



NATIONAL MATHEMATICAL CENTRE ABUJA, NIGERIA

Report on National Mathematical Centre programmes related to
South-South Cooperation and Network activities
(May 2018- April 2019)

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1. COLLABORATIONS AND LINKAGES

1.1 Commission on Science and Technology for Sustainable Development in the South (Comsats)

The Nigerian government signed an international agreement to become a member of COMSATS on 5th October, 1994. By this, the country committed itself to support the programmes and activities of COMSATS. The NMC is a founding member of COMSATS Network of International Centres of Excellence. In particular, NMC is recognised as a Centre of Excellence in Mathematical Modelling. NMC is housing the COMSATS International Thematic Research Group (ITRG) on Mathematical Modelling at NMC and headed by one of the Professors at the Centre.

Nigeria has benefited hugely from COMSATS organisation over the years. This includes:

- i. Research grant awarded to the COMSATS' ITRG on Mathematical Modelling. This grant is still subsisting;
- ii. COMSATS' offer of scholarships to Nigerian Postgraduate students at the COMSATS' University Islamabad, Pakistan and International Centre for Chemical and Biological Sciences (ICCBS) Pakistan;
- iii. Co-organised workshops/Conferences;
- iv. Travel grants, etc.

NMC is a member of COMSATS Centre of Excellence with the COMSATS' International Thematic Research Group (ITRG) domiciled at Centre. ITRG is working on Modelling and Simulation of Pollutants in Air and Water: Effects and Remedies. Members of the ITRG are drawn from COMSATS Centres of Excellence in Nigeria, China, Pakistan, Tanzania, Bangladesh and Indonesia.

1.2 Horizon 2020 Sensitization Seminar

Some scientists from NMC participated online in a seminar on horizon 2020 jointly organised by COMSATS and European Commission. Scientists in Centre are proposing research that are compliance with horizon 2020 project.

1.3 Sustainable Development Goal (SDG) Sensitization Seminar

Some scientists from NMC participated online on seminar on SDGs which was jointly organised by COMSATS and UNESCO office Pakistan. Scientists in Centre are proposing research and training that are compliance with SDGs plan.

1.4 COMSATS-ISESCO Cooperation Programme for 2018

The Centre supported Emmanuel Francis to attend the International conference on "Agriculture, Food security and Biotechnology" held from 25th -26th September 2018, Rabat Morocco with representations from several countries including Algeria, Burkina Faso, China, Kazakhstan, Senegal, Cameroon, Nigeria, Turkey, Pakistan, Sudan, Sri Lanka and the host country Morocco.

The conference was geared towards collaborative efforts and interactions between academicians, scientists and researchers to deliberate on topics such as the states of Agriculture in its current context and current changes, the challenges, opportunities and prospects for food security and biotechnologies and their applications in different production sectors. At the end of the conference, recommendations for policy development were made for



supporting biotechnology to achieve food security in the developing countries in general and Member State of COMSATS and ISESCO in particular.



Mr. Emmanuel Francis at the Conference.

1.5 International Conference on Mathematical Modelling of Environmental Pollution

The NMC Director /CE had teleconference charts with Executive Directors of COMSATS, TWAS and IAP and followed by official request to sponsor specialists to serve as plenary speakers in the international conference on Mathematical modelling of Environmental pollution held at NMC on December 2-6, 2018. Prof. Dr. Xiaodong from Chinese Academy of Science, a member of COMSATS' Thematic Research Group on modelling presented paper on "Development of CAS-ESM and its Applications in Global Climate change and Environmental Simulation. Prof. Thron Christopher, Texas AT & University, Central Texas, USA presented paper on "Dynamic programming: a powerful computational optimization technique with applications" and Prof. B. O. Oyelami presented paper on "Application of artificial neural network in the prediction of water pollution for sustainable development" other scholars also presented interesting papers at the conference. NMC collaborated with University of Abuja and Nigeria Metrological Agency (MINET) Abuja to host the conference.





2. COLLABORATIVE RESEARCH

2.1 COMSATS International Research Group on Mathematical Modelling and Simulation (ITRG)

The COMSATS' International Thematic Research Group (ITRG) on 'Mathematical Modelling' group is working on joint research project entitled: **Mathematical modelling and Simulation of Air and Water pollution: Effect and Remedies**. The project was specifically designed to determine to what extent the pollution in air and water will have impact on agricultural production, human health and global ecology and economy of South-South because of pollution in the region.

The project has been round up and a proposal drafted for new project on Modelling and Simulation on climate change and effect on pollution. This was the recommendation of the study group on mathematical modelling on environmental pollution at the meeting held on 5th December 2018 at the National Mathematical Centre, Abuja.

2.2 COMSATS University, Islamabad Pakistan

2.2.1 Training and Staff exchange Opportunities

NMC has signed MoU with Comsat University (CU), Pakistan for training of Nigerians for M.Sc. / Ph.D. Degrees. The students are to be given rebate of 50 % of the total cost for the training. The Centre is still working on signing of agreement to allow scientists from Centre to be part of the supervising team to the postgraduate students in CU. Moreover, NMC and CU to jointly run scientific activities, exchange staff and students for the period between 1-3 months. The exchange programme will allow Students and Researchers in CU to visit NMC in Nigeria for Research and NMC staff to Visit CU in Pakistan. NMC also agreed to offer post-doctoral fellowship opportunities to CU and other COMSATS Centres of Excellence soon. This has been included in the Centre's strategic plan for 2019-2024.



The Centre has sent proposal to the Honourable Minister of Education to provide scholarship to 30 female postgraduate students to pursue M.sc degree in Mathematics. The proposal is receiving positive response.

2.2.2 VISITING SCIENTISTS' SCHEME

The broad parameter of the joint project was finalized during the visit of Professor Stephen Onah, the Director /Chief Executive of NMC to COMSATS Secretariat, Islamabad, on January 20, 2018. The programme has been included in the Centre's strategic plan too.

3. Multi-literal collaborative Research group

The Centre together with the National Defence College (NDC) Abuja and the Baze University Abuja are working on Research Projects:

- i. Big Date Analysis and Simulation of Terrorism Activities in Nigeria;
- ii. Development of Big Data Security Architecture for Enhancing National Security.

4. NMC-Carnegie Africa Fellowship Collaboration

The Research group on Ethnomathematics is headed by Professor Agwu Nkechi. The group is developing strategy to enhance teaching, learning and research in Mathematics in the area of combinatorics, group theory and Network Analysis and development of industrial products.



The Research Team of NMC and Prof Nkechi Agwu (A Carnegie African Diaspora Fellow)

5. Sustainable development goals (SDGs) Programme

The UN Sustainable Development Goals (SDGs) have a strong focus on reducing environmental pollution (UN, 2015). Specifically, **SDG 3.9** seeks to “substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination” by 2030. Our new proposed Thematic Modelling project is climate change and effect on pollution of environment that is line with SDG.

NMC has been at the forefront in the implementation of the Federal government policy on improvement of teaching and learning of mathematics in the country using Chinese mental arithmetic abacus learning of mathematics.

6. FUTURE PLANS

NMC is planning to:

1. Send delegations to visit other Centres of Excellence, including ICCES (China), etc., to explore possibility of collaboration;
2. Prepare proposals for joint research projects in consultation with other Centres' of Excellence and relevant organisations in member state having national or regional significance, in the line of Sustainable Development Goals.
3. Initiate some new topics for the COMSATS International Research Group on Modelling and Simulation to work on.
4. Create a new International Research Group on Mathematics.