



KWAME NKRUMAH UNIVERSITY OF
SCIENCE AND TECHNOLOGY
KUMASI

RESEARCH REPORT

2017





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VISION

To be globally recognized as the premier centre of excellence in Africa for teaching in Science and Technology for development; producing high calibre graduates with knowledge and expertise to support the industrial and socio-economic development of Ghana and Africa.

MISSION

To provide an environment for teaching, research and entrepreneurship training in Science and Technology for the industrial and socio-economic development of Ghana, Africa and other nations. KNUST also offers service to the community, is open to all the people of Ghana and is positioned to attract scholars, industrialists and entrepreneurs from Africa and the international community.



PRINCIPAL OFFICERS



Otumfuo Osei Tutu II
Chancellor



Dr. Kwame Saarah-Mensah
Chairman of Council



Professor Kwasi Obiri-Danso
Vice Chancellor

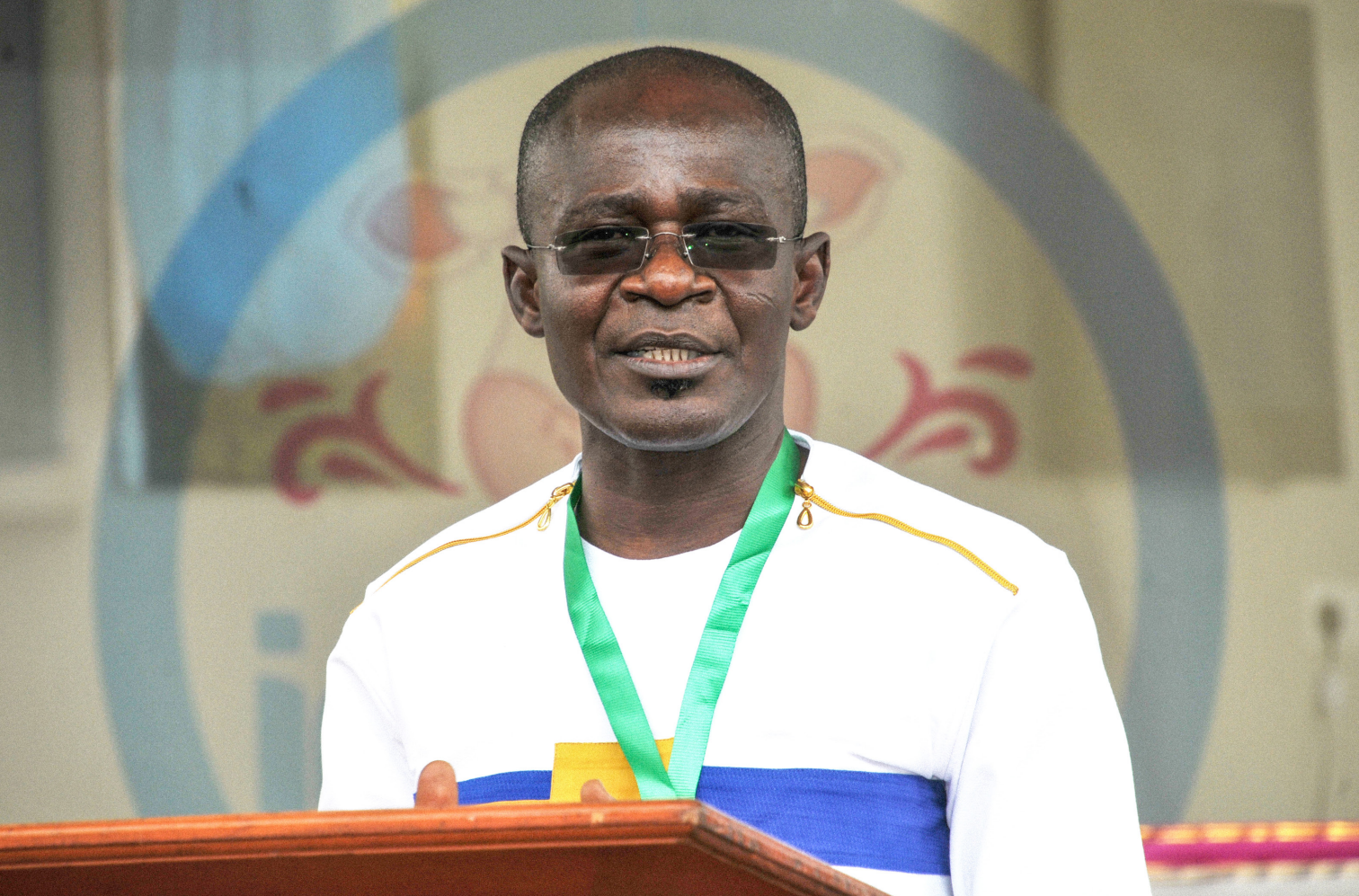
Other Officers



Rev. Professor Charles Ansah
Pro Vice-Chancellor



Mr. Andrews Kwasi Boateng
Registrar



FOREWORD

Kwame Nkrumah University of Science and Technology (KNUST) continues to play a significant role in developing human resource capacity in Ghana, Africa and the world through teaching, research and community service. This commitment is in fulfillment of our core mandate of undertaking cutting-edge research and disseminating the knowledge gained to impact society.

A few years ago, the university reaffirmed its resolve to *“reposition the University as a global institution for Science and Technology with national development as the focus”* by embarking on several initiatives that promote research. These steps included the annual increment of the amount set aside for the KNUST Research Fund and the strengthening of the Office of Grants and Research to effectively manage grants from the pre-award to close-out stages.

The work of the Office of Grants and Research has yielded significant results leading to the increase in the number of research proposals submitted to funding institutions and a corresponding increase in the number and size of grants awarded to KNUST.

KNUST in the coming year, will invest more resources into building the capacities of its early career researchers to attract more external funds. It will also upgrade key research facilities in the various Colleges and intensify research uptake for industrial development.

I congratulate the Office of Grants and Research (OGR) for a good work done and encourage them to continue charting new productive causes for the university. The lecturers and researchers of KNUST have proven that they are equal to the task of leading technological development of Ghana. KNUST cherishes its relationship with industry and donor agencies and would continue to strengthen this relationship. As a university, we will take this collaboration further to enhance the teaching, training and research activities.

K. Obiri-Danso

Professor Kwasi Obiri-Danso
Vice Chancellor



Message from Director



The Office of Grants and Research (OGR) of KNUST has since its establishment provided relevant research support services to the KNUST. We are happy to have made significant improvements in the research environment of the university by providing the desired assistance to the university community for building partnerships to address research issues pertinent to Ghana, Africa and beyond.

This report has been put together with the help of staff of the Office of Grants and Research in the various colleges, the University Relations Office, Quality Assurance and Planning Unit (QAPU), University Printing Press (UPK), Provosts, Deans, Heads of Departments, individual researchers and administrators. I appreciate their commitments to the course of research at KNUST. I also appreciate the tremendous support that the Vice Chancellor has offered to the Office of Grants and Research in general and particularly to seeing KNUST becoming a research-intensive university.

The report contains information on ongoing research, achievements of KNUST researchers and other research highlights of the year 2017. During the year, OGR achieved some major milestones including the development of policies to standardise research activities and provision of ethical guidance to facilitate the transition of young researchers into independent researchers and leaders. The Office of Grants and Research also successfully administered the 3rd KNUST Research Fund (KReF) and is monitoring the previous awards to ensure strict compliance.

Going into the New Year, OGR has planned a number of activities to further strengthen capacity for research work at KNUST, these include:

1. Research uptake
2. Revision of KNUST research policy
3. Development of new policies (e.g., Indirect Cost Policy, Efforts and Compensation Policy, Guidelines and Procedures on Concept Note and Proposal Development and Policies and Procedures for Research Project Close-Out)
4. Grantsmanship and proposal review workshop

It is hoped that the services provided by ORG for researchers at KNUST will make more impact in the coming years and the knowledge derived from our research will feed into industries, and lead to sustainable development.

R.C. Abaidoo

*Professor Robert Clement Abaidoo
Director, Office of Grants and Research*



Overview of Office of Grants and Research Activities

Introduction

The fundamentals of the work of the Office of Grants and Research are Research Management and Administration (RMA).

Research Management and Administration (RMA) can be defined to include any action that a university can take to improve the effectiveness of its research, but which is not part of the research process itself.

Examples are:

- measures to help improve academic awareness of funding opportunities
- assist researcher to present their ideas more effectively to donors
- advice to ensure that research is appropriately costed and takes place on terms that are advantageous to the university,
- researchers meet their obligations to sponsors in a timely way, and
- effective dissemination of research results

Background of OGR

The OGR was established under the Vice-Chancellor's Office in January 2013 as the University's central unit for facilitating and coordinating grant and research administration at KNUST. The establishment of the Office was facilitated by the Initiative on Research and Innovation Management (iRIM) grant, funded by the USA National Institutes of Health (NIH) under the Medical Education Partnership Initiative (MEPI). The aim of the Office is to support the growth of the research enterprise of the University by providing a one-stop-shop for accessing grant and research administrative support, staff with research management expertise and a proactive pursuit of sponsored research. A decentralised research management structure has

been developed and it is made up of a central office (OGR) and a network of Research Offices in the Colleges and other units.

Vision

The vision of the Office is to be a Centre of Excellence for research support services facilitating a stimulated, well supported, accountable and expanded research enterprise at KNUST and beyond.

Mission

The mission of the Office is to help achieve the University's mission by providing support and expertise in research administration and management while ensuring the required compliance.

To achieve this, OGR seeks to:

- Build research management expertise in the University
- Establish and standardise processes and practices in research administration
- Give the necessary support to researchers throughout the research process
- Provide the necessary training for researchers
- Assist in obtaining the necessary resources for research
- Facilitate valuable partnerships that will enhance the institution's research agenda
- Ensure protection of the university's interests in research related matters
- Ensure accountability to external funding sources

Core Values

- Professionalism - meeting our clients' expectations to the highest standards.
- Good stewardship - planning and managing resources effectively to achieve set goals.



- Integrity - adhering to moral and ethical principles in the discharge of our duties.

OGR Advisory Board

The Office has a ten-member Advisory Board chaired by Prof. Rev. Charles Ansah, Pro Vice-Chancellor. The Board has been instituted to give direction and institutionalize the agenda of the Office.

Activities of OGR

Management of KNUST Research Fund

The KNUST Research Fund (KReF) was established in 2015 to stimulate research and build capacity of staff and departments in grant proposal writing. It also seeks to encourage interdisciplinary research among staff, and enhance collaboration and linkages among disciplines within the University as well as external partners for the socio-economic development of Ghana in particular and Africa in general. The KReF's main focus is to support applied, problem solving and interdisciplinary research so as to prepare beneficiaries to apply for external grants.

Support for Proposal Development and Award Management

The Research supports services provided included:

- Dissemination of funding opportunities
- Proposal advisory development and services
- Proposal submission assistance
- Processing of grants and sub-contracts
- Provision of resources to support applications

Funder Registrations

In line with its mandate OGR does registrations with funding agencies as well as regular renewal of existing ones and keeps records so that staff can access these for use during grant applications.

Staff Training

Training session for staff includes both collaborations and those organised solely by OGR. These sessions are organized to give participants the opportunity to learn about the administrative aspects of Proposal development and how to 'hunt' for funding opportunities. There are periodical in-house training sessions for the College Research Administrators to build their capacity to better serve the researchers in their colleges.

Development of Research and Grants related Policies

- Efforts and Compensation
- Indirect Cost Rate
- Conflict of Interest
- Principal Investigator's (PI's) Hand Book

Development of Software for Information Management

- Research Management Information System – REMIS
- Grants Accounting Management System – GAMS

Publications & Circulation

- KNUST Research Report
- OGR's News Letter



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ACADEMIA-INDUSTRY COLLABORATION

ACADEMIA-INDUSTRY COLLABORATION

The TCC-Ade Collaboration: QueenTech

QueenTech is a social venture created by the Affordable Design and Entrepreneurship (ADE) program at Olin College and Babson College in collaboration with the Technology Consultancy Center (TCC) at KNUST. The venture is aimed at providing an opportunity for women producing gari in rural areas to improve their lives economically by providing efficient motorized mini cassava graters and presses at affordable prices and flexible payment terms with no interest. This is a great relief to women in gari processing as the machines are affordable, efficient, food safe and portable. The machines have been piloted in the Asante Akyem area of the Ashanti Region of Ghana for a little over twelve months and are performing efficiently.

Engineering and Business students from the Olin College of Engineering and Babson College, who take up the ADE class continue to work on the cassava grater and press to make it a success and more available to women involved in the production of gari. This is done together with stakeholders at TCC, KNUST and fabricators at the Intermediate Technology Transfer Unit (ITTU) to build, test, distribute and maintain the machines.



Assembling a motorized mini cassava grater and press



Engineering and Business students from the Olin College of Engineering and Babson College on the Queentech project

KNUST RESEARCH FUND (KReF)



KNUST RESEARCH FUND (KReF)

Sustainable Environmental Sanitation through Design

Dr. Edward Appiah of the Department of Communication Design and his team comprising Mr. Justice Acheampong, Mr. George Sarfo and Prof. Rexford Assasie collaborating with the Health Education Unit, KMA received an amount of GH¢29,700.00 (Twenty-Nine Thousand Seven Hundred Ghana Cedis) from the KNUST Research Fund to research on a topic titled “Sustainable Environmental Sanitation through Design”

The aim of the research is to use the participatory design-thinking approach within the ambits of Design for Social Innovation to help create a sustainable clean environment by co-designing and co-creating with the community; as a way of changing the mind set and behavior of the citizens and thus, creating a sustainable clean environment.

Tasks accomplished so far include:

- Scheduling of participatory events involving citizens, experts, cooperating partners, employees of related agencies related to waste management and other interested parties (landlords and tenants on the streets).
- Six focus group discussions and interviews with landlords, tenants, and residents on the streets have been carried out in mapping out rubrics for the project.
- Three conventional events involving stakeholders (chiefs, Assemblyman and some of the landlords), at public hearings, have been held throughout the process. These events were typically open events in public, which featured the presentation of some specific aspects of the project (e.g., the idea development issues or accessibility issues), followed by open discussions. Ethnography activities had already taken place prior to all these.

The expected outcomes of the study are to:

- Create a well-managed environment
- Create a system that indicates an environmentally friendly community with respect to the management of solid waste with stake-holders
- Show indication of being conscious of maintaining a high level of cleanliness in terms of waste disposal and garbage collection.

From a citizen-focused point of view, the participatory design process is useful as a method and a tool for strategic change because it takes a user-centered perspective in the development of new processes, products and services as opposed to focusing on internal hierarchies or traditional core capacity structures.

Mobilisation of IGF by MMDAs in Ghana: A Comparative Study of Six MMDAs

Dr. Clifford Amoako of the Department of Planning and a team of researchers made up of Dr. Ronald Adamtey and Prof. R. Dinye of the Centre for Settlement Studies undertook a project titled “Mobilization of IGF by MMDA in Ghana: A Comparative Study of MMDAs” The project which is expected to run from October 2017 to February 2019 was funded by KNUST (KReF) with an amount of GH¢29,850.00 (Twenty-Nine Thousand Eight Hundred and Fifty Ghana Cedis).

The project seeks to:

- Identify the factors that explain why some MMDAs perform well by mobilizing sufficient Internal Generated Fund.
- Identify the factors that explain the non-performance of the MMDAs in the mobilization of IGF.
- Make practical recommendations to improve IGF mobilisation at the MMDA level



The project has been approved and literature has been reviewed. Preparation for field data collection is ongoing.

It is expected that four academic papers will be published from the findings, quarterly research reports written and stakeholders' dissemination workshops involving MMDA's organised.

Assessment of Renewal Energy Technologies as Off-Grid Power Solutions in Ghana

With a \$89,723 (Eighty-Nine Thousand Seven Hundred and Twenty-Three Dollars) award from the KNUST Research Fund (KRef), Mr. Ishmael Edjekumhene and his team of researchers, Prof. Daniel Inkoom, Dr. Ocloo Kafui, Dr. Akosua Amaka-Otchere and Mr. Charles Owusu in collaboration with the Kumasi Institute of Technology, Energy and Environment (Kite) are working on the project titled "Assessment of Renewal Energy Technologies as Off-Grid Power Solutions in Ghana", which is also partly funded by African Development Bank.

The project started in April 2017 and will end in June 2018. It seeks to gather evidence on the extent to which off-grid mini systems have addressed the energy access challenge.

The research team has so far completed data collection and is on analysis, report writing and publication. A report and journal publication are expected on completion of the research.

Assessing the Impacts of Climate Change on Small Reservoir Irrigation Projects in the Sahelian Region of Ghana

The KNUST Research Fund (KRef) supported the project "Assessing the Impacts of Climate Change on Small Reservoir Irrigation Projects in the Sahelian Region of Ghana" with an amount of GH¢10,000 over a period of one year.

Dr. Kwaku Amaning-Adjei of the Department of Civil Engineering is leading the project with Dr. Kafui Ocloo of Department of Planning.

The aim of the research is to:

- Assess current farming practices and uses of small reservoirs.
- Quantify the potential effects of climate change on small reservoirs
- Evaluate strategies local farmers have been using to manage their water resources against climate change.
- Propose locally based adaptation measures.

Data collection has been done and there have been two articles developed for publication. It is anticipated that the project will train Agric extension agents in climate change adaptation strategies as well as in determining techniques. The agents expressed their desire to have further training to acquire more knowledge. Funding is being sought for the training.

Predictors of Suicide among University Students

Previous studies have shown that students lacking emotional and or familial support funding their university education are at the risk of psychological distress. It is expected that younger students who lack adequate support or good social networks will show greater vulnerability to mood disorders and consequent suicidal ideations and attempts. Persons with premorbid psychological conditions are also expected to be more at risk for suicide ideations and attempts.

The impact and relevance of findings are deemed important for early intervention and preventive response because early identification is associated with good resolution. To curb the occurrence of suicide ideations and attempts on the university campus, delineation of associated vulnerability factors among students is imperative.

It is on this basis that Dr. (Sr.) Frances Emily Owusu-Ansah from the Department of Behavioural Sciences and her team researched on the title "Predictors of Suicide Among University Students" with a budgeted amount of GHS9,500.00 support from KRef. The project began in 2017 and ends in 2018.

So far, ethical clearance is being sought and data collection instruments are being reviewed for the commencement of data gathering.



Motor Vehicles as a Potential Pathway of Invasive Plants Introduction: Example from Ghana's Land Borders

The risk of humans unintentionally dispersing seeds on their vehicle is growing with increasing movement of people across international borders. The number of vehicles entering Ghana from its neighbouring countries, for instance, has increased dramatically. Ghana has limited capacity to respond to plant invasion, so all potential pathway of introducing non-native species need critical attention. Nevertheless, the potential for vehicles crossing our land entry points to serve as agents of introducing non-native species into the country has received no attention.

The Lead Investigator, Dr Michael Ansong was awarded a seed grant of GH 10,000.00 from KREF with a project period of One (1) year. The research will assess the potential of vehicles crossing Ghana's main land entry points to carry seeds of non-native species. The study will quantify the average amount (species and their abundance) of seeds transported on vehicles entering the country. Mud/dust will be brushed and scraped off from different parts of sampled vehicles to assess the presence of seeds. The results would yield a more complete picture of how non-native plant species can be introduced into the country via human mediated dispersal. This will inform strategies to mitigate invasive seed dispersal, and draw attention to motor vehicles as dispersers of plant seeds across international borders.

and project initiation meetings with the management of Komfo Anokye Teaching Hospital and study staff.

The development of the mobile application is ongoing and it is hoped that the App will provide a quick avenue for information among health professionals and the general public; and also cut down the cost of running several hard copies of schedules across the entire hospital. When completed, the App will reduce the time the health staff use to access health related information for patient care, and overall, improve access to health care services by the public. The project is supported with GHC 26,000 funding from the KNUST Research Fund (KReF). Other members of the team are Ing. Dr. Emmanuel Kofi Akowuah, Department of Computer Engineering, Francis Adjei Osei, Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR) and Dr. Sam Newton, School of Public Health, all in KNUST. The App is expected to be ready by September, 2018.

Mobile App to support Efficient Hospital Communication and Patient Care in Tertiary Hospitals in Ghana – Proof of Concept Study in Komfo Anokye Teaching Hospital

A project team led by Prof Daniel Ansong, Department of Child Health, is developing a mobile application that will promote and facilitate internal communication and information transfer among the various health staff involved in patient care. The App will be used to access information on hospital services and facilities, and also provide academic and non-academic clinical support information for staff of the hospital. It will also monitor and evaluate the usability and operational challenges involved in implementing a mobile App in a tertiary hospital. The team has held its stakeholders

RESEARCH ACTIVITIES IN THE COLLEGES



COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

Feed Improvement and Efficiency Strategies for Poultry and Layer Industries in Ghana



Maize emptied into receiving bags after drying with SBHD

With support from the United Nations Department of Agriculture, KNUST through the Department of

Crop and Soil Sciences, is coming out with effective ways of feeding Ghana's poultry industry. The "*Assisting Management in the Poultry and Layer Industries by Feed Improvement and Efficiency Strategies in Ghana (AMPLIFIES-GHANA)*" project seeks to improve the poultry and layers industry by reducing the cost of feed manufacturing and increasing the use of appropriate ingredients in poultry feed. The project, since its inception in 2016, has trained targeted stakeholders including feed manufacturers, maize and soyabean aggregators and poultry farmers using Post-Harvest Technical Officers (PHTOs), on some of the most efficient ways of improving poultry feed. The PHTOs are also working with Farmer Based Organizations (FBOs) to improve their organizational capacity, reduce inefficiencies in harvesting, post-harvest handling, storage and marketing, and ultimately increase their linkages with feed processors. By 2019, the target areas are expected to record greater reduction in post-harvest



resources and improved efficiency in feed management. The project is led by Dr. E. A. Osekere of the Department of Crop and Soil Science in collaboration with the

Adventist Development and Relief Agency (ADRA), Ghana.



Solar Biomass Hybrid Dryer (SBHD) built by AMPLIFIES Ghana Project (KNUST) at Agona-Jamasi

Supporting Investment Decisions in Land and Water Management Activities across the Volta-Niger Focal Region, Ghana. “Invest-in-Water” Project

The research was funded by International Water Management Institute (IWMI) - Ghana with an amount of (USD 80,364). The project team was made up of Dr. Fred Nimoh and Prof. R.C. Abaidoo as project coordinator and Director respectively and Dr. K. Ohene-Yankyera, Dr. Robert Aidoo, Dr. Dadson Awunyo-Vitor, Dr. Collins K. Osei, KNUST, Dr. Bedru B. Balana, IWMI-Ghana, Paulina S. Addy, WIAD and MoFA-Ghana. It was scheduled to commence on January 2015 and end in February 2017.

A number of agricultural water management (AWM) and resource recovery and reuse (RRR) solutions for improved agricultural productivity have been proposed and technically verified in the Volta-Niger region, especially in Ghana and Burkina Faso. However, their effectiveness in terms of multiple ecosystem services delivery, environmental health, adoption factors and returns on investment (RoI) are largely unknown and the potential of some interventions might be over- or undervalued. Therefore, this project assessed the

effectiveness, adoptability and returns on investment (RoI) of some of these solutions, using ecosystems approach, to draw lessons and recommendations for their scaling up and business feasibility potential. Specifically, the study identified, valued and assessed the effectiveness of ecosystem services (ES) provided by small water infrastructure/reservoirs (SWIs) and the financial and economic viability of the SWIs in Upper East region of Ghana. The study also assessed the constraints and adoption of resource (water) recovery and reuse (RRR) interventions for crop (vegetable) production in Greater Accra Region, Ghana. Four MPhil Agricultural Economics students, in the Department of Agricultural Economics, Agribusiness and Extension of KNUST, received scholarships to work on the various objectives of the project.



Feasibility of Sustaining Land and Water Management (SLWM) Activities through Payment of Ecosystem Services (PES) Market Mechanism in Northern Ghana

The Sustainable Land and Water Management Project (SLWMP) as implemented by the Ministry of Environment, Science, Technology and Innovation (MESTI) is promoting the adoption of sustainable and climate resilient agricultural and land management practices from a menu of SLWM technologies to improve the livelihoods of the smallholder farmer in Northern Ghana. Support for the adoption of SLWM technologies is expected to be linked with the Environmental Services (ES) to be generated by farmers, as approximated by an environmental index. This study assessed the feasibility of sustaining SLWM activities through Payment-for-Environmental Services (PES) market mechanism to encourage the adoption of SLWM practices in targeted areas within the three northern regions of Ghana with potential for spatial expansion. The specific tasks were to: identify ES of interest to the SLWMP such as carbon sequestration, watershed protection, and biodiversity in the three northern regions; identify, inventorize and rank land uses and management practices that augment the desired ES; estimate the short- and long term benefits and costs of land use change and SLWM technologies for the desired ES; investigate and discuss the key barriers/ constraints to and opportunities of the adoptions and up-scaling of SLWM technologies for the desired ES; undertake a brief review of international experience in PES development and implementation for short-term adoption of productive land uses and long-term mechanism to induce maintenance of conservation of land uses for potential adoption for the SLWMP; and recommend appropriate PES schemes for selected land uses and SLWM technologies, taking into account the short-and long-term benefits and risks to sustainability.

The project was of one year duration from January-December 2015, led by Dr. Fred Nimoh Department of Agricultural Economics, Agribusiness and Extension, KNUST and Mr. Thomas Adjei-Gyapong, Dr. Bright Amegashie and Prof. Charles Quansah Department of Crop and Soil Sciences, KNUST as research team members in collaboration with EPA-MESTI, Ghana and MoFA, Ghana. MESTI, Ghana funded the project with an amount of USD 22,000.00.

Charcoal production as a Livelihood Strategy and its associated Environmental Challenges

The Access and exclusion along the charcoal commodity chain in Ghana (AX) Project was initiated in the year 2015 to provide insight into the political economy of the charcoal commodity chain in Ghana by describing and analysing the processes of access and exclusion of actors along the charcoal chain. It further explores the critical role of charcoal as a livelihood strategy and the associated environmental outcomes. The project is expected to train three (3) PhD and six (6) MSc/ MPhil graduates. Two district charcoal platforms and a national stakeholder forum will also be established to foster greater awareness amongst different stakeholders, and improve the capacity of actors to be involved in policy discussions. The project is being implemented under the leadership of Dr Emmanuel Acheampong of the Department of Silviculture Forest Management with funding support from DANIDA.



A charcoal producer demonstrating how charcoal is produced



A pile of charcoal ready for the market



Species Invasion of Ghanaian Forest Landscapes

The research led by Dr. Boateng Kyereh in collaboration with the Forest Research Institute of Ghana has provided financing for the training of two students (PhD and MPhil) starting from 2011-2018. With three alien tree species, the study is aimed at determining the environmental and socio-economic conditions that enhance species invasion in natural and semi-natural plant communities in Ghana and the effect invasive species are exerting on natural vegetation. Three scientific papers have been published in peer-reviewed journals to enhance research capacity and knowledge in invasive ecology.

Patterns and Drivers of Forest Cover Loss in the High Forest Zone of Ghana

This research attempts answering questions related to how forest management regimes impact on forest cover loss across environmental gradients. The research focused on the different ways in which drivers of forest cover loss manifest in different management regimes and ecological zones and what their specific underlying causes are. The research project is expected to produce one PhD thesis, three scientific papers in peer-reviewed journals as well as develop capacity in dealing with deforestation and forest degradation in Ghana. The five-year project started in 2013 and is expected to be completed by 2018. The research team is composed of Dr. Boateng Kyereh as the principal investigator, Dr. Winston Asante and Frank Ankomah (PhD Student).

Influence of Management on Tree Productivity and Carbon Stocks of Teak Plantations in Ghana

This study seeks to assess the influence of management practices on tree biomass, carbon stocks and soil nutrient variability in teak plantations. The essence is to determine forgone benefits associated with the less intensive silvicultural practices being used by the Forestry Commission and smallholder plantation developers to manage teak plantations in the country. Outcomes of the project include one PhD thesis, three scientific papers published in peer-reviewed journals and capacity building in forest plantation management in Ghana. The project is led by Dr. Kyere Boateng.

Spatial Knowledge Management in Forest Fringe Communities

With funding of €75,000.00 from NUFFIC and Tropenbos Ghana, the project seeks to examine how knowledge production, brokering and use of multilevel governance can contribute to the empowerment of local communities living around forest reserves to enable them contribute effectively to sustainable forest management and derive corresponding benefits from forests. The project duration is 4-years (2014-2018). Collaborating with University of Amsterdam and Tropenbos Ghana with Boateng Kyereh (PhD) as the Principal Investigator working with Joana B. Echeruo (MSc) as group members.

The Influence of Land Tenure and Ownership Regime on Sustainable Conservation of Mangroves in the Songhor and Keta Lagoon Complex Ramsar Site

The project was led by Winston Asante (PhD), Boateng Kyereh (PhD) and Emmanuel Acheampong (PhD) as team members. With GHS 10,000.00 funding from SNV Netherlands Development Organization, the study sought to explore how mangrove landscape management and conservation interventions could be balanced with sustainable utilisation at the Songor and Keta Lagoon Complex Ramsar sites. The focus was particularly on how improved forest governance could enhance vegetation recovery and better sequestration of carbon dioxide. The study had a duration of 2-years, from 2015-2017.

Integration of Smallholder Forest Plantations into Productive Landscapes

The project seeks to integrate smallholder forest plantations into productive landscapes, by identifying barriers to forest plantation development by farmers in off-reserve areas and options for addressing the barriers. The four (4) year project starting from 2014-2018 has funding support from Tropenbos Ghana. The research team is composed of Dr. Boateng Kyereh (lead investigator), Eric Kumeh Mensah, Eric Osei-Appiah and Emmanuel Owusu as MPhil students. The team is working in close collaboration with Tropenbos Ghana,



Forestry Research Institute of Ghana and Resource Management Support Centre.

KNUST and DTU Establish Fish Nutrition Lab -Sustainable Fish Feed Project

KNUST and the Danish Technical University are collaborating on a “Sustainable Fish Feed Project”. With funding support from DANIDA, the three (3) year project seeks to develop cost effective and environmentally friendly feeds for tilapia culture in Ghana using locally available agro by-products (soybean, copra, cotton seed and groundnut meals), and to build capacity in the area of feed development. As part of the project, field trials were conducted in cages on the Volta Lake, and ponds and tanks created at KNUST with the two best performing diets. Through the project a Fish Nutrition Laboratory has been established, a solar powered Guelph tank system has been acquired with an increase in the number of ponds the Department farm has. The project has also added onto the water quality equipment in the Department. Students in the Department have greatly benefited from this project through improved teaching as well as access to equipment for hands-on-training. Two students presented their work at the World Aquaculture Conference in 2017 in Cape Town, South Africa. Some project activities can be found at: <https://www.facebook.com/dfwm.KNUST/>. The project was led by Prof. Steve Amisah (Principal Investigator), Dr Daniel Adjei- Boateng (Co-PI), Drs. Regina Edziyie, Benjamin Campion and Nelson Agbo all from the Department of Fisheries and Watershed Management. the project was funded by DANIDA with an amount of DKK 4,999,162.

Assessment of the Contribution of Non-Timber Forest Products (NTFPs) to Sustainable Rural Livelihood

Dr Camillus Abawiera Wongnaa and his team made up of Dr Evans Ewald Nkrumah, Dr. Kwasi Adu Obirikorang and Dr Michael Michael Ansong in collaboration with the United Nations University in Tokyo, Japan conducted the project, with US\$ 25,000.00 funding from the African Development Bank, Abidjan, Ivory Coast. The project has three broad objectives which are set to be realised and are categorised in the writing of a book chapter on Rural-Urban Linkage, provide scholarship to ESDA MPhil SIRDA Students and the undertaking

of empirical research to assess the contribution of non-timber forest products (NTFPs) to sustainable rural livelihood. The study identifies commercially important NTFP species of rural communities in the Ashanti Region, determines perception and attitudes of rural dwellers towards NTFP harvest among others. The project has a One (1) year period and it is in its final phase.

Forests 2020 Project

The Project seeks to overcome technical and infrastructure limitations in Ghana to implement effective forest monitoring, evaluation, reporting and learning, in order to measure forest change and understand risks and drivers of forest loss using Earth Observation. The Principal Investigator is Winston Asante (PhD) with Emmanuel Acheampong (PhD) and George Ashiagbor (MSc) as the team members, with funding from the UK Space Agency and collaboration with the Resource Management Support Centre (RMSC) of the Forestry Commission of Ghana, University of Edinburgh, CarboMap, UK, University of Leicester and the Ecometrica Ltd., UK. The project seeks to address the Challenges related to accuracy, frequency, speed, and delivery of EO data products in forest monitoring and how they may be overcome, measurement of forest change and understanding of risks and drivers of forest loss using Earth Observation to improve the situation. The following are the expected outputs of the project:

- Development of approaches for participatory forest monitoring
- Improved expertise in segregation of agricultural tree crops from forest tree
- Improved expertise in dealing with challenges related to persistent cloud covered landscapes in forest monitoring
- Improved expertise in mapping and monitoring forest degradation



Participants of an EO (Earth Observation) Lab training for forestry stakeholders



Interacting with community stakeholders

Managing Shade Trees in Smallholder Cocoa Farms for Climate Change Adaptation and Mitigation

With funding from SNV Netherlands Development Organisation, Ghana, the study explores the crown and phenological perspectives of shade trees to provide guidance on the selection of tree species with the dendrometric attributes which will provide effective shading to cocoa systems. It seeks also to explore the contribution of shade grown cocoa and agroforestry systems to the mitigation of climate change and effective response to the impacts of reduced rainfall and long dry spells as well as high temperatures. These are being looked at in terms of shade tree diversity, factors influencing shade tree incorporation or removal as well as total biomass carbon stocks. The project is led by Winston Adams Asante (PhD) as the Principal Investigator and Boateng Kyereh (PhD), Glen Asomaning, Nuamah Seth Kankam and Ahoma Gabriel as group members. The project has a time span of 4 years, from 2016-2020.

Promoting Biodiversity in Sustainable Oil Palm Landscapes for West African Smallholders

Winston Adams Asante (PhD) of the Department of Silviculture and Forest Management led the project in collaboration with the University of Leeds, University of Yorke, Nature Conservation Research Center (Ghana) and Roundtable on Sustainable Palm Oil (Indonesia). The project seeks to promote best agricultural practices that boost yields, minimise environmental damage and support RSPO-certification. With a 2-year duration and funding from the Darwin Initiative, UK the project will increase incomes and welfare of Ghanaian oil-palm smallholders, provide multiple co-benefits for biodiversity of birds and insects in oil-palm and adjacent rainforest, and ensure robust land-use planning leading to protection of high-conservation-value rainforest.

Decision Support for Restoring Ecological Networks in Rapidly Developing Biodiverse Countries

The project with funding from NERC (UK) seeks to develop an online spatial decision support tool to help decision-makers in developing countries plan robust and resilient habitat networks. The Lead Investigator Winston Adams Asante (PhD), collaborates with University of Liverpool and University of York. With a project period of 2 years (2017-2019), the study seeks to develop a decision support tool for planning land use in cocoa forest mosaic landscape.

Cage Aquaculture in Northern Region, Ghana: Enhancing Food Security and Livelihoods

Dr. Regina Edziye (Lead Investigator) and her team of researchers; Dr. Daniel Adjei-Boateng; Dr. Benjamin Campion, Department of Fisheries and Watershed Management, together with the University of Development Studies, Tamale, have assessed the potential of the Bontanga, Golinga and Libga irrigation reservoirs to grow fish for local consumption using high density low volume cages and to train the communities in all aspects of small cages of cage aquaculture.

Funded by the Australian High Commission in Ghana, the project received an amount of 59,740 AUD, and was



scheduled to last from 2016 through 2017. Through this project, 15 welders (artisans) have been trained in how to fabricate high density low volume cages (1m³) using materials readily available in the area. The artisans made the frames for the cages used under this project at the three different sites. Over 100 community members were trained in net making and in all aspects of fish farming. Two of the three communities are preparing to run cages on their own and the team hopes to continue to offer technical support through this period. The project also offered mentorship and training to one (1) MPhil student of KNUST.

Introducing Cage Aquaculture in Reservoirs in the Upper East Region

With a GHC 80,000 award from the World Bank /WARF project, Prof. Steve Amisah (Principal Investigator), Dr. Benjamin Campion (Project Coordinator) and a team of researchers comprising Dr. Daniel Adjei-Boateng, Dr. Regina Edziyie all of the Department of Fisheries and Watershed Management, assessed the feasibility of growing fish in cages and to determine the optimum capacity for fish culture in the Tono and Veve reservoirs in the Upper East Region.

Collaborating with the University of Development Studies and the Irrigation Company for the Region, the project has trained over 60 community members in all aspects of cage culture. One (1) MPhil student has also been trained. The project which commenced in 2015 is expected to end in 2017.

Optimizing the Use of Commercial Feeds in Semi-intensive Pond Production of Tilapia in Ghana; From Nursery to Grow-out

To contribute to national research capacity by providing scientific knowledge, and expand on the knowledge base of the tilapia industry in Ghana, the research team made up of Prof. Steve Amisah (Principal Investigator), Dr. Regina Edziyie (Co-PI), Drs. Daniel Adjei-Boateng, Nelson Agbo and Dr. Kwasi Adu Obirikorang of the Department of Fisheries and Watershed Management KNUST in collaboration with the Virginia Technical University and Purdue University, have researched on *“Optimizing the Use of Commercial Feeds in Semi-intensive Pond Production of Tilapia in Ghana; From Nursery to*

Grow-out” The project is under the USAID/ AQUAFISH INNOVATION LAB with an amount of \$240,000 and is to develop locally verified base of knowledge for pond-based tilapia producers in Ghana. The project is scheduled to run from 2016 – 2018.

The research focused on Optimising locally available commercial feeds and production systems, Determine the potential for nurseries in the aquaculture value chain and producing a new nursery feed made from locally available ingredients

So far, grow-out studies using commercial feeds have been completed, lowering the protein content by 5% of current levels did not negatively affect growth; this would translate into more profit for farmers since protein is the most expensive ingredient used in making fish feeds. Again, alternative day feeding, using commercially available feeds yielded the most profit. Nursery trials are complete and new feed has been made and digestibility trial on test diets completed and is currently undergoing ponds trials.

Two (2) MPhil students have graduated and four more are expected to graduate in June 2018. One dissemination workshop was organised in June, 2017 to present research findings to pond farmers (>40) in the Ashanti Region. Two of the test diets for nursery fish had comparable results to the commercial control currently on the market. One student and five lecturers were sponsored by the project to present their work at the World Aquaculture Conference in 2017 in Cape Town, South Africa. Three lecturers travelled to an Aquaculture Conference in San Antonio USA in 2017 to present project findings and one medium scale pelletizer has been acquired.



List of active external grants / projects in College of Agriculture and natural resources (CANR) KNUST

No.	Name Of Project	Department	Funder	Principal Invertigator	Amount	Period
1	AGRA PhD Project & Soil Science	Theoretical and Applied Biology	Alliance for a Green Revolution in Africa (AGRA)	Prof R.C Abaidoo	\$2565805.00	2010 - 2018
2	N2 Africa Phase II	Theoretical and Applied Biology	The International Institutud of Tropical Agriculture(IITA)	Prof R.C Abaidoo	\$18618.00	2014 - 2018
3	Sustainable Fish Feed Project	Fisheries and Watershed	DANIDA	Prof Steve Amisah	\$ 113606.32	2014 - 2017
4	Alliance for Food Security	Crop and Soil Science	USAID,Oklahoma State	Dr Enoch Osekere	\$ 5370.37	2014 - 2018
5	Peanut and Mycotoxins Innovation Laboratory(PMIL)	Crop and Soil Science	North Carolina	Prof Richard Akromah	\$ 49863.00	2013 - 2017
6	Soils of Forest Island in Africa	Crop and Soil Science	Imperial College,UK	Dr Vincent Logah	£1132162.00	2015 - 2020
7	Assess Project	Bureau of Integrated Rural Development(BIRD)	USAID/UNDA	Dr Sarfo Mensah	\$ 25000000.00	2014 - 2019
8	Mineralisation and Climatic Controls on Soil Carbon Stocks in West Africa.	Crop and Soil Science	The Royal Society,UK	Dr Vincent Logah	£18640.00	2016 - 2019
9	Improving MSc in Cultivar Development in Africa	Crop and Soil Science	Alliance for a Green Revolution in Africa(AGRA)	Prof Richard Akromah	\$2670000.00	2014 - 2019
10	Alliance for Food Security	Dr. Enoch Osekere	Dr. Enoch Osekere	USAID, Oklahoma State	\$ 5,370.37	2014 - 2018
11	Enhancing Soil Health in Northern Ghana: Inoculants Production, Distribution and Utilization through	Prof. R.C Abaidoo	Crop and Soil Science	CSIR-SARI	\$ 100,710.54	2014 - 2017
12	Excellence in Higher Education for Liberian development (EHELD)	Prof. A. Donkor	Prof. A. Donkor	USAID	\$ 18,500,000.00	2011 - 2017
13	Soils of Forest Island in Africa	Dr. Vincent Logah	Crop and Soil Science	Imperial College, UK	£ 1,132,162.00	2015 - 2020
14	Mineralogical and Climatic Controls on Soil Carbon Stocks in West Africa	Dr. Vincent Logah	Crop and Soil Science	The Royal Society, UK	£18,640.00	2016 - 2019
15	Improved MSc in Cultivar Development in Africa	Prof. Richard Akromah	Crop and Soil Science	Alliance for Green Revolution in Africa (AGRA)	\$ 2,670,000.00	2014 - 2019
16	Building Stronger Universities Project Phase Three (BSU III)		DANIDA	Prof. Robert C. Abaidoo	DKK 13,000,000	2017 - 2021



COLLEGE OF ART AND BUILT ENVIRONMENT

Design and Fabrication of a Changeable Tip Wax Extruding Machine

Mr. Samuel Baah Kissi and his team, Dr. Charles Frimpong, Rosemary Dela, Jeremiah Obuobi and Sylvester Atta Sam, Department of Industrial Art researched into a study titled **Design and Fabrication of a Changeable Tip Wax Extruding Machine**.

The project is aimed at producing a wax extruding machine with a replaceable tip which will give different wax feel for production.

Currently, the project is in the final stage and the prototype of the first sample is ongoing.

At the end of the project, metal smiths will have varied wax feel and also improve the making of the wax at Krofuom in Ghana.

Beeswax in Asante Castings: Then, Now, and the Way Forward

The objective of this project is to improve the metal working techniques (casting) and to impact positively on the life of people and the economy. Mr. Samuel Kissi Baah and his team, Mrs. Peggy Ama Fening and Mr. Dickson Adom are researching into “**Beeswax in Asante Castings: The Then, Now, and the Way Forward**”. The project is for a period of two years starting in 2017.

So far various finishing techniques have been developed and core samples made to improve the existing ones. The project is half way through. The sample for the core will be used to help eliminate defects in the casting as well as the pinhole in the inner wall of the pieces.



Experimentation of Glass Recycling

Mr. Kofi Adjei is leading a research into Experimentation of Glass Recycling with Mr. Japheth Asiedu in the Department of Industrial Art over a one year period starting 2017. The project aims at using waste glass for the production of architectural mouldings and the outcome will be used for ornamentation of buildings.

The project is about three-quarters done. So far, sample models are ready and the next stage of the project is the full scale production. The project outcome will bring a new look at waste glass as a very useful material. It will create avenue for commercialization and job creation. One journal article has already been published from the study.

Design and Production of Ceramic Mannequins for Jewellery Display using Slip Casting Method

Robert Amoanyi and his team, Patricia Afriyie, Samuel Nortey in the Department of Industrial Art are researching into **“Design and Production of Ceramic Mannequins for Jewellery Display Using Slip Casting Method”**. The research team has provided their own funding of two thousand Ghana Cedis (GH¢2000)

The project is aimed at designing and producing ceramic mannequins (models and mould cast) using ceramic materials and the slip casting method.

The project is almost completed and the cast mannequins will be used for jewellery displays.

Towards a Sustainable Ceramic Industry in Ghana

To assess the working environment of the Ghanaian ceramic industry using porters industrial model, Dr. Samuel Nortey of the Department of Industrial Art is researching into the topic **“Towards a Sustainable Ceramic Industry in Ghana”**. The project will run for a period of two years. The assessment has been done and it has been realised that the working environment of ceramic companies in Ghana is uncompetitive.

The study will provide important information on an industry that could bring in a lot of economic gains. It would assist in fine-tuning the industry to assist in accelerating economic and industrial growth.

The Determinants of Pottery Demand in Ghana

The demand for pottery is declining and knowing what consumers want is very important in increasing the patronage. The research titled **“The Determinants of Pottery Demand in Ghana”** aims at examining what consumers want to see in pottery and the feedback would inform what to produce. Dr. Samuel Nortey, is leading the research for a period of 18months.

Data has been collected and analysed. The research has also been accepted for publication in JUST (forthcoming issue, April, 2017)

It has been realised that the pottery industry is now innovating and changing the traditional ways of production and applying other techniques and finishing whilst preserving the cultural heritage.

Developing Creative Thinking and Skills of Potters towards Innovative Pottery Products

Dr. Samuel Nortey, Department of Industrial Art and Dr. Edwin Bodjawah, Department of Painting and Sculpture are undertaking a research titled **“Developing Creative Thinking and Skills of Potters towards Innovative Pottery Products”** over a period of one year.

The project aims to develop the creative thinking and skills of indigenous potters. So far, two case studies have been employed, Afari and Mfansi potters.

Training and experiments have been completed and a paper is being reviewed.

The project is expected to bring innovations while preserving intangible cultural heritage in production.

Developing Field Spathic Glaze Using Seger Classification

Over a period of one year, Dr. Samuel Nortey and Japheth Taa Kwarteng Asiedu have been engaged in research titled **“Developing of Fieldspathic Glaze using Seger classification”**.

The project aims to develop a Field spathic Glaze for local potters to finish their products. Generally, conventional glazes are expensive and have health



challenges to users, It is as a result of this that this research aims at developing a health glaze using non-essential materials.

So far, laboratory experiments have been completed and the paper is in its second stage of review.

The application of the glaze on their waves do not only improve aesthetics but also present other health risk issues related to glaze.

Traditional Weaving in Northern Region of Ghana: A Case Study of Daboya and Yendi Weaving Communities

With an amount of Six Thousand Ghana Cedis (GH¢6000.00) Dr. Charles Frimpong, Benjamin Asinyo and Ebenezer Howard are undertaking a research for a period of two months titled **“Traditional Weaving In Northern Region Of Ghana: A Case Study Of Daboya And Yendi Weaving Communities”**

The project aims to project the traditional weaving in northern Ghana in terms of awareness creation and documentation of relevant literature on the weaving activities for educational purpose; identify, compare and contrast the weaving traditions of Yendi and Daboya based on their beliefs, types of materials, tools, processes and marketing strategies; ascertain whether traditional strip weaving in Yendi and Daboya has influenced the art in other areas and has contributed to the socio-economic and cultural heritage of the indigenes; and find out the challenges confronting strip weaving in the Northern Region.

The project is 80% done. The study would bring to the fore the need for the Ministry of Chieftaincy and Culture, Ministry of Trade and Industry (MOTI) as well as the Ministry of Tourism (MOTI) to institute an annual smock festival and fair in the three northern regions on rotational basis as is being done for Kente in the Ashanti Region. This will go a long way to aid the promotion of smock locally and internationally. Also, it is expected to educate the weaving communities and craftsmen to understand the need to welcome new technologies in their occupation which will boost their production levels and increase their earnings.

The Rise of Metro sexuality among Male Youth in Ghanaian Tertiary Institutions: A Case Study of Male Students at KNUST Campus

The rise of Metro sexuality among Male Youth in Ghanaian Tertiary Institution, A Case study of Male Students at KNUST Campus is the title of a research completed by Mrs. Akosua Amankwah and her team Benjamin K. Asinyo and Ebenezer Howard from the Department of Industrial Art.

The project aims to:

- Assess the levels of metrosexual behaviour amongst male students.
- Identify factors contributing to the emergence of the trend.
- Discuss its impact on the society and the fashion industry.

Realized outcomes of the project are:

- Metrosexuality is very common among male students of KNUST
- Cultural considerations in fashion are gradually playing to the background

Weaving Traditions of Agotime-Kpetoe and Agbozume in the Volta Region

In 2017, Benjamin Asinyo, Charles Frimpong and Justice Abusah funded a project with an amount of five thousand Ghana Cedis (GH¢5000) titled **“Weaving Traditions of Agotime-Kpetoe and Agbozume in the Volta Region”**

The project is near completion and aims to:

- compare the history of weaving, tools and materials, weaving processes, products and marketing of the products of the two major weaving communities in the Volta Region (Agotime-Kpetoe and Agbozume).
- investigate why the two communities are in the same region but have differences in their production.

The project is expected to:

- help these two weaving communities (Kpetoe and Agbozume) in the Volta Region to develop and contribute to the economy of Ghana.



- advocate for the need for the government and individual bodies in the field of textiles to run educational programmes to educate them on new and trending ways to improve the craft and also upgrade their skills.
- recommend government's intervention in the area of acquisition of the raw materials for the weavers.
- create awareness on behalf of the weavers for Ghanaian philanthropists to come to assist these two communities in order to help the youth of Agbozume from migrating to Nigeria to ply this same trade.

Developing Low Temperature Clinker for Sustainable Cement Production in Ghana

Prof. P. S. Kwawukume of the Ceramics Section of the Department of industrial Art is the Principal Investigator in a research over a period of 12 months starting 2017 titled **"Developing Low Temperature Clinker for Sustainable Cement Production in Ghana"**.

The project is funded by the research team with a sum of fifteen thousand Ghana Cedis (GH¢15,000). The other team members are Dr. Lemuel Gbologhah, Department of Industrial Art (Ceramics) and Dr. (Mrs) Yongdan Hou Gbologhah, (Department of Materials Engineering).

The project aims to form clinker at low temperatures using locally available raw materials for cement production in Ghana.

Currently, the project is 30% done and is expected to make use of local materials for clinker formation, which is done at relatively low temperatures compared to imported clinker in Ghana. The local materials utilization and low temperature formation suit national and international sustainable goals; it can also create jobs, add value to natural sources and reduce importation of clinker, which will eventually reduce the price of cement.

Partial Replacement of Cement with Siliceous Material from Natural Sources and Industrial Waste for Rural Household

The research team comprising Prof. P. S. Kwawukume, Department of Industrial Art, Dr. Lemuel Gbologhah, Department of Industrial Art (Ceramics), Dr. (Mrs) Yongdan Hou Gbologhah, (Department of Materials Engineering) are undertaking a project over a period of 12 months starting 2017 with an amount of ten thousand Ghana Cedis (GH¢10,000) titled **"Partial Replacement of Cement with Siliceous Material from Natural Sources and Industrial Waste for Rural Household"**

The main aim of the project is to develop a simple method of processing siliceous materials for partial replacement of cement in rural households. The project is 30% done and it is expected that at the end of the project, there will be the establishment of an easy and operable particle-replacement method of cement by local siliceous materials for rural households. This can reduce permeability of water and still provide greater strength at a reduced cost.

Low Siliceous Contained Bone Ash Cupel by Kenyasi Clay with Cassava Starch as Creating Agent

To design and fabricate cupel from Kenyasi clay, abking soda, bone ash and cassava starch, a team of researchers over 12 months are researching into a study titled **"Low Siliceous Contained Bone Cupel by Kenyasi Clay with Cassava Starch as Core Creating Agent"** with a sum of fifteen thousand Ghana Cedis (GH¢15,000). The study is expected to be undertaken over 12 months.

The research team includes Prof. P. S. Kwawukume, Department of Industrial Art, Dr. Lemuel Gbologhah, Department of Industrial Art (Ceramics), Dr. (Mrs) Yongdan Hou Gbologhah, (Department of Materials Engineering).

So far, the study is about 40% done. The project aims at fabricating a novel cupel with least acidic oxide content from local materials for cupellation of gold, which overcomes the problem in the bone ash-cement cupel caused by silica content, add value to local



materials and also produces cupel locally, which can ease importation of cupel in Ghana.

Patronage of Local Indigenous Textiles in Ghana

Cynthia Akua Chichi and her team of researchers Benjamin K. Asinyo and Theresa A. Dentaa are funding a study with the sum of two thousand Ghana cedis (GH¢2000) over a period of 6 months. The title of the research is “Patronage of Local Indigenous Textiles in Ghana”

The project is aimed at assessing patronage of indigenous textiles within Ashanti Region by identifying the factors that motivate consumers to purchase products.

It is expected that the various indigenous textile products within the Ashanti Region would be identified and the patronage explored to help identify ways to extend the patronage to the outside world.

Risk Assessment of Attitudes and Practices of Students and Practitioners Toward Studio Dyeing: A Case Study of Selected Dyeing Studios in Ghana

With an amount of ten thousand Ghana Cedis (GH¢10,000) a team of researchers comprising Ebenezer Howard, Charles Frimpong and Raphael Seidu are undertaking a research titled “**Risk Assessment of Attitudes and Practices of Students and Practitioners toward Studio Dyeing: A Case Study of Selected Dyeing Studios in Ghana**”.

The project is expected to take six months.

The project is 80% done and is near completion. It aims to:

- Project the attitudes and practices of students and practitioners towards studio dyeing in Ghana in terms of awareness creation and documentation of relevant literature on the adverse effects for health and educational purposes.
- identify and establish the health risk associated with studio dyeing with vat dyes and auxiliaries
- Ascertain the safety rules and practices for students and practitioners on inappropriate disposal of dye waste to limit environmental

pollution in compliance with Eco-Friendly Practices (EFP).

It is expected that the study will:

- Bring to the fore the need for the Environmental Protection Agency, Ghana Health Service and Ministry of Health to institute frequent sensitisation and awareness programmes on safety measures, health check-ups and seminars for students and practitioners on the dangers associated with synthetic dyes and burning wax. This would go a long way to prevent immediate and future health and environmental related problems.
- Educate the users on the hazardous effects of using synthetic dyes and burning wax based on empirical literature, field report and medical practitioner’s assessment of the study.

Urban Growth, Neoliberal Failures, and Water Scarcity in Accra and Atlanta

Cities have nearly 54 percent of the global population and this will continue to grow. A major challenge confronting cities is water scarcity, which is worsening due to population growth and increasing water demand from multiple sectors. Amidst climate change, weak infrastructure, and extreme events, water scarcity threatens the future resilience of cities. Urban scholars increasingly argue that central to water scarcity in cities is governance failure. It is as a result of this that Dr Ellis Adjei Adams (Georgia State University, USA) and his team of researchers in the Department of Planning in Georgia State University are researching into a project funded by the International Collaborative Urban Research Grant, Urban Studies Institute, Georgia State University, USA, titled, “**Urban Growth, Neoliberal Failures, and Water Scarcity in Accra and Atlanta**” with an amount of ten thousand dollars (\$10,000) from 2017 to the year 2018.

The proposed project aims to examine water governance regimes in Atlanta (USA) and Accra (Ghana), two rapidly growing cities—one from the global North and another from the global South—situated within major metropolitan areas, facing water scarcity from multiple stresses, and part of Rockefeller Foundation’s 100 resilient cities initiative. More importantly, Atlanta and Accra share similar histories of neoliberal water governance failures.

So far, preparation for field work is in progress.



Ecotourism in Protected Areas in Ghana

With collaboration from Charles Sturt University, Australia, Dr. Patrick Brandful Cobbinah of the Department of Planning is the principal Investigator teaming up with Associate Professor Rosemary Black (Charles Sturt University, Australia) in a project titled **Ecotourism in Protected Areas in Ghana** with an amount of One Thousand five hundred Australian Dollars (AU\$1500). The project began in 2017 and is ongoing.

In many rural areas of Africa, creation of protected areas and introduction of ecotourism result in changes in local livelihoods. Yet, despite assurances of improved and alternative livelihood options by conservationists and governments, rural communities often tend to be worse off following creation of protected areas and introduction of tourism products due to, among others, inequity in the distribution of tourism benefits. This project examines the outcomes of ecotourism in local communities adjacent to Ghana's foremost and most popular ecotourism destination – the Kakum Conservation Area – and its influence on the relationship between local residents and park officials.

Cobbinah, P. B., Amenuvor, D., Black, R., & Peprah, C. (2017). Ecotourism in the Kakum Conservation Area, Ghana: Local politics, practice and outcome. *Journal of Outdoor Recreation and Tourism*. <https://doi.org/10.1016/j.jort.2017.09.003>

Planning and People

From 2016 to 2025, Dr. Patrick Brandful Cobbinah of the Department of Planning will be researching into a study that focuses on understanding urban planning in developing countries of Africa, particularly Ghana. The research seeks to understand the meaning of Urban Planning in the African Context, local attitudes towards urban planning, experiences and outcomes of Urban Planning in a rapidly urbanizing continent, and providing critical reflections on ways of engaging with African Urban Planning moving forward. The title of the research is **"Planning and People"**.

Siiba, A., Adams, E. A., & **Cobbinah, P. B.** (2017). Chieftaincy and sustainable urban land use planning in Yendi, Ghana: Towards congruence. *Cities*. <https://doi.org/10.1016/j.cities.2017.10.015>

Cobbinah, P. B., & Darkwah, R. M. (2017). Toward a more desirable form of sustainable urban development in Africa. *African Geographical Review*, 36(3), 262-285. doi:10.1080/19376812.2016.1208770

Conservation and Livelihood

Conservation and Livelihood is the title of research being conducted by Dr. Patrick Brandful Cobbinah and Associate Professor Rosemary Black (Charles Sturt University, Australia) from 2015 through to 2025. They are collaborating with Charles Sturt University in Australia on a project that examines environmental development relations in Africa focusing on Ghana.

The aim of the project is to examine the relationship and find out:

- i. The influence of conservation efforts on local livelihoods.
- ii. The local support for conservation efforts.
- iii. The influence of tourism on conservation and on improving local livelihoods.

More information on the project can be found in Black, R., & **Cobbinah, P. B.** (2017). On the rim of inspiration: performance of AWF tourism enterprises in Botswana and Rwanda. *Journal of Sustainable Tourism*, 25(11), 1600-1616. <http://dx.doi.org/10.1080/09669582.2017.1296454>.

Improved Burglar Proof Window with Means of Escape (Tek Burglar Proof Window)

With an amount of GH¢1,500 (One thousand five hundred Ghana Cedis) from IGF, Dr. Divine K. Ahadzie of the Centre for Settlement Studies worked on the topic **"Improved Burglar Proof Window with means of Escape"** from August 2016 to March 2017.

The project aimed at providing escape to address the critical element of lack of openings in Burglar proof louver window and also satisfy the legal requirement of LI 1630 (1996) of the National Building Code. This improved version has eliminated the padlocks used as a locking device reported in the 2016 Research Report thus facilitating easy reach and opening. Due to the uniqueness of the innovation the project was aired on both Joy News and Joy TV on 10th March, 2017. It



was also published in worldneeds.com a global leader in online news.

The Centre is now looking for collaborators to help train artisans in the production of the window. It is also in consultation with the Fire Service on how to incorporate the improved version in their safety campaigns. The Centre for Settlement Studies is currently holding discussions with the Fire Service on the way forward in engendering public awareness in the adoption of the technology.

A Framework for the Procurement of User-Friendly Personal Protective Equipment (PPE) for Construction Workers

Prof. D. K Fugar in the Department of Building Technology is self-funding a study on the topic **“A Framework for The Procurement of User-Friendly PPE for Construction Workers”** with an amount of sixty five thousand Ghana Cedis (**GH¢65,000**). The study is to identify the key processes that would aid the procurement of user-friendly/comfortable PPE suitable for construction workers in tropical climates.

The project began in 2015 and has ran for 3 years. So far, field experiments on selected cases to investigate the presence and extent of physiological strain on construction workers as a result of using selected PPE and to obtain some anthropometric data on Ghanaian construction workers, has been concluded. Currently data is being analyzed.

The study aims to contribute to knowledge by establishing the presence or otherwise of physiological strain associated with PPE use and aid in the development of specifications for PPE used by construction workers in hot environments.

The objectives of the project are to:

1. Orient and select participants based on willingness to participate and establishment of medical fitness.
2. Interviewing of construction workers and site supervisors.
3. Measure of environmental and physical conditions of workers related to physiological strain.

The other team members are Dr. Emmanuel Adinyira and Anita Odame both of the Department of Building Technology.

How does Trade Partnership and Foreign Direct Investment affect Land Trade? – Evidence from West Africa

To examine how trade partnership arrangements and foreign direct investment affect hectrade of land trade in Africa focusing on experiences from Nigeria, Ghana and Benin, the *Council for the Development of Social Science Research in Africa* (CODESRIA) has been funding a project titled **“How does Trade Partnership and Foreign Direct Investment Affect Land Trade? Evidence from West Africa”** with a sum of five thousand dollars (US\$5000). The lead investigator is Dr. Mkpado, Mmaduabuchukwu and his team members are, Joseph Kwaku Kidido Department of Land Economy, KNUST and Janvier Egah, Department of Economics and Sociology of Rural Development University of Parakou, Benin. Other collaborating institutions are Federal University Oye-Ekiti, Nigeria and University of Parakou, Benin.

So far the research data has been collected and analysed. A draft report has also been submitted for review. Specifically, the study examines the effects of Volume of FDI inflow on the size of land trade and trade relations or partnerships on the size of land trade.

It is also expected that the study will help to understand how trade partnerships and foreign direct investment affect land trade and thus, inform policy for effective management of the phenomenon to achieve social and economic development. The study has so far shown that trade partnerships and FDI affect land trade in Africa as these factors are significant in all the countries and with respect to the total volume of land trade in selected West African Countries. Thus,

- African Governments need to increase their investment capacity on development of the region as there is the need to examine the nature of FDI inflow and its ambitions to safeguard African land heritage.
- African trade partnerships may need to be re-scrutinised to preserve Africa’s land heritage for future generations.



Youth Access to Agricultural Land under Customary Land Tenure Regime in Ghana: A Study of Techiman Traditional Area (TTA)

Joseph Kwaku Kidido of the Department of Land Economy is self-funding a project titled “**Youth Access to Agricultural Land under Customary Land Tenure Regime in Ghana: A Study of Techiman Traditional Area**” with an amount of twelve thousand, seven hundred Ghana Cedis (GH¢12,700.00). His other team members are Prof. John Tiah Bugri and Prof. R.K. Kasanga both of the Department of Building Technology.

The research examines youth access to agricultural land under customary land ownership and transfer mechanisms in the Techiman Traditional Area (TTA) and explores any possible constraints of the system on youth land rights and involvement in agriculture. The specific objectives of the research were in four-folds. These are to:

1. study the customary land access mechanisms and ascertain youth access to agricultural land within the context of these access mechanisms in the TTA.
2. examine youth agricultural land access dynamics and the underlying challenges in the TTA.
3. examine the practical effects of some legislative interventions on youth access to agricultural land in the TTA.
4. find out the nature of youth agricultural activities and ascertain the implications of their land access for agricultural development in the TTA.

So far, data has been collected and analysed. Reports in the form of journal publications and conference presentations have also been made. The result of the study has resulted in Journal articles and international conference presentations.

The research reveals that the youth are vulnerable under the customary tenure regime and attention is required from policy makers and relevant stakeholders. The study has developed an intervention model to help ease youth land access constraints under the customary tenure system in the TTA. This model could form the basis for formulating a future agricultural land access policy for the youth in Ghana.

Strengthening Local Governance in Evolving Democracies: Some Perspectives on the Election and Accountability Argument in Ghana

Since July 2017, Mr. William Mark Adolwine, Head, Department of Land Economy and Dr. Anthony Owusu Ansah, GIMPA have been funding a project titled **Strengthening Local Governance in Evolving Democracies: Some Perspectives on the Election and Accountability Argument in Ghana.**

The project aims at testing the popularly held view that popular or direct election of local government political officeholders along political lines will guarantee good governance practices because elections ensure effective participation of the citizenry in local governance processes as well as effective accountability of the officers to the electorate. The failure of decentralization in developing countries to achieve rapid desired results is a direct functional relationship of the failure of governments to fully democratize local governance through direct or popular elections of its political officeholders. The study is to test the relationship between elections and accountability and good governance.

Field data has been collected from four municipalities across the country and is undergoing analysis. The project is expected to include: the confirmation OR rejection of the popularly held view on the nexus between elections and accountability of elected officials and good governance.

Construction of Real Estate Price Indices for Developing Housing Markets: Does Temporal Aggregation Matter?

William Mark Adolwine and Dr Eric Yeboah (Department of Land Economy) are team members in a project led and funded by Dr. Anthony Owusu-Ansah from the Business School of the Ghana Institute of Management and Public Administration (GIMPA). The project was completed and the report published in February 2017. The research is titled “**Construction of Real Estate Price Indices for Developing Housing Markets: Does Temporal Aggregation Matter?**”

The research tested whether temporal aggregation matters when constructing hedonic house price indices for developing markets, using Ghana as a case study.



Perceptions of Residential Real Estate Mortgage Financing in Ghana: A Survey of Low-Income Key Workers

Access to fair and affordable finance remains a critical problem for key workers in Ghana. The results provide strong evidence of the importance of tackling supply-side barriers to access, and particularly barriers to accessing mortgage financing, in order to contribute to housing development. **“Perceptions of residential real estate mortgage financing in Ghana: A survey of low-income key workers”** is the title of the research funded by Dr. Stephen Agyeman-Yeboah, Department of Land Economy from December 2016 to June 2017.

The remit of this research is to analyse the perceptions of public low income key workers who intend to enter the housing market through incremental housing about the Ghanaian residential real estate mortgage financing market.

So far, the paper has been accepted by a journal and is awaiting publication. The findings will reinforce the need for financial institutions to provide mortgage facilities that are ‘affordable.’ Key areas for improvement in the financial packages are the need to introduce more transparency about what financial products are available to self-builders, and the increase of the number of finance products on the market suitable for low income households.

Systems Modelling of Risks to International Joint Ventures in Ghana

To critically assess the host country’s risk to an international construction joint venture in Ghana using system dynamics, Dr. Emmanuel Adinyira of the Department of Building Technology is undertaking a project with Dr. Dominic Ahiaga-Dagbui, Deakin University and Prof. F.D.K. Fugar, Department of Building Technology titled **“Systems Modelling of Risks to International Joint Ventures in Ghana”** funded by Self/RICS Research Trust with an amount of fifty-five thousand Ghana Cedis (GH¢55,000). Other collaborating Institutions are the School of Architecture & Built Environment, Faculty of Science, Engineering and Built Environment, Deakin University, Australia.

At the end of the study, the results will furnish both industry and researchers with the risks associated with International Joint Ventures specifically in Ghana. The

results will help foreign companies to easily identify some of the problems they may have to deal with when working in Ghana. The research will provide local construction companies with information on what foreign companies will be looking out for when they are selecting local partners for any form of collaboration consortiums, joint ventures, partnering or strategic alliances. Most importantly, this study will provide help for policy and decision makers in Ghana on the necessary measures to put in place in order to attract and sustain foreign direct investment.

The study began in 2017 and the team conducted an initial scoping study that sought to assess risks associated with international construction joint ventures in Ghana. This is reported in the paper ‘Potential risks to international Joint Ventures in Developing Economies: The Ghanaian Construction Industry Experience’, presented at the CIBW 107 International Conference on Innovation and Construction in Developing Countries (2011).

Again, the study assessed the nature, strengths, weaknesses, opportunities and threats within the Ghanaian construction industry as well as the economy, governance, business environment, infrastructure, resources, etc. in an effort to determine the major and minor risks to International Joint Ventures (IJVs). Having identified these risk factors, the current study proposes to critically assess the dynamic relationship and interdependence between the significant factors using primary data collected in Ghana. The work will help in designing effective mitigation strategies before and during the operational stages of IJVs in Ghana.

So far, the research instrument has been developed for the collection of data and also the sample frame for the study developed.

Modelling the Impact of Cash Flow Factors on Profitability of Building Contractors in Ghana

With an amount of sixty thousand Ghana Cedis (GH¢60,000) Prof. F.D.K. Fugar, Department of Building Technology is self-funding a research into a study to develop a model to predict profitability of construction firms using cash flow factors. The study is titled **“Modelling the Impact of Cash Flow Factors on Profitability of Building Contractors in Ghana”**, Dr. Emmanuel Adinyira is a team member on this research. The research will run from 2015 to 2018.



So far, the final round of data collection is underway. The study seeks to identify the cash flow determinants that impact on profit and with that, develop a regression model to predict profitability using the cash flow factors. This study also seeks to assess the impact of cashflow factors such as fluctuation, variation, subcontracting and higher percentage of advance payments; the factors have not been addressed in previous studies in the area.

All recognized building and civil contractor associations in the country are collaborating by way of getting their members to contribute data.

Safety Diffusion on Construction Projects as a Corporate Social Responsibility

To develop an effective framework for the diffusion of safety in Ghanaian communities by construction companies as a corporate social responsibility, Prof. F.D.K. Fugar, Department of Building Technology is self-funding a project with an amount of sixty thousand Ghana Cedis (GH¢60,000) from 2016 to 2018 titled, **“Safety Diffusion on Construction Projects as a Corporate Social Responsibility.”**

The field work component of the study is being designed. The project aims to address the need to find innovative ways to help Ghanaian construction companies improve their Corporate Social Responsibility engagements in order for them to remain competitive.

The project hopes to:

1. Identify the barriers or challenges facing Ghanaian construction companies in fulfilling their corporate social responsibility engagement.
2. Identify the enablers or drivers to a successful knowledge transfer process
3. Explore the key diffusion processes by which safety can be diffused into communities by construction companies.
4. Design and test a framework to guide the diffusing of safety into Ghanaian communities and
5. Validate the designed framework.

All recognized building and civil contractor associations in the country will be contributing data to the study. Dr. Emmanuel Adinyira, of the Department of Building Technology is a team member.

Building Information Modelling (BIM) Framework for Practical Implementation

The lead investigator, Dr.Theophilus Adjei Kumi with, Dr. Michael Nii Addy of the Department of Building Technology are researching into a project titled **“Building Information Modelling (BIM) framework for Practical Implementation”** with an amount of sixty-five thousand Ghana Cedis (GH¢65,000) from 2017 to 2020.

The study aims to develop a BIM framework focusing on the issues of practicability for real-world projects based in a developing country Ghana. Although in many cases the adoption of BIM has numerous potential benefits, it also raises interesting challenges with regard to how BIM integrates the business processes of individual practices. This study will provide a practical approach on the adoption and use of BIM in the Ghanaian construction industry.

The research team has so far identified the factors that facilitate the adoption of BIM among industry players and sample case studies on BIM usage among designers have been conducted. Issues of BIM software is being explored.

The study involves the use of a case study where BIM will be adopted and used for a real-life project

Structural Properties of Palm Kernel Shells as Partial/Whole Replacement for Sand in Walling Unit Production

Dr. Alex Acheampong and his team members, Dr. Godwin K. K. Acquah and Mr. Theophilus Addo Quaynopr of the Department of Building Technology are funding a project titled **Structural Properties of Palm Kernel Shells as Partial/Whole Replacement for Sand in Walling Unit Production”** over a period of two years with an amount of twenty thousand Ghana Cedis (GH¢20,000).

The project will explore the mechanical properties of PKS-Sand walling unit production and it is expected to produce alternative lightweight walling materials for building construction In Ghana.



Models for Forecasting the Duration for Rural Roads and Bridge Construction Projects in Ghana

With an amount of (GH¢67,000) sixty seven thousand Ghana Cedis, Dr. Adjei Kumi, of the Department of Building Technology and his team members Dr. Gabriel Nani and Isaac Mensah collaborating with Ghana Institute of Surveyors are researching to develop models for predicting contract duration for both road and bridge construction projects. The project is titled **“Models for Forecasting the Duration for Rural Roads and Bridge Construction Projects in Ghana”**.

So far the study has been concluded and the models for predicting contract duration have been developed. A working tool has been developed for construction professionals at the Department of Feeder Roads under the Ministry of Roads and Highways as well as contractors to determine the contract duration of projects prior to its commencement.

This project is part of the series of research leading to the establishment of work for estimating contract duration for road and bridge projects for the Ghanaian road industry at Kwame Nkrumah University of Science technology.

Improving Construction Tendering Processes using Six Sigma

To explore the possibility of using 6-sigma to improve construction procurement processes, Prof. Bernard Kofi Baiden and his team of researchers, Dr. Gabriel Nani and Mrs Jemima Ottouare, are funding a project titled **“Improving Construction Tendering Processes using Six Sigma”** with an amount of sixty thousand Ghana Cedis (GH¢60,000.00) from 2015 to 2018.

The study has reached the documentation stage. The research is expected to ensure the continuous improvement of construction procurement processes in Ghana.

Developing an Energy Efficiency Assessment Tool for Buildings in Ghana

To develop a building energy efficiency assessment (BEEA) tool for assessing the energy efficiency of buildings in Ghana, Dr. Michael Nii Addy is leading a project with Dr. Emmanuel Adinyira of the Department of Building Technology with an amount of sixty-five Thousand Ghana Cedis (GH¢65,000. The project is titled **“Development of a Building Energy Efficiency Assessment Tool for Buildings in Ghana.”** The project has been running from 2013 and will end in 2018.

The study so far has focused on high rise office buildings within the Greater Accra Metropolis. It is expected that this scope can be expanded to reach other regions and other building sectors based on the work done so far.

The research aims to contribute to closing the knowledge gap identified in building energy research by providing identification of key factors that affect the building envelope in relation to building energy. The developed tool would enable the reduction in the degree of energy expended while sustaining or bettering the quality of services delivered in the buildings.

The study findings so far provide basis for the development of policy framework for building energy efficiency in Ghana. Ghana does not have any building energy efficiency programme in place. Coupled with the rising demand and increasing energy cost, the study will serve as a building block for putting in place policy guidelines.

A Model for the Development of Tender Price Indices for the Ghanaian Building Industry

From 2014 to 2017, Dr.Theophilus Adjei Kumi and his team members Prof. Edward Badu and Dr. Ernest Kissi of the Department of Building Technology have been collaborating with the Ghana Institute of Surveyors to research into a framework for the development of the location based indices for the Ghanaian building industry with an amount of sixty seven thousand Ghana Cedis (GH¢67,000).

The study is titled **“A Model for the Development of Tender Price Indices for the Ghanaian Building Industry”**.



So far, the study has been concluded. The tender price indices and model for predicting tender price indices have also been developed. Three economic indicators have also been identified to influence price of tender in the Ghanaian environment, namely interest rate, exchange rate and producer price index.

This project will facilitate easy prediction of possible tender prices for proposed building projects and effective cost planning thereby ensuring that value for money is achieved in all public projects.

Framework for the Development of Locational Indices for the Ghanaian Construction Industry

Dr. Theophilus Adjei Kumi is leading a project titled **“Framework for the Development of Locational Indices for the Ghanaian Construction Industry** with his team Dr. Michael Addy, Dr. Ernest Kissi both of the Department of Building Technology, Faustina Okyere, Research Assistant with the Ghana Institute of Surveyors, with an amount of Thirty Thousand Ghana Cedis (GH¢30,000). The project started in 2015 and will end in 2018.

The project aims at developing a framework for the development of the location-based indices for the Ghanaian Building Industry.

Currently, factors such as climate, materials, labour, and plant rates have been identified as major cost centres for the development of the framework. Data collection is still on-going.

At the end of the research, it will be easy to predict tender prices of proposed projects located at different parts of the country. The basis of the research is that the prices of construction projects are dependent on the location of the project.

This project is part of a series of research leading to the establishment of a Construction Cost Data Centre for Ghanaian building industry at Kwame Nkrumah University of Science and Technology (KNUST).

Developing a Community Based Resilience Framework for Flood Risk Management in Urban Ghana

Ghana ranks high among African countries most exposed to risks from multiple weather-related hazards and requires the development of an integrated flood risk management plan due to inadequate resources, lack of preparedness and low adaptive capacities in Ghana. In this respect, Dr. Divine K. Ahadzie and Ms. Irene-Nora Dinye of Centre for Settlement Studies are researching into the topic **“Developing a Community-Based Resilience Framework for Flood Risk Management in Urban Ghana”** from July 2017 to May 2018. A research contract has therefore been signed with the University of Capetown with support from the Ford Foundation with an amount of \$10,000. The project is termed “Fostering a comparative research agenda in African cities- Urban Spatial Inequality and the New Urban Agenda (“the Project”).

Drawing from an initial study by the Centre for Settlement Studies leading to the development of a conceptual framework on flood risk management, the team is combining Field Research and City Lab on Flood Risk to understand and address the challenges that can prevent the city from achieving its goals of flood risks management, opportunities to facilitate a successful adaption of the proposed framework and a means to further develop the framework to build on social responsibility.

Findings from the research will inform further academic and policy engagement with attendant stakeholders towards the achievement of the SDG Goal 11, that is making cities inclusive, safe, resilient and sustainable. The city lab will subject the proposed conceptual framework to wider critique, verification and validation and also create an avenue for stakeholders to co-produce knowledge with the specific intent of fostering reflective policy and practice.

The other team members are Prof. Romanus Dinye, Dr. Rudith King and Dr. Clifford Amoako.



The Impacts of Damp Housing Conditions on the Health of Occupants

To examine the impact of damp housing conditions on the health of occupants in the tropics, Dr Kofi Agyekum of the Department of Building Technology is self-funding a project titled **“The Impacts of Damp Housing Conditions on the Health of Occupants”**. The other research member is Dr. Burcu Salgin of the Department of Architecture, Erciyes University, Turkey.

The project is expected to span for four years. The study has begun with a detailed literature survey conducted into the area. Interesting details have been uncovered, and team members from other disciplines are being sourced. The project is expected to identify from literature, key health issues associated with living in damp affected buildings and based on these findings, the team will try to scientifically identify associations between some of the reported ill health as against living in damp buildings.

The first phase which involves the literature survey has been conducted and a paper was generated from it which was presented at the 6th International Conference on Infrastructure Development in Africa (ICIDA 2017) organized by the College of Art and Built Environment, KNUST on 12th-14th April 2017 in Kumasi. The paper was titled **“The Health Impacts of Damp Housing Conditions: Lessons for Inhabitants Living in Damp Tropical Buildings”**

Through a literature survey, the paper sought to examine the impact of damp housing conditions on the health of occupants. It presented lessons from such studies to those living in damp tropical buildings. The review showed that being exposed to damp conditions could trigger a number of upper and lower respiratory tract infections, as well as skin diseases such as asthma, wheeze, allergic rhinitis, atopic dermatitis, headache, eczema, bronchitis and cough at night. The paper was presented by the lead investigator (Dr. Kofi Agyekum) who was adjudged the overall best presenter at the end of the conference.

Integrating Environmentally Sustainable Procurement in Public Universities

Public universities play an essential role in addressing global environmental challenges as their education, research and procurement practices can produce long lasting

environmental effects. This study aimed at developing guidelines for the integration of environmentally sustainable procurement in public universities.

The lead researcher was Prof. Josua Ayarkwa and his team included Ms. Ama Amponsah Appiagyei, Dr. Kofi Agyekum and Mr. De-Graft Joe Opoku of the Department of Building Technology. The project was from August 2015 to August 2017 and dissemination of findings is in progress as it has been completed.

The public procurement laws, Public Procurement Act 2003, Act 663 and the Amended Act 2016, Act 914, have not adequately addressed the issue of environmentally sustainable procurement and therefore there is the need to further review and revise to integrate environmentally sustainable procurement issues and other sustainability issues. Furthermore, it is envisaged that public universities will continue to build the capacities of their suppliers. The developed guidelines, if adopted, would enable the integration of environmentally sustainable procurement in public universities.

Strengthening Capacities for Land Governance in Africa (SLGA)

The Department of Planning, KNUST and some postgraduate students are researching into a project funded by the German Academic Exchange Service (DAAD) titled **“Strengthening Capacities for Land Governance in Africa (SLGA)”** which started in 2017 and will end in 2019. The stipend for students on the project is €400 and €500 Euros monthly for MPhil and PhD students respectfully. It is also paying €460 and €960 as research support to MPhil and PhD students respectively. The printing allowance in the last month of the studies amounted to €1,025.

This project aims at grooming qualified graduates to take over responsible positions in their region of origin, reinforce the participation of women and the underprivileged groups and also strengthen organizational, financial and personnel capacities of partner institutions.

The admission process has been completed and students have started school and as part of the programme 6 participating students are to visit Ethiopia from 11th to 13th November.



The project is expected to involve qualified professionals in the solution of developmental related problems in sub-Sahara Africa. It is also envisaged that the project will strengthen structures, regional networking of partner institutions and partner universities. Graduates will help strengthen education and research in Sub-Saharan Africa.

The programme followed the Department of Planning's successful application in 2016 to be included in the DAAD's In country/In-Region Scholarship Programme SLGA.

Guidelines for Building Capacity of Built Environment Consultants to Practice Environmental Sustainability at the Design Stage of Projects

Environmental sustainability has become an important area of concern within the construction industry and several construction industry players have various responsibilities and roles to play in achieving environmental sustainability. However, most built environment consultants lack the capacity to incorporate issues of environmental sustainability in the design of projects and it is as a result of this that the study seeks to develop guidelines to enable Built Environment consultants build their capacities to practice environmental sustainability.

The research is being carried out by Prof. Joshua Ayarkwa, College of Art and Built Environment and his team comprising, Mr. Degraft-Joe Opoku and Dr. Kofi Agyekum of the Department of Building Technology. The research was from August 2016 to May 2017 and so far a qualitative method of enquiry and a case study strategy have been employed involving seven built environment consultants in the study.

The study revealed that the level of knowledge of built environment consultants on environmental sustainability was not adequate to promote its practice during the design stage of the projects. However, it was envisaged that the practice of environmental sustainability during design could be driven by the designer's own philosophy, request by clients, policies and regulations and competitive advantage. It was revealed that the perceived initial cost, technological difficulties and demotivation by colleague designers also prevent environmental sustainability practice at the design stage.

The research has been completed but dissemination of findings is in progress. The developed guidelines if adopted would enable built environment consultants build their capacities to practice environmental sustainability at the design stage of projects.

The Effect of Climate Change on Farming, Food Production and Nutrition in the Upper East Region of Ghana – The case of the Builsa North District

To understand spatial and temporal climate change impact on food systems and the responsibility of societies, Prof. Daniel Inkoom, Department of Planning, and his team, Dr. Akosua B. K. Amaka Otchere and Dr. Aba Obrumah Crentsil collaborating with the Institute of Statistical, Social and Economics Research worked on a BSU II funded project titled **"The Effect of Climate Change on Farming, Food Production and Nutrition in the Upper East Region of Ghana. The Case of the Builsa North District"** with an amount of GH¢25,100 (Twenty-Five Thousand, One Hundred Ghana Cedis) from January to December 2017.

The project is near completion but the following are outstanding:

- Dissemination workshop
- Submission of final report
- Publication

The project is expected to provide a study report and an action plan to the Builsa North District Journal Publication.

Assessing State of Barrier- Free Environments in Ghana – Delivering an All-Inclusive Environment

To investigate the current state of assessability of public environments in Ghana and develop audit tools for assessing compliance of public buildings to barrier-free environment, Dr. Daniel Y. A. Duah and Dr. Alexander Boakye Marful of the Department of Architecture are leading a study titled **"Assessing State of Barrier free Environments in Ghana – Delivering an all-inclusive Environment"**. Other collaborating institution is Architects Registration Council in Ghana. The project is being funded by the Principal Investigators and Architects Registration Council in Ghana with an



amount of one hundred thousand dollars (\$100,000) for a period of three years.

The project aims to promote an all-inclusive environment using barrier free concepts and so far, the research problem has been developed. The current state of accessibility of public environments in Ghana is 70% completed and an international student's workshop with participants from four universities in Ghana and Germany was organised in August, 2016. Also, there has been a development of tools to assess compliance which is 60% completed and two articles have been completed.

After the project, it is expected that there will be the development of a comprehensive document indicating the current state of accessibility of public environments by all persons in Ghana and a development of a robust audit tool to assess compliance of public environments to the barrier-free concept.

The Potential Value of invasive Weeds and Plants for Hand Papermaking

Mr. Michael Adahie is self-funding a project titled **“Constriction of Papermaking and Intaglio Machine using Locally Sourced Materials”** with an amount of GH¢7000 (Seven Thousand Ghana Cedis) and another titled **“The Potential Value of Invasive Weeds And Plants For Hand Papermaking”**

The project aims to:

1. serve as a teaching and learning tool for students of the painting section of the Painting and Sculpture Department.
2. serve as researchers Investigating into local botanicals for papermaking.
3. serve as economic livelihood for paper and book artists as well as art teachers in Primary and secondary schools.
4. help local industry possibilities for communities where these plants can be found.

So far, the project is 50% done and knowledge will be transferred to interested parties in the communities where invasive plants impede their farming activities as an alternate source of income. Also, SMD's are encouraged as part of the UN sustainable goals. Funding support is welcome from the Grants and Research Office.



INTERNATIONAL DESIGN CONFERENCE, KUMASI 4TH NAD-KIDeC 2017

A three-day International Conference on design was held on the theme **“Sustainable Development Goals in Africa: The Role of Indigenous Design Concepts”** from the 11th to 13th September, 2017. The Conference was the 4th in the series of design conferences first launched in Nairobi in 2009 under the auspices of the Network of Afriko Designers (NAD). The conference is a biennial event hosted on a rotational basis by African universities and derives its name from the host city. The 2017 edition was therefore hosted by the Kwame Nkrumah University of Science and Technology through the College of Art and Built Environment in Kumasi, Ghana hence the name **NAD-KIDeC (KUMASI INTERNATIONAL DESIGN CONFERENCE) 2017**.

The theme of KIDeC 2017 was a follow-up on the KIDeC 2015 held in Kampala, “Design Unlimited: Indigenous Design Processes for Development. The theme therefore was chosen to reflect how indigenous processes in design could be used in the successful achievement of the Sustainable Development Goals in Africa.

The Conference was a multi-disciplinary one bringing together people who believed that design (and specifically



indigenous concepts) form part of their personal and professional ambitions, careers and activities. These included designers, researchers, engineers, scientists, managers, environmentalists, educators, technologists, government officials, IT specialists, systems architects, media specialists, architects, planners, developers, artists, etc. The purpose of the conference was to provide the needed information in developing indigenous design concepts and sustainable development in Africa.

The conference welcomed papers on the following sub-themes:

1. Indigenous Design Theory and Research
2. Indigenous Knowledge Systems
3. Design Concepts and Education
4. Design Knowledge and Collaborations
5. Design Concepts and the Environment
6. Indigenous Design Concepts and Climatic Changes
7. Design Concepts and Entrepreneurship
8. Sustainable Indigenous Design Concept
9. Ethics, Legislation, Regulation Strategy and Policy

In attendance was Prof. Kwasi Obiri-Danso, Vice Chancellor (KNUST), Prof Joshua Ayarkwa, Provost, CABA, Prof. Dr. Aguinaldo dos Santos (Brazil) who was also a keynote speaker and members of the University.

6th International Conference on Infrastructure Development in Africa (ICIDA 2017)

KNUST through the College of Art and Built and Built Environment hosted the 6th International Conference on Infrastructure Development in Africa (ICIDA, 2017) from 12th to 14th April, 2017 on the theme “**Building Resilience through African Urban Culture and infrastructure Development**”. The Conference has been widely accepted as an important event by Professionals as an infrastructure Flagship academic event in Africa and that led to successful hosting of the 1st conference in Kumasi in 2012.

Over the years the theme for ICIDA has been carefully chosen to reflect contemporary issues in infrastructure development affecting the continent. The 6th edition of ICIDA presented the importance of building resilience in the changing environmental conditions, climate

natural and man-made disasters such as flooding, land degradations, rainstorms, droughts, deforestations and emerging terrorist syndrome within the African urban culture and infrastructure development. It also emphasized the major challenges facing cities today such as bad roads, poor waste management, traffic congestion, fast growing slums, general lack of affordable housing and the poor state of educational and health facilities.

In attendance was Prof. Kwasi Obiri-Danso, Vice Chancellor (KNUST); Prof. Joshua Ayarkwa, Provost, CABA; Prof. Mugendi M’Rithaa, Cape Peninsula University of Technology, South Africa; Prof. Chike Oduoza, University of Wolverhampton, UK; Prof. David Edwards, Birmingham City University, UK; Dr. Iain Jackson, Liverpool School of Architecture, UK; Dr. Agyeman Osei, University of Ghana, Legon; Dr.Obuhs Ejphwomu, University of Manchester, UK ; members of the University community, government officials, institutions, organizations and practitioners committed to infrastructure with a total of about 200 participants and a total of 51 papers presented.

STUDENT RESEARCH

Conceptualising Affordable Housing Definition from the Perspective of Informal Low Income Earners: Evidence from Three Urban Settlements in Kumasi

Akwasi Bempah Andoh, an MPhil student, Centre for Settlement Studies supervised by Dr. Divine K. Ahadzie self-funded a project titled” Conceptualizing Affordable Housing Definition from the Perspective of Informal Low Income Earners: Evidence from Three Urban Settlements in Kumasi” with an amount GH¢4,500 (Four Thousand Five Hundred Ghana Cedis).

It was envisaged that the project would classify affordable housing in terms of housing type, type of accommodation, siting or location, facilities needed, proposed rent beneficiaries, financial arrangements and policy issues. Again, the findings also revealed that the experience of the respondents may matter in determining how they conceptualize affordable housing, appreciate the impact of the realities of market forces (especially land prices) and how they affect house type and location of affordable housing. The findings



also have policy implication in the way Government can leverage to engage with informal workers in the location and choice of type of affordable housing in the context of Sub-Saharan African economies. The study adopted the position that housing affordability has different interpretations to different stakeholders across the housing sector and can be understood in terms of individual and households subjective social

and material experiences, drawing from the situation of informal low income earners in Kumasi, Ghana.

An academic journal paper and a policy briefing are being prepared from the study and the findings have been presented at the Colleges colloquium on 16th March 2017. Excerpts have been published in the Real Estate Journal, a trademark journal for the Ghana Real Estate Developers Association 2017 Edition. The project period was from July, 2016 to July 2017.

LIST OF ACTIVE EXTERNAL GRANTS / PROJECTS IN COLLEGE OF ART AND BUILT ENVIRONMENT (CABE), KNUST

No.	Name of Project	Department	Funder	Principal Investigator	Amount	Period
1	Architecture and Planning in the Tropics: From Imperial Gold Coast to tropical Ghana (International Partnership and Mobility 2015)	Department of Architecture	British Academy	Dr. Rexford Asassie	€29,620.00	2015 - 2018
2	Climate Change Implications of the Dependence on Air Conditioning for Cooling Buildings: Empirical Evaluation of Tertiary Institutions Infrastructure in Kumasi	Centre for Settlement Studies	Energy Commission, Ghana and Centre for Settlements Studies	Dr. Rudith King	€35,000.00	2016- 2017
3	Architecture and Planning in the Tropics: from Imperial Gold Coast to Tropical Ghana (International Partnership And Mobility 2015)	British Academy	Dr Rexford Asassie	Department Of Architecture	€29,620.00	2015-2018
4	Facilitating The Development and Growth of the Culture and Arts Sector Under Eu-Ecowas Economic Partnership Agreement	ACP-EU	Anthony A.Aidoo	Centre For Culture And African Studies	£116918.91	2014-2017



COLLEGE OF ENGINEERING

The Department of Civil Engineering in collaboration with the Regional Water and Environmental Sanitation Centre (RWESCK), Kumasi of Kwame Nkrumah University of Science and Technology (KNUST) organised training workshops for Staff of the GWCL under the GAMA Project.

The Government of Ghana through a grant from the World Bank is committed to increasing access to improved water supply and sanitation services in the Greater Accra Metropolitan Assembly (GAMA) with emphasis on Low Income Urban Communities (LIUCs). One of the objectives of the GAMA project is the improvement and expansion of the water distribution network in order to provide piped water to the targeted people living in low income areas in the

GAMA. This component of the project will also support the acquisition and installation of water meters and other equipment as well as the provision of services, aimed at improving water demand management and reducing non-revenue water.

The training workshop which lasted for 5 days was intended to equip participants with the knowledge and technical skills to understand the different models and strategies to adopt when providing water and sanitation services to consumers of low income urban communities. The training workshop was to ensure that participants were able to relate different models of service delivery with their operations. The workshop also allowed participants to develop critical thinking skills by considering the case of social fairness as against commercial viability. The training workshops were scheduled for two (2) batches of GWCL staff, with designations of District Managers and District



Commercial Officers. Staff from the Head Office in Accra also participated in the training workshop. Each training session lasted for 5 days and in all, a total of about seventy GWCL staff were trained.

The training workshop was guided by four (4) sets of objectives which are outlined below:

- Understand the context of low income urban communities and how to provide water and sanitation services in such communities
- Apply and connect theory and practical skills to water and sanitation service delivery in low income urban communities
- Appreciate the needs and aspirations of low income urban community dwellers
- Understand the critical role of various Water, Sanitation and Hygiene (WASH) sector stakeholders in the delivery of WASH services

The training workshop on LIUC was facilitated by Prof. Kwabena Biritwum Nyarko, Dr. Richard Buamah and Dr. Eugene Appiah-Effah from the Department of Civil Engineering, KNUST.

Launching of KNUST UNICEF Project Cooperation Agreement (PCA) and Sanitation Technology Challenge

As part of the ESTE 2 Conference, the Programme Cooperation Agreement (PCA) between KNUST and UNICEF was launched. The Department of Civil Engineering, KNUST has been working with UNICEF to improve Water, Sanitation and Hygiene (WASH) in Ghana. The Department, with the support of UNICEF has worked on assessment of sanitation and hygiene service levels, hygiene cost effectiveness, sanitation technology assessment, prototyping of toilets at the College of Engineering, KNUST. The PCA builds on earlier effort to contribute towards achieving the national sanitation plans, by supporting sustainable and effective sanitation service delivery through addressing the inherent technical challenges in the sanitation sector. The PCA is also in line with the UNICEF country priorities and objectives of addressing rural and urban sanitation. It is also focussed on addressing technical challenges of sanitation specifically by promoting toilet and waste water technologies that contribute to safe management of excreta. The proposed collaboration will focus on six (6) main areas which are:

- Development of sector guidelines and tools for sanitation technology and faecal sludge management
- Research on Sanitation Technologies to reduce cost of toilets
- Capacity building
- Strategic partnership established among the academia for Ghana's ODF drive
- Urban sanitation: design of communal septic tank systems, training on waste water treatment plant and design of sludge drying bed for Ho Municipality
- Communication and dissemination.

The PCA at the College of Engineering, KNUST is led by Prof. Kwabena Biritwum Nyarko and assisted by Dr. Richard Buamah and Dr. Eugene Appiah-Effah, all of the Department of Civil Engineering, KNUST.

The Department of Civil Engineering organised a Training Workshop on Quality Assurance and Quality Control for Building Inspectors in Kumasi

The Department of Civil Engineering in collaboration with the Kumasi Metropolitan Assembly has organised a one-day training workshop for Building Inspectors in Kumasi. The training formed part of the ESTE 2 conference. The workshop was the first of its kind organised by the Department and the purpose of the training workshop was to ensure participants were abreast with the requirements of a building inspector with respect to ensuring quality in building constructions. Participants were taken through topics such as Engineering requirements for building construction, quality of construction materials in Ghana (Ashanti –Region), quality control test and Engineering requirement for Building Inspectors. Each of the sessions ended with some questions, answers and discussions on topics such as challenges in permit acquisition with respect to engineering requirement for building construction, challenges in the quality of construction materials in buildings and meeting challenges in building inspection in Ghana. In all, about 45 participants were trained and fully participated. The training workshop was facilitated by Prof. Mark Adom- Asamoah and Dr. Russel Afrifa, of the Department of Civil Engineering.



TEK Mechanical Cassava Harvester (TEK-MCH) making Strides

A technological innovation developed by an Associate Professor/Agricultural Engineer at the Department of Agriculture and Biosystems at the KNUST, Emmanuel Y. H. Bobobee (PhD, MGHIE) in 1994 and reintroduced in 2011 after years of going through quality checks is now making great strides in the Agriculture sector.

The technology called the TEK Mechanical Cassava harvester (TEK-MCH) is an environmentally friendly light machine that does not require any high power rated tractor to work efficiently. It is also affordable and ideal for smallholder farmers to farm all-year-round. The machine which has been evaluated both in Ghana and South Africa works perfectly with planting in Roles and on ridges.

In 2017, a delegation from the Food and Agriculture Organisation (FAO) paid a visit to the TEK Research Centre at KNUST to witness the TEK Mechanical Cassava Harvester (TEK-MCH) being demonstrated. They were full of praise for the technology and hinted they will promote it across countries with smallholder farmers.

This improved mechanisation of cassava production is hoped to generate economic growth in the country.



A demonstration of the TEK Mechanical Cassava Harvester hitched to a tractor during harvesting



A – Beave to which digging unit is attached
C – Top link hitching point
E – Vertical support
G – Slatted rods for shaking off soil

B – Conical mouldboard
D – Digger
F – Lower link hitching points

Parts of the TEK Mechanical Cassava Harvester

Students Research Support

As part of the IDIN programme, the Technology Consultancy Centre allocated part of the project fund to support students research work with the aim of building local capacity for research, innovation and design. This year, eight (8) students of the Department of Agricultural and Bio-systems Engineering were supported with funds to work on existing CCB technologies for their final year project work (thesis). All eight students were supervised by Prof. Ebenezer Mensah and Dr. George Y. Obeng. Students also received assistance from Mr. Johnson Opoku Asante, the KNUST IDIN Coordinator. The research topics worked on are as follows:

1. Performance Evaluation on a Mechanized Cassava Peeler
2. Performance Evaluation of a Manual Cassava Harvester
3. Performance Evaluation of a Two-Row Groundnut Planter
4. Performance Evaluation of a Hand and Foot operated Rice Thresher.
5. Assessment of the physical combustion properties of briquettes produced from dried coconut husk
6. Cocoa Pod Breaker Performance Evaluation
7. Design, Construction and Performance Evaluation of the Solar Dryer
8. Performance Evaluation of a Groundnut Planter

Engineering Students Design Competition



Some participants, organisers, mentors and judges

The Engineering Students Design (ESD) competition is an annual programme that aims at empowering Kwame Nkrumah University of Science and Technology (KNUST) students through hands-on skills building. It helps the students to identify challenges and needs peculiar




to communities and develop appropriate innovative technologies to solve them. The method of the ESD competition is centred on the design process. The ESD competition therefore introduces the students to the design processes and principles, practical application of what is studied in the classroom, unleashing their creativity and building their confidence to be innovative and creative. The Technology Consultancy Centre (TCC) of KNUST has been organizing this competition

annually in collaboration with the Ghana Engineering Students Association (GESA) with funding from the USAID/MIT International Development Innovation Network (IDIN) programme hosted by the TCC. The focus areas for this year’s competition were Energy and Food security. Six groups of students competed for the ultimate prize, which was GHC 1,200.00.

The groups, their projects and mentors are outlined below.

GROUPS	PROJECT DESCRIPTION	PROTOTYPE
Team RAB Sandra Anokye Koranteng Emily Otoo-Quayson Judith Lurit Michael Hamid Ilham Ku-nwa Mentor: Dr. Russell Afrifa (Civil Engineering)	Revamped Atmospheric Box (RAB) is a device that provides farmers a safer, healthier and more secure way of preserving and maintaining the freshness of food crops especially tubers. This project uses gases from the device to inhibit the growth of micro-organisms that cause tubers to rot in a short period.	 Revamped Atmospheric Box
Team Inno Coal Solomon Grant Bright Frimpong Aninwaa Boakye Dankwa Mentor: Mr. Joseph Akowuah (Agricultural Engineering)	This project will address the issue of energy security by converting waste material (paper) into coal. Waste paper will be shredded and soaked in water. An amount of saw dust will be added and left for a day or two. This will then be packed into a paper brick maker to shape the paper coal which will be left in the sun to dry.	 Briquette Making Machine
Team Green Fire Jonas Yeboah Hamidu I. A. Sammed Naamdiana Ibrahim Mentor: Mr. F. Nyarko (Mechanical Engineering)	This project is about producing biofuel from waste biomass and plastics using a co-pyrolysis reactor. The project is addressing inefficient use of environmentally friendly sources of fuel and improved ways of waste management.	 Co - Pyrolysis Reactor



<p>Team BT Meter</p> <p>Naa Dodua Sappor</p> <p>David Dannah</p> <p>Mentor: Mr. F. Nyarko (Mechanical Engineering)</p>	<p>This project is a cashless microfinance project which deals with exchange of goods between farmers. Farmers will be able to reduce post-harvest loses by exchanging goods for goods (Barter System).</p>	 <p>Barter Trade Meter</p>
<p>Team Evatec</p> <p>Michael Amponsah Ampomah</p> <p>Emmanuel Lartey</p> <p>Jeffrey Boakye Appiagyei</p> <p>Patricia Enam Dzefi</p> <p>Mentors: Mr. Akowuah Joseph (Agric. Engineering) & Miss Deborah Opandoh (ADE - Ghana)</p>	<p>This project is to build an evaporative cooling unit for storing vegetables and fruits after harvest. The unit will be built with low cost materials that can be built on farms and homes of farmers.</p>	 <p>Evaporative Cooler</p>
<p>Team Energy</p> <p>Domfeh Adjei</p> <p>Joshua Senam Awayeboo</p> <p>Jonathan Blankson</p> <p>Solomon Osei Sarfo</p> <p>Mishael Agyei- Boamah</p> <p>Mentor: Dr. J. Ampofo (Mechanical Engineering)</p>	<p>The project seeks to address issues of affordability, durability and cost-effective means of generating energy for commercial uses. Their project brings together known principles of science and mechanism of engineering which are already established to propound a contraction that will generate electricity without depending on traditional energy sources: solar, hydro and wind.</p>	 <p>Semi Autogenous Generator</p>

The final exhibition of prototypes was held on 3rd November, 2016 at the CoE auditorium. In attendance were the acting Provost of the College, Heads of Department, mentors, workshop supervisors and managers, representatives from selected organisations, the media and students. The Chairman for the function was Prof Nicholas Kyei Baffour, the then acting Provost of CoE. The judges for the event included: Prof. F.W.Y. Momade from the

Materials Engineering Department, Prof. E. Mensah from the Agricultural Engineering Department, Mr. Donald Amrago from the Technology Consultancy Centre, Prof. E.Y.H Bobobee from the Agricultural Engineering Department and Prof. A.A. Duker from the Geomatic Engineering Department.



LIST OF ACTIVE EXTERNAL GRANTS / PROJECTS IN COLLEGE OF ENGINEERING (CoE) KNUST

No	Name of Project	Department / Unit	Funder	Principal Investigator	Amount	Period
01	KNUST Cookstove Testing and Expertise Lab.	Technology Consultancy Centre	UNDP	Mr. Michael K. Commeh	USD\$ 90,000	2013 - 2018
02	Upgrading Education and Research Capacity in Renewable Energy Technologies (UPERC-RET) (NMBU-KNUST)	The Energy Centre	Norwegian Agency for Development Cooperation (NORAD)	Dr. Lena Dzifa Mensah	NOK 8.5 million (US\$ 1.3 million)	2015 - 2019
03	ACE-Africa Centre of Excellence	Civil Engineering	World Bank	Prof. S. N. Odai	USD\$ 8,000,000.00	2014 - 2019
04	Potential of Distributed Grid-Connected Solar Photovoltaic (PV) Systems in Rural Electrification in Africa	The Energy Centre	European Union	Mr. Emmanuel Kweku Anto	€186811.30	2012 - 2017
05	Jatropha Energy Facility	Technology Consultancy Centre	European Commission ACP-EU Energy Facility REFERENCE: 129-364	Dr. George Y. Obeng	€ 15,000.00	2012 - 2017
06	International Development Innovation Network	Technology Consultancy Centre	USAID	Dr. George Y. Obeng	USD\$ 800,000.00 +KNUST Cost Share Of USD \$420000	2012 - 2017



COLLEGE OF HEALTH SCIENCES

Phone-Based Intervention Under Nurse Guidance after Stroke (PINGS)

Dr. Fred Stephen Sarfo, Department of Medicine and Prof. Bruce Ovbiagele, Medical University of South Carolina are carrying out a study which is aimed at testing an mHealth (smart phone) intervention to improve care processes and blood pressure control outcomes among stroke patients with hypertension. Hypertension is the commonest reason why people experience stroke. The study is being carried out among 60 recent stroke patients recruited from Komfo Anokye Teaching Hospital in Ghana. Follow-up is now completed and analyses of final outcomes are on-going. Interim results have been published in Stroke Journal (Impact Factor 6.02). The research is funded by the National Institutes of Health with an amount of USD 338,873. Dr. Fred Stephen Sarfo has also been awarded the 2018 Bruce Schonberg award

for International Neuroepidemiology by the American Academy of Neurology as a result of findings from the PINGS trial.

Evaluation of Vascular Event Risk while on Long-term Antiretroviral Suppressive Treatment (EVERLAST)

EVERLAST is premised on systematically assessing the prevalence and predictors of cardiovascular disease (CVD) risk among Ghanaians living with HIV and receiving HIV treatment. It is now thought that Antiretroviral therapy (ART) used to treat HIV patients may increase their chances of experiencing cardiovascular diseases. The inclusion of two control groups - HIV positive patients not yet on HIV treatment and HIV uninfected participants, will allow for a rigorous and unbiased evaluation of the relative risk of both HIV treatment



exposure and CVD risk. Mixed research methods will be employed in EVERLAST to identify the locally-relevant and contextually-appropriate barriers and facilitators of adherence to goals of CVD risk reduction among the HIV population, with the objective of developing an intervention to be tested in a future study. The study is being carried out by Dr. Fred Stephen Sarfo and Prof. Bruce Ovbiagele of the Department of Medicine and Medical University of South Carolina respectively. The study begun in September 2016 and is expected to be completed by June 2018. Recruitment is on-going with about 85% of study participants recruited so far. EVERLAST is funded by the National Institutes of Health with an amount of USD 323,954

Stroke Minimization through Additive Anti-Atherosclerotic Agents in Routine Treatment (SMAART)

SMAART is a clinical trial which aims to test whether a *polypill* containing a combination of 3 blood pressure lowering medications (antihypertensives), a blood cholesterol lowering medicine (a statin) and a blood thinner (antiplatelet therapy) taken once daily orally would result in reducing the risk of suffering another stroke. The polypill because it is taken once a day is expected to improve adherence and tolerability of the treatment compared with taking 5 or more individual tablets. A 12-month follow up is planned to allow sufficient time to assess sustainability of adherence to the polypill and overcome the time-lag effect required for translation of the cardiovascular disease prevention benefits of blood pressure and cholesterol control. This period will also initiate the collection of 'hard cardiovascular outcome measures' such as recurrent strokes and vascular events to inform the design of a larger future clinical trial. Findings from the SMAART study will undoubtedly contribute meaningful data from the African perspective towards the formulation of guidelines for global adoption of polypills into routine care for secondary CVD risk prevention by international bodies such as the World Health Organization. In the long-term, findings from SMAART could serve as a scalable strategy for managing CVD risk among stroke survivors in Africa, and even other low-and-middle income countries.

Dr. Fred Stephen Sarfo, Department of Medicine is carrying out the study together with Prof. Bruce Ovbiagele of the Medical University of South Carolina. The research

is funded by the National Institutes of Health. When the study is completed, it will provide simplification of evidence-based secondary preventive therapy for stroke survivors in resource-limited settings.

Training Mothers and Caregivers to Recognize the Early Clinical Signs of Pneumonia in Children less than 2 Years in Ghana: Proof of Concept Study

Pneumonia which is the foremost cause of death in young children in sub-Saharan Africa is largely driven by poor access to healthcare and delay in health seeking. A study conducted by a research team led by Prof Daniel Ansong, Department of Child Health has shown that women of different educational and socioeconomic status can be trained to count respiratory rate and detect signs and symptoms of respiratory diseases in their new-borns for immediate hospital care. The aim of the study is to design and use culturally acceptable tools (beads) to teach mothers to count respiratory rate accurately at home; to generate and use culturally acceptable videos to educate mothers on pneumonia case detection at home; to teach mothers to count respiratory rate accurately; to recognize other early signs of pneumonia at home; and to evaluate the socio-cultural understanding of pneumonia and the level of confidence among mothers in counting RR and detecting signs of pneumonia.

The trial was conducted over a period of 6 months and was funded by DANIDA Fellowship Centre (Building Stronger Universities-Work Package 3) with an amount of USD 10,000. The study has been completed and manuscripts have been submitted for publication.



Mothers being educated on the clinical signs of respiratory problems

The pilot study grant has made it possible for the team to conduct proof of concept study which has generated empirical data towards the innovative idea



proposed. Their innovation aims at reducing pneumonia morbidity and mortality through the use of basic learning technologies to train mothers to detect early clinical signs of pneumonia at household level. The pilot grant also supported the research thesis of a postgraduate student at the School of Public Health, KNUST. The research thesis is titled 'The Health and Economic Burden of Household with Children less than 5 Years Presenting with Pneumonia at Komfo Anokye Teaching Hospital in Kumasi, Ghana'. Other members of the team are Prof. EOD Addo-Yobo-Department of Child Health, Dr. Jonathan Mensah Dapaah- Department of Sociology and Social Work, Dr. Peter Agyei-Baffour- School of Public Health, Komfo Anokye Teaching Hospital



Project closure with some mothers and research assistants

Performance Monitoring and Accountability 2020 (PMA2020)

PMA2020 aims to provide evidence of the world's progress towards achieving the FP2020 goal. PMA2020 data are used as reference data for policy and programming in reproductive health/ family planning and sanitation. Five (5) survey rounds were completed from 2013 – 2016 and the results have been disseminated. The data is also publicly available and can be accessed at the PMA website. Training for the 2017 survey round is underway across the nation. The PMA2020 platform can be used to collect nationally representative data on any issue of public health interest. Modules on specific issues can be rolled in and out of subsequent survey rounds as and when desired. The concept of a rapid turnaround time between data collection and dissemination at a low cost is the hallmark of the PMA2020 platform.

The project is funded by the Bill and Melinda Gates Foundation/Johns Hopkins Bloomberg School of Public Health (US\$ 2.75m, 2013 – 2017) and led by Dr Easmon Otupiri, (School of Public Health). Mr Emmanuel Nakua

(Population, Family and Reproductive Health) and Dr Roderick Larsen-Reindorf (Obstetrics and Gynaecology) are the other members on the research team.

Preparing Graduates for e-Health and the Private Sector (Colleges for Nurses and Midwives)

Dr Easmon Otupiri, School of Public Health and Dr Victoria Bam, School of Nursing are leading a team of researchers to prepare nursing and midwifery graduates for the private sector by building capacity in entrepreneurship skills and e-health. This will be carried out by a consortium of partners who will work with six (6) Colleges of Nursing and Midwifery in the three (3) northern regions of Ghana to implement the project in their institutions. The current project is a follow-up on the NICHE/GHA/102 project (2011-2016) which sought to upgrade and upscale nursing and midwifery training in northern Ghana. The project is at its early phase which entails a kick-off mission to northern Ghana, baseline survey/needs assessment in the 12 project Colleges and the development of a mentoring system to be implemented by the six (6) colleges that participated in the NICHE/GHA/102

It is expected that at the end of the project, graduates of the participating Colleges will demonstrate the requisite entrepreneurship and e-health skills demanded by the private sector and can easily be absorbed by the private sector.

Other members of the team are Mr Emmanuel Nakua, School of Public Health and Mr. Charles Odonkor (UITS). The project is funded by the Dutch government (EP-NUFFIC) with €2.1m and is expected to run till 2020.

Ghana Reproductive Health Commodity Security Survey II

Access to and the availability of life-saving essential maternal health medicines and family planning commodities mean that women and communities can enjoy the health and wealth benefits of family planning. The Ghana Reproductive Health Commodity Security Survey II project seeks to provide evidence on Ghana's status as far as reproductive health commodity security is concerned. The UNFPA supports these surveys in developing countries to ensure that essential maternal health medicines such as oxytocin and magnesium



sulphate, and family planning commodities are available in such countries. Round I survey of the project was completed in 2016 and the final report has been disseminated. The data for Round II has been collected and analysis is ongoing. The research team which includes Dr Roderick Larsen-Reindorf (Obstetrics and Gynaecology) and Mrs Rose Odotei-Adjei (Health Promotion and Education) is led by Dr. Easmon Otupiri. The project is funded by the UNFPA-Ghana/Ghana Health Service with US\$ 2.75m. It is expected that the project will result in Ghana having evidence-informed data for reproductive health commodity security policy and programming.

Tackling the Obstacles of Filariasis and Podoconiosis Disease Control (TAKeOFF)

The lymphatic, ocular and dermatological damage caused by filarial nematodes have severe economic and social consequences including poor school performance, low productivity, higher health related costs among infected adults, and a reduced life span. A consortium of experts in filarial infections aims to establish a Filarial Clinical Trial & Research Platform (F-CuRE) to address patient needs. To initiate F-CuRE in the most effective way with the goal to harmonize the procedure for clinical trials in filariasis, a research team led by Prof Yaw Debrah of the Faculty of Allied Health Sciences will perform multinational clinical trials in different countries to improve treatment regimen for morbidity control of lymphedema of filarial and non-filarial (podoconiosis) origins. A core facility for non-invasive biomarker-based diagnostics to evaluate the efficacy of mass drug administration (MDA) and new anti-helminthic drug candidates will also be established to validate upcoming promising biomarkers identified by their consortium and others for its use in the field. The project will also implement an awareness programme to roll out doxycycline with its dual activity for lymphedema of filarial and non-filarial origin. This project will therefore not only maximize the collaboration between filarial disease stakeholders and scientists, but will also provide key elements to drive the discovery and progression of promising drug candidates and existing treatment regimens forward. The recruitment of study participants is ongoing and it is expected that by the end of the study, a clinical trial platform to conduct filariasis clinical trial will be

formed and the use of doxycycline for the treatment of lymphedema will be established.

Funding of the project (€2.77 M over a period of four (4) years) is by the German Federal Ministry of Education and Research (BMBF). The work is being carried out in collaboration with Bonn University Hospital, Bonn, Germany. Other members of the team are Dr. Linda Batsa Debrah, (Dept of Clinical Microbiology) and Dr. Jubin Osei-Mensah, (KCCR).



Seeding Laboratory Instrumental Access Program

Ghana Abortion Study

Many reasons have been offered for the total fertility rate of Ghana that is not accompanied with a high enough contraceptive prevalence rate. One of the reasons suggested is that abortion is used as a contraceptive in Ghana. The Ghana Abortion Study, which is funded by the Guttmacher Institute (US\$ 1.5m, 2017 – 2018) and led by Dr Easmon Otupiri, (School of Public Health), seeks to provide evidence on the burden of abortion in Ghana. Abortion is a hushed subject and so there is the need to better understand the factors involved in order to improve programming and policy on comprehensive abortion care and abortion prevention. Discussions are ongoing as to the content and form of the survey tools and it is expected that by the end of the project, Ghana will have evidence-informed data regarding the burden of abortion and its correlates. The research team includes Dr Roderick Larsen-Reindorf (Obstetrics and Gynaecology) and Dr Yeetey Enuameh (Epidemiology & Biostatistics)

Dissecting the Effects of Filarial-Associated Immune System modulation on HIV Susceptibility-RHINO Study

The German Research Foundation has supported a research team led by Prof Alex Debrah, Faculty of Allied Health Sciences, with an amount of € 307, 222 to



investigate the immune-epidemiological associations of Lymphatic Filariasis (LF) and HIV in endemic areas of Ghana and Tanzania. The rapid spread of HIV over the last decades in Sub-Saharan Africa has led to different hypotheses to explain this phenomenon. One well-known hypothesis implies that specific pre-existing helminth infections contribute to systemic immune activation, which facilitates early viral dissemination hence increasing susceptibility to HIV. In a recent prospective study in Tanzania, our consortium has demonstrated, for the first time, that there is a significantly increased risk of acquiring HIV in individuals presenting lymphatic filariasis (LF), especially in 14-30 year olds. LF is known to induce immune-regulation in the host and preliminary findings from this consortium have shown that LF-infected individuals have increased frequencies of activated CD4+ T cells whereas CD8+ T cells showed markers of exhaustion. Field studies in Ghana will assess the prevalence of HIV in endemic

areas of LF and onchocerciasis providing information about whether the increased susceptibility is restricted to LF infections or a phenomenon of filariae per se. LF- infected individuals will further be sub-divided into infection state (MF+ vs. MF-), to determine whether the observed association is MF-dependent. Immune profiling will provide insight into filarial- induced mechanisms that drive enhanced susceptibility. The study will be conducted over a period of three (3) years and it is expected that the study will elucidate the mechanisms underlying the increased susceptibility for HIV in LF-infected individuals and will provide novel insights into parasite-host-virus interactions. Members of the research team include Dr. Linda Batsa Debrah, (Dept. of Clinical Microbiology) and Dr. Jubin Osei-Mensah (KCCR) with collaboration from Bonn University Hospital, Bonn, Germany.



LIST OF ACTIVE EXTERNAL GRANTS /PROJECTS IN COLLEGE OF HEALTH SCIENCES (CHS) KNUST

No	Name of Project	Department/ Unit	Funder	Principal Investigator	Amount	Period
1	Task Shifting Study for Hypertension(TASSH)	Physiology	National Institute of Health/ New York University	Prof. J. Plange-Rhule	\$600,000.00	2012 - 2017
2	H3 Africa Kidney Disease Study		National Institute of Health/ University of Ghana	Prof. J. Plange-Rhule	\$178,638.00(1ST YEAR ONLY)	2012 - 2017
3	H3 Africa Bionet	KCCR	National Institute of Health/ University of Cape Town	Prof. Ellis Owusu Dabo	\$329,080.00	2012 - 2017
4	Stroke Investigative Research and Education(SIREN)	Medicine	National Institute of Health/ Ibadan University	Dr. Fred Stephen Sarfo	\$112,000.00	2013 - 2017
5	Performance Monitoring and Accountability(PMA) 2020	Community Health	Bill and Melinda Gates Foundation	Dr. Eason Otubiri		2012 - 2017
6	Development of Paediatric Nursing Curriculum for Post- Qualified Nurses Specific to Ghana	Nursing	DFID through British Council	Dr. Victoria Bam	€57000.00	2010 - 2013
7	The Efficacy of Rifapentine 900Mg/D Plus Moxifloxacin 400Mg/D Given for 14 or 7 Days Against Onchocerciasis – A Randomized, Controlled, Parallel-Group, Open-Label, Phase II Pilot Trial. Morion	KCCR		Dr. Alex Yaw Debrah	€150000	2015 - 2016
8	Janssen	KCCR	Janssen-Cilag Pharmaceuticals	Dr. Alex Yaw Debrah	€43744.00	2015 - 2016
9	GWAS	KCCR	Bill And Melinda Gates Foundation	Dr. Alex Yaw Debrah	€348700.00	2015 - 2018
10	Transmission of Malaria, Assessing The Effects of Neglected Tropical Diseases on Plasmodium Falciparum Transmission in an Area of Co-Endemicity Transmal	KCCR	German Research Council, (DFG)	Prof. Ellis Owusu-Dabo	£218610	2015 - 2018
11	Drug Resistance Tuberculosis Surveillancetb DRS	KCCR	Global Fund through National TB Program, Ghana	Prof. Ellis Owusu-Dabo	\$149930.00	2015 - 2016
12	DZIF TB		Berhard Nocht Institute for Tropical Medicine	Prof. Ellis Owusu-Dabo	£44336.00	2015 - 2016
13	Pathogenesis and Management of M. Ulcerans Disease (Buruli ulcer) Burulipath	KCCR	Medical Research Council, UK	Dr. Richard Odame Philips	£210856.00	2013 - 2017



No	Name of Project	Department/ Unit	Funder	Principal Investigator	Amount	Period
14	Detection of Chronic HCV Infection and Recovery Among Cohort of HCV Positive Blood Donors In Kumasi (K-LUMC HCV Study)	KCCR	Loyala University USA	Dr. Richard Odame Philips	£23716.00	2014 - 2017
15	African Research Network for Neglected Tropical Diseases(ARNTD)	KCCR	VW Foundation	Dr. Richard Odame Philips	£64000.00	2015 - 2019
16	ANDI	KCCR	BNI Hamburg	Prof. Ellis Owusu-Dabo	€23809.50	2010 - 2014
17	Virus Biology, Host Ecology And Human Behaviour as Determinants for Coronaviral Zoonoses(BAT II)	KCCR	German Research Council (DFG)	Prof. Yaw Adu Sarkodie	€182228.00	2015 - 2019
18	Severe Typhoid in Africa Project(SETA)	KCCR	Bill and Melinda Gates Foundation through International Vaccine Institute(IVI)	Prof. Yaw Adu Sarkodie	\$700000.00	01/12/15-31/12/17
19	ORDISS	KCCR	University of Pittsburgh	Prof. Solomon Ofori-Acquah	\$250000.00	01/2015-12/2019
20	Strengthening Injury Control Research in Ghana and West Africa	Surgery	Forgarty International Center, NIH	Prof. Peter Donkor	\$135000.00	2016-2020
21	EVERLAST	Medicine	NIH	Dr. Stephen Sarfo	\$96331.00	2016-2018
22	BAT Ulm	KCCR	German Research Council (DFC)		€ 136040.00	2014 - 2017
23	The Influence of M. Perstans Infection and their Wolbachia Endosymbionts on Host Immunity against Mycobacterial Infection, BCG Vaccination Efficacy, and Disease Susceptibility in Children and Adolescents (MAP2CO)	KCCR	Bill and Melinda Gates Foundation through International Vaccine Institute (IVI)	Prof. Achim Hoerauf	\$700, 000.00	2015 - 2017
24	Enhancing the Public Health Impact of Latent TB Infection Diagnosis and Treatment: Apragmatic Cluster Randomized Trial (Act 4)	KCCR	Canadian Institute of Health Research (CIHR)	Dr. Joseph Obeng Baah	CAD\$ 78,979.00	2016- 2017
25	ARNDT General Assembly Meeting	KCCR	VW foundation	Dr. John Amuasi		2015 - 2019
26	Development of a Rapid Test for Buruli Ulcer (BU-RPA I)	KCCR	ISID	Dr. Michael Frimpong	\$ 7,000.00	2016 - 2017



No	Name of Project	Department/ Unit	Funder	Principal Investigator	Amount	Period
27	Genetic Determinants for the Transmission of Cryptosporidium Spp. Among Humans and Animals	KCCR	German Research Council (DFG)	Dr. Daniel Eibach	€ 110,453.00	2016 - 2019
28	DELGEME	KCCR	Wellcome Trust through MRTC (Mali)	Dr. Oumou Maiga-Ascofare	£ 213,900.00	2016 - 2021
29	KCCR Research Group on Non-Communicable Diseases (EOD)	KCCR	BNI Hamburg	Prof. Ellis Owusu-Dabo	€ 140,000.00	2016 - 2017
30	Septicaemia in Intensive Care: Pathogens and Antibiotic Utilization	KCCR	BNITM	Dr. Kirsten Eberhardt	€ 11,840.00	2016 - ongoing
31	Tackling the Obstarcles of Filariasis and Podoconiosis Disease Control	KCCR	BNITM	Dr. Thomas Kruppa	€ 13,632.00	2016 - 2017
32	HEPIK II	KCCR	Liverpool University	Dr. Richard Odame Philips	18058.15	2015 -2017



COLLEGE OF HUMANITIES AND SOCIAL SCIENCES

New Materials for Sustainable Energy Future: Linking Computation with Experiment

Seaweeds has been acknowledged as the feedstock of the future and algae is attracting increased investment interest from biofuels, petroleum and agribusiness industries. However, its growth along the coastlines of many countries has become a menace to the fishing industry in these countries.

In an effort to manage the menace along the coast and to derive economic benefits from seaweed, the Seaweed Bio-refinery Project of Ghana (SeaBioGha), a biorefinery project implemented by the Technical

University of Denmark (DTU), Kwame Nkrumah University of Science and Technology (KNUST), and the Water Research Institute (WRIG) of the Centre for Scientific and Industrial Research (CSIR) Ghana is engaging in massive seaweed cultivation in the coastal marine waters.

The project, titled “**Environment Location Assessment for Seaweed Cultivation in Ghana: A Spatial Multi-Criteria Approach**” has Dr Alexander Yao Segbefia, Department of Geography and Rural Development, as the principal investigator. Funding for the project, US\$ 2,000,000.00, is provided by DANIDA.

The project seeks to achieve the following objectives:



- Identify seaweed cultivation sites using the spatial multi-criteria approach.
- Identify opportunities for potential jobs and income generation to minimize the pressure on the already over-exploited marine resources.
- Promote cultivation of seaweeds which has the potential of sequestering carbon to generate carbon credit for Ghana, and save the planet from climate change impacts.

Basically the project is to reveal the main factor that influences the selection of suitable cultivations sites.

The information on Ghana's Regional Sea Surface Temperature (GSST) for year 2009 was downloaded as an image which was then digitised into a shape file. Similarly, physical environmental data (sea floor elevation) was downloaded as a Digital Elevation Model in Geotiff format. Digital Elevation data is the product of the Global Multi-Resolution Topography (GRMT, 2014; Ryan, 2009) at a higher resolution of 1 meter. Sheltered coves were digitized from Google earth imagery while the data for distance to settlements was collected from the World Bank's (1999) Ghana-Country at a Glance (G-CAG) Topodata database (Figure 2).

Arcview 3.3 was used to create a suitability model from different map layers. These map layers are themes representing various spatial variables in Figure 2, and their relationships modeled with spatial analysis as represented in (Figure 3). The input variable characteristics were ranked according to their suitability scales and then combined to create a composite map showing optimum locations for seaweed cultivation. The ranking criteria used to obtain the best locations for seaweed cultivation were based on the criteria used by Gbedemah (2014).

In the case of SST, sheltered coves and buffer distance, the individual reclassified maps were equally weighted and then re-assigned a binary 1 and 0 to depict only suitable area (1) and non-suitable area (0). The elevation model was reclassified into four levels of suitability according to sea depth parameters. All the suitable layers were combined in an overlay operation using reclassify tools and map calculator in Arcview 3.3 to depict optimum seaweed cultivation sites for different seaweed species

From the analysis, 348 communities along the 540km coastline qualified for selection when the 8-kilometer buffer criterion was applied. However, further discrimination

using the digital elevation and sheltered cove criteria reduced the number to only 12 most suitable locations (Figure 9). Of all the factors analysed, sea surface temperature was found to have no significant effect on the final model. Therefore, the main factors that influenced the selection of suitable cultivation sites were the 8-km buffer, the digital elevation and the sheltered coves.

Seaweed cultivation sites identified using the spatial multi-criteria approach is useful for developing a seaweed industry in Ghana as an additional alternative livelihood for coastal fishermen. This activity has the potential for jobs and income generation and may serve to take the pressure off the already over-exploited marine resources. Cultivated seaweeds also has the potential of sequestering carbon to generate carbon credit for Ghana, and save the planet from climate change impacts.

Radicalisation of Muslim Youth in Ghana, a Case for KNUST

As a way of finding appropriate strategies to curb the menace of radicalism and to prevent people from becoming violent extremists and to avoid the risk of students being drawn into violent behaviour to safeguard people and communities from the threats of wanton disregard of human life, a team of researchers carried out a project on **"Radicalisation of Muslim Youth in Ghana: A Case Study of KNUST"**. The team was led by Dr Yunus Dumbe, (Department of Religious Studies), as the principal investigator. Others were: Dr George Bob-Milliar (History and Political Studies), Dr V.S Gedzi (Religious Studies) and Dr Gabriel Eshun (Geography and Rural Development). The project was funded by the College of Humanities and Social Sciences Research Fund with an amount of GH¢ 10,000.00.

The project seeks to, among other things, analyse:

- the psychological variables that contribute to radicalisation;
- the socio-economic and political factors that contributes to the radicalisation of young people;
- the role of foreign powers (Muslim States and Affiliate NGOs) in encouraging radicalisation; and to,
- the level of csos involvement in Muslim youth education.



The team situated their research within ethnography. As a social science research technique, ethnography allows for a “close-up and real-time observation of actors involved”. Following the ethnographic approach, researchers engage in face-to-face interviews and interactions with the activists, community leaders as well as diverse segments of the population such as women groups, Imams, Ulama and teachers.

The research design focused on the process of radicalization of Muslim youth in tertiary institutions, KNUST. The snowballing technique complemented the phenomenological approach in the qualitative data collection. This technique is a link-tracing strategy where one subject leads the researcher to another subject, who in turn provides the name of a third, and so on (Atkinson and Flint 2001).

The team made findings including the following:

- i. Over-dependence on the internet for religious resources significantly contributed to the radicalization of Muslim youths on campus; and
- ii. Leadership vacuum in the management of student unions allowed for the search for external and radical leadership;

The team concluded that Muslim youth radicalisation is real and the underlying grievances should be addressed.

The following are therefore recommended:

- i. Awareness creation of the dangers that radicalisation poses to the community should be encouraged;
- ii. Seminars for Imams and Ulama should be organized to educate and prevent the youth from becoming radicalized;
- iii. Establishment of Muslim Chaplaincy by the University, KNUST;
- iv. Establishment and provision of enhanced mentorship programme for Muslim students on campus;
- v. Extra fieldwork on radicalisation is needed to validate the case study;

KSB Students Launch Mobile Application



A group photo of some Students and Lecturers at the 12th Business Week Celebration of the KNUST Business School

Students of the Kwame Nkrumah University of Science and Technology (KNUST) School of Business (KSB) have developed a mobile application to facilitate interaction between students and staff. The application has features such as events manager model, resource sharing model, student model, news model, announcement model, as well as a section for feedback. The application was launched at the 12th Business Week Celebration of the School.

The celebration was on the theme: “Creating an Enabling Environment to Promote Entrepreneurship”. In launching the KSB application, Mr. Isaac Afful, leader of the Application development Team, explained that the application’s features will enable staff and students reschedule events and to take notice of upcoming events. The application, according to him, will also help students exchange information.

In addition, he noted that the application will also enable users access information on the University website, access students and alumni database and to ensure networking. The application, he said, will be available on Google Play Store.

Dr. David Asamoah, Vice Dean of the KSB, reminded students of the proliferation of business schools in the country as well as the current high rate of graduate unemployment and called for entrepreneurial partnerships among students.

He therefore challenged students to partner their colleagues in setting up businesses and offer solutions to challenges and to render services to patrons to earn income. According to Dr. Asamoah, a lot of opportunities abound for young entrepreneurs if they explore.



Professor Nathaniel Boso, Dean of the KSB, encouraged students to take up volunteerism in order to build more skills for the future. Professor Boso said acquiring these skills from experienced entrepreneurs will go a long way to contribute to their success.

He also encouraged the female students to believe in themselves to be good entrepreneurs as about two-thirds of successful businesses were started by women from their homes.

LIST OF ACTIVE EXTERNAL GRANTS / PROJECTS IN COLLEGE OF HUMANITIES AND SOCIAL SCIENCES (CoHSS) KNUST

No	Name Of Project	Department / Unit	Funder	Principal Investigator	Amount	Period
1	Facilitating the Development and Growth of the Culture & Arts Sector under EU-ECOWAS Economic Partnership Agreement	Centre for African Studies	ACP- EU	Anthony A. Aidoo	€ 116,918.91	2014 - 2017



COLLEGE OF SCIENCE

Nutrition, Physical Fitness and Cognition among School-Aged Children in Ghana

The Department of Biochemistry and Biotechnology, KNUST, led by Dr. Reginald A. Annan has been involved in a collaboration with the University of Tokyo, Japan and Hokaido University, Japan on a Ministry of Agriculture funded project on “Nutrition, Physical Fitness and Cognition among School-aged Children in Ghana”. The project seeks to investigate the physical fitness, nutritional status, cognition and household socioeconomic status in Ghanaian school-aged children. The project is an ongoing collaboration from 2015 till date. Dr. Charles Apprey, a lecturer from the Biochemistry and Biotechnology Department is the supporting investigator. Currently the first part of the research which involved assessment of physical fitness,

cognition and nutritional status of about 450 children in public primary schools has been undertaken in the Kumasi Metropolis. Household assessments have also been done in these selected schools.

Presently, nutrition and physical activity interventions, involving counselling and demonstration for 6 months are being carried out. This is to help in the assessment of the impact on knowledge, practice and cognition. It is expected that the project will:

- increase understanding in the relationship between nutrition, physical fitness and cognition in school-aged children
- improve nutrition and physical fitness knowledge of school-aged children leading to reduction in undernutrition and overweight



- improve dietary practices of school-aged children and impact on cognition and school performance

The next phase of the project is to implement what has been done in Kumasi in school-aged children in primary schools in Accra



Some research team members taking participants through intervention activity



Assessment of physical fitness, researcher checking vitals of a school child

This project outlines a novel approach to developing specific policy recommendations for food system strengthening, grounded in the lived experience of poor communities in South Africa and Ghana.

The expected outcomes of the project are: 1) increased understanding of how communities in SA and Ghana interact with their food suppliers, and the factors that influence this;

Researching the Obesogenic Food Environment, its Drivers and Potential Policy Levers in South Africa and Ghana

Dr. Reginald A. Annan (Biochemistry and Biotechnology Department), KNUST has been awarded 733,800.00 Canadian dollars research grant by the International Development Research Center (IDRC), on a three-year project titled **“Researching the Obesogenic Food Environment, its drivers and potential policy levers in South Africa and Ghana”**. The main aim of the project is to better understand the changing nature of food marketed in poor communities in South Africa and Ghana, the drivers of these changes and the potential policy levers available to improve the healthfulness of the local food environment. The University of Western Cape (South Africa), Ghana Nutrition Association, Peoples Health Movement, Ghana Diabetic Association and Peasant Farmers Association, Ghana are the collaborating bodies. Dr. Charles Apprey (Department of Biochemistry and Biotechnology), Dr. Robert Aidoo (Department of Agricultural Economics, Agribusiness & Extension), Dr. Frances Azumah (Department of Sociology and Social Work) and Ms Linda Esi Aduku, Project Manager are on the research team.

Currently, the project is in its first phase led by Dr. Charles Apprey. In this phase the project seeks to:

- define types of diets and food purchasing patterns among consumers in four communities in both South Africa and Ghana,
- characterize local food environments and
- assess decision-making regarding where, when and why consumers purchase different types of foods.

This project outlines a novel approach to developing specific policy recommendations for food system strengthening, grounded in the lived experience of poor communities in South Africa and Ghana.

The expected outcomes of the project are:

- increased understanding of how communities in SA and Ghana interact with their food suppliers, and the factors that influence this;
- improved communication between health and economic policy makers regarding the (largely unintended) negative health consequences of



the current food system and policies shaping it; and

- identification of specific opportunities to improve food supply policies, in ways that create incentives for the production and consumption of healthy foods.

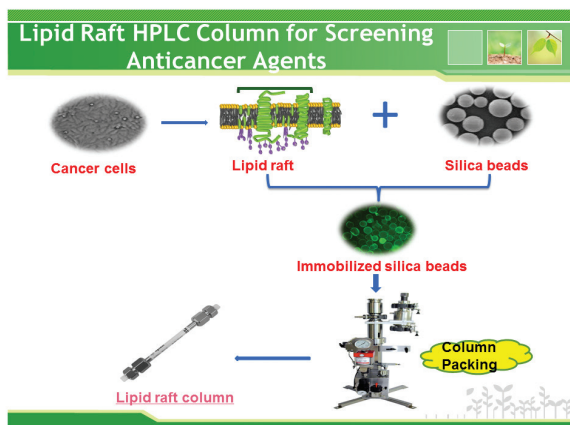


Some research team members measuring the Height of a participant in a community in Ghana

Medicinal Plants used to Treat Abnormal Tissue Growth in Ghana- Ethno-Medicinal, Phytochemical and Pharmacological Studies

The Department of Biochemistry and Biotechnology, KNUST has collaborated with Department of Pharmaceutics, Jiangsu University China, on a National Natural Science Foundation funded project on “*Medicinal plants used to treat abnormal tissue growth in Ghana- Ethno-medicinal, Phytochemical and Pharmacological Studies*”. The project is funded by the National Natural Science Foundation of China, which seeks to investigate the anti-proliferative activities of selected Ghanaian medicinal plants used in treating abnormal tissue growth, and isolate, identify and determine the mechanism of action of the bioactive compounds. A total amount of \$15,000.00 has already been approved for the project, over a two year period. Dr. Caleb Kesse Frempong, (Department of Department

of Biochemistry and Biotechnology) is the Principal Investigator/award holder. Two lecturers each from KNUST and Jiangsu University China, are currently on the project.



New Materials for a Sustainable Energy Future: Linking Computation with Experiment

The Department of Chemistry, KNUST, led by Prof. Evans Adei has collaborated with Cardiff University, UK; University of Botswana and University of Namibia, on a Royal Society– funded project on “**New Materials for Sustainable Energy Future: Linking Computation with Experiment**”. The project is funded by the Royal Society on behalf of the Department for International Development (DfID), UK, which seeks to develop and employ state-of-the-art computational chemistry techniques and synthesis/characterization methods to design and optimize new catalysts and semi-conductor materials for renewable energy applications. A total amount of £1,243,000 has already been approved for the four collaborating research teams, over a period of four years. Dr. Richard Tia, (Chemistry Department) is the supporting Investigator.

Improving Quality, Nutrition and Health: Impacts of inclusion of High Quality Cassava Flour (HQCF) in Bread Formulations in West Africa (Ghana and Nigeria) – the Ghanaian Focus

The prevailing high cost of importation and shortage of wheat flour in many non-wheat producing countries especially Sub - Saharan Africa has led to the development of viable local flour substitutes or alternatives for bread



making and other bakery products. Although High Quality Cassava Flour (HQCF) has been established to be one with such potential for the bread making industry, there is a dearth of information on the cultural acceptability of cassava wheat composite bread by stakeholders in the bread food chain and the product's contribution to good health.

From this backdrop, a KNUST team led by Prof (Mrs) Ibok Oduro, Prof William O. Ellis and Dr (Mrs) Faustina D. Wireko-Manu researched to develop a standardized recipe for cassava wheat composite tea and sugar bread types and test their acceptability. The project supported two (2) MPhil students in the Department of Food Science and Technology to investigate the impact of substituting HQCF cassava flour in the bread formulation on glycaemic index and shelf life of the bread samples, respectively.

Using the standardized recipe, HQCF substitution level up to 20% was acceptable for 'sugar' bread while 10% was acceptable for tea bread. The study results also show that cassava composite bread has lower glycaemic index (GI) than 100% wheat bread. The research findings also show that 'tea bread' has lower GI than sugar bread.

The known GI status for cassava composite bread will support the promotion of its consumption. The information gathered on the enhanced potential health benefits will help consumers make informed choices. In the long term, this will impact policy on the inclusion of cassava for baking by the flour mills in Ghana and West Africa. Thus, there is the necessity for teamwork with bakers to build up their confidence and personal technologies, intense education to eliminate negative perceptions about cassava flour usage in food industries and standardizing recipes for optimum bread quality among bakers.

Funding for this project was from IFAD under the coordination of McGill University and IITA.



Samples of Bread made from High Quality Cassava Flour (HQCF)

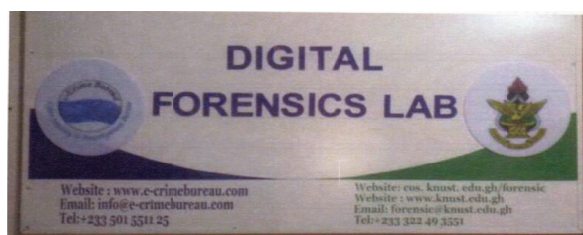
Digital Forensic Laboratory, KNUST

The idea of a Digital Forensic Laboratory started on 13th May, 2011 upon a meeting between some members from the Biochemistry Department of KNUST and the then Assistant Commander of Police (ACP) Kofi Boakyie. The post graduate programme in Forensic Science was borne out of this meeting. Mr. Albert Antwi Boasiako, a Digital Forensic Specialist was invited to contribute to the syllabus. The establishment of a Digital Forensic Laboratory was included in the teaching tools for the post graduate programme.

With this idea, an MoU between e-Crime Bureau and KNUST (College of Science) was signed for the establishment of a Digital Forensic Laboratory which is to provide practical training for students as well as to support criminal investigation and retrieval of digital evidence indisputed transactions such as:

- allegations of employment misconduct
- showing legal and regulatory compliance
- avoidance of negligence and breach-of-contract charges
- assisting law enforcement investigations
- meeting disclosure requirements in civil claims
- supporting insurance claims when a loss occurs

Prospective clients include students, financial institutions, insurance companies, the Police Service, and Armed Forces etc.

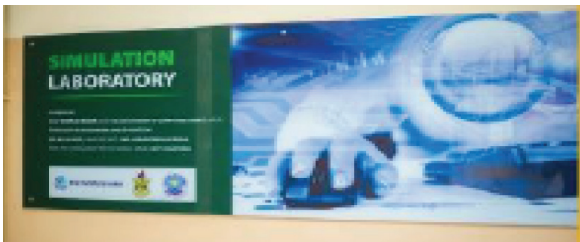


Sign Post of the Digital Forensics Lab



Cross section of the Digital Forensics Lab space

The Simulation Laboratory was commissioned by the Vice Chancellor, Prof. Kwasi Obiri Danso on 25th October 2017. It is located on the first floor of the Aboagye Menyeh Complex. It is mainly used by post-graduate students for the simulation of research results findings and experiments. Also, it helps in the simulation of internet works and improves data transmission. It aids in the mitigation of data intrusion. The Laboratory has five cubicles, a conference room, an office and a classroom. The World Bank sponsored the establishment of this Simulation Laboratory with \$250,000 with Dr. Michael Asante being the lead resource person for the College of Science.



College of Science Learning Commons

The College of Science commissioned its Learning Commons on 25th October 2017. The Vice Chancellor of the University, Prof. Kwasi Obiri Danso and supported by the Provost of the college and senior staff and members of the University Community commissioned the centre. It is located at the basement of the Aboagye Menyeh Complex. It was established mainly for undergraduate students in the College to augment the learning environment and provide congenial reading rooms. It has two sections, a reading area and a discussion area.

The learning commons has been connected to the KNUST Wifi and the College online library, which aids in academic work and research.



Some students studying at the College of Sciences Learning Commons

LIST OF ACTIVE EXTERNAL GRANTS /PROJECTS IN COLLEGE OF SCIENCE (CoS) KNUST

No	Name of Project	Department/ Unit	Funder	Principal Investigator	Amount	Period
01	Dynamics Aerosol Chemistry-Cloud Interaction In West Africa	Physics	EU-DACCIWA	Dr Amekudzi & Prof Danuor	€84000.00	2014 - 2018
02	New Materials For A Sustainable Energy Future: Linking Computation With Experiment	Chemistry	Royal Society-DFID/ Cardiff University	Prof. Evans Adei	£1243000.00	2015 - 2020
03	Develpong Materials For Applications In Solar Cells	Chemistry	Royal Society-DFID/University of Manchester	Prof. J. A. M. Awudza	£1.25M	2015 - 2019
04	Biodiversity Conservation Through Bio-Prospecting For Novel Anti- Plasmodial Compounds From Africa's Rich Flora	Chemistry	Internastional Funds for Science(IFS)	Dr Lawrence S. Borquaye	\$15000.00	2015 - 2017

HONOURS/ ACHIEVEMENTS



Dr. Owusu Ansah Awarded the prize of SME Researcher of the Year

Dr. Wilberforce Owusu-Ansah, head of the Department of Marketing and Corporate Strategy at the Kwame Nkrumah University of Science and Technology (KNUST) School of Business, (KSB) has been awarded Small and Medium Enterprises (SME) researcher of the year. He was awarded at the 4th SME Ghana Awards-SMEGA'16 held at the Banquet Hall recently.

The awards ceremony was on the theme:” Sustaining Ghana’s SME’s in a Globally Competitive Market- Uncovering the Pillars of Profitable Growth in a Digitized Business World”.

The KNUST lecturer, received the award for being an outstanding personality who has devoted time and resources on research to improve the SME sector in Ghana.

For his prize, he received the prestigious SMEGA Trophy, a one-year free insurance cover, a citation, a Lenovo laptop and Business solutions packages.



Dr. Agyekum receiving the award as the overall best presenter at ICIDA 2017

4th KNUST Excellence Awards

- Dr. Fred Stephen Sarfo - *Best Senior Member (Research)*
- Dr. Mrs. Victoria Bam – *Best Senior Member (Service and Innovation)*
- Mr. Charles Nsiah – *Best Senior Member (Administrative)*
- Dr. Russel Owusu Afrifa – *Best Senior Member (Teaching)*
- Mrs. Harriet Eshun – *Best Senior Member Administrative (Specialized Units)*
- The College of Science – *Best College in Environmental Ranking*
- Department of Mathematics – *Best Department*
- Unity Hall – *Best Hall in Environmental Ranking*
- Bureau of Integrated Rural Development – *Best Research Centre*
- Mr. Benjamin Payne – *Best Senior Staff Award*
- Mrs. Kathleen Anyemedu – *Best Junior Staff Award*
- Mr. Francis Martin Baffoe – *Best Teacher (Basic Schools)*
- Mr. Isaac Nkrumah – *Best Nurse (KNUST Hospital)*
- Mr. Blessed Charles Amankwah – *Overall Best Student 2017/18*
- Ms. Constance Akosiwaa Efio-Akolly – *Best Female Student*

RESEARCH OUTPUT

Summary of Research Output for 2014/2015 and 2015/2016

College of Agriculture and Natural Resources												
	Refereed Journals		Published Conference Papers		Unpublished Conference Papers		Books Published		Book Chapters		Total Publications	
	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16
Department of Agroforestry	11	25	4		-	-	-		-	1	15	26
Department of Animal Science	41	9	11	19	-	-	1	2	-	-	53	30
Department of Ecotourism and Forest Recreation	3		-	-	-	-	-	-	-	5	3	5
Department of Crop and Soil Sciences	22	41	6	3	-	-	-	1	-	-	28	45
Department of Fisheries and Watershed Management	32	8	-	-	-	-	-	-	-	-	32	8
Department of Horticulture	10	5	2	-	-	-	-		-	-	12	5
Department of Land Reclamation and Rehabilitation	3	1	-	-	-	-	-	-	-	-	3	1
Department of Silviculture and Forest Management	11	9	5	-	-	-	3	1	-	-	19	10
Wildlife and Range Management	25	14	-	4	-	-	-	-	-	-	25	18
Department of Wood Science and Technology	10	10	-	-	-	-	-	-	-	-	10	10
Bureau of Integrated Rural Development	10	4	2	4	-	-	2	-	2	-	15	8
Department of Social Forestry	-	1	-	-	-	-	-	-	-	-	-	1
Department of Agricultural Economics, Agribusiness and Extension	-	29	-	-	-	13	-	-	-	-	-	42
College Total	178	156	30	30	-	13	6	4	2	6	215	209



College of Art and Built Environment												
	Refereed Journals		Published Conference Papers		Unpublished Conference Papers		Books Published		Book Chapters		Total Publications	
	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16
Centre for Settlement Studies	12	6	8		-	1	-	-	-	-	20	7
Department of Land Economy	7	7	17	2	-	-	-	-	1	1	24	10
Department of Planning	18	20	3	-	-	3	-	-	14	6	35	29
Department of Architecture	17	7	16	-	-	2	-	-	2	-	35	9
Institute of Land Administration (ILMAD)	-	1	-	1	-	-	-	-	-	-	-	2
Department of General Art Studies	14	13	2	-	-	-	-	-	-	-	16	15
Department of Communication Design	3	9	6	2	-	-	-	-	-	-	9	11
Department of Integrated Rural Art and Industry	36	42	10	-	-	2	2	-	-	-	48	44
Department of Industrial Art	-	28	-	-	-	2	-	-	-	-	-	30
Total	107	133	62	5		10	2	-	17	7	187	157



College of Humanities and Social Sciences												
	Refereed Journals		Published Conference Papers		Unpublished Conference Papers		Books Published		Book Chapters		Total Publications	
	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16
Department of Accounting and Finance	28	24	-	-	-	-	-	-	-	-	28	24
Department of Supply Chain and Information Systems	6	9	1	7	-	-	2	-	-	-	9	16
Department of Economics	35	46	-	-	-	-	-	-	1	-	36	46
Department of Geography and Rural Development	63	48	-	-	-	-	-	-	-	-	63	48
Department of Human Resource and Organisational Development	3	12	2	1	-	-	-	-	-	1	5	14
Department of Sociology and Social Work	20	12	-	-	-	-	-	-	-	-	10	12
Department of English	3	21	-	-	-	-	-	-	-	-	3	21
Department of Modern Languages	8	8	-	-	7	-	-	-	-	-	15	8
Department of Marketing and Corporate Strategy	-	10	-	-	-	-	-	-	-	-	-	14
Department of History and Political Studies	-	11	-	7	-	-	-	3	-	3	-	24
Department of Religious Studies	50	31	1	-	18	-	14	3	3	2	46	36
Centre for Cultural and African Studies	10	12	6	-	6	-	4	-	1	1	22	13
Department of Commercial Law	-	-	-	-	-	-	-	-	-	-	-	-
Department of Private Law	-	8	-	-	-	-	-	-	-	3	-	11
Department of Public Law	-	-	-	1	-	-	1	-	-	2	1	3
Total	226	252	10	16	31	-	21	6	5	12	238	290



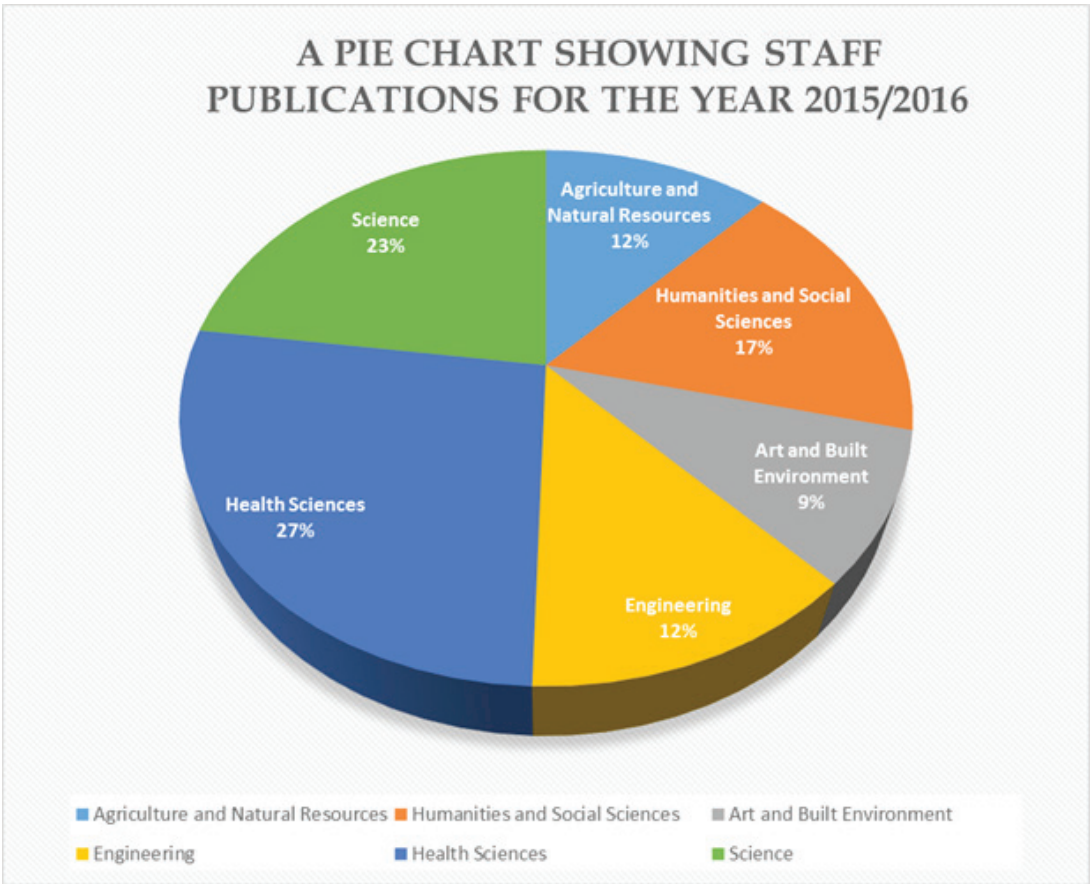
College of Engineering												
	Refereed Journals		Published Conference Papers		Unpublished Conference Papers		Books Published		Book Chapters		Total Publications	
	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16
Department of Chemical Engineering	32	5	-	-	1	-	-	-	1	-	34	5
Department of Civil Engineering	20	30									20	30
Department of Electrical and Electronic Engineering	11	19	15	-	-	-	-	-	-	-	26	19
Department of Geological Engineering	9	11	1	-	-	-	-	-	-	-	10	11
Department of Materials and Metallurgical Engineering	16	4	-	1	-	-	-	-	-	-	16	5
Department of Computer & Biomedical Engineering	7	19	-	-	-	-	-	-	-	-	7	19
Department of Mechanical Engineering	21	23	-	-	-	-	-	-	-	-	21	23
Department of Agricultural Engineering	-	51		-	-						-	51
The Brew-Hammond Energy Centre	-	54	-	-	-	-	-	-	-	-	-	54
Total	116	216	16	1	1	-	-	-	1	-	134	217
College of Health Sciences												
	Refereed Journals		Published Conference Papers		Unpublished Conference Papers		Books Published		Book Chapters		Total Publications	
	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16
Department of Pharmaceuticals	48	9	18	11	-	-	-	-	2	1	68	21
Department of Pharmacognosy	17	12	-	-	-	-	-	-	-	-	17	12
Department of Pharmacology	20	27	-	-	-	-	-	-	-	-	20	27
Department of Pharmaceutical Chemistry	19	6	-	-	-	-	-	-	1	-	20	6
School of Veterinary Medicine	18	28	10	-	-	-	-	-	-	-	28	28

74



College of Science												
	Refereed Journals		Published Conference Papers		Unpublished Conference Papers		Books Published		Book Chapters		Total Publications	
	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16
Department of Computer Science	16	64	2	3	-	-	-	-	-	-	18	67
Department of Physics	31	25	-	-	5	-	-	-	-	-	36	25
Department of Mathematics	12	39	-	-	-	-	-	-	-	-	12	39
Department of Biochemistry and Biotechnology	46	67	6	-	-	15	-	-	1	-	53	82
Department of Chemistry	48	56	5	-	-	-	-	-	-	-	53	56
Department of Food Science and Technology	39	34	51	56	33	-	-	-	-	2	90	92
Department of Theoretical and Applied Biology and Environmental Science	27	33	-	-	-	-	-	-	-	-	27	33
Total	219	318	64	59	38	15	-	-	1	2	289	394
Aggregate Totals	1314	1495	258	128	84	54	29	15	33	28	1593	1729

Other Institutions												
	Refereed Journals		Published Conference Papers		Unpublished Conference Papers		Books Published		Book Chapters		Total Publications	
	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16	14/15	15/16
Quality Assurance and Planning Unit	1	-	3	-	2	1	-	2	-	-	4	3
University Library	2	6	2	1	1	-	-	-	-	-	4	7
Total	3	6	5	1	3	1	-	2	2	-	8	10

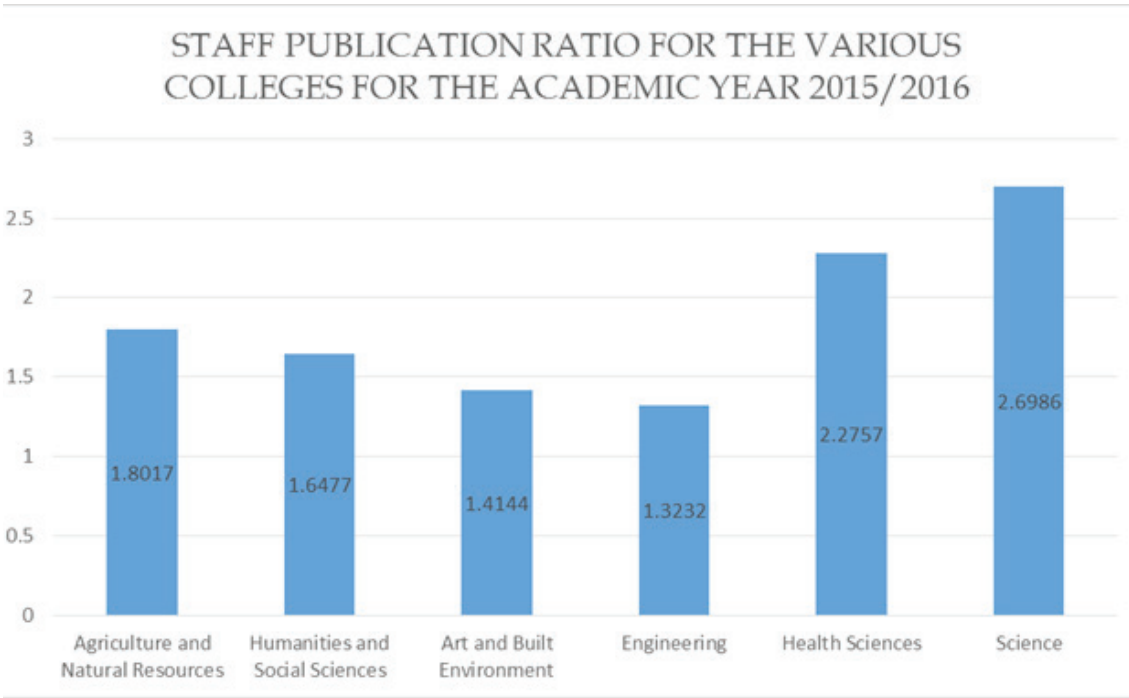


STAFF PUBLICATION RATIO FOR COLLEGES (2015/2016)

College	Total Number of Publications	Total Number of Lecturers	Staff Publication Ratio
Agriculture and Natural Resources	209	116	1.8017
Humanities and Social Sciences	290	176	1.6477
Art and Built Environment	157	111	1.4144
Engineering	217	164	1.3232
Health Sciences	462	203	2.2757
Science	394	146	2.6986
Total	1729	916	11.1613

University Average: 1.860217

(Source: Publication Output from QAPU; Total Number of Academic staff from 2016 KNUST Budget)
Staff Publication Ratio (SPR): Total Number of Publications / Total Number of Lecturers



FIVE YEAR TREND ANALYSIS OF RESEARCH OUTPUT (2011/2012 TO 2015/2016)

	2011/2012			2012/2013			2013/2014			2014/2015			2015/2016		
COLLEGE	R	C	T	R	C	T	R	C	T	R	C	T	R	C	T
Agriculture and Natural Resources	110	23	133	112	62	174	144	53	197	125	29	154	156	43	199
Art and Built Environment	60	39	99	33	35	68	89	48	137	72	44	116	133	15	148
Humanities and Social Sciences	87	16	103	116	4	120	242	81	323	168	56	224	252	16	268
Engineering	55	24	79	48	9	57	98	19	117	118	24	142	216	1	217
Health Sciences	173	37	210	174	17	191	285	45	330	300	52	352	420	33	453
Science	48	39	87	80	4	84	177	53	230	231	49	280	318	74	392
Total	538	184	722	566	134	700	995	146	1334	1014	251	1268	1495	182	1677

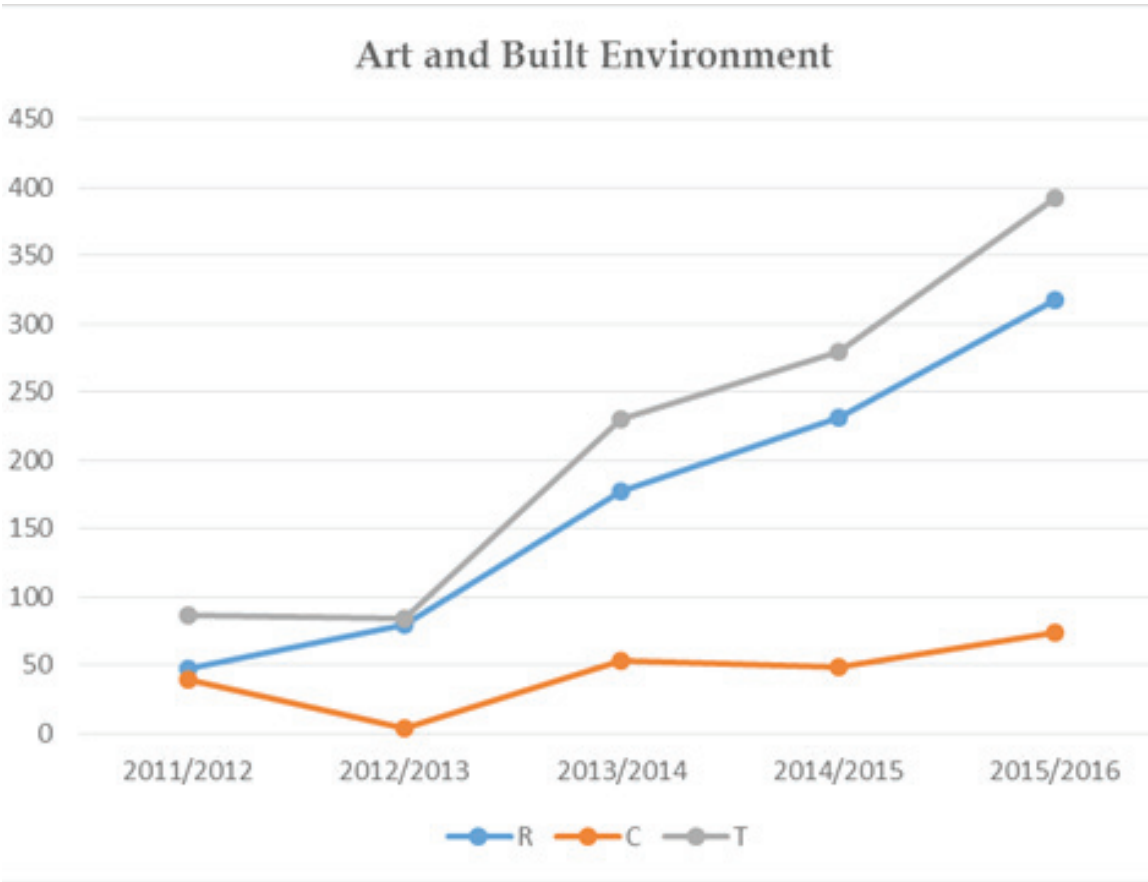
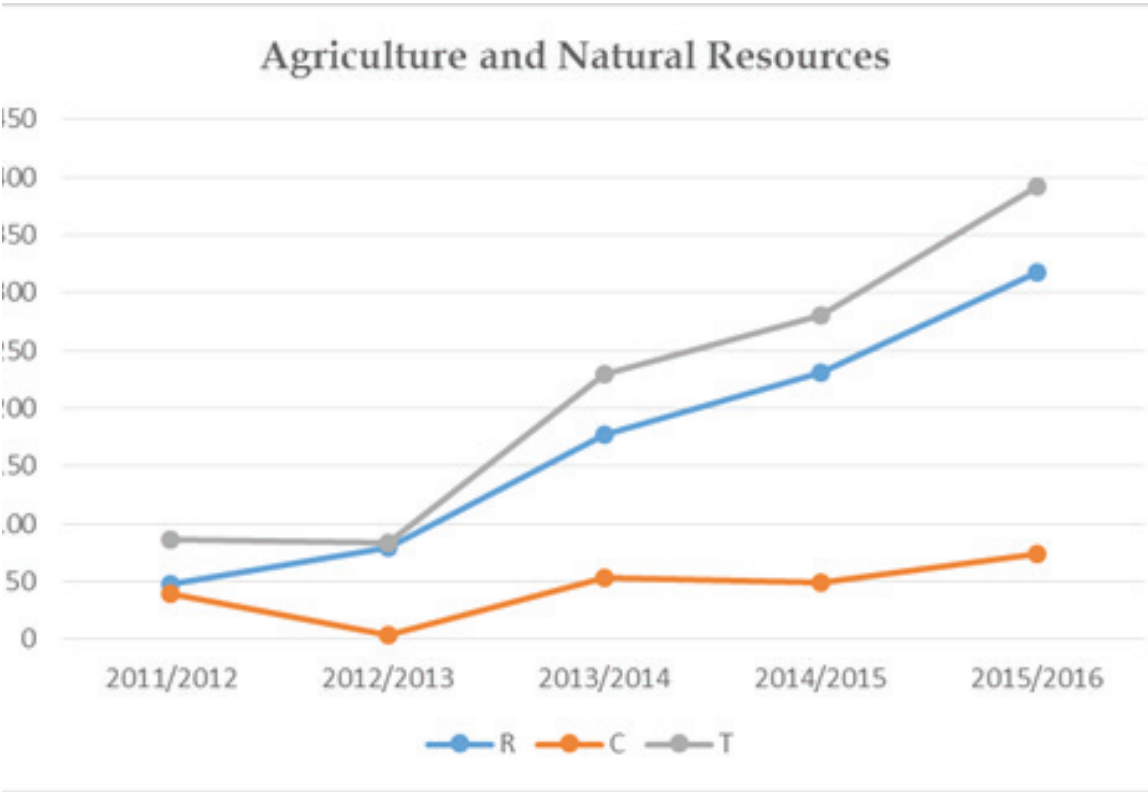
R: Refereed Journals, Books Published and Book chapters

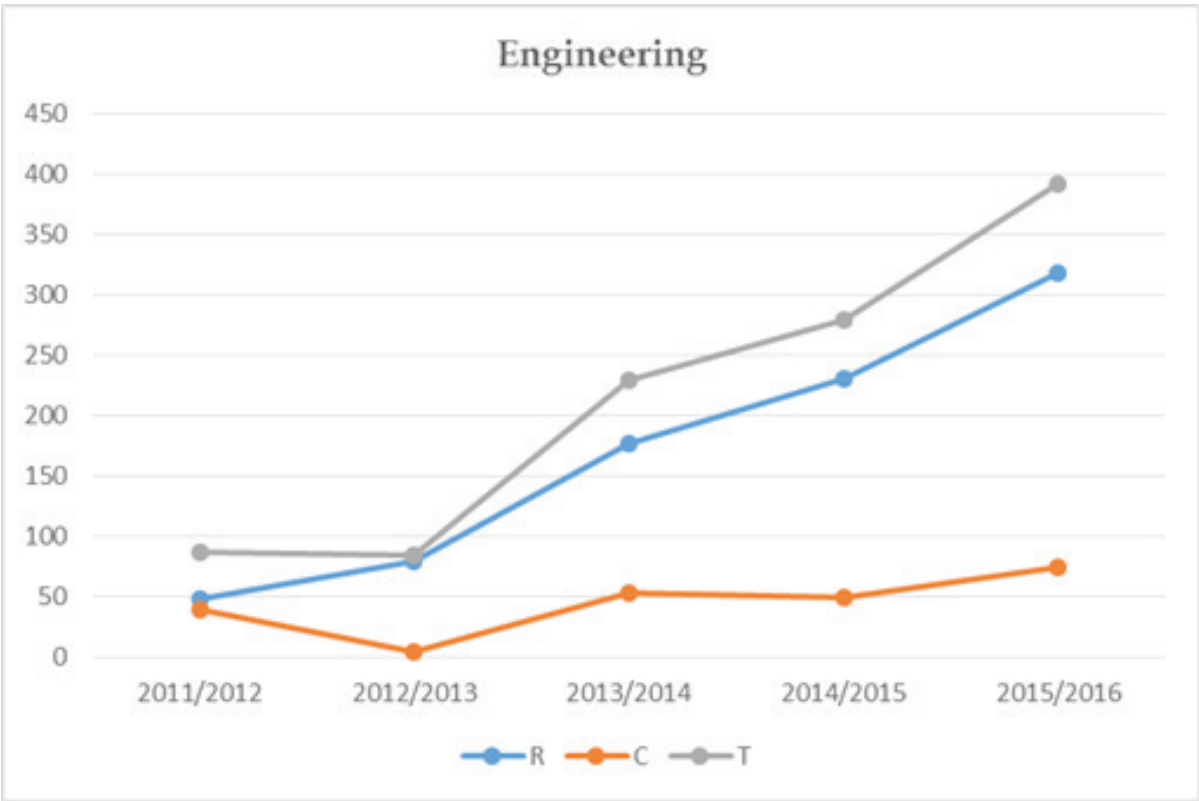
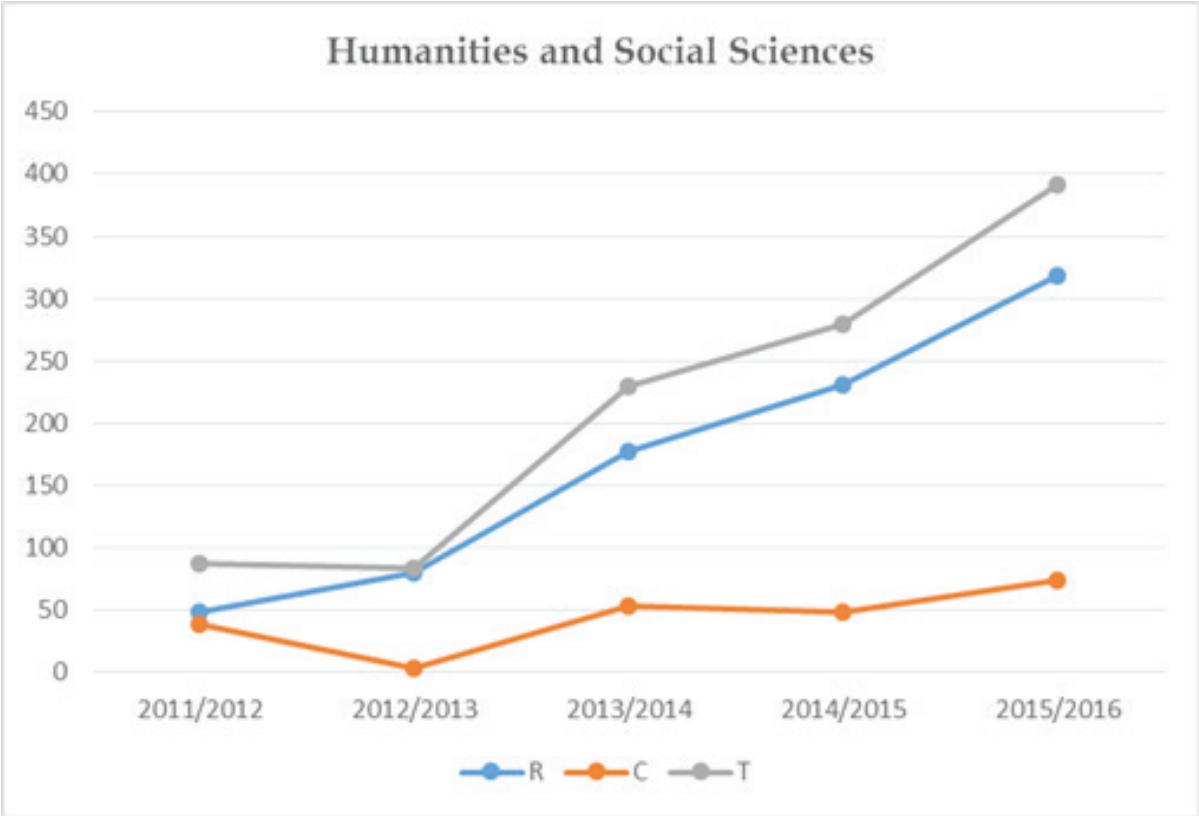
C: Published and Unpublished Conference Papers

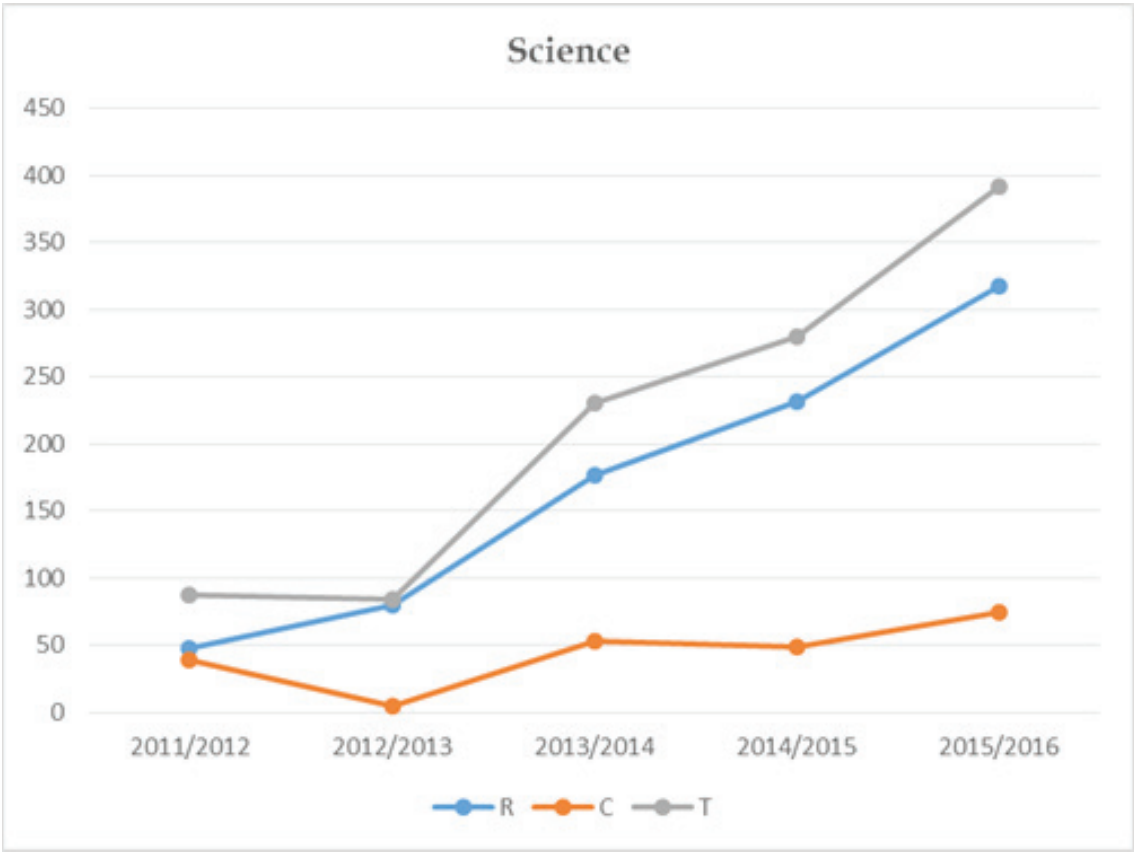
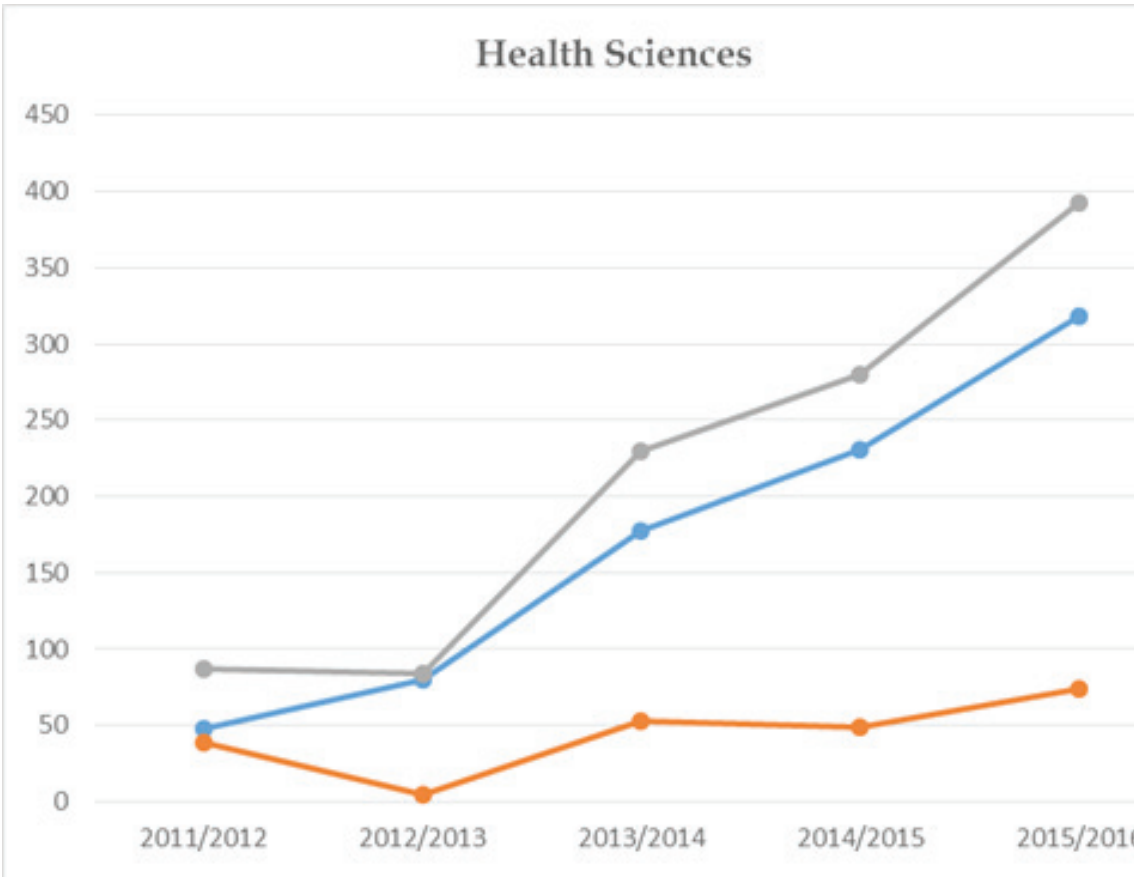
T: Total



TIME SERIES PLOT FOR COLLEGE RESEARCH OUTPUT (2011/2012 TO 2015/2016)











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