

## **RESEARCH PRIORITY 1. AGRICULTURE, AGRO-PROCESSING AND BIOTECHNOLOGY**

The value addition to agriculture through industrial processing provided opportunities for income generation and employment. It can also reduce the food insecurity by reducing losses and increasing the range of food products and making food safe to eat. Small-scale agro-processing is particularly an important tool for poverty eradication as it builds on the assets of poor people's indigenous knowledge and skills and local natural resources. Our export products, which are primarily agricultural, develop in size, number, and capacity through technology transfer and assimilation. The immediate areas identified for agro-processing are described below as research areas.

### **Research Area 1.1 *Food Processing Technology***

The food processing industry includes 9 industrial groups consisting of 200 factories (26%) with a total paid-up capital of Birr 2.5 billion (44%) and 19,000 employees (20%) of the total share of the manufacturing sector. Comprising only 18% of the total number of food factories, the public food factories dominate the sub-sector with 83% of the total paid-up capital, 76% of the GDP, and 71% of the employment. Foreign capital in the sub-sector, on the other hand, constitutes only 5.3%. Product lines include frozen, chilled, and canned meats; pasteurized milk, butter, and cheese; canned and fresh fruits and vegetable products; crude and refined edible oil; flour and bakery products, including spaghetti and macaroni; animal feeds; and sugar and sugar confectioner. The technology used tends to be largely old, with capacity utilization in the sub-sector averaging 58%.

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Food processing is one of the most important activities among the potential sectors for rapid growth. However, this sector has not been fully exploited and promoted in the country. The productivity is low despite the huge number of food products. The production remains among the lowest in the world even by African standard. Hence, supporting food processing with the required technologies and research is essential to tap the potential to satisfy the nutritional deficiencies of the population, and meet import substitution and export promotion targets.

### **Research Area 1.2 *Agriculture***

Ethiopia's economy is mainly agricultural, with more than 80% of the country's population employed in this sector, which represents 45 % of the GDP. Building on the impressive gains of the preceding decade, Ethiopia's Five-Year Growth and Transformation Plan (GTP) has set ambitious targets for the agriculture sector for the period between 2011 and 2015. The Plan's objectives focus on enhancing productivity and production of smallholder farmers and pastoralists, strengthening market systems, improving the participation and engagement of the private sector, expanding the amount of land under irrigation, and reducing the number of chronically food-insecure households. The natural resources base (land, water, and biodiversity) is under intense pressure from population growth and erosion, inducing traditional farming and management practices. The livelihoods of farming communities face severe constraints related to intensive cultivation, overgrazing and deforestation, soil erosion and soil fertility decline, water scarcity, livestock feed, and fuel wood demand.

The importance of agricultural research and its impact on development in Ethiopia can hardly be over-emphasized. AAU should contribute its share by developing and implementing a thematic research in agriculture targeted towards sustainable intensification of production that can ensure food security and bring about sustainable development. The majority of the farmers practice mixed

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farming - they grow crops and keep livestock. Crop yields remain chronically low. There is a need to test and demonstrate a variety of productivity enhancing technologies in both the crop and livestock sectors. The overall efficiency, resilience, adaptive capacity and mitigation potential of the production systems can be enhanced by improving its various components. Some of the key ones are highlighted below.

#### **Research Area 1.3 *Leather, Textile, and Garment Products***

Ethiopia has a comparative advantage in producing leather and leather products given the abundance of its livestock resources. The leather industry is one of the major contributors of export earnings. The Ethiopian highland sheepskin, which is estimated to comprise about 70 percent of the total sheepskin production, has an international reputation for its unique natural property of thickness, fineness, flexibility, strength, and compactness of texture. It is suitable for the production of high quality leather dress gowns, sport gloves, and garments, and it is in great demand in the world market. Goatskin, which is characterized by thick, highly flexible, and clean inner surfaces, is also in high demand for the production of fashion leathers. In addition, hides and skin are major export commodities ranking second to coffee and contributing about 14 – 16 percent of the total foreign earnings. Technology capability building and research activities in this sub-section will, therefore, focus on boosting the production and productivity of the livestock resource base; enhancing value addition, and penetrating the international market in exporting leather and leather products.

From the strategic point of view and in light of its contribution to the GDP, employment, and the national economy as a whole, the textile and garment industry can be considered as one of the basic and strategic sectors. The enormous potential for production of cotton, together with the existence of abundant labor force, places the sector as one of the key industrial sectors for

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Ethiopia's economic development. Expansion of investment, with the emphasis on technology accumulation for productivity improvement and product diversity, will, therefore, be given due attention. Moreover, the application of industrial enzymes to replace imported chemicals for leather and textile processing will be one of our research priorities.

### **Research Area 1.4 *Sugar Technology***

Sugar processing; grain mill and bakery products industry; and meat, vegetable and fruit processing industries are the largest food industries, in that order. The sugar industry alone generates over 47% of the GVP and 35% of the employment of the whole food-processing sub-sector.

The potential for sugar production in Ethiopia is high despite the fact that it will still have to continue importing it. The current investment activities by the government and foreign direct investment are encouraging, and they are believed to reverse the trade in the sugar industry. Local production of sugar also provides useful by-products that can be used in a number of ways in addition to satisfying local demand and generating wealth. Priority will, therefore, be given to improving productivity of the industry starting from sugar-cane production. Research will be carried out on the use of cane tops and other organic residues as livestock feed and source of material for land management and energy. Efforts will also be made to master the imported sugar technologies and to identify potentials for local adaptation and improving marketability of the products with due emphasis to competitiveness and return of investment for such ventures. Therefore, the Sugar Technology Program will also be designed to address the issue of co-product utilization by transfer and development of technologies appropriate to the local conditions.

### **Research Area 1.5 *Biotechnology***

Biotechnology is emerging as an important economic engine, bringing about new opportunities with the potential of solving problems in agricultural, industrial, environmental and health sectors. It is the single most powerful recent development that will fuel the economy and increase the competitiveness and profitability of various industries and economic sectors.

Biotechnology is the use of living things (plants, animals or microbial) or their parts thereof (such as enzymes and other metabolites) to make or modify products. In line with this, Ethiopia is endowed with varied geo-climatic zones that harbor a wealth of faunal, floral and microbial diversity. Like the many river basins of the country, the macrobiotic potential of Ethiopia offers it with a comparative advantage over many other countries. The key to unleash this untapped potential is biotechnology.

Despite the concern by some skeptics about the safety of biotechnological products such as genetically modified organisms (GMOs), biotechnology is by far safer as compared to other agricultural production-boosting inputs such as synthetic fertilizers, herbicides, feed additives, etc. The proper application of biotechnology offers sustainable solutions in support of almost all aspects of the nation's development agenda.

In Ethiopia, conventional research approaches have tried to address the major research and development challenges. However, these approaches cannot achieve the desired level of improvement in agricultural, industrial, environmental and health sectors unless they are supported by modern biotechnological tools. Hence, four core research agenda, viz. agricultural biotechnology, industrial biotechnology, health biotechnology, and environmental biotechnology have been identified for intensive intervention. In

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agricultural biotechnology the main focus is to increase the productivity and quality of food crops and livestock, export and industrial raw materials via developing stress tolerant and climate resilient crops and livestock. The target for industrial biotechnology is to identify and introduce enzymes and microorganisms that can facilitate the industrial production system by rendering it more efficient, low-cost, and environmentally friendly. Environmental biotechnology explores and develops efficient technologies for biological waste treatment processes through bioremediation and avoiding environmental deterioration; it also makes future industrial processes more efficient and less toxic. The health biotechnology research component aims at developing cheap, rapid, and reliable diagnostic tools for human and animal diseases, biotech drugs, vaccines, and therapeutics. Therefore, biotechnology research in AAU will be geared towards adding value to a host of products and servicing derived from biological resources. Its benefits are expected to improve public health, boost the productivity of agriculture, enhance environmental sustainability, and help generate agricultural and industrial value chains, thereby helping to build a bio-economy.

## **RESEARCH PRIORITY 2. THE ENVIRONMENT, NATURAL RESOURCES, AND BIODIVERSITY**

The earth's natural resources have long been put into pressures from multiple sources of anthropogenic impacts. Notably, land use/ land cover change, socio-economic development, ever increasing level of urbanization and industrialization, climate change, and biotic exchanges (e.g. invasive species) were the major drivers of environmental degradation. These human enterprises, directly and indirectly, work synergistically and consequently affect the functioning and properties of biological and ecological systems. The consequences of

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environmental degradation and pollution are not evenly distributed across socio-economic and geographical scales. For instance, developing countries, such as Ethiopia, depend directly on natural resources to support their livelihoods. With increasing human populations, the need for food, fiber, and other vital life-supporting resources will increase and encourage faster rates of land cover change, cultivation of marginal lands, and so on. Similarly, due to the drive for socio-economic development and industrialization, our demands for natural resources have increased over time. There have been massive levels of extraction of natural resources for industrial production and feeding the growing urban population in developing countries such as Ethiopia, which have had tremendous effect on the functioning of natural and biological systems. Environmental degradation is one of the serious challenges for Ethiopia due to its topography and socio-economic problems. Nearly 50% of the geographical area of the country is mountainous and supports above 70% of the population. Nevertheless, the deterioration of the biodiversity on these highlands and the ecosystem services has resulted in the grave consequences of repeated famine and starvation for millions of people in the country. In the same token, lowlands, which have long been known for sparse settlement and ecological resilience, are now becoming very sensitive and degradation (desertification, biotic homogenization) is taking place at alarming rates. The causes for land resource degradation, both in the highlands and lowlands, have become much more complicated due to recent climatic changes.

### **Research Area 2.1 *Climate Change and Natural Resource Management***

Climate change is an added problem to the already over-stretched and often strained human-environment relationships in Ethiopia. Shifting weather patterns threaten food production through increased unpredictability of precipitation,

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catastrophic flooding, and a warming atmosphere which result in emergent pests and diseases for crops and livestock. This research area may focus on issues such as how land use/ land cover change and climate change work in synergy and affect the coupled human-environment systems, understanding the impact of climate change on biodiversity in protected areas and beyond, provision of ecosystem services, and global environmental change. Moreover, a number of sub-research areas such as local adaptation strategies to climate change (mechanisms of building resilience to climate change), mitigation (directions towards low carbon societies), reducing emissions from deforestation and forest degradation, and development of finance models for the green economy can also be considered. Similarly, it may also include attempts to develop options for Ethiopian domestic climate policies at regional and federal levels, international carbon trade, approaches for reducing emissions from deforestation and forest degradation, and climate adaptation policies.

Furthermore, the rapid urbanization in Ethiopia and the resultant environmental problems are raising general concerns about the sustainability of urban development. The widespread environmental problems in urban areas of Ethiopia, as in many towns of developing countries, have grave consequences on the health and life of the society. Environmental problems become particularly serious where there is a rapid growth of population with corresponding expansion of urban settlements with little or no consideration for their impact upon the environment. Lack of proper land use planning, absence of sufficient and reliable environmental infrastructures and services, loss of natural resources, pollution problems, and natural and man-made hazards in urban areas of Ethiopia have challenged sustainable development. Environmental planning implies the optimal utilization of the earth's resources, both renewable and non-renewable, for development activities and also seeks to improve and protect environmental quality for residents both through controlling the generation of pollution and through segregating activities that are environmentally incompatible. Environmental management involves enhancing socio-economic development of the society, on the one hand, and maintenance of environmental quality, on the

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other. Thus, it entails the rational adjustment of human beings with nature involving a judicious exploitation and utilization of natural resources without disturbing the ecological balance and ecosystem equilibrium.

## **Research Area 2.2 *Integrated Waste Management***

This theme looks at the full range of investigating efficient and integrated waste management approaches and policy challenges related to hazardous and non-hazardous waste, as well as issues related to contaminated sites. Wastes are generated from households, institutions, industries, and agricultural fields in gaseous, liquid, and solid phases. Waste management is concerned with collecting, transporting, processing or disposing, managing, and monitoring waste materials. Thus, the thematic topic includes waste management systems that would reduce waste generation, conversion of waste into valuable resources/products, efficient collection and transportation routes of wastes, and appropriate management technologies. This research area focuses on:

- efficient means of waste collection and transportation, optimum collection route, and design and selection of appropriate collection and transportation equipment and vehicles;
- research that converts wastes into valuable resources/products such as reusable water and energy; and
- waste management policy, regulation, enforcement, and incentive mechanisms for sustainable management of wastes.

## **Research Area 2.3 *Disaster Management***

Natural disasters such as earthquakes, droughts, and landslides can have devastating effects on human populations and economies. Studies show that these hazards are on the rise, likely due to climate change in many cases. With increasing numbers of people living in the emerging cities of Ethiopia and other

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vulnerable areas, it is more important than ever to advance our understanding of natural disasters and the ways in which our people can respond to them. This sub-theme strives to deepen Ethiopia's and East Africa's understanding of a range of hazards, from droughts to earthquakes to landslides. This sub-theme also focuses on the development of a disaster risk management system to provide assistance to prepare for and recover from natural or man-made disasters that can result in great human and economic losses. Potential issues under this research sub-theme include:

- studies regarding landslides and the elaboration of standard monitoring manuals;
- geo-hazard mapping, risk profiling and mitigation for sustainable livelihood, and sustainable infrastructure;
- geo-hazard management for the transportation sector;
- earthquake emergency reconstruction – risk assessment, engineering re-design, and construction supervision;
- evaluation of the Optimal Resilience for Vulnerable Infrastructure Networks;
- hazard vulnerability studies, land-use planning, and enforcement of building codes for disaster mitigation;
- public awareness program for disaster prevention;
- safety in construction practices;
- flood risk management component - Rural Development Program; and Development of drought hazard maps.

## **Research Area 2.4 *Environmental Pollution***

This area focuses on the assessment of the deterioration of environmental quality and its impacts on the ecosystem in general and on human health in particular. Environmental pollution can be natural (e.g. high fluoride concentration in waters), but it mainly comes from human activity. The discharge of substances into water, land, and the atmosphere can have detrimental effects on the Earth's ecological balance. Other environmental problems are manifested in the form of visual pollution (change of landscape due to excavation and dumping of wastes), sound pollution, and economic as well as social problems. Pollutants cause primary damage and can also have protracted impacts. This requires a thorough understanding of environmental pollution and its impacts on sustainability of resource use and ecological disturbances. Analyzing the relationships between geo-environment and health and the implementation of integrated waste management schemes are of paramount significance in this regard.

Environmental pollution due to emissions and waste disposal is also becoming a common health threat. Water polluted by suspended matter, toxic substances, organic and inorganic compounds emanating from domestic, agricultural, and industrial sources is one of the major causes of health hazards, especially around major cities and large-scale farms. Air pollution by greenhouse gases and suspended particulate matters is increasing the risk of respiratory diseases. Soils are degraded by erosion, the increase in salinity due to improper irrigation techniques, and the application of fertilizers, herbicides and pesticides. A critical understanding of the consequences of pollution on health is fundamental to devising mitigation methods. Integrated waste management is one important area to be addressed, not only to reduce health risks, but also to derive usable resources from wastes.

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Another important focus under this area is the linkage between geo-environment and health. Past and present research shows a linkage between health and the geological setup of a region where humans and other organisms live. Such manifestations are also common in different geographic areas of Ethiopia (e.g. dental and skeletal fluorosis in the Ethiopian Rift Valley, Iodine Deficiency, and others). Establishing the links - wherever there is one - between local geology and the type of disease prevalent in different parts of Ethiopia is important in order to take remedial measures. One example is devising techniques of defluoridation of water in the rift valley by using closely available materials in order to avoid water-related ailments. Such research will address this issue and can be conducted by researchers from the fields of Geology, Geochemistry, Public Health, Medicine and other relevant disciplines. The research results will be valuable inputs to policy makers and public health practitioners to plan site-specific public health measures to curb the health problem in each part of the country.

### Research Area 2.5 *Biodiversity*

The complex geological and physiographic characteristics provide Ethiopia with a wide range of biological resources. Altitudes range from 4500 meters above sea level to 100m below sea level and provide habitats for various flora and fauna in the country. The country has an estimated 6500 to 7000 higher forms of plant species. Moreover, the altitudinal zones within these ranges create complex agro-climatic systems and ecological zones. Thus, the country was considered as one of the 12 Vavilov centers for crop genetic diversity. However, due to increasing human population and millennia of cultivation, the biological wealth of the country has exhausted over time. The main threats for biodiversity loss in Ethiopia may include *inter alia*, land use/ land cover change, habitat destruction and fragmentation, increase in the number and distribution of invasive species, and climate change.

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The country's recent effort for socio-economic development depends much on the sustainable use of the natural resources, especially biological resources. Such attempts should always consider the involvement of local communities in the management and conservation of biodiversity. A better understanding of how the local ecological knowledge can be tapped to manage biotic resources, on the one hand, and the challenges of meeting local livelihoods and providing alternative livelihood options, on the other, may help to win support for conventional biodiversity conservation and balance the local aspirations for development. This research area may also include issues related to rehabilitations of degraded ecosystems and mechanisms to enhance ecosystems provisioning and regulatory services. In light of these, it could help in rehabilitating the degraded lands and restoring the proper functioning of the ecosystem.

## **RESEARCH PRIORITY 3. WATER RESOURCE MANAGEMENT, POLICY, AND SOCIO-ECONOMICS**

### **Research Area 3.1 *Water Science***

Hydrological modeling to assess water distribution in time and space as related to tropical areas is of remarkable significance in the water area. The main focuses under this area include:

- understanding, forecasting, and mapping rainfall variability in Ethiopia;
- rainfall and runoff generation processes and dynamics in different hydrologic regimes;
- runoff and hydrology of watersheds, catchments, and river basins;
- climate change impacts on rainfall and river hydrology;
- surface water - groundwater interaction; and
- How much water Ethiopia has in ungaged catchment.

### **Research Area 3.2 *Water Resource Engineering and Management***

Water resources management includes planning, developing, and managing the optimum use of water resources. Water resource management and planning has to consider all the competing demands for water and seeks to allocate water on an optimal/equitable basis to satisfy all uses and demands. Successful management of any resources requires accurate knowledge of the resource available, the uses to which it may be put, the competing demands for the resource, measures and processes to evaluate the significance and worth of competing demands and mechanisms to translate policy decisions into actions on the ground. Sustainable water resources development and management is dependent on the capacity to generate new knowledge and/or develop new applications based on existing knowledge through research. It is necessary to bring together multiple disciplines to understand and help resolve problems of water quantity and quality. Research on quantitative analysis and in particular on application of analytical models and optimization tools to support and improve water resources planning and management decisions are required. A significant portion of the water resources of the country crosses the national boundary. Research on water allocation and utilization of trans-boundary rivers, such as the Blue Nile Basin, is important. Ethiopia's national development interest has to be studied in view of fostering regional cooperation and efficient use of trans-boundary waters.

Climate change will exacerbate the severity and impact of hydrological variability, droughts, and floods in Ethiopia. Ethiopia has been identified as one of the most vulnerable African countries to the impacts of climate change. With the growing uncertainties of global climate change and the long-term impacts of management actions, the decision-making will be even more difficult. It is likely that ongoing climate change will lead to situations that have not been encountered. As a result,

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new management strategies will have to be implemented in order to avoid setbacks in the allocation of water resources. Climate change and variability studies to assess the spatial-temporal variability of water resources and to understand the effect of climate change on water resources is needed. Moreover, studies to develop flood and drought forecasting models for some of the basins in Ethiopia in the context of climate change should be undertaken.

### **Research Area 3.3 *Water Supply and Sanitation***

Provision of potable water in sufficient quantity and proper disposal of wastewater are key development agendas both at urban and rural settings though the scale and approach can differ. Researches that enhance the provision of efficient service in the sector are fundamental as any development should be based on a healthy population living in a healthy environment. Research on development of appropriate water sources for water supply, development of design criteria and efficient management of wastewater and solid waste - in general sustainable water supply and sanitation - is fundamental to the success of the national GTP.

Thus integrated research that encompasses basic research; applied research; and the socio-economic, policy, and institutional setup of the water supply and sanitation sector is necessary.

### **Research Area 3.4 *Water Policy, Governance, and Socio-economics***

This area focuses on how to manage community modern irrigation farm-water distribution, what to plant, where to sell, and how to manage dry-period river flow in rivers among competitive uses (reducing conflict in pastoral areas / water scarce areas). This area is critically important for policy makers and mainly:

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- investigates the performance and challenges of water institutions in Ethiopia;
- analyzes policy gaps in water resource management;
- analyzes challenges related to trans-boundary river development; and
- seeks an integrated river basin development and management.

### **Research Area 3.5 *Irrigation and Drainage Systems***

Ethiopia is facing severe and growing challenges in maintaining water quality and meeting the rapidly growing demand for water resources. In addition, water used for irrigation, the largest use of water in most developing countries, will likely have to be diverted increasingly to meet the needs of urban areas and industry whilst remaining a prime engine of agricultural growth. Water logging, salinization, groundwater mining, and water pollution are putting increasing pressure on land and water quality.

New strategies for water development and management are urgently needed to avert severe national, regional, and local water scarcities that could depress agricultural production, cause rationing of water to the household and industrial sectors, damage the environment, and escalate water-related health problems. To minimize the above-mentioned problems research on: irrigation efficiency, salinity and water quality, water logging, and other drainage related issues are important. A large share of water to meet new demands must come from water saved from existing uses through a comprehensive reform of water policy and research work. Research on all of the river basins has been acknowledged to be the appropriate unit of analysis to address these challenges facing water resources management; and modeling at this scale can provide essential information for policy makers in their decisions on allocation of resources.



### **Research Area 3.6 *Hydropower Engineering***

Ethiopia needs to construct big dams to address its huge energy requirements as well as the associated benefits that come with the construction. Big dams serve to meet power generation in addition to controlling floods and providing irrigation possibilities, transport options and fishing.

Nevertheless, there is also a need to undertake research for construction of smaller dams. Small dams are useful as watershed management infrastructure to control soil erosion and stop silt flow. They provide opportunity to have hydropower that is easily managed by average rural dwellers. Such power production needs a very small head and discharge which could be developed over any perennial rivers. It could even be produced from intermittent rivers, as long as the economic and environmental effects are studied. To make sure that a dam serves the desired life span properly, a number of measures, like upstream water shade management, use of artificial means (dredging) or utilization of natural flushing and sluicing have to be undertaken. Nevertheless, the life span of dams may be reduced because of sedimentation. Studying the sediment carrying character of rivers along with appropriate bypassing methods would at least make dams serve their design life. Thus, such research will offer possibility to improve the life time of dams by studying the sediment concentration and monitoring the extent of sedimentation.

### **Research Area 3.7 *Dam Engineering***

Despite being bestowed with abundant water resources and having huge irrigation and hydropower potential, Ethiopia is still dependent on subsistence rain-fed agriculture and has the lowest per capita electric energy consumption in the world. This is further compounded by the extreme hydrologic variability of

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the nation's water resources; due to the absence of adequate water storage facilities, the nation has suffered from recurrent droughts. In recent years, major water storage infrastructure development works (dam construction) have been undertaken in the country to exploit the huge untapped resources for rapid socio-economic development and to mitigate the effects of hydrologic variability. To assist with this national development endeavor Addis Ababa University, plans to conduct research on design and construction of new dams and redevelop existing ones. The University has given particular attention to establishing physical modeling laboratory facilities that will be used to optimize dams and appurtenant structure designs (spillways, dam outlets, energy dissipaters) with due consideration to safety, economy, and impacts on the natural environment (physical modeling is currently done outside Ethiopia), and introducing complementary numerical modeling systems that will be used to solve complex dam hydraulics design problems. The major research activities will include physical model-testing and numerical modeling of Ethiopia's existing and planned major dams; developing and implementing advanced design methods for static and dynamic analysis of embankment and concrete dams; developing dam safety assessment methods; and developing damage assessment and repair methods; and developing dam failure analysis method

### **Research Area 3.8 *Groundwater Resource Assessment, Utilization and Management***

Ethiopia is believed to have a huge reserve of groundwater. This resource is under-utilized. There is no quantitative study of the actual potential in different parts of the country. Moreover, using groundwater for irrigation is becoming common and attractive worldwide. However, it needs proper management as it can be depleted in a short time. Research in this will investigate the different catchments and the corresponding groundwater resources and propose the best

way of managing this precious resource. This will have a big impact on increasing agricultural productivity and reducing rural poverty within a short period of time.

## **RESEARCH PRIORITY 4. MINERALS AND ENERGY**

Economic prosperity and societal well-being require a safe and reliable supply of energy and mineral resources. Currently, global production of most non-renewable energy and mineral resources is at or near all-time historic highs. Non-renewable resource/energy development and use increasingly have profound environmental and social implications. Increased efficiency and conservation, substitution of renewable resources, and recycling may help mitigate some impacts of the looming non-renewable energy/resource shortage by reducing demand. Nonetheless, with a growing population, accelerating industrialization, and improving standards of living in many parts of the world, global demand for most energy and mineral resources is at an all-time high and will inevitably increase in the near future.

Ethiopia is believed to be endowed with enormous energy resource potential, but the use of alternative energy sources such as hydropower, geothermal, solar, wind and bio-fuel energy is limited largely due to the inaccessibility and the lack of economic capacity to acquire technologies to harness these resources. Consequently, it is estimated that about 90% of the energy demand is met by traditional sources such as wood and agricultural residues and cow dung. Access to electric energy is estimated at 18%. The electricity loss in Ethiopia is also estimated to be about 20%, which is much higher than the international average, 12-13%. Most of the loss happens during distribution from the national grid to end users.

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Expansion of electric power generation, transmission and distribution mainly from hydropower and other renewable energy resources and use of bio-fuels and other mineral resources to address the critical shortage of commercial and household fuels is given priority by the government. It is believed that integrated research on the area of minerals and energy can have a remarkable impact to the growth of the nation.

### **Research Area 4.1 *Sustainable Bio-fuel Production and Utilization***

Worldwide demand for fossil fuel is increasing rapidly and, at the same time, known reserves are being depleted. The price of fossil fuels such as petroleum and natural gas is skyrocketing. On the other hand, the increased emission of carbon dioxide and pollutants and the subsequent global warming are causing the climate to change faster than expected.

Bio-diesel production from *Jatropha* is one of the options being considered for partially substituting diesel fuel for transportation in many developing countries of the world. However, several issues, such as food versus energy, energy and environmental benefits, need to be addressed. Bio-diesel from *Jatropha* meets the requirement for consideration in this regard because it is inedible and can be grown in wasteland. In Ethiopia, mechanization of agriculture by using small tractors is necessary to increase agricultural productivity and to overcome the lack of grazing land for the cattle. However, the country is not in a position to supply the diesel fuel required for agricultural mechanization. Decentralized plantation of *Jatropha* and castor in marginal lands, production of biodiesels in small scales, and utilization of biodiesel in tractors, pumps, and generators can be considered to tackle this problem. These different research areas include:

- improvement of biofuel crops;

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- characterization and optimization of biofuel yield (biodiesel, biogas. Producer gas Ethanol);
- development of small-scale biofuel production plants for rural areas;
- biofuel quality control and suitability for internal combustion engines; and
- efficient wood/ producer gas stove development

### **Research Area 4.2 *Solar Energy***

Solar energy is a form of renewable energy which is available abundantly and collected unreservedly. The semi-arid and desert areas in the eastern and the northern-central parts of Ethiopia have the highest radiation intensity of 6.5 to 7.5 kWh/m<sup>2</sup>/day, while the other parts of the land have radiation in the range of 4.5 to 6.0 kWh/m<sup>2</sup>/day.

Many industries in the country use fossil fuel for steam generation processes. Solar energy is a sustainable alternative for large-scale water heating and power generation and it is a step forward to reduce dependency on imported oils. Solar thermal power systems – the parabolic trough concentrators, the solar power towers (central receiver concentrators) and parabolic dish concentrators, and photovoltaic systems can be applied for steam generation. These technologies can be readily hybridized with fossil fuel and can be adapted to utilize solar thermal storage. The technology of hybridization and thermal storage can provide power that can be dispatched, and it can operate during periods when solar energy is not available. Other applications of solar energy include cereal and coffee drying, solar cooking, desalination, solar water pumping, etc.

### Research Area 4.3 *Wind Energy*

Ethiopia has an exploitable reserve of 10,000 MW wind energy with an average wind speed of 3.5 – 5.5 m/s, 6 hours/day. Small towns, villages, farms and other scattered lands in remote areas provide ideal situations in which electricity generation from wind is convenient compared to conventional diesel generation or grid connection. Ethiopia has two basic wind speed zones, separated by the rift valley. In the first of these, covering most of the highland plateaus, there are two well-defined maximum wind speed periods, between March and May and between September and November. In the second zone, covering most of the Ogaden and the eastern lowlands, the average wind velocity reaches maximum values between May and August. The last three years have shown a great leap in the development of large capacity wind power generation in the country. A wind farm project with a capacity of 51 MW was inaugurated in Adama/Nazareth on the 1st of December 2012. A second wind farm project with an installed capacity of 120 MW will be completed in Ashegoda, Tigray Regional State, soon. Feasibility studies, including micro-siting of at least 6 other sites in the country, have been completed. About 85% of the Ethiopian population lives in rural areas, of which only 46 % has access to electricity. However, its renewable energy potential by far exceeds the country's energy demand. Wind power alone could contribute a substantial share of the total energy need of the country, if it was exploited and utilized properly.

The technology of small wind turbine systems has been around for some time. These systems are primarily used to supply energy for houses (lighting, TV, refrigerator), offices, hospitals and farms (water delivery, electrical fencing) as well as for rural radio and telephone applications. Small wind turbine systems typically operate in a stand-alone mode, sometimes in parallel with diesel sets or PV systems. For a typical Ethiopian rural house, a 1.5 kW power is sufficient to

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meet the energy demands of the household. To this end, micro-sitting and aerodynamic designing of 1.5 kW small wind turbine blades, designing and manufacturing of permanent magnet generators, designing and manufacturing safety systems, designing and installing of the tower and assembly, and testing of the small wind power generating system seem visible to meet the energy needs of Ethiopian rural households.

#### **Research Area 4.4 *Hydropower Energy***

Ethiopia's path toward development is constrained by its limited range of natural resources. The country's only economically exploitable resource is hydropower, which offers the potential for generation of more than 45,000 MW. Thus, the expansion of electric power generation, the transmission and distribution of power mainly from hydropower and other renewable energy resources, and the use of bio-fuels to address the critical shortage of commercial and household fuels is given priority by the government. To realize this, research on the efficient utilization of the hydropower resources and the development of small-scale hydroelectric power systems is of prime significance.

#### **Research Area 4.5 *Geothermal Energy***

Ethiopia is one of the African countries that possess geothermal potential. Both high and low enthalpy geothermal energy sources exist in the Ethiopian rift valley and the Afar depression. High temperature/enthalpy geothermal reservoirs containing water and/or steam can provide steam to directly drive steam turbines and power plants that generate electricity. Preliminary explorations conducted in the area detected what appeared to be one of the world's largest potential sources of geothermal power. About 700 MW potential exists in geothermal form of the following magnitude: 170 MW in the Lake District; 120 MW in Southern

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Afar; 260 MW in Central Afar; and 150 MW in the Danakil Depression). In the geothermal industry, low temperature ( $\leq 1500^{\circ}\text{C}$ ) geothermal resources are typically used in direct-use applications, such as district heating, greenhouses (especially for the commercial, out-of-season production of vegetables, flowers and fruit), crop drying, fisheries, mineral recovery, and industrial processes. In the Ethiopian context, geothermal energy can be used for power generation, greenhouse applications, crop drying, and industrial processes.

#### **Research Area 4.6 *Energy Efficiency and Clean Development Mechanism***

CDM (Clean Development Mechanism) does not improve the energy situation directly but it can be a good incentive to attract private investors now that the  $\text{CO}_2$  market is expanding all over the world and the price of  $\text{CO}_2$  is increasing. However, since hydropower, which does not emit  $\text{CO}_2$ , is the main energy resource in Ethiopia, CER (Certified Emission Reduction) is relatively low compared to the countries where fossil electric power generation is the mainstream power source. On the other hand, Ethiopian is embarking on diversifying the energy sector. Thus, this research area mainly focuses on improving energy efficiency and devising clean development mechanisms.

#### **Research Area 4.7 *Mineral Resources***

Ethiopia is endowed with a variety of metallic and non-metallic mineral resources. Recent trends show that a number of companies are investing in the sector in different parts of the country. Data from the export market show that the export from the mineral industry (especially gold and precious stones like opal) is increasing. The various inputs to the construction industry (mainly cement and other construction materials) are becoming important as inputs and catalysts to



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the development of the country and to the ideal sector in generating employment. This trend brought a relative increase in the contribution of the mineral industry to the GDP of Ethiopia. However, because of its recent history of lack of relatively detailed geo-scientific data and poor management, the benefit the country gets is not on a par with its potential. Moreover, other problems peculiar to the sector (smuggling, inefficiency in mining and processing, lack of training to traditional miners, environmental degradation from mineral resource development, etc.) are becoming serious threats to the mineral development sector. The research will address the broad themes of mineral resource potential, formation, localization, extraction, management, and training of professionals and non-professionals working in the sector and others. This will maximize the data base on mineral resources and optimize the efficiency of the mineral development sector.

## **RESEARCH PRIORITY 5. TRANSPORT TECHNOLOGIES AND THE PLANNING AND MANAGEMENT OF INFRASTRUCTURE ENGINEERING**

The nation's infrastructure is the physical framework that supports and sustains virtually all domestic economic activity; it is essential to maintain international competitiveness as well. In its broadest definition, 'infrastructure' includes all types of public facilities such as highways, roads, and bridges; water resource projects and water supply and treatment systems; sewer systems and wastewater treatment plants; locks, dams, and waterways; ports; airports; railroads and mass transit facilities; public buildings; and resource recovery facilities. To meet the immediate concerns, infrastructure research and development (R&D) work on construction technologies and materials for transportation and water-related infrastructure components, commonly known as 'public works', is crucial. Thus, this research priority focuses on public buildings, mass transit systems, railroads,

airports, air traffic control systems, and transport technologies as significant amounts of the Federal budget are allocated to them.

### **Research Area 5.1 *Urban Planning and Design***

Research on urban planning and design is a broad area focusing on the proper utilization and socio-economic and political aspects of space while ensuring sustainability. The research areas in urban planning and design will include: impact assessment of urban plans and projects; analysis of urban structure and form; urban analysis; identification of spatial problems and potentials; urban land-use assessments and identifications of challenges; urban theories and growth models; sustainability; urban forms and growth; urban history and theory; forecast of future needs; strengths and weaknesses of urban projects; urban economics and urban competitiveness; implementation and governance; politics and urban policies; urban poverty; equity and planning; urban planning processes and systems: planners, politicians and people, Urban Conflicts, Urban Projects and Urban Synergies, Urban planning/design and financing; stakeholders in urban development: models of participation, partnerships, citizen rights; urban morphology: qualities and problems; and urban management.

### **Research Area 5.2 *Civil Infrastructure Monitoring, Assessment, and Maintenance Systems***

With the current construction boom, several important civil infrastructures, such as buildings, highway bridges, railway bridges, dams, and so on, are being put in place in Ethiopia. These structures are valuable assets of the nation and are intended to serve the society for a longer period of time. To ensure long life for these structures, a proper way of maintenance and consolidation scheme should

be adopted. However, in the process of decision making for maintenance and consolidation, it is important to evaluate their existing performance.

Developing such a performance evaluation system is highly valuable for rating the safety level of buildings as well as other civil infrastructures for a proper decision making process during maintenance. This overarching goal can be reached through continuous development and verification processes and requires an integrated knowledge of material science and structural mechanics.

### ***Research Area 5.3 The Role of Geological Investigations in Infrastructure Locations and Design***

The sustainability, reliability, designs and economics of infrastructures is highly influenced by the geological formations and geologic structures of the area. Such interplay is evident in the success and failure of most acclaimed infrastructures in the world. The variability of the geology of Ethiopia and the presence of the Great Rift Valley in our country make the influence of geology on infrastructures and other development activities more pronounced in our country. There is ample evidence to prove that geology played a big role in the success, failure or costly accomplishments of infrastructure development in Ethiopia. Research in this area will address such issues and bring attention to professionals and policy makers on the geologic parameters that control infrastructure development in different parts of Ethiopia.

### ***Research Area 5.4 Construction Materials***

The research is mainly in the area of sustainable construction/structural materials subjected to different environmental conditions and the use of waste materials and novel materials in the construction applications. Waste materials include industrial by-products such as coal fly ash (pulverized fuel ash), baggasse ash,

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ground granulated blast furnace slag, silica fume, sludge, desulphurised waste, recycled brick and concrete, and municipal solid waste incineration bottom ash. This area also includes pavement engineering and the use of waste in the bound layer of pavement, environmental impact of construction materials containing wastes, lime/cement stabilization of contaminated land, behavior of structural elements, and development of new non-cement based (alkali activated) composite materials with large contents of industrial wastes/by-products.

This area also focuses on testing that may consist of studying the archeology; physical, mechanical, and durability properties; and structural behavior of construction materials. These include compressive and flexural strength; load/deflection characteristics; non-destructive testing; chemical attack; prediction mass transport into concrete and its effect on reinforcement corrosion, carbonation, porosity and pore size distribution; capillary water absorption; chemical and plastic shrinkage using experimental techniques and products of hydration using TG or SEM analysis and other elements on durability-related investigations.

### **Research Area 5.5 *Construction Management and Technology***

The construction industry has long been realized as one among the most important enablers for social, economic and political development of a given country. A fast and dramatic development of the construction industry has been witnessed in Ethiopia within the past two decades. However, as compared to the development pace of the industry, modern construction technology and project management systems have not yet equally developed.

The construction industry greatly suffers from lack of clear developmental objectives; inadequate co-ordination and planning; inadequate relevant local construction regulations and standards; deficiencies in technical, managerial,

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financial and entrepreneurial skills; lack of institutional capacity for both consultancy and construction companies; and lack of sufficient guidelines for the administration of construction-related delays, variations, claims and disputes. Also, very old-fashioned standards and methods are adopted for determining labor productivity in cost estimation and scheduling. Moreover, the strategic leadership, operation, and developmental efforts have been carried out in a manner that lacks integration and alignment.

Hence, in order to overcome the challenges that the Ethiopian construction industry is characterized by, research should be carried out in areas such as risk and value management systems; integrated team-working and partnering systems; procurement and contract strategies; whole-life-costing and cost management systems; project performance evaluation and benchmarking systems; health and safety systems; design quality management system; and sustainable construction systems. Then, the outcomes should be disseminated to the relevant stakeholders.

### **Research Area 5.6 *The Planning, Economics, and Policy of Transportation Engineering***

An effective, efficient, and sustainable transport system is the way forward as Ethiopia is experiencing a tremendous increase in the movement of people and goods resulting from the double-digit economic growth over the past decade. Thus, an up-to-date and state-of-the-art transport system is duly necessary to facilitate and ensure the ongoing development. To achieve such a system, universities should do their part in research and development activities to lay out properly planned, executable, and sustainable strategies. Hence, collaborative interdisciplinary research on planning, construction, operation, and management of transport infrastructures; costing, financing, pricing, and evaluation of

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transport projects; accessibility, mobility, and safety of transport systems; environmental and economic externalities of the transport sector; inter-modality, multi-modality, supply chain, and logistics of freight transport; and regional and international integration of transport sectors need to be carried out by the different disciplines within the university. These researches should target all the transport modes and encompass multiple stakeholders.

The outcomes of the studies will have significant impacts on the future development plans and policies of Ethiopia. As transport is a leading driver of development activities, the results of the studies will give guidelines and strategic maps to reach the goals of poverty reduction, economic growth, and higher standards of living. They will contribute in transforming the current chaotic and highly disorganized urban and rural transport system into an organized, environmentally friendly, and sustainable system.

### **Research Area 5.7 *Transport Technologies***

The vehicle design thematic research area is an innovative research focus aimed at applying contemporary technologies to develop sustainable transportation solutions for Ethiopia and Africa. The ultimate goal of this area of research is the development of green transport technologies in Africa, while its mission is to carry out research aimed at the development of cost-effective and environmentally-friendly transportation technologies. The tactical objective, on the other hand, is to build from scratch an electric vehicle, while the strategic objectives are the development of a hybrid public transport vehicle and the establishment of a Centre of Excellence in Transportation Technologies Research. Some of the areas include the development of electric train technology (electric power converters for electric drives, power supply system for electric trains, control and communication systems, the rail system, the car and locomotive) and electric vehicles (batteries, power converters, electric drives, the car).

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## **RESEARCH PRIORITY 6. MATERIALS SCIENCE AND NANO TECHNOLOGY**

Nanoscience is the science that deals with substances in which one dimension is less than 100 nanometre (nm). A nanometer is one billionth of a meter, and spans approximately 10 atomic meters; the diameter of human hair is about 50,000 nm. Nanotechnology is the technology of designing, fabricating, and applying nanosystems. A nanomaterial is a materials system that is synthesized to a nanometer scale. It is correctly said to be a foundation of the materials technology of the 21st century.

Nanomaterials technology is rapidly establishing itself as a key technology with many applications in industries ranging from microelectronics to health care. It provides solutions by creating smaller, cheaper, lighter and faster devices that can do more complex tasks, use fewer raw materials, and consume less energy. As nanoscale science and technology fields are expanding rapidly with the worldwide need for nanotechnology, the number of workers in the area is expected to reach 2 million by 2015.

Developing expertise in this subject is a priority area as it is utilized in areas ranging from designing medical diagnostic devices to building better batteries, from creating cosmetics to enhancing energy efficient windows, from auto and plane manufacturing to researching the nature of matter itself. Research into new filters and desalination devices incorporating nanotechnology is currently underway, and this could help provide clean, safe, and inexpensive drinking water in areas where the supply is scarce and the water is often contaminated. Nanoscience is attracting more public funding (40 billion euros worldwide in 2008) than any other area of technology. Nanomaterials technology is a highly

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interdisciplinary subject appropriate to a wide range of science and industrial sectors and is instrumental in the development of many new industrial and manufacturing processes. Each nanotechnology project requires the contribution of a team of people, which may include engineers, life scientists, physicists, chemists, and information technology experts.

Nanotechnology industry is defined as the group of firms focused on bringing nanotechnology processes, materials, tools and devices into the market. The high tech nano start-ups also play a critical role in keeping the economy dynamic and generating employment and bringing new technologies to market. Nanomaterials are also useful in Small-Scale Industries (SSI) like garments, small electronic gadgets, rubber, carbon products, mineral extraction, etc. Small-scale nanoelectronics industries also include solar cells, nano-sensor components, nano-LEDs, conducting polymers, nano-batteries, fuel cells, etc., which can utilize nanomaterials and nanofabrication techniques for better yield and device performance.

#### **Research Area 6.1 *Graphene Nano-structures***

Graphene – a sheet of carbon atoms – is a new wonder material for the nanotechnology. It won a Nobel Prize in Physics in the year 2010. It has a potentially high applicability in the futuristic nanoelectronics, chemical engineering, and other manufacturing technologies. Contemporary trends in advanced countries indicate that Graphene and its nano-devices are exploited in the nanotechnological advancements and innovations. Atomistic simulational science is nowadays smart enough to predict and verify imperative characteristics of nanomaterials, especially the atomically thin Graphene and its nanostructures. Recent research efforts are on ab-initio nanostructures' simulations for exploring electronic structures and transport properties of Graphene and its nano-devices. On a case-by-case basis, the research priority should be on synthesis,



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characterization, and computational modeling of novel physical properties of several key Graphene nanostructures like G-Antidots (0D), Graphene Nanoribbons (1D), Doped Graphene lamellae (2D), and polymer-Graphene ribbon nanocomposites (3D). This sub-priority scheme can be used to perform novel nanoelectronics' device fabrication simulational study.

### **Research Area 6.2 *Nanomaterials for Solar Energy Conversion***

In global terms, the world currently consumes (or generates with large inefficiency and losses) about 14 terawatts of electrical power. By 2100, the world will need to generate over 30 terawatts. Solar energy conversion is a viable option to meet the growing energy demands. Nanomaterials can bring about improvements in solar energy conversion and storage; better energy-efficient lighting; and stronger and lighter materials that will improve energy transportation efficiency and use of low-energy chemical pathways to break down toxic substances for remediation and restoration. Semiconductor Nanoparticles are some of the most efficient light harvesting materials. The use of nanomaterials is found to increase the efficiency of Dye sensitized solar cells and inorganic II-VI compound solar cells. ZnO nanoparticles increase the solar power conversion by up to 5%. At the same time, nanocrystalline thin films of CdS and CdTe semiconductors exhibit the higher photo-charge generation factors. Thus, nonmaterials scale down the size and cost of today's solar cell technology, which is very relevant in the context of developing nations.

### **Research Area 6.3 *Nanomaterials for Futuristic IT***

The technologies in IT area are at the forefront of the commercialization of nanotechnology's. The ongoing shrinkage in 'conventional' electronic devices will inevitably reach fundamental limits due to quantum effects such as 'tunneling,' in which electrons jump out of their prescribed circuit path and create atomic-scale

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interference between devices. This creates the demand for new methods of manufacturing, nanotechnology being one of them. Nanotechnology has the potential for smaller and faster computers with larger memories than current processes of making transistors and other components permit. Nanotechnology is nowadays used in Giga tera bytes storage hard drives. Graphene and Carbon nanotubes are also likely to be used in IT. These two dimensional crystals can be either conducting or semiconducting and have the potential for memory and storage as well. The nanotechnology-based IT industry is heralding a new world order and its capital is estimated to grow to over \$1 trillion by 2015. Switchable nanostructures can be incorporated into nanoprocessors, random access memory, and data storage media.

#### **Research Area 6.4 *Nanomaterials in Concrete Industry***

Concrete is the most commonly used material for construction and its design consumes almost the whole cement production in the world. The use of large quantities of cement produces increasing CO<sub>2</sub> emissions, and as a consequence increases the greenhouse effect. Nanomaterials like silica fines are used to reduce the cement content in concrete mixes. At the same time, the blending of nanographite and graphene in cements is found to improve its reinforcement mechanics. Thus, nanomaterials can bring about strength, durability, low cost, as well as lesser environmental pollution in cement production.

#### **Research Area 6.5 *Nanomaterials in Environmental Technology***

Nanotechnology is expected to play a pivotal role over the next 50 years in providing sufficient energy for a growing world and in protecting the environment in which we live. Energy companies involved in energy generation have already

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started using nanotechnology in their power plant design, nuclear power generation, and oil wells. Nanotechnology can improve production from old wells by improving lifting percent through harder and more versatile drilling; by improving platform and pipe line materials (stronger, lighter, more flexible and more impervious to heat and corrosion); by using better catalysts for processing lower quality crude; by using stronger impeller blades for oil pumping motors; and by using finer and more selective filters to minimize contamination and improve usable yields. Fuel cells, carbon nanotubes for energy storage, and hydrogen storage in carbon nanotubes are based on nanotechnology. Nano-scale catalysts can save energy and increase productivity in industries when they are used in rechargeable batteries.

### **Research Area 6.6 *Nanomaterials in Biotechnology and Pharmacy***

A main focus of biotechnology is to discover the cause of genetic diseases, to develop a cure for them, and to develop an effective delivery device. Recent developments and advances on nanomaterials have fetched a new insight into the area of biotechnology. The detection and formulation of various chemical and biological agents using nanostructured materials is a hot topic of contemporary research. Due to the comparable size of biomolecules such as antibodies, peptides, and DNA with nanoparticles, the understanding of the self assembly of these materials and the cause and cure of the related diseases is relying on the understanding of nanoparticle formation and utilization. Under this sub-priority area, the focus should be on (1) detection of diseases by nanoscale devices, (2) nanofabrication of synthetic protein polymer, and (3) discoveries on nanoscale drug delivery devices.

Nanomaterials technology can be further extended to the nanoscale drug delivery

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systems and devices. In addition to the potential improvements in the diagnostic field, nanotechnology offers advantages that allow a more targeted drug delivery and a more controllable release of a therapeutic compound. The aim of a targeted drug delivery and a controlled release is to better manage drug pharmacokinetics, non-specific toxicity and bio-recognition of systems. Cancer treatment often involves the administration of inhibitors to block over-reaction or over-production of cancer cells. A controlled and precise release of inhibitors is essential in preventing damage or side effects to surrounding or non-targeted cells. The use of nanoscale devices offers direct on-site drug delivery and provides direct release and, thus, increases patient acceptability.

## **RESEARCH PRIORITY 7. INDUSTRIAL PROCESS IMPROVEMENT AND PRODUCT DEVELOPMENT**

### ***Research Area 7.1 Quality and Productivity Improvement***

The research on the quality and productivity improvement of the Ethiopian manufacturing firms will have the following significance:

- Manufacturing firms will be able to devise means and mechanisms to promote the concept of quality and productivity as a competitiveness weapon for their industries.
- Critical factors that influenced the quality and productivity of the Ethiopian manufacturing industries will be clearly distinguished and defined so that they can take appropriate actions to improve.
- The main problem so far has been the lack of a clear and appropriate method to measure and control quality and productivity of a firm. Research conducted in this area will enable firms to continuously follow

up and improve their manufacturing processes by providing them with a methodology.

- Production planning and control system is not well organized. Most manufacturing firms do not have/prepare factory layout, material flow plans, and work plans. Research in this area will address this problem as well.

## **Research Area 7.2 *Industrial Control***

Industrial control deals with modeling, optimization, automation, and control of systems. Modern industries are becoming more complex and automated. Hence, in order to cope with the ever increasing development of the manufacturing technology, understanding (modeling) and optimization of these systems is critical. The development track of a nation is most of the time determined by its manufacturing capability rather than the natural resource it has at hand. It is most important to develop in-house machine manufacturing capability to support the nation's GTP goals since most industrial machines are expensive and high tech. Potential areas for research include:

- Industrial drives and control are the workhorse of every modern industry and the major power-hungry components of a manufacturing plant. These include increasing efficiency of the drive systems and replacing/adapting the drive system controllers.
- Industrial robotics
- Development of manufacturing machines control firmware, which can be done in collaboration with the machine design team at SME.
- Development of autonomous robotic systems: Autonomous Aerial Vehicles (UAV) are used for crop-dusting, surveillance of traffic, and rescue missions. In the military applications, it is used for reconnaissance and target location. UAV development can be undertaken in collaboration

with the Ethiopian Air force since such sensitive issues should be developed in-house.

- Development of industrial process control software: Nowadays, the software component cost of an industry is becoming equivalent to 30% of the plant installation cost.
- Development of traffic control systems

### **Research Area 7.3 *Mechanical Processing Technique-Powder and Bulk Material Handling***

Currently, in Ethiopia, there is a rapid industrial development. We can see food materials such as *teff* flour being produced in mass. Unlike the situation in the past, new pharmaceutical industries which are concerned with powder processing, including producing pellets and tablets, are being established. The mining industry is highly intensifying and powder handling is the main issue there as well. The powder and bulk material processing is done in nearly all industries, from powder coating to food; from nano-powders and pharmaceutical substances to bulk commodities such as cement, coal, and ore; from dry materials such as fly ash solids to damp as filter slurry, loam, and clay. All these materials must be transported, stored, dispensed or handled. The characterization of powders and bulk materials in terms of flow properties plays a major role in the context of product development, customer support, and the handling of complaints. Especially during discharge of powders and bulk solids from silos, feed hoppers, transport containers, etc., serious problems are encountered, e.g. due to flow obstructions, segregation, vibration or irregular flow.

Hence, measurement of different powder properties, such as bulk flow property, physical property of powders, and operational and equipment parameters could lead to the optimization of the processes and the facilitation of storing, handling,

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and transporting bulk powder material of any nature described above. As a result, developing a relationship towards equipment design could be made scientific and reasonable. To cope with the increasing demand of the industry, the need is there to establish a laboratory for powder handling and investigation.

#### ***Research Area 7.4 Design, Manufacturing, and Dissemination of Agricultural Machinery***

The Ethiopian agriculture is currently the major sector supporting higher employment, the majority of export goods, and the lion's share of the GDP. But the sector is not well due to different deficiencies stemming from several sources. Now, there is a tendency for the agricultural output to increase through the efforts made by the stakeholders maximizing the agricultural inputs. Referring specifically to crop production, one can see that due to the distribution of improved seeds, the application of fertilizers, and increased use of the water available for crop production, it has been possible to produce more crops.

But to get a better return, these efforts should have been supplemented with the application of agricultural machinery for different operations so that quantity of work and quality of work on the different agricultural operations can be improved, so that a larger area can be covered, intensive operations can be run, operations can be done in a timely manner, and operations difficult to human or draught animals can be done easily with the best possible quality.

Hence, research, design and manufacturing, adoption, and distribution of agricultural machinery for crop production could help the farmer increase his return from the inputs. This area needs a special emphasis to match the smallholder with power sources so that the farmer can increase productivity and ensure food self-sufficiency.

### **Research Area 7.5 *Electronics and Microelectronics***

The microelectronics engineering stream is established to introduce and develop the flourishing technological ideas and results in the field of electronics engineering and to educate the future electronic and microelectronic engineers, who will be capable of producing new ideas and new scientific results. Under this area, main electronic designs and production theories and practices will be handled. In addition to that, research topics under the following broad categories will be explored. Bio-sensing and neuro-electronics, micro-system technology and sensorics, photonics and optical properties of materials, spin-based electronics and spintronics devices, solid-state electronics and materials at micro and nano scale.

## **RESEARCH PRIORITY 8. INFORMATION AND COMMUNICATION TECHNOLOGIES**

### **Research Area 8.1 *Electronic Communication***

From a general point of view, electronic communication can be defined as an electronic transmission of information that has been encoded digitally (as for storage and processing by computers). It includes several forms of communication such as:

- transmission of numerous forms of data, text, sound, picture, video, etc.;
- interactive communications between multiple parties;
- multiplex forms of communication;
- internet and Intranet communication;
- financial trades where mainly stocks and currencies are traded, etc.

One can say electronic communication is the backbone of many infrastructures that encompass business, educational, and military facilities. It comprises all

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necessary components to enable communication: communication channel (cable or wireless, satellite), service provider facilities (server, communication equipment), security layers, distribution mechanisms (stand-alone or distributed forms of communication), value added service providers (extra services using the platform to provide end-user-focused service), operating system (server side and client side), connectivity devices, end-user transmission/receiving devices, security policy, quality of service (including service policy), and many more. This makes electronic communication not only essential but also sensitive. In the Ethiopian context, the level of electronic communication is on its low-to-mid level of quality and distribution. Many issues can be raised within this premise that necessitate for more research to be done and solutions to be proposed (and implemented). The sensitivity of the data flow (and the data itself) has created a new form of concern on a national and personal level as the age provides with powerful tools to cause significant damage to a nation or community.

### **Research Area 8.2 *Computing***

The IEEE/ACM defines computing as an umbrella term describing any goal-oriented activity requiring, benefiting from, or creating computers. Computing includes:

- designing and building hardware and software systems;
- processing, structuring, and managing various kinds of information;
- doing scientific research on and with computers;
- making computer systems behave intelligently;
- Creating and using communications and entertainment media, etc.

Sub-fields of computing include computer engineering, software engineering, computer science, information systems, and information technology. Each of these disciplines focuses on areas as clearly defined in the document [http://www.acm.org/education/curric\\_vols/CC2005-March06Final.pdf](http://www.acm.org/education/curric_vols/CC2005-March06Final.pdf).

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The performance of all these disciplines corporately satisfies the ultimate goal of computing as each complements the other.

The nation has started a promising path in this regard, envisioning appropriate computerization (or automation) of its services and information interchange. Two major classifications can be viewed in this regard: hardware and software (content). Both components are requisitioned currently in the country as many institutions automate their processes. But Ethiopia can thrive in the content development area, which would significantly reduce cost and even generate income in the future. Neighboring countries like Kenya have proved successful in this regard. Ethiopia can save billions in investment on more local software contents while creating future billionaires. The African market itself expects its professionals in the sector to alleviate its chronic inefficiency, which resulted due to lack of proper information dissemination and effective flow of data.

There are vast areas of research and development expected from these fields including High Performance Computing, Cloud Computing, Mobile Computing, Artificial Intelligence, GIS and Remote Sensing, Data Mining, eLearning, e-Government, Cyber Security, Robotics and Industrial Automation, Smart Grid (Power, Data), Web Technologies, and more.

### **Research Area 8.3 *m-Government System***

Since Ministry of Communication and Information Technology (MCIT) announced “e-Government Strategy and Implementation Plan” in 2011, it is started Ethiopian e-Government to build up. Mobile system based m-Government is the next stage and an advanced version of e-Government, and it is appropriated in Ethiopian communication environment. Issues for m-Government include:

- Analysis of m-Government Environment

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- Benchmark for m-Government in Developing Countries
- Vision and Strategies for Ethiopian m-Government: m-Government model and Frameworks
- Projects and Their Financing for Ethiopian m-Government
- Road Map for Ethiopian m-Government
- Core technologies of m-Government: Service framework & Quality management, Smart infrastructure and Security, Education and Legal Environment

### **Research Area 8.4 *e-Learning Technology***

E-Learning includes all forms of electronically supported learning and teaching, including educational technology. In Ethiopia, the rapid increasing demand of higher education makes e-learning is one of the emerging important technologies. Issues for the evolutionary e-Learning frameworks for Ethiopian universities include.

- Analysis of e-Learning Environment for Higher Education
- Vision and Frameworks of e-Learning for Ethiopian Universities
- Evolutionary Strategies and Projects
- Case Study: e-Learning Planning for AAU
- Road Map
- Core technologies of e-Learning: Lecture Management System (LMS), e-Learning Contents management System (LCMS), e-Learning Contents production, Service and Operation, e-Learning Quality Management, Educational Engineering.

### **Research Area 8.5 *Information Security***

Information security is the practice of defending information from unauthorized access, use, disclosure, disruption, modification, perusal, inspection, recording or destruction. Information security should be assured for not only national security, but also every sensitive task in government, business, and the individual. Issues for the information security include:

- Information Security Governance
- Information Controls (Administrative, Logical, Physical) and Privacy
- Risk management
- Core technologies of Information Security: Digital Signature, Public Key management, Cryptography, Access control, Incidence response plans, Change management, Disaster Recovery, Authenticity, Non-Repudiation

### **Research Area 8.6 *Business Process Modeling and ERP Technology***

Business Process Modeling (BPM) in systems engineering is the activity of representing processes of an enterprise, so that the current process may be analyzed and improved. Also, Enterprise resource planning (ERP) systems integrate internal and external management information across an entire organization—embracing finance/accounting, manufacturing, sales and service, customer relationship management, etc. Normally, ERP is developed based on BPM in order to improve the productivity and competency of organizations. Issues for the BPM and ERP include:

- Vision, Mission, and Strategies of the organization
- Analysis of Environment and Modeling of As-Is and To-Be process

- Design of the ERP system with Breakdown of functional components
- Connectivity to related systems and Knowledge management
- Business cases and Benefit/Cost Analysis
- Customizing and Data Migration

### **Research Area 8.7 *Smart Devices Applications***

Smart device is an electronic device that is cordless, mobile, always connected and is capable of voice and video communication, internet browsing, geolocation and that can operate to some extent autonomously. . Issues for the BPM and ERP include:

- Smart devices market and technical trend analysis
- Design and Development of Smart phone app : Android, or iOS-based
- Platform of Smart devices and convergences of technology
- Bio-medical system with Smart devices
- Educational personal terminals with Smart devices
- Smart services implementation for mobile users

## **RESEARCH PRIORITY 9. TROPICAL AND INFECTIOUS DISEASES OF PUBLIC HEALTH AND/OR ECONOMIC IMPORTANCE**

Tropical and infectious diseases continue to be major causes of human and animal morbidity and mortality, and these diseases are in most cases major causes for economic losses in Ethiopia. Hence, there is a continual need to carry out more focused and multidisciplinary studies to determine the magnitude of these diseases and contribute towards their control/intervention measures.

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These include studies on major vector-borne diseases; endemic, emerging, and re-emerging diseases; HIV and other sexually transmitted diseases; zoonotic diseases; medicinal plants/ethno-medical and ethno-veterinary practices for diseases; the development of drugs, the resistance of pathogens/parasites to drugs and vectors to insecticides; the exposure of humans, animals, water, and soil to pesticides; and climate change and infectious disease preparedness for eventual control and prevention of diseases of public and health as well as socio-economic importance.

#### ***Research Area 9.1 Major Vector-borne Diseases of Public Health and/or Economic Importance***

As in many developing countries of the tropics and subtropics, the majority of the Ethiopian people live in environments that provide suitable conditions for the development of pathogens/parasites and vectors/intermediate hosts. For instance, about 75% of the land area of Ethiopia is vulnerable to malaria infection, with two-thirds of the population at risk of infection. Similarly, vast areas of the country are conducive and risk-prone to various other vector-borne diseases of public health and economic importance. To this effect, multidisciplinary studies need to be conducted on vector-borne diseases along with their vectors/intermediate hosts such as parasitic ones (malaria, schistosomiasis, leishmaniasis, fasciolosis, etc), viral ones (yellow fever, West Nile virus, Rift Valley fever, etc), and bacterial ones (endemic typhus, epidemic typhus, etc.). In addition, the biology, ecology, and control of vectors/intermediate hosts needs to be investigated.

**Research Area 9.2 *Major Endemic, Emerging, and Re-emerging Diseases of Public Health and/or Economic Importance (Non-vector-borne Diseases, Including Water- and Food-borne Ones)***

Non-vector-borne diseases including water-borne and food-borne ones of humans and animals remain to be among the leading causes of morbidity and mortality in Ethiopia. Several epidemiological studies have shown that infections with intestinal parasites and other pathogens are widespread problems in the country due to lack of safe adequate water supply, acceptable personal hygiene, proper human waste disposal, environmental sanitation, and optimal standard of living. Under this sub-theme the following important diseases can be mentioned:

- bacterial infections (cholera, salmonellosis, shigelliosis, listeriosis, tuberculosis, brucellosis, bovine mastitis, etc.);
- fungal infections (candidiasis, aspergilosis, etc.);
- viral infections (hepatitis, rotaviruses, avian influenza); and
- parasitic diseases (hookworm, fasciolosis, toxoplasmosis, giardiasis, amoebiasis, cryptosporidiosis, hydatidosis, etc.).

**Research Area 9.3 *HIV and Other Sexually Transmitted Diseases: Prevention, Treatment, and Psycho-Social Care***

Although prevalence and incidence of HIV infection in Ethiopia seems to stabilize as a result of availability and expansion of HAART, the overall burden of AIDS is still high. The widespread prevalence of STDs is among the important factors that contribute to the sustained burden of HIV/AIDS. Thus, HIV/AIDS and other STD-related investigations should be given priority. Hence, among others, ARV drug resistance, bacterial (gonorrhoea, syphilis, etc.), viral (HPV, herpes, etc.) and

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parasitic (trichomoniasis) STDs are worth investigating. Similarly, Ethiopia is one of the most disproportionately affected countries by the HIV/AIDS epidemic. Data suggest that Ethiopia had an estimated 1,320,000 people living with HIV/AIDS as well as a total of 79, 871 children of age 0-14 living with the virus and 804, 184 AIDS-induced orphans that require care and support from one or another source in the year 2010. One of the most significant consequences of the HIV/AIDS epidemic is its negative effect on the psychosocial and economic wellbeing of people living with the virus and their affected families. Furthermore, there are limited contextually relevant studies related to psychosocial needs and community-based psychosocial care. In addition, the country has acute shortage in trained human resources that can deal with the psychosocial wellbeing of PLWHAS and affected families. Building the human resource capacity is one of the core emphases that the Ministry of Health is currently working on. To address the overwhelming psychosocial problems and human resource demands of the country, a consorted research is required.

#### **Research Area 9.4 Medicinal Plants/Ethno-Medical and Ethno-Veterinary Practices for Control of Diseases of Public Health and/or Economic Importance**

There is a rich tradition of applying traditional medicine, including the use of medicinal plants such as *Endod* in Ethiopia to treat both human and animal ailments as well as control vectors and intermediate hosts. Such practices, however, are not well-documented and evaluated for their better use to control such ailments. Hence, ethno botanical, bioassays, phytochemical isolation, formulation and standardization studies on plants traditionally used against infectious diseases and their vectors/ intermediate hosts in Ethiopia are greatly needed. Medicinal plants could be one possibility in the search for effective remedies against major bacterial and parasitic diseases of humans and animals.



Moreover, plant products may also serve as potential sources of antioxidants, insect repellants, as well as being instruments in the control of vectors/intermediate hosts. Again, studies in these areas are greatly warranted.

***Research Area 9.5 Development of Drugs and Biologicals for Treatment, Diagnosis, Prevention, and Control of Major Diseases***

Drug development involves multi-disciplinary work and, by its nature, is cross-boundary requiring knowledge from chemistry, pharmacy, engineering, biology, and medicine. These aspects are key elements in delivering quality medicinal products to patients. Many elements of drug development impact directly on the quality, safety, efficacy, and cost of the products. Progress in the knowledge of disease etiology and pharmacogenomics will support the development of more efficacious therapies. Similarly, the diagnosis of infectious diseases depends upon highly sensitive and specific test systems, and the control of diseases nowadays can be effectively undertaken by the use of efficacious vaccines. Hence, the development of drugs, diagnostic kits, and vaccines are considered to involve integrated approach to tackle the growing health problems and are, accordingly, important areas of research. Additional studies include pharmaceutical supply systems and health policy; and essential drug use, quality, efficacy, toxicology, and delivery systems.

***Research Area 9.6 Drug Resistance, Insecticide Resistance, and Exposure of Humans, Animals, and the Environment to Pesticides***

Current pathogen/parasite preventions mainly rely on case treatment with drugs, while vector control is practiced by applying conventional synthetic insecticides.

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However, drug and insecticide resistance is a challenge for future effective disease and vector containment efforts. Moreover, pesticides utilized for both agricultural and vector control purposes are harmful to non-target organisms and also pollute the environment. Therefore, it is valuable to carry out timely monitoring, evaluation, and study drug and insecticide resistance mechanisms (molecular and enzymatic) and factors contributing to the development of resistance in pathogens and vectors. Molecular and genetic investigations elicit the frequency of occurrence of resistant alleles. There is also a compelling need to assess the status of exposure of humans, animals, and the environment (water bodies, soil, etc.) to pesticides.

### **Research Area 9.7 *Climate Change and Infectious Diseases Preparedness***

As an economically developing nation, Ethiopia is one of the countries suffering most from infectious diseases. Although most of these infectious diseases are endemic throughout the country, the recent occurrence of repeated pandemics of emerging/re-emerging infectious diseases (avian and swine influenza, SARS, arboviral diseases, Ebola, etc.) suggest that Ethiopia, like any other developing nation, might be experiencing the lion's share of these sufferings. Given the prevalence in Ethiopia of natural and man-made factors such as ecological and environmental disturbances (due to natural disasters and water and land development-related changes) and demographic factors (like diverse and unique life styles of the various ethnic groups including the nomadic way of life among the pastoralists, and high cross-boundary population movements) pertinent to the emergence of new diseases, it is only rational to assume that such newly emerging infectious disease can be common causes of morbidity and mortality in the country. More importantly, climate changes of anthropogenic origins are increasingly having their impact on the occurrence/prevalence of these diseases.

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Unfortunately, but not surprisingly, the country's capability to easily trace and tackle such health threats is rudimentary, if not non-existent.

Infectious Disease Preparedness Capability Building (IDPCB) for combating outbreaks from emerging/re-emerging diseases, roles of host genetics, development of biomarkers which could help for diagnosis and predict treatment outcomes has not been fully achieved. Hence, the need to investigate such diseases and prepare to handle impending outbreaks cannot be overemphasized.

## **RESEARCH PRIORITY 10. HEALTH AND NUTRITION**

Nutritional imbalance and unhealthy nutrition both in humans as well as animals may cause acute and chronic diseases, including heart disease, diabetes, cancers as well as obesity in humans and a number of diseases of intensification in livestock production. To introduce appropriate diets that reduce these risks, multidisciplinary epidemiological research on food security, food safety, nutritional surveillance, and dietary habits of societies is essential. Protection against contamination and infection is important in food processing. National surveys of diet and health status are crucial to inform and complement policy. Changes in food intake and improving nutritional content can improve health.

### **Research Area 10.1 *Diet and Lifestyle***

Alcohol abuse, an unhealthy diet and physical inactivity, and contamination of foods may, over a lifetime, be linked to cancer, hypertension, diabetes, and obesity. The major risk factors for liver cancer are infection with HB and HC viruses and consumption of foods contaminated with aflatoxin. Diets are very complex, and unraveling the effects of diet on cancer and disease risk is of great

public health importance. Modifying dietary choices could prevent many more premature deaths.

### **Research Area 10.2 *Environmental Pollution and Health Problems Associated with Industry, Agriculture, and Transport***

The environment, defined as everything outside the body that enters and interacts with the body, is not contaminant-free. The human body interacts with environmental exposures such as carcinogens (chemical, physical, or viral agent) in the air, water, soil, food, and workplace. Also, alcohol abuse, smoking, or an unhealthy diet may, over time, be linked to cancer, cardiovascular diseases, and metabolic diseases including diabetes and obesity.

There is sufficient evidence for the carcinogenicity of alcoholic beverages in humans, and the International Agency for Research on Cancer has classified alcohol as a Group 1 carcinogen. Heavy alcohol drinkers have an increased risk of cancers of the female breast, mouth, throat, liver, pharynx, larynx, esophagus, stomach, colon, rectum, and ovaries. Drinkers who also smoke may have an even higher risk of oral and throat cancers.

Smoking or tobacco use harms nearly every organ of the body and causes many diseases and more deaths each year. An estimated 90% of all deaths from chronic obstructive lung disease are caused by smoking. Compared with non-smokers, smokers take an increased risk of coronary heart disease, stroke, lung cancer and chronic obstructive lung diseases (such as chronic bronchitis and emphysema). Smoking is the single most common cause of cancer.

Worldwide, cancer is responsible for one in eight deaths. Almost all cancers are caused by environmental factors, and of these, 30–40% of cancers are directly linked to diet. Studies have linked consumption of large quantities of fatty foods,

red meat, preserved meats, salt-preserved foods, and salt to an increased risk of breast cancer, colon cancer, stomach, and pancreatic cancer. At diagnosis, 80-90% of people in developing countries have late-stage, terminal cancer. By 2020, 70% of all cancer-related deaths will occur in developing countries. About 82% of liver cancers occur in developing countries. Worldwide, the major risk factors for liver cancer are infection with HB and HC viruses and consumption of foods contaminated with aflatoxin.

## **RESEARCH PRIORITY 11: NON-COMMUNICABLE DISEASES, MENTAL HEALTH, AND TRAUMA**

A non-communicable disease is a medical condition or disease which, by definition, is non-infectious and non-transmissible among people. NCDs may be chronic diseases of long duration and slow progression, or may result in more rapid death such as some types of sudden stroke. The major NCDs include cardiovascular diseases (heart disease, hypertension, stroke), cancer, asthma, diabetes, chronic kidney disease, osteoporosis, and cataracts.

Given the global population distribution, almost 80% of deaths due to chronic NCDs worldwide now occur in low- and middle-income countries. WHO reports NCDs to be by far the leading causes of mortality in the world, representing over 60% of all deaths. By 2030, deaths due to chronic NCDs are expected to increase to 52 million per year while deaths from diseases are expected to decline.

High blood pressure, raised cholesterol, tobacco use, alcohol consumption, and overweight were identified as the five important risk factors for non-communicable diseases in the top ten leading risks to health. Most NCDs are considered preventable because they are caused by these modifiable risk factors. It has been estimated that if the primary risk factors were eliminated, 80% of the cases of heart disease, stroke, type 2 diabetes, and 40% of cancers could be

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prevented. Interventions targeting the main risk factors could have a significant impact on reducing the burden of disease worldwide. Efforts focused on better diet and increased physical activities have been shown to control the prevalence of NCDs.

NCDs are lifestyle diseases because the majority of these diseases are preventable illnesses, the most common causes being tobacco use, alcohol abuse, poor diet (high consumption of sugar, salt, saturated fats, and fatty acids), and physical inactivity. Chronic kidney disease, diabetes, and cardiovascular disease are common and closely associated conditions that often coexist, share common risk factors, and would benefit from a coordinated approach to prevention, treatment, and control. Important measures should be taken to prevent, mitigate, and control non-communicable diseases and their impacts on the public, especially on women, who are usually the primary caregivers. Integrating the prevention of NCDs and injuries into the national development policies is achievable as well as a priority for developing countries. Trauma is a universal major public health problem and is one of the most preventable afflictions. Road traffic accidents and violence are major causes of injury, disability, and death, mostly in ages 15-45. The potential sub-themes include the following.

#### ***Research Area 11.1 Newly Emerging Diseases (cancer, diabetes, cardiovascular diseases, metabolic diseases, chronic respiratory diseases): The Burden, Prevention, Early Diagnosis, and Treatment/Control***

The burden of disease attributed to NCDs has been estimated at nearly 50% in countries with the lowest national incomes. In 2008 alone, NCD's were the cause of 63% of deaths worldwide - a number that is expected to rise considerably in the near future if measures are not taken. Risk factors such as a person's

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background, lifestyle, and environmental factors are known to increase the likelihood of non-communicable diseases. Most NCDs are considered preventable because they are caused by modifiable risk factors. Premature deaths or inability to work resulting from heart disease, stroke, and diabetes can affect national economy. The burden of chronic NCDs, including mental health conditions, can be felt in workplaces as absence from work or less productivity. It has been estimated that if the major risk factors were eliminated, 80% of the cases of heart disease, stroke and diabetes and 40% of cancers could be prevented, pointing to interventions targeting the main risk factors to reduce the burden of disease. Efforts focused on better diet and increased physical activity has been shown to control the prevalence of NCDs.

### ***Research Area 11.2 Trauma and Violence: The Burden, Prevention, and Control***

Trauma and violence are major global burdens causing a great deal of suffering, deaths, disabilities and economic losses; and they have become increasingly important public health problems that require a multidisciplinary approach to develop capacity in prevention and control as well as minimizing disability and suffering. The vast majority of people with disabilities live in low- and middle-income countries, and the disabilities are caused by injuries from traffic crashes, falls, burns, and violence. Children, pedestrians, cyclists, and the elderly are among the most vulnerable of road users. Burns and falls are the leading causes of morbidity and mortality among children under the age of 15 years. Global and regional estimates of the violence or injury-specific causes of disability are lacking or not well documented.

A thematic research on trauma may help in human resources, networks, institutional and infrastructural capacity building to enhance knowledge, develop skills, and create an enabling environment for violence and injury prevention and

control. The results of the research may help develop national injury and violence prevention policies and strategic plans of action.

### ***Research Area 11.3 Epidemiological, Pre-clinical, and Clinical Studies on Mental Health***

Mental disorders affect about one in five individuals and lead to considerable personal distress and disability, family burden, substantial societal cost, and premature death. Mental disorders are closely linked to poverty: mental disorders lead to poverty and poverty leads to mental disorders; interventions directed at mental disorders improve poverty outcomes, while interventions directed at poverty improve mental health outcomes. Co-morbid mental disorders are common in those with physical disorders, and those with mental disorders are more prone to developing physical health problems. Mental disorders in mothers are common, and are associated with suicidal ideation, high levels of disability and adverse infant growth and development outcomes. Despite ongoing studies by Addis Ababa University in the past 15 years in Ethiopia, our knowledge about the epidemiology, etiology, measurement and treatment of mental disorders is limited. Therefore, further larger scale, systematic and multi-disciplinary studies are required. Studying the mental health of the population and investigating culturally appropriate and scalable interventions is essential for the success of the growth and transformation agenda of Ethiopia.

## **RESEARCH PRIORITY 12: HEALTH SYSTEMS (HUMAN AND ANIMAL), MATERNAL AND CHILD HEALTH**

The World Health Organization has recently recognized Ethiopia as one of the best performing countries with respect to alleviating maternal and child mortality and morbidity. This was mainly attributed to political commitment, supportive

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health systems, and improved interventions. While acknowledging the performance, it is also empirical to look for additional tools, models, and strategies that would help sustain and improve this performance. Therefore, there is continued need to perform public health (including techniques helpful for family planning); clinical; and pre-clinical and clinical studies on child and maternal health problems.

### ***Research Area 12.1 Maternal and Child Health Improvement and Sustenance***

Ethiopia is recognized as one of the few countries that has demonstrated rapid improvement in maternal, newborn, and child health services along the continuum of care. However, there is evidence to indicate that MDGs 4 and 5 may not be achievable by 2015. Policies, guidelines, and strategies that give emphasis to vulnerable segments of the population including mothers, newborn babies, and children are in place. The impact of these documents on health outcomes has not been well explored. Health inequities related to place of residence and socio-economic status exist. In addition, maternal, newborn, and child health services utilization is low. The proximal and distal factors contributing to these disparities and limited utilization of services has not been well studied. The extent of influence of the prevailing ignorance, poverty, harmful traditional practices, and low status of women in the household and community on health seeking behavior has not been studied extensively with pertinent methodologies. Operations research to develop innovative, workable, locally acceptable and culturally appropriate health-related policies and strategies and health service delivery systems is essential. Clinical research to develop evidence-based practice and improve quality of care at health facility level is also imperative.

**Research Area 12.2 Urban and Rural Community Health  
Problems**

As in many developing countries, communicable diseases such as lower respiratory infections, HIV/AIDS, prenatal conditions, diarrheal diseases, Tuberculosis, and measles lead the list of ten top causes of death and years of life lost in Ethiopia. However, it is a country in transition, facing the consequences of epidemiologic, demographic, economic, and nutrition transitions, which continue to favour the epidemic of chronic diseases particularly in urban areas. Current projections indicate that the proportion of people living into older ages and in the urban areas will significantly increase over the coming two decades. Some of the available data also indicate that chronic diseases and their risk factors in Ethiopia tend to occur at younger age groups and result in higher mortality compared to the developed world.

The fact that non-communicable chronic disease (NCD) risk factors such as hypertension, smoking, overweight/obesity, binge drinking and *khat* chewing (an amphetamine-like substance), and physical inactivity are widely prevalent among adults in urban Ethiopia is a clear evidence for a significant co-existent NCDs in the background of under-nutrition and widespread poverty. Accordingly, a thematic research that addresses both communicable/nutritional problems as well as the emerging chronic diseases in rural and urban areas, respectively, will be of paramount importance to strengthen the evidence base for informed decision making by the Ministry of Health and other relevant stakeholders.

**Research Area 12.3 *Laboratory Biosafety and Biosecurity Practice***

With the increasing biological threat from emerging infectious diseases and bioterrorism, it has become essential for governments around the globe to increase awareness and preparedness to identify and contain those agents. Assessment criteria for biorisk of laboratories should include both biosafety and biosecurity measures. Biosafety includes the protective measures against the risks of contamination with pathogen germs in the laboratories that handle pathogens, or stock or manipulate potentially contaminated products, or perform microbiological tests for medical or scientific research purposes, as well as the means of protecting the environment and human collectivities against hazardous contaminations that have as a starting point these laboratories. Besides, lately, a new notion - biosecurity - has emerged. This notion refers to the sum of measures designed to protect workers, the environment, and populations against the loss, theft, use and release in the environment of pathogenic biological agents. Conducting research in a manner that guards against theft and intentional misuse of biological materials requires a process of hazard identification and risk assessment to most effectively identify and implement a risk management plan. Procedures describing physical security, personnel reliability, and material control and accountability define a security plan for the type of research.

**Research Area 12.4 *Determination of Human and Animal Population Normal Values for Different Parameters***

Lack of appropriate local reference values for human and animal population bio-parameters is a challenge in interpreting results for the management of patients, animals and for decision making. Health professionals usually use textbook reference values to compare the reported values. In addition to the lack of

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evidence-based practice, such values have substantial variability between subjects by age, sex, geographic, environmental, and genetic variation. Health and disease can only be distinguished by accurate and reliable reference values of a particular laboratory test. In interpreting laboratory test results, the reported values are usually compared with established reference values from developed countries. Now, it is a fact that there is considerable variation in biomarkers reference intervals by several variables. However, such data are scanty at a population level in the Ethiopian situation. Therefore, a study should be conducted to determine the human and animal population normal values in a community setting.

## **RESEARCH PRIORITY 13: ANIMAL PRODUCTION AND HEALTH**

### **Research Area 13.1. *Food and draft animal production***

Ethiopia has a huge livestock resource in terms of species and number. They are vital in the traction system, tillage activity and transportation and overall livelihood. The production potential of indigenous cattle breeds has not been fully realized, as these breeds have not been characterized fully for primary and ancillary traits. Improvement of the already existing genotype or replacement with superior genotypes depends on the knowledge of the attributes of those genotypes and the factors that affect production in those environments. Environmental stress, disease challenges and seasonal malnutrition put a high demand on the productive adaptability of indigenous animals and may mask their

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genetic potential under more favorable environment. Sustainable use of cattle breeds demands phenotypic and molecular characterization of the same. Urbanization trends and rising household incomes are leading to a substantial increase relevant in the demand for livestock products, especially dairy and poultry products. Peri-urban and urban dairying are intensive production systems largely dependent on input supply and high grade animals. The system is associated with increased susceptibility to disease, poor survival rate and mortality, low reproductive and productive efficiency. Quantification of the genetic inheritance of causes of reproduction wastage and calf mortality will be essential to maintain replacements. There is a problem of getting suitable genetic material for poultry breeding in peri-urban poultry production. Therefore, research emphasizes on identification, characterization, evaluation and selection of local and synthetic breeds will be important. For effective and productive animal production (milk, meat, egg, skin and hide, wool, etc) development Feed and Nutrition is very important and hence research on feed resources and effective utilization of pasture, range lands, and crop residues and industrial bi-products is essential.

### **Research Area 13.2. *Microbial pathogens involved in animal infections and food borne zoonoses***

Microbial pathogens of bacterial, viral and fungal type cause a number of important animal diseases causing huge economic loss worldwide. In addition, about 70% of emerging human pathogens originate from animals mostly through

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contamination of human food originating from animals. Microbial pathogens are characterized by a common feature of variation within a species that makes control and prevention of these pathogens difficult. Understanding the microbial pathogens that cause animal infections and also transmitted to human through food in Ethiopia is of paramount importance to institute appropriate intervention strategies. Therefore, food borne pathogens investigation (identification, genotyping, development of diagnostic assays, risk analysis) is the future research direction.

#### **Research Area 13.3 *Diagnostic assays for microbial pathogens involved in animal diseases and food borne infections***

Detection of microbial pathogens timely during development of an animal infection and outbreak cases is an important step applied in disease control. Different kinds of diagnostics have been developed world wide to detect microbial infections. However, almost all of these tests are imported with incurring foreign currency and their availability is unpredictable. This is an impediment in our effort in detecting and controlling microbial animal infections. Therefore, availability of microbial diagnostics locally at reasonable cost if an important asset for the livestock sector and requires the contribution of local professionals in the process.

#### **Research Area 13.4 *Vaccination strategies against microbial infections***

Chemotherapeutic based control of animal infections is one of the most commonly used strategy in veterinary medicine. The increased development of antibiotic resistance bacteria, contamination of human food and the environment with antibiotic residues, etc are some of the challenges we are affecting in this era of chemotherapy. Vaccination has always been a strategy of choice in

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intervening animal infections. The practice has various advantages such as improved animal welfare, absence of effect on the environment and food of human consumption, discouragement of emergence of antibiotic resistance microbes. However, there are quite a number of animal infections for which there are no effective vaccines. This calls for scientific efforts for designing of vaccines for these diseases.

### **Research Area 13.5 *Food safety issues on foods of animal origin and food processing establishments***

Food of animal origins is contaminated with infectious agents, toxins and chemicals from different sources. One of the most important sources of contamination is microbial causes from sick food animals that are zoonotic. Moreover, sick food animals may be treated with therapeutic agents and antibiotic preparation for growth enhancement causing entry of antimicrobial residues in food of animal origin. Food safety could also be affected by hormones used for growth enhancement of food animal production. The contamination of food of animal origin could result in food borne infection /intoxication and food spoilage. As a result, contaminations of food of animal origin have high public health and economic impacts. Besides, food borne infection/intoxication and food spoilage causing disease, death, thus affecting food security, and economic loss through restricting international trade of food of animal origin. Therefore, in order to benefit from the livestock sector of the country's food safety issues along the food chain of foods of animal production should be investigated and appropriate intervention strategies should be designed.

- Food safety (toxin, antibiotic and chemical residue)
- Food of animal origin processing and preservation technologies
- Environment sanitation

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**Research Area 13.6 *Emerging, re-emerging and zoonotic disease of veterinary importance***

Veterinary disease suffers from animal's own intrinsic factors, pathogen factors, anthropogenic (human) and environmental effects. Issues like vectors, vector-borne diseases, endemic, emerging and reemerging animal and zoonotic microbial diseases, environmental pollution, ways of life (animal production systems), and health conditions among the animals are closely interwoven with and influenced by environment, socio-economic activities of humans such as the current ongoing national dam construction and sugar cane plantation, climate change and global contact within and between livestock species and wildlife at many interfaces. The long international border area and the ease in acquiring legal and illegal veterinary drugs pose new and growing health threats in livestock through influencing veterinary drug usage and misuse. This situation demands epidemiological research that takes the local biome's specificities into account. Therefore, (1) population-based epidemiological research on microbial, parasitic and zoonotic disease determinants from genetic to nutritional, from production systems to agro-ecological, from environment and land use change to changes in production process (intensification), from climate change to changes in socio-economical activity as well as evaluating efficacy and effectiveness of veterinary disease treatment and preventive measures in the field and under experimental setup, and (2) research on the working—including the economic dimension—of veterinary health services at all levels, from prevention to primary care to clinical activities. In this line, a number of sub-components of veterinary epidemiology such as molecular epidemiology, spatial epidemiology, pharmaco-epidemiology and other epidemiological researches will be conducted within 5 years and more in different geographical landscapes of Ethiopia.

**Research Area 13.7. *Diseases of Intensification in Livestock Production.***

Population growth, urbanization, increase in household income, and high public awareness in urban, periurban and rural agriculture in Ethiopia are leading to an



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increased demand for food of animal origin. And yet, the supply is getting meager with time. The current high off take rate of animals for export and meat, increased egg and milk supply, hide and skin production in the country is a result of an increased number of animals per holding, rather than increased yield per animal. This is a persuasive and trendy animal production system in Africa and elsewhere in the developing countries of the world.

This keeping of livestock in confined and overcrowded conditions leads to several problems that span from land and forest degradation in the rural areas to public health threats in the cities. These are main concerns that need prudent scrutiny by research institutes. In the developed countries intensive production system by itself has caused several diseases and conditions in the animal system that are not common in the extensive settings. Thus, the main focus areas begin from the animal itself: feeding, housing, health, its production environment and, more importantly, its welfare situations. For instance, big concentrations of animals in urban environments where policy statements for livestock production are not strictly outlined can lead to a buildup of pesticides and antimicrobials in the food chain. Also, food safety risks from microbial contaminations and an increase in the incidence of existing and new zoonotic diseases is a big worry in this production system. Thus, research focus in these areas is aimed at increasing productivity of livestock, improving animal welfare, and ensuring food quality and safety focusing on infectious and non-infectious diseases.

### **Research Area 13.8 *Reproductive Biotechnology***

Reproductive biotechnology also encompasses several cutting-edge technologies in animal reproduction such as artificial insemination, super ovulation, embryo collection, invitro fertilization, embryo transfer, assisted reproduction techniques, etc. It is a very important tool to improve the genetic potential of domestic animals in many aspects of production, in propagation of endangered species in

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the wildlife and control (contraception) of invasive populations of animals. In general, this technology enables us to use frozen and stored germplasm to upgrade genetic potential livestock and to support conservation measures for the maintenance of genetic diversity in threatened species and serve as genetic resource banks. For example, artificial insemination technology has revolutionized the domestic cattle breeding industry and allowed for the dissemination of valuable genetics male animal worldwide. Fertility drugs/hormones for super ovulation in ruminants enable us to exploit the genetic potential of the superior female for embryo transfer. It enables us to develop genome banks for insuring extant genetic diversity; to assess the relationship between physiology, behavior and environmental perturbations; to manage small populations; and to deal with dilemmas ranging from contraception to skewed sex ratios to animal welfare. However, most of the time technologies developed for one species of animal do not work for other species due to peculiarity of reproductive biology and physiology. Equally problematic is a protocol outlined for animals in the higher latitude is not equally satisfying in animals thriving in the lower latitude like Ethiopia. Therefore, adaptation of these technologies and validation of their protocols is very important for the genetic improvement and reproductive efficiency of domestic animals and wildlife.

#### **Research Area 13.9 *Skin and Hide health and quality***

Ethiopia has a great potential for the hide and skin production, leather industry. However, it has not benefited much from the sector majorly due to reasons like ectoparasites, pre-slaughter defects (e.g. branding), flaying defects, lack of transport and modern marketing, preservation facilities and due to low awareness of the population which reside in rural areas. As soon as hides and skins are removed from the animal, it is susceptible to autolysis and degradation

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that cause to lose the hide and skin substance and lead to a poorer quality leather. The loss to the national economy resulting, therefore, is immense unless a proper collection and preservation means is devised. Therefore, research on devising ecto-parasite control and prevention strategies, skin and hide harvesting and post harvest handling and processing are very crucial.

#### **Research Area 13.10. *Transboundary animal disease management: import***

Transboundary animal diseases are animal diseases having public health, economic and international trade impact like FMD, RVF, CBPP, CCPP, PPR, brucellosis with different requirements for prevention, control and prevention. High mortality and morbidity due to these diseases leads to direct and indirect losses especially with increasingly stringent regulation to meet export standards. These diseases status of Ethiopia countries plays the key barrier for live animal and animal products trade possibilities. Animal health standards imposed by importing countries for international, regional or bi-lateral trade, and through the World Trade Organisation's (WTO) Sanitary and Phytosanitary (SPS) agreement must be met based on Import export risk analysis principles. The capacity of national veterinary services in Ethiopia to control and manage trans-boundary and epidemic diseases more effectively needs research in development to promote safe trade in livestock and animal products under the new scenario of international standard measures arising from the Sanitary and Phytosanitary Agreement of the World Trade Organisation, and, thus contributing towards

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developing or expanding exports markets and trade including possibilities of commodity based trade. Thus there is a need to explore for epidemiology, prevention and control of major transboundary animal diseases of trade and public health importance, import-export risk analysis and commodity based trade as an option of livestock products export to high price market in the developed world.

## **RESEARCH PRIORITY 14: LANGUAGES, COMMUNICATION, AND FOLKLORE**

Language is a window to knowledge. Ethiopia has implemented a language training policy which recognizes the use of the mother tongue for instruction at primary level and English as a subject and a medium of instruction at secondary and higher institutions of learning. While the move is in principle correct and democratic, how this training policy has been progressing in its implementation process has not been studied. There are serious academic complaints with reference to language capability of students both in their mother tongue and in English as a language of instruction. Employers also reflect similar complaints - inability to understand instructions given either in Amharic or English, or for that matter, in a mother tongue. This requires an extensive research on the teaching and learning of the mother tongue, Amharic (the national medium of communication), and English (the language of academic instruction). The research is hoped to generate ideas as to what needs to be done to mitigate the challenges of language instruction in the country.

### **Research Area 14.1 *Teaching and Learning Languages in Contemporary Ethiopia***

More than seventy languages are spoken in Ethiopia and currently 38 languages are being used as a medium of instruction at primary school level. The demand of the people to use their own mother tongue at least at primary school level is increasing by the day and the regional governments are struggling to meet this demand. Satisfying these demands after prioritizing needs and presenting detailed descriptions of each of the languages is vital in the formal education. As most of the languages are not written, the task of designing orthographies is eminent in the process. Preparations of primers and pedagogical grammar books as well as dictionaries are possible when the languages are described linguistically from different angles: phonetics, phonology, morphology, syntax and semantics. If these languages are to be visible on the internet - as it is becoming a major resource in education - the descriptions are the bases. Nevertheless, there are very few complete descriptions of languages done so far.

### **Research Area 14.2 *Communication***

Ethiopia has embarked on a huge national development program aiming at bringing about a rapid growth and socio-economic transformation. The Growth and Transformational Plan is a multi-sectoral and multidimensional program that aims to lay the ground for a transition of Ethiopia from a low- to a middle-income country in the coming 10-15 years. The program requires a huge capital investment, but more important than capital is the full and committed participation of the Ethiopian population and other stakeholders. This sub-thematic area assumes that such a development program cannot be realized through the sole effort of the government. The participation of the people can be ensured through the use of effective development communication in all the

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sectors that the plan includes. The sub-theme may focus on the current strategies and discourses used to enhance the participation of the beneficiary communities and other stakeholders. It also encourages researchers to identify the communication strategies and discourses that should be operationalized to help realize the objectives of the Growth and Transformation Plan.

#### ***Research Area 14.3 Literature and Folklore Analysis in Ethiopia: Challenges and Opportunities***

Both literature and folklore have an expressive nature. They reflect human life in context and/or help to see the opportunities and challenges in line with particular phenomena. Studying literary works and indigenous knowledge systems of the local communities is believed to provide valuable inputs for policy makers, administrators, local people, stakeholders, and other concerned bodies. In the case of Ethiopia, the contributions of these disciplines as sources of input to the modern administration system and economic growth are not well defined and are, therefore, underestimated. Now, the country has already started implementing the national development plan. However, the role of the knowledge and expressions of the local communities towards the success have not yet been studied in relation to this plan. Hence, research in this area focuses on assessing the coexistence of knowledge systems of local communities and the transformation plan of the government.

#### ***Research Area 14.4. The Role of the Mass Media in Cultural Transformation/ Minorities and the Ethiopian Media***

A cursory observation of the available narratives of history tells us that what is constant in human history is the constancy of change. Throughout its existence, human society has been in a state of constant change and transformation

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although these changes and transformations may not be uniform, linear or unidirectional. What is instrumental in all such changes and transformations is communication media. The mode of communication available in any historical period shapes the behaviors and values of the particular society. Today, we live in a media-saturated globalizing world where the global affects the local and vice versa although the influences might be unequal. The media is a site for the interaction of the global with the local, where new forms of social organization and values are formed, new meanings are created, and new ways of doing things are adopted. In societies like ours that are transitioning from tradition to modernity, the media has an enormous responsibility in helping the society navigate through and adapt to the current of cultural change and transformation. This theme focuses on identifying how the Ethiopian media are faring in structuring narratives that shape the understanding and response of society to the new current of cultural transformation.

In the new political dispensation, the equality of all the constituent members of the Ethiopian polity is enshrined in the Ethiopian Constitution. Apart from the constitutional recognition of the equality of the Ethiopian nations, nationalities, and peoples, as might be reflected by the representation of all the constituent groups at different levels of government institutions, their equitable representation and participation in the public sphere is pivotal in creating and sustaining a pluralist democratic society. The media are instrumental in creating and nurturing such a pluralist democratic society by providing space for all the relevant constituent groups and ensuring that they all have a voice in the media discourse and their issues are catered for in the media coverage. Anything short of this might result in the visibility of certain constituent groups and the invisibility of some others, which in turn can erode the development of genuinely pluralist democratic polity. Studies in this area aim at examining the practice of the Ethiopian media in providing equitable space in covering and representing the

minorities in its media narratives, in identifying gaps, if any, and in pointing out the way forward.

### **Research Area 14.5. *Documentation of Endangered Languages and Cultures***

Ethiopia is a highly multilingual nation. The numbers of the languages spoken in the country are not precisely known. The languages in the country are spoken by people ranging from tens of millions to a few individuals. Various social variables, such as urbanization, modernization, and the social and political upheavals that the country has gone through have resulted in a number of social and political changes. Due to pressures from dominant linguistic groups, minority languages have become socially, politically and linguistically marginalized in their own homelands. Many languages in the country are, therefore, falling out of use. It is in particular the smaller languages that are facing increased danger of extinction. As a result not only the languages as such face extinction, but also the indigenous knowledge and the cultural heritage tied to these languages.

The indigenous languages are the core bearers of social identity for groups and individuals. They embed in ingenious ways the socio-cultural values, norms and beliefs that are genuine to the people that speak the language. We thus need to preserve the wealth of human languages and cultures, to preserve the wealth of human knowledge. The sociolinguistic situation shows that many languages and cultures are highly endangered, and might well be extinct in the course of only a few years time as no younger people will keep them alive. This situation clearly shows the relevance of language and culture preservation and documentation efforts. Since languages and cultures are inherently linked to the social and personal life of their speakers. With every language and culture that becomes extinct, priceless knowledge about the history of their speakers will be lost



forever. This makes documentation of an endangered languages and cultures urgent and significant.

### **Research Area 14.6 *Translation and terminology***

Ge'ez and Arabic are store houses of classical literary works of ancient and medieval Ethiopia. Translating such ancient manuscripts into Amharic and many other languages, and publishing the results will contribute to the advancement of Ethiopian modern literature.

Regarding terminology: carrying out cross-disciplinary projects of terminology and translation of scientific and technological terms is of a paramount importance the development of local languages.

## **RESEARCH PRIORITY 15: APPLIED ETHICS AND SAGE PHILOSOPHY IN THE ETHIOPIAN CONTEXT**

Applied ethics is the domain of ethical inquiry that includes particular areas such as professional ethics, business ethics, engineering ethics, medical ethics, environmental ethics, ethics of journalism, law, education, etc. It is a philosophical examination of particular moral and ethical problems in private and public life. It covers the whole range of personal and institutional relationships that are matters of moral judgment. Ethical and moral attitudes and practices of people in medical science, in engineering and technology, education and culture, politics and economics, etc. must be studied from a philosophical perspective. Similarly, there is a wealth of knowledge (philosophical, cultural, political, environmental, moral, medical and many more) in the oral cultures of communities in Ethiopia and rescuing such knowledge is of prime importance for the socio-economic development of the country. Rescuing this knowledge means

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documenting this knowledge using the method developed by sage philosophy. This knowledge from disappearing because with the passing of time and the passing away of the sages (elderly wise persons), valuable knowledge can disappear altogether. Such knowledge can serve the purpose that any form of knowledge can serve. Knowledge produced in this manner will be subjected to an intercultural encounter with other forms of knowledge. There is no better way of educating the young generations to face the future with a sense of self-confidence and all-rounded knowledge than creating a system of education that tries to tap from both indigenous and exogenous sources.

### **Research Area 15.1 *Applied Ethics***

People indispensably live together. The basic issue in morality and ethics is how should these people live together in their economic, political, social and cultural life? People treat one another in politics, economy, culture, social relations, professions, and other areas of life. The point is how should I treat others, and how would I like to be treated by others? Applied ethics examines the moral and ethical quality of the action and behavior of a moral agent in terms of others' security of life, interest, rights, freedom, and opportunities. In the current societies of Ethiopia, there are plenty of ethical issues arising from politics, professions such as teaching, construction, bio-medical treatment, media, public service, rule of law, business, and anthropological and sociological realities. Does each of these have an ethical code of its own to pursue and its performance and services?

### **Research Area 15.2 *Sage Philosophy: A Creative Appropriation of Indigenous Philosophy and Knowledge***

Sage philosophy is one of the branches of African philosophy. Its assumption is that there is a wealth of philosophical ideas in our folklore and culture in general.

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Research into oral cultures from a philosophical point of view shows that fundamental questions pertaining to God, the reality, knowledge, truth, and moral and ethical values are constituent elements of sage philosophy. The method that has been developed by sage philosophy is useful in getting to the source of these ideas. Once these ideas are discovered, then it is also possible to use both the methods of Western philosophy and that of sage philosophy to analyze these ideas and use them for different purposes. They can constitute a genuine source for philosophical investigation and are useful for the construction of indigenous philosophical ideas. It is also possible to attempt to synthesize these ideas with ideas from other traditions including those of the West. Sage philosophy is a testimony to the assertion that philosophy is the self-consciousness of a culture. Sages are not conformists or custodians of a culture who sanction what they inherited from their ancestors as holy and sanctified but subject it to the test of a rational inquiry.

## **RESEARCH PRIORITY 16: LAND AND TENURE POLICIES, DEVELOPMENT, AND SOCIAL JUSTICE**

The issue of land tenure has long attracted debate among academics and development practitioners in Ethiopia. Arguably it has been one of the hot topics since the late 1960s, and problems related to defining access to and rights over land have still been a challenge. Most of the Ethiopian problems of land degradation and socio-economic development are linked directly or indirectly to land tenure policies in the country. The 1975 land reform had partly addressed the issue of land tenure but was not effective, and debates on how it should be resolved are still active. Although the issue is still hot and the solution long overdue, there has not been much research on it, especially in reframing access rights in urban and rural areas. The current regime's policy on urban land use and

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land certification could generally be considered a soft response to address such challenges. In addition, the recent development plans, such as the massive conversion of lowland agricultural frontiers to large scale agricultural schemes, beg research to better understand the political ecology of local peoples, government, and conservation organizations.

#### **Research Area 16.1 *Land Measurement and Certification***

Land measurement and certification is perhaps one of the latest policy measures in Ethiopia's contentious and evolving land tenure issues. In effect, it has been a 'polite' response to the question of tenure insecurity that has been blamed for hindering investment in land and land management as well. As a policy endeavor, however, it could have a number of repercussions far beyond the security/insecurity questions. It has, for instance, implications for social relations (conflict), conflict resolution, and environmental issues. In some areas, it resulted in something approaching privatization of land, which compromised common spaces - even pass-ways, riverbanks, and watering points. This strategy also has a gender dimension. This sub-theme may render more than four issues which may need thorough investigations on several areas such as: 1)land measurement, tenure security, investment on land/local livelihoods; 2)land measurement and social relations: disputes, dispute settlement; 3)land measurement, tenure security and resources management; and 4)land measurement and gender relations.

#### **Research Area 16.2 *The Political Ecology of Changing Values of Land***

Although large scale agriculture has long targeted lowlands exploited by Ethiopia's pastoral communities, particularly along the Awash Valley, population movements to the lowlands, which had traditionally been perceived as

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peripheries and as less suitable for settlement by the highland population, are relatively a recent phenomena. The current government in its development discourse and policies also portrays these areas as vacant, open, and out there waiting for investment. This sub-theme intends to explore population movement, agricultural investment, and local populations' livelihood issues and their understanding of the emerging intense interest in their environment. It also aims to examine land-based conflict and environmental sustainability that result from these new phenomena. It appears that the government and government-backed investors are competing with extra-local populations migrating or seeking to migrate to these lands. Resources in general and land in particular are now being in-between interests of actors who wield differential power. This sub-theme may consist of a number of issues, namely, 1) large-scale agricultural investment and local livelihood options; 2) large-scale agricultural investment and local environment; 3) investors-host relations (perceptions) of each other and issues of sustainability; 4) population movements and local livelihood options; 5) population movement and the local environment; and 6) settlers-host relations and reciprocal perceptions.

### **Research Area 16.3 *Urban Land Policies and Administration***

The adaptation of appropriate urban land use and administration policy is one of the main factors that enhance urban development in a country. Ethiopia has experienced different forms of land tenure system in general and urban land holding system in particular. In the pre-1975 Ethiopian land tenure system, the land policy helped few feudal landlords to monopolize the land, and this had caused irreversible economic, social, and environmental challenges. After the 1975 Ethiopian Revolution, there appeared a new proclamation on urban land and extra houses, which put the right to urban land ownership entirely in the hands of the socialist government until 1991. According to the current government of Ethiopia, land belongs to the government where citizens have full

rights to use both rural and urban land in the country. In particular, urban land is managed under the system called 'Land Lease', which was introduced in 1993 for the first time in Ethiopia. In all the three regimes mentioned above, urban land has been a major cause of instability, insecurity, and conflict between the government and citizens, groups, individuals, and institutions. Under this sub-theme, the following issues are worth considering for research: 1) urban land lease systems and their implications; 2) forms of the current urban land lease system; 3) land ownership and social relations; 4) urban landownership and the urban-rural land interface; and 5) urban land ownership and the formation of new social structure.

## **RESEARCH PRIORITY 17. ETHNIC GROUP, ETHNIC IDENTITY, and INTERETHNIC RELATION**

While this overarching theme encompasses very broad inter-disciplinary and multidisciplinary areas of research, the issues we would like to make researches is related to Ethiopian ethnic groups as specified into three sub-themes below.

### **Research Area 17.1. *An appraisal of Ethiopian ethnic groups***

Currently, ethnicity is a guiding principle enshrined in national legal and factual phenomena in Ethiopia. It is a state of the time by way of which the country is engineered and the whole edifice of political, legal, economic, social, and cultural structures is ensconced. A number of national political, economic, cultural and social governmental and non-governmental concerns are designed based on ethnicity. However, the whole edifice of ethnic approach is built upon in an area of uncertain knowledge and the fact that Ethiopia is a nation of multiple ethnic groups is simply an ostensive knowledge. There is no authoritative, authentic,

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scientific work from which we fetch exhaustive number of Ethiopian ethnic groups, their ethnographic variables, and shared identities and interethnic relations of one with another. There should be an extensive, if not intensive, approach thereby produces comprehensive, scientific, and reliable source on numerical and ethnographic dimensions. In the history of Ethiopian Studies, there is no complete knowledge of ethnic groups in Ethiopia for academia, policy makers, politicians, and other concerned bodies that input ethnicity into a work directly or indirectly related to ethno-cultural, political, social, and economic matters. So, a record of all Ethiopian ethnic groups at least as they stand in our time is absolutely essential work together with their basic ethnographic features.

#### **Research Area 17.2 *Ethnic Identities***

We have lost much of our history of who is who because of lack of proper scientific research and documentation of ethnic group identities. Until today, we do not have sufficient record of the identity of ethnic groups, their role in making and baking the entire fabric of what is today called Ethiopia. Even some of what exist has improper representation of ethnic groups that have been shrouded in the mist of long historical process that favored assimilations. This is very hard task that involves multidisciplinary approach of, for example, history and anthropology. Yet, it is very important theme because it is here where the store house of knowledge exists if we really want to work for the dearth of knowledge about ourselves.

#### **Research Area 17.3 *Interethnic relations/boundaries***

Needless to mention, Ethiopia is made up of astounding diversity of ethnic groups. The knowledge of interactions of ethnic groups both at national as well as local level is, however, lacking. In researches made so far on Ethiopia, there is a frustrating dearth. Already existing ones focus on some obvious aspects of

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cultural items, on narrations and descriptions of them as respective to a certain ethnic group. Much of cross cultural knowledge, thus, has already been lost with out documentation. Interethnic relation changes with the change of political, economic and socio-cultural changes of a country. For instance, since ethnic federalism in Ethiopia, there appears to be difficulties of adjustment to ethnically set up boundaries in which a particular group 'owns' its federal state proper. As a result shaky relationships have developed between ethnic groups sharing contiguous territories and mixed settlements. Thus, broader understanding of the dynamics of ethnic relations in Ethiopia and a follow-up study of ethnic-group relations in current political and administrative system is very important subject of study.

#### **Research Area 17.4 *Contemporary Urban Issues in Ethiopia***

This is a broad theme that addresses several issues. The research tackles two interrelated tasks: adequately investigating those issues which have been shallowly touched upon or glossed over in previous researches, with a view to bridging the existing knowledge gap, and make an in-depth exploration of contemporary urban issues so far unexplored by any of prior researches, with a view to adding something new to the existing store of knowledge in the area under study and proposing pertinent solutions for practical problems.

##### ***Contemporary religious dynamics in urban setting***

The post 1991 period witnessed revival of religion in all its forms in Ethiopia. The trend is more pronounced in urban areas as can be inferred from the proliferation of worship sites. On the positive side, the phenomena can be celebrated as an expected outcome of people exercising their freedom of worship, which is enshrined in the federal constitution. On the other hand, it should also be noted here that Ethiopia is not alone in witnessing revival and resurgence of religion as



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an urban phenomenon in the modern age. The trend is observable everywhere in the world. As explained above, while a positive outcome of exercising constitutionally granted right of worship, the post 1991 revival of religion has also aspects that proved to be serious causes for concern. At times, the effort to assert ones right of worship creates an atmosphere of competition and tension among the adherents of the various faith traditions. This has manifested itself in the urban space in various ways such as communicating very pointed messages, some of which are downright denigrating polemics toward the “other” through pamphlets, books, DVDs. It is also difficult now a days to find any private city bus, minibus and taxi that does not have religious messages and symbolism in the form of bumper-stickers. The content of these messages is carefully chosen in such a way that they are antithesis of the central tenet of a perceived rival religion. Lately, both Christian and Muslim major annual religious holidays and processions are also becoming occasions to make public display and demonstration of sectarian militancy. The phenomenon certainly calls for a serious study and analyses. The findings of the study will suggest and recommend policy alternatives and more elaborate legal framework in handling the issues of religion in the urban space. The findings will also inform public debate in a way that religious institutions committee commit themselves to interfaith dialogue and mutual understanding

### ***Urban Heritage Conservation and Documentation***

As we know, Addis Ababa is undergoing an unprecedented and accelerated change largely attributed to a massive urban renewal program launched by the city administration. Old neighborhoods (residential and business quarters) spontaneously developed over the years without plan are being demolished and replaced by new high rising buildings; expensive residential units/ apartments and shopping molls constructed by private developers, and low-cost condos built by the city government for low income segment of the society. The renewal process

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includes slum clearance, upgrading of deteriorating quarters, paving of new road arteries, and expansion of existing ones, in-fill activities or utilization of open spaces, etc. All these activities do not take place in a vacuum. They rather act upon established social and cultural sediments and fabrics, which might in the course of the renewal process be subjected to shocks and disturbances or even obliteration. The cultural landscape of the city which has been formed through long-term interaction between the inhabitants and the natural environment is now under pressure. When the slum is cleared, it is not only the dilapidated physical structure that is removed, but age-old cultural sediments and long established webs of social relations as well as social memories are exposed either to alteration or eventual disappearance. Obviously, development involves change which entails disappearance of some aspects of social life, modification of others and appearance of new practices. Yet, heritages, considered to be valuable aspect of human creation (both tangible and intangible) should be preserved, handed down to the next generation and thereby ensure continuity of culture. So far, documentation of the city's cultural landscape is not an integral part of the urban renewal process being undertaken in Addis Ababa. No research has also been conducted on this issue. Efforts so far made by limited interest groups, too, put much emphasis on restoration and preservation of individual elite buildings, as if the so-called ordinary people and their heritages are devoid of cultural significances and meanings worth preservation. Yet, we firmly believe that creation of a new urban landscape without preservation of the past experience would mean loss of historical memory. We also think that small residential units, market places and ordinary people's life styles and relics are as much valuable cultural heritages as splendid, beautiful multistory elite edifices, and a society ignorant of its past is hardly capable of shaping its future. Who we are today and who we will be tomorrow is often shaped by our past.

## **Research Area 17.5 Collection and preservation of Ethiopian material and literary heritages (Manuscripts)**

### ***Collection and preservation of material heritages***

Heritage (both tangible and intangible) are considered to be valuable aspect of human creation and should be preserved and documented. Humans as beings limited in time & space can transcend destruction of heritages through cultural continuity and social memory. The IES is perhaps the only institution in the academic circle tasked with collection and preservation of the nation's rare cultural heritages. Mainly, this is taken place in a new way of research based collection rather than old conventional way of acquiring objects merely out of their context under which they exist. So far, documentation of the nations' material cultural landscape was not paid due attention. No due research has also been conducted on this issue. So our research plan is about making a linkage between our historical past and anticipated future in the matters related to material heritages.

### ***Collection and preservation of literary heritages***

As we well know, Ethiopia is also rich in literary heritages. We have several Ge'ez and Arabic manuscripts as well as ajemis that are just left somewhere in the hands of individuals or institutions such as churches and mosques, some of which are without proper technique of preservation. These materials are not only heritages as such, but they are also invaluable sources of research. Therefore, it seems useful to share concern to the collection and preservation of these materials and making them available to research. So, far, the IES has acquired the largest manuscripts in the country, but much remains undone.

## **RESEARCH PRIORITY 18: POPULATION MOVEMENTS AND CROSS-BORDER MIGRATION**

It is no exaggeration to state that Ethiopia is a nation of people on the move - both traditionally as well as in current times. Traditional population movements, such as those by pastoralists and agro-pastoralists continue to date, and other forms of movement are evolving and intensifying. In terms of internal labor migration, the process that started early in the 20th century has continued, and currently it takes the form of seasonal and permanent labor migration to the commercial farms and urban centers of the country. The Humera Investors Union's annual call for up to 500,000 seasonal laborers every year illustrates the scale of seasonal labor migration to commercial farms in Ethiopia. Moreover, perceived employment opportunities at cities in the country where several infrastructural and social service-related projects are under construction has further increased the rate of rural-urban expansion to the extent that about 40% of the population growth rate of Addis Ababa and a third of the current population is a result of migration. In addition to domestic migration, there is also a rapidly expanding trend of international migration. The massive exodus of people during the 1970's and 80's has reappeared in the current decade, albeit in the form of labor migration to the Middle East, the United States, and Europe. While this form of migration has created a large Ethiopian Diaspora base, one cannot overlook the various problems it entails, particularly in relation to human trafficking (some reports claiming that up to 70 percent of labor migration is facilitated by illegal brokers) and brain drain. In addition to these, the fact that Ethiopia is located in a tumultuous region has made it a favorite destination, at least temporarily, for refugees fleeing persecution, conflict, and natural disasters.

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In recognition of these facts and to properly manage the various types of population movements, the Ethiopian government has promulgated various proclamations including the Immigration Proclamation No. 354/2003, Refugee Proclamation No. 409/2004, Employment Exchange Services Proclamation No. 632/2009, Protocol Against the Smuggling of Migrants by Land, Sea and Air Ratification Proclamation No.736/2012, Protocol to Prevent, Suppress and Punish Trafficking in Persons Especially Women and Children, Ratification Proclamation No.737/2012. Moreover, it has established a Diaspora Engagement Affairs Directorate General, has adopted a national action plan against trafficking in persons, and developed National Employment Policy and Strategy in 2009, which, among other objectives, has the aim of protecting the rights of migrant workers. Thus, understanding the dynamics, patterns, challenges, and the various forms of population movements, as well the impacts and process of the above institutional and legal frameworks and measures through empirical and policy oriented research is a task of utmost importance.

### **Research Area 18.1 *Follow-up Research on Resettlement in Ethiopia***

During the 2nd half of the 20<sup>th</sup> century, the successive governments of Ethiopia implemented planned resettlements with the objective of reducing population pressure and combating food insecurity. In the late 1950s and 1960s, the Imperial government resettled a limited number of peasants from northern Ethiopia to western parts of the country and the rift valley areas. In the mid 1980s, the Derg regime relocated about 600,000 people from the north and central Ethiopia to the southwest, west, and northwest. Between 2003 and 2005, the current government resettled over 180,000 households (of the total planned number of 440,000 households) in more than 100 villages. The resettlement programs of the current and the Derg governments were large-scale, highly controversial, and

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widely criticized on account of inadequate planning, inappropriate management, disregard for the interest of the settlers and their hosts, and environmental damage. While the resettlement in the 1980s has been considered unsuccessful, the status of the recent program is yet to be determined.

The recent resettlement program, which aimed at relocating 2.2 million people in three years, was launched as a development response to food insecurity in the country. Authorities justify the program in terms of the prevalence of landlessness and land degradation in some parts of the country and alleged availability of habitable areas with productive potentials in other parts. In 2003, the government and its partners (donors and NGOs) developed a joint food security document that came to be known as the New Coalition for Food Security in Ethiopia (NCFSE). The program is supposed to depend on four major pillars (namely, voluntarism, availability of under-utilized land, consultation with host communities, and provision of minimum infrastructure) and numerous other principles such as partnership, community participation, transparency of program design, development, and environmental protection, to mention a few. Nine years has elapsed since the first batch of settlers was relocated in 2003. Little is known about the socio-economic adaptation and social integration of the settlers in the new environments.

### **Research Area 18.2 *Diaspora Engagement in Development in Ethiopia***

Traditionally, migration scholars argued that most immigrants tended to sever their ties from their countries of origin as they get assimilated into the countries of destination. It was also assumed that loss of the best and brightest through brain-drain would hurt sending countries. Recent studies suggest, however, that transnational migrants tend to maintain ties with the countries of origin and contribute to peace-building and development activities, and the highly skilled

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diaspora could play many important roles. Apart from sending remittance and engaging in direct investment, they could facilitate information flow, improve the reputation of their countries, promote trade, facilitate the flow of foreign investment, and facilitate transfer of knowledge and technology. Hence, it is widely recognized that the diaspora of developing countries can be a potent force for development for their countries of origin.

In recognition of the contribution of the diaspora to the development efforts of the country, the Ethiopian government took several measures expected to promote diaspora engagement. For the purpose of this report, the measures taken by the government could be divided into two categories: institutional arrangement and policy instruments. The institutional arrangement involved the establishment of different agencies responsible for attracting the diaspora and facilitating their activities. The "Ethiopian Expatriate Affairs General Directorate" was established under the auspices of the Ministry of Foreign Affairs in 2002 to encourage and facilitate the involvement of the Ethiopian diaspora in the country's development. In 2004, the Ministry of Capacity Building established the 'Diaspora Coordinating Office' to foster relations with the diaspora and ensure the transfer of knowledge and materials needed for capacity building. In 2006, a federal level joint committee consisting of eight institutions was established to expedite the constituency building activities abroad. Ethiopian missions overseas have also been given additional tasks of outreach and constituency building with the objective of promoting diaspora engagement. In each regional state, steering and technical committees and diaspora affairs offices were established so that the regions could contact their population abroad and provide information and services for the diaspora. Policy instruments have also been put in place to grant certain rights and privileges to the diaspora. However, little is known about the effects of these measures or the contributions of the Ethiopian diaspora to national development. This warrants the need to undertake applied research on diaspora engagement in Ethiopia.

**Research Area 18.3 *Cross-Border Migration in the Frontier Regions***

Trans-border movements of people and goods, and cross-border and internal conflicts among pastoralists and farmers affects not only regions of violence, but the wider communities as well, undermining local economies and societies, diminishing steps towards regional development, and destabilizing relations – between neighboring states in the Horn of African region. All the borderland pastoral areas of the East African region - from the Sudans (Sudan and South Sudan) across to the Horn of Africa, including Somalia, Djibouti, Ethiopia, and Eritrea - are affected by frequent conflicts and cattle raids. The areas that are not outright war zones are marked by growing insecurity resulting from the possession of arms by all different pastoral people. In the southern Ethiopian frontier regions, it has turned traditional cattle raiding in these areas into a nomadic battle. Cattle rustling, for example, have metamorphosed from a cultural artifact conducted as a show of warrior zeal amongst warrior age groups into some form of primitive accumulation where war-gangs are mobilized, trained, and armed with modern warfare equipment. This has affected all the dry land areas of Eastern Africa without exception. Banditry has become a daily occurrence along the common borders between Ethiopia, Kenya, Somalia, Somaliland, Djibouti, Eritrea, and Sudan. Resource use tensions arising from competing grazing and land rights sometimes transmuted into wider borderland conflicts involving the security of nation-states.



## **RESEARCH PRIORITY 19. HISTORICAL PERSPECTIVES RADICALISM, RELIGION, GENDER and ENVIRONMENT**

### **Research Area 19. 1. *Radicalism in Ethiopian History***

Over the last forty years or so Ethiopia and its people have experienced a bewildering series of ideas and practices of state craft, economic organization, social (re) engineering and cultural identity formation. There have been two signposts of this time. One consist of the civilian and military protests of the early 1970s that brought about the demise of the Monarchy in September 1974; the other is the successful conquest of power by a coalition of ethno-nationalist rebel forces in 1991, unseating the military that had taken over from the Monarchy in 1974.

Critical historical studies of this radical period in Ethiopian history have been overall few and limited. The Department therefore has identified the study of this period as one of its important research priority areas. Under the overarching theme “Metamorphosis and Memories of Radicalism in Ethiopia”, we have identified the following sub-themes as areas of research focus:

- Politics and Ideology
- The Culture of Violence and Terror
- Militarism and War
- Religion and Secularism
- Political Economy and Social History of Property
- Culture and Identity Politics
- Social Groups and Social Change

- Education
- Public and Professional Historiography

### **Research Area 19. 2. *Gender Issues in Ethiopian History***

Like the environment, gender has been identified as an important area of research priority by units in the University as can be seen from the bulletin prepared by the Office of the VPRTT. For example, Research Priority 19 focuses on: Gender, Gender Relations and Gender Awareness. As can be seen from the description of the research priority in the above area, the issues that are identified for investigation are concerned with contemporary developments and seem to be influenced by what has been called the “women and development” perspective. Furthermore, issues related to masculinity are ignored. Gender in a way appears to have been equated exclusively with women.

The Department believes that a historical approach is important in understanding how gender has been constituted historically and in what ways gender relations in Ethiopia have been mediated by various historical processes such as state formation; processes of modernization; urbanization and migration; wars and conflicts. Such an approach will give depth to our understanding of current gender relations. The following are some of the sub-themes we seek to examine:

- gender and the economy;
- gender and state formation;
- gender and religions
- gender and development
- gender and war and
- gender and revolutions.

### ***Research Area 19. 3. Religion and religious processes in Ethiopian history***

The region of Ethiopia and the Horn has been a platform for the interaction of Christianity, Islam and various localized religions since ancient times. Although Ethiopian historical scholarship has examined some aspects of the histories of these religions, the histories of each of these religions and the interactions of the people who profess these faiths across time and space has not yet been studied in an in depth-fashion. The spread of various forms of radical religious movements and their growing importance in the lives of the people of the region makes studying the complex history of religion and religious interaction in Ethiopia an important theme of research.

The Department has therefore identified the following sub-themes as important areas of research:

- Histories of the introduction and spread of Christianity and Islam
- Christian and Islamic Revivalist Movements
- Pilgrimage Sites and their Histories
- State Policies Towards Religions

### ***Research Area 19. 4. A Historical Reconstruction of the Environment in Ethiopia and the Horn***

A study of the environment in Ethiopia has been identified as a priority area by other units in the University as can be seen from the bulletin prepared by the Office of the Vice President for Research and Technology Transfer (March 2013). For example, Research Priority 2: Environment, Natural Resources and Biodiversity; Priority 3: Water Resource Management, Policy and Socio-Economics. Priority 9: Tropical and Infectious Diseases of Public Health. However, all of these

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studies tend to focus on contemporary developments and lack a historical dimension. The Department thinks that this historical dimension is critical to understand the current challenges of the environment and take appropriate policy measures. It therefore proposes to examine historically different aspects of Ethiopia's past environment. Among the particular issues we propose to investigate are:

- The political ecology of agriculture and pastoralism
- A historical study of drought, famine and coping strategies
- Histories of Health, Disease and Healing
- A Historical reconstruction of Indigenous Environmental Knowledge Systems and
- Studies of environmental narratives.

## **RESEARCH PRIORITY 20. POLITICAL SCIENCE, INTERNATIONAL RELATIONS and IDENTITY POLITICS**

Political Science and International Relations as a broad area of academic and research engagement encompasses a wide range of fields anchored in normative to the empirical studies ranging from the local to international foci of undertakings. In fact, at least three different sub-fields, viz: International Relations, Comparative Politics and Peace and Conflict Studies come under the discipline. The central objective of engaging in teaching and research in this field is to help those involved understand the political world better by linking analytical concepts and approaches to global contemporary realities in general and address concerns and problems that local, national, and regional and international actors encounter in particular. The decisions of the state in socio-cultural and economic spheres being largely of a political nature, involvement in education and research pertaining to the field of political science and international relations is of

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paramount importance for dealing with drives and directions aimed at fostering development and progress. This is particularly significant for developing countries like Ethiopia that are grappling with multifaceted challenges that need to be overcome through scientific endeavors. In fact, Political Science and International Relations is an inter-disciplinary field since it extensively draws on knowledge generated in other areas of the social sciences like History, Human Geography, Economics, Sociology, Anthropology and Psychology. In view of this, the Department of Political Science and International Relations, CSS, AAU, has developed the following thematic areas that are given priority as governing its research priority in the years to come. This is in recognition that students and researchers in the field should keep pace with the strides of contemporary global knowledge system on the one hand and assist the ongoing development drives of the country on the other that are presumed to be best served through generating knowledge by conducting scientific and empirical studies.

#### **Research Area 20.1. *Political Science***

##### **1) State and civil society in Ethiopia**

- Assessment of decentralization and governance drives in Ethiopia
- The workings of the Ethiopian federal political system in blending state-society relations
- Progress in entrenching democracy and democratization in post-1991 Ethiopia
- Role of civil society in Ethiopia's development

##### **2) Federalism and Constitutionalism**

- Ethiopian federalism and Management of Diversity
- Ethiopian constitutionalism and its ramifications for harmonious interethnic relations
- Political, legal and constitutional basis of Ethiopian federalism

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- Federalism as means for entrenching multi-culturalism and nation-building in Ethiopia
- Federalism as a basis of decentralized governance-cum-devolution in Ethiopia
- Opportunities and challenges associated with the politics of identity in Africa

#### **3) Hydro-politics and politics of trans-boundary resources**

- Geo-politics of trans-boundary water resources in the Nile Basin and the Horn
- Politics and utilization of energy sources
- Ethiopia's access to the sea and utilization of port services

## **Research Area 20.2 *International Relations***

### **1) Transnational involvements and conflicts in the Horn and North East Africa**

- Intra-state and inter-state conflicts: Causes, consequences and prospects for resolution
- Policies and institutional arrangements for conflict mitigation
- Environmental politics and large-scale development schemes

### **2) Human Rights and democratic governance**

- Assessment of progress and challenges in the upkeep of human rights in post-Cold War Africa
- Human rights institutions, application of human rights in national, regional and international contexts
- Democratization in Africa in view of the workings of contemporary political economy
- Challenges and prospects of democratization

### **3) Contemporary Issues in International Relations**

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- Emerging issues in South-South Cooperation (Intra-African relations, relations with Middle East, Asia and the industrialized nations)
- The politics of aid and Africa's international economic relations
- Africa's diplomatic engagements with the west and the BRICS
- International cooperation on security, development aid and humanitarian assistance

### **Research Area 20. 3. Emergent Identity Politics and Conflict in Ethiopia**

- 1) Ethnic federalism and identity politics
- 2) Emergent religious identify and conflict

### **RESEARCH PRIORITY 21. RESOURCES ANALYSIS, MANAGEMENT AND SOCIO-ECONOMIC DEVELOPMENT AND PLANNING**

#### **Research Area 21.1. *Urban and regional development and management***

- **Urban growth, development planning and management**
  - Urban poverty
  - Urban environment
  - Urban governance and administration
  - Urban growth

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- Urban systems and rural –urban linkages
- Planning and managing urban services and housing
- **Regional growth, development planning and management**
  - Regional governance and decentralization
  - Dynamics of regional growth and development
  - Regional development policy and planning
  - Regional specialization, competitiveness and Inter & Intra-regional linkages

### ***Research Area 21.2. Resource analysis and management and the application of GIS and remote sensing***

**Broad issues: Measure, Mitigate, Rehabilitate and address in livelihoods and food security**

- **Understanding the processes (measurements)**
  - Assessment of the extent of land degradation
  - development Indicator
- **Causes, consequences and implication**
  - Identification of variables (factors)
  - Livelihoods and food security
- **Conservation and development**
  - Watershed management and development



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- Climate change impact and mitigation, implications for food security and resource management
- Land resources characteristics (soil characteristics, climatic, wildlife)
- Land use plan for rainfed, irrigation, forestry, urban)
- GIS and Remote Sensing application to Resource (soil, climate biodiversity) survey analysis and management
- Benefits of conservation
- Geographic units
  - Administrative units
  - Field lab at watershed
  - Experimental plots

### **Research Area 21.3. *Sustainable livelihoods and food security***

- Challenges of population dynamics and poverty on food security and the environment
- Role of women in sustainable rural livelihoods and resource management
- Integration of Indigenous knowledge in assuring food security and sustainable resource management
- The need for enabling institutions for sustainable rural food security and resource management
- Rural and urban interface for sustainable food security and development

- Understanding and analyzing rural household economy for diversification.

## **RESEARCH PRIORITY 22. ARCHEOLOGY, HERTIAGE MANAGEMENT AND TOURISM MANAGEMENT**

### **Research Area 22.1. *Archaeology***

Archaeology deals with human culture and behavior from the origins of humans to the present through the examination of material remains of previous human societies. Archaeology as a discipline contributes to a better understanding of the process of nation building and provides an objective reconstruction of the complex system of interactions and differentiations among various communities. It can also contribute to our understanding of how people evolved and adapted to environmental and cultural changes. Furthermore, a diachronic perspective of interaction between human population and the environment provide a detail explanation for the cultivation and processes of indigenous plant domestication. Archaeology has also a direct impact on the country's economy through the promotion of tourism. Archaeological research increases our knowledge of natural and cultural heritage of the country. In light of this, Ethiopia's archaeology not only contributes to developing a sense of pride but also serve as a forum for trans-cultural education, conservation and documentation of our heritage.

The research theme focuses on:

- Heritage inventory
- Rescue archaeology

- Archaeological Impact assessment
- Indigenous knowledge
- Arts and crafts
- Cultural Industries
- Research policy and legislation
- Human settlement distribution and regional specialization
- Cultivation and Domestication

### **Research Area 22.2. *Heritage Management***

Heritage management covers wide range of socio-economic, cultural and environmental aspects that reflect the life, activities, creativity, and relationships of various groups and individuals in the past. They are important components of value and memory that are essential to reconstruct and conserve human past. This is basically why we have to document, research and conserve, promote and manage heritage resources. They serve as channels for trans-cultural education.

Potential issues under this theme include: Museums, archives, galleries, wildlife, natural heritage sites. Such institutions through their collections and exhibitions provide views of the past and present to promote identity and values with the general framework of culture.

Research themes:

- Heritage and the public
- Heritage and development
- Collection policy in heritage institutions
- Heritage exhibition and presentation
- Heritage management, documentation, conservation, research and promotion,
- Illicit traffic and heritage legislation
- Heritage conservation and modernization projects
- Urban heritage

- Heritage policy, legislation, planning and strategy.

### **Research Area 22.3. *Tourism Management***

Tourism has a significant role for socio-economic and cultural development. It has a direct impact on the economy through the promotion of natural and cultural heritage. In view of this, Ethiopia is one of the few African countries that possess unique and attractive untapped natural and cultural heritage resources for tourism development. The country is the origin of humankind, ancient state formation manifested in the form of ancient palaces, temples, churches and mosques. Ethiopia's unique physical features, rich diversity of wild life, paleontological, archaeological and historical sites are tourist attractions. In addition, the presence of diverse nations and nationalities with their annual festivals and celebrations provide high potential to attract domestic and foreign tourists. Such heritage play an important role not only the history and culture of Ethiopia but also contribute to sustainable economic development by creating employment and small scale job opportunities for the local community. The valuable resources for tourism industry must be exploited like mineral and energy resources.

The main focus of research under tourism includes:

- Public private partnership
- Tourism in a multi-cultural society
- Community partnership
- Tourism marketing and partnership
- Eco-tourism, conservation and development
- Developing tourism destination centres
- Tourism Hospitality and customer services

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- Tourism policy, legislation, strategy and planning
- Tourism capacity and facility development
- Tourism governance
- Travel agencies and tour guiding
- Tourism products
- Opportunities and challenges of Ethiopian tourism

## **RESEARCH PRIORITY 23. QUALITY, POLICY, LEADERSHIP, AND GOVERNANCE OF EDUCATION**

Change is natural and it happens to all spheres of life at an alarming rate. Societal change must be supported by education. To contribute its share to societal change, education itself should also undergo some changes as desired by the change in society. Viable policy is crucial for educational reform to attain its purpose. Implementation of such policies in turn requires effective leadership. Research in education reform, policy leadership, and governance, therefore, helps to address issues related to curriculum review, education governance at different levels, and preparation of teachers for the various ladders of the country's education system. Science has been recognized as one of the school subjects which must be taught to children from early years of education. The current trend is towards enhancing science education, as the 70/30 training system indicates. Exploration in science and technology education helps solve educational problems related to allocation and utilization of resources, science pedagogy and effective teaching practices, assessment in science and technology education, the value of scientific literacy, and the importance of building a culture of science. It also helps promote environmental sustainability through science-education-related research. Moreover, the issue of quality education is currently a hot topic under discussion and requires urgent actions. Specifically, graduate education is a

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case in point. Graduate education has been a topic of interest and investigation in higher education for the last 60 years or so (Baird, 1990; Berelson, 1960; Brink, 1999). Although researchers have consistently paid attention to the issues associated with graduate education, the topic has lately been approached with new vigor. Based on the above conceptual premises, the future research agenda of IER can focus on the following components of graduate education/programs in Ethiopian public universities: quality of advisement services in the graduate programs (both MA/MSc and PhD programs), thesis examination/Viva voce in the graduate programs; challenges and opportunities in service provision/delivery and resource utilization in the graduate programs; management and governance of the graduate programs; graduate students' motivation to learn/self regulation and their academic achievement; etc.

#### **Research Area 23.1 *Teacher Professional Development***

The Education and Training Policy (ETP) has set high standards for teachers and described a new approach to education. Research surveys showed that, although the expansion of education has addressed the question of access and equity, it has resulted in serious questions of quality which are inherently linked with teacher professional development and performance. Quite many issues and concerns that require serious and continuous interventions along the teaching profession have emerged. Large class size, dwindling interest in learning among students, challenges of cost of living among teachers, the need for accommodating diversities among students (e.g. students from different socio-economic and geographical backgrounds), issues related to teaching and learning in vernacular languages where children face challenges as the medium of instruction keeps on changing, increasing number of students with disabilities in schools as a result of the inclusive education policy, issues of comparability of curriculum across different regional states throughout the nation, limited collaborative role of parents in the education of their children, challenges in

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automatic profession, etc. have implications for the teaching profession. This situation makes research in the area urgent to inform policies and practices in the education sector. Moreover, the shift from the positivist teacher-centered paradigm of teaching and learning to the constructivist learner-centered paradigm has resulted in new approaches such as active learning, continuous assessment, action research, school-based teacher professional development, induction, etc. This has implications for carrying out a series of studies that would inform different stakeholders on the effectiveness of the teaching and learning activities. The newly emerging approaches in lesson study as a strategy of improving teacher performance through peer and self reflection also require a range of research projects involving staff and graduate students.

### **Research Area 23.2 *Student Support across the School System***

The ultimate purpose of education is to make the individual learner independent in thoughts and acts. To become an independent thinker, the learner needs varieties of support while studying at different levels. Research in student support seems a neglected area, and it is believed that investigation in this field will open opportunities for awareness and subsequent interventions by relevant professionals and the society at large. It helps address issues related but not limited to counseling services, special educational support, career guidance, and management of behavioral problems that may arise at different developmental stages in life.

## **RESEARCH PRIORITY 24: CONFLICT, PEACE, AND SECURITY**

While modern codified legal norms remain the hallmark of western societies, customary dispute resolution mechanisms, often deeply embedded in cultures,

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are widely used in non-western societies. In recognition of this fact, international organizations such as the UN and regional organizations such as the AU have long encouraged the study, harmonization, and use of traditional mediation and arbitration in resolving intra- and inter-group conflicts. Ethiopia is one of the countries where informal dispute resolution mechanisms prevail. Despite the presence of the modern legal system, research reveals that most people in different cultures prefer traditional dispute resolution mechanisms. Sometimes tension arises between the codified law and the customary practice, while cooperation and cross-referencing of cases characterize their relationships at other times. This warrants the need to identify the areas where the two justice systems converge and diverge. Customary dispute resolution mechanisms continue to play crucial roles in the resolution of inter-group and intra-group conflicts and tensions over water and grazing land, animal raid, boundary, blood feud, etc. Government institutions at various levels often engage in dealing with such conflicts. However, the use of formal laws and institutions alone is rarely effective in addressing inter-group and intra-group conflicts. It often fails to restore severed relations although it may be effective in restoring law and order albeit for a short term. Effective resolution of the disputes and transforming them to peaceful and productive interaction between groups requires an integrated approach that combines formal and informal justice systems. This warrants the need for a deeper study of the state of customary conflict resolution mechanisms and how best to integrate them into the formal laws and institutions in Ethiopia. Other issues which could be considered under this thematic priority area may include cross-border pastoral conflict; security and regional development; and tolerance and the driving force behind religious tension in Ethiopia.

#### **Research Area 24.1 *Customary Dispute Resolution Mechanisms***



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Although the customary dispute resolution mechanisms are given limited space, in practice they resolve a wide range of disputes, including serious crimes. Whether informal justice systems are suitable for complicated cases like hard crimes and commercial disputes is altogether a difficult issue but there is a need for a careful study of the state of customary courts in Ethiopia with a view to understanding their role and contribution to community peace and to identifying their differences/similarities with the formal laws and institutions in dealing with serious crimes. Knowledge of the structure, processes, values, and effectiveness of customary courts could be instrumental in terms of bridging the gap between the formal and the informal justice systems. Ethiopia is not only a multi-ethnic society but also a multi-religious country. It is a home for different kinds of Christianity (Orthodox, Catholic, and Protestant), Islam, traditional beliefs, and other religions. Ethiopia is historically known for religious tolerance. This does not mean that religious conflicts/tensions never happened; rather, it points to the existence of strong mechanisms to pre-empt or address religious conflicts/tensions. Therefore, it is important to understand those mechanisms with a view to strengthening and promoting them.

## **RESEARCH PRIORITY 25: GENDER, GENDER RELATIONS AND GENDER AWARENESS**

### **Research Area 25.1 *Education and Training to Eliminate Gender Gaps***

The research topics under this area include dimensions of gender inequality in education and enrollment rates at the primary, secondary, and tertiary levels; evaluation of girl-friendly school initiatives and reforms; issues of quality in education and the links between education and training systems and their

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corresponding impact on employment and incomes of poor women; the specific skills and knowledge needed by women to succeed in the workforce; the institutional and policy framework of preschool education; and the economic costs of low enrollment of girls on productivity and national growth.

#### **Research Area 25.2 *Gender and Institutional Reform***

Under this specific research area, possible issues for investigation include: institutional reforms undertaken to promote gender equality, including constitutional revisions and legislative quotas, and their impact on women's equality and empowerment; the determinants of higher access to formal politics for women; identification of the features of a political system most likely to support a gender-sensitive legislative agenda; measures necessary to increase women's political participation from the grassroots level to the legislative branch; the impact of women's machineries (national councils for women, ministerial gender units) on women's equality and empowerment; the role of international women's movements and other international agencies and donors in influencing policies related to gender equality; gender-sensitive budget analysis of government revenues and expenditures; and the relationship between the different types of government revenue-raising mechanisms and their impact on women.

#### **Research Area 25.3 *Gender and Cultural Change***

Research work in this area could focus on a variety of issues such as variations in reforms of personal status laws throughout the region; the relationship between religious discourse and women's empowerment; the factors and conditions that make reforms in family laws possible; the impact of customary law and religious discourse on policy decisions regarding gender equality; the gender asset gap and the effect of traditional inheritance mechanisms on women's accumulation of

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assets; changes in the structure of families in the region (including divorce, female-headed households, widowhood, late marriage); and gender bias in social security laws.

#### **Research Area 25.4 *Health Reform in Favor of Gender Equity***

The following are topics of interest under this research area: the costs of poor reproductive health for households and the economic burden of reproductive health services; the relationships between poor outcomes in reproductive health with other types of socio-economic disadvantages; the socio-economic risk factors and the long-term socio-economic consequences of poor reproductive health on women and other members of their households; issues of fertility reduction; the prevalence of domestic violence and its variations in different settings and countries; the variables or factors associated with domestic violence; the impact of health sector reforms (including user charges, decentralization, privatization of services, integration of service delivery, and public-private partnerships) on health outcomes for women; and a gender analysis of health sector reform and the integration of reproductive health and other women's health issues into reforms.

#### **Research Area 25.5 *Female Participation in the Labor Market***

The following are some of the topics that need to be addressed under this research area: gender constraints to employment in the formal sector; the differences among challenges facing women working in different sectors; women's work in the informal sector; the collection of time-use data for a complete understanding of women's productive activities; the differential effects of poor working conditions and/or lack of social protection (pensions, social security benefits) on women in the informal sector; the role of collective unions to protect women in the informal sector; discrimination against women in the

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workplace; diversification of women's work opportunities away from traditional female jobs; the implementation of special labor regulations for women in the workplace (i.e. maternity benefits and working hour restrictions) and their effect on women's employment; women's work and its effect on women's health, especially women's reproductive health; the impact of the 'feminization of the labor force' on reproductive rights; and women's role as caregivers and the challenges in balancing care-giving roles with labor market participation.

### **Research Area 25.6 *Gender Opportunities from Trade and Globalization***

Research ideas under this area include: the effect of structural changes and economic reforms on women's employment; the effects of globalization on employment opportunities for women; changes in working conditions for women due to globalization; the effect of globalization on the gender wage gap; the regional variations in women's employment resulting from globalization; the effect of greater specialization in export commodities on women's employment in the region; and the effects of globalization and trade liberalization on women's work in the informal sector.

### **Research Area 25.7 *Gender and Violence***

Research ideas under this area include: the relationship between patriarchy and violence; the role of national, regional, and international legal frameworks regarding Gender-Based Violence (GBV); women empowerment and its implication on Violence Against Women (VAW); the role of men in eradicating violence in the society; the socialization process and its effect with regard to GBV; and VAW and HIV/AIDS.

## **RESEARCH PRIORITY 26: BUSINESS AND ECONOMICS**

### **Research Area 26.1 *Micro and Small-Scale Enterprise Development and Entrepreneurship***

Given the fact that most economic activities take place in a relatively few large-scale businesses and many small-scale businesses, the micro- and small-scale enterprise (MSE) sector contributes about 67% of the employment to the total labor force in most of the developing countries. For instance, in the capital city of Ethiopia, Addis Ababa, 60% of the dwellers benefit directly or indirectly from MSE activities, both formal and informal. Hence, this calls for special promotional work and intervention of policy makers, researchers, and other development agents into this sector. In Ethiopia the labor market is very underdeveloped, lacking in diversity and alternative opportunities. Youth unemployment is pervasive at about 90% of the total number of unemployed people. The Central Statistics Authority reported that there is a slight decline in the unemployment rate in urban areas but still the percentage is significant. There is still a significant disparity between the male and female urban residents in terms of unemployment. A significant percentage of females are reported to be unemployed as compared to males. As a result, a detailed research work and policy engagement is required in order to identify the sources of disparities and propose a sound policy option to be implemented.

Ethiopia is growing fast and the income gap between rich and poor is growing. The number of graduates from TVETs and universities is increasing. An increasing number of young people are migrating from rural to urban areas because of growing landlessness and interest in urban life style. As a result, there is

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undeniable need for employment creation for the young to act against the mounting unemployment in Ethiopia. The labor intensive, easy entry, small investment cost, and less skill (knowledge) requirement of micro and small businesses have a crucial role in income generation and better distribution of income for the unemployed youth. Therefore, micro- and small-scale enterprises (MSEs) are the number one priority area for the Ethiopian government to be used as instruments for creating employment opportunities for the unemployed young as well as for fresh graduates from technical and vocational schools. The Ethiopian government recognizes in its Growth and Transformation Plan (GTP) the significance of this sector and has developed a National Micro- and Small-Scale Enterprises Strategy document to promote and create a dynamic private sector. However, no systematic evaluation, revision, and study has been made that would help to identify important policy options that can be used to revise and update policies in Ethiopia. Moreover, there is little empirical research on this area viewing the issue from the perspectives of the youth despite the fact that micro and small businesses are the dominant operators in the Ethiopian economy. Hence, this thematic research will identify important policy options that are useful for utilizing the potentials of the sector. This thematic research is expected to produce policy relevant quantitative and qualitative research outputs for policy and academic inputs.

### **Research Area 26.2 *Local Governance and Economic Development***

Local governance and local economic development are on the frontier of development discourse. Unlike the previous approach that focused on state institutions as the only actors of development, the concept of governance now involves multiple actors from multiple sectors sharing decision-making authority when undertaking public affairs. It involves a continuous and complex process

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while multiple actors are engaged in the common agenda of local economic development to the benefit of the local citizens in general and the poor in particular. However, the success of local governance in achieving local economic development greatly depends on its arrangements as explained by the fact that different localities are registering different successes in their development endeavors. Thus, it is quite imperative to undertake research in this area to capture the experiences and challenges of decentralized local governance and economic development in post-Derg Ethiopia.

#### **Research Area 26.3 *Public Sector Financial and Fiscal Management***

The public sector is under continuous pressure to adopt management systems that are responsive to the changing global, national, and local needs. Resource is increasingly getting scarce while public demands and needs are increasing and getting complex. Moreover, Ethiopia has been experiencing a federal structure over the last two decades, which demands an effective inter-governmental fiscal policy and management frameworks. Research in public finance and fiscal management is, thus, a top priority to improve the allocation and utilization of public funds to meet the growing and complex needs of citizens driven by competing political and social interests.

#### **Research Area 26.4 *Urban Governance and Development***

Ethiopia's urban centers are characterized by a poorly developed economic base, a high level of unemployment, and a worrying incidence of poverty and slum neighborhoods. The overall urban unemployment rates as registered in the Urban Biannual Employment and Unemployment surveys of October 2008 and April 2009 were 26.2% and 22.9%, respectively. Achieving Millennium Development Goal 7, Target 11 – improving the quality of lives of slum dwellers – is a major

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challenge. Studies made in the last five years conclude that only 30% of the urban housing stock is in good or fair condition. Inadequate shelter, combined with poor sanitation; overcrowding and a high proportion of vulnerable women, youth, children, and elderly and destitute people with very low incomes result in a high risk of disease and puts many urban residents in a poverty trap. In order to make these urban centers play their roles, multiple jobs must be done. These make urban governance and development issues multi-sectoral and multi-dimensional. If left unattended, this process may result in unwanted consequences, both for businesses and urban development. It is, therefore, vital and timely to seek appropriate strategies that lead to deliberate actions on the part of the public and the private sectors and researchers to contribute to proper urban management and development.

### **Research Area 26.5 *Supply Chain Management and Value Chain Analysis***

The need for managing supply chain and adopting supply chain management practices through integration with partners is inevitable for Ethiopian firms because it is not only a source of competitive advantage for these firms. It is also a matter of survival for them as the firms are already in the global market competing with global companies. Because of information asymmetry by some players, the bullwhip effect has been created (in a number of occasions) - the distortion in information with regard to availability of goods (stock out/shortage) in the market which is magnified as one goes from market (buyer side - downstream) to supplier (upstream side). This has aggravated inflation caused by multiple factors. Therefore, an effective and holistic approach to the management of market players from source to end in an integrated way through value chain analysis is an essential research area that would help address the problems of inflationary pressure and price speculations.



### ***Research Area 26.6 Corporate Social Responsibility and Corporate Governance***

Effective corporate social responsibility and governance mechanisms are imperative for ensuring the internal health of a firm, safeguarding wealth maximization interest of shareholders, as well as the interests of the society at large. Private sector development in Ethiopia is a recent phenomenon and, thus, the practice of effective corporate social responsibility and governance is at its infant stage. There is a strong need to assess and analyze the state of legal frameworks and practices of corporate social responsibility and accountability at the national level.

### ***Research Area 26.7 Adoption of International Financial Reporting Standards***

Ethiopia is pursuing an aggressive growth plan as it is evidenced by its Growth and Transformation Plan (GTP). Many business organizations are flourishing in Ethiopia based on the opportunities the government has opened for privatization. Many foreign investors are interested in investing in Ethiopia. However, Ethiopia does not have its own accounting and auditing standards. There is evidence that shows that there are no uniform accounting and auditing practices in Ethiopian industries. Some of the practices were imported from the USA and others from the UK. On the other hand, most business schools in Ethiopia train graduates predominantly based on USA accounting and auditing systems. Thus, there is no uniform accounting and auditing practice in the country. Lack of a uniform accounting practice can affect the confidence of both local and international investors, and, in turn, affect the investment activities in the countries. Thus, this project aims at finding a solution as to how Ethiopia can have a uniform accounting standards.

***Research Area 26.8 Stock Market Development and Financing Investments in Ethiopia***

Although there are many companies and organizations in Ethiopia, the country does not have stock market at all. This seriously affects the ability of firms to raise funds from financial markets. On the other hand, stock market establishment requires adequate infrastructures such as a strong legal system, appropriate accounting and auditing standards, good corporate governance, and so on. Thus, this project aims at examining whether it is the right time for Ethiopia to establish stock markets given the low level of development of infrastructures needed to operate stock markets.