland specialists. Generalists are those birds frequently found in wetlands, but are sometimes seen in other habitats as well, such as ibises, weavers, warblers and plovers. Cranes are generally regarded as terrestrial birds, but breed exclusively in wetlands, especially favoring seasonal grass swamps. If their wetland habitat is lost, cranes will be driven to extinction. For this reason, two out of the six African cranes are now endangered because of threats to their wetland habitats.

According to (EWNHS, 1996), there are 69 IBAs which have importance that include international significance for the conservation of birds at global, regional and sub-regional levels. In addition, these sites are vital tools for the conservation of waterfowl and their habitats. IBAs comprise over 17 wetland ecosystems (Table 2).

These ecosystems provide shelter to five categories of wetland dependent bird species of Ethiopia based on their status as indicated in (Appendix II).

IBAS	Bird Category															Conservation Status			
	Endemic			Globally endangered	Vulnerable		Near-threatened								Data Deficient	Protected	Partially Protected	Unprotected	Proposed for protection
	A	B	C	D	E	F	B	C	G	H	I	J	K	L	M				
Gefersa Reservoir		✓	✓	✓			✓	✓								✓			
Lake Abe Wetland System														✓				✓	
Lower Awash Valley														✓			✓		
Awi Zone		✓					✓											✓	
Lake Tana			✓		✓			✓		✓								✓	
Fogera flood plains					✓					✓								✓	
Baro River															✓			✓	
Abijatta-Shalla					✓									✓	✓				✓
Bishoftu Lake									✓									✓	
Chelekleka Lake and Swamp									✓	✓									
Green Lake									✓	✓								✓	
Dilu Meda					✓													✓	
Fincha & Chomen Swamp			✓		✓													✓	
Genale River										✓								✓	
Sululta Plain			✓	✓		✓		✓				✓						✓	
Lake Turkana & Omodelta													✓					✓	
Guassa (Menz)	✓	✓					✓											✓	

Table 2: IBAS, Bird categories, and Conservation status (the contents of the table are taken from EWNHS, 1996).

Key: Letters A, B, C, D, E, F, G, H, I, J, K, L and M in the above table indicate the bird species which are listed in Appendix II.

4.6 Other wildlife

Ethiopian lakes and rivers host good populations of hippopotamus and crocodile (Hillman, 1993). High Lander hyenas, rabbit, otters, monitor lizards and amphibians are found around Rift Valley Lakes. More over, Diversity of arthropods and reptiles are also prominent in wetlands and associated habitats.

5. Threats of Wetlands in Ethiopia

Wetlands produce an ecological equilibrium in the environment by maintaining the integrity of life support System for sustainable socio-economic development of the nation in general and the people around, in particular. Yet, many wetland ecosystems, particularly flood plains and swamps are regarded as wasteland and continue to be altered at an alarming rate through out Ethiopia (Wood, 1999; Yilma Delelegn and Geheb, 2003). More over, national economic policies that prioritize crop production seriously affects wetlands through extensive land development schemes that have no concern for environmental costs.

The causes of wetland degradation include the conversion of wetlands for intensive rrigation, agriculture, expansion of human settlements, dumping of industrial waste, pollution with pesticides and fertilizers, water diversion for drainage and construction of dams. Wetland conversion often results in water depletion, displacement of populations, the destruction of traditional production systems, habitat degradation, increase of water borne diseases and related adverse ecological impacts (WCED, 1987; Williams, 1990).

According to Elizabeth Kebede and Humber (1989), degradation of the catchment areas of the wetlands is the main problem for wetland conservation. This is more severing in the Rift Valley area. Cultivation, especially of vegetables results in soil disturbance and reduces the ability of wetlands to control erosion (Yilma Delelegn and Geheb, 2003). Over-grazing and trampling enhance soil erosion, resulting in the formation of gullies. According to Ash (1979), disturbances caused by human activities at the edges of wetlands hamper the breeding of wetland dependent bird species. Cutting grass for fodder, thatching and the construction of boats can reach critical levels, if it is not sustainable.

Wetlands are threatened by several development pressures including damming, which destroy habitat of wetland dependent-species. Wetlands are also modified for industrial and mining. For example, the soda ash extraction plant at Lake Abijata has a detrimental effect on the lake levels (Dixon and Wood, 2003).

Pollution of wetlands arises from human-induced activities and natural resources. The use of agricultural inputs such as chemical fertilizers and herbicides, and pesticides (such as DDT) for malaria control can contribute towards the pollution of wetlands.

6. Conservation status

Wetland ecosystems in general, and flood plains and swamp habitats in particular are facing pressures from unregulated access, upstream effects, mismanaged watersheds, variation in water quality and quantity caused by siltation and pollution. Ethiopian wetlands are currently being lost or altered by unregulated over utilization, including water diversification for agricultural intensification, dam construction, pollution and other anthropogenic interventions.

Although the mission and roles of each stakeholder with regard to wetlands of the county is not clearly defined, there are various governmental institutions that are directly or indirectly involved in wetlands-related activities. Such institutions include Ministry of Water Resources (dams, irrigation ,formulate water policy), Ministry of Agriculture (conversion of wetland to farm lands), Environmental Protection Authority(environmental policy issues, environmental impact assessment), Ethiopian Electric Power Corporation(construction of macro-dams for hydroelectric power supplies), Ministry of Industry (establishment of non-environmental friendly industries), Ministry of Health (draining and spraying) and Investor (conversion and pollution). Paradoxically, the roles of many of these institutions conflict and there is inadequate coordination and collaboration among them, and hence efforts for conservation of wetlands resources in the country are with little emphasis (MengistuWendafrash, 2003).

The degradation of biophysical environment of the country enforces the government of Ethiopia to formulate various policies directed at addressing the various aspects of this general problem. The environmental, biodiversity, and water resource policies are the main policies of such kind. According to Mesfin Bayou and Getachew Tesfaye (2003), there is no single policy that specifically dedicated to deal with wetland issues comprehensively. They further indicated that these policies have some general provisions that may applicable to wetlands and some tangential policy statements on wetlands and the aggregate of such policy provisions constitute the wetland policy of the country at present.

However, in few places, where shortage of thatching reeds and other unique products become serious, the community themselves developed regulation to protect swamps for production of

reed and other construction materials rather than allowing open access (Wood,1999; Afework Hailu *et al*., 2000). As the resource bases in wetland ecosystems are not very well documented, their status of conservation is not known and need future investigation. More importantly, there is an urgent need to address the issue of wetland ecosystem conservation with emphasis of their extent, diversity, distribution, and sustainable utilization (Dixon, 1999).

7. Conclusion and Recommendation

Ethiopia possesses a variety of wetland ecosystems, which hosts a great variety of biodiversity. These ecosystems are degraded due to the absence of a proper guiding policy and an institution which is accountable for addressing problems associated to wetland degradation. Lack of any strategic planning and capacity for wetland management program and sustainable uses are other impediments. Thus, the following actions are recommended to overcome these problems:

- An appropriate (focal) institution should be created with a mandate to implement wetland policies, provide alternatives to actions that cause wetland degradation and to formulate modalities for a national wetland management program. This would provide understanding values and problems of wetlands, as well as filling gaps to support the protection and wise use of wetland ecosystems in the country.
- Further investigation is needed to know the status, distribution and classification of wetlands of Ethiopia.
- Integrations of water policy with forestry and land-use policy are needed for wetland conservation.
- Research results should integrate with indigenous knowledge for wetland conservation.
- The communities around the wetlands should provide with benefits from wetland.
- Integrated wetland ecosystem planning should be a requirement to enhance the values of wetlands in ecological and socio-economic development.
- To gain technical support and development assistance, the country must ratify international wetland agreements. Wetlands are a shared resource that have global importance and require support from international communities for sustainable management.

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Appendix II

- **List of wetland dependent birds**

Endemic

A. Spot-breasted plover (*Vanellus melanocephalus*)

B. Blue-winged goose (*Cyonochen cyanopterus*)

C. Rouget's rail (*Rougetius rougetii)*

Globally endangered species

D. White-winged fluff tail (*Sarothrura ayresii*)

Vulnerable Species

E. Wattled crane (*Bugeranus carunculatus*)

F. Corn crake (*Crex crex*)

Near-threatened species

B. Blue-winged goose (*Cyonochen cyanopterus)*

C. Rouget's rail (*Rougetius rougetii)*

G. Ferruginous duck (*Aythya nyroca*)

H. Lesser flamingo (*Phoeniconaias* minor)

I. Black-crowned crane (*Balearica pavonina*)

J.Great snipe (*Gallinago media*)

k. African skimmer *(Rynchops flavirostris)*

L. Basra reed Warbler (*Acrocephalus griseldis)*

Data deficient species

M. Black-winged pratincole (Glareola nordmanni)

(Source: EWNHS, 1996)

Gap Analysis between the Preparatory High School Program and the University Educational Systems in line with Mathematics Subject in Ethiopia

By

Kassahun Melesse Tegegne & M. Ranga Reddy

Abstract

This cross sectional study design on mathematical syllabi at preparatory levels of the high schools was to investigate the efficiency of the subject mathematics at preparatory level education serving as a basis for several streams, like Natural science, Technology, Computer Science, Health Science and Agriculture found at tertiary levels. The study tried to answer the central question "What could be the gap between the link of the two programs due to the new set up that could possibly lead to certain modification or restructuring the system for a better quality of science and technology education through the support of mathematics in Ethiopian educational system" followed by several sub-questions. The information was collected from appropriate students and teachers of the university faculties mentioned above selected based on the purposive and random samplings through self administered questionnaires both closed and open ended.

Varity of short comings like; content gaps in different dimensions, quality of teaching, disparity of resource distribution, insufficient infrastructure facilities in rural schools, lack of mathematics background in support of the science, technology and applied sciences fields were identified by this study. It implied the link between the two programs was not friendly as expected, though the modification of the new set up and the question of the hypothesis forwarded as a possible solution was supported by majority of the respondents from both sides very controversial debates were raised to and fro showing the concern from both sides, where by the hypothesis was mainly splitting natural Science stream in to two steams mathematical (deep mathematics) and Natural Science (as it was basic ones) and making the current two streams three.

It is recommended that suitable steps should be taken to rectify all the shortages and strongly suggested for implementation of our HYPOTHESIS on urgent basis because it has

advantages than disadvantages but based on further deep studies in line with other subjects, possibly using developmental study design.

Introduction

The world is currently drastically changing by science and technology towards new ways of life worldwide, being the basis for development and advancement. Mathematics is then the fundamental tool of all these sciences and technology supporting the advancement worldwide change without which nothing can happen in this regard.

As modern society progresses, use of applications of mathematics has been increased in the field of Science and technology. Because of this, the courses like Mathematics, Physics, Engineering and Computer Science in Science and Technology field require various studies of mathematics at graduate level. Now-a-days, it will be difficult to science & technology courses to solve problems without mathematics [1].

Universities are responsible for such change through science and technology supported by mathematics implying its responsibilities extended worldwide. As a result, it is obvious that high schools are the feeders of these universities creating the future scientist and engineer generations which in return they share the responsibilities. This situation is the set up in every corner of the world educational systems including Ethiopia. To redirect the traditional system of education in Ethiopia criticized for long, the country is trying to develop a better curriculum that suits the development science and technology hopping to change its position from developing to developed country level which is part of the dream of Africa. For this a new set up was designed linking the high schools with the universities through preparatory program (11^{th} & 12^{th} grades-second cycle of the high schools).

High school education is very important to every student because it provides basic education at preparatory level. It helps the student to acquire higher level of education. Generally, educational programs provide every youth with knowledge and skills which students need and can use [2]. Due to this, suitable curriculum at preparatory should be set up to gear the objectives and the ability of the students at higher level of studies.

The study of different mathematical areas at preparatory level will have impact on each course at university level [3]. In this scenario, some courses in science and technology faculties require more varied and deep concepts of mathematics. It is noted that study of different and suitable mathematical areas at preparatory level play important role in

university level. This is being realized under the new educational policy changed by ministry of education for academic year 1996 E.C, freshmen program cancelled and all academic and curriculum requirements has been adjusted within the specified time in a compact way. Here students are forced to learn more in a small duration of specified time which varies from faculty to faculty [4].

As a result, problems and complaints were raised in every corner of the learning components mainly instructors and students at the university level. Though it is obvious that such new initiation will result a resistant at the beginning the changes made to a new system taking the freshman program down to the high school (preparatory) and reducing the duration of the university level by one year is for sure a concern of the academic community whether all necessary basic syllabi and respective courses and contents are accommodated properly since such things are out of hand by the change.

Moreover, it was observed that the present social science and natural science courses at preparatory level may not provide much required at university level courses of computer science, technology, mathematics, physics and which are having world level curriculum resulting their support is questionable [5]. It initiated that a research was required in this regard to make relevant modification and find appropriate set up at preparatory level to cover all short comings identified based on the response of the teachers and students community.

As it is stated in education sector development program II of Ethiopia; syllabi are dynamic for change, and revision of grades 9-12 is essential and text books shall be of high quality. High quality implies students at preparatory level shall have no background problem when they join different fields at tertiary level. For this studies are assumed important to be conducted on content, relevance and quality of curricular materials and to see the directions for possible improvement, whence the need for investigating the mathematics syllabi its relevant compared to higher studies in the future [6].

So the statement of the problem of the study could be summarized as follow.

The recent changes, the newly redesign Ethiopian curriculum assumed to improve the old system by taking the freshman program down to high schools and reducing the training duration by one year was the concern of the university community to enhance quality education through a smooth friendly link between the two programs. Due to this change complaints from different angles were coming were by the issue of bringing the urban and

rural students at equivalently same pace questionable in the new set up. Since students coming to the universities from high schools at different levels of qualities due to resource disparities had been sought to bring to the same level at freshman program, it was the worry of everyone who knew the disparity of resources (be it human power or material) still going on at the time of this redesign. As a result the background of the new batch of students is questionable though changing the educational system towards the new arena is mandatory. This is very crucial in line with science and technology areas where mathematics takes the biggest share of supporting them, subjects, syllabi, contents are to be seen seriously in terms of their depth and width.

For this, a very serious design of educational system linking the two levels smooth and friendly by identifying the gap existed in between and working more for improvement, modification or restructuring. In the new set up university trainings are supported by high school preparatory level syllabi categorized in the two streams, namely Natural Science and Social sciences streams which may be the center of the issue at hand how much mathematics required for courses like Computer Sciences, Information Sciences, Technology and Physics, Mathematics itself, and other applied sciences like Health, Agriculture and the like found at the university level to bring them up to the world level standard. Here the degree of mathematical support varies depending on how deep they need it, like in science and technology. In order to meet this problem appropriate and more specific and varied streams are likely to be designed so the suggestion/ hypothesis presented as one possible solution. For this, basic and appropriate investigations must be done to suggest a redesign for a change.

The central question of this research is then "What could be the gap between the link of the two programs due to the new set up that could possibly lead to certain modification or restructuring the system for a better quality of science and technology education through the support of mathematics in Ethiopian educational system, is there any improvement done so far"? This central question is followed by the following sub-questions directed to the weaknesses of preparatory set up, any short comings between the two programs in line with the curriculum in general, material human resources and qualification specific to teaching profession, subject knowledge and methods of teaching, any need for modification or restructuring the set up and what can be said about the suggested hypothesis (as explained below) as one possible solution?

The hypothesis:

1st: Mathematical science stream consisting of deep mathematical areas for Technology, Computer Sciences, Physics and Mathematics itself.

2nd: Natural sciences with more basic science areas like Agriculture, Chemistry, Biology, Pharmacy, Health Sciences (Medicine, Pharmacy, given emphasis) Management, Accounting and the like.

3rd Social science stream as it was for economics, law, language, behavioral sciences, and other related social sciences.

Methods of the Study

Study design: The study design is a cross-sectional using questionnaire consisting closed and open ended items for mixed mode of quantitative and qualitative approaches based on the purposive samples of university faculties and respective departments assumed relevant to mathematic whose teachers and students were selected randomly using appropriate sampling method.

Study site: The study sites were all universities entertaining the new preparatory level students coming through the new educational system of Ethiopia found at the time of this study (2005), whereby Jimma, Addis Ababa, Bahardar, Gondar, Mekele, and Alemaya universities involved in this study except the southern university which was not included due to inconvenient time for data collection. Furthermore, appropriate faculties like technology, natural sciences, health sciences and agriculture students and teachers were the target of this study as sources of information since these are assumed to use mathematics as a fundamental tool.

Sampling: The subjects for source of information specially the students were randomly selected proportionally 30% from each section while all teachers in these fields were taken for the same purpose assumed 10 teachers on average. It was estimated that 30 students from each department and 120 from 4 of the departments in a university a total of 720 sample students from all the six universities on average. On the other hand, an average of 10 teachers per department making the total 240 was also the estimation for the second source.

Data collection: Data collection was processed using appropriate questionnaires to be self administered by teachers and students of the sites selected. Assistants for administrating the data collection were selected within the respective universities right at the spot and oriented

on how to do it. Documentary information regarding the curriculum comparison of the old and the new version was done for base line data at the beginning. Observation and further participatory inquiries were used to identify the current improvements going on.

Data analysis: Data were encoded, cleaned, processed and analyzed using spss package summarized and organized by appropriate basic statistical method and chi-square test for significant testing,

Ethical considerations were taken care by getting the consent of the universities selected through official communications from Jimma University (JU).

Results

1. Background

In this study four science faculties or colleges (Natural Sciences, Technology, Health Sciences and Agriculture) were involved in six of the universities. Six universities namely JU, AAU, Bahirdar, Gondar, Mekele and Alemaya were used as sites of the study with the basis of random sampling of 30% of the students in departments of each faculty. A total of 833 (out of the minimum expected 720 sample size) were selected of which 17.3% (144) were female students, the highest 33.3% (48) and 32.6% (47) in natural science and health sciences respectively. Looking into the background of the students, 77.4% (645) students indicated their origin where they came from in which 24.5% (158) came from Addis Ababa, the big city; 30.9% (199) from the main towns, 22.3%(144) from district towns and the rest from the remote areas.

On the other hand out of 240 expected respondents 130 university instructors found volunteer to respond their questionnaire properly. Of these respondents 98 (78.38 %) of them indicated their academic status; assistant lecturers 19.4% (19), lecturers 55.1% (54), assistant professors 7.1% (1), associate professors 17.3% (17) and professors 1.0%. Among these respondents 125 instructors indicated their teaching experience in the university and 80.8% (101) confirmed they have had the experience of teaching at PPCI level showing the relevance of their judgment, many of them 94.5% (69) by teaching in the class, laboratory work and practical supervisions.

2. Academic performance of students in mathematics

2.1 Performance at preparatory level

From the total respondents about 75% students [75.9% (632) of first semester and 75.6% (630) of second semester] exposed their mathematics results scored in 11th grade. Majority of the respondents 91% (576) scored 60% and above in mathematics in 11th grade of first semester, while 95% (599) of them scored same range in 2nd semester. Similarly, about 75% of these students [75.39 % (628) in the first semester and 74.79 % (623) in the second semester grades] responded their 12th grade semester wise with at least 93% performance rate in both semesters the detail of both groups who scored 60% and above shown in the table below.

Table-1: Rate of students' mathematics performance in preparatory school who scored at least 60%

Category	*11th grade (%)*				*12th grade (%)*			
	n_1 =632			n_2 =630	n_1 =628			n_2 =623
	male	female	total	Pi (M/F)	male	female	total	Pi (M/F)
Sem I (n_1)	92.2	84.9	91	P<0.01	93.9	92.5	93.7	P>0.05
Sem II (n_2)	81.8	86	95	P<0.01	94.7	84.8	93.3	P<0.01
Yearly AVG	95.6	91.4	95	P<0.01	95	91.3	94.4	P=0.024

As we can see from the table the rates of performances of male and females in mathematics at preparatory level is significant in all cases except first semester of 12th grade which is not so. Of course we cannot decide for the yearly average of 12th grade performance P=0.024. In general, the mathematics scores of preparatory classes were noted with the mean of 76.4 (st. dev. = 31) in grade 11 and the mean of 75.3 (st. dev. = 10) in grade 12 where there was no significance difference observed in general P>0.05.

2.2 Performance at the university level

For the inquiry raised to know students performance in mathematics at first year level (PPCI) in the university 465 responded for the first semester performance and 426 of them for second semester. The mean score of these students CGPA at the end of 1st year found to be 2.7 (st. dev. = 0.6). In year one the first semester 95% of the students scored C and above while 56.2% (263) of them scored above average ($\geq$B). Similarly in the second semester, 95.7% scored C and above while 58.5% scored above average ($\geq$B). The study revealed that there was no significance difference between males and females in both semesters, P>0.05.

Coming to the cumulative grade point average (CGPA) of PPC I in all courses of the year (semester I & II), the majority 94.8(292) were successful scoring 2 and above. From these successful students 95.4(249) of the males and 91.5%(43) of the females scored 2 and above. Only 3.6%(11) were dismissed academically scoring below 1.75 in which 5 of them for good. Besides, a lot of students were distinction ($\geq$3.25) and great distinction ($\geq$3.75), 19.8(61) of them in both cases. There was no significance difference seen in this comparison between male and female, P>0.05 (P=0.186).

Comparing the success of preparatory students when coming to PPCI at university level: 5% (14) failed to score C and above in mathematics at first semester from those scored 50 and above both in 11^{th} and 12^{th} grade scores.

Table-2: Average mathematics score of students before and after joining universities

Grade level	*Number*	*Mean*	*Std. Dev.*
11-Sem. 1	635	74.9	12.02
11-Sem. 2	634	77.3	11.11
12-Sem 1	634	76.6	11.51
12-Sem. 2	629	77.4	11.36
11-yearly average	512	75.2	9.24
12-yearlt average	507	75.3	9.62
PPC-I Sem. 1	468	2.75(68.75)	0.88(22)
PPC-I Sem. 2	429	2.73(68.25)	0.79(19.75)
PPC-I CGPA	308	2.73(68.25)	0.60(15)

As we can see from Table-2, the average mathematics scores in preparatory level are above 75% (Std. Dev. = about 11) in both 11^{th} and 12^{th} grades yearly as well as semester wise while at the university level their average scores are about 2.73 equivalents to 68% (Std. Dev. = about 0.75).

Instructors were also asked about the academic performance of these students (the new generation) whether they have had difficulty in teaching this group. Accordingly, 65% of 117 respondents of university teachers reflected that they were having very difficult situation in teaching these new group. The following were some of the reasons forwarded by 68 respondents on how teaching had been difficult.

- They could not express themselves very well, they lack of communication skills and most of them are slow learners. They lack of understanding due to background in mathematics specially calculus (39)
- They have little interest in learning, little motivation to reading and only dream to get their degree without working hard, they do not even take any note of their own (10)

Majority 60.7% (71) of those teachers who had difficulty in teaching PPCI said that the level of understanding of this generation was low or very low compared to the previous generation (FPC) where only 5.1% of them said high or very high, the rest 34.2% average.

3. The gap between the two levels (preparatory & university year I)

As to the question raised whether the preparatory mathematics is sufficient for the field area where the respondents are involved; 53.9% (48) said not sufficient providing the following remedy.

Students seem to have profound difficulties in dealing this subject (mathematics) due to lack of basic areas at preparatory and hence their level of understanding is low. So we need applied mathematics, numerical mathematics, problem solving, pre-university mathematics, binary numbers for computer application to be specific. In addition, the quality of teachers at high schools must be improved along with sufficient material supply like texts. Besides, evaluation methods and promotion policy must be revised. More than that, remedial classes before major courses at university level should be given.

Assuming all science areas basically supported by mathematics will be affected, inquiry was made to know factors affecting their study of mathematics at first year university level which could possibly show the gap between the preparatory and university levels. Accordingly, from several possible choices given where by more than one possible choices were shown by 272 respondents. Taking the top four factors, most of the respondents 72%(196) said that their mathematics study was affected by lack of basic knowledge at high school level, the gap between preparatory and PPCI curriculums 61.8(168), high standard of courses at PPC level 58%(158) where the preparatory level could not sufficiently support, and teachers ability to teach and evaluate properly 33%(90).

Students were also asked to suggest major areas of mathematics they felt weak (deficient) in their university performance due to lack of background from preparatory level. A maximum

of 333 students responded based on the possibility of selecting more than one items for a respondent. The main subject areas indicated in this regard are Geometry (96.10%), Statistics (50.75%), Calculus (48.05%) and Algebra (33.33%). In addition, yes or no answer question was raised regarding the deficiencies/the gap of the subject matter in question. As a result, 68% (499) said preparatory level mathematics was sufficient to support tertiary level mathematics and other mathematical applicable subjects while the rest were against by saying no giving their major reasons that it would be too early to comment up on. The former group (who said there is gap) reasoned that some important topics/subjects like statistics are missing and some are new in content and there was no deep treatment in calculus, it was introduction and definitions only with no proofs for theorems, at the rate of 50%. Ability of teachers which was not efficient where by many of them were not professionals even some at diploma level followed by non-student centered teaching methods was the second reason rated 33.65%. This shows that the major gap is due to lack of basic and standard mathematical course components and then next qualified teachers.

The teachers also supported these views of students on the same type of question raised to them to give their views whether there was gap between the PPCI and preparatory level subject areas under the new educational curriculum. As a result, 65.3% (64) of them said yes there was gap as one of the factors of difficulty in teaching at university level. In what ways the existence of the gap could be expressed was the next issue in which the following ideas were forwarded.

- Depth of education at high school level is not enough to cope up with the university courses; they cannot write even a paragraph properly; they come with no sufficient basic knowledge; there is a very big knowledge differences among students themselves; they lack study mechanism and skills.
- They need make up classes to build their confidence; they should be brainstormed by easier courses in university campus like in the freshman program. Culture is one factor dominating their activities so they need some awareness about university courses.

In addition, instructors suggested subject areas in which emphasis to be given to help those students who have weakness in areas of mathematics. The following are summary of these areas in which students were found weak that need support as reported by the university instructors. Majority of them explicitly listed areas where students are weak in the area of

mathematics and its application; such as calculus, algebra, geometry, numerical methods, symbolic calculations, mathematical operations and deriving equations, working on statistical and epidemiological calculations, numerical for computer sciences, lack of logic and set theory in basic mathematics, elementary probability theory.

4. The need for modification at preparatory level

Two very similar questions on very similar ideas were given to the students to suggest their views towards modifying the style. One is to show whether they agree or disagree for the need of modification of the current preparatory modality or not in which they were divided almost into two half, 49% agreed and 50.9% disagreed. The second was to say yes or no for a complete restructuring of the system in which case 44.7% said yes while 55.3% against. Following these, similar ideas were forwarded on how to modify or restructure in line with the positive responses.

Consequently, all prerequisite courses must be considered adding some topics like algebra, geometry, statistics etc; adjust by adding some and dropping some unnecessary contents whereby priority is given for the curriculum to adjust subjects and topics to appropriate fields like introducing basic courses like algebra, computer science, ICT which are prerequisite for the university students and their topics must be covered in time. Some topics like matrix essential for natural sciences are given to social science only but not given to natural science part which are basic at university level thus there is a need for rearrangement. In the contrary some unrelated areas like drawing from health and natural sciences are suggested by these students to dropout from their syllabi. In addition, students suggested that some topics at preparatory are very hard must move to university level. Technical issues like including practical activities, laboratory work, application problems, exercises and simplify learning were also suggested (55.48%). The need for good and trained teachers with full of variety of methods along with completing the course in time and making it applicable is the other issue.

Furthermore, the inquiry went further asking university teachers if there was a need for changing the new preparatory level curriculum to make students background strong. Accordingly 59.8% (61) supported for a change and suggested of changing the curriculum in the following ways, which went with students view more or less.

Curriculum at high school level must be changed in such a way that strengthening students background (emphasis on basic areas) at this level including relevant and important concepts

that can support university courses, but must be at the level of students considering the age of students at each level. Moreover, curriculum design must involve students, teachers and stakeholders. The training time extension at universities must be considered up to four years which enables students to work independently and practically. In addition, deep mathematical knowledge areas must be added in the syllabi and it must be applied towards problem solving in other fields. Like that of the students these university instructors agreed on the improvement of quality of professional teachers, proper evaluation system and sufficient resources materials to be available. On the contrary very few people suggested to use the new curriculum as it was but work on proper implementation.

Teachers at university level were also asked to suggest new mathematical topics to be added to preparatory level to make successful education at PPCI. Accordingly, they listed/suggested various mathematical areas where by those indicated by the students were part of it. Basic mathematical areas like calculus, algebra, geometry differential equations and applied ones like Applied mathematics and Statistics and probability were suggested followed by specific topics like logic for computer sciences, trigonometric functions, computational mathematics linear measurements to medicine & health in general, computer sciences, discrete, numerical, triangulation, solving transcendental equations by numerical methods were given emphasis.

5. The hypothesis

Noting that mathematics is basically a fundamental tool for all sciences including social sciences, and it is the concern of all the above faculties/colleges selected for this study, a hypothesis was designed in this study to improve/modify the preparatory educational modality so that it suits the university level advanced training.

The hypothesis was therefore designed on the positive sense (null hypothesis) of modifying the preparatory program into three streams instead of the current two streams (Natural and social sciences). Since all science areas are based on mathematics background they can generally be categorized into two depending on the depth of mathematics they need. That is, one category could be those (like biology, health, agriculture …) needing mathematics at the basic background level like the existing syllabi currently at hand, and the second could be those fields (like technology, ICT, physics, mathematics itself…) in need of mathematics support very deeply which assumed missing currently. So this leads to split the current natural science stream into two making it three with the existing social science stream implicating the construct of the hypothesis suggested.

Thus 46.7% (326) of the students agreed completely on the hypothesis of re-streaming the preparatory level into three, 41.8% (292) agreed the change with some modification resulting 88.5% agreement on the hypothesis in aggregate. In similar manner 52% of the teachers completely agreed on the hypothesis while 25% agreed with modification implicating an aggregate agreement of 77%.

Furthermore, opinions were asked in open ended question to give their reasons on why respondents agree or disagree on the hypothesis and forwarded the following views and opinions, number of respondents in parenthesis.

University instructor forwarded their views and general opinions which they assumed constructive for improvement. The following were few of their views.

- In Ethiopia we have no system of compromising quality and quantity, so instructors at preparatory level must be highly competent, methodologically equipped. Human and material resources must match. There is a need of high standard of training in the future teachers at high school level are not able to make them grasp the main concepts.

- Care must be taken when contents of mathematics are designed to fit into other areas, say mathematics for health, mathematics for technology, for natural sciences, for information technology etc; and avoid duplication emphasis given on the theoretical part of proofs and formula derivation. Furthermore, it must be applicable and solve the language problem. Adjust mathematical courses; by adding extra topics like in calculus, algebra, computational techniques for computer, software, chemical industry, electrical industry, etc; provide deep mathematics. English language for teaching mathematics must start right at 7^{th} grade, and make it practical and applied. In general detailed data based study must be done to modify the streams, care must be taken into account before modification.

Currently from practical observation, the number of high school teachers increased from 36% to about 80%, harmonized curriculum was developed throughout the nation to improve quality of teachers subject wise, changing the educational training system to add on for methodology improvement, the HDP for tertiary levels to upgrade the quality of trainers of teachers, the Plasma TV (PTV) implementation throughout the high schools to bring the rural and urban discrepancy at about equal pace, the students placement rate increasing as per their interest and the GEQIP supporting the educational bureaus to have texts at the ratio of 1:1 for

high schools are some of the obvious improvements at hand. In specific, the current movement of tertiary level education emphasis given to science and technology leads still the need to try the hypothesis; modifying the streams at preparatory

Discussion

School education in general, high school level education in particular is very important to every student since it provides basic education at pre-university level assisting higher level knowledge and skills, developing independent thinking which leads to a necessity of conducting investigation on the existing curricula [7]. In India for example, the universities concerned shall frame the curriculum for their respective inter disciplinary courses through Board of Studies and also can introduce syllabus suitable to present trends. The committee felt for practical oriented mathematics. The committee of opinion that syllabus should be changed as per existing conditions and developments [1].

Traditionally students at the end of high school (12^{th} grade) used to take Ethiopian School Leaving Certificate Examination (the national exam usually named ESLCE) to enter tertiary education whereby the first year in all universities was meant to review selected high school subject areas assumed prerequisites for advanced learning; the program called freshman program. The main objective of this program was to bring together fresh university students originated from different high schools with different level of facilities that made the quality of education varied from school to school, particularly those coming from rural or remote areas with very low standard. But this system was criticized in many forums unsatisfactory for the development of the country not able to solve the societal problems; the bases for a change of the whole system.

It has been some years since Ethiopian educational system ventured a paradigm shift changing the curriculum of the nation right from elementary up to tertiary levels. The Ethiopian government specially the MOE initiated the change in educational system and made a paradigm shift, one of which changing the university level training duration reduced by one year, taking freshman program down to high schools in 11^{th} and 12^{th} grades calling it preparatory program. Selected students join these preparatory program after passing national examination given in 10^{th} grade.

Consequently, several comments dissatisfactions and criticism appeared following this change. Some saying that high schools are not yet at equal status specially teaching and

learning facilities and environment, some saying students are young to choose their best interest at preparatory level, others saying narrow possibilities of field choices at this level, and some other supporting the system and suggesting to wait and see giving it enough time for implantation. This study tried then to investigate the situations at preparatory and tertiary level interrelation and coherence for a better educational standard.

Based on the dissatisfactions and complaints on the new set up initiation this study tried to investigate the situation of the interrelation between tertiary and preparatory levels to show the direction for improvement specifically in mathematics which is fundamental tool for all sciences and progress of technology. Second year students at university level which of the new generation, called preparatory program complete (PPC) and their respective instructors were assumed appropriate sources for the feedback of the preparatory level, the tertiary and their coexistence.

In this line, different shortcomings were reflected by both respondents (students and university teachers) mainly the disparity of placement of fresh students as per their interest and attractiveness of the field areas at university level like medicine and related health areas and technology specifically the urban students having the upper hand to go into the 'best' ones. The study justified this by showing that 77% of urban going to health and technology fields while 73% of the rural went to the fields in agriculture and education.

This was true even if their preparatory level (11^{th} and 12^{th} grades) performance in mathematics were 60% and above for most of them in which more than 90% of them scored in that level. Here the male dominance in mathematics performance was significantly ($p = 0.02$) observed at preparatory level; showing the need of empowering females through affirmative activities and assertiveness to bring them up. This disparity of placement between rural and urban students was the concern of both parties involved in this study, a means to initiate fair distribution between the two origins.

Another issue of concern was weak background of mathematics manifested by these students while they study their tertiary education in which both parties reflected at different rates. According to the result, 74% of the students confirmed that their level of understanding mathematics good and excellent but still insisting that they have mathematics background problem while taking university courses which was highly supported by their university teachers. On the other hand, if at all they have mathematical problem 72% of the students supported that at least their PPC level mathematics was mainly affected by lack of basic

knowledge at high school level. In support of this idea mathematical areas like geometry, algebra, calculus and statistical contents are revealed by both respondents either contents are missing, not deep and wide, or sequentially misplaced implicating curriculum revision. These actually make the university level education deficient for sure and implicate for some improvement. Though subject area construction through appropriate curriculum development is essential it is not complete by itself without qualified teachers which is the next factor affecting mathematics learning at university level assumed shortage of school teachers qualified to adequately teach and evaluate their subjects which was supported by both students and instructors. So apart from content gap lack of qualified teachers was mentioned as the next major problem in high schools (preparatory), some teachers are even teaching the preparatory at diploma status is a fatal exercise. Lack of relating theory and practice at least in very obvious areas like in laboratory and tutorials where by these teachers could not handle them properly make the situations very critical. This implied the urgent need for improved training manpower system.

These ideas of the gap between the two programs in line with subjects, syllabi design and deficient teaching quality at high schools was strengthened by their university level instructors where by this study revealed that 65% confirmed that they faced difficulties in teaching the new generation PPC, which corresponded with the response of students in this regard. These teachers complained that the difficulty of teaching arose due to lack of background and understanding with full of slow learners from the new generation, with little motivation to learn and do things by themselves indicating the level of understanding of these students very low (61%). Like that of the students, teachers also confirmed that there is gap between the two curriculums, preparatory & PPC (65%) one of the factors of difficulty in teaching. The teachers view showed us that teaching difficulties arose due to lack of depth and width of education at high school level to cope up the university level education so that confidence of students could properly be built at preparatory program.

The university may change or amend the curriculum at any time and changes or amendments made shall be applicable to all the students and respective courses. Applied mathematics plays very important role in engineering and computer sciences courses [8]. Looking in to the document of curriculum for computer science at AAU in Ethiopia; the present curriculum for Computer Science courses for all university in Ethiopia has been drafted as per world standards. In which, Application of Mathematics in Computer Science courses is stressed in

more specific way. According the above curriculum Applied Mathematics contributes more and more in the development of computer science field [9].

Following the gap analysis raising issues on the short comings, it was the direction of the study to redirect the issue of modifying the current new set up existed between the preparatory and university systems to smoothen the link between them since high schools are the bases for university level constructive learning. In this line the study showed that both students and teachers reflected openly towards these ideas showing their concern deeply.

In this regard, students were divided almost into two equal parts to support modification (49%) and to leave it as it was for the time being (51%). This may imply that it was too early to raise this question at the level of students at this time. Students reasoned out for not modifying this new set up at this time first appropriate implementation must be tried out before resisting the change which is different from the previous criticized system marked unworthy. From this it would be wise to look into further investigation through time and gradually improve the new system being flexible to alleviate the problems at hand.

After all, as we can see it in the curriculum structure for preparatory level in Ethiopia, mathematics is being taught at preparatory level throughout the country in two streams; Natural Science and Social science the first stream have more mathematical areas than social science stream. Both streams have common chapters like Polynomials- Rational functions – Logarithms, Geometry, Elementary Calculus [2]. Correspondingly, the curriculum structure of at all university levels had also been revised recently which needs time to see. For example, the curriculum for department of mathematics at Jimma University is an evidence for applied mathematics which is true in every university in the country [10, 11, 12, 13].

Furthermore, university teachers strongly suggested that preparatory mathematics was not sufficient for the support of university level courses implying the need for considering modification and hence suggesting the modification in line with the need of selected applicable mathematical topics towards problem solving and up-grading the quality of high school teachers in particular those found at diploma level. As narrated by the university teachers students were weak almost in all subject areas, lack of mathematical background like calculus, algebra, geometry, numerical methods etc, students with no active participation in learning suggesting all to be worked out for improvement. Contrary to students response 60% of the teachers suggested for modification of the new preparatory curriculum to make students background strong in such way that; depth of mathematical knowledge, quality of

professional teachers, and strong entrance examination to join university all to be considered seriously for revision.

In general majority of these university instructors supported restructuring the existing field stream designed in the hypothesis 77% of them agreed out of which 25% with modification to change it in to three stream; similar to students view in this issue. The university teachers general comments and suggestions shown in the result sections, like for appropriate duration of training at least a semester at freshman level to strengthen the background, working to up-grade the level of students understanding and background at high school level, adjusting mathematical courses according to the needed topics mentioned above, designing a system compromising quality and quantity both in content and quality of professionals (teachers at high schools) both in teaching delivery and evaluation system, were some of the justification for modifying the curriculum and restructuring the streams

From variety of complaints revealed by both respondents it was found that the proposal of the hypothesis as one possible solution though not sufficient by itself since it cannot at least solve the problem on lack of qualified school teachers. From the responses we can see that re-streaming the categories based on mathematical background could contribute in supporting different science and technology areas which are the current focus of developing countries like Ethiopia. This was supported by this study that respondents assumed that this hypothesis changing the current natural and social science streams into natural sciences, mathematical sciences and social sciences for fields listed in the result section above could provide variety of opportunities for the students at early stages, which was manifested by 88.5% of the students and 77% of the teachers agreed for this hypothesis of which 42% of the students agreed with modification leading the study to accept the hypothesis and suggested the change to happen.

But from the very critical arguments of these respondents (both students and teachers) all science and applied sciences do not need the background of mathematics at equal footing where by the depth and the width shall vary from subject to subject though the need in general is fundamental, implying the division of the natural science stream into two seems reasonable. Nevertheless, the warning given by both parties to make further investigation on how to restructure the streams should be given a very serious attention. Say for example, what do we need to change in line with other sciences (other than mathematics) at preparatory level leads to the need of conducting variety of studies in these subjects too. On

the other side, though the study concentrated on mathematics, weaknesses on English understanding and communication in general found critical problem revealed by the teachers which obviously affects the learning situations in every direction be it technology, natural or social sciences, without which one cannot step an inch. So another area of investigation whether the background or the communication problems or both are to be treated prior.

The other issue of the study in this line which cannot be ignored is the idea of those who are against the hypothesis suggesting that we need to see the current system for sufficient time till we are well organized to implement it with full support of facilitation. So this may take us to conduct consecutive studies following developmental design studies.

Conclusions and recommendations

Both parties generally agreed on the existence of gap between the preparatory and university programs mainly on the mismatch of contents and syllabi to fit into the university level different field requirements as background support, especially for technology, ICT and applied sciences, the areas in which deeper mathematics is needed. Beyond the question of their insignificant performance in mathematics in which most of students for this study had relatively good stand from their first year performance 94.9% scoring C and above, many of them as well as their teachers complained that still they lack mathematical background when they are dealing with their specific applied areas, suggesting some sort of bridging must have to be done towards the link. Next to content gap, almost everybody agreed on the very low quality of teaching at preparatory level even some teaching at diploma status. This also needs to work on producing qualified teachers at high school levels both in knowledge and skills

On the other hand, controversial issues were raised with in the two groups of respondents at some points of modification. Some supported the idea of improving the curriculum design by readjusting the contents with regard to its relevance, depth, width and sequence considering vertical and horizontal integrity, while others were against this idea arguing that it is too early for such change before exhaustively trying the implementation supported by the necessary learning resources of course. Further they expressed their feeling that if at all there is to be revision it must be based on further evidences.

From these ideas narrated above, we can recommend that at least revisions at syllabi levels could be taken care if not the whole curriculum revision which will come in its own time at least in a five years time. Facilitating fair distribution of the learning resources both materials

and human is unquestionable to take measures immediately, specially trained human power for qualified teachers at high school level. In general, a sort of bridging courses that play the role of the old freshman program bringing the rural students up to equal level must somehow be designed.

The hypothesis proposed as one possible solution to make mathematics supportive with respect to the depth and width of variety of science and technology fields attracted both students and teachers. Consequently, majority (88% of students and 77% teachers) of respondents from both parties supported the idea of re-streaming the preparatory programs in to three so that natural science stream to have two different mathematics background in depth and width to make it appropriate to science, technology and ICT fields who complained a lot as indicated in the result section. Some of them recommended the change with some modification emphasis given to creating awareness for both students and the family before any decision is made on the field choices; special focus directed towards those students coming from rural areas. We therefore recommend that steps should be taken towards the implementing the hypothesis, making it three streams instead of two as proposed by the study but serious detailed work plan must be done for its successful implementation, taking it through constructive studies using developmental study design, since a change in streams as presupposed need a change at least in mathematics syllabi rearrangement. The current governmental emphasis towards science and technology by the rate of 70% is a sign to support this idea.

In addition to the recommendations given above; from this study we can further recommend that serious care must be taken towards communication skills in English language which is the learning media in both levels. Since this study is based mainly on mathematics only further studies are wise to be conducted in similar manner before making any dynamic change. Through the initiation of this study several other studies could be conducted for improving quality of education in the country. Say for example; on what the high school community would say in line to these issues of improvement, at what stage is actually the quality of school teachers, how varied the disparity of facility distribution are, what measures are being taken for improvement, what could be investigated in line with other science subjects, what leally is going on in the preparatory schools regarding the teaching quality, what would be the performance level of students coming to universities in basic mathematics

nationally examined through standardized performance tests, and the like are areas for further studies.

In general we could certainly agree that this study could help as a base line evidence for variety of further studies in line with enhancing quality of education in general; mathematics, science and technology in particular by improving the link between the two programs.

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Survey on the Usage of Plastic Bags, Their Disposal and Adverse Impacts on Environment: A Case Study in Jimma City, Southwestern Ethiopia[a]

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Abstract

Plastic bag wastes pose serious environmental pollutions and health problems in humans and animals. The situation is worsened in economically disadvantaged countries like Ethiopia. The objective of this survey was to assess usage of plastic bags and their environmental impacts in Jimma City of Ethiopia. A semi-structured questionnaire was used to collect data from 230 randomly selected respondents. The results indicated that the larger proportion (176, 76.52%) of the respondents used plastic bags more frequently than any other plastic products regardless of their age, occupation, and economic and educational status. Low price (159, 69.13%) and easy availability (152, 66.08%) were the main reasons for the widespread utilization of these products. Among the practices used for disposal of plastic bag wastes, open dumping to surrounding areas (137, 59.56%) was a practice widely used by almost all the residents of the city. Some of the major problems were animal death (167, 72.60%), blockage of sewage lines (162, 70.43%), deterioration of natural beauty of an environment (144, 62.60%) and human health problems (119, 51.73%). The findings of the present study also indicated that the trend of utilization of plastic bags is increasing from time to time in spite of a good deal of awareness of the residents about the adverse effects of these products. In order to reduce the problems associated with plastic bag wastes, it is recommended to educate the public (1) not to use plastic bags, and (2) to use eco-friendly alternative materials (bags) made from clothes, natural fibers and paper. City level legislation is also highly recommended against indiscriminate use and disposal of plastic bag wastes as well as to end free distribution of plastic bags by retailers.

Assessment of Familiarity and Understanding of Chemical Hazard Warning Signs among University Students Majoring Chemistry and Biology: A Case Study at Jimma University, Southwestern Ethiopia[a]

By

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[a] *(Accepted for publication in World Applied Sciences Journal)*

Abstract

The objective of this study was to assess of students' familiarity and comprehension of chemical hazard warning signs at the Departments of Chemistry and Biology, Jimma University. Data were collected from randomly selected students using of structured questionnaires. The collected data were analyzed using simple quantitative analysis. The results the study revealed that the majority (56.8%) of the respondents were not familiar with hazard signs of laboratory chemicals. The respondents were also requested the match chemicals properties with the corresponding labels (pictograms). However, only 26.5%, 14.45% and 12% of the respondents were able to correctly match "flammable", "toxic" and "irritant", respectively, with their associated signs. The responses given to the rest of the properties (e.g., explosive, oxidizing, corrosive, harmful and radioactive) were not encouraging. The results indicate that understanding (comprehensibility) of hazard warning signs is low among the students. This necessitates organization education/training programs to help students to get familiarized and increase their compressibility about chemical hazard warning signs. Thus, it is recommended that warning students to follow safety rules is not sufficient, and thus, they should be educated to understand and recognize the signs in order to avoid the possible happening of chemical accidents on them and the environment.

Ethnobotany of the Plants and Plant Products Sold in Jimma Market, Ethiopia

By

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Abstract

Marketplaces are readily accessible and cost effective places for fieldwork, providing qualitative and quantitative data concerning cultural, social and economic aspects of plant resource utilization. The traders in these markets sell large amount plants for the multifarious requirements of the local people and marketplaces found in many cities and towns are rich sources of ethnobotanical information. A study has been conducted on the plant resources sold in Jimma market for the last one year and data on various ethnobotanical aspects were gathered using structured and semi structured questionnaire surveys and participant observation. The study revealed that Jimma market is a place for trading diverse plants and plant products which consist of 96 species of higher plants which spread on 68 genera and 38 families. Regarding the representative species of various families *Poaceae* is the largest represented by 11 species followed by *Fabaceae* (8 species) *Zingiberaceae*, *Apiaceae*, *Asteraceae*, *Brassicaceae*, *Lamiaceae* and *Rutaceae* (5 species each). Most of the plants belonged to herbs (60 species) followed by trees (18 species), shrubs (12 species) and six are herbaceous climbers. The occurrences of 18 species are wild and 78 species are cultivated. Most of the plants and plant products are represented by edible plants (42 species) which include cereals and pulses (22 species), spices and condiments (18 species), fruits and vegetables (16 species) and leafy vegetables (6 species). Besides that there are medicinal plants (12 species), leaf plates (one species), packing sheaths (one species), repellants (6 species) dye yielding plant(one species), basketries (2 species) and there are 25 plants sold in the market places are also having some use in the preparation of traditional medicine among the local vendors. Regarding the useful part majority are fruits (23 species) followed by seeds (22 species), leaves (21 species), roots (12 species), rhizomes (8 species), bark (5 species) resins (3 species) and stem (2 species). Two plant species sold in the markets such *as Brassica carinata* and *Plectranthus punctatus* var. *edulis* are underutilized wild edibles.

Isolation and Characterization of Compounds from *Helinus mystachinus* (*Rhamnaceae*)

By

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Abstract

Helinus mystachinus is a woody climber belonging to the family *Rhamnaceae*. The plant is distributed throughout Ethiopia, Uganda, Somalia and other East African countries. *Helinus mystachinus* is one of the medicinal plants used by the Shinasha people, Metkel Zone, Ethiopia for the treatment of malaria and abdominal pain. It has been noted that the plant is not subjected to any phytochemical and pharmacological evaluation so far. An attempt was carried out to extract and isolate bioactive compounds from this untouched plant. Two compounds were isolated from the chloroform extract of this plant by using chromatographic techniques namely column chromatography. The compounds were characterized using infrared and nuclear magnetic resonance spectroscopy. Based on these studies the compounds were found to be benzoic acid and betulinic acid. This is the first report of the isolation of these compounds from this genus. The paper deals with the systematic steps involved in structural elucidation of these compounds from *Helinus mystachinus*.

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Microbiological Safety of Kitchen Sponges Used in Food Establishments of Jimma Town, Southwest Ethiopia

By

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Abstract

The food residues trapped by kitchen sponges, during washing of utensils, together with the moisture retained in sponges offer a favorable condition for microbial growth, making sponges potential sources of food borne pathogens. To this effect, the microbiological safety of kitchen sponges being used in food establishments of Jimma town, were investigated between October, 2010 and June, 2011. A total of 201 kitchen sponges sample were included in the study and evaluated for the presence and types of microorganisms. The aerobic mesophilic bacterial load of restaurant kitchen sponges ranged from 7.43 to 10.4 log CFU/mm^3. A total of 1506 bacterial strains were isolated from kitchen sponges and categorized to various genera and bacterial groups. Generally, 61.6% of the samples were dominated by gram positive bacteria. *Pseudomonas spp* is the dominant bacterial flora (16.9%) followed by *Staphylococcus spp* (16.8%) and members of *Enterobacteriaceae* (11.6%). Of the total samples, 98.7% had aerobic mesophilic count > 8 log CFU/mm^3; 64.16% had *Staphylococcus* counts > 4 log CFU/mm^3; 64.9% had coliform counts of > 4 log CFU/mm^3; 55.6% had Enterobacteriaceae count > 5 log CFU/mm^3; 72.8% had yeast counts > 3 log CFU/mm^3 although counts of molds were below detectable level in among 24.5% of the samples. Of total samples of kitchen sponges examined, 24 (11.9%) were found positive for *Salmonella*. There were Significant variation in prevalence of *Salmonella* among the kitchen sponges of the food establishment types (p= 0.023). None of sampled sponges were positive for *Listeria spp*. However, 69 (34.3 %) of the kitchen sponges were found positive for *S. aureus*. Frequencies of isolation of *S. aureus* differ among the food establishment types and it ranged from 30% (restaurant) to 36.4% (hotels). The statistical analysis revealed the presence of significant variation in prevalence of *S. aureus* among kitchen sponges of food

establishment types (p= 0.034). Ampicillin and Nalidixic acid were the most resisted drugs by the *Salmonella* species, while the maximum sensitivity was observed for Norfloxacin, Gentamycin and Ciprofloxacin. Similarly, Streptomycin and Ampicillin were the most resisted drugs by *S. aureus* with maximum sensitivity to Norfloxacin, Amikacin and Ciprofloxacin. A total of 5 and 7 multi drug resistance patterns were detected among Salmonella and *S. aureus* isolates, respectively. In conclusion, majority of the kitchen sponge samples investigated in this study had high microbial load. Prolonged duration of its usage, continuous contamination during each washing steps, absence of sanitizing practice, inappropriate storage conditions or combination of these factors might contributed to high microbial counts. Thus, kitchen sponges can potentially act as reservoirs for food contaminants. Therefore, there is a need for awareness development training for the food establishment workers on the basic hygienic practices and appropriate use of these materials. As information on the current antibiotic resistance level of microbes are important in determining the right antibiotic therapy in control of foodborne diseases, the resistance profile need to be assessed regularly.

Key words/phrases: Antimicrobial susceptibility, Food Establishment, Jimma, Kitchen Sponge,



Some of the Participants of the Parallel Session Organized by College of Natural Sciences, Jimma University

Prevalence and Antibiotic Susceptibility Pattern of Methicillin-resistant Staphylococcus aureus (MRSA) among Primary School Children and Prisoners in Jimma Town, Southwest Ethiopia

By

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Abstract

Staphylococcus aureus infections are increasingly reported around the world both in health institutions and in the community. In particular, infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA) strains have been detected worldwide. If MRSA becomes the most common form of *Staphylococcus aureus* in a community, it will make treatment of common infections much more difficult. To this effect, a cross sectional study was conducted to evaluate the current prevalence and antibiotic susceptibility pattern of MRSA among primary school children and prisoners in Jimma town. A total of 354 nasal swabs were collected from the study population during the months of December 2010 to March 2011 following standards microbiological methods. MRSA was detected using Cefoxitin (30µg) disc; and questionnaires were distributed to the children parents and prisoners to assess epidemiologic risk factors. A total of 169 *Staphylococcus aureus* were recovered. The overall prevalence of MRSA was 23.08 % (39/169). Specifically, the prevalence of MRSA among primary school children and prisoners were 18.8% (27/144) and 48% (12/25), respectively. The isolated *Staphylococcus aureus* and MRSA displayed multiple drug resistance to 2 to 10 antibiotics. The present study revealed that MRSA could be prevalent in the healthy community, transmitted from hospital to the community and its high distribution can be easily favored by potential risk factors. For comprehensive evaluation of the current prevalence of MRSA and design control measures, consideration need to be given to the healthy community besides data coming from health institutions.

Key words: CA-MRSA, HA-MRSA, MRSA, Prevalence, risk factor, *S. aureus.*

Electrochemical Determination of Hydrogen Peroxide (H_2O_2) at Glassy Carbon Electrode Modified with Palladium Film and Palladium Nanoparticles

By

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Abstract

The unique chemical and physical properties of nanoparticles make them extremely suitable for designing new and improved devices for detecting molecules at very low concentrations. We report here the modification of glassy carbon electrode with palladium nanoparticles and palladium film on glassy carbon electrode. The electrochemical detection of hydrogen peroxide was investigated on these modified electrodes in phosphate buffer solution (pH 7.4). The response to hydrogen peroxide on the modified electrode was examined using cyclic voltammetry and amperometry. The modified electrodes showed excellent electrocatalytic activity for oxidation and reduction of hydrogen peroxide. The amperometric determination of hydrogen peroxide was carried out at -0.2 V versus Ag/AgCl reference electrode in the phosphate buffer solution. The palladium film and palladium nanoparticles (Pd NPs) modified glassy carbon electrode (GCE) showed a linear response to hydrogen peroxide in the concentration range between 10 µmol/L to 14 mmol/L and 1 µmol/L to 14 mmol/L with detection limit of 6.79 µmol/L and 0.33 µmol/L (3δ) respectively. Pd NPs modified glassy carbon electrode showed a better detection for lower concentration of hydrogen peroxide than palladium film modified and bare glassy carbon electrodes. The surface modification of glassy carbon electrode with Pd NPs and film was found to be a sensitive and simple method for the development of a new hydrogen peroxide electrochemical sensor. In addition to this, the electrode modification procedure was found to be simple as compared to other similar investigations.

Keywords: Palladium, Nanoparticles, Hydrogen peroxide, Glassy carbon electrode

I-Vague Sets and I-Vague Relations[a]

By

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[a]*This article was published in international Journal of computational cognition Vol. 8. No. 4 which is a base for my PhD thesis. In the thesis we also improved some of the results in the article.*

Abstract

The notions of I-vague set in a set with membership and non-membership functions taking values in an involutary dually residuated lattice ordered semi group are introduced which generalize the existing notions with truth values in a Boolean algebra as well as those usual vague sets whose membership and non-membership functions taking values in the unit interval [0,1]. Various operations and relations on I-vague sets are defined and established. We also proved that the class of I-vague sets form a De-Morgan's algebra. If I is complete, then I-vague sets also form a complete De-Morgan's Algebra.

Two New Hypogean Blindfishes From Kerala, India

By

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Abstract

A Siluroid blind fish, *Horaglanis abdulkalami* **sp. nov.** and a swamp eel, *Monopterus trichurensis* **sp. nov.** are reported from an old well at Irinjalakuda, Kerala, India. The *H. abdulkalami* **sp. nov.** different from its congeners by following combination of the characters: gill membrane free at the base of the isthmus and it is united only half distance towards the tip of the lower jaw from the base; brangeostegal rays are 13, dorsal fin with 21 un-branched rays and anal fin with 15 rays; caudal fin rounded and supported with 28 rays, of this middle 6 rays are branched. *M. trichurensis* **sp. nov.** different from already reported species by the following characters: body wipe like, thin and black in colour; head capsule prominent with almost pointed upper and lower jaw; gill opening on the ventral side of the body, just below the head; body devoid of scales and the dorsal and anal fins are present only on the tale extremity; pre-caudal vertebra 71 and caudal 62; eyes totally absent and few numbers of cephalic pores present. Taxonomic descriptions of these two new hypogean fishes have been discussed with that of the species under the same genus described earlier.

Key words: Hypogean, *Horaglanis*, *Monopterus*, Blindfish, Kerala

Rapid Seed-based and Vegetative Propagation Methods of *Glinus lotoides* L.: East African Threatened Medicinal Plant

By

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Abstract

In vitro and *ex vitro* seed germination and vegetative propagation (by stem cuttings) have been established for *Glinus lotoides*. Seeds treated with water at 70 ^{o}C for 10 to 30 minutes or GA_3 (10^{-3} and 10^{-4} M) did not show significant ($p<0.05$) difference in germination except with the control. Seeds sown in pots containing a mixture of nursery soil, animal manure, and sand in a ratio of 2:1:0.5, respectively, germinated best (91.6 ± 0.54%) compared to other soil ratios, which showed rapid reduction in germination percentage with increases in animal manure or sand. Seeds stored for 2 months gave best germination (93.7 ± 2.0%) compared to ones stored for 5, 8 and 11 months, which showed decreases with increasing storage time. Apical stem cuttings gave the highest rooting percentages (90.2 ± 0.02%), root number (8.02) and root length (6.18 cm) with or without hormone treatment than basal stem cuttings. In general, the number and length of roots decreased with applied indolebutyric acid (IBA) concentration. The highest rooting percentage (98.2 ± 2.35%) was obtained in a rooting medium consisting of sand, nursery soil, and cattle dung, in equal proportions followed by 1.5:1:0.5 ratios of the same constituents. The percentage of survived rooted cuttings decreased with increasing age of stockplants from which the cuttings were derived. Rooted cuttings obtained without IBA treatment survived significantly ($p<0.05$). The study found that *G. lotoides* can effectively be propagated by both sexual and asexual means provided that germination media of specific are employed, and the apical cuttings derived from young seedlings are used for maximal rooting responses.

Keywords: apical and basal cuttings, germination medium, indole-butyric acid**,** rooting percentage**,** Molluginaceae

Survey on the usage of plastic bags, their disposal and adverse impacts on environment: A case study in Jimma City, Southwestern Ethiopia

By

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Abstract

Plastic bag wastes pose serious environmental pollutions and health problems in humans and animals. The situation is worsened in economically disadvantaged countries like Ethiopia. The objective of this survey was to assess usage of plastic bags and their environmental impacts in Jimma City of Ethiopia. A semi-structured questionnaire was used to collect data from 230 randomly selected respondents. The results indicated that the larger proportion (176, 76.52%) of the respondents used plastic bags more frequently than any other plastic products regardless of their age, occupation, and economic and educational status. Low price (159, 69.13%) and easy availability (152, 66.08%) were the main reasons for the widespread utilization of these products. Among the practices used for disposal of plastic bag wastes, open dumping to surrounding areas (137, 59.56%) was a practice widely used by almost all the residents of the city. Some of the major problems were animal death (167, 72.60%), blockage of sewage lines (162, 70.43%), deterioration of natural beauty of an environment (144, 62.60%) and human health problems (119, 51.73%). The findings of the present study also indicated that the trend of utilization of plastic bags is increasing from time to time in spite of a good deal of awareness of the residents about the adverse effects of these products. In order to reduce the problems associated with plastic bag wastes, it is recommended to educate the public (1) not to use plastic bags, and (2) to use eco-friendly alternative materials (bags) made from clothes, natural fibers and paper. City level legislation is also highly recommended against indiscriminate use and disposal of plastic bag wastes as well as to end free distribution of plastic bags by retailers.

Parallel Session 4: Organized by College of Public Health and Medical Sciences, Jimma University

Lead Exposure Assessment in Women Dwelling around Addis Ababa-Adama high ways in Ethiopia

By

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Abstract

Lead is one of a limited class of element that can be described as purely toxic and found naturally in the earth's crust. Most of the lead that we see today comes from human activities. Lead can also emitted significantly from brake wares, engine oils, road abrasion and tyre wears while operating vehicles. Lead has no known biological role; it is toxic in a cumulative way known to be teratogenic and carcinogenic. The objective of this study is to compare the blood lead level between people who lives relatively near busy roads and those who lives relatively far (an average of 10 km) from busy road. Cross-sectional comparative study design is used to compare 40 child bearing women who live relatively near Addis Abeba-Adama highway and other 40 child bearing women who lives relatively far from the highway. Venous blood was taken from each study group and analyzed for lead concentration to compare exposure level between women live nearby and far from busy road. Checklist and interview questionnaire were used to assess household environment and feeding habit of women inhabitants. The result of the study indicates significant blood lead level difference between the two groups and those who live near busy roads found with high blood lead level (35.11±8.14 µg/dL). Regression analysis indicates that blood lead level of study participant decreases as the distance of their household from the busy road increases. This study concludes that child bearing women who live near busy roads in Ethiopia are at risk of developing lead related health problems than those who lives relatively far from busy roads. The researchers recommends for various related governmental organization and research institutes to study the burden of lead exposure and its chronic effects around busy roads in Ethiopia to come up with better prevention and protection of inhabitant who live near busy roads for lead exposure

Family Planning Services in Public Health Centers of Jimma Zone, Southwest Ethiopia

By

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Abstract

Background: Good quality of care in family planning services help individuals and couples to meet their reproductive health needs safely and effectively. The unmet need for family planning services in Ethiopia is believed to be high (36%) while the already available services do not appear to be optimally used by potential clients. Therefore an assessment and improvement of the quality of family planning services could enhance family planning services utilization then improves maternal &child mortality.

Objective*:* The main objective of this study was to assess the quality of family planning services in public health centers of Jimma Zone, Southwest Ethiopia.

Methods*:* A cross sectional facility based study using quantitative and qualitative methods of data collection was conducted from March 1-25, 2011. A systematic random sampling technique was employed to reach the study unit at the selected service delivery points. Data was collected from 301 family planning clients ,five family planning service providers and facility inventory by trained data collectors using structured questionnaire, in-depth interview guide and observation checklist. Analysis and interpretation of data was carried out by considering linear regression.

Results*:* The mean age of the respondents was 26 years, 185(61.5%) of the respondents were from the rural area and 285(94.7%) discussed about FP with their husband/partner. The mean waiting time at the service delivery points and consultation duration was 16.4 and 10.5 minutes respectively. The providers used at least one information education communication materials in 33.3% of client provider interaction. Proportion of clients satisfied to family planning services were 93.7%. Clients' perception on adequacy of information during consultation (β=0.24; P<0.001), ease of getting the clinic site, short waiting time (β=0.17; P<0.001) and educational level (β=0.09; P =0.01) were significantly associated with overall satisfaction. According to providers' opinion shortage of some medical equipment, limited number of trained staff, lack of sufficient information education communication materials, client's awareness level on FP and providers' knowledge are factors affecting quality of family planning services.

Conclusions and recommendations: Shortages of necessary equipments and supplies were observed in public health facilities in Jimma zone. Therefore; many aspects of the quality of family planning services observed by this study need to be improved and measures should also be taken to improve the provision of family planning services through training and maintaining adequate resources.

Key words: *Family planning, quality of FP services, client satisfaction, Jimma zone*

Assessment of Clients' Satisfaction with Health Service Deliveries at Jimma University Specialized Hospital

By

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Abstract

Background: Client satisfaction is considered as one of the desired outcomes of health care and it is directly related with utilization of health services. Nonetheless, there is no adequate information on users' perception about the service provided in the hospital after the implementation of Business process re-engineering reform. Hence, the objective of this study was to assess the perceived levels of clients' satisfaction with health services rendered at Jimma University Specialized Hospital.

Methods: A cross sectional study was conducted from March 1-8, 2010 on a sample of 422 service users of the hospital using systematic random sampling technique. Data was collected using structured questionnaire and analyzed by SPSS for windows version 16.0. Statistical tests were employed where necessary at 0.05 level of significance.

Result: The questionnaire was administered to a total of 422 clients , of which, 51.7 % were male, about 33.4% of the respondents were between the age group 25-34, 41.% of the clients were illiterates, 60% were from the rural areas and 57.8 % received the service free of charge. The findings of the study showed that the overall client satisfaction level with the health services rendered at the hospital was 77%. Satisfaction was reported to be highest (82.7%) with the way the doctors examined them and on the other hand dissatisfaction was reported to be highest (46.9%) by respondents with the time spent to see a doctor. Furthermore, satisfaction with the health care was found to have a significant association with the age of the respondents (p=0.034) and educational level of the respondents (p=0.003)

Conclusion: This study showed higher clients' satisfaction level in the University Specialized Hospital when compared to previous studies in the same hospital as well as other similar studies in the country. Lack of drugs and supplies, poor information provision, long waiting time, poor cleanliness, lack of privacy and inadequate visiting hours, were found to be the major causes of dissatisfaction. Therefore, the Hospital management should understand these weak service areas and plan for a better service delivery.

Keywords: Hospital, Outpatient Department, inpatient, satisfaction.

Baseline Characteristics of HIV Cohort Receiving RUSF During Treatment with ART, Jimma, Ethiopia

By

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Abstract

Background: A randomized nutritional supplementation trial among adult HIV patients, commencing antiretroviral treatment (ART) is in progress in Jimma, Ethiopia. The objective is to assess the effect of a whey-containing nutritional supplement to HIV infected patients commencing ART on general and HIV-specific treatment outcomes.

Methods: A total of 400 HIV-patients (>18 years) initiating ART are randomized to ready to use supplementary food (RUSF) with either whey or soya, during the first 3 months or identical intervention from 3 to 6 months. Complete blood cell count, $CD4^+$ count, anthropometry and physical activity are measured at baseline. In addition, demographic, and clinical data are recorded through standardized questionnaires. The primary outcome is changes in lean body mass after three and six months, assessed using deuterium dilution.

Results: Of 213 participants enrolled at baseline 66.7 % were females, the mean age was 32.3 years$\pm$ 8.9, and BMI 19.4 ± 2.4 kg/m^2. The median (range) CD4 count was 182.5 (22-849) cells/microL. For 18 % of participants treatment was initiated with $CD4^+$ count below 100 of which 60% were diagnosed for HIV in less than 6 months before the initiation of the treatment. Eighty one percent of participants are taking Tenofovir based ART regimen. At baseline, 41% were classified as WHO stage III and IV. Co-trimoxazole was taken by 98%, Isoniazid prophylaxis by 7.4% and anti-TB treatment by 7.4% of the participants. Anemia (hb<12 and 13 g/dl for women and men respectively) was indicated in 30% of the participants.

Conclusion: Significant proportion of patients initiated treatment at low $CD4^+$ count and had anemia, which may both affect treatment outcome. Furthermore other baseline characteristics of this cohort will be presented.

Iodine Nutritional Status and Prevalence of Goiter among School Children, 6 to 12 Years of Age, in Shebe Senbo District, Jimma Zone, Southwest Ethiopia

By
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Abstract

Background: Iodine deficiency disorder (IDD) is the collective name of endemic goiter and endemic cretinism. It is a major worldwide problem, especially during pregnancy and childhood. It is a threat to the social and economic development of countries. The most devastating outcomes of iodine deficiency are increased perinatal mortality and mental retardation. Iodine deficiency is the main preventable cause of brain damage in children and constitutes a universal public-health concern.

Objective: The main aim of the present study was to determine iodine nutritional status and prevalence of goiter among school children, 6 to 12 years of age, in Shebe Senbo district, Jimma zone, Southwest Ethiopia.

Methods: A school-based cross-sectional survey was conducted in Shebe Senbo district, Southwest Ethiopia from December 1 to December 30, 2010. All kinds of schools were listed. Primary Sampling Units (3 schools) were selected from the list of all schools in the district. From the selected schools, children were selected using random sampling technique with probability proportional to their size (PPS). Each selected child was subjected to both clinical examination and urine testing for iodine level. Data were collected from the following goiter survey methods: measurement of urinary iodine status using spectrophotometer, goiter assessment by palpation, measuring iodine content of household salt and by estimating water iodine content.

Results: The children studied were severely affected by iodine deficiency disorders (IDD) as goiter prevalence is 59.1% (grade I: 35.2%; grade II: 23.9%). The median urinary iodine level was 56 μg/L indicating biochemical iodine deficiencies. The median water iodine level was 3 μg/L, indicating that the iodine content of ground water is very poor quality with respect to the iodine level.

Conclusion: The current prevalence rate of goiter/IDD was 59.1% among the school children aged 6-12 years; the iodine level in the urine showed that 83.5 % of the school children were iodine deficient. Among these 84.3% were females and 82.7% were males. Therefore, health education about causes and detrimental effects of iodine deficiency and methods of prevention, increasing the availability of iodized salt and improved surveillance programs should be the main focus for the intervention programs of this study.

Visual Impairment and Road Traffic Accident among Drivers in Jimma Town, Southwest Ethiopia

By

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Abstract

Background*:* Vision, the ability to see details clearly play a vital role in driving where good and efficient visual functioning of the driver is essential. Ethiopia has the highest rate of fatalities per vehicle in the world.

Objective: To determine the prevalence of visual impairment and associated occurrence of road traffic accident (RTA) among vehicle drivers.

Methods: A cross-sectional descriptive study was conducted on 249 sampled drivers in Southwest Ethiopia. A pre-tested and refined examination protocol was used for interview and vision test was done using Snellen's acuity chart and Ishihara pseudo-isochromatic plates. Data were analyzed using SPSS version 16 and test of associations between variables was done using chi square test and logistic regression models. P-value less than 0.05 was considered significant.

Results: The mean age of drivers was 33.6 years (SD ± 10.3). Relative frequency of self reported RTA was 15.3%. The prevalence of uncorrected binocular visual impairment was 1.6% and there was a significant association between visual impairment and RTA (p=0.012). Refractive error was seen in 7.6% and 8.8% of drivers in the right and left eyes respectively, and 3.2% of them had vision less than that is required to obtain driving license. Color vision impairment was seen in 1.6% of tested drivers.

Conclusion: Uncorrected binocular visual impairment was strongly associated with involvement in RTA. There is need for consistent inspection and screening, strict rules and regulations of licensing and health education for drivers to minimize RTA and to save the life of productive citizens.

Key words*: visual acuity, visual impairment, driving, road traffic accident, color vision*

Effect of *khat* on Bronchial Asthma

By

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Abstract

***Introduction*-**asthma is a chronic inflammatory disorder of the airways. About 300 million people worldwide were affected by asthma leading to approximately 250,000 deaths per year. Khat having amphetamine like effect induces the release of catecholamine. This study deals with the effect of khat on bronchial

Methods - comparative cross sectional study was conducted in JUSH Adult Chest Clinic on170 asthmatic patients with a 1.4 to 1 ratio of non-chewer to chewer between November 2010 and January 2010.Interviewer administered questionnaire, patient history and pulmonary function test using Spirometer was used to collect the data.

Result and discussion – of 170 asthmatic patients 72 were chewers and 98 were non chewers. Frequent asthmatic symptoms was seen on 23(31.9%) of chewers and 43(43.9%) of non chewer asthmatic patients(χ^2=2.488,p=0.11).A less frequent use of β_2 agonist was observed on 42(58.3%) of chewers and 53(54.1%) of non chewer patients(χ^2=2.678,p=0.12).Less frequent night time awake and chewing status was found to be positively associated [AOD=0.633,CI(1.778,3.059)] The mean predicted personal best of forced expiratory volume in one second (FEV_1%) for chewers and non.

Key words: *bronchial asthma, khat, clinical parameters, catecholamines*

Ethiopia's Readiness for the Introduction of HPV Vaccine

By

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Abstract

There is a new tool available in the global fight against cervical cancer, a disease with a devastating effect on women's lives worldwide. The vast majority of cases occur in developing countries, mainly because of lack of screening. Vaccines have recently been developed to prevent infection with the human papillomavirus (HPV), the primary cause of cervical cancer. Jimma University in close collaboration with PATH conducted studies in Jimma Zone and Addis Ababa to generate evidence to help policy makers and planners in Ethiopia make informed decisions regarding HPV vaccine introduction. Focus group discussions with girls, parents and community leaders and in-depth interviews with policy makers and health workers were performed. In addition, relevant reports and policy documents were reviewed. This study explored the health systems and policy context that will affect HPV vaccine introduction, beliefs, values, attitudes, knowledge, and behaviors related to cancer of the cervix, HPV, and vaccination. The current study demonstrated that cervical cancer is a major public health problem of women in Ethiopia for which there are currently inadequate intervention programs, but which can be effectively prevented by HPV vaccine. Parents and adolescent girls (vaccine recipients) are supportive of the introduction of the vaccine and are willing to receive it when available. There is a supportive policy environment for the introduction of the vaccine which can be considered as an opportunity to benefit from the new tool and circumvent cervical cancer. Schools were identified as a vaccination venue, given that there is high primary school attendance rates by girls, which could be complemented by mop up via the Health Extension Workers for the out of school girls. Findings from this study provide a valuable contribution to the decision-making process as the government considers how best to implement its reproductive health policy goal of reducing cervical cancer.

Parallel Session 5: Organized by College of Social Sciences and Law, Jimma University

The Significance of Indigenous Knowledge and Institutions in Forest Management: *A Case of Belete-Gera Forest in Southwestern Oromia Regional State, Ethiopia*

By

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Abstract

Indigenous/customary knowledge that once considered as "traditional", backward, and inefficient has been started to be seen as rational response to local environmental conditions. Many researchers have argued that sustainable natural resource management cannot be realized without considering the perceptions and culture of local people living in or near the resources. This article, therefore, endeavors to contribute the significance of local perceptions and customary institutions of local people to Forest Management with particular reference to **Belete-Gera Forest Priority Area** of Jima Zone, Oromia Regional State, Ethiopia. The study was based on the field research conducted in Gera district for two months ranging from 21 December 2009 to 21 February 2010. The findings of the study revealed that the perception of local people about ecological, economic and socio-cultural values of forest in the study area were remarkable. The study also indicated that customary institutions of the local people have played a significant role in forest management. Moreover, this article implied the importance of incorporating perceptions and existing customary institutions of resource users by policy makers during the formulation forest management policies.

Key terms: local perception, customary institutions/knowledge

1. Introduction

Traditional (conventional) approach to natural resource management in general and common pool resources like forests in particular has been subject to criticism as it failed to alleviate

resource degradations and deforestation. Many scholars from the different disciplines of social sciences have tried to demonstrate the limitations of top-down approach which totally disregards traditional local knowledge and indigenous rights of local people who have had historical connection with their resources. Top-down approach to resource management dominated the world, especially developing countries until 1980s. The paradigm shift involved in the reconceptualization of "development" as individual and community fulfillment requires not only greater devolution of power and authority to the local community level but also greater validation of traditional or popular knowledge. It has been noted that when local or popular knowledge and modern (scientific knowledge systems) meet, the latter tends to suppress the former, either by denying its existence or validity or by incorporating it without any acknowledgment (Howes and Chambers, 1980)**.** Hence, in the last decade of 20th century, political ecologists and common property theoreticians strongly challenged the conventional approach and influenced the minds of many stakeholders towards the advocacy of community-based management approach to resources as an alternative. Ignoring the knowledge, institutions and livelihoods of the local people has been found to be the major problem that has hindered the implementation of effective common pool resources management (see Ostrom 1990).

In Ethiopia too, natural resource management like forests has been under the monopoly of the government, and as a result, the state has been accounted as stewardship in forest management and its conservation. This has posed a problem in forest management from the emperors' era up to the present government. This has never stopped the depletion of forest resources and the forest has increasingly been deteriorating. Besides, local forest users have been alienated from the resource use. The protectionist approach of forest management has adverse effect on both the resources and the people who depend on the forest for their domestic subsistence.

Discerning the problem of protectionist approach, management approach to resources like forests has been undergoing paradigm shift towards the ends of 20th and in the beginning of 21st century in developing countries. Decentralizations of power, participatory management approach, considering indigenous institutions, rights and perceptions are some to mention. Ethiopia is not unique in this regard at least at discourse level although its realization has been questioned. The concept of institution has been forwarded by some scholars depending on either formality of the rules or levels of operation. North (1990) is the most frequently

cited author in this regard. According to North, institutions can be categorized into formal and informal relying on the idea of "formality of the rules". Recently, informal institutions can be used interchangeably with customary institutions, indigenous institutions, and 'traditional intuitions' with insignificant change in meaning unless it is politicized. North (1990) also classified institutions into local and beyond local depending upon the levels of organizational operations. Rules at local level are operational ones. Since the term 'local' is relative concept, in the context of this study it refers to institutions both at community level (customary institutions) and district (local government organizations) levels. Thus, in this section, the nature of customary institutions and formal institutions are discussed in relation to their contribution to sustainable forest management.

This article, therefore, endeavored to explore the significance of local knowledge and institutions in forest management in relation to subsistence mechanisms of local people. The focus of the study is Balate-Gera Forest Priority Area, Jimma zone of Oromiya regional state. The study was part of my MA thesis based on the field research conducted in Gera district for two solid months ranging from 21 December 2009 to 21 February 2010. Different tools of data gathering mechanisms were employed; structured and unstructured interviews, focused group discussions, observation and survey were utilized in order to obtain relevant and reliable data.

2. Background of the Study Area

Location and Climate: This study is concerned with the management of Belete-Gera Forest Priority Area, 150,000ha in size (JFCEC 1998), found in Jimmaa zone of Oromia Regional State. The forest consists of two disjoint forests, namely Gera Forest and Belete Forest situated in *Gera* and *Seka-chkorsaa* districts respectively. For methodological reason, Belete Forest which covers about 35,434ha of Belete-Gera Forest is not included in this study. Hence, Gera Forest area is the focus of this thesis. Gera Forest is situated in Gera district, Jimma Zone of Oromiya Regional State, Ethiopia. It is about 430 km away from Addis Ababa, the capital of the country, and 93km far away from Jimma, the administrative center of Jimma Zone, in Southwestern direction (See *Fig. 3.1 and Fig.3.2* for the location of Gera and Jimma zone). Gera district has a total land area of 14430ha within which 29 rural *Ganda* administrations and one urban *Ganda* are situated.

Information regarding land use system indicates that 56 percent of the total area of land in Gera district has been covered by natural forests. The remaining 25.39 percent is farmland

and 5 percent is grazing land, whereas uncultivable land, arable land but not cultivated yet, and land reserved for construction comprises 2.99, 4.87, and1.88 percents respectively and natural coffee covers about 3.89percent of the total land area in Gera district.

According to the data from Gera district Information Office, Gera district is bordered by Shabe Sombo district to the east, Gomma district to the north, Guma, Setema and Sigimo districts share borderlines to the west, and SNNPR demarcates to the south (see map of Jimma zone in fig. 3.3). The altitude of the district ranges from about 1400m to 3000m above sea level. It has three climatic zones that can be categorized as *Baddaa* (highland), *Badda-daree* (mid-altitude), and *Gammoojjii* (lowland) which constitute about 46.11, 50.19 and 3.7 percents respectively of total land area in the district. The area is characterized by humid climate of heavy annual rainfall that ranges from 1800mm to 2084mm, and the mean annual temperature lies between 14^0c and 24^0c.

Soil Type: According to the study carried out in Belete-Gera forest priority area by (JFCEC 1998), the types of soils in the study area are generally fine textured. *Nitisols* and *Cambisols,* often more than 100cm deep, occur in areas with gentle slopes and forest cover. *Leptosols* are found on mountain peaks, steep slopes and stream banks where soil is shallow (less than 30cm deep). *Luvisols* dominate in depressions such as marshes and low lands along rivers.

Water Resources: Furthermore, the district is endowed with many streams of water fall which are situated in different *Gandaa Administrations* of the area. These waterfalls include; ketch kimo in Gaara Naso kebele which is found 15km away from *Chira*; *Deda I and Deda II* in *Ganji–Caalla Gandaa* located 2km away from Chira, *Naso Bodiya* found in *Sadiloya Gandaa*; *Asebo* in *Gure Daco Gandaa*, *Hono kilo*, *Hareri* and '*Loogaja*' in Timba Gandaa.

Gera district has also ample rivers that flow throughout the years without interruption. This might be attributed to the suitable climatic conditions prevailing in the district as a consequence of relatively dense natural forest resources found in the district. Some of the rivers in the district include; *Dacho, Naso, Cherico, Andaracha, Etta Naniya, Gicho* and *Bore*. Mountains like *Waara kimbibit* and *Timba* are also the other resources of the district. The district has also been endowed with natural caves such as *Biche Wara* caves, *Amushe* in Secha *Gandaa, Kol-kata* in Gara- Naso *Gandaa*, and *Choroto* in *Timba Gandaa*.

Vegetations and wildlife: Gera forest is one the remnants of broad leaf moist forest in Ethiopia. Vegetation like *Bakkanniisa*, *Kereyo (Polyscias ferruginea), Kararo (Aningeria*

adolfi friedertel), Baddeessaa (Acacia nubica), Ibicha (*Vernononia amygodolina), Buttoo (Schefflera abyssinica), Sonboo*, *Sesa, Omi/Omacheessaa (Pygeum africanum), Birbirsa, Getema, heexoo, Waddeessaa (cordial africana) and Hambabeessa (Albizia gummifera)* are some of the most common species of trees found in the area.

Within the dense natural forest, there are some wild animals that are most probably under threat by different human activities carried out either in or near the forest of Gera district. The major wild lives in the study area include: Lion (*Leenca),* Buffalo(*gafarsa*), Colobus monkey (*Weennii*), Vervet monkey (*Qamalee*), leopard (*Qeerransa*), Warthogs (*karkarroo),* Bush pigs (*booyyee*), Porcupine (*dhaddee*), Civet Cat (*xirinyii*), Fox(*sardida*), Antelopes (*kuruphee*), bush buck (*bosonuu*), hyena (*warabeessa*), anubus baboon (*jaldeessa*), and ant-eater (*awwaaldiiigessa*). Elephants have disappeared with the disturbance of the forest.

Research Site: *Ganji-Caalla* is one of the 29 rural Gandas in Gera district. This *Ganda* is situated adjacent to *Chira* town, the locus of district administration, and the administrative center of *Ganji-Caalla* is located to the east of *Chira* at not more than 1.5km distance. This ganda is named *Ganji-Chaalla* after combining two Gandas, *Ganji* and *Caalla* as one Ganda in 1999.

According to the information from Adminstration of Gandaa Office, *Ganji-Chaala* has a total inhabitant of 2945, out of which 1578 individuals are males and 1367 are females. The data from the office also confirmed that there are about 440 households, as the local people call it, *Abbawarraas*. Out of those *Abbawarraas* only 32 of them are female headed where as the remaining 408 are male headed households. This dominance of males implies the significance of gender differences and its contribution to the development of socio-economic activities of the area.

There are different ethnic groups residing in *Ganji-Caalla Gandaa*. Oromo ethnic group constitute majority, which is 75 percent of the total inhabitants whereas *Amhara* is the second largest ethnic group comprising 22.5 percent. Concerning religious background, there are different religious groups of which Muslims are the dominant, encompassing 74.73 percent of the total population in *Ganji-Callaa Gandaa.* Christians come the second comprising 21.73 percent of *Ganji-Caalla*. The remaining are some other religion followers like protestant (*Ganji-Callaa Gandaa* Administration office).

The total area of land in *Ganji-Caalla Ganda* is estimated to be about 4010.75 hectares. In proportion, more than half of the land area in the *Ganda* is covered by natural forest *baddaa duudaa* (dense forest) and/or *bosona haphataa* (degraded forest). Hence, a dense and degraded natural forest constitutes 728 and 1455 hectares of land areas respectively. The remaining 1827.75 hectares of land area is occupied by *qe'ee (*homestead) and *lafa qonnaa* (farmland).

The *Ganda* has been categorized into three zones whereas each zone is also divided into Garees. Each Garee is again divided into homestead (*qe'ee)* then household (*Abbaawarraa*).

Socio-economic Background: Although there are some other ethnic groups residing in the study area, Oromo are predominantly the permanent dwellers for a long period of time. The historical foundation of Oromo in Gera district may be traced back to the Oromo occupation of Gibe region in the sixteenth century. The Oromo in this area belong to *maccaa* Oromo branch of *Maccaa-Tuulama* division who expanded originally from *Madda-waalabuu* to southwest and west parts of what we call today 'Oromiya Regional State'. As Mohammad (1994) indicates, Oromo pastoralists first arrived in Gibe region in 1570s. When they arrived in the area for the first time, they were unable to take maximum advantage of economic potential of the new environment. It was mainly after the transformation of their mode of production from pasturalism to sedentary agriculture that they were able to do this. They changed their political institutions, ideology, and mode of production to meet the demands of new conditions (Mohammad 1994). Hence, agriculture was the material foundation of Gibe region including Gera.

Oromo of the study area share common cultural heritages and speak the same language. *Afan Oromo* (Oromo language) is a widely spoken language with little variation in dialect. It belongs to Cushitic language family, which extends over most parts of East Africa. Moreover, *Afan Oromo* has been used as an official language of administration since 1991, after the collapse of Derg regime. This is, of course, true in every parts of Oromiya Regional Administrative State. In the study area, however, *Afan Oromo* is not the only means of communication among the local people. Amharic is also spoken by some individuals who are either literate or non-educated.

With regard to religion, until the first half of 19th century, the Oromo in the study area was followers of Oromo indigenous belief system called *waaqeffanna*. The Oromo in the Gibe region in general and of Gera in particular were practicing their *Qalluu* and *Gada institutions*.

However, Oromo traditional belief system, including *Gadaa institution* had already been losing its strength by the 18th century as a result of the internal "stratification" and development in coping with the existing situations (Guluma 1984). Then, Islam gradually became the religion of Oromo in Gibe region including Gera. The spread of *Islam* in the study area was the phenomenon of the nineteenth century (Mohammad 1994).This does not mean, of course, that the other Oromo were not exposed to *Islamic* influence before that time. According to Mohammad (1994), contact between Islam and some Oromo groups may be traced back to six or seven century. Furthermore, Mohammad asserted that the spread of Islam among Oromo was a gradual process usually related to trade and state formation in the then Gibe region, now called Jimma Zone of Oromiya Regional State. Oromo of Gera, the study area, accepted Islam religion in the late 1840s. Today, the religion of Oromo in the study area is predominantly *Islam.*

Kinship System: Every kinship system identifies blood relatives (biologically related or socially constructed) and relatives by marriage. In other words, except for married couples without children, all groups of relative residing together consists of "*consanguineal*" relatives, but married couples are usually regarded as "*affinal*" relatives since marriage relationship is socially the most important bond between them (Johnson 2007). Hence, kinship system is fundamental for the social organizations of Oromo in general and Oromo of Gera, in particular. Like other Oromo groups, Oromo group in the study area trace their descent through father's line. Oromo of the study area become the member of certain clan through *patrilineal descent*. There are different clans (*gosaa*) in Gera. They include *Sayyoo*, *Sadachaa*, *Dagoyyee, Dooyyuu, Qoree*, *Hawaas*, *Agalo Algaa*, *Karrayyuu*, *Awulani* and others. For individuals who are born into these groups, knowing their kin groups in the line of their fatherhood is very important for various reasons. First and for most, property right is claimed through *patrilineal descent*. Inheritance of farmland or forest land, for example, is through father's line. Second, since intra-clan marriage is exclusively impermissible, they clearly identify their *cosanguineal* kin groups of their father. Hence, the marriage type of this society is exclusively exogamous. However, there are some exceptions. There are traditional social groups such as *Tumtu* (blacksmith) and *Faaqii (*tanners) who were culturally despised as a result of their daily activities. In these kin groups, endogamous marriage was common although this trend has been subject to change in recent time. Last but not least, persons to whom they relate by kinship system may normally look for emotional support and various kinds of help in case of need. Thus, kinship system plays important role in rights of access to

resources, formation of marriage and other social organization among the Oromo of the study area.

Marriage: The formation of new household (*abbawarraa*) is marked by marriage. Johnson (2007) defines marriage as "a stable relationship in which a man and a woman are socially permitted, without loss of standing in the community, to have children." This definition is very narrow for it cannot be applied to a marriage that involves two or more spouses. Basically, there are two forms of marriage: monogamy and polygamy. *Monogamy* is the form in which a person is institutionally allowed to have only one spouse at a time. On contrary, *polygamy* is the form of marriage in which a person is institutionally permitted to have two or more spouse. Polygamy can be categorized into two: *polygny* (the institution of marriage that allows a man to have two or more wives at the same time) and *Polyandry* (the institution that permits a woman to have more than one husband at the same time).

In the context of the study area, *polygny* has been the most common form of marriage until recent time. As the elders indicate, *polygyny* was the dominant marriage type as they attached it with *shar'a* law in Islamic religion that permits man to have up to four wives. But, this trend has currently been discouraged by the government and by new generation. Moreover, the marriage relationship among the Oromo of the study area has been exclusively exogamous for intra-clan marriage is not allowed. For instance, a man from *Agalo* kin groups can get married to a girl from *Hawaas* kin groups, but he never gets married to a girl from *Agalo* groups.

Livelihood Strategy: Agriculture is the major economic activity of the local people from which they make their living. From the moment of settlement in the study area, agriculture has been the material foundation of the local Oromo. As most of them own farming land, they cultivate various crops such as *Teff, Maize, Sorghum*, twice a year. They sow maize, for instance, in February and harvest it in July, and they sow Teff in July/August and harvest it in November. This is made possible as rain prevails throughout the year at little intervals. Of course, the cultivators are not only those who have possessed their own land, but also those who cultivate by renting farmland from those groups who possess ample farmland.

There are also individuals who rely on both farming and coffee plantation as their major economic activities. These people plant coffee seedlings in their homestead, in addition to crop production, which serves them as cash crops. In the study area, these social groups are wealthier than those who rely only on cultivating crops. They do not buy anything related to

food crops as they have farmland, and the cash income obtained from coffee plantation is considered as extra income which they sometimes deposit in the nearby bank, *Agaro* town.

Livelihood of local people in the study area is also manifested in relation to Gera Forest. Some social groups are dependent upon forest and forest products directly or indirectly. Although they may plant coffee in their homestead, they also earn their income from coffee beans gathered from natural forest. Moreover, they hang traditional beehives on the trees and obtain honey produce in the natural forest. These social groups buy crops for food from the market by selling coffee or honey. They do not have farmland of their own because they are not permanent dwellers in the area. Rather, they have come to Gera for searching alternative life from different parts of the country. However, they also produce crops sometimes by renting farmland from those who have ample plots of farmland.

Livestock is another livelihood supporting economic activity in the study area. Animals like cattle, goats, sheep, donkey, mules and horse are indispensable for subsistence. In the study area, every *abbaawarra* (household) could have one or more cows in their homestead. Cows help by giving milk and milk by-products which can be sold in the nearby *ciraa* town, which is about 1.5km away from the villagers. This helps, especially women to get income with which they buy some household items. On the other hand, these animals are source of labor. Oxen, for instance, support the economy because local people use oxen for farming. Besides, oxen can be fatten and sold in the market for large amount of money. Making them fat is easy because grass is available throughout the year without interruption. This may be attributed to the availability of abundant rainfall in that locality. Sheep or goats are also means of generating income as they can be sold in the nearby market. Mules, donkeys and horses, support the livelihoods of the local people by providing transportation. They are important for the economic activities of the local community as it may be tiresome to bring agricultural products, honey, and coffee to the market center without the labor of these animals. Since labor is the most important means of production, these animals provide labor force for transporting their products from one place to another. In short, the livelihoods of people in the study area are so diverse in kind.

3. Results and Discussions

3.1. Local Perception on Ecological Importance of Forest

It seems apparent that the role of local community in development activities in general and natural resource management in particular was completely neglected before 1970s. Hardin's

"Tragedy of the Commons" misunderstood the role of local communities in governing their own common property. Hardin (1968) perceived local people as "irrational", irresponsible to conserve natural resources. It is this wrong conclusion that made local people's contributions in conserving their environment blurred, and led governments and other stakeholders to ignore local people from the responsibility of protecting their own natural resources, especially common pool resources like forest.

Thus, the response of government in many developing countries has been the creation of "Protected Area" Institutions (Johnsons and Nelson 2004). However, some scholars have started to understand the knowledge of local community, particularly indigenous community in all development activities including natural resources. Forest management is one of them. It is apparent that forest management was completely under the monopoly of state under "Protectionist Approach". The State usually considers itself as custodianship for the management of forest resources. The effectiveness of this protectionist model of forest conservation, however, has been also criticized in recent years. Advocates of protectionist approach perceive that humans and conservation of natural resources are incompatible with each other. As a result, local people are completely excluded from forest management and utilization of forest products from protected area. Hence, protectionist strategy disregards the human needs that they derive from resources and ignores the possibility that the protected resource may have adapted to human use.

There is, however, an understanding that natural resources and local (indigenous) people have been coevolved. "Current resource use is often the product of thousands of human history, and some natural systems may in fact have coevolved with social system" (Norgaard, 1994). This implies the long history of relations between humans and their surrounding natural resources like forests. The long historical relations of local people with their natural environment made them know more about the effects of forests in their area.

According to the perception of local people in the study area, forest (*baddaa daggala)* has great contribution in maintaining the stability of weather conditions. They know that the existence of forest made them enjoy abundant rain fall almost throughout the year. The sufficient availability of rain in turn provides the opportunity to harvest their crop at least twice a year. They underscore that in the absence of forest there is no rain fall, and when there is scarcity of rainfall, the possibility of cultivating crops ceases. Moreover, they know the fact that streams of waterfall are the direct and indirect consequences of existence of

forest resources in their locality. Streams and rivers like Deda 1and Deda 2 flow because of the existence of forest. Besides, key informants told me that "if we dig down the ground about 3-6 meters, with no doubt water comes out."On the other hand, this water is the base for their livelihood because it is used by humans both for drinking and cleaning, as well as for domestic animal use.

Forest is habitat not only to wild life, but also it has been the place where local people keep their animals during dry season. Besides, historical and cultural experience, majority of households in the study area have some connection with the external world through different mechanisms such as listening to radios, visiting market, or local government officials, and they were well aware about the ecological values of forest. According to the household survey carried out in the study site, all the sampled households strongly agreed on the ecological values of the local forest. This survey also coincided with the perceptions of other local people interviewed. They required forest conditions to be improved more for its non-economic benefits such as cleaner air, soil conservation and water retention rather than improving forest for economic reason such as fodder, fuel wood and timber. In this case, 54 percent of households wanted the forest to be improved for non-economic reason, whereas only 45 percent of them wanted the forest condition to be improved for economic reason out of 44 sampled households surveyed in *Ganji-callaa Gandaa Administration.*

3.2 Local Perception on Economic Importance of Forest

Forest resources are important not only for ecological values they provide, but also they are imperative in supporting livelihoods of local people living in/near forest who depend on them either totally or partially. Hence, people-forest interactions that stemmed from the issue of livelihood captured the attention of many scholars and other political activists to integrate forest resources into the development of national economy. Generating income from forest resources at the expense of ecological disturbance is possible but this may end up in environmental disturbance as a result of deforestation. The economic motivation towards forest resource by local people is the direct influence from national and market economy.

Local people in the study area were well aware about the fact that forest provides money as the source of income by selling individual trees, fuel wood or timber production. Before *Amharas* settled in the area, the culture of Oromo people did not allow cutting tree for timber or for charcoal. Moreover, the perception of local people on economic imperative is related to the belief that the existence of forest directly or indirectly affects their subsistence economy.

For instance, in the absence of forest, they perceive that life is impossible or difficult because they have strong connection with the forest for their subsistence. One of the key informants stated the importance of forest conservation as follow;

> *First there was no forest in this area. Drought, famine and disease all together adversely affected people and made them evacuate from home land. It is in response to that problem that our ancestors planted trees by bringing them from other areas. That problem was controlled by planting trees. The same fate awaits us if forest is completely destroyed. That is why we value forest and have conserved Gera forest until now.*

This perception about the importance of forest was what almost all my informants reflected in the study area. Forest has been everything for them. One of my informants also explained the importance of forest for Gera people, metaphorically as, "*Like Fish never sustain without water, Geras never sustain without forest.*" This is clear manifestation of the relation of local people's livelihoods to the forest resources in the study area.

Of course, local people have substantial awareness about both the ecological and economic values, but the question lies on prioritization. According to the views of key informants, ecological benefit should be given priority as other benefits such as economic as well as socio-cultural are the consequence of friendly environment. Climate change, which is threatening the world today, is the direct consequence of environmental disturbance, usually deforestation and natural resources degradation. The global consequence of deforestation is even understood at local level as this case study reveals.

3.3 Local Perception on Socio-cultural Importance of Forest

Forest also provides cultural or social values. It is clear that forest is important for recreation, walking through, religious and other purposes. Many trees are perceived as sacred forest. Sacred trees are conserved for they provide scene for worships under their shades. Blessed trees are not only important for the place of worships but also they function as place where conflict resolution takes place by local elders (*jaarsa biyyaa*). In the study area, for instance, *qilxuu (Ficus vasta)* is well known tree species under which mediation (*araara*) of two individuals or groups in conflict has been carried out. Others consider planted trees as their "*child*", especially if they could fail to get children in their life time. Out of the total 44 sampled households, 81.8 percent of them believed that forest is somewhat important for cultural values. They were also well aware about the importance of forest as a source of

"traditional" medicine (*qoricha aadaa).* Workineh (2001) rightly argued that Ambo Oromo have a considerable knowledge of indigenous medicines usually extracted from different plants (forest) for the healings of both humans and animals. This view is equally true with the Oromo of the study area as I have confirmed through my field research.

Broadly speaking, the economic and ecological importance of forest is socially and culturally constructed, and, therefore, the perception of local people about the forest importance was holistic rather than isolated entities. This kind of perception made the local people more responsible on forest conservation than any other external agents.

3.4. *Abbaa Lagaa, Shanee* and Forest Conservation

Natural resource management institutions exist throughout all Oromo areas including Gera, the study area. However, their development over time, organizational structure and functions is spatially and temporally subject to change. In this study I focus on customary institutions of Oromo people in Gera district based on the information obtained from key informants. They are known locally by variety of names; *Abbaa Jigaa*, *Abbaa Lagaa* and *shanee*. The name *Abba Laga* is the most frequently used in conjunction with local social and economic affairs including conservation of natural resources. In the past, *Abbaa Jigaa* also called *Abbaa Tuulii* was the higher authority to which complaints appealed if they were dissatisfied by the decision made by *Abba Lagaa* and *jaarsa biyyaa(*mediators). At present *Abba Jigaa* is not functioning and hence it is not discussed in this article.

The extent (if any) to which *Abba Laga* had played a role in the traditional Oromo Gadaa system of administration prior to the Menelik conquest in the late 19th century remains unclear. The Gadaa system of public administration was itself brought to the then Gibe Region (now Jimma Zone) during the Oromo expansion to the area in 17th and 18th centuries although its form and application varied from place to place. It was essentially a traditional socio-political institution in which the male members of each community progressed through different life 'grades', each with its own associated rights and responsibilities.

Within the system, one grade ruled for 8 years, before being replaced by another and, within each 8-year period, an *Abba Gadaa* (father of power), *Abba Dula* (father of war) and *Abba Sera* (father of the law) were elected (Mohammed Hassan, 1994; Watson, 2003). Whilst there is no documented evidence on *Abba Laga* playing an essential role in the *Gadaa* administration, it is probable that *Abba Laga* was a title instituted when and where the need to coordinate land use occurred. In the present day Borana zone in southern Ethiopia, where

remnants of the *Gadaa* system still exist, Watson (2003) reports that *Abba Konfi* (father of the well) regulates access to water, yet there is no indication that the title is intrinsically linked to the Gadaa life grades system.

Eventually, in western Ethiopia, the *Gadaa* system was gradually eroded as a result of internal socio-economic development and the emerging local warlords (Guluma 1984, Lewis 1964). Hence, the administrative system of *Gadaa* institution disappeared some years before Menelik's conquest of the then Gibe region. The origin of *Abba Laga* is, therefore, uncertain, and necessitates further investigation. What appears different to the traditional Gadaa administrative roles, however, is that the title *Abba Lagaa* is now used to describe both the institution itself that is made up of participating local people, and the appointed head of the institution, rather than just the latter as during the *Gadaa* era.

According to the perceived views of local people, *Abbaa Lagaa* has been the powerful customary institution accountable for the life situations of all local people grouped under the same '*laga*'. *Laga*, here, refers to both the specific spatial area and the people living in such territory. In other words, *Lagaa* means local people who belong to the same village in specific territory and share the same leader (*Abbaa Lagaa*). Literally, *Abbaa Lagaa* is the 'father' of all individuals in his territorial area (village), and therefore it is assumed that *Abbaa Lagaa* is respected among the villagers as the father of the family is respected among his family members. *Abbaa Lagaa* institution can be best comprehended in the same way "*abbaawarraa*" institution is perceived among the local people of the study area. In the study area, *abbaawarra* (household) refers to both household head and household unit (institution) itself.

Abbaa lagaa institution performs its duties and responsibility in collaborating with other lower structures called *Shane*. There are three to four *shanes* in a single *Abba Lagaa (village)* and three to four *Abbaa Lagaas* in *Gandaa* Administration. In the specific research site of this study, *Ganji-Caallaa gandaa*, there are three *Abbaa Lagaa* and each *abbaa lagaa* has three *shanes* with which they work. Thus, *shane* refers to smaller groups of *abbaawarraas* (households) organized as sub-unit of *Abbaa lagaa*. Each Shane has one representative with whom *Abba Lagaa* communicates about the social affairs of his village (*laga*).

Abbaa lagaa performs the following social functions that indirectly contribute to the forest management: executing the burial ceremony of the dead; mobilizing the local people for constructing home for a person whose home is destroyed by fire; constructing houses for poor

powerless persons; and resolving conflicts among individual or groups. Because of his social capital and capacity to persuade people, local people respect any order that comes from the *abba lagaa*. Hence, in the practice of constructing houses, the role of *Abbaa lagaa* is great in deciding on the kind of house to be built, and what type of tree species is used for the construction. Tree species such as *Buttoo (Schefflera abyssinica), ibicha (Vernonia amygodolina), baddeessaa (Acacia nubica), Omacheessaa (Pygeum africanum), qararoo (Aningeria adolfi-friedera)* are very valuable because they are used for honey production. Therefore, they are not used for the purpose of house construction and other domestic uses. This implies that these trees are preserved for their invaluable economic contribution to the livelihoods of the local people. According to my key informants, before Coffee was well known as income generating crop, honey was the basic income generating produce for Gera people. For this reason, some trees in the forest as well as in their homestead area have been valued among the local people. The respect (*safuu*) given by people to those trees makes them stay and expand by natural regeneration. *Safuu* is an important concept in the beliefs and practices of Oromo (Workineh 2001). The Oromo believe that *Safuu* involves avoiding embarrassment, bad conversation, lying, stealing and working on holidays. Hence, *Safuu* is respecting one another or giving respect to other things like river, mountain, and trees. for their valuable importance. That is why trees like *Buttoo (Schefflera abyssinica), Bakkanniisa (Croton macrostachys)*, and *Qararoo (Aningeria adolfi-friedera)* are abundant and sustained until now in the study area.

Other species of trees such as *Qilxuu (Ficus vasta)* are valuable for they symbolize peace as local people sit down under their canopy and mediate people who are in conflict. The other equally important culturally adopted mechanism of tree conservation is that some trees are important for coffee shade. Those tree species have characteristic features of shadings leaves during heavy rainy season and growing leaves during the dry season when coffee plants need shade. Hence, trees species such as *Gaattiraa (juniperus procera), Kombolcha (maytenus ovatus)* are used for the construction of houses and/or fences or other domestic materials.

Other equally interesting issue is that some trees are important for burial ceremony in the study area. According to the culture of local people, the dead body is put into the grave and covered with *leedii* to protect the soil from leaking into the grave. *Leedii* is thus trees prepared for burying the dead. Local people do not use other valuable tree species for the grave except *hambabeessa (Albizia gummifera)*. This indicates how customary institutions of

the local people shape their behavior towards effective utilization of forest resource and thereby conserve the forest.

On the other hand, "permanent" Oromo residents in the study area do not extract timber from the forest. This is possible because they give priority to the other non- economic values of forest than of economic values. The other reason is they might not be aware of timber production. One of my informant reported that 'timber' production is a recent phenomena to their locality after some individuals came from other places, especially the Northerners and the *Shewas*. The other important culture of Gera people that contributed to forest conservation is that they never chop down trees for charcoal burning. As it is well known, charcoal is the basic domestic fuel for the people of Ethiopia. However, charcoal burning practice was minimal in the study area.

Gera people, however, use either self fallen trees or dead woods as firewood for the purpose of domestic fuel. They also occasionally collect dead woods and sell them in the nearby town, *Chira,* as fuel wood although this happens seldom. This selective approach to the collection of fuel wood in the area also contributed positively to the conservation of forest. As women primarily engage in the practice of fuel wood gathering, they are well aware of not to cut down live trees for the purpose of fuel wood. Moreover, the practice of cutting trees for house construction and some other household furniture remain the duties of males. However, they were wise enough to choose among trees species appropriate for house construction. Some tree species were never cut down for the purpose of construction or households furniture as they have other more important functions in that specific area.

This cautious utilization and conservation of forest resources has been historically and culturally rooted in the traditional institutions developed over generations by the local people. The intimacy of human beings and natural resources is not new for African people in general and Oromo people in particular. Oromo views toward natural environment have been considered valuable. Their valuable local knowledge of resources like forest for sustainable development and management seems an exemplary to others. For its soundness, the relative high forest area existing in Oromiya constituting 63% (WBIPP 2004) of the total forest area in the country, which made first out of total regional states, seems evidence. Currently, the remnants of forests in the country are found in areas where customary institutions and knowledge are relatively in practice although 'modern' economic oriented systems have been weakening those traditional natural resources management institutions.

Despite such constraints, local people have developed the tradition of natural resource management systems because they have close interaction with forest for a long period of time. Gera people too have traditional leadership setups such as *Abbaa Lagaas* that are responsible for regulating natural resources and other socio-economic concerns. Violations of the regulations of forest conservation existed for generation results in different social sanctions. Since such social sanctions alienate the violator from any social organization, local people obey the traditional systems of resource utilization.

On top of this, in traditional systems of natural resource conservation, local government authorities have been using the traditional leader's social capital for execution of state programs and policies. For instance, in my research site, *Ganji-Caallaa Gandaa* administration, there are three *abbaa Lagas* each at their respective three zones: *Caallaa*, *Guree Ganjii* and *Warwarii*. Each *abba Lagas* at their respective zone has dual purposes. First they represent traditional leadership system of the local people. Second, they have manipulative functions for the execution of state programs and policies. The government authorities at local level do this for they know the acceptability of this traditional leadership among the local communities.

Although cooperating with local government authorities on the conservation of natural resources (forest) seems encouraging, the strength and power of customary leadership is being eroded. The social sanction enforced by traditional institution, *Abbaa Lagaa*, on an individual who do not comply with it can be reversed by government authorities, but the reverse is impossible. So, this kind of power imbalance finally, with no doubt, leads to the collapse of traditional system, and replace totally by state institutions.

To sum up, the vitality of customary institutions in natural resource management (forest) was apparent as it is indicated in this paper. Local people were well aware about importance of forest resources that have cultural, material and spiritual significance for them. Today, it seems clear that the relative abundant forest area in the country is found in areas where remnants of traditional institutions have still existed although they have been under the threats of "modern" intervention. Ninety five percent of high forest areas are found in Oromiya, South Nations Nationalities and Peoples of Ethiopia and Gambela regional states (WBISPP 2004) where cultural institutions are still relatively strong compared to other parts of the country. These regions have well developed traditional systems of natural resource management as the people of these regions have close interaction with their natural resources.

In the study area, traditional social obligations were more respected by the people than the institutions created and enforced by the government. But, modern protectionists in forest conservation poorly understand the valuable knowledge of local people about forest management. However, customary resource management systems often developed over time through a process of cultural learning and adaptation seems successful in generating appropriate local institutions for sustainable forest management.

Conclusion

This study explicitly indicated that the role of local perception of forest resources values and its management contributed positively to the conservation of Belete-Gera forest. The local people in the study area were well aware of the fact that forest was the integral part of their life. Besides, indigenous institutions and cultural understandings of the forest land tenure system was still feasible in playing vital role in forest conservation.

The study also portrayed the significance of access right to resources and ownership right to forest management and its conservation. Although natural resources like forests belong to state by government proclamation, the local people perceived Gera forest as their own common property. They perceived as their own property because the forest had never been completely detached from their hand, and above all they had the strong belief that the forest had been founded by their ancestors.

The recent participatory management of Belete-Gera forest priority area project considered the cultural institutions of local people on forest management, and the local people themselves were happy with it. However, the more recent problem has emerged when forest resources were given to State Enterprise. In this case, local people were very skeptical about the access, use and property right they had been enjoying. Furthermore, expanding investment activities in the forest had negatively affected the forest resources and the poor forest users.

Therefore, this study strongly stressed the importance of considering local knowledge, customary institutions, and subsistence mechanisms of local people in sustainable development of forest management.

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Some Aspects of the Life and Activities of Moti (King) Abba Jifar II (1861-1934) of Jimma Kingdom

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Abstract

This research work principally deals with a biography of Abba Jifar II (1861-1934) of the Jimma kingdom. The work will not, however, be a simple narration of his life history. Attempts have been made to investigate the major social, economic, administrative and political achievements and challenges of Moti (King) Abba Jifar II. The assessment is on the pre-1882 period when Abba Jifar ruled Jimma as a sovereign king (1875-1882) and is extended to the period after his submission to Menilek in 1882 up to his death in 1934. The Oromo began inhabiting the Gibe region since the end of the 16th century. Like their former times, the Oromo continued to administer themselves by their age-old socio-political organization, i.e. the gadaa system and the moiety clan-lineage (kinship) social structure. But by the middle of the 18th century the process of monarchical state formation was started in the Gibe region. In Jimma, particularly, an elected gadaa official (Abba Dula, war leader) by the name of Abba Faro began the process around the mid of the 18th century. Yet, the state of Jimma was apparently founded with most of its institutions by another Abba Dula, Abba Jifar I (Abba Jifar Gudda,) the third successor of Abba Faro, who ruled the kingdom between 1830 and 1855. Abba Jifar II (Abba Jifar Xinna) took the leadership of Jimma at a crucial time. Just a few years elapsed between his assumption of power and Menilek's troops pressure on the Gibe region. Abba Jifar II submitted without fighting in 1882 and subsequently Jimma became an autonomous province under Menilek. The future social, economic, political and other developments of the Jimma kingdom emanated from this peaceful submission. Through his submission, Abba Jifar II had maintained his power. He also safeguarded his people from the hardship of the gabbbar-naftagna system was imposed on the other southern peoples following their forcible incorporation (annexation) into the expanding Ethiopian empire-state. Thus, the study attempts to investigate social, economic, political and other developments under Abba Jifar's kingship before his submission and as a vassal of Menilek, and his

successors up to the first four years of Emperor Haile- Selasse. This article reflects on some aspects of the life of Abba Jifar for the sake of space. The detailed work of Jimma Kingdom and its popular king Abba Jifar II will be published in another work very shortly.

Jimma Oromo Nomenclature and Genealogy

Before treating the major topic of the article let us start with the Gibe region nomenclature. Of course, the region's nomenclature has been unique among the Oromo.[1] Boys after birth were given Oromo names (Tullu, Gutama, Gamada, etc.). After the introduction of Islam, Islamic names like Hussein, Hassen, Ahmed… were given. The sons of nobility and royalty were also given the compound names started with Abba "(father of or owner of…)" like Abba Jifar, Abba Dula, Abba Bulgu…[2] In literary works, these names are generally described as horse names. Lewis and other writers state that Abba Jifar means "father of the dappled horse."[3] But oral informants in Jimma emphasized that these compound names are honorary names. They were often given on the morrow of wedding at the ceremony of *Buna Maqa Mogessa* (the coffee of naming). The names were given by grandfather of bridegroom or elder brother or any other senior member of the family.[4] These compound names are said to have established relations with Islamic names already bore. Muhammad is said to have been given to Abba Garo; Abdella to Abba Jobir, Abdurahman to Abba Dula, etc. During Abba Jifar II, men of noble birth frequently took such names. This was the case even after him. The same is true for the women of noble birth who also got the name of respect; *Hadha* "mother of or owner of …" followed by another additional names.[5] It appears that literary materials have not offered consideration to the dynamism of nomenclature that occurred over time in the region. Possibly before the 19th century Abba compounded with the second name indicated only horse name. But it is apparent that during Abba Jifar II and thereafter such names came to be given to show high social status (dignity).

This type of nomenclature has its origin likely in Oromo tradition, particularly, the *gadaa* system. This can be demonstrated by the titles of the *gadaa* officials which started with Abba followed by a particular duty of the official. For example, Abba Dula '(father of war or in charge of defense), Abba Boku (father of scepter)…" The title of Jimma kingdom's officials and the names of many of its people also began with Abba. However, during Abba Jifar such names were not horse names but names of dignity and social respect. Thus, Abba Jifar is the name of honour not the name of his horse and no other men in the kingdom was allowed to

take this name. Of several names the king had, Abba Jifar is the most widely used in literary and oral sources.

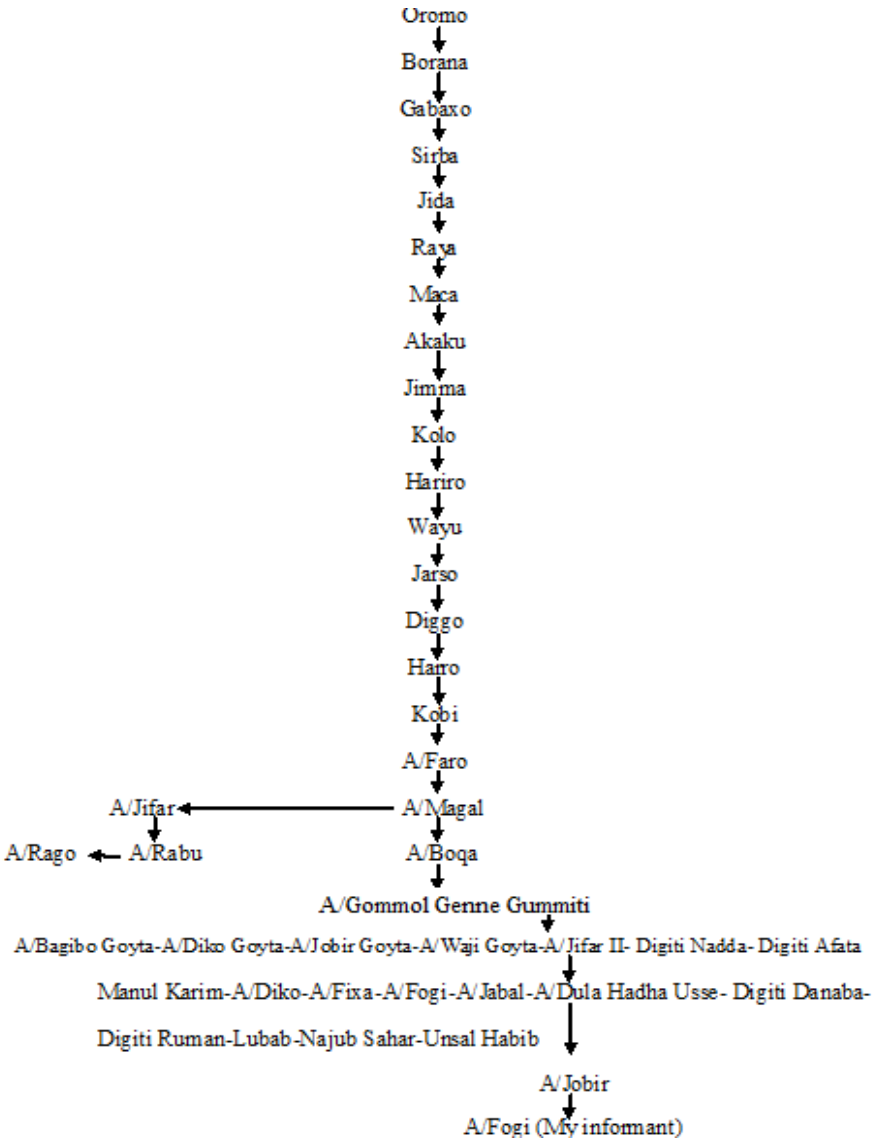
Marriage and Genealogy

According to Islamic *Sharia*, it is permissible to marry up to four wives at a time. This is the case as long as the husband could give his wives equal love, share of wealth and treat them in other aspects with complete equity. Abba Jifar II had four wives. The following were the consorts of Abba Jifar according to chronological order of marriage to the king from the first to the last:

Genne Jarsiti Queen of Jarso clan
Genne Limiti Queen from Limmu
Genne Minjiti – Queeen from Kafa royal family
Genne Saphertiti-Queen from Saphera clan of Limmu, and
Genne Hadha Kedir[6]

As already cited, the Queens of Abba Jifar were not called by their family given names. Instead, they were granted upon marriage to the king the compound names. The first one, *Genne* (also called sometimes *Gifti* meaning Queen in English or *Itegue* in Amharic). The surnames referred to their genealogical background except that of Hadha Kedir whose name is the appellation of honour that she was given when she was bride.[7] The first wife of Abba Jifar died early just giving birth to their eldest son, Abba Dula. Abba Jifar thus passed most of his time with the remaining three wives before he married his last wife, *Genne* Hadha Kedir. It is said that he did have also concubines,[8] about which informants are unable to say much.

The queens had undoubtedly noble birth, but not necessarily daughters of kings. One of them, *Genne* Jarstiti was from Dedo within Jimma kingdom proper. The second wife herself was the daughter of the brother of the king of Limu-Enariya, Abba Bagibo (Ibsa), the renowned king of that kingdom between 1825 and 1861. *Genne* Haddha Kedir was originally form low birth in Hadiya.[9] Hence, the marriages of Abba Jifar II did not fully seem political marriages. Inter-state tensions and confrontations were not there and as such political wedlock had no paramount importance. It is said that Abba Jifar had a plan to be in-law with *Kawa* Tona of Walaita kingdom.[10] This was actually to be king to king marriage without much political significance.



As for the names and number of the sons and daughters of Abba Jifar, all the five wives gave birth including the last one, according to my informant. In total, they were more than a dozen. Their names with their respective mothers will be cited in the genealogical tree which is indicated below. Here it suffices to state that, the daughters of Abba Jifar were offered in marriage to his own notables (*mostly Abba Qoros)* by the good will of the king. This was done exclusively by Abba Jifar II without any question from his future in-laws. To mention some, his first-born daughter was given to a certain *Ulama* by the name of *Haji* Bilfe whereas Abba Bulgu Abba Garo was related in marriage to the other daughter Hadha Usse before he lost her to *Lij* Iyyasu. He gave his sisters in the same way; Digiti Nadda and Digiti Afata married the notables of newly incorporated mini Garo kingdom whose leaders were given important administrative positions in Jimma kingdom. [11] This was to boost internal integrity

of the kingdom. Hereunder is the genealogical tree of Abba Jifar II and in effect the Oromo of Jimma.[12]

The males whose names begin with Abba were married ones. Similarly females having the first name of Hadha and Digiti (derived from Diggo clan) indicate marriage as well.

Each wife of Abba Jifar had her own separate residence with in the compound of the palace, which covered about ten hectares. Their houses are said to be magnificent and spacious and very well built. According to *Genne* Hadha Kedir, the servants [slaves] attached to one house alone numbered up to five hundred. The queens also had their own Abba Qoros for home affairs. Their estates, domestic animal, jewellery and other property were immense. Hadha Kedir could not list all what she herself owned. She simply said it was innumerable.[13] The wives of Abba Jifar had an exclusive right to wear gold jewellery which was forbidden for others in the kingdom, except for few insignificant wives of the notables. Even selling gold was prohibited in the market.[14] This was possibly due to its scarcity in the kingdom.

Abba Jifar passed the night with his wives turn by turn (*Agiyo).* He did pass two successive nights with one wife and the same number of nights with others likewise.[15] It is surprising that the king himself did not go to the wives' houses. It was the other way round i.e., the women went to him. There was no ignoring of the *agiyo* (night-turn)[16] According to *Genne* Hadha Kedir, Abba Jifar was in good terms with his wives. However there was no place for them in the political hierarchy and they could not influence decisions. That was only for his mother, the most influential woman in Jimma kingdom's history.[17]

The Palace Life

The feeding of the whole members of the palace and other attendants was rotating with the *Agiyo.* The consort of the *Agiyo* did provide the food from her own private possessions. This was accomplished by her own slaves. Abba Jifar did eat his dinner with his wives in relative exclusion while lunch was served with his notables. It is said that up to nine animals (including *Sanga,* fattened oxen) were slaughtered for a meal.[18] There was orderly way of arrangement of dish service. The notables of Abba Jifar, his brothers, ministers, Abba Qoros and other distinguished guests who were there during lunch (up to thirty individuals) did it sit with the king on the principal table in the *mana sanqa*, the "house of the table". Next to the principal table in the same house sat other peoples according to their rank. The table (*Madi)* of Soressa (wealthy), *Jabarti* and *Jagna* (soldiers) are well known.[19] The kinds of food

prepared for one meal were diverse and numerous; up to forty five.[20] The *watt (itto)* the king had twice would be ear marked and the cook who prepared it would be rewarded. It was just rich and orderly dish.[21]

The palace life was clearly grandeur for the royal family. But the slaves themselves lived there in favorable situation. Informants have to tell that many individuals abandoned their houses and joined Abba Jifar's service as slaves attracted by better treatment and living conditions under his custody. In fact, Abba Jifar settled slaves at different areas in the kingdom not only in the palace.[22]

The palace had its own administration. The official called *azaj* "(commander)" in Amharic was at the apex of the hierarchy. He was mainly concerned with feeding the palace people.[23] Moreover; the palace compound was guarded by soldiers at every gate. At the principal gate, *Kella Guda*, fifty were assigned at the time. The more trustworthy ones stood over the tip of the palace (*Foqi Kella)* above the first floor. At once four were allocated to the four "windows," facing four directions (east, west, north and south). They were twenty four guards who regularly guarded from the watching windows (see Fig. 1) .[24] Abba Jifar is said to have about one thousand five hundred personal bodyguards who lived around the palace. Hence, all sorts of people from slaves to king lived in Jiren in and around the palace at Jiren. This made the life there lively and interesting. On the whole, there was orderly living condition at the palace in which every one knew his/her responsibility.[25] Darley puts the palace actually as "cleaner and better ordered, in every way, than the palace… at Addis Ababa."[26] There were forums of entertainment for the king and other people living there. The king did enjoy wrestling of young selected men conducted at empty space by the palace. It seemed ancient Greece gladiatorial game. There is veranda from where this game could be seen on the first floor.[27] Abba Jifar II had also his own 'band' which would play for him whenever he needed it.[28]



Fig. 1 The magnificent *Masara (palace)* of Abba Jifar II at Jiren overlooking Jimma town

Personal Wealth

Regarding the personal wealth of Abba Jifar, there was no clear distinction between government revenue and that of the king. Because according to Mohammed Nasser, Abba Jifar spent his personal wealth on government works but not the reverse. The major sources of government income was generated from taxation as already been assessed. The king, however, had land as a major source of income. It was believed that he inherited the land from *Diggo,* the pioneer occupant of Jimma and its surroundings. Abba Jifar also claimed any uninhabited land along river banks, big forests, etc. He settled on these lands his slaves numbered up to fifteen thousand, hundreds of Amhara and certain Tigre servants.[29] However, the king was not owner of the entire land of the kingdom like Kafa, Swaziland and Ethiopian emperors of the medieval times. Instead, he was the biggest *Abba Lafa* (owner of land). He had also special right to tusk of elephants, skins of lion, horns of buffalo, and other hunted beasts in his kingdom. Hunting elephants and buffaloes could be done with the sole permission of the king.[30]

Most slaves were obtained through trade with southern non-Oromo kingdoms such as Kafa and Kullo. Trade in slaves did exist prior to Abba Jifar II but it reached its peak after Menilek's conquest of the Gibe region.[31] It remained essential commodity for some years to come. It was believed that it continued to be important sources of Jimma's autonomy from 1882 onwards and prosperity. This was due to the fact that slave merchants from the south

also brought a large quantity of ivory which Abba Jifar paid to Menilek along with other commodities. Stoppage of trade in slaves would devoid Abba Jifar of ivory he supplied to Menilek to maintain his autonomy. Jimma, in particular, its Hirmata market, is described as the largest slave market in the southwest.[32] This means that the conquest of Menilek aggravated trade in human beings until Menilek himself promulgated its banning. Slaves in Jimma were largely settled on the king's land (*Yabbo).* Abba Jifar had above one hundred-fify *Yabbos.* Each yielded thousands of quintals of variety of crops per year produced by slaves. During crop failures Abba Jifar gave it out to the peasantry.[33] There were also a number of cattle rearing centers (*Darebas)* for the king where thousands of animals were raised. The animals slaughtered at the palace came from these centers which scattered in the kingdom. Abba Jifar also had *gagurtus* (bee-keepers) which supplied honey to the palace and for tax payment. Plantations of coffee, cotton and pepper were also encouraged and expanded. These plantations were run by slaves.[34] Jimma kingdom basically had agrarian economy backed by trade and local industries. In Jimma's political economy slaves played significant role. There were also soldiers, officials and also farmers, particularly on the king's land.[35]

Physical Appearance and Character

So far Abba Jifar's wealth, palace life, his genealogy and family have been delineated in this work. It would be proper to treat to a certain degree the physical appearance and character of Abbba Jifar to understand more about him.

In fact, Abba Jifar's age was an age of photography. Today his photographs can be found at so many places in Jimma in particular. However, how good the photograph of the time could display somebody is another question. Thus, it would be appropriate to describe the king in brief physically and characteristically. Abba Jifar has been described by informants as handsome and charming. He was so tall that he could be seen when he stood in the mid of his companions and at any large gatherings. He was also huge; the size which matched with his height.[36] Abba Jifar had bright yellow "(red)" face and straight nose. Appreciating his lovely appearance the Bacho Oromo of Woliso area had the following to say: "*Moti Jimma nama mo waqatu Dhalche*.[37] Who has begotten the king of Jimma, human being or God?"

A number of my informants had seen Abba Jifar. All of them expressed their admiration for his physical appearance.[38] Some travelers also witnessed this.[39] One of them displayed him as diplomatic and handsome in the 1880s:

> He is of delicate complexion, with hands and feet very small. His face pronounced, almost white, is beautiful and sympathetic one would say that of a baby. He has cuttings on his eyes which had given them a definite shape and from them come sweetness….[40]

Abba Jifar clothing's included locally made trousers, loose garment, loose and long overcoat costume. He appeared usually in turban and Islamic dresses (Fig. 2 below).[41]



Fig. 2 Abba Jifar II seated wearing traditional costume

Abba Jifar was hospitable and generous to guests, foreigners or locals and the needy as a whole. Informants and documentary sources confirm this. He is said to be intelligent, inquisitive and open in his manners. He did not hesitate to ask questions he deemed worth being asked.[42] Cerulli and Darley had undergone serious questions of Abba Jifar. He particularly inquired about contemporary issues not only of his kingdom and Ethiopia but of the world in general.[43]

The Last Years of Abba Jifar II

Abba Jifar fell ill for almost seven years since 1927. These long years of ailing, he spent in the house of his last wife, Hadha Kedir. The disease which ultimately took away his life is said to be internal.[44] The remarkable king drew his last breath on 19 September 1934 at the age of seventy-three.[45] Unfortunately, Berhanena Selam news paper does not give coverage of the death of one of the giant figures of the 19th and early 20th centuries Ethiopia.

His body was laid to rest to the west of the palace (see Fig. 3 below). The cemetery where Abba Jifar's body lies is seen today near the Mosque of Afurtama. It is also where the tombs of his father, grandfather, other kings and other notables are found.[48] Informants say that, he died in distressed situation giving up power some years back to attain salvation as he wished.[47]



Fig. 3 The Tomb of Abba Jifar II located to the west of his palace on the way to Jiren

Although Abba Jifar had already designated his successor in 1928-29, Emperor Haile Sellasse I did appoint his own governor, the first non-Oromo governor in Jimma, *Dejach* Wolde Amanuel in 1933.[48] Haile Sellasse put in prison Abba Jobir, the grandson of Abba Jifar who was willing to succeed to the postion of his father, Abba Dula, who declined to take. Thus, before the death of Abba Jifar, the autonomy of Jimma which had lasted for almost half a century was annulled and the kingdom was made a province.[49]

Abba Jifar II is in the minds of every body and even on the lips of many in Jimma Oromo up to now. Because he was the last most remarkable king of the autonomous Jimma kingdom. For Jimma Oromo, the economic achievements and the good administration of the time recall them also a glorious age associated with him. Before closing this chapter, it seems proper to quote Henry Darley at some length to illustrate the above statement:

> …if he dies [Abba Jifar II], his memory will never disappear from the minds of his people. Because he did not only save them from the

> plundering and killings of the Abyssinians but also he consolidated trade, made them happy and prosperous self-governing people in Africa….[50]

Notes

[1] It is known that among the other Oromo groups, single names were given after birth: Tullu, Gutama, Hassen… Such names are used for life. After marriage, both men and women can be called by name of their first-born son or daughter as *Abba* or *Hadha*… This is just for social respect. For official (formal) purposes only the name given upon birth is used. This is true for many Ethiopian societies.

[2] Informants: Abdul Karim Abba Garo, Abba Jihad Abba Godu, Hadha Kedir and others.

[3] See among others Lewis Herbert, *A Galla [Oromo] Monarchy: Jimma Abba Jifar, Ethiopia 1830-1932*, Madison, 1965, p..19; Enrico Cerulli, ''Etiopia Occidentale (Dallo Scio Allo Frontiera Del Sudan'', *Note Del Viaggio 1927-1928* ,Roma, p.73.

[4] Informants: Abdul Karim, Abba Jihad and Hadha Kedir.

[5] Ibid.

[6] Commonly known information by Jimma elders.

[7] Informant: Hadha Kedir.

[8] Informants were lunatic on Abba Jifar's affair of having concubines. But see Lewis. p.77.

[9] Informants: *Haji* Abba Bor Abba Dula, Abdul Karim and Abba Fogi Abba Jobir; Bahru Zewde, *A Short History of Ethiopia and the Horn*, ed. Addis Ababa, 1998, p. 119.

[10] Informant: *Balambras* Abba Garo Abba Simbo.

[11] Informants: Abba Garo Shekh Mahmoud, Abba Maca *Haji* Said Kabire, Abba Bulgu Abba Dula and others.

[12] Informants: Abba Fogi, Abba Garo, *Balambras* Abba Garo and others.

[13] Informants: Hadha Kedir and Abba Garo.

[14] Mohammed Nasser, '' Economic History of Jimma Abba Jifar 1878- 1930'', BA thesis (HSIU, Economics, 1973), pp.34 and 41.

[15] Lewis, p.71; informants: Hadha Kedir and Abba Garo.

[16] Informant: Hadha Kedir. Under polygamous situation the occurrence of not respecting their turn *Agiyo*, in Jimma, *Kore* in Arssi, would cause serious trouble among the wives. So, Abba Jifar's respecting it would show his harmonious relationships with his wives and also peaceful atmosphere among the co- wives.

[17] Informant: Hadha Kedir.

[18] Mohammed Nasser, p .92; Lewis, p.71; informants: Abba Garo, Abdul Karim and Hadha Kedir.

[19] Ibid.

[20] Mohammed Nasser, p. 92. Mohammed further relates that the king did not eat from all kinds of food on the table. But all known types of food were prepared since it was considered a taboo to reply negatively in case he asked for certain type of food. As a result, all types of food known were prepared.

[21] Informant: Abba Garo.

[22] Informants: Abba Gidi Abba Garo, Abba Bulgu and Sheik Muhammad Awal.

[24] Lewis, p.71.

[25] Informants: Abba Garo, Abdul Karim, Hadha Kedir and others.

[26] Henry Darley, *Slaves and Ivory in Abyssinia*, London, 1935, p.128.

[27] Buli Ejata, ''Seena Masara Abbaa Jifaar'' in the possession of Jimma Zone Information and Culture Office, p.14. The veranda and the empty space for this can still be seen.

[28] Max Gruhl, The Citadel of Ethiopia, The Empire of the Divine Emperor, trans. F.D. Morrowa and L.M. Sie Veking, London, 1932, p.,152; Arnold Wienholt Hodson, *Seven Years in Sothern Abyssinia* (London, 1927).

[29] Mohammed Nasser, pp. 99-92.

[30] Lewis, p.76.

[31] Informants; *Haji* Abba Bor, Abdul Karim, *Balambras.* Abba Garo.

[32] Darley. pp. 196-197, Lewis, pp. 57 and 66.

[33] Mohammed Nasser, p.91.

[34] *Ibid*; p.92; informants: Sheik Muhammad Awal, Abba Garo and Abba Maca.

[35] Tekalign Wolde Mariam, ''Slavery and Slave Trade in the Kingdom of Jimma (ca. 1800-1935)'', MA thesis (AAU, History, 1984), pp. vi and 56.

[36] Informants: Hadha Kedir, Abba Bulgu, Abba Garo and *Baambras* Abba Garo. See also a copy of his photo in this work and also in literary materials like Bahru, A *History of Modern Ethiopia 1855-1991*, London, Athens, Addis Ababa, 2002, p. 64.

[37] Informant: *Haji* Abba Bor.

[38] Informants: Hadha Kedir, Abba Bulgu, Abba Garo, Abba Maca and others.

[39] Cerulli, Gruhl, Darley and Hudson were among those who saw him in person and expressed their appreciation for Abba Jifar's appearance and characters in different terms.

[40] Quoted in Haile Mariam Goshu, The Kingdom of Abba Jifar II (1861- 1934)'', BA thesis (AAU, History, 1984), p.42.

[41] Informants: Hadha Kedir, Abba Garo, *Haji* Abba Bor and others. Some of his clothes can be seen also at Jimma Museum. See also his photograph in the work.

[42] Informants: *Balambras* Abba Garo, Abba Bulgu and Abba Garo, See also Gruhl, p.152. and Darley, p. 196.

[43] *Ibid*, see also Haile Mariam, p.43.

[44] Informants: Abdul Karim, Hadha Kedir and Abba Garo.

[45] Tekalign, p.47. Informants however say that Abba Jifar died in 1926 E.C. But September. 19, 1934 corresponds to 1927 E.C. So, if informants are right Abba Jifar II died not on 19 Sept. 1934 but before 11 Sept. 1934.

[46] This can be observed going to the cemetery which I saw.

[47] Informants: Abba Garo, Abba Jihad and *Balambras* Abba Garo.

[48] Tekalign, p.47; Haile Mariam. p.ii.

[49] Bahru, *A History of Modern*…, pp 144-145. Informants: Abdul Karim, Abba Gidi and Abba Maca.

[50] Darley, p. 124.

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- **List of Oral Informants**

Distinguished informants have been interviewed in Jimma town and its surroundings. The following table contains those gave me information (tradition) for this particular work.

S. No.	Name	Age	Interview		Remark
1.	*Haji* Abba Bor Abba Dula	100	2.1.2001	Dedo	He had been both trader and and farmer. His father was a servant (*Naho)* of Abba Jifar II. He himself knew Abba Jifar.
2	*Obbo* Abba Bulgu Abba Dula	100	30. 1. 2001	Sarbo	His father was a servant of abba Jifar II. He had a good a acquaintance of the *Moti*.
3	*Obbo* Abba Fogi Abba Jobir	88	5.3. 2001	Jimma	He is the great grandson of Abba Jifar. He knows Abba Jifar and some of his wives
4	*Balambras* Abba Garo Abba Simbo	93	5.1. 2001	Sarbo	He has served as Abba Qoro (district governor). During Abba Jifar he had served as secretary.
5	*Obbo* Abba Garo Sheikh Mahmoud	87	10. 3. 2000	Jiren	Has been peasant. His father was one of the Islamic teachers of Abba Jifar. He was born and grew up in the Palace of Abba Jifar at Jiren.
6	*Obbo* Abba Gidi Abba Garo	68	5.1. 2001	Sarbo	He is trader. His father and mother worked in the palace of Abba Jifar
7	*Obbo* Abba Jihad Abba Godu	59	2.12. 2001	Jimma	He is trader. He has lived in Jimma town for 35 years.
8	*Obbo* Abba Maca Haji Said Kebire	88	27. 6. 2002	Jimma	His father had close attachment with Abba Jifar and remembers very well the events of the time.
9	*Obbo* Abdul Karim Abba Garo	45	12.3.2000	Jimma	He is well versed oral historian on the history of Jimma kingdom. He has collected large number of historical sources. He is a relation of Abba Jifar.
10	*Genne* (Queen) Hadha Kedir	120	21.3. 2000	Jimma	The last Queen of Abba Jifar II. At this age she has a good memory. She died after I interviewed her in 2002.
11	Sheikh Muhammad Awal Abba Qoro	56	30.1.2001	Nadda	Farmer and Imam of a mosque. He has some information about the living condition during Abba Jifar II.

Competing for Legitimacy: Trends of Change and Continuity Islamic Reform since 1991 in Jimma, Ethiopia

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Abstract

Revival of Islam became a major phenomenon in Ethiopia particularly as of the last decade of the 20th C following the regime change by EPRDF. The new policies on one hand shifted the global trend of Islamic reform movements. On the other hand, it became a revolutionary departure in the quest for ensuring tangible equality among the Muslim population of the country following the darg regime which indeed gone beyond lip service along the same line. This enlighten that political history of the country framed the pace and nature of the reform movements at local level in contrast to still contributing transnational reform movements in the wider Islamic world. Diverse socio-cultural and religious compositions also added to the further molding of basically worldwide reform movements to their distinct local facets.

Accordingly the political background of Jimma directly contributed to its present day diversification of the Muslim community ranging from the age old Sufi to recent reforms like the Salafi and tabligh. Being an independent state since its foundation in the first half of the 19th c officially preserved Islam as its integration to the Ethiopian state in 1932.The non-interference agreements of Jimma over religious aspect with the Ethiopian state enabled Jimma to e noted for its Islamic identity and a center of Islamic scholarship being under the Christian state overrule. This facet was also exploited by the Italian occupational presence from 1936 to 1941 which inadvertently continued past religious legacies. Post- Italian absolutism of Haile Selassie largely continued in the keeping the Muslim society under subordinate status quo beside some activities for appearances' sake initiated by national and regional political dynamics.

Even though Islamic reforms had a long history, they became among prime issues of global discourse particularly following the end of the cold war which also coincided with a rise of a new political era with undisguised religious policies. Such policies enabled the Muslim

communities to wrestle for religious equality. The conducive political atmosphere thus became an open air for orderly infusion of long-standing reform movements to the country. Muslim dominated parts of the country like Jimma became hosts of both developments, from within by Muslim communities for legal equilibrium with co –religions in parallel or fused with largely outlandish ideologies of reforming Islam. This paper intended to give an insight on how reform movements in the last two decades were shaping Islamic religious identities being both part of reform movements of the wider Islamic world and more importantly with distinct local features focusing on the case of Jimma and its environs.

Introduction

Dynamics in Islam and Muslim communities of Ethiopia is commonly masked by few disconnected episodes which dated back to the early days of Islam started by the contemporary state of Aksum's host for the immigrants from Arabia.[54] The welcoming of these earliest Muslim immigrants also used to propagate continually as a corner stone to legitimize 'peaceful' tie between the two sides of the Red Sea. Yet, mentioning this fact did not serve beyond being as a palpable icon used for beautification of diplomatic and political relations needed selectively along the course of history. Seemingly, the bigotry had also impacted the way Islam is perceived in the local context either consciously or otherwise in Ethiopian historiography. Above all, it installed the perception of Islam as an external and incidental force challenging successive Christian states.[55] The centuries old state-church bond of mostly present day northern Ethiopia made Christianity the only standard ideology by obscuring the multi facial religious identity in the region leading to the widely preached illusion of the modern Ethiopian state as ``Christian island'' all the way to 1974.[56] As a

[54]It can said that almost all works dealing with early periods of Islam use this episode as the earliest external link of

Islam beyond Arabia. For instance Eloi Ficquet ''Flesh Soaked in Faith: Meat as a Marker of the Boundary Between Christians and Muslims in Ethiopia'' in Benjamin Soares(ed.) *Muslim-Christian Encounters in Africa*,

Brill(2006),p.39,Ali Mazrui, 'The Re-invention of Africa:Edward Said,V.Y.Mudimbe,and Beyond' in *Research in*

African Literatures, Volume, 36 No 3(Fall 2005),

[55]Abbink p,114

[56] Haggai Erlich, *Saudi Arabia and Saudi Arabia, Islam, Christianity, and Politics Intertwined*. Boulder & London: Lynne Rienner publisher.p.16

result, the equally rich cultural domain of Islam, its dynamics and inter-religious relations across the Ethiopian region barely had coverage among scholars. Even peripheral references of Islam and Muslim communities by scholars are largely devoted to phobic and externalizing images.[57] For instance, the wars of Imam Ahmed Ibrahim of Adal is commonly coined with aggressive religious sentiments rather than being an event among multiple inter-state conflict of the time. Being driven by such distorted images even European sources ended up in claiming unhistorical kingdom of the Prester John which eventually claimed to fight against Muslim forces. Post medieval historic accounts similarly attempted to show Islam and Muslim communities as exclusive aggressive element. Even Muslim communities dated back to the eighth and the ninth centuries claimed as illegitimate groups in the Christian state of the North as reflected in several measures of religious suppression.

Since Islam channeled to the horn of Africa mainly along trade routes, it became an integral part of the local identity starting from the coastline towards the hinterlands of Ethiopia and the Horn of Africa making the region among the oldest destinations of the religion. This early contact of Islam became one factor in keeping universal features of the religion while more importantly developed its peculiarities through either an adjustment to pre-Islamic religio-cultural settings or by picking elements out of them. Transnational features of Islam like the *tariqas* and the use of *madhabs* mostly are common manifestations for the historic interaction between local Muslim communities with the wider Muslim world as this is also a typical feature for communities in the Horn of Africa. Above all the entire link with the Holy sites of Mecca and Medina served as a forum of keeping more of its universal characteristics. The political consumption of religion across history seemingly undermined the dynamism from within and beyond of Islam among Muslim communities in the region. The harsh interaction and eventually the overtake by the Christian state are magnified above all and this became a conventional headline having no or minimal deal with religious developments and their liveliness.

Political formation of modern Ethiopian state had used the Christian Kingdom as its nucleus in the process incorporating of huge Muslim population into the modern Ethiopian empire for much of the second half of the 19th C to stretched to early decades of 20th C. Eventually this made the modern Ethiopian state to be the last replica among series of Christian states dominating its Northern half for thousands of years since the Aksumite kingdom. Expectedly,

[57] Eloi Ficquet,p.47

the past subordinate status of Islam and Muslims became evidenced in the modern Ethiopian state which inherently continued with the same socio-cultural and political structure sharing iconic elements like common dynasty, ''Solomonic'' dynasty, having a state religion, Orthodox Christianity to 1974. On the other hand, the 20th C also evidenced closer communication of the Muslim community with the outside world which complemented with revival and reform movements across the wider Muslim world.[58]

Revival and reform in the Islamic world was not in parallel application to the mass with the wider Muslim world at least for the 19th C and much of the 20th C in Ethiopia and the Horn. Old Muslim states known in the region had more record of fighting against each other and with the Christian state. Possibly due to an elongated isolation from the wider Muslim world many newly incorporated Muslim inhabited areas had their earliest Islamization in their recent memory with some even progressing to the 20th C thus making issue of reform too early unless the introduction by itself is considered to be part of a reform. Even in the case of Jimma, a Muslim kingdom incorporated in 1888 and continued with its autonomy to 1933 reform was replaced by efforts of keeping the religious identity despite using Islam as its ideology and had established contact with Arabia through the *hajj* pilgrimage and the Mahadist Sudan.[59] Such movements of the wider Muslim world entered to the public in Ethiopia particularly since the 1970's and 80 are becoming more vivid since 1991 all framed within contemporary political atmospheres towards Islam. This paper is intended to explore the various Islamic reforms and their developments in Jimma and its environs within the last two decades.

Islam in Jimma to 1991

The discourse on Islam in Jimma in particular and Ethiopia at large can have a clear picture only in consideration to the political dynamics and their respective policies. It all began with the independent kingdom of Jimma and the official adoption of Islam in the 1830 from above by King Aba Jifar I who became effective in making most of the people Muslims by 1882.[60]On the other hand, Braukamper indicated the presence of Islam even before the wars

[58]Hussein Ahmed, ''The Coming of Age of Islamic Studies in Ethiopia: The Present State of Research and Publication'' in Svein Ege,Harold Aspen,Birhanu Teferra and Shiferaw Bekele(eds.) *Proceeding of the 16th C International Conference of Ethiopian Studies,* Trondheim 2009 P.449

[59] Herbert Lewis.1965.*The Galla monarchy:Jimma Aba Jifar II,Ethhiopia,1839-1932*.Wisconsin.P.69

[60] Lewis,pp.41-42

of Ahmed Ibrahim by considering the 19th C only as a period of reIslamaization.[61] Beside its introduction and spread, Islam served as a leading ideology of the kingdom throughout its diplomatic, commercial and political ties with other neighboring Ghibe states like Gomma ,Guma and Gera .The same ideology marked Jimma's cordial with farther states like the Mahadist Sudan state , Yemen and the Sultanate of Zanzibar. The physical icon of allegiance of Aba Jifar with land of the Holy sites of Mecca and Medina can be reflected by an storey built by Aba Jifar in the then destitute Arabia to accommodate pilgrims from Jimma and Ethiopia since the post Italian period to this day. Incorporation of Jimma through submission to the Ethiopian state in 1888 was followed by the conditional ``reward'' of continued regional autonomy inclusive of agreements over how to maintain its Islamic identities.[62]Gradual infiltration of non-Muslim peoples for government bureaucracy, labor migration and their treatment along religious matters became among contentious topics dominating dialogues and eventually used as a pretext to end Jimma's autonomy, naturally driven by the eagerness of Haile Selassie to tap the enormous resource of coffee production which was becoming more valuable in the global cash crop market.[63]In a way, following the death of Abba Jobir II, Haile Selassie ended the autonomy of Jimma which marked the end for ``the last and only administrative manifestation of Islamic existence in Ethiopia''[64]

In Jimma, the Muslim community was favored within the short lived Italian occupation of the country. The Italian divide and rule colonial policy led to the construction and maintenance of mosques, opening of *madrassas*, appointment of *qadis* (judges) to courts and a radio transmission in Arabic addressing the Muslim population. Allowing pilgrimage to *hajj* likely continued the contact with the wider Muslim world even though Trimingham indicated the decreasing number of pilgrims during their occupation.[65] With the restoration of Haile Selassie, in 1941 only physical legacies of the Italians were left behind to the Muslim community. Systematic demolition of the sense state hood of Jimma became a top agenda of the restored Haile Selassie as unfinished business of pre Italian period. This seems to start decades long period of isolation and stagnation for the Muslim community to the rest of the

[61] Ulrich Braukamper , *Islamic History and Culture in Southern Ethiopia*, Lit Verlag,p.54

[62] Guluma Gemeda.2002 "The Rise of Coffee and the Demise of Colonial Autonomy: The Oromo Kingdom of Jimma and Political Centralization in Ethiopia" in *Northeast African Studies* Vol. 9, No. 3

[63] Ibid,p.58

[64] Erlich,pp.16-17

[65] Spencer Trimingham ,*Islam in Ethiopia*, Frank Cass.1952,p

country. It began the all rounded integration of Jimma deterring local trends with strong drift towards dissolving autonomous mentality and aimed at economic centralization of the rich coffee yield of the region. The social retardation became apparent in Islam which largely remained stick to features of pre 20th C. Being in subordinate status was also started for the Muslim community of Jimma since 1940's.The influx of co-religionists to the area was also followed by systematic alienation of the local Muslim Oromo from political and administrative posts.[66] Like similar groups in Ethiopia Sufi Islam strive to keep the status quo instead of reform unlike many Muslim societies across the Muslim world. Muslims from Jimma continued to be inspired in great zeal for the visit to the *qubbas, mudda* (local pilgrimage) to the shrine of Dire Sheikh Hussein in Bale. External links like the *hajj* dwindled in shocking figures even further as compared to the Italian period according to Erlich.[67]

The growing quest for religious equality in post Italian period of Haile sellasie and the *darg* were was bounded by local and regional Islam-affiliated concerns of Ethiopia like the Eritrean secessionist movement and regional political issues and relations with Muslim Arab states which caused the taking of outwardly measures even with unnoticed changes to the local Muslim community particularly during the imperial period.[68] The *darg* continued with the same approach with some image building measures of providing ceremonial status to Islam through its measures of seizing a state religion by breaking the church state–bond and allowing publicity of Muslim holidays nationally despite undermining religion indiscriminately for the sake of Marxist political consumption. At the back of this image, local Islamic practices among the Sufi Muslim majority were aggressively suppressed. Local pilgrimages like the ones to Dire Sheikh Hussein in Bale, Qatbery and Abret of Silti and Gurage areas respectively were forcefully discouraged. Their Leaders were arrested and killed.[69] More localized shrines like *qubbas* were denounced in public as anti-revolutionary actions. In Jimma, the last decades of the reign of Haile Selassie and the *darg* polices eventually led towards two consequences. First, religious practices like group *dhikr*, *mauled* celebration and related festivity, various congregations for *dua* and *dhkir* in selected *qubbas*

[66] Guluma p.63

[67] Earlich

[68]Donald Crummey,'The Horn of Africa: Between History and Politics' in *Northeast African Studies*,Vol.10,No 3(2003),p.124

[69]Bawer p.48

were highly minimized and mostly limited to individual households and mosque compounds if present at all in urban areas. Second, such actions became excuses for many to flee to the Sudan, Egypt and Gulf states as this is enlivened by better life for many likely more than the religious freedom. Further Islamic education became an unfilled area for many beside gains from the booming laborer market. Inevitably the limited quota of *hajj* became a safe and cheaper short cut for both economic gain and fulfilling religious duty.[70]

Islam through liberalization in Post 1991 Jimma

Post 1991 Jimma as in any other parts of the country was benefitted from new policies introduced in 1991 by EPRDF government. Public images of ethnic and linguistic identities became major scenes of the federal structure of the new system. The parallel urge for religious equality was responded by government through its liberalized policies towards religious equality. The abrupt long sought atmosphere had resulted in two developments in parallel. The first and the major one was the brief chance towards public exhibition of their religious identity and equality. The second one was the joining of such efforts with flushing imported reform ideas already spread across parts of Muslim world. Both internal dynamics of assuring religious equality and rapidly increasing association with the outside world were strongly intertwined obscuring signs and achievements of post 1991 liberalization. That is why many Ethiopian Muslims associate religious matters of post 1991 to the reforms instead of the political atmosphere which enabled both at a time.[71]

The capital Addis Ababa and Muslim dominated parts of the country like Jimma became important destinations to manifest such reform movements. Returnees from Middle Eastern countries mainly Saudi Arabia were encouraged by the previously unseen tolerance towards their activities at home at least for much of the 1990's which paved the way for diffusing reformist ideas to already enlivening religious consciousness.[72] Beyond their own activities, such returnees also served as agents of reform-affiliated individual and institutional missions of foreign origin. This should not however be misconceived as if foreign sources were entirely handling Islamic reform movements in the country.

[70] Informants

[71] Hussein Ahmed,islam and Islamic….p.798

[72] Informant: Shaykh Aba Biya aba Temam

Internal developments were definitely fueled not only also by returnees but also by the cash flow from the Middle East through different channels. Such resources helped the ongoing initiative and effort of publicity and practicing Islam through building more mosques and *madrassas*. Jimma became an important focal area particularly for foreign based institutions. Several foreign institutions had their agents and offices in Jimma. Islamic and more reform oriented booming publications eased the means of diffusing reform to Jimma mostly after published in Addis Ababa. With increasing market, audio-visual shops increased rapidly holding materials with mediums of Amharic, Arabic and increasingly Afan Oromo by targeting much of the local audience of the town, its outskirts and satellite towns. The *hajji* and *umra* pilgrimage increased as the bureaucracy eased. The number of mosques increased faster those previous paces of building mosques particularly due to past challenges to construct mosques. Eventually number of mosques in the last two decades increased from few to thirty four in 2010.[73]Moreover, the effort of towards the image of restoring an 'Islamic city'[74] is became evident in urban parts of Jimma as I am going to discuss along the detail of the paper. The reform movements particularly in Jimma town were also inclusive of students from different parts of the country enrolled in Jimma University and Jimma Teachers Training College and other higher education institutions. such educational institutions also became important centers for the Islamic reform in the country however with limited public interaction. Muslim *jama'as* of these institutions gradually became strongly involved particularly in Islamic and Muslim related discourses.[75] It is also visible that Muslim *jama'as* also had little variations in their reform approaches from the public as to be seen in forthcoming discussions.

Competing for Legitimacy: Reform movements in Jimma since 1991.

Like many parts of the Muslim World, Jimma and Ethiopia at large experienced Islamic revival since the 1970's however, it revealed more publicly since 1991 due to the policy of

[73] *ibid*

[74] Abdulkader Tayob, ''Defining Islam in the Throes of Modernity'' in *Studies in Contemporary Islam* 1(1999)2.p, 1

and S.V.R.Nasr, ''Islamist Intellectuals of South Asia: The origins and Development of a Tradition of Discourse'' in

Studies in Contemporary Islam (1999),2,p.40

[75]Noorhaidi Hasan,p.8 Julia Howell, ``Sufism and the Indonesian Islamic Revival'', in *The Journal of Asian Studies*,Volume.60,No.3,p.701

liberalization and its resulting conditions discussed before.[76] Islamic reform in Jimma has featured in terms of great zeal of religious practices as well as stronger competitive interaction with other religions. This was causing increasing emotions by the eagerness in publicizing and increasing symbolism of religious equality due to similar revival and reform movements among other religious groups. The manifestation of Islamic reform in public life encompass a wide range of phenomena as the increasing adoption of the veil[77] by a growing number of women, the proliferation of Islamic publications and programmes in the audio-visual media, the establishment of Islamic schools and clinics, the growing importance of the mosque as a center of people's daily lives, and increasingly regular reference and seeking Islamic solutions from preachers of reforms for private and public problems.[78]Such Islamic presses largely focus on current issues especially on historicity of Islam and Muslim communities in Ethiopia, Christian-Muslim relations and incidents of religious tensions at both local and global scales.[79]

Sufi revival: Never lost but newly found[80]

It can generally be agreed that Islam in Jimma is predominantly along Sufi line particularly before the changes started since the early 1990's having closer theological orientation with

[76] Hussein Ahmed. "Islamic discourse…" p798-799 Hodgkin.p.75

[77]By the veil I refer to the *hijab*, literally interpreted as head coverage but the tem also understood by some as collective term inclusive of the *niqab* and the *jalbab*

[78] Katerine Dalacoura,''Teaching (and Learning in Egypt ''in *SAIS Review*, no 2(Summer-Fall 2001) Pp207-208,

[79]Hodgkin,p.73,hunwick,p.6, tesfasion p.28

[80] The word 'Sufi' is not a common among the Muslim community in Jimma. If not derogatory, the Sufi prefer to be called simply Muslims. Other Muslim groups however frequently use the term to designate them. According to Al-Madkhalee, the word Sufism is derived from Greek word '*sophia'* meaning wisdom. It is also said that it is a word referring to the wearing woolen(*soof*) clothing, and this saying is the most probable since wearing woolen clothes was a sign of *zuhd*(abstemiousness/disassociation from the worldly life).For more on principles of Sufism see Muhammad ibn Rabee Haadee Al-Madkhalee,*The Reality of Sufism in the Light of the Quran and Sunnah*,(1404H)Makkah

Muslim communities in the country. In much of the modern scholarship concerned with Islamic reform, there is visible neglect in acknowledging the significance of Sufis in modern and even reforming Muslim societies. Reform trends in Jimma reflect the fact that the reform is also inclusive of Sufis themselves even though many of the devotees of recent reforms gained adherents at the expense of the wider Sufi Muslim population which on the other hand hosted all the rest and indeed became subject of reinterpretations.[81]

The Sufi Muslims and their reform in Jimma challenged the assumption of Sufis as static, traditional and less dynamic category. The other falsified common assumption about Sufism is its association with rural parts and other reforms as urban based. The absence of clear distinction in terms of presence and the coexistence of several reform movements in both rural and urban Jimma are peculiar realities to other parts of the country. Sufi reforms can be equated simply with the popular moves and the manifestations of religious equality within the country. Accordingly, many Sufi practices undermined as public practices were banned during the *darg* era were revived. The usually lavish *mauled* celebration, veneration of local *qubbas*, collective *dhikir* and even the *mudda* ceremony to Sheikh Hussein revived with rapidly increased attendants. Such practices were largely characterized by proliferation and public upholding of religious liberalization.[82] So it can be said that such practices were of local initiative and manifestations of long awaited religious rights. Extraneous to this, there is tendency of stricter observance of basic teachings of Islam by focusing mainly on performing *salat* on regular basis and on time, fasting the *saum,* attending *salat* performance in group (*jama'a*) regularly at mosque. This seems more of admitted and shared point with other recent reforms. Thus also served as a mechanism of coping with stronger *da'awa* of other groups in observance of 'refined' basic practices of *wajib* (mandatory) and selective and/or optional

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[81] Chanfi Ahmed, ''Introduction to Special Issue: Performing Islamic Revival in Africa'' in *Africa Today* 54(4),p.8,10

and Fuad Naeem,Sufism and Revivalism in south Asia: Maulana Ashraf Ali Thanvi of Deoband and Maulana Ahmed Raza Khan of Bareillt and their paradigms of Islamic Revivalim in The Muslim World,Volume 99(2009),pp.435-436 Julia Howell, ``Sufism and the Indonesian Islamic Revival'', in *The Journal of Asian Studies*,(2001)Volume.60,No.3,p.710

[82] David Anthony, ''Islam in Dar es Salaam,Tanzania'' in *Studies in Contemporary Islam*''4(2002),p.38 Abdulkader

Tayob,``Defining Islam in the throes of Modernity' in *Studies in Contemporary Islam* (1999),Volume.1,No.2,pp.5-

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stand on accustomed practices with controversial debates .For instance, chat ceremony which is largely accepted social norm in Jimma is tolerated by the Sufi *da'awa* not by many others. Celebration of the *mauled* also continued to be celebrated even though rejected by the *Salafi da'awa* in particular as *bida'a* (religious innovation or addition). *Chat* ceremonies associated with *du'a* and *dhikir*, *manzuma,* all congregations of various occasions continued to exist.

The Sufi revival in Jimma had no separate leader or institution for guidance unlike other reforms. Sheikhs with various level of recognition teach their disciples commonly by using mosques and *khalawaas* and even their own residences. The *imams* of mosques enjoy great respect as they lead *salat* daily and other bigger events like the *eid salat*. Expectedly they are also more knowledgeable in *ilm* (knowledge) and performed the *hajj* so entitled as *hajji*. He also regularly addresses a huge crowd on weekly basis by the *juma'a salat*. The *kutba* of every *juma'a* expected to address instructive awareness and guidance over contemporary themes. Mosques function as key institutions for practices and assemblage. Distinctly to other reform trends, Sufi reforms are confines largely to mosques. Individuals were not given particular authorities or there is no hierarchical structure of *da'awa* activities. In fact, those with better knowledge (*ilm)* and its practice, normally inclusive of *imams* of mosques and *shayks* are expected to be active in *da'awa* circles. Accordingly, the elderly becomes engaged more in such *da'awa* activities. As it true with basic natures of Sufism in general, the *da'awa* is tolerant towards others with no or minimum critique towards others.

Claiming originality: The Salafi reform trends

The other of particular importance is the *da'awa* movement of the so called *Salafi,Wahhabi,ahl al Sunna wal Jama'ah,* or *ahl al-hadith* aimed at purifying Islam from local accretions strongly emphasizing the conception of the oneness of God /*tawhid*/.[83]With changed political atmosphere since 1991, in Ethiopia, the movement became the most widely spread recent *da'awa* movement initially in urban areas like Jimma and very shortly diffusing to the rural parts. The spread of *Salafi* reformist movement became a late move to the Ethiopian region in particular as a popular movement. Returnees mostly from Saudi Arabia and some from Egypt, Libya and Sudan since the 1990's were favored by political terrain in

[83] The term *Salafi* (followers of the pious ancestors ,*Salaf al-Salih*, has been used as a banner of the movement because of the pejorative connotation of the term Wahhabi among Muslims of the world

Ethiopia and even Saudi Arabia.[84]In the case of Jimma returnees implanted the *Salafi da'awa* to localities of their origin both urban and rural. The honor and the economic well-being of such individuals added their service as agents and/or employees of Arabia based institutions and finance.[85] The *Salafi da'awa* movement, made evident in the appearance of more of the young men wearing long beards, the casual wearing of *jalabiyya*, turbans (*imama*), and trousers right to their ankles (*isbal*) and women wearing a form of black veil (*niqab*) more in public. The *Salafi* are also devotees maintaining some form of separation between Muslims and non-Muslims eventhough this is character is less publicized.[86]

The *Salafi* reform movement trend had its adherents in both the rural and urban parts of Jimma as they primarily targeted public Sufi practices without compromise.[87] This is against the usual notion of considering recent reform movements as urban and the Sufi as rural. With far more proportion of the Muslim population being in the rural part in Jimma, more development and interaction within the same religious group can also be observed. Local Sufi religio-cultural practices associated with beliefs became major points of concern within the *Salafi da'awa*. Since the Sufi elders stick to their own reform line, The *Salafi daiis* (preachers) and their followers largely became the youth being appealed by public forums prepared by *jama'a* members around mosques, higher education campuses and even schools. The *Salafi da'awa* became energetic because of different factors. Above all, it targeted the youth which is already aroused by the new sense of religious equality. The local *Salafi* also is backed by external, commonly Saudi based individuals and organizations. The wider spread was also facilitated by the use of audio-video and published materials circulated particularly among the youth and educated. Indeed audio materials preferred by the rural mass. Such mediums complemented also by arranged congregations. Distributed materials were largely brought to Jimma from Addis Ababa including those prepared locally and also popular translated works in Amharic, Arabic and Afan Oromo. It is quite interesting to note that such audio visual centers distribute mostly *Salafi* oriented materials also keeping the *manzuma* audio-video records targeting mostly Sufi customers with more circulation during events like the Ramadan fasting month.[88]

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[84] Gwenn Okruhlik,``The Irony of Islah(Reform)'',in *The Washington Quarterly*,Vol.28,No.24,pp.153-168

[85] informants :Shakh Tahir aba Diko,Shaykh Aba Biya aba Temam

[86] *ibid*

[87] Muhammad Umar, 'Education and Islamic Trends in Northern Nigeria:1970's-1990's''in *Africa Today*,p.132

[88] Informants: Shakh Tahir aba Diko,Shaykh Aba Biya aba Temam

Salafi reforms became economically self-sustained as fund raising became a common practice with increasing religiosity not only among the peasantry and the urban merchant group as traditionally perceived with being a Muslim in Jimma but also with Muslims in other occupations gradually. This increasing diversification for the adherents of *Salafi* ideas also led to mushrooming of *Salafi jama'as* along occupational groups and different organizations. The inter-*jama'a* network also became sounder with social relations like mourning and wedding.

The external attachment of the *Salafi* had both organized and unorganized natures. There were multiple funds particularly from Saudi Arabia and sent informally with an intended aim of funding tasks like supporting activities with local mosques and helping orphan children among others. Such finance was transferred to local agents usually facilitated by originally returnee sheikhs. The amount of money and efficiency of using it for the intended purpose is so obscure to evaluate. There were also conditions in which individuals send donations in forms of *zakat* (alms) to organizations with similar mission to reach beneficiaries. This trend was shaked since 1995 and entirely deterred following the 2001 attacks which shortly led to the direct scrutiny of any properly untitled money flow from or to the Middle East.

The organizational structure of the *Salafi* reform was represented mainly by the Muslim World League/MWL/ which had its office since 1962 but with more influence after its reestablishment in 1991 represented mainly by its section of International Islamic Relief Organization /IIRO/. The IIRO backed by powerful financially even to engulf those institutions like Awelia School. The IIRO had its headquarter in Awelia school, previously funded largely by *Iqra al-Kayr* based in Kuwait, and expanded its service beyond education to health Centre, orphanage home and a college. The IIRO also had several projects in areas like Woliso's orphanage center, not yet finished projects in Jimma and Agaro. It is very clear that IIRO had a *Salafi* orientation not only being state sponsored Saudi institution but also observed local support exclusive to *Salafi* fans. The Fund of Amir Sultan was the other Saudi based organization with similar objectives and several projects in Jimma zone until it was finally banned with many others following 9/11.The Islamic African Centre through its office in Addis Ababa also used to facilitate the Islamic scholarship of Ethiopian students in Sudan, Egypt, Saudi Arabia and Pakistan. This programme particularly enabled many students from Jimma to leave for these countries as immigrating to there from Jimma and its surroundings is almost like an old tradition. The *Da'awa* and Knowledge Association was

another organization more committed in sponsoring particularly publication of written materials among which translation of popular works from Arabic to local languages like Afan Oromo and Amharic was significant for the case of Jimma.[89]

The manifestations of the *Salafi da'awa* were common scenes in Jimma. Among all the mushrooming of audio visual centers served as important channels of linking the reform thoughts and their global figures to the mass. The content of these materials of distribution can also show their orientation, coexistence and contradiction among reform trends and relations with other faiths. It is true that, growing religious awakening led to the increasing need to get informed about ones own faith in multiple options. It is also equally important to note that the *salafi* reform had exploited this vacuum so effectively for its own target helped by relatively better coordination to reach its adherents by manipulating modern mediums. Accordingly, issues related to the *tawhid*, five pillars of Islam were among common themes. On the other hand, materials selectively demanded by the other reforms were much limited. Increasing *manzumas* recorded on audio and later on video were understandably intended to the wider *Sufi* audience indeed with different topics associated either with basics of Islam or issues in controversy with other reforms.

The tabligh jama'a in Jimma

The *tabligh jama'a* of is an Islamic reform movement globally active but with minimum success in Jimma in the last two decades. The *tabligh jamaat*, a transnational movement emerged in 1927 by *Hazarat Maulana* Muhammed Ilyas in Northern India. The commitment of the *tabligh da'awa* primarily intended towards promoting brotherhood among Muslims by inculcating broader devotion and concern to Islam which enabled them to integrate easily to the *Sufi* majority. Thus it became one of the most successful reform movements globally in size of adherents.[90]

[89] Informants:Shakh Tahir aba Diko,Shaykh Aba Biya aba Temam

[90] It is sited to be the biggest reform movement in Islam today in Chanfi Ahmed, ''Introduction to Special Issue: Performing Islamic Revival in Africa'' in *Africa Today* 54(4),p.9 also in Bettina Dennerlein and Dietrich Reetz,Continuity and Disparity:South-South Linkages in the Muslim World in Comparative Studies of South Asia,Africa and the Middle East,Vol.27,no.1(2007),p.5 Alexander Horstmann,``The Inculturation of a Transnational Islamic Missionary Movement: Tablighi Jamaat al-Dawa and Muslim Society in Southern Thailand'

In terms of their methodology, unlike the *Salafi* which focus on the mere interpretation and strict implementation of scriptures by publicly denouncing many accustomed religious practices, the *tablighi jama'a da'awa* tend to tolerate such practices with concentration to the *tartib*/procedures/dealing basically on how to exert more commitment towards basic practices of Islam. Due to the very similarity with Sufism, some scholars align the *tabligh* as one version of Sufism. Commonly by limiting their *da'awa* activities to *Sufi* owned mosques in Jimma, the *tablighi* dais earnestly attempt to form *jama'a* using local mosque as Centre. Their reliance on standard procedures to implement basic gathering and wider interaction among the Muslim community made them to be with no participation in contemporary Islamic discourses at local and global levels. This in way helped them to have not only smooth integration but also to be easier coexistence with contemporary reform approaches.

The *tabligh jama'at* presence in Jimma is the result of its stretching from Addis Ababa. There are scanty indications about the introduction of the *talbligh jama'at* to the capital by a certain *Shaykh* Mussa a decade ago however with retarded progress in successive decades. The fact that this reform trend is dominated by the Gurage and the Silti *daiis* enforced their *da'awa* largely to be limited largely to urban areas where they can face lesser language barrier. The same trend was there until recently when *tablighi daiis* speaking Afan Oromo started to appear thus becoming more active in both rural and urban Jimma than before.[91]

The image of the *tablighi jama'a* as outsiders affected the pace of their progress in Jimma as compared to the capital where there is much better success. Their activities in Jimma are limited to selected mosques and their surrounding inhabitants. Members of the *jama'a* engage in a door to door task of awakening of the people to their nearby mosque for *salat* regularly. After every *salat* period usually short speeches follow stressing on how to strengthen and maintain the *jama'a* to be formed. Similar teaching may also continue in circles of those willing to stay longer. Under an arranged schedule, there are *ta'alim* (education) and *ijtima al da'awa*/collective *da'awa*/, short term and elongated ones, and *shura*/consultative council/ on various issues. Such post *salat* programmes serve as forums of recruiting voluntary participants in *da'awa* tours to other mosques with ranging durations from the shortest for a

in *Journal of Social Issues in Southeast Asia*''Volume.22,No.1(2007),pp.107-108 Ira Lapidus,*A History of Islamic*

Societies, Cambridge University Press,2008,p.643

[91] Informants: Shakh Tahir aba Diko,Shaykh Aba Biya aba Temam

day and the maximum for two months.[92] The destination might be to a mosque within the town usually for shorter durations and bit far mosques within the same zone. Under both cases, the intention is with dual purpose, one to entirely engage oneself in religious duties without worldly interferences and second to continue the task of establishing or strengthening *jama'as* of mosques to host them along their duration. *Tablighi daiis* also engage in much wider global interactions. Travelling of few *tablighi daiis* to Kenya and South Africa is part of this network commonly recruited from followers in Addis Ababa. Fewer *daiis* also attend the annual conference of the *tabligh jama'at* hosted frequently by India and Pakistan.

Smaller reform trends

Besides the already discussed reform movements of Sufi*, Salafi and tabligh jama'at*, there are also other approaches with much smaller adherents. Despite their existence they became less visible in their activities within the society. Labeling of such groups as militants and their banned status in many countries enforced them to pretend mostly like the *Salafi*. Many strongly agree on the existence of the so called the Muslim Brotherhood /*Ikwan al-Muslimun*/ and its offshoot the Jama't al-Muslimun (called by others *takfir wal hijira*).[93] However, they tend to publicly identify themselves more with the Salafi .The foundation of the Muslim Brotherhood under Hasan al-Banna in 1928 in Egypt was the cause for the rise of such groups.[94] After suffering various setbacks with imprisonment and execution of the founder and other figures like Sayid Qutb and his brother Muhammed Qutb, the group became a legal party under the reign of Nasser in the 1960's.Esposito indicated this time as their opportunity to inspire millions within and outside Egypt to the extent of influencing government policies to the end of the 1970's.The export of ideology of the group was a fast phenomenon in many Muslim dominated countries particularly in the 80's and after particularly accelerated by the impacts of political dynamics caused by the Camp David agreement and the Islamic revolution of Iran in 1979.[95]Accordingly, neighboring Sudan became one destination where many local peoples from Jimma were influenced by it. Beside

[92] *ibid*

[93] Ira Lapidus, *A History of Islamic Societies*. Cambridge University Press,2008,p.531

[94] Ana Soage,"Hasan al-Banna and Sayyid Qutb:Continuity or Rupture?" In *The Muslim World*,99,4(2009),pp. 294-
298

[95] John Esposito, *Islam: The Straight Path*,(1998),oxford University Press

such contact to bring in the ideology, the wider circulation of printed materials even by leading figures like brothers Sayid and Muhammed Qutb inspired many outstandingly the educated youth.

Expectedly, devotees to this trend do not have any representative institution in Ethiopia. However, their ideological indoctrination as observed among higher education students and graduates concentrate on knowledge and competence in various social programmes aimed at forming morally fit society. More excluvism is preached among followers of the *takfir wal hijira* who originally secluded themselves from the Muslim Brotherhood led by Shukri Mustafa during prison days. The *takfir* seem to be with extreme political orientation by claiming a Muslim state as the only legitimate asserting any form of allegiance to any different form of state is equated with *kufr* /desertion/ consequently to be excommunicated. Even distinguished *ulemas* /scholars/ indifferently suffers such labeling by this group.[96] Their exclusion reach to the extent of forming their own circle segregated from the mass performing salat in the same mosque. The *takfir* orientation is visible in Jimma and its surroundings but with no conclusive evidence. Instead, a certain Jemal Beshir claimed the leadership of the *takfir* in around 2003 seated in the Addis Ababa until his final fate became vague among informants.

Competition versus coexistence of reforms

Beyond the rush towards having more adherents, reform movements also engaged in strong commitment to justify their view more legitimate than the rest. Such frictions are also evident with other religious groups mostly using different printed and electronic mediums in addition to various forums of mosque based *da'awa* activities on daily and arranged manners. Most of these activities are peaceful and addressing points generally emphasizing more religiosity from the point of their particular approaches and with increasing critique about other religions. Here by I try to address points of similarity and contention among reforms.

The *Sufi* majority being considered as hosts to various reformist movements are more tolerant and less critical about others. Possibly the best to show this tendency is their willingness to allow any group to Sufi affiliated mosques like Munir mosque in Jimma. Informants of this group openly accuse the *Salafi* and those under their umbrella with sound polarization and excluvism in the society and accuse them for their emphasize on strict implementation of

[96] Ira Lapidus,p.531

scriptures as done by *salafis* should be in line with contextualization and adaptability by considering missing basic principles. *Salafi* scholars argue about universality of Islam, with full of principles expected to be implemented among diverse socio-cultural settings instead of narrow interpretation of texts by the *Salafi* which eventually fail to integrate realities on ground.[97] In other words, Islam owes the parameter to evaluate any norm or activity as Islamic or not leaving meaningful space for justification. Thus the Sufi rejects the categorization of many of their practices by the *salafi* as *bida'a*. Among others the celebration of the *mauled* is argued by the Sufis to be worth celebrated since it is simply to show an honour to the prophet adding the occasion also as an opportunity towards further remembrance of their Lord. Similarly, the ceremonial status of *chat* chewing tradition more importantly in Jimma is accepted among the Sufi despite widely circulating debate in which *chat* (*Catha edulis*) is categorized as *haram*/forbidden/ among the new trends of reforms in particular. It is quite interesting to note the tolerance level by the Sufi which might possibly cause the smooth interaction even with extreme reform approaches despite the fact that the Sufi still are majority with strongholds in urban and rural Jimma and primary targets of critics. Sufi self appraisal towards better conscious and *ilm* of Islam, the *dua* for better unity and integration of the Muslim *umma* is an important part of daily *dua* by the Sufi with no reference to contradictory themes. Even powerful *khutba* messages of *juma'a salat* frequently state on the will and prayer towards denouncing inter reform and inter religious tensions becoming in recent times.

Salafi extreme seclusion above all considered to become a manifestation of usually hidden or invisible intolerance and critique towards both other Muslims and even non- Muslims. Symbolical derivations in daily life tended to be guided by their own circles as much as possible. Accordingly, the *jama'a* grouping engaged in various activities also extending their duties to social interactions as well. Such dispositions even apply to Muslims with different orientation.

The manner of separation among the *salafi* is also growing tangibly in areas of education. The old Islamic education approach of *madrassa* held in mosque compounds found to be insufficient to qualify students both in the Islamic line and less organized as compared to

[97] Tariq Amin-Khan, `Issues of Power and Modernity in Understanding Political and Militant Islam'' *Comparative*

Studies of South Asia, Africa and the Middle East'',Volume.29,No.3,(2009),p.545

modern education. Furthermore, the demand for both modern education and religious teaching geared the demand towards schools with both characters even though currently at its early phase. The conflict with the conception of education as secular at national level is not far from being nominal as partly religion orientated curriculums serve as important mark of distinction for all major faiths in different schools throughout the country.[98] Accordingly, the few 'Islamic schools' as they popularly known commonly teach Arabic as a language added to the English and a mother tongue language as per the national curriculum. The labeling of a subject as *din* under Ethical Education is a common way of pretending 'secular' only expected to escape the loose inspections which might be problematic for the annual license renewal and other official documentations. Many of such schools are limited to elementary level.

The scarcity of such schools is becoming increasingly matchless to increasing demand in quality and higher levels. Some of them try to compensate their need to with home tutoring of *din* scheduled after school. The disastrous impact however is getting displayed currently in the rural parts. Worsened by relatively low awareness and ill thought of male-female segregation of children as taught by the *salafi* in particular, female students' dropout rate is increasing. This is becoming against the common pattern of growing female students' school enrollment.[99] Travelling by claiming to learn *din* to distant areas like Harar within the country, the Sudan and Egypt is becoming common among male school age youth.[100]

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[98] Informants:Shakh Tahir aba Diko,Shaykh Aba Biya aba Temam

[99] The misconception of modern education as an imposition from past 'Christian' systems also discouraged many Muslim communities from sending children to school until very recently. Thus, Islam conceived as resistant ideology as this notion seems to be restored with the recent reform trends. Similar feeling is also observed by other African communities who used to oppose colonial education as in Nigeria by Muhammad Umar, 'Education and Islamic Trends in Northern Nigeria:1970's-1990's''in *Africa Today*,p.135

[100] It is quite interesting to note that similar trend in education was seen in the 1990's as indicated in Sayed Fatma, ''Security,Donours' Interests, and Education Policy making in Egypt' 'in *Mediterranean Quarterly,Volume16,Number 2,Spring* 2005,p,77 Such student movements overlap with Islamic revival since the 1970's,see Muhammad Umar, 'Education and Islamic Trends …'',p.138 and Abdullahi Ali Ibrahim,'A theology of Modernity:Hasan al-Turabi and Islamic Renewal in Sudan' in *Africa Today* ,p.214

The *tabligh* seem to avoid any conflict along their duties by shunning doctrinal debates of all kind. Instead they press on Islamic fraternity and communality as symbolized by assemblage around mosques. Some informants also indicate that the *tablighi da'awa* was limited from the start partly because of ethnic tensions between the Oromo inhabitants and the immigrant Gurage to Jimma which caused massive exile and further losses for the latter following the downfall of the *darg*. The domination of the *tabligh* by the Gurage made their propagation synergy particularly to the rural parts resulting in their much limited success to the urban parts. In the last two and three years however, *tablighi daiis* with local Afan Oromo language became active as this look too late as the *Salafi* and Sufi reforms above all had already an established status within the Muslim community.

The Sufi and the *tablighi* commonly share many critics by the *Salafi*. Obviously practices like visiting *qubba*, the *mudda*, the celebration of the *mauled* among others are classified as *bida'a* /innovations/.Some ceremonies associated with such practices like the link between the *chat* ceremonies and the *dua'a* and *hadra* are also under *salafi* critique. Many elderly Sufi *ulemas* denounce such claims even as non-scriptural but subjective and unsettled controversies within the community. The *tablighi* as they keep silent institutionally to comments, critique against them extending their passivity to any political dialogue calculating such involvements could potentially affect their *da'awa* efforts.[101] The major peculiar character of the *tablighi* under criticism is the *tartib* of *da'awa* approach which again sorted as *bida'a* not only by the *salafi* and others under their umbrella but also by their Sufi ally who commonly claim their *da'awa* style as self-styled and never implemented even during the normative period. Both agree that *da'awa* is part of daily duty of every Muslim with no necessity of distinct time and space in an attempt to omit the actual life. Adding to this, the sense of secluded spirituality by the *tablighi* also denounced as unrealistic and against the totalitarian conception of Islam. [102]

Reform and education

[101] Alexander Horstmann,``The Inculturation of a Transnational Islamic Missionary Movement: Tablighi Jamaat al-
Dawa and Muslim Society in Southern Thailand' in *Journal of Social Issues in Southeast Asia"*Volume.22,No.1(2007),p.110

[102] *ibid*

The two decades since the early 1990's also seen to be where reform movements utilized higher education institutions as one platform within the country. This is also coincided with similar developments in several parts of the Muslim world particularly in Egypt with likely impact over the trend within Ethiopian institutions.[103] Muslim students in universities and colleges are with better coordination given the fact students are departing from membership of student *jama'a* as they graduate. The *jama'a* in many ways is the extension of what is going on within the society. Hence, both awareness creation and molding Muslim students towards reformed religious identity in the campuses take place. The Muslim *jama'a* also actively acted as a 'protecting' body for the individual and group rights and privileges of Muslim students in campuses. Intensifying religiosity is the most important duty of the *jama'a* by lessening cooperation over their ultimate objective of education as this is becoming true for other religious groups in campuses. The Umar mosque located adjacent to the university main campus serves as headquarter of the *jama'a* from the very beginning while other mosques like Bilal, Abu Bakr, and Rahma are also widely attended by students. The commitment of the *jama'a* can be seen in the founding and coordinating the construction of Bilal mosque. The jama'a also have social structures like the Dawrul Hasan (Arts club), Beytul al-mal (treasury) and al Ansar (support for the needy).It also used as a place for *ilm* learning, scheduled in convenient time for students, between *Maghreb* and *Isiha* and between *Subhi* and breakfast time. The *jama'a* is led by the *amir* (leader) who is elected among students.

The *jama'a* commonly identified under the *salafi* influence while some are partial over this self-identification. The student *jama'a* is highly confined to the campuses and their adjacent areas. The integration to the wider society is highly limited. Some *jama'a* members trace their ideologies more with the Muslim Brotherhood than the *salafi.* Some students accuse the later claiming the later as 'Saudi politics'. This can be evident by the wide circulation of the manuals and pamphlets authored by Sayid Qutb are worth mentioning.[104] The idea of

[103] Sayed Fatma,''Security, donors' Interests, and Education Policy Making in Egypt' 'in *Mediterranean Quarterly*,

Volume16, Number 2, Spring 2005, pp. Similar pattern was also seen in Indonesia as in Noorhadi Hasan,p.8

[104] To see the emphasis of education and other principles of the Muslim Brotherhood of Egypt in Muhammad Al-

Hudaibi, *The Principles of Politics in Islam*, Islamic Inc. (1997). Even though the *Salafism* look as a leading ideology of the *jama'a*,it is difference with Muslim Brotherhood and had no reference towards each other

"Islamization of knowledge" is prevalent among *jama'a* discourses as an insight to future of the society.[105] The focus on education as a means of reforming a society also marked as a difference with the *salafi*. Currently such *jama'as* are found universities across the country with nation-wide network especially while demanding stronger national agenda.

The *jama'a* also acts so distinctively and in competitive manner with similar religious groups in campuses particularly in the last decade. By this time, religious contentions are sporadically violence and demonstrations are becoming common incidents even outshining the prevalent inter-ethnic tensions in the previous decade. In the early period since 1990's, the *jama'a* of Addis Ababa University and successively in newly flourishing universities there was a quest for an equal consideration by the university authorities by implication to the government. The effort by student *jama'a* of Addis Ababa University became monumental for similar *jama'as* in mushrooming higher educational institutions all over the country. Among some early gains, formation of separate Muslim dining section within university cafeterias, suitable schedule for Ramadan fasting and extended in demanding separate space for collective *salat* for students are said to be crucial demands with solutions.[106] The pace of success for this period was so fast mainly because of two obvious factors. The first is the due attention for religious rights by government policies as deduced by university administration. The second factor was the absence of similar chase for religious rights by groups like Orthodox Christians and Protestants at least for the first decade after 1991 as all became contenders for splendid religious rights in campuses as these became with more sound effect in the last decade. As a result, the last decade became more of increasing interference of university administrations within religious activities in campuses. Such efforts in many ways became failed attempts and more importantly causing religious mobs across the country sometimes escalated to the wider community. It is also agreed by many that measures are discriminatory and not uniform throughout the country without legal ground or even authoritative regulations.

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historically as indicated in Richard Shifter, 'The Clash of Ideologies' in *Mediterranean Quarterly,* Volume 15,Number 3,Summer 2004,p.20 ,Braukamper,pp.3,180

[105] S.V..R.Nasr, "Islamist Intellectuals of South Asia: The origins and Development of a Tradition of Discourse "in

Studies in Contemporary Islam (1999),2,p.36

[106] Informant:*Ustadh* Khalid Aba Diga

Local facet from transnational reforms

It is quite important to note that transnational reform movements are contextualized with locally existing socio-cultural, religious interactions and political frame. Accordingly, distinct character of a reform movement might be missed or modified at its local presence. Thus, it is valuable to understand certain common features of each reform in contrast with their local stances.

Among other reform movements in Jimma and beyond in the country, the *salafi* is associated with strong affiliation to politicization of Islam also with record of stretching even to violence. This concept however seem to be vague among the *salafi* followers in Jimma.[107] They rather tend to focus much on the need towards stronger exclusive religiosity as this potentially leads to better social and political status. Many *salafi ulemas* consider politics as integral part of Islam but argue that it is too much premature to think in the context of Ethiopia comparing the current situation. Some also argue that involving in politics does not mean necessarily being a politician or establishing an Islamic state as suspected by many. They rather emphasize on their fair representation within the political system they were deprived from throughout history. Emphasis on legacies of past subordination should necessarily be pushed towards religious equilibrium crediting achievements to present. However, there are indications of violence between Muslims and non-Muslims in Jimma's vicinities. The *salafi* externalize such group as still different group whom they identify as *Khawrijs* whom also accused of having political and violent ambitions. The *salafi* also accuse the same group for not willing to cooperate with government to the extent of rejection to pay taxes.

Conclusion

The last two decades since 1991 manifested dual processes of strive for religious equality and the infiltration of Islamic reform movements rushing to win more adherents locally. The local response towards both streams is usually intertwined becoming complex to differentiate impacts from each. These movements also had a friction with the already existing religio-cultural landscape. It is also quite important to note about the peculiar features of reform movements while applied in local contexts. Many transnational features are screened and adapted to the realities locally. Some features are more adopted while some are totally rejected. With respect to the religious equality and reform, the political atmosphere at

[107] Syed Hussein Alatas,``Perceptions of Muslim Revival' 'in *The Muslim World*, Volume 97,July 2007,p383

national and global scales are leading and even determining the pace and their extent of success as it can be confirmed through the political impact following the downfall of the *darg*, consequences from the 1995 assassination attempt in Ethiopia and impacts 9/11 internationally.

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"The Images of Women in the Proverbs and Sayings of the Oromo: The Case of West Arsi Area"

By

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Abstract

The major goal of this study is to examine the portrayal of women in the proverbs and sayings of the Arsi Oromo and to assess the awareness of the people about the effects of these proverbs and sayings on women. To achieve this goal, an attempt was made to collect proverbs and sayings that refer to women and attitudinal information from two woredas of West Arsi zone- Aresi Negelle and Kofale. The data was collected using three types instruments (focus-group discussion, interview and questionnaire). The focus group discussion was used to collect as many proverbs as possible with their contextual explanations from the selected elders of the two woredas. Their belief on the effect of these proverbs and sayings was also taken through this instrument. A questionnaire was used to collect proverbs and sayings from students and certain attitudinal data both from teachers and students. The interview was employed to seek clarifications of certain concepts and attitudes from Afan Oromo teachers and Oromo speaking male and female students in order to cross-check and support the data gathered from the elders through the main instrument. The collected data was transcribed, tallied and tabulated (for questionnaires), translated from the original language (Afaan Oromoo) to the target language (English) and finally, it was analyzed and interpreted qualitatively. The study shows that women are portrayed both positively and negatively in the proverbs and sayings of the Arsi. The image of women as a mother is a positive one, despite the fact that even the proverbs sayings that are used to praise women also reflect a socio-cultural attitude of the people and the sex-role stereotypes that are hidden in these proverbs and sayings. Even though majority of the respondents have indicated that among the Arsi, proverbs are used to add flavor to their speech; to settle social problems; to correct misbehavior; to criticize, praise and encourage good behavior; etc., they directly or indirectly show the inferiority of women and the biased social attitudes towards them. In

these proverbs and sayings, women are depicted as weak and dependent, illogical, irrational, irresponsible, ignorant, jealous, unfaithful, unreliable and unpredictable, and as inferior members of their community. Positively, women are portrayed as good house makers and obedient servants for their family. And it was found out that, the women have internalized the negative attitude the society show towards them and they act according to the social code of conduct honestly. The elders attributed the cause of the existing negative attitude towards women to the cultural adoption of the Oromo people after the fall of Gada system due to the 'conquest' of Minelik II to the region. Though they are not aware of the socializing effect of the proverbs and sayings that they use for their aforementioned functions, the respondents indicated that the proverbs and sayings they use towards women have both positive and negative effects on them. It is also found out that the transmission of these proverbs and sayings from one generation to the other generation facilitates the continuation of the existing images of women to the future thereby causing women's negative self image that results in low women's participation on different social affairs. Finally, it was indicated by the respondents that this problem will be solved by: teaching the society about gender equality; increasing women's participation; hindering the use of proverbs and sayings that undermine women; and by educating women so as to enable them defend the violation of their rights.



Some of the participants of the Parallel Session organized by College of Social Sciences and Law, Jimma University

The Status of Opposition Political Parties in Post-1991 Political Order of Ethiopia

By

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Abstract

This paper analyzes the status of legally registered opposition political parties in post-1991 political order of Ethiopia. To analyses this state of affairs, the researchers adopt a structural approach. Two major questions should be addressed in this regard. First, what factors affects operations of opposition parties. Second, why have the opposition political parties has been weakened? The paper argues that the weak nature of opposition political parties in Ethiopia has to do with the existing internal and external contexts in which the opposition political parties currently operating. Scrutinized from this perspective, the current status of opposition parties arises from the manner in which multiparty politics is organized and governed. In other words, it arises from the nature of internal and external contexts. We view the current status of opposition political parties in Ethiopia arising primarily from the political environment or context in which these extra-constitutional actors operate or find themselves in. At the centre of these contexts is the incumbent government. In sum, in order to explain the relevance, role and impact of incumbent government in this state of affairs, we approach the issues from both internal and external perspective.

The Inter-Relationship among Health-Related Behaviors, Health Consciousness and Psychological Well-Being, Academicians of Jimma University

By

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Abstract

The study examined the inter-relationship among health consciousness, health-related behaviors and psychological well-being in adulthood at Jimma University. 110 Jimma University academic staff participated in the study. Semi-Structured questionnaire and scales were employed. Descriptive and multiple regression and partial correlation analysis were used for data analysis. Most participants had proper health-related behavior, pay attention for their health and have high sense of psychological well-being. Moreover, a positive significant correlation was found between health-related behavior and psychological well-being. Furthermore, health-related behavior was found to be significant independent predictor of psychological well-being. It looks that health-related behavior and health consciousness influences optimal functioning and development at one's true and highest potential during adulthood. In-depth research is need in the area.

An Investigation of Evening Continuing Education Program at Jimma TTC: The Issue of Quality of Education

By

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Abstract

Being educated in higher education institution alone does not guarantee meeting personal and social expectations. In situations where graduates fail to compete in the world of work, unemployment will rise. When institutions are unable to produce competent graduates, joblessness will rise and creates burden to parents and the country. This requires carefully managed educational process to control personal, societal and institutional crisis. Accordingly, this study tried to investigate the quality of evening continuing education program at Jimma TTC. The specific objectives of the study were to see the conditions of dropout, to identify major challenges, if any, students and Instructors face in the teaching-learning process, to investigate whether these students are equipped with the necessary knowledge and skills needed in the world of work; and to suggest possible corrective measures that could be taken to control the problem, if any.

Data for this study were collected from students and instructors of the four existing evening program (Biology, Afan Oromo, Civics and Geography) in the college; registrar officer was also a major data source. In addition, information from direct class observations and students' academic records were used as data sources. For triangulation purpose, interview, questionnaire, Focus Group Discussion, observation and document analysis were accordingly used as instruments for data collection. And, the collected data were analyzed using both qualitative and quantitative methods; though qualitative method was dominantly used.

The results of the study showed that the dropout rates in all the departments were significant, especially in the departments of Civics, 20 (33.90%) and Afan Oromo, 15 (30.61%). Among others, the major reason for the dropout was found to be academic dismissals. Furthermore, student respondents described instructors' lack of subject matter knowledge and pedagogical

skills, negative attitudes towards evening students, unpunctuality and lack of sufficient educational resources (like books in Afan Oromo) as major problems that have worked against their successful learning. They also added inconvenient teaching-learning atmosphere, consideration of evening program as a secondary activity, timing of the evening program, personal and occupational problems as major obstacles to their academic performances. On the other hand, teacher respondents attributed the challenges (in fact, accepting some of the problems mentioned by their students) to lack of guidance and counseling services, students' poor educational background, lack of interest (students blind intention to collect diplomas after graduation, without devoting themselves for their ultimate goal), lack of reference materials in Afan oromo and IT services. More importantly, all the respondents have evidenced that most of the challenges and problems described have worked against the academic competences of the students in particular and the quality of evening education program at the college, in general. Ideas were further discussed and implications about quality in evening continuing education program at the college were underlined.

Agro-Ecological History of Omo-Naaddaa from 1900 to the Present

By

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Abstract

The name Omo-Naaddaa is derived from the Omo and the Naaddaa Rivers located in the Gibee area. Omo-Naaddaa was reorganized as *aanaa* (*waradaa*) in the post-1941 period. For a long time, Omo-Naaddaa has continuously attracted different groups of peoples. The Kafichoo and the Gaaroo are said to be the predecessors of the Oromo who conquered the area in their renowned expansion from the 16th to 18th centuries, which greatly changed demographic features of the area. After conquest, Omo-Naaaddaa has been known to be the centre of different historical processes in the history of the Jimmaa Oromo. Odaa Hulle that served as the Jimmaa *gadaa* confederacy centre for a long time was located in Omo-Naaddaa. Daakkaannoo, which was the chief iron mining centre of the Jimmaa Kingdom, was also located there. The area was also known to be one of the key way stations for local, middle and long distance trade passing along the axis of southwest to the northeast. This strategic location and the natural resources of the area attracted many other peoples (Yam, Daawuroo, Hadiyyaa etc.) to the *aanaa*. This incessant migration together with natural population increase (alongside state land use policy interventions) led to persistent crop production expansion, which in turn was responsible to ecological changes.

This thesis examines the agro-ecological history of Omo-Naaddaa by focusing on local information. It attempts to describe changes in the demographic and physical landscape. It depicts changes over time in population settlement pattern, land use pattern, crop types and human adaptations of agricultural systems as well as environmental transformation and human crisis. It narrates the impact of population change on agricultural practice, the effects of urbanization on agricultural hinterlands and the consequences of agricultural expansion on the surrounding non-farm lands like forest and pasture lands. It shows how the area of ample pasture and relatively extensive forest lands around 1900 was changed to widespread crop fields in 2007. It analyzes how the area known for its *teff*, sorghum and finger millet before 1950 has been transformed to the area increasingly dominated by maize. It discusses how maize cultivation has continued to spread from plots in broadleaf forest to highland plateau and from remote lowland villages to urban vacant lots and even to the marshy areas (*caffee*), which are in turn conducive for the expansion of malaria.

Importance of Play Therapy in Self-Healing Process of Children under Critical Conditions: The Case of Three Child Care Institutions in Addis Ababa

By

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Abstract

Background Now day, different findings showed that Play therapy has paramount importance for children's wholesome development.

Methods In this regard play therapy was conducted on 13 (7 male and 6 females) children with concentration, conduct, shyness and limited interaction, aggressive and frequently crying, getting easily angry and bullying. To achieve such objectives the play therapist collected data from caregivers through the SDQ and interview.

Result A closer look at the analysis of the difference of the pre-SDQ and post-SDQ of the thirteen children revealed that play therapy has an inestimable importance for children with the aforementioned problems. The total difficulty of the children falls on the average 7.38 while the total impact score fall on the average 4.15. The decreased total difficulty score indicates the children's improvement in the abovementioned negative behaviors while the decreased total impact score show a decrease in the negative behaviors, too, but also an increase in their prosocial (desirable) behaviors. Actually the analysis of the pre and post-SDQ of the prosocial aspect increased on the average 3.23 which means an improvement in the positive (desirable) behaviors of the children. In addition to this, the observation of the children as well as the caregivers assured that the children improved their behavior by far.

Conclusion Thus, these results showed that play therapy has remarkable implication to decrease and their by avoid children's emotional instability, hyperactivity, conduct and peer relation problems while increasing their prosocial behaviors. Therefore, it is straight forward to say that play therapy is helpful to children in some other similar contexts.

The Child Sexual Abuse Epidemic in Addis Ababa: Some Reflections on Reported Incidents, Psychosocial Consequences and Implications

By

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Abstract

Background: Though child sexual abuse is a universal phenomenon, only reported cases of the incidence are common source of information to get insight on how to understand the problem. Besides, investigating complaints presented by victims themselves would be a stepping stone for designing prevention and rehabilitation programs. The objective of this study was to identify the nature of sexual incidence and experience victims face.

Methods and Materials: The research was conducted by collecting reported child sexual abuse cases from Child Protection Units of Addis Ababa Police Commission and three selected non-governmental organizations working for the welfare of sexually abused children in Addis Ababa. 64 selected samples of victim children were included from the three organizations. They completed a semi-structured questionnaire and data were analyzed.

Results: Of the total reported crime cases committed against children (between July 2005 and December 2006), 23% of them were child sexual victimization. On average, 21 children were reported to be sexually abused each month where majority of the sexual abuse incidence were committed against female children in their own home by someone they closely know. The psychological trauma and physical complaints presented by victims include symptoms of anxiety and depression.

Conclusion: It was found out that child sexual abuse cases presented to the legal office was not properly managed. Female children appear to be more prone to sexual abuse than their male counterparts. By virtue of their nature, many children are at risk of sexual victimization by people they truest. Based on the findings, several implications are made, which includes the importance of nation-wide study to formulate a comprehensive policy guideline for protection and criminalization of child sexual abuse in Ethiopia.

Keywords: Children, sexual abuse, victimization, psychosocial consequences, crime, Addis Ababa, child protection

The Impact of Regime Type on Health Does Redistribution Explain Everything?

By

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Abstract

The earlier versions of this article were presented at the 2009 American Political Science Association annual meeting and at Australian National University's 2008 Economics and Democracy conference. The article is written by Simon wigley andAakkoy unlu-wigley.

In this article the authors consider whether democratic governance also has a pro-health effect regardless of its impact on public redistributive policies. In other words, does a country that transitions from autocratic to democratic rule undergo an improvement in population health even if its public redistributive policies remain unchanged?

The prevailing theoretical explanation for the linkage between regime type and population health is distributional. It is argued that democratic regimes spread health-promoting resources more widely than their more autocratic counterparts because they must satisfy a broader support base. This article does not attempt to challenge the distributional thesis. On the contrary Simon wigley andAakkoy unlu-wigley argued that the distributional thesis does not fully explain the health effects of regime type. In support of their claim they develop a theoretical account of the ways in which regime type can have a policy-independent affect on population health. They then used a panel of 153 countries for the years 1972–2000 to examine the relationship between extent of democratic experience and life expectancy. The evidence presented by the authors suggests is that even in the hypothetical case where a democratic regime distributes pro-health resources no better than an autocratic regime, it will still have a comparative advantage in terms of morbidity and mortality outcomes.

Dynamics in the Oromo Beliefs and Practices' Contributions for Sustainable Environment: The Cases of Ambo and Limmu Kossa Districts

By

Dheressa Dhebu and Kamil Mohammed

Abstract

Even though the study of environmental issues in Ethiopia has attracted many researchers in the past few decades, the attention given to the study of religio-ecological changes in specific rural societies like Ambo and Limmu Kossa Districts is still insignificant. Consequently, in this research paper, the attempt has been made to reconstruct the long-term dynamics within the Oromo indigenous beliefs and practices contributions for sustainable environment focusing on Ambo and Limmu Kossa districts. The former is located in West Shewa Zone and the latter is located in Jimma Zone in Oromia regional state within FDRE. They have been selected for this research to make comparative analysis since the former steadily made changes from indigenous Oromo religion nowadays called Waqeffanna where as the later made changes from Waqeffannaa to Islam. The religious changes had their own implications on dynamics within the Oromo Indigenous beliefs and practices contributions for the sustainable environment.

This study has tried to investigate the extent to which indigenous wisdom and environmental issues are interrelated. It throws some lights on how the religious changes brought about considerable changes in ecological features of the districts. It reveals the Oromo environmental views before 19^{thc}. It demonstrates the contributions of Oromo Gada beliefs and practices to spurn environmental degradation. It has assessed the consequences of Abyssinian conquest in detaching Oromo indigenous ideas and practices from those of environment. It shows the ways of renovating Oromo indigenous concepts for the future environmental sustainability.

Since it has been written from a grass-root level it is anticipated that it will minimize some of the shortcomings that arise with dependence on politically-oriented documents. The data for this research has mainly been collected from key informants of the two districts. Oral information has been cross checked with written documents and archival sources as well as personal observation and experiences of the researchers. In the analysis, qualitative research method has mainly been used. Both descriptive and narrative styles have been utilized.

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A study on Environmental Assessment and Pollution Prevention from the Thermal Power Plants

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Abstract

As the increasing emissions from the thermal power plants has been a potential threat to the human society which causes green house gases and responsible for the global temperature rise , the object of the study is to sets forth procedures for establishing maximum emissions levels for all fossil-fuel based thermal power plants with a capacity of 50 or more megawatts of electricity (MWe) that use coal, fuel oil, or natural gas. This paper also suggests various ways to achieve a less polluted environment by using cleaner fuels , abatement of Nitrogen Oxides and particulate matter , fly ash handling , ambient air quality and minimal water use . This paper also describes the advanced coal utilization technologies such as Engine driven power plants, fluidized bed combustion and integrated gasification combined cycle (IGCC) and Co- generation compared with conventional coal fired power plants.

Keywords: Emission standards, Fossil fuel fired power plants, Engine driven power plants, integrated gasification combined cycle, Co generation.

Introduction

Conventional steam-producing thermal power plants generate electricity through a series of energy conversion stages: fuel is burned in boilers to convert water to high-pressure steam, which is then used to drive a turbine to generate electricity. Combined cycle units burn fuel in a combustion chamber, and the exhaust gases are used to drive a turbine. Waste heat boilers recover energy from the turbine exhaust gases for the production of steam which is then used to drive another turbine. Generally, the total efficiency of a combined-cycle sys- tem in terms of the amount of electricity generated per unit of fuel is greater than for conventional

thermal power systems, but the combined-cycle system may require fuels such as natural gas.

Advanced coal utilization technologies (e.g., fluidized-bed combustion and integrated gasification combined cycle) are becoming available, and other systems such as cogeneration offer improvements in thermal efficiency, environmental performance, or both, relative to conventional power plants. The economic and environmental costs and benefits of such advanced technologies need to be examined case by case, taking into account alter- native fuel choices, demonstrated commercial viability, and plant location. The criteria spelled out in this document apply regardless of the particular technology chosen.

Engine-driven power plants are usually considered for power generation capacities of up to 150MWe. They have the added advantages of shorter building period, higher overall efficiency (low fuel consumption per unit of output), optimal matching of different load demands, and moderate in- vestment costs, compared with conventional thermal power plants.

Waste Characteristics

The wastes generated by thermal power plants are typical of those from combustion processes. The exhaust gases from burning coal and oil contain primarily particulates (including heavy metals)if they are present in significant concentrations in the fuel), sulfur and nitrogen oxides (SOx and NOx), and volatile organic compounds (VOCs). For ex- ample, a 500 MWe plant using coal with 2.5% sulfur (S), 16% ash, and 30,000 kilojoules per kilogram (kJ/kg) heat content will emit each day 200 metric tons of sulfur dioxide (SOx), 70 tons of nitrogen dioxide (NOx), and 500 tons of fly ash if no controls are present. In addition, the plant will generate about 500 tons of solid waste and about 17 giga watt-hours (GWh) of thermal discharge.

This document focuses primarily on emissions of particulates less than 10 microns (μm) in size (PM, including sulfates), of sulfur dioxide, and of sulfur dioxide and of nitrogen oxides . Nitrogen oxides are of concern because of their direct effects and because they are the precursors for the formation of ground level ozone.

The concentrations of the pollutants in the exhaust gases are a function of firing configuration, operating practices and fuel composition. Gas – fired plants generally produce negligible quantities of particulates and sulfur oxides and level of nitrogen oxides are about 60 % of those from plants using coal .Gas fired plants also reduces less quantities of carbon dioxide, a

green house gas.

Ash residues and the dust removed from exhaust gases may contain significant level of heavy metals and some organic compounds in addition to inert material. Fly ash removed from exhaust gases make up to 60- 85% of the coal ash residue in pulverizes coal boilers . Bottom ash includes slag and particles that are coarser and heavier than fly ash.

Steam turbines and other equipment may require large quantities of water for cooling, including steam condensation. Water is also required for auxiliary station equipment, ash handling. Contamination arises from demineralizers, lubricating and auxiliary fuel oils, and chlorine, biocides and other chemicals used to manage the quality of water in cooling systems.

Policy frame work

The development of a set of environmental requirements for a new thermal power plant involves decisions of two kinds. First, there are specific requirements of the power plants itself. These are the responsibility of the project developer in collaboration with relevant local or environmental authorities. This document focuses on the issues that should be addressed in arriving project site requirements. Second there are requirements that relate to the operation of a power system as a whole.

Environmental Assessment

An EA should be carried out early in the project cycle in order to establish emissions requirements and other measures on a site specific basis for a new thermal plant or unit of 50 MWe of larger. The initial tasks in carrying out the EA should include Collection of baseline data on ambient concentration of PM10 and sulfur oxides (for oil and coal fired plants), nitrogen oxides ,(and ground level ozone).Collection of similar baseline data for critical water quality indicators that might be affected by the plant. Use of appropriate air quality and dispersion models to estimate the impact of the project on the ambient concentrations of these pollutants.

When there is a reasonable likelihood that in the medium or long term the power plant will be expanded or other pollution sources will increase significantly, the analysis should take account of the impact of the proposed plant design both immediately and after any probable expansion in capacity or other sources of pollution. The EZ should also included impacts from construction work and other activities that normally occur, such as migration of worker

when large facilities are built. Plant design should allow for future installation and additional pollution control equipment.

The EA should also address other project specific environmental concerns such as emissions of cadmium and other heavy metal resulting from burning different types of coal and heavy fuel oil. The quality of The EA (including systematic cost estimates) is likely to have a major influence on the ease and speed of project preparation. A good EA prepared early in the project cycle should make a significant contribution to keeping the overall cost down.

Emissions guidelines

Emissions levels for the design and operation of each project must be established through EA process on the basis of country legislation and the pollution prevention and abatement handbook, as applied to local conditions. The emissions levels selected must be justified in the EA and acceptable to the World Bank group.

The following maximum emissions levels are normally acceptable to the world bank group in making decisions regarding the provision of world bank assistance for few fossil fuel fired thermal power plants or units of 50 MWe or larger . The emissions levels have been set so they can be achieved by adopting a variety of cost effective options or technologies, including the use of clean flues or washed coal. For example, dust controls capable of over 99% removal efficiency, such as electrostatic precipitators or bag houses, should always be installed for coal fired power plants, similarly the use of low NOx burners with other combustion modifications such as low excess air (LEA) firing should be standard practice. The range of options for the control of sulfur (less than 1 % S), high calorific value fuels , specific controls may not be required , while coal cleaning , when feasible or sorbent injection may be adequate for medium sulfur fuels (1- 3 %) . Fluidized combustion, when technically and economically feasible, has relatively low sulfur emissions. The choice of technology depends on a benefit cost analysis of the environmental performance of different fuels and the cost of controls.

Approaches to pollution prevention

Air borne particulate matter (PM) emissions can be minimized by pollution prevention and emission control measures. Prevention, which is more cost effective than control, should be emphasized . Special attention should be given to pollution abatement measures in areas where toxics associated with particulate emissions may pose a significant environmental risk.

Management

Measures such as improved process design, operation, maintenance, house keeping and other management practices can reduce emissions. By improving combustion efficiency, the amount of products of incomplete combustion is reduced. Proper fuel firing practices and combustion zone configuration, along with an adequate amount of excess air , can achieve lower particulate emissions

Choice of fuel

Atmospheric particulate emissions can be introduced by choosing cleaner fuels. Natural gas used as fuel emits negligible amount of particulate matter. Oil based processes also emit significantly fewer particulates that coal fired combustion processes. Low ash fossil fuels contain less noncombustible, ash forming mineral matter and thus generate lower level of particulate emissions .Lighter distillate oil based combustion results in lower level levels of particulate emissions than heavier residual oils. However, the choice of fuel is usually influenced by economic as well as environmental considerations.

Fuel cleaning

Reduction of ash by fuel cleaning reduces the generation of PM emissions. Physical cleaning of coal through washing and can reduce its ash and sulfur content , provided the care is taken in handling the large quantities of solid and liquid wastes that are generated by cleaning process .An alternate to the coal cleaning is the co firing of coal with higher and lower ash content . In addition to the low particulate emissions low ash coal also contributes to better boiler performance and reduces boiler maintenance.

Choice of technology and process

The use of more efficient technologies or process changes can reduce PIC emissions. Advanced combustion technologies such as Engine driven power plants fluidized bed combustion and integrated gasification combined cycle (IGCC) are examples of cleaner processes that may lower the PICs by approximately 10 %.

Engine-Driven Power Plants

Engine-driven power plants use fuels such as diesel oil, fuel oil, gas, oil emulsion, and crude oil. The two types of engines normally used are the medium-speed four-stroke trunk piston engine and the low-speed two-stroke crosshead engine. Both types of engine operate on the

air-standard diesel thermodynamic cycle. Air is drawn or forced into a cylinder and is compressed by a piston. Fuel is injected into the cylinder and is ignited by the heat of the compression of the air. The burning mixture of fuel and air expands, pushing the piston. Finally the products of combustion are removed from the cylinder, completing the cycle. The energy released from the combustion of fuel is used to drive an engine, which rotates the shaft of an alternator to generate electricity. The combustion process typically includes preheating the fuel to the required viscosity, typically 16• centistokes , for good fuel atomization at the nozzle. The fuel pressure is boosted to about 1,300 bar to achieve a droplet distribution small enough for fast combustion and low smoke values, Fuel quality. Fuel ash constituents may lead to abrasive wear, deposit formation, and high temperature corrosion, in addition to emissions of particulate matter. The properties of fuel that may affect engine operation include viscosity, specific gravity, stability (poor stability results in the precipitation of sludge, which may block the filters) presence of solids such as rust, sand, and aluminum silicate, which may result in blockage of fuel pumps and liner wear, and water content

Abatement of Particulate Matter

The options for removing particulates from exhaust gases are cyclones, bag houses (fabric filters), and ESPs. Cyclones may be adequate as pre cleaning devices; they have an overall removal efficiency of less than 90% for all particulate matter and considerably lower for PM Bag houses can achieve removal efficiencies of 99.9% or better for particulate matter of all sizes and they have the potential to enhance the removal of sulfur oxides when sorbent injection dry-scrubbing, or spray dryer absorption systems are used.

Abatement of Sulfur Oxide

The range of options and removal efficiencies for SO controls is wide. Pre-ESP sorbent injection can remove 30¸% of sulfur oxides, at a cost of US$50–$100 per kW. Wet and semidry FGD units consisting of dedicated SO absorbers can remove70Í%, at a cost of US$80–$170 per kW (1997 The operating costs of most FGDs are substantial because of the power consumed (of the order of 1²% of the electricity generated), the chemicals used, and disposal of residues. Estimates by the International Energy Agency (IEA) suggest that the extra annual cost for adding to a coal-fired power plant an FGD de- signed to remove 90% of sulfur oxides amounts to10Œ% depending on capacity utilization. An integrated pollution management approach should be adopted that does not involve switching from one form of pollution to another. For example FGD scrubber wastes, when improperly managed can lead to

contamination of the water supply, and such SO removal systems could result in greater emissions of particulate matter from materials handling and windblown dust. This suggests the need for careful benefit-cost analysis of the types and extent of SOx abatement

Fly Ash Handling

Fly ash handling systems may be generally categorized as dry or wet, even though the dry handling system involves wetting the ash to 10•% moisture to improve handling characteristics and to mitigate the dust generated during disposal. In wet systems, the ash is mixed with water to produce a liquid slurry containing 5ˆ% solids by weight This is discharged to settling ponds, often with bottom ash and FGD sludges, as well. The ponds may be used as the final disposal site, or the settled solids may be dredged and removed for final disposal in a landfill. Wherever feasible decanted water from ash disposal ponds should be recycled to formulate ash slurry. Where heavy metals are pre-sent in ash residues or FGD sludges, care must be taken to monitor and treat a overflows from settling ponds, in addition to disposing of them in lined places to avoid contamination of water bodies. In some cases, ash residues are being used for building materials and in road construction. Gradual reclamation of ash ponds should be practiced

Minimal Water Use

It is possible to reduce the fresh water intake for cooling systems by installing evaporative recirculating cooling systems. Such systems require a greater capital investment, but they may use only5% of the water volume required for once-through cooling systems. Where once-through cooling systems are used, the volume of water required and the impact of its discharge can be reduced by careful siting of intakes and outfalls, by minimizing the use of biocides and anticorrosion chemicals (effective non chromium-based alternatives are avail-able to inhibit scale and products of corrosion in cooling water systems), and by controlling discharge temperatures and thermal plumes. Waste waters from other processes, including boiler blow down, demineralizer backwash, and resin regenerator wastewater, can also be recycled, but again, this requires careful management and treatment for reuse. Water use can also be reduced in certain circumstances through the use of air-cooled condensers.

Ambient Air Quality

The guidelines presented in Table are to be used only for carrying out an environment assessment

in the absence of local ambient standards. They were constructed as consensus values taking particular account of WHO, USEPA, and EU standards and guidelines. They do not in any way substitute a country's own ambient air quality standards

Ambient air quality in thermal power plants

(Micrograms per cubic meter)

Pollutant	24 – hour average	Annual average
PM10	150	50
TSP	230	80
Nitrogen dioxide	150	100
Sulfur dioxide	150	80

Approaches to emissions control

A variety of particulate removal technologies, with different physical and economic characteristics are available. Inertial or impingent separators rely on the inertial properties of the particles to separate them form the carrier gas stream. Inertial separators are primarily used for the collection of medium size and coarse particles. They include settling chambers and centrifugal cyclones. Cyclones are low cost low maintenance centrifugal collectors that are typically used to remove particulates in the size range of 10 -100 microns (mm). The fine dust removal efficiency of the cyclones in typically below 70 % where as electrostatic precipitators and bag houses can removal efficiency of 99.9 % or more.

Electrostatic precipitators remove particles by using an electrostatic field to attract the particles on to the electrodes. Collection efficiencies for well designed, well operate and well maintained systems are typically 99.9 % or more of the inlet dust loading . They are less sensitive to maximum temperatures than are fabric filters, and they operate with the low pressure drop. ESPs have been used for the recovery process materials such as cement as well as for the pollution control. They typically ass 1- 2 % to the total cost of a new industrial plant.

Filters and dust collectors (bag houses) collect dust by passing flue gases through a fabric that acts as a filter. The most commonly used in the bag filter or bag house. The various types of filter media included woven fabric, needled felt, plastic, ceramic and metal. The operation temperature of the bag house influences the choice of fabric. Accumulated particles are removed by mechanical shaking, reversal of the gas flow, or a stream of high pressure air. Fabric filters are efficient for both high and low concentration particles but are suitable only

of dry and free flowing particles.

Equipment selection

The selection of PM emissions control equipment is influenced by environmental, economic and engineering factors.

Environmental factors include (a) the impact of control technology on ambient air quality; (b) the contribution of the pollution control system to the volume and characteristics of waste water solid waste generation and (c) maximum allowable emissions requirements.

Economic factors include (a) the capital cost of the Control technology; (b) the operating and maintenance costs of the technology; and (c) the expected lifetime and salvage value of the equipment.

Engineering factors include (a)contaminant characteristics such as physical and chemical properties ;concentration , particulate shape , size distribution , chemical reactivity , corrosivity, abrasiveness , and toxicity ; (b) gas steaming characteristics such as volume flow rate, dust loading , temperature, pressure, humidity , composition , viscosity , density , reactivity , combustibility , corrosivity , and toxicity ; and (c) design and performance characteristics such as pressure drop, reliability , dependability , compliance with utility and maintenance requirements and temperature limitations . As well as size, weight of the particulates and mass transfer or contaminant destruction capability for gases and vapors.

Conclusions

Key issues for pollution prevention and control planning

The principle methods for controlling the release of particulate matter are summarizes here .

- Identify measures for improving operating and management practices
- Consider alternate fuels such as gas instead of coal
- Consider fuel cleaning option such as coal washing , which reduce ash content by up to 40 %
- Consider alternate production process and technologies such as Engine driven power plants fluidized bed combustion and integrated gasification combined cycle (IGCC) that result in reduced PM emissions.
- Select optimal particulate removal devices such as ESPs and bag houses.

Recommendations

For effective PM 10 Control in industrial application the use of ESPs or bag house is

recommended. They should be operated at their design efficiencies. In the absence of a specific emissions requirement, a maximum level of 50 milligrams per normal cubic meter (mg/Nm3) should be achieved.

Draw backs

However controlling emissions of many heavy metals such as cadmium, lead and mercury that are present such as trace elements in fuels is a difficult and largely unsolved problem .

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For Export: Knowledge Economy, as a Catalyst to Achieve Economic Growth in Ethiopia

By

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Abstract

Knowledge is an important factor for every person to survive and succeed in this world where rapid change takes place. Our early ancestors never stopped from learning and discovering different techniques in order to survive. Up until now in this period of Information technology different nations of the world are finding ways to uplift their economic conditions. Nowadays progressive nations don't rely alone on their natural resources but also their utilizing the natural talents of their citizens. Knowledge Economy specifically the I.T. sector can significantly contribute to pump-prime the economy of the nation. Knowledge Economy is still in the infancy stage therefore support from the stakeholders should be clearly defined. In order to reach the level of growth desired focus must not only be geared to the usual economic contributors of the nation but also to the generations of the nation with potential to bring Ethiopia to the map of the world that exports not only agricultural products but also knowledge commodities. Most of the rich nations, even the developing countries have a share of economic growth coming from the Knowledge Economy sector, not to mention that is also their number one export that make-up their Gross National Product (GNP). Success in Knowledge Economy can be achieved irregardless of the economic background of the country as long as the proper support is provided. Knowledge Economy is a billion dollar industry that a fraction of earnings from it can bring significant contributions to the economy. The research will be concluded by highlighting different solutions to make this sector a reality. Also it will suggest on how talented people can be encouraged to hone their skills on this area. The stakeholders, experts from different institutions are encouraged to participate in the development of this untapped area of Information Technology.

Introduction

Knowledge is defined in Wikipedia as familiarity with someone or something, which can include information, facts, descriptions, or skills acquired through experience or education. A

popular philosopher by the name of Sir Francis Bacon once said that "Knowledge is Power". Ever since human beings populated this earth they started using their knowledge in order to survive. Record shows how our ancestors invented different tools to hunt for food up to the discovery of fire to cook their catch. In this era of Information Technology where different technologies has been invented which led to the advancement of industrialized nations growth and development. But without the knowledge and talents of every individual who persevered to make the different technologies happened, it would have not been possible to attain those successes being enjoyed by many advanced industrialized countries. Those individuals who made it possible utilized their skills emanating from within, these skills being mentioned refers to the knowledge as a skill. Yes indeed through knowledge a nation can drive its economy at a greater pace by honing the skills of talented individuals in the area of Information Technology which can create the so called Knowledge Economy.

According to Wikipedia, Knowledge Economy refers to:

An economy of knowledge focused on the production and management of knowledge in the frame of economic constraints, or to a knowledge-based economy.

The use of knowledge technologies (such as knowledge engineering and knowledge management) to produce economic benefits as well as job creation.

According to Peter Drucker a brilliant management author, "This new *knowledge economy will rely heavily on knowledge workers.* ...the most striking growth will be in "knowledge technologists:" computer technicians, software designers, analysts in clinical labs…. Just as unskilled manual workers in manufacturing were the dominant social and political force in the 20th century, knowledge technologists are likely to become the dominant social and perhaps also political force over the next decades".

Many nations have been benefited economically from the income generated by Knowledge economy. Due to the continuous growth and strong demand on Information Technology requirements locally and internationally many countries took advantage of this situation. A nation like Ireland has been transformed from agricultural nation to a Knowledge economy. Ireland is exporting software across the globe not to mention their existing economic problem before entering into this arena. In other words they are exporting knowledge based products which becomes a global phenomenon around the world. Nations such as China, Hong Kong, United States (Please see. Fig. 1 and Fig. 2) are the top three exporters of IT based products

as shown on the statistics provided by UNCTAD a division of United Nation. On figure 2, it shows the top 10 countries that exports their knowledge based goods. Not to mention other countries who are participating in this knowledge economy, a lot of nations are significantly benefiting to the economic contributions brought about by this phenomenon as with the case of Hong Kong which is also another province of China, their IT products exports comprises 43.1 percent of their total exports based on 2009 statistics. If you are going to combine the exports of China's IT goods with Hong Kong, it will reach more than 50% of their total exports.

According to the article published by the European Commission in the year 2004, the key areas of concern with the knowledge as an economic driver in today's economies are:

1. Knowledge is increasingly considered to be a commodity. It is packaged, bought and sold in ways and to levels never seen before.
2. Advances in ICTs (Information and Communication Technologies) have reduced the cost of many aspects of knowledge activity, for example knowledge gathering and knowledge transfer.
3. The degree of connectivity between knowledge agents has increased dramatically.

Knowledge Economy is not only beneficial to the nation's economy but also to its citizens who are participating to it. It creates job, creates new market and encompasses other areas of the society. It does not require one to be a rocket scientist in order to fulfill it, but becoming a Knowledge-based economy cannot be achieved overnight. However, there is a trade-off to make this thing a reality. The stakeholders as well as the policymakers should collaborate effectively to identify the market areas of the knowledge economy locally and abroad. We have to make sure also that the market needs are achievable and the pool of talents should be available.

Exports of ICT goods in 2009			
	Economy	ICT goods exports ($ billion)	ICT goods exports as a share of total exports (ICT-4)
1	China	356	29.7%
2	Hong Kong, China	142	43.1%
3	United States	113	10.7%
4	Singapore	91	33.9%
5	Republic of Korea	80	21.9%
6	Japan	70	12.1%
7	Taiwan, Province of China	67	33.0%
8	Malaysia	57	36.5%
9	Germany	55	4.9%
10	Netherlands	53	12.4%
11	Mexico	50	21.7%
12	Thailand	30	19.8%
13	United Kingdom	23	6.7%
14	Hungary	21	26.0%
15	France	20	4.3%
16	Czech Republic	16	14.4%
17	Philippines	14	36.4%
18	Poland	13	9.4%
19	Ireland	13	11.0%
20	Sweden	12	9.0%

Fig. 1

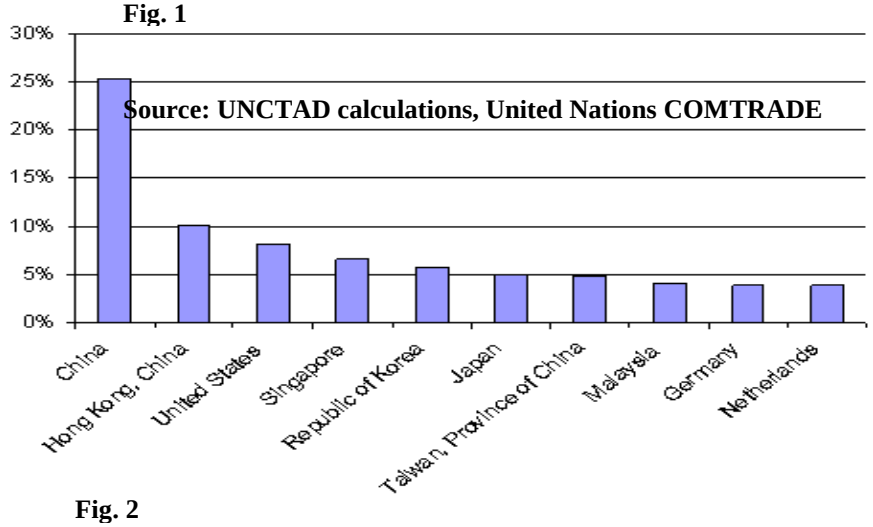


Fig. 2

Source: UNCTAD calculations, United Nations COMTRADE

Source: UNCTAD calculations, United Nations COMTRADE

The current education system should be revisited and revise if necessary if it is attuned or ready to cater to the current needs of the knowledge economy. Education will play an

important role to shape the future of Knowledge economy in Ethiopia. In countries that adopted the I.T. based knowledge economy different strategies were implemented specifically in the education system. Such changes implemented are improvement of English communication skills, enhancing logical and reasoning skills and integration of computer programming class in the high-school just to mention a few. Education is not only a contributory factor in one nations economy but also an important key to eradicate poverty as once mentioned by James D. Wolfensohn, a former President of the World Bank, 1999. He stated that "*All agree that the single most important key to development and to poverty alleviation is education. This must start with universal primary education for girls and boys equally, as well as an open and competitive system of secondary and tertiary education".*

Statement of the Problem:

The purpose of this research is to identify how knowledge economy as a economic growth driver can improve the economic situation in Ethiopia as what has been done by other countries successfully. But in order to become an economy that invests on the intellectual skills of its citizens the issues surrounding how Knowledge Economy can be initiated in Ethiopia must be answered. It has been mentioned that Knowledge Economy can contribute significantly to the economy but what or who are the other entities that can directly benefit from it aside from the nation itself. Lastly to make Knowledge Economy a reality and attainable, studies must be conducted in order to identify its pros and cons. Having sufficient knowledge resources concerning the issue will provide a solid foundation later on for this economic phenomenon.

Significance of the Study

Since Knowledge economy is broad but mostly concentrated in Information Technology based products. It will tackle other areas of knowledge economy that can also contribute to the economy of Ethiopia. It will also discuss how knowledge economy affects other areas and sector of society which will play an important role to the development and growth of Knowledge economy.

Conclusion and Recommendation

Every nations are finding ways to uplift the economic conditions of their country. Strong economy only signals good revenues for the nation concerned and good public service can be rendered to their citizens. Most industrialized nations improved their economy by utilizing

the different economic sectors of their society such as agriculture, mining, industrial, just to mention a few. Many of these sector exports their goods and yields big revenues in return which forms part of their GDP. Knowledge economy is another sector economy that is just waiting to be tapped here in Ethiopia.

Ethiopia as an agricultural country relies heavily on agriculture to support its economy including its workforce. If Knowledge economy can be given a chance to start and thrive here in Ethiopia it can bring significant revenues to its economy as well as to its people.

Knowledge economy can open up a lot of opportunities here in Ethiopia. Among this opportunities are the creation of employment, increase revenues for the country, it can bring development to the countryside, it can even give rise to the birth of other forms of businesses, increase demand for telecommunication facilities, creation of other employment opportunities apart from Knowledge economy worker, give rise to the development of a new city and many more since Knowledge economy permeates beyond other economic opportunities.

If some work are very demanding in terms of physical capabilities of individuals. Knowledge economy related work doesn't require one to be physically bit as long as the person is mentally fit, he or she can be a part of it irregardless of they are physically challenged or not. In the Philippines alone many call center are hiring physically handicapped individuals. Not to mention that other call centers, began hiring blind people for its outbound calls, as part of its workforce thus giving them new hopes and opportunities as an important part of the community. A call centre is often operated through an extensive open workspace for call centre agents, with work stations that include a computer for each agent, a telephone set/headset connected to a telecom switch, and one or more supervisor stations. It can be independently operated or networked with additional centres, often linked to a corporate computer network, including mainframes, microcomputers and LANs.

Knowledge economy does not use and exploit natural resources it only uses talents and skills emanating from every individuals. But it provides vast opportunities for the nations economy because it brings big revenues, as well as employment to its people.

Some big industries, corporations requires a hug space perhaps as a football field in order to operate but Knowledge economy business requires only a portion of that space mentioned. Knowledge economy encourages migration causing other nationalities to come in one country and look for work, allowing for the transfer of technical know how and experiences.



Fig. 3

Knowledge economy is not simply a hype or something that will stay and go away forever, it is here to stay. The reason for this is due to constant changes in technology, this massive and rapid change in the technology around us causes the demand for work to increase. At times there would even shortages of skills because no individuals are qualified to fill up certain jobs.

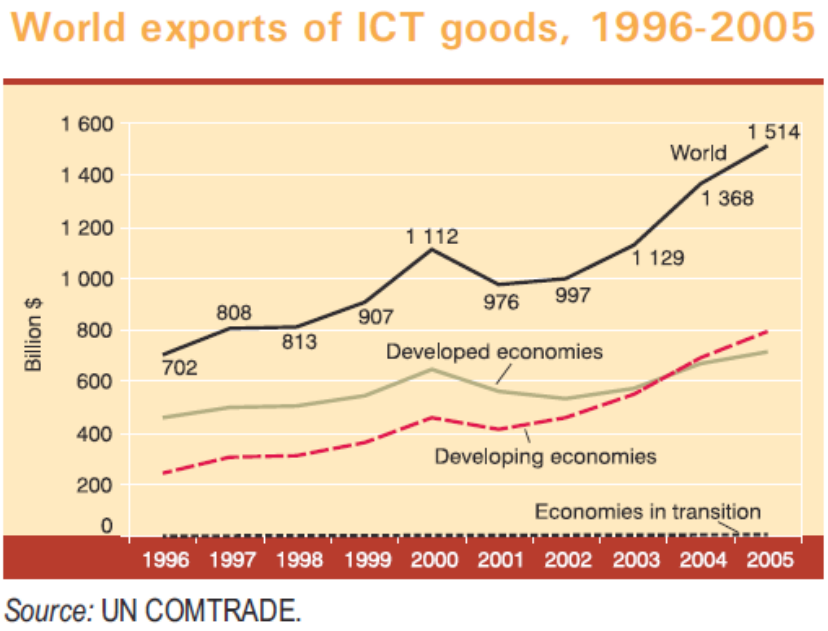


Fig. 4

By far Knowledge economy have further enhance economies of different nations whether the country is an agricultural nations, industrial nations, advanced nations, all of them have a share and reaping the benefits of it. Look at figure 3 shows how ICT export products top other merchandized being exported around the globe based on the study conducted by UN COMTRADE a division of United Nation. While on figure 4 shows how the export of ICT goods are increasing around the world both shared by developed nations and developing nations. All from 1996 up to 2005, take note of the significant growth which are steadily growing.

Lastly the stakeholder and policymakers must be ready to face the challenges in order to attain the economic development by adopting offered by Knowledge economy. The cooperation of everyone from public and private sectors are being encouraged in order to make this thing a reality.

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Trend Analysis of Ground Water Fluctuation in the Sher River Basin, India

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Ground water continues to be main source of irrigation for agriculture crops and to meet domestic water requirement (urban as well as rural areas) in the absence of substantial surface water storage schemes. A large number of shallow and deep tube wells have been developed in the alluvial area mainly for the purpose of the irrigation in the Sher river basin of the India. Ground water level data of eighteen observation wells for the periods of 10 years to 30 years have been analyzed to quantify the rising or falling trend of ground water levels. The procedure suggested by the CGWB has been used to analyze the trend. Trend analysis of water table fluctuation of ground water for a period of 1993-1999 shows that water table falls remarkably about 1 to 2 m for pre-monsoon and 2 to 5 m fall for post monsoon seasons for lower part of the study area (Alluvium). On the other hand rise of 1 to 4 m and 1 to 2 m were observed in upper part of study area (Deccan trap) for pre-monsoon and post monsoon seasons respectively. These conditions denote that exploitation in ground water source is intense in alluvium area due to intensifying of agricultural area while ground water rise in upper part of area is result of application of surface water storage schemes in the study area.

Key words: ***Ground water trend, Alluvium, Deccan Trap, Ground water exploitation.***

1. Introduction

Groundwater is a prime source of fresh water in many parts of the world and especially in developing countries like India. Some highly populated regions in India are highly dependant on ground water source. In the last two decades significant changes have been taken place in India in the use of groundwater for irrigation, and currently about 60% of irrigated agriculture depends on groundwater pumping (Shah et al., 2003). Irrigation wells are managed by individual farmers and their management and replacements are made under their own control.

Further, there is an increased reliance on groundwater irrigation due to fragmentation of farm land holdings and increasing numbers of marginal/small farmers. This has resulted in systematic changes in land use practices especially in the upland areas (recharge areas of river basins), which were not part of the green revolution during 1950–80. Decline of ground water table due to over-extraction of groundwater source have become critical issues in several regions of India. In addition, close to 90% of rural domestic water supply is from groundwater (Javeed, 2010). In the same part of country, significant proportions of the water demand in the cities and towns are met from groundwater supplies only. Several regions in India are experiencing rapid development and population increase, and the demand on groundwater for water supply has grown considerably during the last decade, and is expected continue to grow further. Also, during the past few years, India has experienced extreme weather events such as droughts, floods, and cyclones more frequently. Therefore it is necessary to understand the situation of ground water depletion under over the time period. Central Ground Water Board (CGWB) monitoring ground water table levels at various possible locations in the India and the Board is aware that groundwater is being withdrawn at unsustainable rates in some areas.

Several GIS based ground water studies (Agarwal, 1989; Saraf and Choudhary, 1998; Pandey et al., 2007; Singh et al., 2009; Bhalla et al., 2011) which analyze the spatial as well temporal ground water trend are useful for assessment of ground water development. To tackle the future ground water demand whilst by maintaining the sustainability of ground water, holistic regional groundwater assessments would be valuable in promoting appropriate policies for agricultural development and for hydrologic research. Therefore present study aims at (1) to analyze the ground water trend of Sher river basin, India, by spatially as well as temporally using GIS as tool.

1.1 Study area location, Topography, Drainage pattern and Climate

Study area representing Sher, Umar and Barureva watersheds (Figure 1) is located between latitudes $22^0$15’00”N and $23^0$05’00”N and longitudes $79^0$00’00”E and 79^0 45’00”E. Survey of India (SOI) topographic maps (Scale, 1:50000) numbered 55M4, 55M8, 55M12, 55N1, 55N2, 55N5, 55N6, 55N7, 55N9, 55N10 provide topographic details of the study area. Three watersheds encompass area of 2822 km^2 as study area. The three adjacent watersheds namely Barureva, Sher and Umar (Figure 1) conjoin together to form an important southern sub-basin of Narmada basin in its upper reaches in Madhya Pradesh State of India. The three

rivers flow in the north-westerly direction from the south. Umar and Barureva join Sher before the confluence of the latter with Narmada river. Thus, Umar and Barureva rivers are in fact, tributaries of Sher river. From the south of the Satapura highlands down to the Narmada in the north, the drainage system of the three rivers represents an accretional plain of alluvium deposits. Sher watershed, having an area of the magnitude of 1,635 km^2, is the largest followed by Umar (699 km^2) and Barureva watersheds (488 km^2).

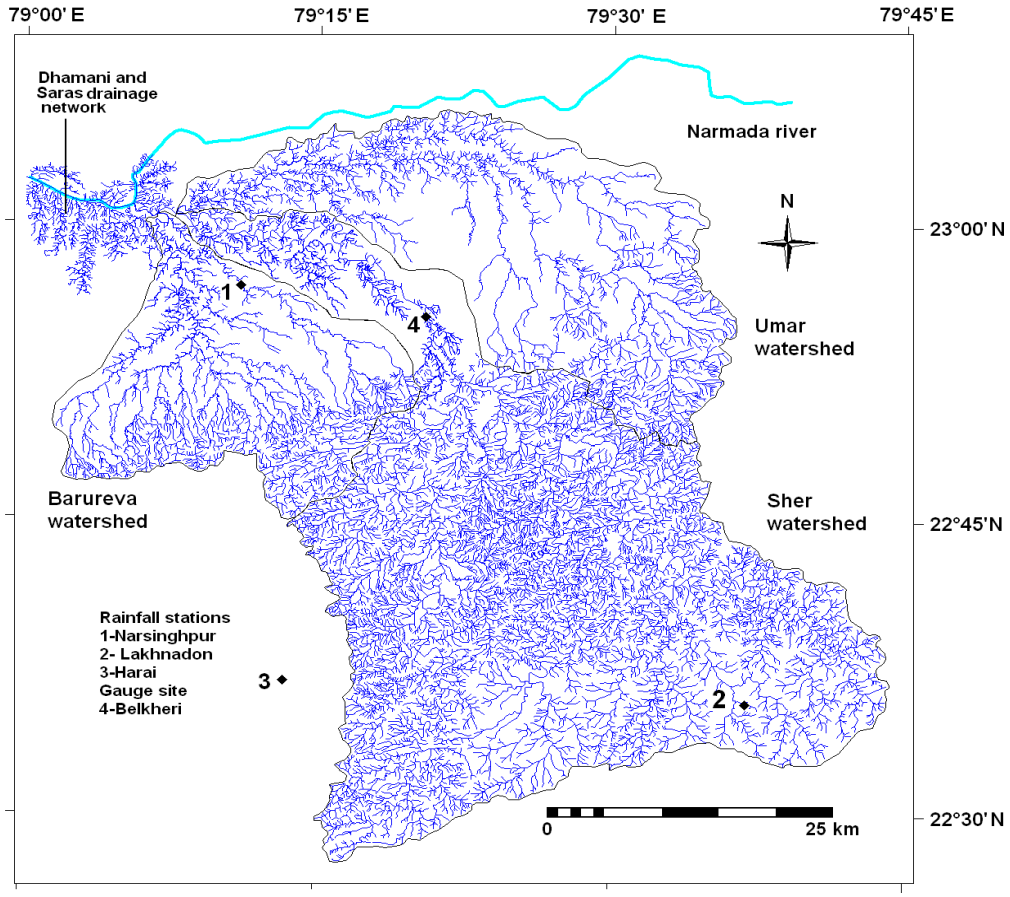


Figure 1: The study area, location of rainfall stations and gauge site

The elevations in study area vary from 300 m to 890 m above mean sea level The Barureva and Umar watersheds have flat topography, however near the confluence of three rivers and along the river course deep gullies and ravines have been formed. The upper part of Sher watershed is hilly in the uppermost portion followed by the undulating and plain topography. Central most part of the Sher watershed is identified with hilly terrain while lower part of watershed has flat and depositional topography. However along the river course, vertical bank cutting gullies are in active state. Barureva and Umar watersheds have relatively small hilly area, mostly located in upper most part of the watersheds.

The drainage patterns of three rivers are mostly dendritic type with medium and coarse drainage network (Figure 1). The study area experiences sub-tropical climate with considerable temporal variations in rainfall, temperature and humidity.

Rainfall pattern: The area has three distinct seasons in a year, i) rainy season ii) winter season and iii) summer season. The rainy season extends from June to October under the influence of south-west monsoon. The area also receives some rainfall during January and February from north-east monsoon. July and August are the main rainy months. Normally, the rainfall ceases by the end of September. However, some times in recorded years, October also happens to be month of good rainfall The average annual rainfall at Narsinghpur, Harai, and Lakhnadon is 1165 mm, 1144 mm and 1092 mm respectively. The rainfall distribution within a year suggests that about 90% of annual rainfall is received in monsoon period (June-Sept) and the remaining 10% occurs in non-monsoon period.

Temperature: The temperature in the study area begins to rise rapidly from about March till May which is generally the hottest month. The mean daily maximum temperature in May falls between 39^0 C and 45^0 C. December and January are the coldest months of the year. Normally, annual temperature varies from the 2^0 C to 45^0 C. On the average whole days are warm and nights are cooler.

Relative Humidity: The relative humidity is highest during morning hours in July, August and September months ranging from 83.9 to 89.6%. March, April and May are the months when relative humidity during morning hours is lowest and ranging from 40.3 to 48.6%. The annual mean relative humidity is 60.5% in the morning and 45.6% in the evening hours.

Wind Speed: The mean annual wind velocity in study area (Narsinghpur station) is 4.35 km/hr in the evening and 2.44 km/hr during the morning hours. The mean seasonal wind velocity is 3.05 km/hr during morning and 5.96 km/hr during evening. It is observed that mean wind speeds are higher during the evening hours than in the morning hours.

1.2 Geological Setting, Aquifer Characteristics and Ground Water Condition

The geological setting of the study area is shown in Figure 2 is based on the study of the field survey reports and geological maps of administrative blocks representing study area (GOI 1996, GOMP 1983, 1988a, 1988b). Study area shows recent Alluviums, Deccan traps (basalt) and Gondwana formations are dominant in the upper reaches as compared to quartzite and gneissic-schist rocks of Archeans complex which are found as limited outcrops along the

lower slopes of the Satpura mountains (Figure 2) whereas, for larger part, these remain underneath the thick cover of the alluviums. Quartzite formations are, at places, found in Barureva and Umar watersheds, whereas gneissic-schists formation is observed only in the Barureva watershed.

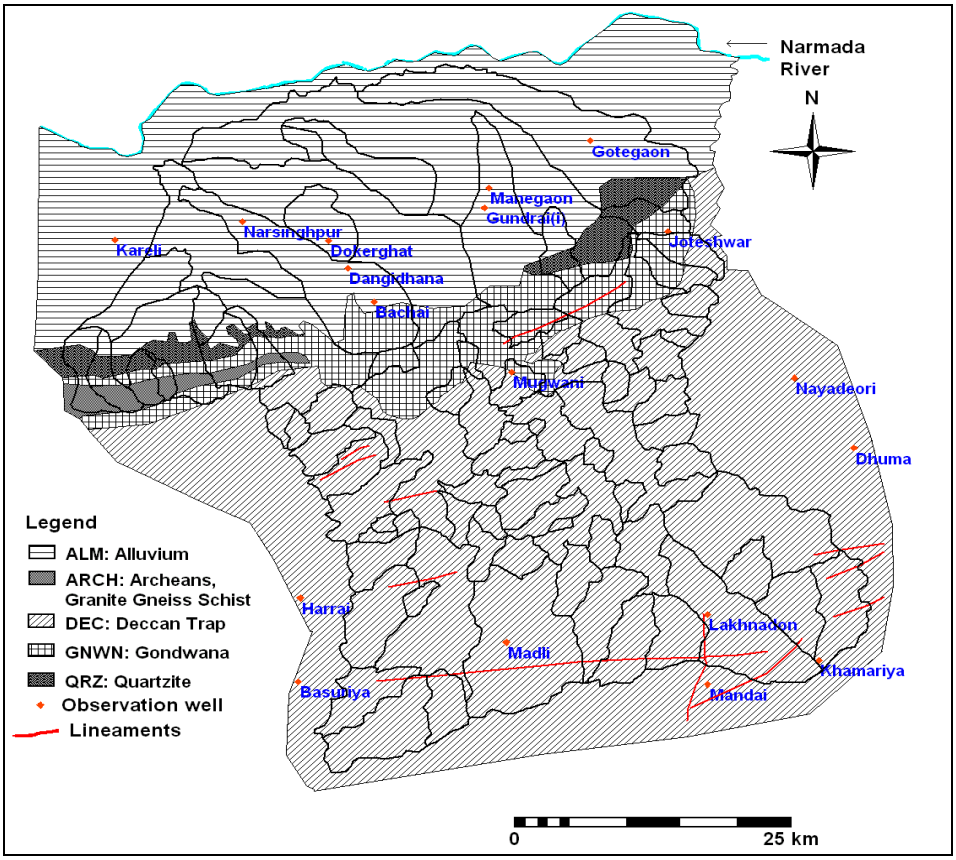


Figure 2: Geological formations and observation wells in study area

1.3 Aquifer Characteristics and ground water condition in the study area

The alluvial aquifer system (Figure 2) has layers of fine to medium coarse grained sand and some layers comprising of gravel and kankar(clay aggregates) separated by clay lenses.

The top phreatic aquifer in general ranges in thickness from 2 to 10 m and its top is encountered at depth range of 5 to 20 m below ground level. The yield of dug wells belongs to the phreatic aquifer ranges from 7.5 to 12 liters per second. The lower most zone of alluvial has confined aquifer conditions between the clay layers (aquitard). The confined aquifers starting within general depth of 15 to 91 m below ground level constitute the principal aquifer system. It forms a potential source of irrigation water in the area tapped by both shallow and deep tube wells. The yield of these tube wells ranges from 20 to 60 liters

per second. The maximum depth of thickness of alluvium aquifer system is found at the place of confluence of three rivers. The depth of thickness decreases from west to east and from north to south away from the confluence point. Alluvium layer is deposited over the Gondwana and Archeans formations in the study area.

The Gondwana formation starts to occur next to the alluvium in south direction. These rocks outcrop as high hills and narrow steep valleys forming the Satpura range. The Gondwana formation comprising of weathered zone of shale and fine to medium sandstones has moderate potential of ground water occurrence and yield of dug wells in this formation ranges from 2 to 3 liters per second.

The Archeans rock formation is the oldest one occurring in the south within the hilly area of Barureva watershed. These are hard, medium to coarse grained rock of granite, gneisses and schists which extend from east to west direction. These rock formations lack pores and fissures which in turn limits supply of ground water. The quartzite formation is seen in upper most part of Barureva and Umar watersheds in the form of narrow strip. These rocks have low porosity and permeability similar to the Archeans complex of granite and schists. The ground water may accumulate in the weathered zone of these rocks with secondary openings.

The Deccan trap formation mostly occurs in upper part of the three watersheds with substantial coverage in the Sher watershed. The ground water occurs under phreatic conditions in weathered zones or joints and fractures extending to shallow depths. These shallow aquifers are tapped by open dug wells near to the confluences of streams or at the intersection of fractures often yielding about 0.57 to 1.16 liter per second. The boreholes which pierce through the various vesicular horizons and its flow contacts yield moderate quantities of water. The yield of boreholes, however, depends upon the thickness of vesicular or jointed horizons and its interconnection with the top recharging zone.

2. Materials and Method

2.1 GIS map generation

Depth to water level data for 18 observation wells (Figure 2) is available for the study area and its vicinity. Out of 18 wells; 8 wells are in northern alluvial area and remaining 10 wells are in the Gondwana and Deccan trap formation in central and southern part of the study area. Observation wells in the vicinity of the study area have been considered for smoothing the interpolation process in the spatial distribution of ground water in the study area and also to

avoid overestimation of interpolated ground water level data along the boundary of the watersheds.

A point map of observation wells has been generated from the toposheets of Survey of India (Scale: 1:50000) using GIS software (ILWIS 3.0, 2001). Historic ground water table depth values of observation wells were filled in the attribute table of the point map. The weighted average point interpolation technique with inverse distance weight function is applied to observation well point map to generate pre and post monsoon water table contour maps over for the specific time period. Subtraction map operation over the pre and post monsoon of map layers of years 1993 & 1999 yields the spatial map showing the ground water table rise and fall for the study area as shown in figure 4 and 5.

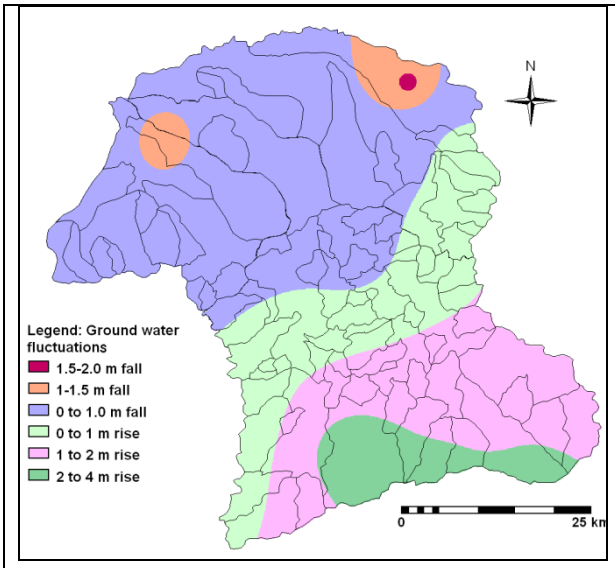


Figure 3: Rise and fall of ground water table for pre-monsoon season in the study area

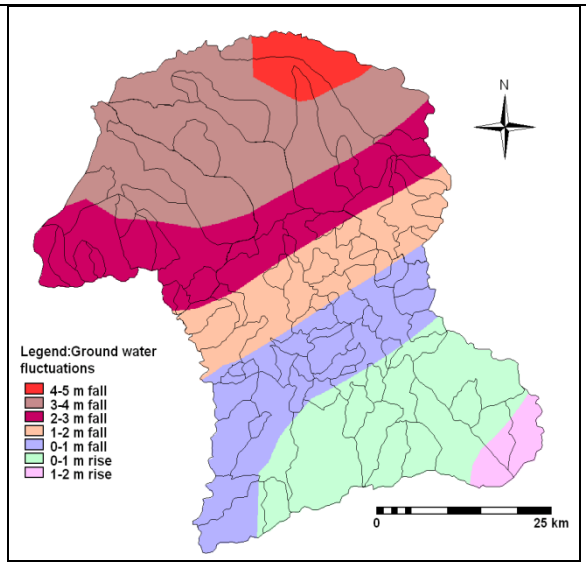


Figure 4: Rise and fall of ground water table for post-monsoon season in the study area

2.2 Temporal Trend analysis of Depth to ground water table by CGWB

To analyze the trend of ground water fluctuation over the time period CGWB suggested the following procedure and formula if the average ground water depth is available for the pre-monsoon as well as post monsoon seasons. The average depth to water table for August and November months is considered to be the average depth for post-monsoon season while the average depth to water table for January and May is considered as average depth over the pre-monsoon period according to the CGWB. In general, average depth to water table of November month is considered as the average depth for post monsoon season while average

depth to water table for May month is considered as average depth to water table for pre-monsoon seasons.

Table D1: Trend analysis of pre-monsoon water table depths over the years for Lakhnadon observation well

Sl.No.	Ground water year	Year, X(i)	Depth to water table for pre-monsoon mbgl Yi	$X(i)^2$	X(i) x Y(i)
1	1990	1	6.8	1	6.8
2	1991	2	6.8	4	13.6
3	1992	3	6.8	9	20.4
4	1993	4	6.6	16	26.4
5	1994	5	6.0	25	30
6	1995	6	5.5	36	33
7	1996	7	5.8	49	40.6
8	1997	8	6.4	64	51.2
9	1998	9	4.5	81	40.5
10	1999	10	5.4	100	54
		S_1=55	**S_2=60.6**	**S_3=385**	**S_4=316.5**

Number of data sample (N)=10

Trend of ground water table depth below ground level during pre-monsoon in cm/year

$$= \frac{\left(N \times S_4\right) - \left(S_1 \times S_2\right)}{\left[\left(N \times S_3\right) - S_1^{\,2}\right]} \times 100$$

$$= \frac{\left(10 \times 316.5\right) - \left(55 \times 60.6\right)}{\left[\left(10 \times 385\right) - 55^2\right]} \times 100$$

= - 20.36 cm/year rising

In the computation negative value indicate the rising trend while positive value is the falling trend.

3. Result and Analysis

3.1 Spatial Analysis of Depth to Ground Water Table Data in the Study Area

Ground water level variation in the study area has been analyzed for the years 1993 and 1999. For these years, all observation wells in the study area have ground water data. The ground water table contours of pre and post monsoon seasons for year 1993 have been obtained using point interpolation of weighted average method. In alluvium area ground water table fluctuates between 340 m to 380 m above mean sea level. Upper part of Sher watershed shows ground water table depth at 520 to 620 m above mean sea level. Fluctuations in ground water tables (Figure 3 and Figure 4) for pre and post monsoon condition were observed for period of 1993 to 1999. During this period water table falls remarkably about 1 to 2 m for pre-monsoon and 2 to 5 m fall for post monsoon seasons for lower part of the study area (Alluvium). On the other hand rise of 1 to 4 m and 1 to 2 m were observed in upper part of study area (Deccan trap) for pre-monsoon and post monsoon seasons. These conditions denote that exploitation in ground water source is intense in alluvium area due to increasing agricultural area while ground water rise in upper part of area is result of surface water storage in the study area.

3.2 Temporal Analysis of Depth to Ground Water Table Data in the Study Area

Ground water level data of eighteen observation wells are available and duration of data availability is from 10 years to 30 years. The temporal variations of ground water fluctuation are determined by the well-known procedure by the CGWB (See in materials and methods). Long term trend in rise/fall in ground water level are shown in Table 1. and Figures 5, 6.

As per the figures and above tables, the falling trend of ground table is visible in the upper part of watershed which is mostly dominated by the alluvium geological formation. Places like Gotegaon, Kareli and Dokerghat shows very sharp decline in ground water table in recent period compared to other observations wells in Alluvium area. The remaining observation wells like Narsinghpur and others show gradual depletion in ground water table depth. Variation of ground table depth particularly for hard rock formation area for Mugwani and Joteshwar is alarming and it shows somewhat sharp decline in ground water table depth. While other hard rock formation i.e. Deccan trap shows somewhat rising water table depth due to completed water conservation structures in that area.

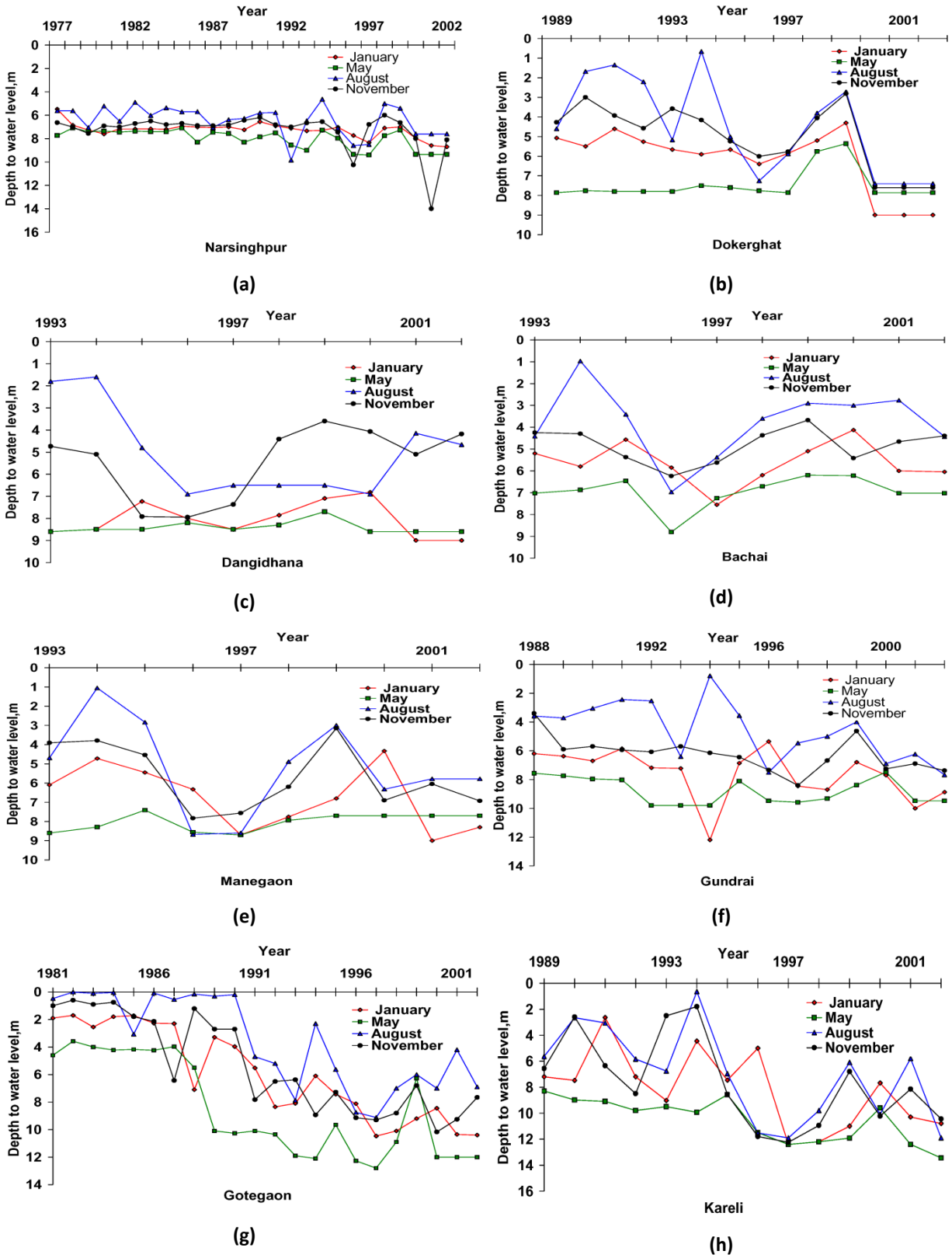


Figure 5: Depth to ground water table fluctuation over the years in alluvium area.

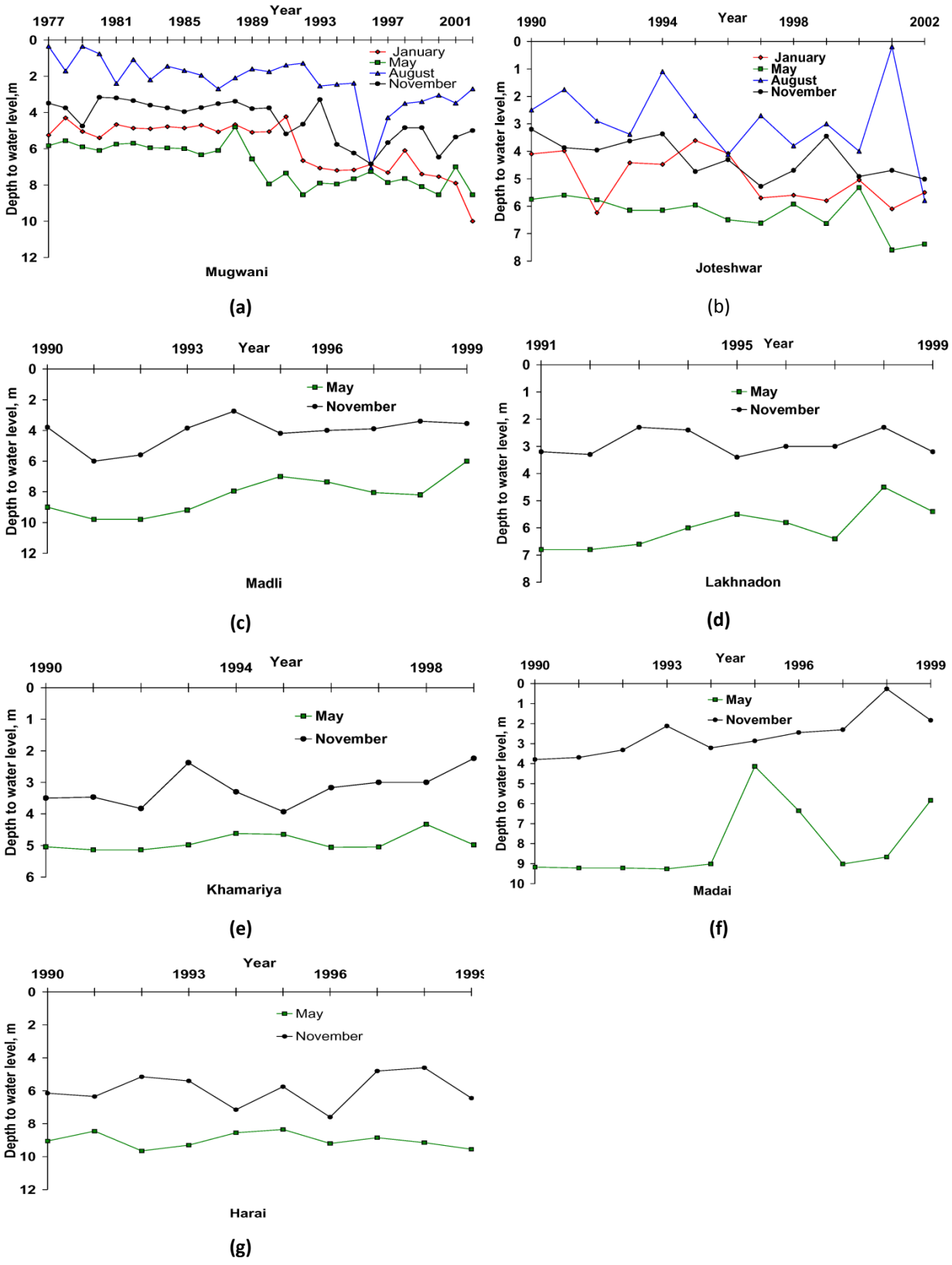


Figure 6: Depth to ground water table fluctuations over the years in hard geological formations (Gondwana and Deccan trap)

Table 1: Trend analysis of ground water table data for the study area

Geological Formation	Well locations	No. of years	Pre-monsoon			Post-monsoon		
			Std. Dev.	Coeff. of variance	Trend cm/year	Std. Dev.	Coeff. of variance	Trend cm/year
Alluvium	Kareli	14	1.69	0.0049	76.89	3.45	0.0099	68.85
	Narsinghpur	26	0.81	0.0023	39.94	3.45	0.0094	37.78
	Gotegaon	22	3.53	0.0097	61.32	1.59	0.0046	46.50
	Manegaon	10	0.46	0.0013	-8.55	1.70	0.0047	23.87
	Gundrai(I)	15	0.91	0.0025	56.55	1.20	0.0033	45.62
	Dokerghat	14	0.81	0.0023	37.70	1.66	0.0047	44.59
	Dangidhana	10	0.28	0.0008	-3.30	1.66	0.0045	-24.42
	Bachai	10	0.74	0.0027	-5.14	0.79	0.0021	-2.91
Gondwana	Joteshwar	13	0.67	0.0017	30.75	0.70	0.0017	22.96
	Mugwani	26	1.10	0.0027	36.52	1.10	0.0027	25.06
Deccan	Lakhnadon	9	0.76	0.0013	-20.36	0.44	0.0007	-2.84
	Khamariya	10	1.08	0.0024	-3.87	1.30	0.0028	-9.56
	Madli	10	1.23	0.0020	-32.39	0.98	0.0015	-16.39
	Madai	10	1.84	0.0031	-29.33	1.05	0.0017	-27.87
	Nayadeori	10	1.08	0.0024	-18.82	1.30	0.0028	-14.69
	Dhuma	10	0.61	0.0010	-8.67	0.68	0.0012	-18.21

Trend analysis in above table 1, gives the explicit picture about the situation of ground water conditions at various locations in the study area. In the alluvium area, observation well shows that ground water is falling gradually with rate of 23 to 68 cm/year which is quiet alarming and it needs special attention for ground water conservation in that particular areas. These areas sustain cash crops (sugarcane and soybean) agriculture which is completely dependant on ground water source. Therefore supply of surface water through building the surface water conservation structures is the only way to sustain regular crop pattern of area. Introduction of surface water supply in the alluvium area can reduce the possible threat to ground water source. The falling trend of ground water table (22 to 25 cm/year) in Gondwana hard rock formation is also prevalent likewise of alluvium area due to high agriculture water demand. On the other hand the picture in upper part of watershed is quiet green and it show rising trend in ground water table because of immergence of surface water storage structures. Upper part of watershed which is dominated by the Deccan trap hard formation and also it has arid agriculture crops so this areas is not under high demand of agriculture water. In addition to this, this area got the water storage structures which are built by government schemes consequently have been improved the ground water situation of the area. The ground water

table is rising by 2 to 27 cm/year for this area beside the fulfilling the domestic and agriculture water demand.

Conclusions

Trend analysis of water table fluctuation of ground water table for a period of 1993-1999 shows that water table falls remarkably about 1 to 2 m for pre-monsoon and 2 to 5 m fall for post monsoon seasons for lower part of the study area (Alluvium) indicates the alarming situation and it suggest the special measure for ground water conservation and development. On the other hand rise of 1 to 4 m and 1 to 2 m were observed in upper part of study area (Deccan trap) for pre-monsoon and post monsoon seasons respectively. Ground water table rise in upper part of study area which contains hard rock formation denotes the improved situation in ground water condition due to the result of surface water storage schemes in the study area.

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Achieving Optimal Software Using Data Mining and Software Engineering

By

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Abstract

The primary goal of software development is to deliver Optimal Software, i.e., software produced at low cost, high quality & productivity and scheduled with in time. In order to achieve this optimal software, programmers generally reuse the existing libraries, rather than developing similar code products right from the scratch. While reusing the libraries, programmers are facing several changes such as many existing libraries are not properly documented and many libraries contain large number of program interfaces (PIs) through which libraries expose their functionality. These challenges lead to certain problems that affect in producing optimal software. The problems such as reuse of existing libraries consumes more time, lack of knowledge on reusage of program interfaces and we can't generate effective test inputs during white box testing. The first two problems reduce the software productivity where as last one affect on software testing. To resolve these problems, we propose a general framework called Netminer. Netminer contains a code search engine. With the help of code search engine, we can search the available open source code over the internet. In the analysis phase, Netminer automatically compares the specifications of program interfaces with relevant code examples that are available in the internet. In the next phase, Netminer applies data mining techniques on code examples that are collected and identify common patterns. The common patterns represent exact usage of program interfaces. We propose some more approaches based on Netminer. Some approaches help programmers in effectively reusing program interfaces provided by existing libraries. Some approaches identify defects under analysis from the mined specifications and some approaches help in generating test inputs by the use of static and dynamic test generation. Our research study shows that Netminer framework can be effectively used in software engineering for achieving optimal software.

Index Terms: Software Engineering, Data Mining, Program Interface, Netminer, Algorithms

The Impact of Wastewater Application on Soil Hydraulic Properties

By

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Abstract

In many countries wastewater from household and industrial production is applied to soils, often agricultural land, either as a treatment and/or as fertilizer/irrigation water. In this study we investigated soils that were subjected to long-term application of wastewater originating from olive oil production aiming at identifying and quantifying the impact on soil hydraulic properties such as saturated and unsaturated soil hydraulic conductivity and flux field generation.

Soil samples were collected and in-situ experiments were conducted at three sites in Syria which have been under olive oil wastewater application (OWA) for 0 (T0), 5 (T5) and 15 (T15) years respectively. The results showed that the regular application of wastewater for 5 and 15 years increased soil hydrophobicity and decreased the drainable porosity as a consequence of increasing organic matter content. OWA furthermore reduced the soil hydraulic conductivity in T5 and T15 compared with T0. Likewise, the infiltration rate decreased in the T5 treatment; the highest infiltration rate, however, was observed in the T15 treatment because of the presence of large and deep shrinkage cracks that do not completely close upon rewetting. Dye tracer infiltration experiments and aggregate stability tests further confirmed the rearrangement of soil physical properties with long-term application of wastewater. Consequently, OMA over long time periods alters the surface layer of soils and makes it fragmented. At sites with high groundwater levels, OMA may lead to groundwater contamination with nutrients and organic substances and should therefore carefully be managed.

Determinants of Effective Household Solid Waste Management Practices: The Case of Ambo Town – West Showa Zone

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Abstract

Most of the developed countries recognized that solid waste management is very crucial for survival (economically) in addition to secure the safety of environment and human health. However, the developing countries like Ethiopia, let alone use its economical benefits, because of various reasons they are dumping of wastes in unauthorized sites, which easily expose to harsh hazards, like environmental pollution and health problem. Hence, the overall objective of the study is to describe and analyze the household solid waste management current situation and examine the influence of demographics, socio-cultural and institutional factors on the effectiveness of solid waste management at household level in the town. The data were collected from 200 households, which were selected through multi-stage sampling from three 'kebelles', from responsible staff and private participants using interviews and focus group discussion respectively. Descriptive statistics and inferential statistics tools such as two-sample t test, Pearson chi-square and correlation were used to know the relationship between variables. Logistic regression model was used to identify factors that determine the effectiveness of solid waste management at household level in the study area. The descriptive findings show that plastic, paper and ash constitute the major waste bulk generated by the households. In addition, there is a positive link between household's income and waste generation. Though all households have temporary storage in their home, they did not store wastes separately based on its nature. Disposed off solid wastes in unauthorized sites by the households is highly practiced in Ambo. The empirical analyses, using the logistic regression model, shows that household head sex, household head educational level, household's location (distance of residents from the main road or center), household's willingness to pay, household's awareness on solid waste management and household's access to the private waste collectors' service are the major determinants of effective household solid waste management in the study area. Moreover, the qualitative analyses, using the interview and focus group discussion data, show that manpower, budget, and facilities such as container, adequate vehicles, waste gown, and gloves are the other major determining factors of effective solid waste management at household level in Ambo.

Key words: Household Solid Waste Management, Private Waste Collectors, Logit, Ambo, West – Showa Zone

Review on Interior Climate Control and Reduction in Chloro Fluoro Emissions from a Building Using Latent Heat Exchange Phase Change Materials

By

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Abstract

As the demand for the air conditioning increases to a great extent during the last decade, large demand of electrical power leads to the search for the most energy efficient applications .In hot and cold climate countries the major part of the load variation is due to the air conditioning and space heating respectively. Recent discussions on Global warming and heat waves once again brought interest to the energy efficient cooling system using renewable energy sources .Climate change has brought additional challenges for the cooling system designers .Thermal storage plays an important role in building energy conservation , which is greatly assisted by incorporating latent heat storage in buildings. Phase Change Materials (PCMs) have been considered for thermal storage in buildings since before 1980, the idea studied here is to integrate PCM in the Construction materials . In the literature, the heat reduction using withering course in roofs (WC- Mixture of broken bricks and lime mortar), PCM wall boards, PCM shutters, Trombe walls, Ceiling boards , Under floor heating system is analysed . This paper also summarizes the investigation and analysis of the available thermal energy storage system incorporating PCM in the building structures.

Key words: Thermal energy storage system, Phase Change materials, Withering Course, Trombe walls.

Data Hiding Based on the Similarity between Neighboring Pixels with Reversibility

By

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Abstract

The technique of reversible data hiding recovers the original image from a stego-image without distortion after the hidden data are extracted. A natural image usually contains several smooth areas. The difference between two adjacent pixels has a high probability of being a small value. Therefore, this study proposed a novel reversible data hiding method, Adjacent Pixel Difference (APD), which employs the histogram of the pixel difference sequence to increase the embedding capacity. APD may achieve a high embedded capacity and still maintains a high stego-image quality. However, the transmission of digital media in an open Internet channel has increased the risk of incurring leaks of sensitive information. Therefore, the protection of sensitive data from attackers in an Internet environment has become an important issue. Data hiding is an important method for embedding secret data in a meaningful cover medium (such as an image or a video stream) to generate a stego-medium with a small distortion. One of the major requirements of data hiding is that the hidden data must be imperceptible. In order to satisfy the imperceptibility requirement, the quality of stegoimage must to be improved. In practice, when a sender delivers a stego-image to a receiver, an illegal observer may not perceive the distortion in the transmission and so believes that it is only a common image. Many data hiding techniques have been proposed to enhance imperceptibility in various applications such as robustness against compression, error resilience, and undetectable hiding. However, many traditional data hiding technologies are not reversible. That is, once the hidden data have been extracted from the stego-image, the cover image will undergo some distortion from the original image. In some medical and military applications, it is critical for a sensitive original image to be recovered after the hidden data are extracted. Even a slight distortion is intolerable. The technology of reversible data hiding satisfies the requirement of obtaining the original image from the stego-image. This technique, which is also called distortion-free or lossless data hiding, has been employed in the digital library.

Keywords: Histogram, Reversibility, Reversible data hiding & Stego-image

A Review on Appropriate Deflouridation Technologies for Use in Rift Valley Areas in Ethiopia

By

Esayas Alemayehu

Abstract

Groundwater from crystalline rocks, especially granites are particularly susceptible to fluoride build-up because they often contain abundant fluoride bearing minerals. In the Great Rift Valley regions especially in the dry arid and semiarid areas of Ethiopia fluoride concentration is extremely high due to volcanic action. Research conducted in rift valley of the country revealed that over 40% of deep and shallow wells and springs used for drinking have fluoride levels above the WHO optimal level of 1.5 mg/l for fluoride. Other research conducted in rift valley of Ethiopia also revealed that more than 73.6% of the water samples taken in the rift valley areas had a concentration exceeding the permissible limit. Drinking water exceeding the critical fluoride concentration (1.5 mg/L) for a period of time causes serious dental and skeletal damages known as fluorosis. Excessive intake of fluoride causes neurological damage in severe cases. Both Dental and skeletal fluorosis have been found in Rift Valley region. At present the vast majority of rural population and a considerable number of urban populations are fetching water from high level fluoride containing groundwater. In Ethiopia, because of the dry nature of the Rift Valley region alternative water supplies such as surface water and/or rain water protection are impractical. Moreover, adequate conventional water treatment facilities are almost nonexistent, mainly for economic reasons as well as settlement characteristics of the people. Precipitation and coprecipitation using alum and lime, ion exchange and adsorption using activated alumina, bone products, etc, membrane separations by reverse osmosis and electrodialysis, and combination of these processes are the major technologies proposed to remove fluoride from groundwater. However, available methods have one or more disadvantage, which make them not effective and not sustainable for poor areas of developing countries. In such cases the development and popularizing of low cost fluoride removal technologies, which does not demand much money and skilled manpower, is important.

Key words: fluoride, fluorosis, groundwater, removal technologies, rift valley

Diagnosis of Human Brain Tissue Sections using Raman Spectroscopic Imaging (& comparison with histopathological findings)

By

Birhanu Assefa Belay *

Abstract

Morphological information such as size, number, and appearance of cell nuclei are the key features in histopathological diagnosis. Raman spectroscopic imaging is a powerful technique which provides image contrast based on material's intrinsic vibration spectroscopic signature without the use of stains. It has been used to characterize tissue sections and diagnosis tumor (& cancer). Vertex component analysis (VCA) was applied to extract important information from Raman images of brain tissue sections. Cell nuclei that are characterized by the spectral contributions of nucleic acids and histone protein were clearly identified by VCA. Chemical images were constructed using nucleic acid (DNA) spectral bands to identify cell nuclei in the tissue section. Based on the results and comparisons to microscopy image of the hematoxylin and eosin (H&E) stained brain tissue section, spectral unmixing VCA gives important information about the structures of the tissue section. In addition, VCA identified nuclei of tumor cells in the brain tissue section.

Key words: Spectroscopy, VCA, H&E, Histopathology



Some of the participants of the parallel Sesion organized by Jimma Institute of Technology, Jimma University

The Impact of Wastewater Application on Soil Hydraulic Properties

By

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Abstract

In many countries wastewater from household and industrial production is applied to soils, often agricultural land, either as a treatment and/or as fertilizer/irrigation water. In this study we investigated soils that were subjected to long-term application of wastewater originating from olive oil production aiming at identifying and quantifying the impact on soil hydraulic properties such as saturated and unsaturated soil hydraulic conductivity and flux field generation.

Soil samples were collected and in-situ experiments were conducted at three sites in Syria which have been under olive oil wastewater application (OWA) for 0 (T0), 5 (T5) and 15 (T15) years respectively. The results showed that the regular application of wastewater for 5 and 15 years increased soil hydrophobicity and decreased the drainable porosity as a consequence of increasing organic matter content. OWA furthermore reduced the soil hydraulic conductivity in T5 and T15 compared with T0. Likewise, the infiltration rate decreased in the T5 treatment; the highest infiltration rate, however, was observed in the T15 treatment because of the presence of large and deep shrinkage cracks that do not completely close upon rewetting. Dye tracer infiltration experiments and aggregate stability tests further confirmed the rearrangement of soil physical properties with long-term application of wastewater. Consequently, OMA over long time periods alters the surface layer of soils and makes it fragmented. At sites with high groundwater levels, OMA may lead to groundwater contamination with nutrients and organic substances and should therefore carefully be managed.

A Highly Reliable Broadcast Scheme for Mobile Ad Hoc Networks with Double Coverage

By

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Abstract

The broadcast operation, as a fundamental service in mobile ad hoc networks (MANETs), is prone to the broadcast storm problem if forwarding nodes are not carefully designated. The objective of reducing broadcast redundancy while still providing high delivery ratio under high transmission error rate is a major challenge in MANETs. In this paper, we propose a simple broadcast algorithm, called double-covered broadcast (DCB), which takes advantage of broadcast redundancy to improve the delivery ratio in an environment that has rather high transmission error rate. Among the 1-hop neighbors of the sender, only selected forwarding nodes retransmit the broadcast message. Forwarding nodes are selected in such a way that 1) the sender's 2-hop neighbors are covered and 2) the sender's 1-hop neighbors are either forwarding nodes or non-forwarding nodes covered by at least two forwarding neighbors. The retransmissions of the forwarding nodes are received by the sender as the confirmation of their reception of the packet. The non-forwarding 1-hop neighbors of the sender do not acknowledge the reception of the broadcast. If the sender does not detect all its forwarding nodes' retransmissions, it will resend the packet until the maximum number of retries is reached. Simulation results show that the proposed broadcast algorithm provides good performance under a high transmission error rate environment.

Key words: DCB, MANETs, BF, CDS, DS, AHBP, DNDBA

Per MULTICAST KEY DISTRIBUTION SCHEME WITH CLUSTER FORMATION IN AD HOC

By
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Abstract

Wireless networks and devices are becoming increasingly popular as they provide users access to information and communication anytime anywhere. Conventional wireless communications are usually supported by a fixed infrastructure. A mobile device would use a single hop wireless communication to access a base station. But Ad Hoc Network is infrastructure wise less. The nodes in an Ad hoc network communicate via single hop or multi-hop path in a peer-peer fashion. The intermediate nodes between a pair of communicating nodes act as routers. Other properties such as topology change, energy constrained and bandwidth constrained. These properties necessitate a radical security scheme which is deviated from the security scheme found in the wireless counterparts due to lack of centralized control and the security schemes must be distributed. The inherent characteristic of it raises many design issues. In this work, the Key Management scheme issues are focused. The proposed work is to build virtual clusters throughout the networks. Each cluster has a cluster head and the other nodes of the cluster are the member nodes. With the help of the cluster heads, the nodes authenticate each other and exchange their public key in a secure manner. The cluster head selection is based on the degree of nodes (i.e. number of neighbors around the node) and node's ID identification number. Apart from these, parameters the member nodes assess trust of the cluster head.

The main idea in this research paper is Key Management for secure group communication in Ad Hoc Networks. Group communication is one of the most important services in a mobile Ad Hoc networks, in which data confidentiality and integrity is realized by encrypting data with cluster key (Group key). In order to meet the forward secrecy membership and the backward secrecy policy, any change in the group membership will induce group re-keying.

The proposed scheme in the project tries to achieve better scalability by cluster formation and regard to key management, the system tries to address the communication overhead and partial distribution in threshold key management scheme and improve the success rate in key management.

Keywords: Multicast, Ad hoc.

Comparative Analysis on Selecting an Appropriate OS for Compiler Development: A Case Study of Fedora, Ubuntu and Windows OS.

By

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ABSTRACT

The word "Compiler" is a very important term when it comes to programming. Compiler with no doubt is the most important tool. The performance of a compiler can be due to many factors such as dead code, if statements, reassembling the basic blocks from DAG, common sub expression and peephole. Compilers can be developed from its own programming languages or by using Compiler writing tools (LEX, YACC, Flex, Bison). These compiler writing tools can help the compiler developers up to a certain extend. LEX helps the lexical phase of the compiler development and YACC helps the syntactic phase of the compiler development while the Flex and Bison is a supreme version of LEX and YACC. Compiler writing tools can be executed in LINUX environment; here we are going to compare the best OS for the compiler development. The Linux operating system has been around since the early nineties and has managed to stay secure in the realm of widespread viruses, spyware and adware. For all these years Linux is perfect for those old computers with barely any processing power or memory it. LINUX environment not only gain popularity among the network servers and also helps the programmer during the development of the compilers. As Compiler writing tools provides the appropriate way to develop compilers, we need the necessary packages to execute the compiler writing tools (LEX, YACC, Flex, Bison) structures. Even though windows OS has been widely used in many non research areas we are going to find out the tribulations that can encounter in Windows, Fedora and Ubuntu during the front end, middle end and back end of the compilation phases. In this research we conclude that based on the complexity of the program when compiled in windows OS & LEX and YACC programs when compiled in Ubuntu as well as in Fedora, we concluded that though Fedora and Ubuntu operating system proves to have more impendence over the windows operating systems but Fedora proves to be having more impendence than Ubuntu during the execution of the commands in their individual platform respectively.

Parallel Session 7: Organized by Institute of Education and Professional Development, Jimma University

Linking Functional Adult Literacy (FAL) within Poverty Reduction Interventions: Potentials and Prospects in Ethiopia

By

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Abstract

Ethiopia is the home for 80.1 million population composing about 85 ethnic nationalities (CSA 2010). The recurrent drought, age long backward subsistence farming, illiteracy/the very low rate of adult literacy (40%), being a land locked (since 1994) and the population pressure (2.7% per annum) are the serious bottlenecks of the country against promising survival and food self sufficiency. For instance, in 2003, Ethiopia experienced its most severe humanitarian crisis to date. During that year, nearly a fifth of the country's population, 13.2 million people needed relief assistance to survive (DPPC, 2003)

Adult education is an agent of social development. Ethiopia has practiced adult education for centuries. Although the results are controversial, adult education in its various models and approaches is not a new phenomenon for the country. In course of the practice of the various forms of adult education, however, there is usually a tendency of announcing a seemingly new model without making lessons from the old and linking with the present.

Currently, the government of Ethiopia has decided to involve into a full scale FAL program to reach nearly 36 million adults who mainly live in rural areas(ESDP IV , 2011). The primary school teachers and schools are targeted to play the key role. Other development sectors particularly agriculture and health are considered to be the main partners. Practically, apart from schools, there are at least 3-5 development workers who can facilitate adult education and development at the village level.

In spite of the very good potentials and intentions the actual role of FAL particularly that of the literacy element is not clearly shaped. In this regard there are points that require investigation and integration. The opportunities at the grassroots are high, although the challenges in lack of clarity and harmony on how to better link literacy element and the livelihood element within and between sector development programs are still vivid. In this regard, FAL seem to be defined differently by the different sectors within the enhancement of the livelihoods of the illiterate target groups. On the other hand, on part of ministry of education, hardly strong study and evidence base is available on the actual role (purpose), approaches to handle FAL with the diversified target groups (e.g. illiterate and semi literates etc.). Thirdly, there is still a tendency of making basic literacy in the name of FAL. Despite the challenges, there are clear opportunities mainly the favorable sector development programs and relatively huge human resource at the grassroots. In order to realize the actual role of FAL in local development, beyond signing the memorandum of understanding between sector ministries, it requires a practical move on clarifying concepts and approaches and how to use the available resources and avoid duplication of efforts at the grassroots. Unless these areas are not harmonized and smoothly enhanced the results may strongly hamper adults from intended and future adult education programs.

1.0 Background

Ethiopia is a historic country located in the horn of Africa. Currently, the country is the home for 80.1 million population composing more than 80 ethnic nationalities (CSA 2010). The recurrent drought, age long backward subsistence farming, illiteracy/the very low rate of adult literacy (40%), being a land locked (since 1994) and the population pressure (2.56% per annum) are the serious bottlenecks of the country against promising survival and food self sufficiency. Subsistence agriculture this the main stay of nearly 85% of the population. The sector is responsible to generate 80% of the GDP and timer to time is facing serious problems of satisfying the social demands of citizens and the country as well.

Ethiopia has a total land mass of 1.1 million sq. kms. It has also immense potentials of natural resources. However, poverty and illiteracy stand against the country's overall development efforts. As a result, in Ethiopia nearly 40% live below the poverty line (World Bank, 2008). Hence, Ethiopia is one of the poorest countries in the world.

The issues how illiteracy aggravates poverty and in turn what type of literacy/ies enhance local and national development are open agenda in Ethiopia. The main development sectors (i.e. Agriculture, Health and Education) are making considerable efforts to introduce technology, productivity and fight illiteracy respectively. Nevertheless, there are still practical gaps on how to link literacy and local development. This paper tries to discuss the opportunities and prospects in relation to the current major development efforts.

2.0 Introduction

After the fall of the military government (1975-1991), Ethiopia endorsed a new federal constitution (1995) and introduced ethnic/language based federal government system which never had in its history. Accordingly, there are now nine regional states and two chartered city administrations. Along with the federal government system, the Education and Training Policy (1994) favors the decentralized education administration. Hence the regional states are responsible to manage and implement the education of children youth and adultsIn the traditional sense, Ethiopia has practiced adult education for centuries. Although the results are controversial, adult education in its various models and approaches is not a new phenomenon for the country. In course of the practice of the various forms of adult education, however, there is usually a tendency of announcing a seemingly new model without making lessons from the old and linking with the present.

The practice of adult education in the country is usually done with deficient definitions and conceptual framework. The definitions are usually understood differently from practitioners to probationers and from organizations to organizations. For instance, until recently, the term adult education is usually equated with adult basic literacy and the alpha numeric activity. As a result, to many of the stakeholders adult education remains to be only teaching adults the basic literacy with a similar methodology of teaching children. At the same time many sectors understand adult education is the task of the Ministry of Education. On part of the government, although the commitment to education has been appreciable (3.6% to 6.0% of the GNP in 1999 and 2006 respectively; and at least 18% of the government expenditure to education) adult education has been a forlorn child.

With regard to formal education, until 2005 tackling the deep rooted educational problems related to access, equity has been the priorities of the government of Ethiopia. In so doing the government aspired to ensure UPE in 20 years (1994-2014) through five year round based sector plans. On the basis of this, the Ministry of Education (MoE) developed subsequent Education Sector Development Program(ESDPs) in relation to the acute problems existed within the education system. The first and second ESDPs (1996-2001); (2002-2005) respectively emphasized on teaching children with the mother tongue, reaching basic education to rural and under served regions/nation nationalities and narrowing the gap between gender (boys and girls) to primary education. Accordingly, preparing new curriculum, constructing a lot of formal schools and training of hundred thousands of teachers were the key interventions to realize the plan. The government spending during this period was between 1.8 to 2.1 billion USD each year. However, the easy access to all school children was still a challenge due the huge part of the expenditure on costly formal school construction (on average 1/2 million birr for a school) and salary. More seriously, the issue of adult education has been an overlooked area which has been given less than 0.5% budget from the total earmark to the education sector.

Towards the end of 2005, the Ministry of Education (MoE) has introduced the ESDP III (2006-2011). This plan unlike the other two; focuses on quality of education and the education of youth adults. In the document, the ministry planned to reach 5.2 million adults through Functional Adult Education (FAL), although the rationale and the source of finance were not mentioned. In the years followed, the ministry made a considerable effort to clarify the goal of literacy, approaches to FAL and attract at least six line ministries to actively take part in FAL implementation. In order to institutionalize the good beginnings and sustain efforts, a memorandum of underrating was singed between the ministries in 2008. Nevertheless, there is still a missing gap on how to link literacy and local development activities with the available resource (human, material and financial) at the grassroots.

3.0 Objectives of the study

The general objective of the study is to highlight the opportunities, limitations and options of linking Functional Adult Literacy (FAL) with local development efforts in Ethiopia.

The specific objectives of this paper are:

- To identify the components of sector development programs and limitations in implementing FAL in Ethiopian context
- To identify the opportunities of linking FAL within the existing development plans
- To suggest feasible options on how to link FAL with existing development activities at the grassroots

4.0 Basic Questions

- What are the rationale and advantages of selecting FAL for adults in Ethiopia?
- What are the existing limitations of FAL so as to smoothly implement at the grassroots?
- Are there opportunities to link FAL with the existing development plans?

5.0 Methodology

This study is more of a desk work. An attempt to review of available documents and further analysis in relation to the topic was made. Documents related to the practices of adult education in Ethiopia were consulted and reviewed. The existing national development plan and the sector development plans were also consulted. In addition the various workshops and discussions where by this researcher participated were also considered.

Based on the basic questions, the concerned senior level experts and officials at the MoE and other two line ministries were approached and interviewed. The response of the experts and the field observations made by the researcher served to strengthen the analysis.

6.0 Literature Review

This session highlights the theoretical background of literacy and FAL and the tradition of literacy in Ethiopia.

6.1. Literacy: Definitions and Determinants

There are various definitions and opinions of literacy. There are still debates on who is literate and a functionally literate person. Furthermore, the issue how literacy be planned and implemented to best serve the daily life of persons is an agenda. Basically, the understanding of literacy or functional literacy influences its planning and implantation. Unesco defines a functionally literate person as any person 15 or older who can" read and write a simple statement on his every day life "(Unesco 1993,p.24) the world development report (1997) also adopts this definition of functional literacy. Others propose a broader and more explicitly political definition. For example Paulo Friere, the Brazilian educators, sees literacy as a process of "conscientization" that involves "reading the world" rather than merely "reading the word"(Friere and Macedo 1987).

The concept literacy as understood by Rogers (2001) is not bounded only to the reading and writing skills but understanding the surrounding reality in a meaningful manner. In this regard, Okech (2005) briefly discusses that literacy refers to the meaningful *acquisition*, *development* and *use* of reading and writing (also for *numeracy* purposes) in everyday life, as a tool for self-expression, information, communication, lifelong learning, work and civic participation, and as a means to improve one's life and to contribute to family, community and national transformation and development. Literacy, meaning "working with written text" (Rogers 2001:3) is thus in itself a tool for better livelihood, hence poverty reduction.

The determinants of literacy vary depending on the socio economic context of the country. A study made by Lavy, Spart and Leboucher (1995) indicated that age, sex and geographic location are the determinants which inter play in literacy activity. According to this study, illiteracy is more widespread among females than their counter parts; higher in rural areas than the urban; and inversely correlated with age. The negative relationship between age and literacy may reflect deteriorating literacy skills over time in localities where encouraging literate environment is lacking. Furthermore, parent's literacy and household expenditure level positively affect the level of children's literacy, which might entail that poverty and family background are important determinants of literacy. A similar study conducted in Gahana (2000) suggests that age negatively affects the likelihood of being functionally literate; and the distance to nearest primary school negatively affects the likelihood of being literate. The results of the study suggest that supply part factors are important determinants of literacy.

On the other hand Verner (1999) analyzed the determinants of worldwide literacy rates by applying a human capital framework. She finds that enrollment rates, average years of schooling of adults and life expectancy at birth are the main determinants of literary. Income affects literacy in a nonlinear fashion, with a negative impact until the threshold of about $2,000 income per-capita, after which the effect is positive. Institutional and regional variables are not very important in explaining literacy across countries. Literacy rates differ widely across regions, a finding that can be explained by social and economic condition.

6.2 The Link between Literacy and Development

There is no doubt that literacy is an agent of individual and social development. A literate society is a learning and living society. Nevertheless, the literacy context determines the core content and the role of literacy in development. The particular political, social or economic circumstances where the action actually takes place do have strong influence on the overall purpose, policy, planning, and performance of literacy programs. With regard to literacy and development, the conceptual frame of literacy(basic literacy, functional literacy, integrated functional literacy etc.) and beyond literacy (continuing education and life long learning etc.) need to addressed in a wider sense and within the context it is operating.

In Africa, there are about 280 million illiterate adults (UNESCO, 2007). Then it means there is such huge number of living reasons for literacy. According to Green in Fordham (1983), illiteracy reduces workers flexibility and productivity even in "simple" occupations such as peasant farming, construction or handicraft. Furthermore, Kasam Y.(1979) discusses that the ability to read and write is increasingly indispensable for living in all societies. The same writer argues that there is evidence to show that illiterates de feel marginalized whenever they come close to the literate world. In Africa nearly 30 % of women are illiterate; this is simply one of the many realities which highlight the existence of multiple deprivation and massive gender inequalities.

However, the question why literacy and how to make literacy to best serve both individual and social changes within the time given is the challenging planning agenda. To answer the question why literacy (Purpose)?; is as we can understand it intimately bound up with the question, what for(goal)?. Most adult educators argue that literacy is just beyond reading and writing the alphabet or certification upon the completion of the program. The role of literacy in individual and social development is not simply a notion in the mind of a planner or an economist, but a means by which millions of individuals can transform both themselves and their societies. In this regard, many African countries including Ethiopia have hardly satisfactory and sustainable literacy programs.

6.3. Functional Literacy: The Different understandings

According to Okech (2006) the concept of *functional literacy* has undergone several transformations. About five decades ago, the world, through the mediation of UNESCO, adopted the concept of functional literacy. Functional literacy has since then had different meanings in the history of literacy in the world. As first adopted by UNESCO in the early 1960s, it was initially linked to the notion of sustainable literacy (reading and writing with understanding and autonomy). It was believed that four years of schooling were the minimum necessary for acquiring a functional literacy level. The distinction between *Basic literacy* and *functional literacy* later evolved; the first was understood as the first phase of literacy (literacy acquisition, learning to read and write) and the latter as the next phase (the effective use reading and writing).

In 1964 UNESCO launched the Experimental World Functional Literacy Programme, which adopted the *functional literacy* approach agreed upon in the Conference of Ministers of Education for the Eradication of Illiteracy (Teheran, 1965). "Functional" was redefined as work-oriented and production-oriented. Each literacy Project had to link with a specific Project, often economic in nature, leading to improved *livelihood* as understood by many. It was assumed that this approach would also contribute to solving the traditional motivation problem towards literacy, that is, it would make literacy more attractive; a kind of sugar coating to a bitter pill.

Definitions of (basic) literacy and functional literacy were subsequently streamlined as follows:

> [A person is literate] who can with understanding both read and writes a short simple statement on his everyday life.
>
> [A person is functionally literate] who can engage in all those activities in which literacy is required for effective functioning of his group and community and also for enabling him to continue to use reading, writing and calculation for his own and the community's development. (UNESCO, 1978)

According to Okech (2006), in practice, two different understandings of functional literacy have persisted: functional literacy as reading and writing acquired at a level of enough competence to be put to use and actually put to productive use (the definition given above), and functional literacy as reading and writing plus knowledge and skills in other fields. As explained in the previous paragraphs, initially these other fields were restricted to narrow economic benefits but later, after Persepolis, widened. Whereas definitions continued to give the first meaning to functional literacy, practice in most cases gave prominence to the second meaning, emphasizing other fields learned together with or after literacy acquisition. Often in what was referred to as *post-literacy* the question which arose was how literacy was put to use in the other functional knowledge and skills.

Regardless of the approaches, Okech (2006) finally discusses the following points on literacy/functional literacy practice to be the central agenda of development:

a) Literacy is a livelihood or poverty-reduction skill that is becoming increasingly essential for anyone in any part of the world

b) Better livelihood requires not only skills in economic productivity, production and management, but also the more basic human skills of communication, living with others and management of society.

6.2 Highlights on Adult Education and Literacy in Ethiopia

Ethiopia is one of the African countries with long tradition of basic literacy practice. Since the days of king Ezana (4th century A.D) religious related literacy practices have been persistently taking place in the country particularly in the northern and central highlands. In this regard Ethiopian Orthodox Church has due contribution in exercising traditional literacy aiming at the expansion of the religion, producing clergy for the church and state. In modern Ethiopia, all the government systems have made and making the attempt to have eliminating illiteracy and promote livelihood skills for citizens. Particularly, the politically driven literacy campaign promoted by the Dergue (1980 to 1989/90) was notable in mobilizing hundred thousands of young secondary school students and millions of illiterate people each year.

Practically, literacy in Ethiopia is marked by the paradox of long practice and yet multifold nexus to the existing deep rooted poverty. While the continuous state initiated attempts to fighting against illiteracy dates back to early 18th century, Ethiopia is still known as the land of script and thumb print. According to UNICEF (2007) nearly 36 million citizens are still functionally illiterate. The adult literacy rate is estimated to be only 40%.Neverthless; the figure masks the serious disparities between regions and among sex groups. According to recent documents, of the total women population (36 million), nearly 78% are unable to manage written communication for daily life use. This situation may strongly impede the development policies which the country envisioned to reach a middle class society by 2020.

Percentage of adult Literacy in Ethiopia

Year **National**	**Rural Male**	**Rural Female**	**Urban Male**	**Urban Female**
1996 (25.8)	27.9	8.4	77.5	56.7
2004/5 (37.9)	43.4	18.7	86.2	64.4

Source: Plan for Accelerated and Sustained Development to End Poverty (PASDEP);2005:19

Until 1991, in Ethiopia, the politically driven campaign approach to basic literacy for the purpose of acquisition of the alphabet and numeracy has been the dominant practice. At the same time basic literacy was considered as a prerequisite for the next level of livelihood skills acquisition. Hence, the basic literacy practice had been followed by the post literacy program mainly the acquisition of certain pre- planned skills at the Community Skills Training Centers (CSTCs).

As far as the actual reinforcing of literacy and poverty alleviation is concerned, Ethiopia can hardly justify or present evidences about its literacy programs and practices. Despite the cloudy definitions and understandings of FAL, these days, the government of Ethiopia, once again has given due attention to functional literacy to fight poverty and expedite the development plans stated in the PASDEP (2005).

6.3 **The Plan for Accelerated and Sustained Development to End Poverty (PASDEP) and Functional Adult Literacy (FAL)**

In 1996/7 the government of Ethiopia developed and implemented the Agricultural Development Led Industry (ADLI) national plan. The plan aimed at changing the age long traditional backward agriculture into a strong arm for reliable food self sufficiency and food security. Although 90% of the farmers who directly engaged into the sector are illiterate, the goal of ADLI, using mass labor and land, aspired to create a strong agricultural economy and productivity that serve as basis for the promotion of industrial sector. In the middle of the course of action the government seem to have realized agriculture alone hardly cure multifaceted poverty situation. Hence in 2002/3 the national Poverty Reduction Strategy Plan (PRSP) was introduced. The PRSP mainly deal with the introduction of technology based farming, market chain and cooperative in production and distribution of resources. During both ADLI and PRSP periods the actual adult education and literacy practice has been an area given less attention both by the decision makers and practitioners.

Based on the valuable lessons obtained from ADLI and PRSP, in 2005, the government has developed an ambitious guiding plan named the Plan for Accelerated and Sustained Development to End Poverty (PASDEP). This national development plan is both comprehensive and content full in many regards including dealing with the role of education in national development and approaches to development interventions. The plan emphasizes a system overhaul in agriculture, health, education, private sector development, infrastructure and cross cutting issues like gender and HIV/AIDS.

The document begins with critical assessment of the socio economic realities of the country. According to PASDEP, the challenges of development are not only multifaceted but also deep rooted. The situation is explained as follows:

> The challenges of Ethiopia are daunting. The dynamics of population growth, very low productivity, structural bottle necks, dependency on

> unreliable rainfall, and being land locked combine to pose challenges almost unequalled anywhere in the world..... These poverty traps –self reinforcing mechanisms that prevent the country from breaking out from a combination of low income levels and low productivity growth (PASDEP, 2005, p3).

The PASDEP discusses the economic role of education. The education sector to contribute to the national needs, is expected to supply literate farmers, qualified resource personnel at all level, to all sectors. As stated in the document, labor is found to be the most important contributor to the growth rate achieved thus far and shall be strengthened in the years to come (PASDEP,P.7). Furthermore, the need for improving the low level of basic livelihood skills, literacy and mummery skills of the productive section of the society particularly the disadvantaged women is duly addressed as follows:

"…Ethiopia's 35 million women represent a major under-used human resource and unleashing their potentials is central to PASDEP strategy."

PASDEP not only asks efficiency of sectors but also emphasizes the need for synergy and relentless government efforts to accelerate progress as rapidly as possible including a big push on education, expanding infrastructure and good governance. These efforts are explained as"…are like those of an athlete running uphill: extra efforts are required just to keep pace."

On the basis of PASDEP most line ministries have developed sector development programs that shall serve for 5 years. In this paper the three line ministries (Health, Agriculture, and Education) which have very close attachment with rural adults will be highlighted.

6.3.1. The Health Sector Development Plan

According to the PASDEP, poverty and low level of literacy are the two the major underlying factors for health problems and poor health status of the country. Furthermore, it requests the harmony of the training plan of the education sector with the health sector demand.

On the basis of this understanding, the health sector development program developed 17 health packages (namely:) which most emphasize on educating citizens on the basics of health and sanitation and its preventive mechanisms.

Inn order to realize the program, Ministry off health since 2006 has focused on the training of Health extension Workers (HEWs). According to the target of the Ministry , until 2011, 2HEWs will be assigned in each Kebele; which are considered to be the lowest government units(according to CSA, 2008, there are more than 10,000 kebeles in Ethiopia).The HEWs obtain a minimum of one year basic training and regular refreshment trainings.

Mothers and children are the main targets of the health development program. Accordingly, over 90% of the HEWs serving the ministry are females. The central role of the HEWs is teaching the mothers (also family and community) with the relevant health packages; gather health and related data, organize and disseminate health information etc. The model Family package consists of 40-60 households which closely live in a Gott or two. Adults who are ready to innovation and new health practices are targeted to be models and train for 96 hours (3-4 months) on major topics:

- Basic Hygiene and Sanitation (7 sub topics)
- Family Health Care (14 sub topics)
- Preventing Disease (9 sub topics)

Community conversation, demonstration, experience sharing, question and answer, group work etc. are the proposed methodologies to be applied by the facilitators. Model adults who completed 75% of the allotted time and applied the lessons in home life will be legible for graduation. After graduation the HEWs make home to home visits, negotiations and continuous follow-ups to help the family/community improve their health status. According to the directives (MoH,2009) a HEW is expected to visit an average of 8 households and day and during the four months at least 8 rounds to the same house to help learning by doing and check the positive changes. In spite of all the appreciable statements of the health package there is no idea on how the illiterate adults particularly women are helped to engage into self directed learning using written information.

The village level local administration is responsible to coordinate all local level development efforts including health, agriculture and education. Both the HEW and the Agriculture Development Agent (DA) are the members of the village council that is the important body to plan and execute the local development activities.

6.3.2. The Agriculture Sector Development Program

Nearly 85% of the population of Ethiopia lives in rural areas depending on subsistence agriculture which is the backbone of the national economy. The Rural Development Program and Strategy explores the possibility of rapid economic development in Ethiopia taking the agriculture as the starting basis. There are two branches in the strategy document. One is a labor-intensive strategy that assumes a fair distribution of land. The second is a capital-intensive strategy. Ethiopia's existing realities reveal that there is an acute shortage of capital while the country is rich in number of working age population and a potentially cultivable land. It is believed that faster growth and economic development could be realized if the country adopts a strategy that help raise the employability of its labor resources and enhance productivity of land to bring about capital accumulation.

ADLI is intended to use labor extensively and land intensively. Accordingly, the strategy emphasizes modernizing smallholder agriculture and intensifying yield productivity through the supply of appropriate technology, certified seeds, fertilizers, rural credit facilities and technical assistance.

Subsequent to the overarching policy, in order to realize the strategy, a National Extension Intervention Program (NEIP) was established under the Ministry of Agriculture (MoA) delegated with the task of developing a nation wide agricultural extension program. To that end, in year 1995, an extension program namely Participatory Demonstration and Training and Extension System (PADETES) was devised and applied in pilot base in selected regions. According to Ministry of Agriculture and Rural Development, until 1999 this program was claimed to have reached nearly 3 million farmers.

The technical package has six components. In its implementation, extension agents which commonly named as Development agents (DAs) are considered to be the key linking pins. The recruitment of Development Agents (DAs) often takes place at a wereda level which in turn oversees activities out carried at the kebele level-the lowest tier of local administration where actual work with peasants takes place. According to MoARD (2008) , 3 DAs (one for natural resources, the other for animal husbandry, the third for cereal and horticulture) are assigned to reach out a maximum of 1000 farmers in one kebele association. The DAs are trained for 9 months in theory and practice. The training of frontline extension agents, the assortment and development of locally specific technical packages, the supervision and coordination of input agencies and credit organizations, all fall in the mandate of the regional agricultural bureau. Since 2005/6, Farmer Training Centers (FTCs) were constructed at the cluster villages to train model farmers who are able to read and write. The training, which is handled by the DAs takes between 3 to 4 months depending on the activity of the participants. Up on completion, the trained farmers are named the green army and expected to apply on the farm areas and help the rest neighborhood. The DAs are expected to visits the households, farm plots and render technical assistances regularly. From the field observation and informal discussions, however, the DAs are usually complain for being overburden and some times frustrated in taking non related assignments like collecting credits and other administrative activities.

Despite the aforementioned efforts to intensify small holder agriculture for nearly a decade or more, critics emphasize that ADLI with its green revolution packages has not yet realized its basic objective i.e. food self sufficiency. In fact the problem of food insecurity has now become chronic which accords to WFP (2008) an average of 9 million people needs food assistance every year. Increases in yield productivity were not consistent but followed by abrupt and sharp declines. The situation is further debilitated by the fast growth of the Ethiopian population at an annual rate of 2.5-2.7 percent.

According to Belay Tegene (2003), the criticisms posed on ADLI in general and the packages in particular are mainly of two types. The first cluster of arguments dwells on the technical, managerial

and marketing problems of the policy. The recruitment and training of frontline extension agents, known as the development agents, was put as inadequate. The agents are high school graduates that got a nine months training only. According to Mulat Demeke (2001:196-202) the agents are also under-funded and over-burdened with other unrelated activities like the management of credit facilities. They tend to spend much of their time instructing farmers instead of improving farmer skills and utilizing indigenous knowledge. The other main problem, faced by farmers enrolled in the package, was the decline in output prices especially during years of good harvest.

This has been acknowledged both by the practitioners (Federal Ministry officials and Regional bureau heads) and the academics. The decline has adversely affected farmers gain and in most cases they were not able to defray costs incurred for fertilizer Procurement. A study conducted by Tadesse (2002:47-48) succinctly summarizes how grain prices have tumbled down in face of the meteoric rise in the market price of farm inputs like fertilizers.

Others set out to criticize the ADLI practice as one that has not essentially helped in the reduction of absolute poverty both in the rural and urban areas. There is an excessive decline of farm sizes with population increase. (Mulat, 2001) These plots are argued to be economically unviable as they have no capacity to generate surplus. In this regard, the market oriented livelihood skills straining and functional literacy for the land les youth and adults who contribute into the development of small rural town, the centers of most commercial and manufacturing activities seem essential.

There is no study made on how illiteracy affected the advancement of the rural development strategy. However, according to the ministry, most of the peasants recollect that the package started out in 1995/96 and identify the provision of inputs, credit facilities and technical assistance as the hallmarks of the extension program. Almost all peasants acknowledged that the use of fertilizers and selected seeds did increase yield productivity per hectare. However they resented the fact that fertilizer prices have sky rocketed following government decisions to stop subsidizing the market. Their situation is further bedeviled by the unfavorable decline of grain prices in the markets.

On top of illiteracy, the prevailing poor soil fertility improvement, environmental degradation, poor crop and livestock productivity, and absence of agricultural transformation into improved production system are still bottlenecks within the agriculture system. All the above mentioned problems call for an urgent and appropriate measure.

6.3.3. The Education Sector Development Program

The Government is placing particular emphasis on education with the firm belief that the long-term development of the country rests upon the expansion and provision of quality education. The mission of the education sector is to:

- Extend quality and relevant primary education to all school-age children and expand standardized education and training programs at all levels to bring about rapid and sustainable development with increased involvement of different stakeholders (community, private investors, NGOs, etc.)
- Ensure that educational establishments are production centers for all-rounded, competent, disciplined and educated human power at all levels through the inclusion of civic and ethical education with trained, competent and committed teachers.
- Take affirmative actions to insure equity of female participation, pastoral and agro-pastoral and those with special needs in all education and training programs and increase their role and participation in development.

In 1997 a twenty-year education sector indicative plan has been translated into a series of five years national ESDPs. The main thrust of ESDP is to improve educational access, equity relevance, efficiency, and quality to education with special emphasis on primary education in rural and underserved areas, as well as the promotion of education for girls as a first step to achieve universal primary education by 2015.

The third ESDP was developed in 2005 for the span of five years (2005/06 to 2009/10). Like the previous ESDPs (first ESDP (1997/98 to 2001/02); the second ESDP 2002/3 to 2004), ESDP III is aligned with the national development goals and the MDGs. In addition it has been summarized in the Program Action Plan (PAP), which is an output of a nationwide planning process involving the center and the regions.

The ESDP III considers adult and non -formal education program to include a range of basic education and training components for out-of -school children and adults for a continued increase in the skill levels of the work force, particularly youth, adults and farmers (PASDEP, 2005:9). Hence ESDP aspired to provide increased access to Adult and Non-Formal Education, particularly women in order to combat the problem of adult illiteracy and to enable learners to develop problem-solving abilities and change their lives (p 47).

On the basis of this notion, ESDP III program stated the following three sub components (p.10):

A. **ABE** : for out-of-school children with 7-14 years of age (ABE centers, mobiles)

B. **FAL**: for those youth and adults whose age are above 15 (in schools and centers)

C. **Basic skill training**: to youth and adults (in the community skills training centers)

The functional adult literacy, beyond the basic reading and writing skills, is expected to enhance the participation of communities in the national development and poverty reduction strategies. Moreover, the realization of this component has been believed to have made adults more productive and self-

reliant. Accordingly, 5.2 million adults were expected to benefit FAL during the program period .Moreover, 143,500 adults be trained in different skills in the existing 287 CSTCs.(ESDP,2005:47-48)

In order to realize this program, the Ministry of Education together with NGOs (e.g. . ANFEAE) has worked out the preparations and subsequent documents:

A. A national FAL curriculum guide has been developed

B. Bench mark on FAL has been developed

C. FAL guideline has been developed.

D. MoU with six line ministries have been signed.

The actual implementation of the FAL program lies on the schools teachers and classrooms. According to the ministry, the schools teachers will obtain a short term orientation /training and be assigned to teach adults in addition to the normal teaching task and load.

7.0 Opportunities, Challenges and Ways forward on FAL program implementation

7.1. **Opportunities**

7.1.1 Political will and Policy

In Ethiopia, there is the political will and the policy framework to fight and end the abject poverty and illiteracy. In all the documents, the government underscores the need for the link between literacy and poverty reduction. In line to this, the national development plan, the PASDEP acknowledge the need for adult functional literacy and requests the integration of all development interventions at all levels. The nation plan expects education to be relevant, market oriented and demand driven to enhance the transformation to take place both in urban and rural areas through modern technology based productivity. In line to this, the concerned line sector ministries (Agriculture, Health and Education) have developed and are applying the sector development programs

7.1.2 The sector Development Programs and the approach to FAL

On the basis on the national development plan framework (PASDEP,2005), the selected line development sectors which are discussed in earlier sessions, have developed their respective development programs which targeted at the overall improvement of the livelihoods of the target communities and groups. With regard to the rural community who are dominantly illiterate farmers the selected line development sectors have coined core programs, designed strategies and implementation framework respectively.

Sector	**Core program**	Target	Theme/content	Facilitator	Methodology (not exhaustive)	Goal
Health	Health Extension Package /17/	Women children	-Basic hygiene -Family health -Environmental sanitation -Disease prevention etc.	Trained Health agent (2 in each village)	- discussion -demonstration - model site work - application -reflection	Better health better life
Agriculture	Agriculture Extension Package /6/	Farmers household	-soil and environment cons. - farm productivity -income diversification -animal husbandry -horticulture etc.	Trained DAs (3 in each village)	- Discussions -demonstrations -Farm plot work - field visit -Reflections	Better productivity Better life
Education	Functional Adult Literacy (FAL)	Adults 15+	Basic Literacy /Numaracy To be given at schools/ABE centers	Teachers	Classroom instruction	Not clear : diverged goal of the provider and learners

Source: Annual reports of line ministries; July 2009/10, Addis Ababa

7.1.2. Favorable Organizational Structure

Ethiopia follows a decentralized government system. The nine regional government have been given much of the authority to plan and implement region-based context oriented development plans and programs. The same is true for regional education bureaus in designing and preparing education curriculum including FAL.

The development plan and strategy turns into practice at the woreda and village level. In this regard, since 2002 there is the power devolution to the lower level. Accordingly, the regional council fixes the lump sum budget to the woredas and the woreda council which is chaired by the administration and composed of the line offices, is the highest body to decide on the priorities and implantation of local development activities. In so doing, the woreda has the authority to recruit and hire development workers including budget earmark.

The village administration is the government layer closest to the communities. Since 2005/6, in Ethiopia, there is an encouraging trend of establishing the village administration to be a functionary government unit. Accordingly, in each kebele there are at least one ABE/school (5-10 teachers), 3 DAs and 2 HEWs. The representatives of these institutions form the village council which is responsible for the planning and implementation of the village level development plan.

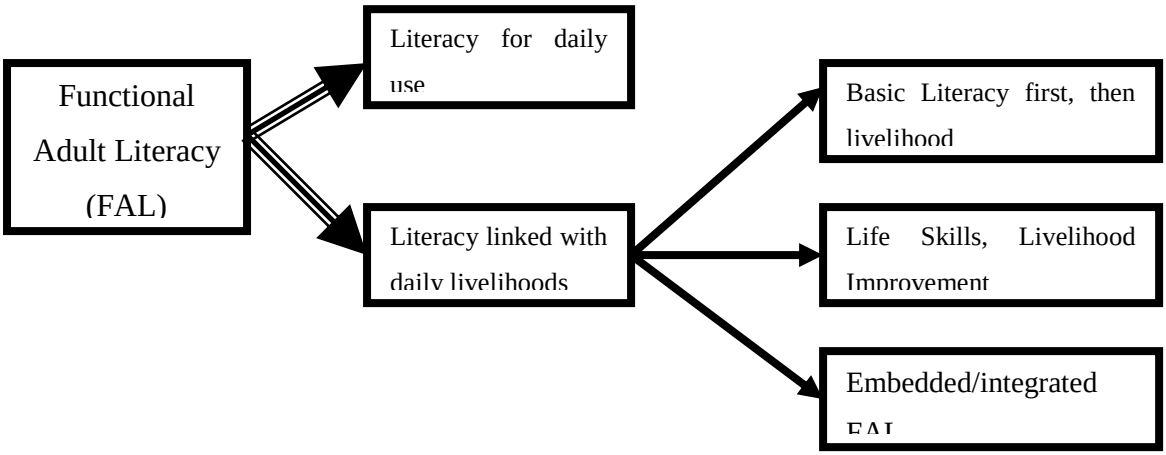
7.2 Challenges

7.2.1 The concept and implementation of FAL in Ethiopian context

In Ethiopian context, despite the age long practice, the concept literacy is neither addressed nor implemented correctly. Since long years, literacy is considered as a disease which needs to be cured. Some of the slogans related to the literacy practice read as: "Illiteracy is a journey in the deep dark!" "Literacy is the Cure!". There seems a similar tendency on the concept and implementation of Functional Adult Literacy (FAL) as well. The development program of the selected sectors can tell us that there are the following understanding and options in applying FAL. For the agriculture and health sectors, FAL is practically applicable without mentioning it and thinking about the role of literacy element in sustaining the good beginnings. On the other hand, the Ministry of Education (MoE) seem to be ambitious in making all 5.2 million adults functionally literate without defining the specific target groups and ensuring the link between literacy and livelihood within the available opportunities and contexts.

7.2.2. Efficient use of human and other resources for FAL Implementation

In Ethiopian context, FAL is intended to expedite the struggle against poverty and national economic growth. It mainly targeted rural adults who are busy on multiple social and personal responsibilities. On the other hand, there is relatively huge potential resource for implementing local development activities including FAL. The following table can give the highlight.



Sector	Trained human power at the village level	Number of Centers/schools
Health	38,000	7888 Health posts
Agriculture	52,000	8589 FTCs
Education	140,000	20660 schools

Source: Documents of the sector ministries (July 2009/10)

The Ministry of Education (MoE), beginning from mid October, 2009, wants to implement FAL at the schools/ABE centers through the school teachers. The ministry together with regional education bureau, arranges basic orientations on FAL strategy and curriculum for the school teachers before the assignment. The teachers are expected to offer FAL after the normal school hours. In practice, the teachers have the chalk and the board; and might help the landless youth (15-24) who aspire to migrate to town for the search of employment. Apart from this the rest majority of adults need FAL for daily life use; which the school teachers might hardly address in the classroom teachings. On the other hand, both the DAs and HEWs have clear target groups, meet the adults more regularly (time) with relevant agenda (FAL content), interaction (method and practice) and feedbacks. In reality, integrating literacy element within the existing livelihood practice is more sound and relevant than teaching FAL in the classroom.

7.2.3 Learning materials for FAL

According to the Ministry of Education (MoE), the purpose of FAL is not reading and writing; rather ensuring the conditions of living of the target groups. Basically the purpose (livelihood improvement) determines the content and methodology including the learning materials. In this regard, the ministry encourages the learning materials (both children and adults) to be context bound and relevant to the learners. From observation, with regard to rural adults, the key learning topics are already identified and being implemented by the health and agriculture workers. In line to this both the sectors have a number of interesting materials (postures, leaflets, pictures, brochures etc.) that can serve as initial source to start literacy. However, on part of woreda education experts, there is the tendency of expecting printed learning materials from the top. Furthermore, the challenge on how to help adults learn the alphabet, reading and writing skills seem a clear gap. With regard to school teachers, due to work load and lack of commitment, there might be a tendency of practicing the usual traditional alphabet count (letter –word building) which of course unattractive for adults.

7.2.4 Environment that favors and enhances Literacy

FAL in order to contribute its development role, an environment that favors and enhances literacy need to be initiated and promoted. Basically, a favorable literate environment is one of the determinants in sustaining literacy practice. In this understanding, literacy unlike an individual skill; is a social practice that plays vital role for the common good.

Ethiopia has experienced that basic literacy can hardly stand on its own and help learners live better. In turn, literacy for social practice needs an investigation of the favorable conditions and its integration to the beneficiaries' livelihood improvement efforts. On part of the Ministry of Education, FAL need not to consider as a classroom activity but a living practice within the daily lives of the communities. Hence the current local development plans including rural electrification and

communication technology shall be considered as good opportunities to enhance the link between FAL and local development

8.0 Conclusion

Ethiopia is exerting it's at most effort to end poverty and illiteracy. In so doing has developed a relevant nation wide development plan named PASDEP. This comprehensive plan duly acknowledges the need for FAL and synergy of all concerned actors at all levels.

Most of the poor and illiterate who live in the rural villages await for a meaningful intervention to get out of the abject poverty. At the grassroots there are very good development potentials and intentions that help the poor learn to live better. Nevertheless, development initiatives need to be sustained by commitment and self directed learning. In line to this, the actual linkage between the sector development plans particularly linking FAL (the literacy element) with livelihoods is not clearly shaped. Equally, these is tendency of making FAL within the four walls while there is a relatively huge resource (human, material, structure etc.) that can efficiently and effectively implement FAL for better results.

The opportunities at the grassroots are high, although the challenges in lack of clarity and harmony on how to better link literacy element and the livelihood element within and between sector development programs are still vivid. In this regard, FAL seem to be defined differently by the different sectors within the enhancement of the livelihoods of the illiterate target groups. On the other hand, on part of ministry of education, hardly strong study and evidence base is available on the actual role (purpose), approaches to handle FAL with the diversified target groups (e.g. illiterate and semi literates etc) . There is still a tendency of making FAL within the four walls with overload and less motivated school teachers.

In order to realize the actual role of FAL in local development, beyond signing the memorandum of understanding between sector ministries, it requires a practical move on clarifying concepts and approaches and how to use the available resources and avoid duplication of efforts at the grassroots. Unless these areas are not harmonized and smoothly enhanced the results may strongly hamper adults from intended and future adult education programs.

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Partnership between Teacher Education Institutions and Secondary Schools in Ethiopia: Status, Challenges, and Prospect

By

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Abstract

The purpose of this study was to examine the status, challenges, and prospects of partnership between teacher education institutes (TEIs) and secondary schools in Ethiopia. To this end, 141 secondary school teachers, 70 instructors, and 162 student teachers were taken as a sample of the study from three Teacher Education Institutes and 15 secondary schools attached to the three Teacher Education Institutes for practicum using purposive and random sampling technique. Data were collected from participants (instructors, student teachers, secondary school teachers, school principals, deans, and practicum coordinators), through questionnaires (open and close-ended), interview, and documents analysis. Then the data were analyzed using descriptive statistics and a qualitative thematic analysis. The data analyzed suggests that the partnership between teacher education institutes and secondary schools is weak and TEIs, secondary schools, student teachers, TEI instructors and secondary school teachers' contribution and supports to each other are not found to be satisfactory. In addition, the evidences suggest that there exists an opportunity for collaborative research, providing professional development trainings, and involving school teachers in mentoring and assessing students teachers in better ways. However, Organization of practicum, student teachers' discipline, instructors' assessing student teachers, distance of secondary schools from the TEIs and secondary school teachers' involvement in mentoring are identified as challenges.

The State of Community-Based Research in Jimma University

By

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Abstract

Research is one of the key functions of higher education institutions. Particularly, in universities like Jimma university where community based education is a leading educational philosophy and strategy, the very importance of community based research is not questionable. Accordingly, this study was conducted to investigate the state of community-based research in Jimma University. More specifically the study sought to :(1) explore the place of community-based research in Jimma University; (2) examine the level of involvement of various groups in community-based research; and (3) examine barriers and facilitators to conduct community-based research. A descriptive survey method was employed to carry out this study. Data were gathered through questionnaire, interview and document review. Both quantitative and qualitative data analysis methods were used in this study. Descriptive statistics were generated and Univariate and Bivariate statistical analysis were performed as needed to examine variables and relationships of interest. Qualitative data from interviews, documents (existing programmes and curricula and promotion criteria) and qualitative/response of survey respondents were analyzed qualitatively. The results indicated that, theoretically, the place given to community-based research is promising though the promotion criteria reveal an inherent bias against developing community-based research. The most important barriers and facilitators relate to methodological and funding and/or institutional issues. The key barriers include lack of community-based research researchers, few rewards/incentives for faculty, scarcity of funding to support community-based research, belief that results will not be disseminated or acted upon, and lack of knowledge or training in community-based research. Facilitators include increasing funding opportunities, creating interdisciplinary research teams and increasing institutional supports (including promotion practices). Besides, the findings of the study revealed that faculty of education and public health faculty differed only in one of the twenty barriers and the twelve facilitators. Finally, conclusion and recommendations were drawn so as to improve the existing situation of the university by taking into consideration the barriers that hindered the practice and the facilitators that help to support community-based research.

Professionalism and Educational Leadership: the Case of SNNPR

By

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Abstract

Leadership is absolutely essential in the present times in all organizations regardless of their origin, nature, ownership or purpose for good performance and effectiveness of the organization. To this end, the main purpose of this study was to analyze the effectiveness of educational leadership in Southern Nations Nationalities and Peoples Region and describe its current status in terms of identified leadership qualities. Descriptive research methodology was employed to conduct the research. All educational leaders currently holding the leadership positions in the region were the study subjects. To collect the data appropriate for the research, multi-stage sampling technique was employed. Accordingly, 6 educational leaders at regional level, 6 at zone level and 9 at Woreda level totally 21 leaders were described in various perspectives of leadership. Forty five subordinates at regional level, 45 at zone level and 99 at Woreda level i.e. the total of 189 subordinates were randomly selected and described the leaders at each level. Leader behavior description questionnaires by Stogdill Form XII and questionnaire prepared by the researcher on organizational climate and leader effectiveness were used to collect the required data for the study. The instruments were pilot-tested and the necessary amendments were made before they were administered. T-test, F-test, ANOVA, Pearson's r, percentages, means, standard deviations, etc. were employed to analyze the data to draw meaningful generalizations. SPSS version 13 software program was used to get appropriate outputs. Hence, the findings of the study revealed that the educational leaders in the region were found to be ineffective because of the factors such as lack of relevant knowledge and skills, lack of adequate training, inappropriate selection and placement of educational leaders. Therefore, to bring about the leadership effectiveness in the region, greater attention should be given to implementation of the policy directions effectively, morever, the concerned bodies should use appropriate criteria of selection that could bring people with appropriate knowledge and skill as well as those who are professionally competent and capable to the leadership positions.

Closing Session

Outstanding Issues in the Parallel Sessions and General Discussion

Minutes of the third Annual Research Conference January 26-27/2012

Place: JUCAVM Main Hall

Time: 03:30 to 06:30

Chairperson: Ato Kora Tushune, V/President for Administration and Development

Rapportauers: Dr. Ketema Bacha (Dean, College of Natural Sciences)
Dr. Tesfaye Refera (Director, Publication and Extension)

Present: Invited participants of the conference

Agenda:

- Presentation of Outstanding Issues identified by the parallel sessions of the conference
- Identification of main points for general discussion
- General discussion
- To forward recommendations for future activities (related to Research and Dissemination)

1. Presentation of Outstanding Issues identified by the parallel sessions of the conference

The chairman invited representatives of the parallel sessions to present outstanding issues raised in each parallel session. The representatives presented the outstanding issues identified in the parallel session according to the following order:

A) Parallel Session 1 (Organized by College of Agriculture and Veterinary medicine)

The first chance was given to Ato Solomon Tulu coordinator for Research and Postgraduate Studies of the college to give the presentation. The following are the main points extracted from the presentation.

General information:

In this parallel session, 9 papers were presented and the number participants range between 21 and 31 in the sessions. The papers were categorized under the following themes:

- Crops production and management
- Animal production and health
- Social science

Outstanding issues and major issues debated by the parallel session were:

- Conservation of the endangered plant animal species Example: Sheko breed of cattle
- Taenia saginata (Koso), prevalence found to be increased and identified as important Zoonotic disease in food safety and export market

The parallel session participants discussed on the following points and reached the following consensus.

- Research works conducted at the college should focus on solving the problems of the farmers.
- The link between research findings and the development need of the society should be strengthened.
- Sustainable way of securing funds for research should be established.
- Research findings/outputs should be extended to actual users.

Major issues debated by the parallel session and consensus reached was:

- More attention should be given to applied research than basic research.

Possibilities suggested for multidisciplinary research:

- The university has planned to prepare research thematic areas in which both the researchers and post graduate students should focus. This has the advantage to avoid duplication of research works and efficient utilization of research funds.
- The researches done at various colleges and departments in the University should be communicated
- Research papers should be presented at the most relevant disciplines (parallel session).

B) Parallel Session 2 (Organized by College of Business and Economics)

The presentation was made by Ato Taye Amonge, coordinator for Research and Postgraduate Studies of the college.

General information:

- ✓ On average 27 JU staff participated in this parallel session
- ✓ Out of 9 papers supposed to be presented, 8 were presented

Outstanding issues and major issues debated by the parallel session were:

Issues related to solid waste management, HR strategies, financial leverage and credit development and economic growth.

Major issues debated by the parallel session were:

- With respect to issue of financial crisis vs currency crisis, Does global financial crisis really cause depreciation of domestic currency in Ethiopia?
- What should be the main emphasis area of the financial sector? Is it service, manufacturing, agriculture or what else?
- What causes current account deficit (CAD)? What should be done about CAD?
- What should be the orientation of organizations in Ethiopia? Should it be customer oriented like BPR or employee focused?
- Who is effective in management of household solid waste? Male headed or female headed household?

Possibilities suggested for multidisciplinary research:

- Issues related to financial leverage can be further investigated in collaboration with Statisticians.
- Issues related to impact of micro-finance on growth and studied in collaboration with College of Agriculture.

C) Parallel Session 3 (Organized by College of Natural Sciences)

The presentation was made by Ato Kassahun Melese, coordinator for Research and Postgraduate Studies of the college.

General information:

On average 31 staff participated in the sessions and a total of 11 papers were presented.

Outstanding issues identified by the parallel session:

- Issues related to Medicinal plants like: Documentation (distribution, utilization, etc), chemical composition (identification & characterization, etc), Conservation practice (Propagation)
- Safety issues like food & water safety, Environmental safety/pollution
- Nanotechnology: The science and its application (electrochemistry perspective)
- Science Education in issues related to bridging the High schools & University, Introducing lab safety in curriculum

- Biodiversity Conservation - Issue like the need for conservation of plants, animals and microbial resource biodiversity. A case for attention was the confirmation of the existence of Blind fish.

Issues identified for further discussion

The following were issues identified by the parallel session that worth discussion:

- Issue of balancing applied sciences with basic science research.
- The need for multidisciplinary research.
- What to do with the declining trend in students' academic performance and interest towards "hard sciences"?

The following recommendations were forwarded by the parallel session:

- Concern on sustainability of the forum.
- On how to provide extra support to outstanding researchers.
- On strengthening collaborative and joint researches among institutions.

D) Parallel Session 4 (Organized by College of Public Health and Medical Sciences)

The presentation was made by Prof. Tefera Belachew.

Out of the 11 papers submitted, only 8 were presented that can be categorized under the following themes:

- Environmental health issues
  - √ Lead exposure among women
  - √ Road Traffic accident versus visual impairment
- Nutritional problems
  - √ Clinical trial on effect of whey on HIV patients
  - √ Iodine nutritional status
- Reproductive health
  - √ Quality of FP services
  - √ Ethiopia's readiness to introduce HPV vaccine
- Health services
  - √ Client satisfaction with health service delivery at JUSH
- Biomedical
  - √ Effect of khat on bronchial asthma

In the presentation of the college, the following points were recommended for the betterment of such kind of annual research conference:

- Invitation of guest speakers on the lead papers is very good for experience sharing and shall continue.
- Enhance efforts to disseminate research outputs to the end users to bring about outcomes using communication tools such as Policy briefs including in local languages.
- The need for initiation of screening for Cervical cancer and treatment in Jimma University Specialized Hospital. For this purpose, enhancing the capacity in effective screening in terms of human, facility and supplies is required.

- Encourage research initiatives on clinical trials – for this there should be increase research budget for research undertaking and need to revise the funding schedules.
- With the aim of improving research quality, the culture of interdisciplinary/ multidisciplinary research undertaking has to be enhanced by involving appropriate investigators e.g. Statisticians.
- With the aim of building the capacity of the Ethics committee, a premise (office), fulltime workers (administrator) shall be allocated.
- Awarding best researchers of the year has to be initiated to motivate researchers.
- With the issue of conference participation
  - ✓ The balance and mix of disciplines to be presented shall be looked into
  - ✓ Conduct of the research has to be considered
  - ✓ Quality of Presentation need to be improved
  - ✓ Type of papers (meta analysis, review articles, case reports)
  - ✓ All PhD candidates and graduating MSc/MPH students be invited to participate
  - ✓ All academic staff should be invited if not at least all female academic staff
  - ✓ Invite sectoral offices and other end users in consultation with presenters
  - ✓ Devise mechanisms for conference participants attend the sessions up to the end

Finally the presenter concluded with the remark that, in addition to the oral presentations, there should be poster presentation sessions to diversify mechanism of presentation of research outputs.

E) Parallel Session 5 (Organized by College of Social Sciences and Law)

The presentation was made by Ato Alemu Kassa, coordinator for Research and Postgraduate Studies of the college.

General information:

Out of 14 papers accepted for the conference, 12 were presented. On average 29 participants attended the parallel session.

Outstanding issues identified by the parallel session were:

- Issue of Gender and development (example: women's social status in proverbs, language. In multidisciplinary approach, the college can work with Colleges in the regard.
- Issue of Cultural heritage management (Indigenous Knowledge, natural resources management, local institutions). The college proposed to work with college of agriculture and veterinary medicine and with college of natural sciences in this issue.

- Issue of Governance and Development (religion and politics, administration, leadership, public policy). The college identified Business and Economics College as a potential collaborated under this theme.
- Issue of human development and welfare (child development and adult, psychological, social and legal issues. The college wants to work with college of public health and medical sciences, college of natural sciences, Jimma Institute of technology in multidisciplinary approach to make significant impact.
- Issue of Language and communications (language standardization, sexuality). The college identified college of public health and medical sciences as a partner in this regard.

F) Parallel Session 6 (Organized by Jimma Institute of Technology, Jimma University)

The presentation was made by Ato Dida Aberaa, coordinator for Research and Postgraduate Studies of the institute.

General information:

- Totally 11 papers were submitted and out of this 10 were presented
- On average 23 participants attended the presentations
- Participants were from Ethiopia (JiT, AAiT, Giz, MoWE, Mettu University, JU), India, Cuba, Philippines and Germany.

Outstanding issues identified by the parallel session:

The papers presented in this parallel session were categorized under the following thematic areas:

- Renewable Energy
- Environmental Management (Remedial Technology)
- Construction and manufacturing Technologies
- computing areas

Outstanding Issues identified for further discussion were:

- Innovative and low cost water Treatment Technologies
- Enhancing compression and data handling without affecting the quality of image,
- Pollution prevention technologies at plants
- Medical Imaging Modalities
- Improving energy management at HAVC on buildings
- Developing renewable energy Technologies
- Feasibility of adsorption technologies for water and wastewater engineering (e.g. Deflouridation Techniques)

G) Parallel Session 7 (Organized by Institute of Education and Professional Development, Jimma University)

The presentation was made by Dr. Mitiku Bekele, coordinator for Research and Postgraduate Studies of the Institute.

General information:

- Average attendance 16 participants (UNESCO, REB, AAU)
- Five papers were presented
  - ✓ Partnership between TEIs and Secondary schools in Ethiopia
  - ✓ Linking adult literacy with poverty reduction
  - ✓ Quality of education and training in college of Engineering and Technology
  - ✓ Professionalism and Educational Leadership in Ethiopia
  - ✓ The state of community based research in Jimma University

Outstanding issues identified by the parallel session were:

- Suggestion to move from descriptive/narrative to analytic creative researches
- Quest for quality – where should we start, who should make it? and How can it comes?
- Research based community service and community based research
- Value chain between education and market
- A system to convert research outputs into outcomes
- Encourage and facilitate collaborative research – inter Universities and intra University
- Emphasis to Educational Leadership quality
- Meaningful participation of stakeholders
- Encourage and facilitate collaborative research – inter Universities and intra University
- Emphasis to Educational Leadership quality
- Meaningful participation of stakeholders

Issues identified by the parallel session for further discussion were:

- Time allocated for the research conference is not adequate
- Research workshops at College/Institute levels to enhance quality of papers to be presented on the conference

2. Identification of main points for general discussion

Dr. Berhanu Belay, Senior director of Research, CBE and Postgraduate studies has listed six main discussion points that are considered to encompass all the issues raised by the parallel session presenters. The points were:

A. Improving the culture and Quality of Research.

As the number of staff involved in research is in the range of 15%- 20%, the issues of concern were:

- How can we engage staff in research?
- What incentive and legislative mechanisms could be followed?
- What experience does exist elsewhere?
- How the qualities of Research need to be considered?

B. Issues related to diversification of research funding.

- There are a number of options to access research funds (External and Internal sources).
- Our share from the external sources is decimal and the internal sources are neglected.
- How can we improve the research funding? Keep on trying and the success rate for grant is (1:10).
- There are a number of opportunities but we did not exploit.
- Securing grant is also a means of retention of faculty

C. Issues of Research output dissemination mechanisms to:.

- Policy makers
- End users
- Academics

It has been alleged that, the research outputs are still shelved. Hence; what innovative methods can we use to disseminate the research outputs to the end users?

D. How can we match or align our research and dissemination with the national development agenda (GTP)?

- Research output aligned to the national development plan
- National and Global policies are not captured to teaching and learning

E. On issue of collaboration and partnership: How can we strengthen partnership to undertake need based Research to:

- Overcome the research capacity limitation
- Mobilize resources

F. With the issue of quality of Education:

- How research evidence to advise the policy makers so as to improve the quality of Education?
- What platforms can be created to improve quality of education?

After Dr. Berhanu's presentation, the chairman invited all presenters to come to stage and then gave participants opportunities to forward their views whether the discussion points

well iterated by Dr. Berhanu and to give suggestion on these points or add new ideas if they find it not listed.

3. **General discussion:**

The chairperson gave opportunity for participants of the conference to forward their ideas. The following is a condensed summary of the points raised and discussed by the participants.

Ideas raised with respect to Research Policy were

- Should Research align to national policy? Or should research challenge national policy?
- Should the challenge to government emanate from university researchers?
- Problem of less culture in research and less quality output imply low collaboration. Is there any strategy to track the endings of research works even to the community? Instead of small scale budget, why not we identify key national issue and direct resource towards it?
- Is there research based directive at county level?
- There should be a governing level that addresses federal issues then regional policy to implement to the regional level. Incentives reward systems should be in place. We should address the issues from holistic approach.

Ideas raised with respect to Capacity building were:

- Capacity of researchers has to be increased to carry out quality research. We need capacity building (training, research basics). What are the activities of the university in this regard?

Ideas raised with respect to Motivation aspect were:

- What is the strategy of JU to motivate staff to publish on high impact factor journal?
- Does the university have clear incentive mechanism for high impact work and extension work?

Ideas raised with respect to Research ethics were:

- How ethical clearance issued for waste management to be studied by business professionals?
- With the definition "Quality is fitness for a purpose", let us at least agree to this concept work on it.

Issue raised in relation to collaboration with stakeholders were:

- Institute of biodiversity is willing to cooperate write JU
- Collaboration shall be based on Mutual interest from sectoral offices and university

Issue raised in relation to Interdisciplinary/multidisciplinary research were:

- Interdisciplinary research can improves quality and avoids repetition.

Issue raised in relation to Resources were:

- Why funding is done once a year? Ideas may come at any time. The call has to be announced at least twice a year?

Ideas raised with respect to Dissemination strategy of research outputs were?

Lesson to be shared as a strategy for dissemination of research findings:

- local radio
- policy briefs
- radio message

- Depending on the research priority for policy makers at national level or regional level or individual level, based on demand to disseminate the output through newsletter, web page. The researcher has to develop sense of "It is my issue!" and then act accordingly.
- Research agenda shall be aligned to GTP. But the question may be: Is there a desire from the government side to seek for research output?
- How is the experience of JU in Knowledge Management? The university can learn Knowledge management system from the experience of Ministry of water and energy.
- How many of the papers presented for the parallel sessions were reviewed at college level?
- How successful was the university in providing Research based recommendation to government?
- Is it not time to change research output to changing the society? The community we are leaving in should benefit from this.
- Environment policy makers look for information from NGOs to make decision. The universities are not that much capable to provide information. University should try to break this silence and start impacting.

Conference organization

Make sure policy maker partcipate on such kind of conference to bring about change. We do not have any policy making official here with us.

The following points were replied by the panelists

Dr. Berhanu's replies (Senior Ddirector for research, community based education and postgraduate studies):

- With regard to motivation aspect, reward mechanism and issue of impact factor; the draft procedure developed has considered these issues.
- Extension service (as community service) should be addressed for staff promotion like publication record.
- With respect to issue of thematic area, the thematic areas should be harmonized across the nation and allocate specialty to excellence centers to avoid redundancy and wastage.

- With respect to Administration issues, collaboration strengthens quality
- With respect to Funding aspect, there is management issue where budget closing date boundary is set. How this issue can be addressed at management scale?
- With respect to training (capacity building) the university has identified 6 training packages for 150 staff. Some of the areas include: a) grant and scientific proposal writing, b) Qualitative research c) Data handling and analysis d) Monitoring and evaluation- this trainings have already done.
- With respect to dissemination mechanisms, we should identify for whom we are disseminating? We have to use appropriate communication mechanism to address users. We have a number of research project but poor dissemination mechanism. One mechanism which is planned is to establish a "model village" and to apply and adopt innovation at the village level.
- With respect to Issue of Collaboration: We have not done much in this regard. Intensive collaborative link to work with regional governments. We have a policy but not actually implemented.

The other panelists have also responded to the raised issues:

Ato Alemu Kassa, we have to encourage the people who have the capacity to do it. We have to determine the appetite of policy makers to utilize research outputs in relation with the relevance and quality issues of our research outputs. Let us be equipped with the information on how to communicate (user friendly information).

Ato Solomon Tulu shares the experience of proposal review at JUCAVM. The council that is given the mandate to review proposals related to agriculture is composed of JUCAVM, Jimma Agriculture Research Institute and Limmu shai.

Ato Kora Tushune, chairman of the forum summarized the main points of the general discussion session as follows:

1. Issue of balance between Basic and Applied research
   Pragmatism is the way forward.
2. Issue of multidisciplinary research
   Strong disciplinary research strengths multidisciplinary research
3. The issue of quality
4. Funding for research projects: In the absence of strong financial funding, we have to prioritize research projects based on national agenda, local relevance
5. Issue of launching new journals: Publishing on international journal should be encouraged than opening new journals. The question is not how many journals. The issue is how many publications on international Journal.
6. We need for strong center of excellence
7. We have to Nurture young researchers
8. Publication vs. extension: Reward system should be implemented for both

9. Frame work to encourage multidisciplinary and trans-disciplinary approach by establishing research centers.
10. Issues related to Graduate programs: The programs are also victims of fragmented structure. The postgraduate studies should support the attainment of goals set at higher level.
11. Effective communication of research outputs: We should be trained on how to communicate with policy makers.

With these deliberations, the Third Annual Research Conference of Jimma University was concluded after closing speech made by Dr. Taye Tolemariam, v/president for academic, research and students affairs.



Dr. Taye Tolemariam

V/president for Academics, Research and Students Affairs, Jimma University

Closing Speech

By

Dr. Taye Tolemariam

V/president for Academics, Research and Students Affairs, Jimma University

Dr. Edimealem Shitaye, deputy director for Agricultural Extension at Federal Ministry of Agriculture

Distinguished Invited Scholars

Dear conference Participants

Esteemed Senate Members

Ladies and Gentlemen

It gives me a great pleasure and honor to make this closing remark. Please accept my heartiest delight to wind-up this third annual national research conference at our university. This workshop is organized under the Grand research theme: the Role of Research and Extension in the Implementation of Growth and Transformation Plan (GTP) of Ethiopia.

In this Annual National Research Conference eight lead papers were presented. By the same token in the seven parallel sessions taken place in different colleges and institutes across the university 72 research papers were presented and discussed in various disciplines such as energy, health, agriculture , business, education ,environmental conservation, and hydro politics related to Nile.

Various participants drawn from different governmental and non governmental organizations have participated in this conference and forwarded to us to enable us do better than what we have done so far in the future.

I would like to extend my heartfelt gratitude to all the participants from different organizations. Your input to such academic and research conference and discussion has a pivotal role in the development of our country in general and such academic and scientific forum at Jimma University in particular.

I personally believe that this forum has created conducive forum for future collaboration and joint multidisciplinary research that can solve the felt need of the society and address the national priority needs.

Jimma University aspires to be one of the research based universities in Ethiopia.

Our university has made an aggressive infrastructural expansion and has made a great stride in expanding the postgraduate programs in the last five years gone by to contribute its share to the national development endeavor.

The expansion of the need based postgraduate studies programs with out research tradition in vain.

Therefore, linking problem solving applied researches to post graduate program play a greater role in the country's national endeavours to achieve our Growth and Transformation Plan.

Dear Participants

Ladies and Gentlemen

Research would boost learning at all levels and build the capacity of a nation to better understand the world, sharpen their production and augment their productivity and enable them to suggest their own solution to their own felt needs and problems in all aspects of their daily lives.

The national conference has played a greater role in discussing different scientific research papers in various faculty at the university and suggested a better perspectives to do more problem oriented research that can contribute to the national development effort in achieving the Growth and Transformation Plan of the Federal Government.

As all we know, conducting sound and problem solving research in a country where resources are meager and trained labor is acute, is a challenge.

However, it is our national duty and responsibility to leave no stone unturned to conduct problem based applied researches to contribute our role to the Growth and Transformation Plan to over come the quagmire of poverty. It is through doing such kinds of research and expanding the postgraduate studies that we can discharge our responsibilities and execute the national mission entrusted to us in the areas of producing competent and qualified trained labour force that can help the development of our country.

The lead papers presented and discussed and the other research papers presented in respective colleges and institutes the instructive and constructive comments given and the prioritization

of research themes derived form this forum along the comments and the feedbacks forwarded by different expertise at this third annual research conference have given as a better way of enriching and amending these curricula.

I hope, the respective colleges and individual presenter will look into the drafted curriculum and will incorporate the feedbacks and ideas suggested from different expertise.

The ideas cross-fertilized during the plenary sessions about different research areas within the frame Growth and Transformation Plan and its contribution to the national development goal and the united nations millennium development goal to create a middle income country in the next decades.

The two-day research conference has pinpointed to all participants and our university to work hard and prioritize the research areas which contribute to the enhancement of the national development in order to overcoming our economic backwardness. Though we are young university with meager capacity and resources our commitment to develop research and scholastic tradition to support the national growth and transformation plan in this regards is the step forward in the right direction in line with our university's current institutional reform with high emphasis on research, teaching and community services.

We are delighted to organize such a national research conference to share experiences and get critical comments and feedbacks from experts in various fields across our faculties for further development of our research and academic cultures.

In sum, I would like to extend my heartiest gratitude to all participants for devoting your precious time in being part of this national research conference at our university some of you away from your home and caring family members.

Once I earnestly ask you to accept my gratitude for your contribution and perseverance in being part of our national research conference and contributing your critical comments and feedback to help us develop our scholastic tradition and research.

Finally yet importantly, I would like to thank all of our university communities and offices who are involved in one way or another to make this annual research conference materialize and be successful in our university in such a remarkable manner.

Thank you for your attention!

Annex

Conference Program

Day 1: January 26, 2011 General-opening Session

Time	Activities	Speaker	Venue
8:00-8:30	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 Research, CBE and PGS (JU))	
8:45-8:55	Opening Remarks	Dr Fikre Lemessa (President of Jimma)	
8:55-9:00	Key note address		

Day 1: January 26, 2011, Lead Papers Presentation Session

Time	Activities/title of the papers	Presenter	Chairperson and Rapporteurs	Venue
9:00-9:15	Research and Outreach Highlights of Jimma University: Challenges and Opportunities to Advance Research and Extension	Dr Berhanu Belay	Chairperson Prof. Abebaw Gashaw, Rapporteurs Dr. Esayas Alemayehu and Ato Taddese Regassa	JUCAVM Main Conference Hall
9:15– 9:30	Capability for Renewable Energy Mix and Bio-fuel Production is Crucial to Drive Ethiopia's Development Engine	Dr. Ing Berhanu Asefa		
9:30-9:45	Innovation Systems Perspective and Value Chain Analysis in Agricultural Research for Development: Of Help to the Ethiopian Research for Development Community to Effectively Contribute to the GTP	Dr. Berhanu Gebre-medhin		
9:45-10:00	Quality Higher Education for the Implementation of the Growth and Transformation Plan of Ethiopia: Requirements and Actual Conditions	Dr. Firdissa Jebessa		
10:00-10:35	Discussion			
10:35-11:00	Health break and group photograph	Audiovisual center, JU		Greener area
11:00-11:15	Prospects and Prognosis of Nile Cooperation in the 21st Century	Dr. Yacob Arsano	Chairperson Prof. Abraham	JUCAVM Main

11:15-11:30	Health Research Policy and Strategy in Ethiopia	Dr. Yemane Teklai Abraha	Haileamlak Rapporteurs Dr. Ketema Bacha and Ato Gashahun Lemessa	Conference Hall
11:30-11:45	Renewable Energy for Growth and Transformation of Ethiopia: RE Investment Plan, Feed-in-Law & Recent Interventions Development	Dr. Demissew Eshete		
11:45-12:00	Importance of Research for Conservation of Natural Resources: Practical Implications for Sustainable Development in Ethiopia	Dr Gemedo Dalle		
12:00-12:30	Discussion			
12:30-7:45	Lunch Break			JUCAVM Staff Lounge

Parallel Session 1: Organized by College of Agriculture and Veterinary Medicine, Jimma University

Theme: Multidisciplinary Agricultural Researches for Increased Agricultural Productivity and production and for Improved Quality of Life

Day 1: January 26. 2012

Venue: B2-24

Time	Activities/title of the papers	**Presenter**	**Chairperson and Rapporteurs**
2:00-2:20	An Assessment of the Financial Performance of Private Commercial Banks in Ethiopia, The Case of Some Selected Banks	Mr. Ebisa Deribie	Dr.Derbew Belew Mr. Sirawdunk Fikreyesus Mr. Tatek Woldu
2:20-2:40	Revisting Ferrolysis Processes in the Formation of Planosols for Rationalizing the Soils with Stagnic properties in WRB	Mr. Alemayehu Regassa	
2:40-3:00	Taenia saginata/ cysticercosis: Prevalence, Risk Factors and Cyst Viability Study in East Shoa, Ethiopia, By	Dr. Hailu Degefu	
3:00-3:20	Validation of a specific primer for identification of heterodera schachtii and screening acting Gene for species-species-specific primer design	Nr. Chemeda Abdeta	
3:20-4:20	**Discussion**		
4:30-5:00	**Health Break**		

Day 2: January 27, 2012

8:30-8:50	Current Status and Furure Prospects of the Endangered Sheko Breed of Cattle (African Bos Taurus) in Ethiopia: A review Paper	Mr. Tatek Woldu	Mr. Solomon Tulu
8:50-9:10	Experimental Polymerase Chain Reaction to Improve the Detection of Mycobacterium Bovis from Cow's Milk,	Dr. Mihretab Bekele	Mr. Alemayehu Regessa
9:10-9:30	Effects of Root Symbionts and PGPR on the reproduction of root-knot Meloidogyne incognita and on the growth and enzyme activity of pea	Dr. Mohd Sayeed	Mr. Chemeda Abdeta
9:30-10:00	**Discussion**		
10:00-10:30	**Health Break**		
10:30-10:50	Biocontrol Potential of Paecilomyces lilacinus Against the Root-Knot Nematode (Meloidogyne Incognita) onTomato plant (Lycopersicon esculentum),	Dr. Tanweer Azam	Dr. Sentayehu Alamerew
10:50-11:10	DNA Fingerprinting and Genetic Relationship Sorghum (Sorghum Bicolor(L.) Moench) Released Lines	Dr. kassahun Bantte	Mr. Mulugeta Seyoum
1:10-11:30	Evaluation of the potential Impacts of Climate Change on the Hydrology and Wter Resources Availability of Didessa Catchment, Blue Nile River Basin, Ethiopia,	Mr. Sintayehu Legesse	
11:30-11:50	Assessing the Potentials of Rhizoctonia solaniinhibiting Bacteria through mutational analysis and in Vivo bioassay	Mr. Gezahegn Berecha	Mr. Shiferaw Mukugeta
11:50-12:30	**Discussion**		
12:30-2:00	**Lunch Break**		
2:00-3:00	**Preparation for General Discussion and health break**		

Parallel Session 2: Organized by College of Business and Economics, Jimma University

Theme: Finance, Management and Development

Day 1: January 26, 2012

Time	Activities/title of the papers	Presenter	Chairperson and Rapporteurs	Venue
2:00-2:40	Financial Leverage: A Study of Selected Ethiopian Companies,	Samuel Kifle	MR.Derese Mersha and Daniel Tolossa	
2:40-3:20	Determinants of Foreign Direct Investment in Ethiopia, By Megbaru	Migbaru Misikir	Abiy Getahun and Taddle Mengesha	
3:20-4:00	The Causal Relationship between Bank Credit and Economic Growth in Ethiopia, Timeseries Analysis	Hailegabriel Abebe	Bedasa Woltiji and Tofic Siraj	
4:00-4:40	Assessing Indicators of Currency Crisis in Ethiopia: Signals Approach,	Kelbesa Megersa	Geremew Teklu and Reta Megersa	
4:40-5:00	Health Break			

Day 2: January 27, 2012

8:20-9:10	Determinants of Effective Household Solid Waste Management Practices: The Case of Ambo Town – West Showa Zone, By Ashenafi Haile	Ashenafi Haile	Zelalem Gebretsadik & Zerihun Ayenew	
9:10-10:00	Determinants of Capital Structure: A Study of Selected Firms in Ethiopia,	Samuel Kifle	Wondowsen Siyoum and Workineh Bayssa	
10:00-10:30	Health Break			
10:30-11:10	Practicability of Public Procurement Principles: Evidenced from Public Universities of Ethiopia,	Mekonnen Bogale Shimeles Zewudie (PhD)	Dr. Reddy and Asres Abitie	
11:10-11:50	Macroeconomic Determinants of	Wondaferahu	Hassen Abda and Nebiat Nigusie	

	Current Account Deficit in Ethiopia,	Mulugeta		
11-50-12:30	Role of HR Managers and HR Specialists in Ethiopian Organizations	Workineh B. (MBA), Shimels Z. (Ph.D)	Chalachew Alimaw and Eshetu Yadecha	
12:30-2:00	Lunch Break			Staff lounge
2:00-3:00	Preparation for general discussion and health break			Team

Parallel Session 3: Organized by College of Natural Sciences, Jimma University

Day 1: January 26, 2012

Time	Activities/title of the papers	Presenter	Chairperson and Rapporteurs	Venue
	I: The attachment of science in life+			
2:00-2:25	1. Gap analysis b/n preparatory and university programs	Kassahun Melesse	Chair person: Dr. Alemayehu Geremew Rapporteurs Ato Menberu Yitbarek Ato Delelegn Weyessa Ato Yinebeb Tariku	
2:25-2:50	2. Vegetative propagation methods …	Dr. Balcha Abera		
2:50-3:15	3. Ethnobotany of plants and their products ..	M. Remish		
3:15-3:40	4. Hypogean Blindfishes from kerala ..	K. K. Subhash babu		
4:30-5:00	Health Break			

Day 2: January 27, 2012

	II: Science for empirical evidences	Dr. Zelalem Teshome	Dr. Diriba Muleta Rapporteurs Ato Menberu Yitbarek Ato Delelegn Weyessa Ato Yinebeb Tariku	
	1.I-vague sets and relations			
	2. Isolation and characterization of compounds	Getahun Tadesse		
	3.Prevalence & antibiotic susceptibility pattern	Tekalegn Kejela		
	4. Electrochemical determination of hydrogen peroxide	Shimelis Addisu		
10:00-10:30	Health Break			

	III: Science for environmental protection		Mr. Tsegaye Gadissa Rapporteurs Ato Menberu Yitbarek Ato Delelegn Weyessa Ato Yinebeb Tariku	
	1. usage of plastic bags and their disposal	Dr. Legesse Adane		
	2. Chemical hazard warning	Asmamaw Abeje		
	3. Microbiological safety of kitchen sponge	Tesfaye Wolde		
	4. Bio-physico-chemical study of drinking water	Tsion Tefera		
12:30-2:00	Lunch Break			Staff lounge
2:00-3:00	Preparation for general discussion and health break		Ato Kassahun Melesse Ato Menberu Yitbarek Ato Delelegn Weyessa Ato Yinebeb Tariku	Team

Parallel Session 4:

Organized by College of Public Health and Medical Sciences, Jimma University

Day 1: January 26/2012 (Afternoon)

Time	Activities/title of the papers	**Presenter**	**Chairperson and Rapporteurs**
2:00-2:15	Lead Exposure Assessment in Women Dwelling Around Addis Ababa-Adama High Ways in Ethiopia	Daniel Haile, Seblework Mekonen, Agraw Amberlu	**Prof. Chali Jira**
2:15-2:30	Family Planning Services in Public Health Centers of Jimma Zone, Southwest Ethiopia	Fikiru Tafese	
2:30-2:45	Baseline Characteristics of HIB Cohort Receiveing FUSF During Treatment with ART, Jimma, Ethiopia	Alemseged Abdissa, Daniel yilma	**Dr. kifle Woldemicheal**

Day 2: January 27/2012 (Morning)

Time	Activities/title of the papers	**Presenter**	**Chairperson and Rapporteurs Venue**
8:00-8:15	Visual Impairment and Road Traffic Accident Among Drivers in Jimma Town, Southwest Ethiopia	MohamedBiza, Andualem Mossie, Yeshigeta Gelaw	Prof. Chali Jira Dr. kifle Woldemicheal
8:15-8:30	Incidence and Determinants of Stillbirth at Jimma University Specialized hospital, Ethiopia	Dejene Tilahun and Tsion Assfa	
8:30-8:45	Assessment of Clients' Satisfaction with health Service Deliveries at Jimma University Specialized Hospital	Alemseged Abdissa, Daniel yilma	
8:45-9:00	Ethiopia's Readiness of r the Introduction of HPV Vaccine	Alemseged Abdissa, Pro.Tefera Belachew	
9:00-9:15	Effect of Khat on Bronchial Asthma	Eiden Yitna	
10:00-10:30	**Health Break**		
Time	Activities/title of the papers	**Presenter**	**Chairperson and Rapporteurs**
10:30-10:45	Delivery Readiness and Associated Facto Among Women who gave Birth in Jimma University Specialized Hospital, Ethiopia health Break	Dejene Tilahun and Tsinon Assefa	
10:45-11:00	Iodine Nutritional Status and prevalence of Goiter among School Children, 6 to 12 years of Age, in Shebe Senbo district, Jimma Zone, Southwest Ethiopia		
11:00-11:15	Molecular Characterization of Pediatric Clinical isolates Mycobacterium Species	Bereket Workalemahu (MSc), Alemseged Abdissa	
11:15-6:30	**Discussion**		
12:30-2:00	**Lunch Break**		**Staff Lounge**
2:00-3:00	**Preparation for Genral Discussion and Health Break**		**Team**

Parallel Session 5:

Organized by College of Social Sciences and Law, Jimma University

Day 1: January 26, 2012

Time	Activities/title of the papers	Presenter	Chairperson and Rapporteurs	Venue
2:oo-2:15	**The Images of Women in the Proverbs and Sayings of the Oromo: The Case of West Arsi Area**	Sena Gonfa	Ashenafi Belay Tekle Ferede	
2:16-2:30	The Inter-Relationship among Health-Related Behaviors, Health Consciousness and Psychological Well-Being, Academicians of Jimma University,	**Aregash Hassen**	Dr. Tena Shale Mr. Gashahun Lemessa	
2:31-2:45	"Abba Jifar II of Jimma Kingdom 1861- 1934: A Biography'',	Ketebo Abdiyou (PhD)	Dr. Getachew Seyoum Mr. Yonas Seifu	
2:46-3:3:00	Competing for legitimacy: Trends of Change and Continuity Islamic Reform since 1991 in Jimma, Ethiopia,	Bawer Oumer	Dr. Ketebo Mr. Yonas Seifu	
3:00-3:15	The Impact of Regime Type on Health Does Redistribution Explain Everything?	Yosef Alemu	Dr. Yacob Arsano Professor K. Mathews	
3:16-3:30	Dynamics in the Oromo Beliefs and Practices' Contributions for Sustainable Environment: The Cases of Ambo and Limmu Kossa Districts,	Kamil Mohammed	Mr. Alemayehu Haile Mr. Daniel Deressa	
3:31-3:45	An Investigation of Evening Continuing Education Program at Jimma TTC: The Issue of Quality of Education,	Berhanu Nigussie	Mr. Fisha Mikre Mr. Habtamu Mekonen	
3:46-4;00	Importance of Play Therapy in Self-Healing Process of Children under	Gashaw Tesfa	Mr. Berhanu Nigussie Mr.	

	Critical Conditions: The Case of Three Child Care Institutions in Addis Ababa,			
4:00-4:15				
04:30-5:00	Health Break			
Day 2: January 27, 2012				
8:00-8:15	The Status of Opposition Political Parties in Post-1991 Political Order of Ethiopia	Gudeta Kebebe	Dr. Yacob Arsano Professor K. Mathews	
8:16-8:30	Agro-Ecological History of Omo-Naaddaa from 1900 to the Present	Deressa Debu	Mr. Daniel Deresa Mr. Alemayehu Haile	
8:3o-8:45	The Child Sexual Abuse Epidemic in Addis Ababa: Some Reflections on Reported Incidents, Psychosocial Consequences and Implications,	Jibril Jemal	Mr. Fisha Mikre Mr.	
8:45-9:00	The Influence of Safer Sex communication on Jimma University undergraduate students' sexual behavior, "in the Age of AIDS".	Tesfaye Gebeyehu	Mr. Ashenafi Belay Mrs. Sena Gonfa	
9:00-9:15	The Significance of Indigenous Knowledge and Institutions in Forest Management: *A Case of Belete-Gera Forest in Southwestern Oromia Regional State, Ethiopia*	Disasa Merga	Mr.Chimdi Waquma Mr. Kasaye Ambaye	
10:00-10:30	Health Break			
12:30-2:00	Lunch Break			Staff lounge
2:00-3:00	Preparation for general discussion and health break			Team

Parallel Session 6:

Organized by Jimma Institute of Technology, Jimma University

Day 1: January 26, 2012

Time	Activities/title of the papers	Presenter	Chairperson and Reporters	Venue
2:00-2:15	Achieving Optimal Software Using Data Mining and Software Engineering	T.Murali Krishna	**Chairperson:** Prof. B. Lennartz **Reporters:** Ismael kedir & Dejene Alemu	
2:20-2:35	Comparative Analysis on Selecting an Appropriate OS for Compiler Development: A Case Study of Fedora, Ubuntu and Windows OS	A.Samuel Giftson		
2:40-2:55	Data Hiding Based on the Similarity between Neighboring Pixels with Reversibility	Vuttaradi Anand		
3:00-3:15	Diagnosis of Human Brain Tissue Sections using Raman Spectroscopic Imaging (& comparison with histopathological findings)	Birhanu Assefa B.		
3:20-3:35	Processing and Characterization of Nanoparticles Reinforced Cellular Materials	Solomon Bayu		
3:40-4:30	**Discussion**			
4:30-5:00	Health Break			

Day 2: January 27, 2012

8:30-8:45	The Impact of wastewater application on soil hydraulic properties	Professor B.Lennartz	**Chairperson:** Dida A. **Reporters:** Melaku T. & Dr.D.S. Deshmukh	
8:50-9:05	A Review on Appropriate Deflouridation Technologies for Use in Rift Valley Areas in Ethiopia	Dr.-Ing. Esayes A.		
9:10-9:25	Review on Interior Climate Control and Reduction in Chloro Fluoro Emissions from a Building Using Latent Heat Exchange Phase Change Materials	M.S. G. Kumar		
9:30-4:05	**Discussion**			
10:00-10:30	Health Break			
10:35-10:50	Determinants of Effective Household Solid Waste Management Practices: The Case of Amb Town – West Showa Zone	Ashenafi Haile	**Chairperson:** Dr.-Ing. Esayes A. **Reporters:** Dejene Beyene & Dereje Tadesse	
10:55-11:10	Trend Analysis of Ground Water Fluctuation in the Sher River Basin, India	Dr.D.S. Deshmukh		
11:15-11:30	A study on Environmental Assessment and Pollution Prevention from the Thermal Power Plants	M.S. G. Kumar		
11:35-11:50	For Export: Knowledge Economy, as a Catalyst to Achieve Economic Growth in Ethiopia	Joey Tamidles Ng		
11:50-12:30	**Discussion**			
12:30-2:00	Lunch Break			Staff lounge
2:00-3:00	Preparation for general discussion and health break			Team

Parallel Session 7:

Name of the parallel session: Educational Research, Policy and Management

Organized by Institute of Education and professional Development, Jimma University

Day 1: January 26, 2012

Time	Activities/title of the papers	Presenter	Chairperson and Rapporteurs	Venue
2:00-2:40 pm	Partnership between Teacher Education Institutions and Secondary Schools in Ethiopia: Status, Challenges, and Prospect	Alemselam Fekadu	Dr. Mitiku. B (**Chairperson)** Mr. Abbi Lema (**Rapporteur)** Bekalu Ferede (chairperson) Mr. Abbi Lema (**Rapporteur**	
2:40- 3:20 pm	The State of Community-Based Research in Jimma University Jimma University	Mekuria Abebe		
3:20-4:00 pm	Professionalism and educational leadership in Ethiopia: the case SNNPR	Dr. Mitiku. B		
4:30-5:00	Health Break			
Day 2: January 27, 2012				
8:30-9:10 am	Linking Functional Adult Literacy (FAL) with Poverty Reduction: Potentials and Prospects in Ethiopia	Samuel Asnake	Ewnetu Hailu (chairperson) Worku fentie (raporteur) Desalegn Beyene (chairperson) Firew Amsale (raporteur)	
9:10- 9:50 am	practice problems and prospects with the implementation of costs sharing in HE	Tadesse Regassa		
10:00-10:30am	Health Break			
10:30-11:10 am	An Assessment of the Impact of Social Factors on the Female Students' Retention in Undergraduate Teachers Education Programmes of Ethiopia	Woldu Asefa		
11:10-11:50am	Perspectives of Suspension as a tool Correcting Disruptive Behavior: the case of Jimma, Adama, Hawasa and Wellega universities	Ewnetu Hailu	Desalegn Beyene (chairperson) Firew Amsale (raporteur)	



Some of the participants of the Parallel Session organized by JUCAVM



Some of the participants of the Parallel Session Organized by Institute of Education and Professional Development Studies, Jimma University