The role of Norway's programs in the development of mathematics in Southern Africa

Bernt Øksendal

Department of Mathematics, University of Oslo, Norway

and

Norwegian School of Economics (NHH),Bergen, Norway

MENAO: Mathematics in Emerging Nations: Achievement and Opportunities

Tuesday 12 August 2014

Dedicated to the memory of my dear cooperation partners
Sergio Salbany and *Temba Shonhiwa.*

The Mathematical Modelling program in Southern Africa 1996 - 2007

The background for this program is the following:

- 1993: Visit to the Dept of Mathematics, University of Oslo by Professor Hyde , Chairman of the Dept. of Mathematics, University of Botswana (UB). He told us about the (relatively) newly established university in Botswana and about the cooperation program between UiO and UB that had been signed some years earlier by Rektor Inge Lønning UiO and the Chancellor of UB. At the same time he invited us to visit UB.

- December 1993: A conference of SAMSA (Southern African Mathematical Sciences Association) was held at UB in Gaborone, Botswana.
  Participants from Norway: Knut Aase (NHH) and Bernt Øksendal (UiO)
  Also participating: Edward Lungu from UB, David Henwood (University of Zimbabwe (UZ)) and Mark Roberts (Warwick University and UZ).

  At the conference we started discussing possible mathematics cooperation programs between UB and universities in Europe.

There are several problems with mathematical education at
universities in Southern Africa:

- ▶ 1) Although a Masters program in mathematics might exist
  on paper at some universities, there are too few students at
  each place to run the program
- ▶ 2) Many students cannot afford to take graduate studies
- ▶ 3) Very little cooperation: Students from one country are
  usually not admitted for studies in another country in the
  region
- ▶ 4) A clustering of competence of the academic staff at each
  university and little movement of lecturers made it difficult to
  run Master programs
- ▶ 5) Difficulties for talented students to continue into a PhD
  program

To overcome these problems, David Henwood, Mark Roberts, Knut Aase and I worked out in 1993 -1995 a proposal for a new Southern African mathematical Master/Ph.D. cooperation program within The Norwegian Programme for Development, Research and Education (NUFU). The program was called

Mathematical Modelling in Southern Africa

The main ideas of this program were the following:

- ▶ Build a center for the program at one of the universities in the region. Because of the good situation at UZ at that time, UZ was chosen as the center.

- ▶ Lecturers from Europe and the Southern African region are invited to come to UZ to give courses and also otherwise contribute to a good study and research environment at UZ.

- ▶ The Master program lasts 2 years. The first year consists of core mathematics courses common for all students. In the second year, when the students write their Master thesis, they can choose between the following 3 specialisations:
  (i) Industrial mathematics
  (ii) Environmental mathematics
  (ii) Financial mathematics

- ▶ Students from all countries in the Southern African region can apply for admission to the program. Every year up to 20 students with the best qualifications are admitted.
- ▶ Funding from NUFU pays all the expenses of the admitted students (housing and study expenses, including student fees) and administrative costs at UZ and UiO. Moreover, NUFU is funding PhD stipends for the most talented students.
- ▶ In addition NUFU covers the (economy) travel expenses and local expenses (at standard rates) of the visiting lecturers, but no salaries.
- ▶ All the courses and exams are taken at UZ in agreement with the UZ regulations, and UZ issues all the final documents.

With this program we wanted to avoid taking away students from the region for studies in other continents, but rather establish a strong and attractive educational and research environment in Southern Africa, open to all qualified students in the region. We believed that such a program would avoid the brain drain that often is the consequence when students from Africa are taken to Europe to study there: Statistics show that about 75 percent of them never return to their home country.

This proposed Mathematical Modelling program was approved by NUFU and started in 1996. It continued until 2007, after two periods (which is the maximum) of NUFU support.

The program has been very successful: It has created about 60 Masters degrees and 10 PhD degrees. With few exceptions these students have remained in the region after their studies, and they now constitute a substantial contribution to the general level of mathematical competence in the region. Some of them are even active researchers and they participate at research conferences in the region (e.g. the SAMSA conferences) and elsewhere. They are now our potential research collaborators.

Indeed, I have 4 joint research publications with Southern African mathematicians, one of them with my former Ph.D. student.

Southern African Masters Programme in Mathematical Modelling

In 2008 the NUFU Mathematical Modelling program was replaced by a program funded by Norad's Programme for Master Studies (NOMA) in Norway. The program was entitled

Southern African Masters Programme in Mathematical Modelling.

This program terminated in 2013. It was based at the University of Dar-es-Salaam, Tanzania (UDSM).The program coordinator in Tanzania was *Wilson Charles* and the Norwegian coordinators were *Giulia Di Nunno* and myself.

The main idea of the NOMA program was the same as for the NUFU program:

It is based at UDSM, where all the lectures are given, partly by visiting lecturers and partly by local staff. The program lasts 2 years. Every year there is an intake of at most 20 qualified students. All the courses and exams are taken at UDSM, in agreement with the UDSM regulations.
In total about 110 students received their Master degrees through this program, among them 31 females and 79 males. Most of the students who graduated are now working in Higher Learning institutions both private and public as lecturers.

The program is now entirely run by UDSM. It has since 2012 enrolled 53 new students without full NOMA support.

Conclusion

Our experiences with these programs are very good.
The programs have made a substantial contribution to the education of mathematically competent people in the region. Most of the students of the program have remained in the region after completing their education and they have taken important positions in the universities and colleges and other institutions in Southern Africa. Former students (and students of former students) from the NUFU and NOMA programs now constitute a significant part of the participants at the annual conferences of the Southern African Mathematical Sciences Association (SAMSA).

The intention with both programs has been that after the NUFU/NOMA support has terminated, the hosting university should take over the funding and running of the program. With the NUFU program at UZ this turned out to be impossible, due to the rapidly worsening political and economical situation in Zimbabwe.

Regarding the NOMA funded program, however, it is encouraging that the program is now taken over entirely by UDSM, albeit so far without any accompanying student fellowships. Hopefully we can enhance their mathematics educational production capacity further by adding student stipends from the forthcoming program ERICEA, also funded by Norad in Norway.

Acknowledgments

I am grateful to Edward Lungu, Knut Aase, Mark Roberts, David Henwood, Sergio Salbany, Herbert Fleischner, Precious Sibanda, Temba Shonhiwa, Wilson Charles and Giulia Di Nunno for their friendship and valuable cooperation throughout these gratifying years of cooperation with countries in the Southern African region.

12 12 '03

innostoch
INNOVATIONS IN STOCHASTIC ANALYSIS AND APPLICATIONS
with emphasis on STOCHASTIC CONTROL AND INFORMATION

CMA
Centre of
Mathematics for
Applications

innostoch
INNOVATIONS IN STOCHASTIC ANALYSIS AND APPLICATIONS
with emphasis on STOCHASTIC CONTROL AND INFORMATION

7
SEVENTH FRAMEWORK
PROGRAMME

erc

CMA
Centre of
Mathematics for
Applications

CALL FOR ABSTRACTS – 1st call

33rd Southern Africa Mathematical Sciences Association Annual Conference

SAMSA

http://samsa-math.org/

CMA Centre of Mathematics for Applications

NATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY ZIMBABWE (NUST)

Theme:	**"Mathematical Journeys - From theories in mathematical sciences to knowledge for building our communities"**
Date:	24 – 28 November, 2014
Venue:	Victoria Falls, Zimbabwe

SAMSA will be thirty-three years in December 2014 and it has continued to serve as an avenue for the exchange of knowledge, information and provoking new ideas in problem solving among experts from Southern Africa's academic, industrial and commercial sectors. SAMSA has always extended invitation to experts from countries outside the region, who have been gracious enough to be present to share their ideas at the conferences. Being conscious that the world is increasingly becoming one, SAMSA thought it necessary to involve the global village. The international event intends to bring together over 100 delegates from all over the world. For the first time in its history, the SAMSA conference will be held in Victoria Falls, a town known for its beauty and tourist attraction in the form of one of the seven wonders of the world, the might **Victoria Falls**. The conference will be hosted by the Department of Applied Mathematics at the National University of Science and Technology (NUST). In the past 33 years of its existence, SAMSA has managed to get sponsorship from Norway through the NUFU and NOMA programmes that have enabled at least 100 students graduating with Masters and/or Ph.D/D.Phil degrees in Mathematical Modelling. SAMSA is also in partnership with the University of Sussex, UK, Auburn University, US, through the MASAMU programme whose main emphasis is research in Mathematical Sciences.

Elephant Hills Resort

National University of Science and Technology

The Victoria Falls

Paper Categories
Algebra, Real Analysis, Topology, Functional analysis, Financial Mathematics, Mathematical Biology, Fluid Mechanics, Numerical Analysis, Mathematical Statistics, Operations Research, Mathematics Education, etc.

Conference Fees: There will be a Conference Registration fee of US$250.00 for faculty and US$100.00 for students. The registration fee will include tea/coffee during the breaks, lunches, conference dinner, excursion and conference materials.

Call for abstracts: the deadline for submission of abstracts is the 30th September 2014. The abstracts preferably prepared in Latex should be sent to the following:
Mr Edward Chiyaka, email: *samsaconference2014@nust.ac.zw*; *edward.chiyaka@gmail.com* (L.O.C Secretary) and copied to Dr P. Y. Mhone, email: *pmhone@poly.ac.mw* (SAMSA Secretary)

Local Organizing Committee:
Chairperson: Prof S. D. Hove-Musekwa *sdhmusekwa@gmail.com*
Secretary: Mr E. Chiyaka *edward.chiyaka@gmail.com*
Treasurer: Mr F. K. Mutasa *toriromutasa@gmail.com*
Transport and Logistics: Mr P. Nyamugure *pnyamugure@gmail.com*;
Technical Committee: Mr N. Malunguza *nmalunguza@gmail.com*;
I.T support: Mr T. Silongwe *silongwe@gmail.com*

Scientific Committee:
Prof W. Ogana (University of Nairobi)
Prof B.Oksendal (University of Oslo)
Prof O. Jenda (Auburn University)
Prof E. Lungu (University of Botswana)
Prof H. Fleischner (University of Vienna)
Prof J.A. Ryan (Mzuzu University)
Prof G. Di Nunno (University of Oslo)
Prof H. Dzinotyiweyi (University of Zimbabwe)
Dr J. Myers (Econet Zimbabwe)

Conference Proceedings: The date for submission of full papers to be published in the SAMSA 2014 conference proceedings is 31st September 2014. The papers should be in Latex.

Invitation/acceptance letters:
If you require a visa to enter Zimbabwe write to the SAMSA Secretary copied to the Secretary of the Local Organizing Committee who will issue the invitation.

Invited Speakers:
The list of invited speakers will be given in the second announcement.

INNOVATIONS IN STOCHASTIC ANALYSIS AND APPLICATIONS with emphasis on STOCHASTIC CONTROL AND INFORMATION

SEVENTH FRAMEWORK PROGRAMME

CMA Centre of Mathematics for Applications