



THE PAPUA NEW GUINEA
UNIVERSITY OF TECHNOLOGY

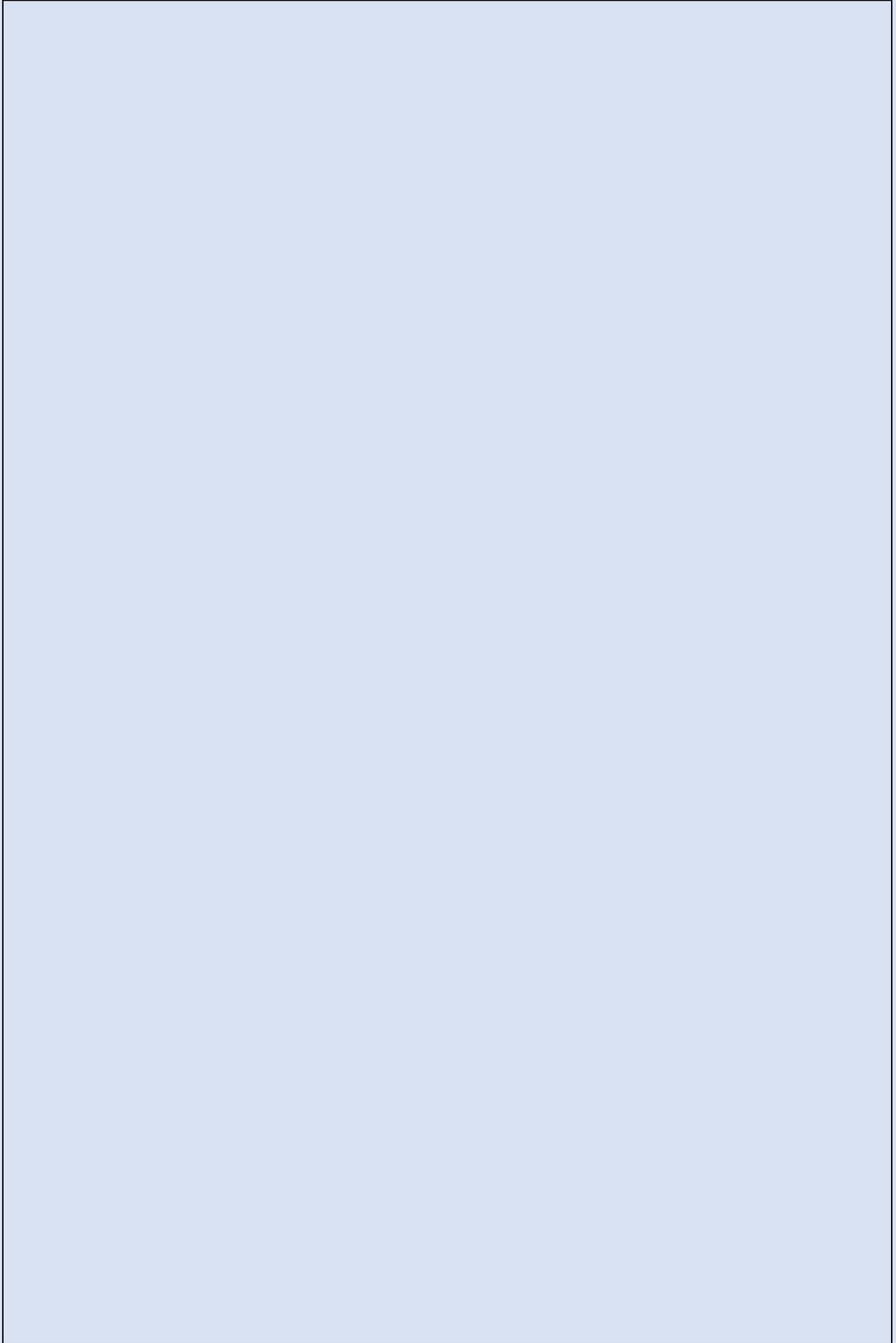
RESEARCH REPORT

2013

Compiled and Edited
by

Professor Shamsul Akanda

Department of Agriculture





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CONTENTS

Contents	Page
Foreword from the Research Committee Chairman	ii
Research Committee Terms of Reference and Membership	iii
Departmental Research Programs	1
Department of Agriculture	2
Department of Applied Physics	8
Department of Applied Sciences	13
Department of Architecture and Building	16
Department of Business Studies	23
Department of Civil Engineering	25
Department of Communication and Development Studies	27
Department of Electrical and Communication Engineering	31
Department of Forestry	35
Department of Mathematics and Computer Science	39
Department of Mechanical Engineering	40
Department of Mining Engineering	42
Department of Surveying and Lands Studies	45
List of Publications from the Office of the Vice Chancellor	50
Allocation of Research Fund	51
Allocation of Conference Fund	52
Research Committee Seminar Series Abstracts	53

FOREWORD

It is my great pleasure to present the 2013 Research Committee Annual Report. It was a hectic year, but we managed to maintain a good rhythm in terms of research and publications. Money was always a constraint, but I would like to see more money is allocated for research and conference purposes. The Research Committee took a bold step in reviewing the 1994 version of Research Management Policies and Guidelines for Unitech with the objectives of promoting research culture in the university. The new policies stipulate development of a corporate research plan, mandatory research plan for the academic departments, promotion of departmental seminars, restoration of university seminar series, increase the upper limit of funding for GAP students, allowing GAP students to attend national and international conferences, etc. Also noteworthy is a new chapter on "Research Ethics" incorporated in the revised version to uphold the integrity of research and publications.

2013 was a successful year in terms of reviving the weekly University research seminar series and departmental bi-weekly research seminars. These seminars were important to transform positively the research culture of the University. A total of 12 University research seminars were presented on different subjects of interest during the second semester of 2013 academic year.

One of the hallmarks of Unitech, the postgraduate student research seminar entered into its 3rd year in 2013. Fifty six PG students presented their research findings during 25-26 September 2013 to showcase the PG studies and research capabilities; communication and presentation skills to wider community to encourage research culture at Unitech and PNG as a whole. This seminar was attended by the representatives from AusAID, ACIAR, FPDA, NARI, DAL and Trukai Industries Ltd, besides the Unitech staff and students.

I take this opportunity to thank the Research Committee members, Executive Officer and Heads of the Departments for their continued support and contributions.

Md. A. Satter

Professor M. A. Satter
Pro Vice Chancellor (Academic) and Chairman
Research Committee

THE RESEARCH COMMITTEE OF THE ACADEMIC BOARD

1. TERMS OF REFERENCE

In order that research activities within the University may be encouraged, coordinated, funded and monitored efficiently, the Academic Board set up a Research Committee under the following terms of references:

- (a) To promote and encourage research and development;
- (b) To formulate an overall research policy and appropriate guidelines;
- (c) To allocate funds for research and development within the University;
- (d) To prepare an annual report on the research conducted by the University.

2. CONSTITUTION

Ex-Officio Members

- a. Vice Chancellor
- b. Pro Vice Chancellor (Academic)

Appointed Members

- c. One person appointed by the vice Chancellor who shall be the Chairman of the Committee
- d. Six persons appointed biennially by the Academic Board

MEMBERSHIP

Ex-Officio Members

Dr Albert Schram
Professor M. A. Satter

Appointed Members

Professor M. A. Satter (Chairman)
Professor S. Akanda
Dr. K. Nwabueze
Dr. G. Anduwan
Dr. M. Peki
Dr. S. Samanta
Dr. G. Arpa

In Attendance

Deputy Bursar
Mr Robert Leso, Executive Officer

DEPARTMENTAL RESEARCH PROGRAMS

DEPARTMENT OF AGRICULTURE

Head of Department: Professor Abdul Halim

The Department of Agriculture is committed in delivering quality teaching, research, out-reach activities and post-graduate studies. Besides the regular 4-year Bachelor of Science in Agriculture (BSAG) course, the Department offers a 2-year Bachelor of Agriculture and Rural Development (BARD) course in distance-learning mode, which is for upgrading qualifications of agricultural professionals holding Diploma and Post Certificate Diploma (PCD). The postgraduate studies include PGD, MSc, MPhil and PhD programmes.

The department's capacity to conduct agricultural research is strengthened by 18 highly qualified Academic Staff (currently 11 with PhD's, 4 PhD's on study leave, 3 MPhil's), 11 technical staff, 5 farm staff and 17 casual labourers working in the farm. It has well guided activities including research thrusts stipulated in the department's Five year Strategic Development Plans (2005 – 2010 and 2011 – 2015) based on the University's Vision 2030 and Mission. The curriculum is enhanced through regular and periodic review in consultation with clients in the public and private sector. The Department has established strong collaborative research links with aid donors and the stakeholders including NARI, Trukai, and in the past with ACIAR and NZAID.

Efforts to further develop the agriculture research program in the department has received significant enhancement recently with acquisition of updated virus detecting, PCR, tissue culture and DNA finger printing equipment through as Office of Higher Education (OHE) funding. It also helped improve research facilities including the expansion of Biotechnology Centre. Similarly, the department has a state of the art Analytical Laboratory equipped with ICPOES and the Combusting Analyser. The Department also has a 39-hectare Farm to support field research in crop science, animal science, agriculture engineering and aquaculture. The Department actively pursues its outreach extension program through its extension arm, the SPISARD (South Pacific Institute for Sustainable Agriculture and Rural Development). This acts as a vehicle that bridges the link between the department and the rural communities through the "Educational Institutional Approach" for sustainable rural development across the country and provides a valuable conduit for action research in rural development.

Regular publication of the scientific journal '*NIUGINI AGRISAIENS*' and academic staff publishing scientific papers regularly confirm the department's strong commitment in research in UNITECH. Strong collaborative research activities with PNG NARI, University of South Pacific (USP), CSU (Australia), National Research Institute (NRI) of Greenwich University (U.K), South Australian Research and Development Institute (SARDI) Australia and other NGOs, industries and institutions further cements our strong leadership in agriculture research. Other publications, compilation of abstracts of research done by the post graduate students, Annual Reports, Farm Report and Strategic Plan on annual basis also strengthens the department's research capacity.

Based on the above background, resource availability and practicability of execution, the following research focus areas have been identified:

- Crop Science
- Animal Science
- Agricultural Economics
- Agricultural Extension and Rural Development
- Post-harvest technology

The selection of the above research focus areas are in line with PNG Vision 2050 national research priorities in agriculture. These research focus areas also provide an effective framework as well as topics to carry out the post-graduate research program. The following are some of the major projects in the priority areas:

Crops Science

Crop improvement and adaptation to stress environments caused by climate change

Use of *Trichoderma* spp. as a biocontrol agent against some selected soil borne pathogens

Study of the production technology and practices of selected crops by farmers in different agro-ecological regions of Papua New Guinea

Study of the production technology and practices of selected vegetables by farmers in different agro-ecological regions of Papua New Guinea

Development of a maize seed system for PNG

Gene discovery in PNG wild rice: Seed and Grain characteristics

Genetic transformation of taro

Evaluation of promising rice variety for Papua New Guinea

Quantification of greenhouse gases (GHG) emissions from soils under major cropping systems of Papua New Guinea

Animal Science

Conservation of farm animal genetic resources

Utilization of crop wastes and agro-industrial by-products for feeding livestock and poultry

Determine digestibility of locally available feed and fodder

Determination of anti-nutritional factors in the fodder crops of PNG

Develop a suitable weaner diet for piglets

Agricultural Economics

Economic Impact Assessment of Honeybee –Coffee Integrated Farming in Eastern Highlands Province

An Analysis of Marketing Costs and Margins Spread of Sweet Potato Sales Produced From the Highlands of Papua New Guinea

Measuring the Economic Impact of Climate Change on Coffee and Cocoa Production in Papua New Guinea: ARicardian Approach

Handbook on Relevant Production, Trade and Price Statistics on Agricultural, Livestock and Poultry Products of Papua New Guinea

Agriculture Sectoral Growth in Papua New Guinea since Political Independence

Agricultural Extension and Rural Development

Study to evaluate the on-going extension approaches in PNG and their effectiveness in rural livelihood improvement

Problems and Prospects of Retaining Youth in Agriculture in PNG

Technology Transfer Problems in Rural Communities of PNG

Study to identify the present farming systems in different regions of PNG and scope for improvement

The role of unemployed women in sustaining household food security in urban settlements

Post-harvest

Survey on current status of mechanization in Papua New Guinea: Impact study of mechanization on rural livelihood and environment impact

Development of Post-Harvest Technology and Post-Harvest management systems for horticultural crops in Papua New Guinea

LIST OF RESEARCH PROJECTS UNDER TRUKAI INDUSTRIES LTD

1. Evaluation of 39 local and introduced rice varieties in Lae, Morobe province, Papua New Guinea.
Total Amount: **K 300,000.00**
Two PGD students already graduated and **two Mphil** and **1 PGD** students are working under the stipend from this project.
2. **Trukai Scholarship Scheme**
Total Amount: Kina **150,000.00**
3 PGD students are working under this scheme and one will be upgraded to Mphil for 2014

List of Publications

Akanda, S., A. Halim and Maino, M. (2013). Problems and Prospects of Postgraduate Program at Unitech: A case study of the Department of Agriculture. Proceedings of the 7th Huon Seminar held at Unitech during 13-14 November 2013. HS72013-HS-091. Pages 343-349. (ISBN: 978-9980-87-541-9).

Baloiloi, D. S. and Akanda, S. (2013). Screening of cocoa seedlings for resistance to vascular streak dieback through leaf disc inoculation. *Niugini Agrisaiens*, 5:19-27

Ban, G., S. Akanda and Maino, M. (2013). Study the effectiveness of Trichoderma spp. on the growth of bean and tomato plants under greenhouse condition. Proceedings of the 7th Huon Seminar held at Unitech during 13-14 November 2013. HS7-2013-060. Pages 159-163. (ISBN: 978-9980-87-541-9).

Bangita, B. and B.K. Rajashekhar Rao (2013). Effects of sugarcane (*Saccharum* spp.) cultivation duration on some soil physical properties in Ramu Valley of Papua New Guinea, *The South Pacific Journal of Natural and Applied Sciences*, 31: 66-72. DOI: 10.1071/SP13007

Besari, F., G. Danbaro and P Glatz (2013). Overview of the layer hen feeding trials in PNG. Proceedings of the ACIAR PROJECT (ASEM/2010/053) meeting on enhancing the role of small scale feed milling in the development of the monogastric industries in Papua New Guinea held at NARI Headquarters, Lae, PNG, Wednesday 2 October 2013

Elahi, K. (2013). Individualising Customary Lands in Melanesia: How theoretically Sound is the Policy Prescription?" Proceedings of the 7th Huon Seminar held at Unitech during 13-14 November 2013. HS72013-HS-092. Pages 350-357. (ISBN: 978-9980-87-541-9).

Elahi, K and Stilwell, F. (2013). "Customary Land Tenure, Neoclassical Economics and Conceptual Bias", *Niugini Agrisaiens*, Journal of Agriculture, University of Technology, Papua New Guinea.

George, N., Rajashekhar Rao, B.K. and D Lopez Cornelio, 2013. Land use conversion and soil properties in a lowland tropical landscape of Papua New Guinea. *Journal of Tropical Forest Management (Jurnal Managemen Hutan Tropika)*, 19(1): 39-45. DOI: 10.7226/jtfm.19.1.39

Halim A. (2013). Retaining Youth in Agriculture in PNG: Challenges and Opportunities. Proceedings of the 7th Huon Seminar held at Unitech during 13-14 November 2013. HS72013-HS-093. Pages 358-363. (ISBN: 978-9980-87-541-9).

Halim, A. (2013). Educational Challenges of Retaining Youth in Agriculture. Consultation meeting organized by the Asia Pacific Association of Agricultural Research Institutions and held at Islamabad, Pakistan during October 23-25, 2013

Hinafa, S. A. and Abdul Halim (2013). Smallholder Coffee Growers in PNG: A Review of Coffee Industry Corporation's Extension Services. Proceedings of the 7th Huon Seminar held at Unitech during 13-14 November 2013. HS7-2013-031. Pages 274-281. (ISBN: 978-9980-87-541-9).

Kapia, Samuel and Gariba Danbaro (2013). Evaluating Phenotypic Trait of Gift Tilapia on Small Holder Farm at Potosy, Lae. *Environment Papua New Guinea*, 2 (3): 31-35

Kaupa, P. and Rajashekhar Rao B.K. 2013. Mineralization and leaching of nitrogen from animal manures and urea applied to sweetpotato under humid tropical conditions. Proceedings of the 7th Huon Seminar held at Unitech during 13-14 November 2013. HS7-2013-069. Pages 164-173. (ISBN: 978-9980-87-541-9).

Kewa, N. and P.A Manus. (2013). Assessing Policy Impact on the Smallholder Rice Based Crop Production Systems in Papua New Guinea: A Food Security Implication. A paper presented and published in the 12th Pacific Science Inter-Congress Proceedings. 8th -12th July, 2013. University of South Pacific, Laucala Campus, Suva, Fiji

Manus, P and A, Hallim. (2013). Attitude of smallholder farmers in domestic rice production in Papua New Guinea. *Niugini Agrisaiens*, Vol. 5, No. 1, pp 40 – 50.

Michael, P. S. (2013). Ecological impacts and management of acid sulfate soils – A Review. *Asian Journal of Water, Environment and Pollution*, 10 (3): 13-24.

Michael, P. S. (2013). Biological assessment of the effect of acid soil on plant biomass production at Toora, Lower Murray River Basin, South Australia. *Environment PNG* 2 (3), 23-31.

Michael, P. S. (2013). Phenotyping and similarity screening of some *Arabidopsis thaliana* mutant lines using BLAST. *PNG Journal of Research, Science and Technology* (in print).

Michael, P. S. and Davinah, L. (2013). Evaluation of eighteen potato varieties micropropagated *in vitro*. *South Pacific Journal of Natural and Applied Sciences* (reviewed).

Michael, P. S., R. Reid and R. Fitzpatrick. (2013). Biological Assessment of the Effect of Acid Soil on Plant Biomass Production at Toora, Lower Murray River Basin, South Australia *Environment Papua New Guinea*, 2 (3): 21-28

Nano, W. and Julian Poiye. (2013). Growth performance of tilapia (*Oreochromis niloticus*) fingerlings offered different levels of copra meal with local ingredients as tilapia feed. *Journal of South Pacific Agriculture, Volume 16 (1 & 2, 2012): 60-63.*

Nano, W. and Takfulu Emos Nano. (2013). Traditional reef fish farming method in Panamecho village of New Ireland, Papua New Guinea: A sustainable and environmentally friendly fish farming method for food security. *Journal of South Pacific Agriculture, 16 (1 & 2, 2012): 69-71*

Sattar, M. (2013). Improving Agricultural Production and Rural Institutions through Farmers' Field Schools (FFS): Experience with Smallholders in Southern Bangladesh. Presented at the Unitech Research Committee Seminar on 30th July 2013.

Srinivasarao, Ch., Rama Gayatri, S., Venkateswarlu, B., Vijay S. Jakkula, Wani, S. P., Kundu, S., Sahrawat, K. L., Rajashekhar Rao, B. K., Marimuthu, S. and Gopala Krishna, G. (2013). Heavy metals concentration in soils under rainfed agro-ecosystems and their relationship with soil properties and management practices. *International Journal of Environmental Science and Technology*, DOI: 10.1007/s13762-013-0350-9 (ONLINE FIRST)

Tiko, B and A. Halim. Gender-based Division of Labor in PNG Agriculture: Some Farm level information about Male-Female Participation in Smallholder Coffee Farming. Proceedings of the 7th Huon Seminar held at Unitech during 13-14 November 2013. HS7-2013-069. Pages 308-312. (ISBN: 978-9980-87-541-9).

Yual, W. Lena and Jayaprakash (2013). A survey on the prevalence of gastrointestinal parasites of goats in the highlands and lowlands of Papua New Guinea. Published in the Proceedings of the 7th Huon Seminar held at Unitech during 13-14 November 2013. HS7-2013-048. Pages 151-158. (ISBN: 978-9980-87-541-9).

Wamala, M. and Akanda, S. (2013). Effects of early water stress on the growth and developments of ten selected sweetpotato genotypes. *Niugini Agrisaiens*, 5:10-18

DEPARTMENT OF APPLIED PHYSICS

Acting Head of Department: Dr Ora Renagi

Research Plans 2013 from Applied Physics Staff

Dr Ora Renagi

Topics

Numerical Modeling of Harbour Currents

Lae Harbour for PNG ports sediment transport information

Modeling of currents in Lae Harbour. I have a numerical model that can simulate current patterns in the Lae Harbour under different weather conditions. The model was successfully run for the harbor prior to the building of the new tidal basin. Sediment transport processes are well documented before the new development. With the new tidal basin it is important to see changes in the sediment transport patterns. The model will be re-run to accommodate the new extension and study the changes in the current patterns and the sediment transport processes.

NMSA would like to study the extent of oil spills in major ports. Our expertise in modeling can be used to carry out models in major ports to determine the extents of oil spills.

Ocean dynamics

Coastal Upwelling – Upwelling is a major ocean event that is crucial in determining whether subsurface layers of sea water can rise to the surface. This is a major argument point in environments where deep sea tailings placement is considered. Measurements of wind patterns over oceans, water column measurements of temperature, salinity and turbidity and velocity can be used to determine whether upwelling can occur. Sites of interest include Vitiaz Strait and Huon Gulf.

Deep Sea sediment Transport. There is evidence at the head of the Markham Canyon, just 150m from the mouth of the Markham River, showing active sediment transport processes to the deep oceans. Conclusions, drawn from seabed features, show that major events do occur by which millions of tons of sediment are transport directly from the river to deep sea. It is appropriate to deploy instruments so that some of these major events are captured and the sediment transported quantified. This study is paramount to situations where mine tailings are dumped into deep sea and expected to be driven to the deep sea by natural forces.

Environmental Monitoring

Monitoring of river systems for sediment discharge and transport processes

Monitoring of physical chemical and biological parameters in Rivers and coastal areas which are impacted by developments.

River Health Studies – I have been engaged in River Health studies by MMJV for the Watut Markham system. These studies can be made as part of the student projects.

What Instruments are needed for this work?

OBS with pressure, waves, SSC settling

ADCP to measure current profiles
 Hobo meters
 Current meter like what Peter built
 Tide gauges
 CTD profiler

Instruments	What parameters to measure		Availability
OBS with pressure, waves, SSC settling			Yes
Weather Stations			No
River health study equipment	What are this equipment		
ADCP to measure current profiles			No
Hobo meters built Current meter like what Peter			Yes
Tide gauges			No
CTD profiler			No

Research Plan (2013): Dr S. Pal: Senior Lecturer

The Layered 2-D Semiconductors:

Researchers are developing a new type of semiconductor technology for future computers and electronics based on "two-dimensional nanocrystals" , layered in sheets less than a nanometer thick that could replace today's transistors.

The layered structure for ex : molybdenum disulfide, which belongs to a new class of semiconductors - metal di-chalogenides - emerging as potential candidates to replace today's technology, complementary metal oxide semiconductors or CMOS. Transistors contain critical components called gates, which enable the devices to switch on and off and to direct the flow of electrical current. In today's chips, the length of these gates is about 14 nanometers, or billionths of a meter. The semiconductor industry plans to reduce the gate length to 6 nanometers by 2020. However, further size reductions and boosts in speed are likely not possible using silicon, meaning new designs and materials will be needed to continue progress.

Hence, new technologies will be needed to allow the semiconductor industry to continue advances in computer performance driven by the ability to create ever-smaller transistors. It is becoming increasingly difficult, however, to continue shrinking electronic devices made of conventional silicon-based semiconductors.

At present, we are working on the 2-D layered semiconducting di-chalcogenides to find out the best suitable materials for the post Si-CMOS applications and investigating different aspects of carrier transport in these semiconductors for this purpose, based on both experimental and theoretical observations. Already published some work on the layered semiconducting chalcogenides GaTe in Physical Review B.

Final Year BSAP (Undergraduate-Level) Projects .
[Under S C Dey- Research Plan]

1. Inversion of Recorded Seismic Waves for the Estimation of Earthquake Source Parameters.

The Earthquake Magnitude Estimation

Mechanisms of Discriminating the Natural events of Earthquakes from the artificial events of Underground Nuclear Explosions in respect of Monitoring Compliance of the UN negotiated "Comprehensive Test Ban Treaty (CTBT)".

Seismological Methods of Investigating Earth's Crust and Upper Mantle Structures

Understanding the Geophysical Phenomena of the Generation of Earthquake Tsunamis and the Tsunami Forecasting Systems

Post-Graduate (M.Sc - Level) Research Project

(under joint-Supervision: S. C. Dey and S. Ampana)

Project Title: Study of Seismotectonic Character of Papua New Guinea and its Surrounding Region by Earthquake Analysis.

Final Year (Undergraduate) Projects .

(Under: Dr. Gabriel Anduwan)

1. GSM Based Home Security System
2. Fault-Tolerant and Thermal Characteristics of Quantum-dot Cellular Automata Devices

THREE YEAR RESEARCH PLAN (2013 – 2015)

Submitted By: Suame Ampana

Theme of Research: Monitoring of Hazards in Papua New Guinea (PNG) via Remote Sensing

AREA OF RESEARCH: Natural Disaster Monitoring and Mitigation in PNG

[Under R. Soto- Research Plan]

Detection of Electromagnetic Waves.

Design and testing of Basic Instrumentation.

Renewable Energy applications

Computer Modelling and Simulation of Mechanical Systems/Structures

Post-Graduate (M.Sc- Level) Research Projects

Project: Virtual Laboratories; (Remote Access of Lab equipment to perform experiments, via the Internet).

FIVE RESEARCH PLAN – Mr Michael GAOMA

<u>Year</u>	<u>Research Topic</u>	<u>Brief description</u>	<u>Objectives</u>	<u>Comments</u>
2013	Physics Teaching and Learning in Secondary Schools in Morobe Province, Papua New Guinea: A case study	To establish understanding of the issues that affect physics teaching and learning in secondary schools	To improve quality of physics teaching and learning in secondary schools.	
2014	First Year Physics Teaching and Learning at UPNG, UOG and Unitech.	To establish understanding of the issues that affect physics teaching and learning particularly at first year level of studies at the three universities.	To improve quality of physics teaching and learning in the universities particularly at first year level.	
2015	Students Assessment Practices at Papua New Guinea University of Technology. Identify and secure a	To re-examine the students assessment practices, processes and policies at the PNG Unitech.	To use the assessment as a driving force for quality teaching and learning	

	PhD study area in Physics Education.			
2016	PhD Studies Teaching, Learning and Assessment Practices at PNG Unitech DODL	To re-examine PNG Unitech DODL Program.	To improve and maximize the externalization of the PNG Unitech DODL Program. teaching and learning	
2017	Quality Control Issues in Academic Programs at PNG Unitech.	To examine quality control mechanisms of PNG Unitech Academic Program.	To improve quality of teaching and learning here at the PNG Unitech.	

Mr David Kolkoma – Research Activity

Currently doing research on a detector for detecting Marijuana odour. Some results may be available by the end of this year, either November to December. It is a collaborative work with Mr David Timi from Applied Science Department and Helen Osora one of our Masters students. We are now on the second stage of the research project dealing with extraction of oil from the marijuana and detecting the hydrogen and carbon compounds which gives the odour using a gas detector.

DEPARTMENT OF APPLIED SCIENCES

Acting Head of Department: Dr J. Gopalakrishnan

The Department functions with two sections: Applied Chemistry and Food Technology. Food Technology courses are only offered in PNG University of Technology in the whole of the South Pacific. Our department, based on the current market scenario and other developments, keeps track on the curriculum, and suitable changes and revisions to the curriculum is done. Applied Chemistry Section revised the curriculum and implemented the changes effective from the year 2011. Now, based on certain requirements, another revision is being done during 2013. Food Technology Section revised the curriculum this year (2013) and will be implemented from 2014.

The details on the teaching and research facilities, number of students in each year, academic, non-academic as well as support staff of the department are provided as follows:

ACADEMIC STAFF

Applied Chemistry Section

Sl. No.	Name	Qualification	Designation	Research Areas of Interest
1	Dr. Samson Akoitai	M.Sc., Ph.D.	Professor	Heavy metals and speciation of heavy metals in environmental systems
2	Dr. Janarthanan Gopalakrishnan	M.Sc., Ph.D.	Associate Professor	Synthetic inorganic chemistry, coordination chemistry, phosphate and organophosphorus chemistry, inorganic heterocyclic chemistry
3	Dr. R. Alagarsamy	M.Sc., Ph.D.	Lecturer II	Oceanography, Earth / Environmental Sciences, Environmental / Analytical Chemistry, Geochemistry, Marine Sciences
4	Dr. S. Gopalakrishnan	M.Sc., M.Phil., Ph.D.	Lecturer II	Applied organic chemistry, medicinal chemistry, analytical organic chemistry, synthetic organic chemistry
5	Mr. Justin Narimbi	M.Sc.	Lecturer I	Environmental and Analytical chemistry, lab quality standards
6	Mr. David Timi	B.Sc., M.Phil.	Lecturer I	Natural product chemistry
7	Mrs. Sandy Puy	B.Sc.	Technical Instructor	Environmental chemistry, biofuels, and water analysis
8	Mr. Jayson Wau	B.Sc.	Technical Instructor	Natural Product Chemistry

Food Technology Section

Sl. No.	Name	Qualification	Designation	Research Areas of Interest
1	Mrs. Rag Gubab-Sipou	B.Sc., M.Phil.	Senior Technical Instructor	Microbiological quality of foods, water and herbs, microbiological ecology of indigenous fermented foods, production of virgin coconut oil
2	Mr. Reilly Nigo	M.Sc., PGC in Chem.Engg.	Lecturer II	Food engineering and food processing, clean and renewable energy
3	Mrs. Sogoing Denano	M.Sc.	Lecturer I	Food standards and regulations, HACCP/QA; Non-food uses of Carbohydrates; Chemical toxins in starchy foods
4	Mrs. Lydia Yalambing	M.Sc.	Lecturer I	Nutrient composition studies of PNG foods, human nutritional intervention studies
5	Ms. Elizabeth Nasing	M.Sc.	Lecturer I	Public Health and Food Safety: Food Microbiology & Microbial Biochemistry, Molecular Microbiology
6	Mr. Zeipy Toksy	M.Sc. (completed 1 year)	Technical Instructor	Protein and lipid chemistry related to plants and animal extracts, studies on applications of oil and protein extracts
7	Mr. Sibron Bingmalu	B.Sc. (pursuing M.Phil.-GAP)	Graduate Assistant	Food Engineering

COMMUNITY SERVICES

Various short courses run by the department

Applied Chemistry Section

Fundamentals and Essentials of Inorganic Chemistry – 3 days

Simple and Advanced Laboratory Techniques in Chemistry: level 1 – 3 days

Simple and Advanced Laboratory Techniques in Chemistry: level 2 – 3 days

Analysis of Applications of Organic Chemistry: level 1 – 2 days

Analysis of Applications of Organic Chemistry: level 2 – 3 days

Petroleum Chemistry and LNG Technology – 3 days

Food Technology Section

Food Safety Course: science and applications training: farm to fork – level 1 – 3 days

Food Safety Course: science and applications training: farm to fork – level 2 – 3 days

Food Safety Course: science and applications training: farm to fork – level 3 – 3 days

List of ongoing research projects in Department of Applied Sciences

1. Collaborative Cholera Research with PNGIRMR & Monash University- [Total Budget: K30,000; Target date for completion: July 2014]
2. Madang Biodiesel Programme – [K80,000; Nov. 2014]
3. Fish Feed Development – [BUDGET with NFA and we are jointly working with them, Nov. 2016]
4. Solar Sorption Development from local Materials – [K5,000; Nov. 2014]
5. Biogas Development from Household and Market wastes – [K5,000; Nov. 2014]
6. Studies on traditional salts used in Eastern Highlands and Morobe provinces of PNG – G. Janarthanan [through Research Committee (RC); details with RC]
7. Synthesis, Characterization and antimicrobial activities of silver nano particles from selected medicinal plants – S. Gopalakrishnan [through Research Committee (RC); details with RC]

List of Publications

Gopalakrishnan, S. (2013) Green synthesis, characterization and antimicrobial activity of silver nano particles from *Dysoxylum mulleri*, *Journal of the Institute of Chemists, PNG*, 5: 6-15.

Kunte, P. D., R. Alagarsamy and A.S. Hursthouse (2013). Sediment fluxes and the littoral drift along northeast Andhra Pradesh Coast, India: estimation by remote sensing, *Environmental Monitoring and Assessment*, 185: 5177-5192.

Lakshmi, Y. S., F. Banu and S. Gopalakrishnan (2013) Green synthesis and antimicrobial activity of silver nanoparticles from the medicinal plant *Vernonia amygdalina*, *Indian Journal of Nanoscience*, 1:32-35.

Shyamkrishnan, M. P. Dhanalakshmi, Y.S. Lakshmi, S. Gopalakrishnan and A. Manimaran (2013) Evaluation of phytochemical constituents and antioxidant activity of medicinal plant *Hydnocarpus pentandra*, *International Journal of Pharmacy and Pharmaceutical Sciences*, 5:453-458.

DEPARTMENT OF ARCHITECTURE AND BUILDING

Acting Head of Department: Mr D. Wasi

The Department of Architecture & Building is in the process of drafting a Research Plan, which we hope will address critical issues affecting built environment concerns in Papua New Guinea. Subsequent sections of this paper give only a draft outline of what is still to be developed as a substantive research plan.

In order to maintain clarity in the discussions, this part of the paper is divided into four main sections: (i) the need to formulate appropriate research policies, (ii) the need to address PNG Vision 2050 ideals, and (iii) research at undergraduate and post graduate levels, and (iv) an overview of the nature of architectural research is provided.

The Department of Architecture and Building at the PNG University of Technology, Lae, will need to collaborate with the industry to draft appropriate research policies with the aim to give some direction to architecture and building research in PNG. This exercise should help to formulate priority areas in research taking into account the national goals of PNG such as those contained in the PNG Vision 2050.

Some of the obvious benefits of a research policy should include the following (Sariman 2012):

- To guide research efforts in the undergraduate and postgraduate courses
- To assist in identifying critical issues affecting architecture and building, and the built environment in PNG
- To co-ordinate research both in practice and academia
- To address PNG government strategies such as “PNG 2050 Vision”
- To develop and enhance regional networks and collaborations
- To attract donor agencies that may be prepared to assist in research funding
- To market the Department’s research work internationally
- To improve the Department’s capabilities in research publications
- To develop a strong research culture in the PNG architecture profession.

This policy must also direct future post graduate programs. Stakeholders such as architectural practices and building professionals must be made aware and be encouraged to become active participants in growing a sustainable research culture.

Response to PNG Vision 2050

Each profession and discipline in Papua New Guinea is expected to respond to the ideals of the PNG Vision 2050. The architecture and building professions are no exception. The aim of this section is to highlight strategies on how these two professions can make a contribution to the PNG Vision 2050.

To begin this task, we should refer to the general ideals of the PNG Vision 2050. These are given as: “We will be a Smart, Wise, Fair, Healthy and Happy Society by 2050” and “We will be ranked in

the top 50 countries in the United Nations Human Development Index.”

The following discussions should help to identify strategies on how the profession can contribute to smart solutions compatible with the ideals of PNG Vision 2050. Discussions are divided into three (3) areas that need attention and these include: (i) the need to review the role of the school of architecture, (ii) the need to review the role of the industry, (iii) the need to pay attention to current critical issues affecting PNG. These are discussed in the subsequent sections of this paper.

The Role of the School

The overall role of the school should be reflected in its mission statement. The statement is given as follows:

“The mission of the Department of Architecture and Building at the Papua New Guinea University of Technology is to serve as the regional centre for:

- Training qualified architects and building managers with an emphasis on developing design skills in architecture, problem solving design skills in building, and a commitment to the concepts of professionalism and intellectual endeavour.
- Conducting research and development work to promote environmentally, culturally and economically sustainable forms of tropical architecture and building, conservation of architectural heritages, beneficial utilisation of local natural resources, and advance the creative, technical and entrepreneurial talents of indigenous architects and building managers.

In conjunction with the mission statement given above, the following four (4) points need to be considered by the school: (i) the need to maintain international accreditation, (ii) proactively engage in community and societal issues, (iii) engage in community projects, and (iv) continually seek overseas and international collaborations with regional partners.

Maintaining international accreditation - this is an important objective of the school and needs to be maintained at all costs. This has everything to do with quality assurance ensuring that the quality of architectural and building education is at a par with other schools within the Australasian region and the greater global community.

Engage in societal issues – the school needs to be sensitive to national issues that affect PNG. The school must not work in isolation of critical issues that affect the quality of built environments of both urban and rural areas. It must be prepared to take a proactive and leadership role.

Engage in community projects – the school must participate in community projects. It must have the desire to assist disadvantaged communities and be prepared to promote technology transfer through practical solutions.

Maintain international collaborations – the school must be prepared and willing to participate in

overseas and international design and research projects. It must expose its staff and students to international best practices and at the same time show case its potential to international participants. These can be done through projects and research work.

The Role of the Industry (PNGIA & PNGIOB)

The industry has an important role in addressing national issues relating to the quality of built environments. It can play a proactive role by adopting the following strategies:

- Support the work of the PNGIA and PNGIOB
- Develop appropriate research policies
- Support the school
- Provide training and
- Participate in Master Class & Project Week programs
- Participation in forums
- Engage in community projects

Addressing Critical Issues Affecting Papua New Guinea

The architecture profession (school & industry) must take an active interest in contributing meaningfully to the development of PNG. To do this, it has to be prepared to take a more proactive role in assuming leadership in addressing some of the issues discussed in the following sections.

As a unified force, the profession should look at critical issues affecting PNG, and make every effort to bring about appropriate and sustainable solutions. There are many ways in which the two professions (architecture and building) can assist in developing PNG but the following three issues are considered important and warrant some discussions: (i) affordable housing, (ii) the use of smart solutions, and (iii) the need to promote a Melanesian identity in architecture. These are briefly discussed in the following sections.

Providing Affordable Housing

The professions of architecture and building must consider the following strategies:

- Organize forums to get community and government to engage in dialogue.
- Conduct/engage in community projects
- Work with people (both rural & urban)
- Educate young men & women
- Highlight issues that affect people in community & society
- Promote passive and sustainable building designs

Promote the Use of Ecological & Sustainable Solutions

These are some strategies we can propose:

- (i) Help to develop national policies on the use of ecological/green architecture. Develop an environment policy for the architecture and building professions.
- (ii) Develop awareness in the profession and all stakeholders, such as clientele, contractors, businesses, community, etc.
- (iii) Help to institute appropriate planning and building regulations/review existing laws.
- (iv) Conduct research.
- (v) Reward and give recognition to those who produce ecological/green solutions.

The Need to Promote Melanesian Architecture

As a way to remind ourselves of what we mean by Melanesian architecture (which could be considered different to other types of architecture), the following few features are posited below:

- (i) Melanesians are communal people. The extended family unit plays a major influence on how the Melanesian lives his/her life. The number and size of spaces within a building must reflect this need. This is unlike other cultures that perceive the nucleus family as the main household unit.
- (ii) A strong outdoor concept is very beneficial --- the gathering of people is usually done efficiently in an outdoor space. The size and location of outdoor space such as verandahs and pavilions is an important design consideration. Due to natural climatic conditions, outdoor living is more preferable than indoors. For example, large shade trees play a part in how people use space – in some cultures buildings are constructed in relation to large shade trees as these trees become natural shelters for people to sit under, converse, and conduct other business.
- (iii) Spaces created under highset houses (a feature of pile foundations) can be used efficiently to address issues regarding private and public use of space. Bedrooms can be located upstairs (private space), whilst public spaces such as the kitchen and other social spaces can be raised but underneath the main floor. These spaces are efficiently used during the waking hours.
- (iv) The roof of a building is a dominant element and can be used effectively in defining the form of the building and can be used to portray symbolic meanings, especially when considering public buildings, etc. In fact, the traditional architecture of the warm-humid tropics has been coined as “roof architecture” by many architectural theorists.

The architecture profession in PNG needs to make a commitment in promoting the uniqueness of Melanesian architecture. Failure to do this will contribute to the gradual elimination and loss of tradition, cultural identity, and a way of life for the Melanesian people. Our objective should be about creating a sense of community in the way we shape our built environments suitable to the way we organise communities in response to climate and other factors that affect people.

Research at the Undergraduate & Post Graduate Levels

In order to grow a strong research culture in the professions of architecture and building, a

concerted effort must be made at the undergraduate and post graduate levels of education. Some opinions are shared below.

Research at the Undergraduate Level

The seeds of research must be sowed at the undergraduate level. Students at this level must be introduced to basic research processes and be encouraged to undertake simple research projects beginning at 1st year level. In the latter years, various methodologies appropriate to the disciplines need to be promoted. Application of these methodologies and concepts should be a consistent effort in all subsequent years.

At the senior years (4th and 5th year), students must be challenged to demonstrate sound understanding of research concepts, processes, etc. As part of their academic requirements, students should be required to submit an equivalent of undergraduate thesis for evaluating performance in research competence.

Research at the Post Graduate Level

When the correct seeds of research have been sowed at the undergraduate level, research at the post graduate level should prosper and blossom. What do we mean by this? When students are exposed to a sound research culture at the undergraduate level, they will become confident in pursuing research-related activities at the post graduate level. This should also become a motivating factor for graduates to seriously consider post graduate studies not only in PNG, but overseas.

Post graduate research programs should be designed to conform to university-wide policies and standards and at the same time be in tune with industry needs in PNG. In terms of types of masters programs that are offered by various academic departments at Unitech, there seems to be three types. These include: Master of Philosophy (MPhil), Master of Science (MSc), and Master of Technology (MTech).

The Master of Philosophy degree is a full-time research program, suitable to candidates who want to broaden their knowledge (basic research) and will be required to demonstrate sound research skills. Research investigations will be conducted with the aim to contribute to new knowledge and/or to refine existing theories. They will be expected to conduct independent research with little supervision. This should form a platform for those who may want to pursue PhD studies later in their careers.

The Master of Science degree usually has two components: course work, and a dissertation. Candidates are required to take scheduled course work subjects, which will consist of lectures, tests, assignments, and examinations to make up the first component of the program. Once they have passed the course work, they are then allowed to attend the second component of the program, which is dedicated to the conduction of a research project.

The Master of Technology degrees are offered somewhat similar to the MSC programs, but use the flexible mode of delivery. That is, candidates enrol but stay at their places of employment. They participate in lectures or other components required by the actual syllabus.

The Department of Architecture & Building will need to design postgraduate programs taking into account the three (3) options indicated above. For architects, qualifications gained from such courses should assist them enhance their design knowledge and ability so that they can continue to contribute meaningfully to the profession and society at large. For example, it has come to the notice of the architecture profession that graduates are taking too long to become licensed architects. In order to address this problem, the School and the Industry need to design a suitable post graduate program which can assist graduates to gain registration in a shorter duration than is currently the case.

The finer details of the exact form of Masters Program that the School will offer will depend on the discussions and directions taken by the architecture & building professions.

Training of Academic Staff

Academic staff especially those recruited from the industry will need to be inducted into the culture of doing research. Some may have had very little experience in conducting research. The Department together with the university will need to conduct training sessions to up skill staff. This should be a role played by the Research Office, that is, to identify areas in which assistance can be provided to assist academic staff and post graduate students hone research skills.

Currently, the SCI-COM program facilitated by the Department of Communication Studies is helpful, however, this needs to be taken to another level. A lot of work is required in training staff in the areas of research methodologies, especially for architecture which is a multi-disciplinary profession. Assistance will therefore be sought in the areas of social science, qualitative research, and strengthening in the use of statistics applied for both natural and social science research.

Procurement of Facilities/Equipment and Other Resources

The provision of adequate resources continues to be a major problem. For example, a dedicated experimental station is vital for disciplines, such as architecture and building to conduct applied research. This need has been thoroughly canvassed in a proposal titled: Proposal on the Need to Establish an Experimental Station dated: 25th October, 2011, which was submitted to the Planning Office for possible external funding – an official response has yet to be received.

It is important for the University to realise that the provision of land and facilities is an important prerequisite for research. Researchers need to be resourced so that work can be done. This is particularly important in PNG institutions where vandalism rates are high and the safe keeping of expensive equipment and tools is paramount.

Execution of Research

It is anticipated that serious research will commence when post graduate programs are launched in 2015, taking into account discussions raised in preceding sections of this paper.

Dissemination of Research Findings

The Department of Architecture & Building has created its own journal titled: the Melanesian Journal of Built Environment, which has produced to-date two volumes. Hopefully others in the built-environment disciplines will also use this journal as a way of disseminating research literature.

Other modes of dissemination such as the production of monographs have also being considered. These are particularly useful for publishing village studies reports, etc.

On a broader note, the building and construction industries in PNG will need to collaborate and formulate unified systems for disseminating research findings for the benefit of both industries. The realities on the ground indicate that these two industries are small and therefore need to get into the habit of collaborating instead of working in separate spheres.

DEPARTMENT OF BUSINESS STUDIES

Head of Department: Professor Chris Mbah

Future Research Projects

Geoffrey Jones (lecturer)

(Doctoral Thesis) Disrupted. "General Belief Theory Towards a General Systems Theory of Socio-Economic Behaviour"

Mr. Gome Gipe (Lecturer)

- Harvesting the Mineral Elements: A cost-benefits analysis

Ms. F. Siaguru, Lecturer

- Income Inequality in Papua New Guinea

Syed Quddus, Lecturer

(Doctoral Thesis) progressing
"Efficient SVM based and booster piecewise linear classifiers for data mining and optimization"
University of Ballarat (Federal University) Vic. Australia

Dr Wise Mainga (Associate Professor) and Mr Londari Yamarak (Lecturer)

- Analysis of Project Competencies among Project-based firms in PNG
- Comparative Analysis of Project Learning among project-based firms: UAE vs PNG

Adimuthu Ramasamy, Lecturer

Measuring Employability and Preparing for Job Growth: PNG Students and Employers"
Perception on Person-job Fit.

List of Publications

Mbah, C. (2013). "What You Didn't Know About Thai Football – Its made of War Elephants,". Academy for Global Business Advancement 2013. <http://ssrn.com/author=2139663>

Mainga, W. (2013). "Inter-Project Learning among Project-based Firms in the United Arab Emirates; An exploratory Study, International Conference on Innovation and Management and Management (IAM2013W), Sapporo, Japan, 28-31st January 2013. ISSN: 2218-6387

Ramasamy, A. (2013). "Examining the Role of Educational Leaders in Higher Education System in Papua New Guinea; Issues and Challenges. 3rd Regional Conference on Educational Leadership and Management (RCELAM) 2013, Malaysia, Ministry of Education Malaysia.

Quddus, S. (2013). Fluid flow in a naturally fractured Porous media" , in the research conference of university of Ballarat on Science, Information Technology and Engineering .

Quddus, S. (2013), "Impact of Information Communication Technology (ICT) Globalization of Agricultural Cooperative Marketing in Papua New Guinea" in the 10th Annual World Congress of the Academy for Global Business Advancement conference proceedings, in Bangkok, Thailand, 15-17.

Quddus, S. and Bahirov, A. (2014). Effects of toluene (C₇H₈) addition on microstructure and superconducting properties of bulk C₆H₁₀O₆Fe + SiC-doped MgB₂" in the Fourth International Conference on Industrial Engineering and Operations Management (IEOM), Bali, Indonesia, January 7-9.

DEPARTMENT OF CIVIL ENGINEERING

Acting Head of Department: Mr Chris Kobal

Research interests for the staff members from the Civil Engineering Department are as follows:

Chris A Kobal, *Principal technical Instructor and Acting Head of Department.*

Research Interests:

1. Coconut Timber – as a structural material. Coconut timber is currently not included in the Timber structures Design Code list of timber species available for use as a structural material for structural designers. The aim is to carry out tests on timber specimens.
2. Solid Waste Management – Domestic and Industrial Solid Waste. The aim is to properly dispose of these wastes. This involves determining the composition of these wastes, physical and chemical. Management includes collection, transportation, and disposing of these in properly designed, constructed and managed landfills. Work has started in the identification of these properties but more needs to be done in order to be able to propose alternative systems.

A two-year fulltime MSc programme is now being prepared for submission to Postgraduate committee for approval by the Academic Board.

Dr Graham P Atkins, *Associate Professor*

Research Interests: Flood Predictions

His PhD was based on data up to 1973. He intends to from where it stopped. This is a possible Masters and/or PhD research topics.

Dr Mirzi Betasolo, *Lecturer*

Research Interest and Priorities

1. Material Engineering & Technology
 - a) Concrete Technology
 - b) Nanotechnology & Sensors
 - c) Structural systems
 - d) Timber technology
 - e) Water resources
 - f) Recycling
 - g) Utilization of local resources
 - h) Energy resources
2. Urban & City Management
 - a) Resource Management
 - b) Safe & Resilient City
 - c) Technicity

- d) Urban Transport
 - e) Sustainable Urban Land Use Planning
 - f) Energy Efficiency in buildings
 - g) Designing Water Utility Reform
3. Engineering Education
 4. Water Engineering
 5. Structural Engineering

List of Publications

1. Mirzi, B. (2013). Utilization of Shale Concrete for the Low Cost Housing Industry (an Axiomatic Design), presented during the ICAD & DCEE 2013 Conference via movie presentation on 29 June 2013, and published in the ICAD & DCEE 2013 Journal, can be accessed thru <http://www.mkthompson.net/wp-content/uploads/2013/09/DCEE-2013-14-Betasolo.pdf>
2. Mirzi, B. (2013). Managing Technology in Papua New Guinea: The Papua New Guinea University of Technology Adaptation Approaches to Emerging Crisis. A poster presentation last 30th September - 2 October 2013, MEPEC (Middle East Processing Exhibition and Conference) in the Kingdom of Bahrain.

In process for 2014:

1. Concrete Innovation Using Rabaul Volcanic Ash as Cement and Fine Aggregate in Concrete (Authors: Dr. Mirzi Betasolo, Mr. Joseph Lelepo, & Mr. Nicholas Kaurea)– for presentation on 13 June 2014, at Concrete Innovation Conference CIC2014, Norway
2. Axiomatic Design to Assess Influence Affecting Pedagogic –Learning in the courses Engineering Materials & Fluid Mechanics –for ICAD 2014, Lisbon Portugal on 24-26 September 2014
3. Design Science for Benefit Cost Analysis of Alternative Route(s) to the Congested Mendana Highway, Solomon Island (Authors: Dr. Mirzi Betasolo, Mr. Jayson Hallu, & Mr. Justin Kubul) - for ICAD 2014, Lisbon Portugal on 24-26 September 2014.
4. Design of Sustainable Use and Management of Groundwater in Morobe Province of Papua New Guinea (Authors: Dr. Mirzi Betasolo, Mr. Samson Gore, & Mr. Anthony Bii)- for 3rd International Workshop on Design in Civil & Environmental Engineering at Denmark on 21-23 August 2014.
5. Lae City GHG Monitoring System (Author: Dr. Mirzi L. Betasolo, <http://mnd.mx/jirb#.U1kmQJaeSm0.gmail>).

DEPARTMENT OF COMMUNICATION AND DEVELOPMENT STUDIES

Acting Head of Department: Dr Garry Sali

The department offers a 4-year professional program and has two sections: the Communication for Development (CD) Studies and also offers service course in English for Academic Purposes (EAP) to students across all disciplines. The professional program Communication for Development offers Diploma and Degree Programs to train liaison and community development and public relations officers for resource development companies, government departments and non-government organizations.

In 2009, the department started offering a Masters in Communication Studies (MCS) programs. This program is both by course work and a dissertation component, where the students are expected to write a paper in the final semester of their second year.

Masters of Arts in Organizational Leadership (offered in Cooperation with Development Associates International (DAI), The Christian Leadership Training College of Papua New Guinea (CLTC) and the Pioneers of Australia

Human Resources in the department and the research interest

Name of the Faculty and position	Research Interest
Dr Eric Gilder Professor	Higher education policy, communication theory and practices across intercultural contexts, radio-TV history and legal aspects of broadcasting and the socio-psychological aspects of the communication process.
Dr Golam S. Khan Associate Professor	Areas of international migration, urbanization, health sociology, political economy, research methodology (qualitative) and family dynamics.
Dr Garry Sali Associate Professor and A/Head	Development sociology, sociology of crime and deviance, prison systems and crime and development.
Mr Justin Kehatsin Senior Lecturer	Conflict resolutions
Dr Rachel Orake Senior Lecturer	Research interests include topics in English as a Second Language Writing, Education/English Curriculum and Pedagogy, English for Academic Purposes, Cross- Cultural Communication, Development and Responsibility and Participatory Research
Mary Kunenda Aisi Lecturer	Research focus is in the areas of development communication, gender and leadership, and mass media.
Imelda Ambelye Lecturer	Research interests include topics education for sustainable development and communicating sustainable development.
Olive V. Baloiloi Lecturer	Research focus areas include: Literacy Practices and Development in Rural Communities and the role of Literacy and Development in PNG.
Mr. Joshua Frank Kuri Lecturer	Language Development and Practices via Bilingual Education; Practices and Effects of Communication across Developing Societies.

Ms. Rhonda Lakele Eva-Gwale Principal Technical Instructor	Research interests include information management, traditional knowledge, changing societies and gender
Mrs. Fredah Wallum Lecturer	Her major interest in Doctoral Studies is in the field of Efficient English Teaching in Secondary Schools in Papua New Guinea and Communication Problems and its effect on students learning in secondary schools in PNG. She is currently working on these papers.
Miss Sheryl Sialis Lecturer	Her research interests include topics in emotional intelligence and leadership, critical thinking, communication in crime and sociology with relations to development, community development and participation.
Mr. Michael Winuan Lecturer	His current research interest is: Means by which Agriculture Messages are Communicated to Farmers: A Case Study of OPIC and Small-holder Oil Palm Out-growers at Buvussi and Sarakolok Sub-divisions in Wes New Britain Province.

List of Publications/Seminar Presentations

Gilder, E. (2013). Technological drivers of (r)evolutionary change in modern societies and how developing countries might productively respond to them via intentional, thoughtful 'leapfrogging.' In *The Proceedings of the 7th-2013 Huon Conference*, PNG University of Technology, Lae, November 13-14 Lae: The Papua New Guinea University of Technology, 2014 (pp . 220-28).

Gilder, E. (2013). Book Review [Book Review of *Twilight of the elites: America after meritocracy* by C. Hayes], *European Journal of Higher Education* 3 (1): 114-25.

Florea, S. and Gilder, E. (2013). "The end of the university" in a massively open online world: Implications of the coming tsunami of change for access to an affordable, quality, humane higher education for all. *Conference proceedings 2 of the knowledge--based organization: The 19th international conference ("economic, social and administrative approaches to the knowledge-based organization)*, "Nicolae Bălcescu" Land Forces Academy Publishing House, Sibiu, Romania (pp. 295-303).

Gilder E.and Kostjuevich, S. (2013). A Burkean analysis of society and scientific higher education in the USSR: Effects of historical patterns upon achieving the knowledge-based society in modern Russia. *Conference proceedings 2 of the knowledge--based organization: The 19th international conference ("economic, social and administrative approaches to the knowledge-based organization)*. "Nicolae Bălcescu" Land Forces Academy Publishing House, Sibiu, Romania (pp. 310-18).

Gilder E. and Mihailescu, C. (2013). Presented a paper titled 'The continuum of Benjy's (non) awareness in Faulkner's *The sound and the fury* via Kelly's theory of personal constructs and various written representations of sound patterns,' at the east-west cultural passage conference: The international Faulkner in Sibiu, Romania, from the 31 May – 1 June.

Florea, S. and Gilder E. (2013). Presented a paper titled "The end of the university" in a massively open online world: Implications of the coming tsunami of change for access to an affordable, quality,

humane higher education for all,' at the Knowledge--based organization: The 19th international conference, "Nicolae Bălcescu" Land Forces Academy, Ministry of Defence in Sibiu, Romania, from the 13-14 June.

Gilder E. and Kostjuevich, S. (2013). Presented a paper titled 'A Burkean analysis of society and scientific higher education in the USSR: Effects of historical patterns upon achieving the knowledge-based society in modern Russia,' at The knowledge--based organization: The 19th international conference, "Nicolae Bălcescu" Land Forces Academy, Ministry of Defence in Sibiu, Romania, from the 13-14 June.

Gilder, E. (2013). Presented a paper titled 'Deception by degrees? The ongoing problem of 'diploma mills' in higher education' at the research committee seminar, The PNG University of Technology, Lae, on the 24 of September.

Gilder E. (2013). Presented a paper titled 'Technological drivers of (r)evolutionary change in modern societies and how developing countries might productively respond to them via intentional, thoughtful "leapfrogging"' at the 7th Huon Seminar, The PNG University of Technology, Lae, from the 13-14 November.

Gilder, E. (2013). Presented a lecture titled 'Breaking the "rules" of story structure' (by D. Lefer), at the Graduate School's "advanced composition" writing course, Cuttington University (Liberia) on 26 November.

Gilder, E. (2013). Presented a lecture titled 'The problem of diploma mills: The Liberian case' at the faculty colloquium, Cuttington University (Liberia) on 27 November.

Gilder, E. (2013). Presented a lecture titled 'Research methods: The social sciences and liberal arts compared' at the College of Liberal Arts, Cuttington University (Liberia) on 28 November.

Gilder, E. (2013). Presented a seminar titled 'The analogue to digital transition through the eyes of theologian Jürgen Moltmann' at the College of Theology, Cuttington University (Liberia) on 28 November.

Khan, G. S. (2013). Partition-Migration in Bengal: Political Schism and Regional-Cultural Divide. *Sociology and Anthropology*, Vol. 1 No. 2, pp.72-75, September 2013, Horizon Research Publishing, USA.

Khan, G. S. (2013). Partition-migration and oral history of East Bengal Hindus in Kolkata: Retention of regional identity and politics of exclusion. *American Journal of Sociological Research*, (accepted for publication, 2013).

Khan, G. S. (2013). Politics of partition-migration and the economic instability of the East Bengal Hindu migrants: Evidence from the fieldwork", presented at the International Refereed Conference on 'Innovation Challenges in Multidisciplinary Research and Practice' (ICMRP), December 13-14, 2013 Kuala Lumpur, Malaysia.

Sali, G. (2013). Capital punishment is not the answer, Focus, *The National Newspaper*, Tuesday 20th January, page 34

Sali, G. (2013). How to address law and order problem, Focus, *The National Newspaper*, Tuesday 5th February, page 36

Sali, G. (2013). Corruption culture in Papua New Guinea, Focus, *The National Newspaper*, Tuesday 19th February, page 35

Sali, G. (2013). Intriguing challenges of sorcery, Focus, *The National Newspaper*, Friday 22nd February, page 22

Sali, G. (2013). Addressing the vicious cycle of rape culture, Focus, *The National Newspaper*, Tuesday 19th March, page 46

Sali, G. (2013). Prisons in PNG need a radical overhaul, Focus, *The National Newspaper*, Tuesday 30th April, page 50

Sali, G. (2013). Dual salary regime has outlived its purpose, Focus, *The National Newspaper*, Wednesday 31st July, page 56

Sali, G. (2013) Presented a paper titled 'Is capital punishment answer to the law and order challenges in PNG' at the capital punishment symposium in DWU, Madang, from the 8th – 9th 2013.

DEPARTMENT OF ELECTRICAL AND COMMUNICATION ENGINEERING

Acting Head of Department: Mr Moses Kavi

Electrical and Communications/Computer Engineering, arguably, is the most interdisciplinary of all technical subjects at a University. Since University of Technology is the premier University of Papua New Guinea in Technology, especially in the engineering disciplines, it is indeed pertinent that the research plan should aim at projecting and developing it as a leading institute in the Oceania, producing undergraduates that are competent to be top class engineers and leaders, able to position themselves as advisors and wealth generators for the community. Moreover, it is pertinent that that the University should generate new knowledge and new technology that is relevant to the local and national needs, including that which will take away dependence on hiring expertise from abroad but make Papua New Guinean engineers and researchers as able to provide the needed technical and research expertise to attract foreign industries to invest in Papua New Guinea and produce a local job market and economic benefit to the nation.

Considering the trends and needs in the local, national and international scenario, we envisage that at the end of the entire phases one and two of the research plan, the department would require electrical and communication engineering graduates with specializations in the following ten areas:

1. Power/Energy Systems 2 members of staff.
2. Telecommunications engineering. 2
3. Computer engineering 2
4. Sensors, Systems and Signals Engineering, 2
5. Renewable Energy Systems, 2.
6. Control and Systems, 2
7. Climate and Severe Weather Engineering, 2
8. Agriculture and Environmental Engineering, 2
9. Biomedical Engineering, 2
10. Music and Sound Signal Processing, 2

The major **academic priorities** for **phase one (2014-2016)** of the research plan will be the following:

1. Integrate Research with Teaching and Learning
2. Local and national: connecting with the community
3. Recruitment of the best talents nationally and internationally – and retaining them.

An **additional three priorities** could be added when the **Phase 2 (2017-2019)** of the research plan is ready at the end of the first three years. One of the priorities for Phase 2 will be **Sustainability** where

we project that about 70% of the full academic carder will be filled with national members of staff, of which a minimum of 80 % will have PhDs) and the rest with competitive expatriate members of staff expert in one of the ten specializations and able to work together giving significant research leadership in the global scenario.

Research priority (2014 – 2016)

In Phase 1 (2014-2016) we have only one research priority, which is to: Match the strengths of the department with opportunities for high impact research in Papua New Guinea (see Appendix 2 for one of the three Phase 1 Clusters). Additional two research priorities will be defined and aimed at once this basic research priority is accomplished. Under this single agenda we will seek to:

- (a) Recognize and reward significant contributions and seek to get undergraduate students fully involved in industrial and research projects.
- (b) Develop the department to meet the local, provincial, and national demands on our engineering profession.
- (c) Redesign the department is able to compete with the leading Universities in neighboring countries, especially Australia.
- (d) To set the initial stages, to be fully pursued in Phase 2, to match the strengths of the department with opportunities for high impact research in Papua New Guinea

Research Clusters (2014-2016)

Over the next three years we shall seek to develop the following three research clusters:

1. Smart and Renewable Energy Systems: Technology, Planning and Policies
2. Communication, Information and Sensor Systems
3. Climate and Environmental Engineering

For a more complete set of clusters, we envisage another four to be added. However, some of the others are already active in some of the research projects proposed within the above three clusters. **Space-Earth Technology** (a needful cluster) is used in the form of Geographic Information System (GIS) in developing the Renewable Energy research on solar and wind energy, as well as tidal energy potential in Papua New Guinea; moreover in developing the Geospatial Information System (GSIS) for Power Systems distribution maintenance and future expansion, the Space map of Papua New Guinea cities will be used to track present and future street and building locations.

Strategies (2014-2016)

2014

1. From 2014 onwards, a minimum of three **PhD degree research** to be conducted at the department.
2. From 2014 onwards, a minimum of 10 full time or part time **MPhil research** programmers conducted by the department.
3. In each semester hold a minimum of five research or research related **seminars**.

4. By the end of 2014, recognizing the fact that many conferences and journals are substandard, the department will set out a **list of approved ECE conferences and journals** to be submitted to the University.
5. From semester 2, 2014 onwards all **expatriate members of staff** be divided into Teaching and Research streams. Those in the **Teaching stream (TS)** will do up to 18 hours of student contact work. They will be encouraged to do enough research to publish one first-author conference paper each year. Those in the **Research stream (RS)** will do a maximum of 6 hours undergraduate student contact work, supervise a minimum of 2 graduate students and produce a minimum of 1 conference paper and 1 journal paper in each semester.
6. From the middle of 2014 onwards all **national members of staff** shall be divided into similar streams (TS and RS) as the expatriate members of staff. Those doing research (including PhD and Master's candidates) will do a maximum of 6 student-contact hours, and publish a minimum of 1 national/international conference and journal paper each year.
7. By the end of 2014, a list of **laboratory technicians** willing and in a position to assist in research work will be identified and allocated to work with the national members of staff doing research, both in the research work and in translating the research to undergraduate projects. Their work and contribution will be recognized and rewarded according to a set of policies drawn to accommodate this new category of technical officers.

2015

8. A completely revised and **upgraded undergraduate syllabus** to be produced by the end of 2014, to be implemented in 2015 semester 1 or semester 2. The revision will be led by those in the Research Stream (RS), in cooperation with those in the Teaching Stream. The TS will be responsible to those in RS to teach up to standards set in the new syllabi.
9. In each semester hold a minimum of five research or research related **seminars**.
10. A new, **taught course Master's degree programme**, drawing on the expertise in the department, including courses and syllabi, be produced and implemented by the middle of 2015.
11. From the beginning of 2015 onwards, the department actively seek **support from private and government departments** to support purchase of new equipment and support of research related work and publicizing of results.
12. Each member of staff to recognize his/her strength and productively contribute to one of the major research clusters. From the second year (2015) onwards those in the RS **producing a minimum of one conference and one journal paper each semester**, co-authored with either fellow members of staff or students.

2016

13. By the beginning of 2016 the **three research clusters** should be formed.
14. From semester 1 of 2016 onwards, a minimum of 50% of the undergraduate final year projects (FYP) should be research-based projects, with the rest being industrial projects.

15. In the first semester of 2016 form an **Industrial Advisory Panel (IAP)** that shall meet either once a semester or once a year under the Chairmanship of the Vice Chancellor or one of the Pro-Vice Chancellors. At this the head of ECE shall give a progress report on the department. And at the first meeting the new syllabi, research and other activities of the department shall be submitted for scrutiny and advice from the IAP.

MPhil Research Projects in Smart Energy Systems: Technology, Planning and Policies

- I. **Protection and Reliability**
- II. **Intelligent Energy systems**
- III. **Renewable Energy and Future Challenges**
- IV. **Energy Efficiency and Consumer Concerns**
- V. **Harmonics**

DEPARTMENT OF FORESTRY

Head of Department: Dr Larry Orsak

UNITECH's Forestry Department is the only academic institution in the South Pacific island region to confer undergraduate and postgraduate degrees in Forestry.

Education is the university's principal mission and the Forestry Department aims to provide high quality academic and administrative support services not only for undergraduates, but with increasing focus on the training of postgraduate students. Our postgraduate program continues and further develops research skills they began learning through Year 3 courses (especially 'Experimental Design'), and culminating in Year 4 (final year research project).

Our overall educational challenge in forestry is to produce professionals, both men and women, with the necessary technical skills. Foremost amongst these is the ability to solve problems. It is to develop this problem-solving capacity that our department's research activities fundamentally fit into our education mission. To achieve this goal requires that the faculty themselves are not only well versed in research but apply that knowledge through active research projects and programs. This five year plan is our first departmental articulation of the strategies and mechanisms by which we hope to enhance our department's research activity component. The document also points out current, significant constraints in attaining our objectives that must be overcome at the university level.

Forest/Forestry Research Themes

The Forestry Department has long recognized the multi-faceted value of Papua New Guinea's forests, and over the years has woven this into its academic and research program. Sustainable forestry in PNG requires a cross-disciplinary approach, which today means blending aspects of the economy, social features, environment services and climate change.

The Department structures its Research Development Plan and Post Graduate Study Program around a number of specific research themes:

Ecosystem and Environmental Services

Forest Biology, Ecology & Biodiversity

Forest (health) Protection

Wildlife Management, Community-Driven Forest Conservation.

Role of Forests In Climate Change

Silviculture, Including Reforestation and Plantation Management

Agro-forestry/ Social and Community Forestry and Multiple land-use

Wood Science and Technology; Timber Production/Utilisation

Forest Engineering

Forest Economics and Forest Product Marketing

Appropriate Technology

Remote Sensing and GIS

Biomass Energy

On-Going Research Programs in the Department

The Forestry Department has a number of on-going research activities, which are segregated according to general theme and briefly described below, noting the principal investigators involved:

Ecosystem and Environmental Services

Forest Biology, Ecology & Biodiversity

Variation in the tropical rainforest soil seed bank communities along an altitudinal gradient in Papua New Guinea

Variation in plant ecomorphic traits along an elevational gradient in the Bulolo-Watut Basin, Morobe Province, Papua New

Catalytic Efficiency of Broadleaf Primary Forest Tree Species in Rehabilitation of Degraded Grassland in Papua New Guinea

Forest biodiversity indicator assessments and technology

Forest (health) Protection

Soil, plant stress and pest/disease vulnerability in plantation in *Araucaria* species

Wildlife Management, Community-Driven Forest Conservation

Role of Forests In Climate Change

Silviculture, including Reforestation and Plantation Management

Clonal propagation techniques for selected species (including *Eucalyptus pelita*, *Acacia* spp.) and Forest Plantation Development

Clonal Propagation for Eaglewood

Agro-forestry/ Social and Community Forestry and Multiple land-use

Wood Science and Technology; Timber Production/Utilisation

Mechanical Strength Testing of 2ND Rotation *Araucaria cunninghamii* and *Pinus caribaea* trees from Bulolo Plantation

An Investigation of the Physical Properties (Basic Density & Volumetric Shrinkage) of *Pinus caribaea* and its Drying Behavior.

Developing suitable (optimized) drying schedule for the timber species *Tremaorientalis*

- Forest Engineering

Operational analysis for various levels of partial cutting in small-diameter and old growth stands.

Quality control in timber harvesting

Forest Harvesting Productivity Study at Bulolo Plantation Forest

Impact of logging and road construction on soil and water at Bulolo Plantation Forest

Wood strength testing to use in the design of house and bridge

Forest Economics and Forest Product Marketing

Appropriate Technology

Mini-Pro Solar Kiln Timber Dryer – Drying of hardwood timbers using solar energy (low power consumption) technology

Remote Sensing and GIS

Multi-temporal Analysis of Land Use and Land Cover Change Using Landsat TM Data in Morobe Province, Papua New Guinea

Biomass Energy

Ongoing Research Collaboration with External Partners

Apart from internally funded research programs, Forestry Department has been blessed with number of opportunities to conduct collaborative research with external partners over the last five years. The formal projects that contain research components include:

Improving the Papua New Guinea balsa value chain to enhance smallholder livelihoods (FST 2009/16)

Technical support to the Papua New Guinea Forest Authority to implement a multi-purpose National Forest Inventory (GCP/PNG/006/EC)

List of Publications

David Lopez Cornelio (2013). Open source GIS software options for forestry education in Papua New Guinea, accepted by Open Journal of Ecology, Volume 4, Number 4, March 2014.

David Lopez Cornelio and John Kopattlie. (2013). GIS Analysis of land suitability for commercial tree species in Papua New Guinea, (in revision).

Nangu George, Rajashekhar Rao B.K., David Lopez Cornelio (2013). Land use conversion and soil properties in a lowland tropical landscape of Papua New Guinea, *Journal of Tropical Forests Management*, University of Bogor, JMHT Vol. XIX, (1): 39-45, April 2013.

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

Acting Head of Department: Mr John Lanta

Scientific activity of the Department can be organized in different ways. It is necessary first of all to organize a serious scientific seminar which must work systematically. It is very important to involve in this activity students and colleagues from other departments. I propose to reserve ½ day exclusively for research activity, seminar, analysis of recent scientific papers (Tuesday or Friday).

It is necessary to write a program of seminar and even post it on internet. It is necessary to select for seminar topics connected with pure mathematics and computer science.

I propose to organize a seminar with the title "Algebraic structures, coding theory and statistics". We will study algebraic structures which have applications in computer science: lattices, semi-lattices, semigroups, ordered sets. We also will discuss at this seminar papers on statistics.

A tentative program of the seminar "Algebraic structures, coding theory and statistics":

To study the book "Algebraic Codes for Data Transmission, Cambridge University Press, 2003, 482 pages"(the book is readable and contains chapters about applications).

To try to find directions of research in statistics.

To report new results obtained by the members of the Department.

List of Publications

Ambrish Kumar Pandey, Q S Ahmad, Kulbhushan Singh, "Lacunary Interpolation (0,2;3) Problem and Some Comparison from Quartic Splines", American Journal of Applied Mathematics and Statistics, 2013, Vol. 1, No. 6, 117-120 www.pubs.sciepub.com/ajams/1/6/2

Senthilkumar, K. S. (2013). A Study of Behavior-based and Role-based Autonomous Multi-Robot Exploration and Coverage Systems. International Journal of Latest Research In Engineering and Computing (IJLREC), Volume 1, Issue 1 : Page No.12-20, September-October 2013, www.ijlrec.com

Ursul, Mihail (2013). The weights of closed subrings of a locally compact ring. (English) [Topology Appl.](http://www.ijlrec.com) 160, No. 8, 960-964. MSC2000: *16W80, Reviewer: Mart Abel (Tartu)

Ursul, Mihail; Juřař, Martin (2013). Notes on topological rings. *Carpathian J. Math.* 29 (2013), no. 2, 267--273. [MR3137559](http://www.ijlrec.com)

DEPARTMENT OF MECHANICAL ENGINEERING

Acting Head of Department: Mr Brian N'Drelan

The following is the List of priority research areas and the publications for 2013.

Staff Member	Topics of Research	No. of Papers published in 2014	Comments
Professor Nicholas Lambrache (PhD)	<ul style="list-style-type: none"> a) 3-D modeling of weak parts and subsystems. b) Finite Element simulation on stresses – including dynamic stresses and fatigue c) Fatigue experiments on computer controlled devices. d) Statistical interpretation based on accumulated data from the mine site. e) Material Science interactive research on minerals affecting strength of metal alloys in mining equipment 		Joined in 2014
Dr. Praveen Pandey	<ul style="list-style-type: none"> a) Engine combustion b) Alternative Fuels especially hydrogen and emission control c) Heat transfer enhancement through extended surfaces 	5 (another 3 awaiting)	Joined in 2012
Mr M.R. Satter	<ul style="list-style-type: none"> a) Creative problem solving in engineering design b) Integrating the use of technology to enhance creativity engineering education c) Engineering curriculum optimization using Quality Function Deployment (QFD) house of Quality. d) Renewable energy technologies – power generation systems 		
Dr. Hassan Khurshid	<ul style="list-style-type: none"> a) Computational Fluid Dynamics (CFD) 	1	Joined in 2013
Mr Hari S. Srivastava	<ul style="list-style-type: none"> a) Operations/Production management and Supply Chain Management 	1	Paper presented at Huon Seminar 2013
Mr E. Sirisena	<ul style="list-style-type: none"> a) Automotive Engineering 		
Mr Samuel Dunstan	<ul style="list-style-type: none"> a) Effect of corrosion (rust) on structures 		
Mr Brian N'Drelan	<ul style="list-style-type: none"> a) Renewable energy – use of solar to provide power b) Statistical analysis of Failure of mining equipment – study of the properties of the mineral being mined and the effects on life expectancy of equipment components. 		

List of Publications

Hassan Khurshid and Klaus A. Hoffmann, "Development of a High Order Solver for Blood flow", *Engineering with Computers*, DOI 10.1007/s00366-013-0324-z, Volume 29, Number 3, Online First, published, September 2013. (Publisher: Springer-Verlag)

Praveen Pandey and S. C. Dey (2013). *Industry-Academia Interaction in PNG*, Paper No. HS7-2013-0094 (ISBN 978-9980-87-541-9), 7th Huon Seminar, The PNG University of Technology, Lae, ISBN 978-9980-87-541-9 Nov 13-14, 2013

Praveen Pandey (2014). *Hydrogen: The Fuel Forever*, Proceedings of All India Seminar on Renewable Energy Development and the way Forward, The Institution of Engineers (India), Ghaziabad, March 8-9, 2014.

H.S Srivastava and Praveen Pandey, *Curriculum Development in the Technical Education Supply chain of Papua New Guinea*, Paper No. HS7-2013-0097 (ISBN 978-9980-87-541-9), 7th Huon Seminar, The PNG University of Technology, **Lae**, Nov 13-14, 2013

Praveen Pandey and B P Pundir, *Hydrogen Supplemented Combustion: A Study on Soot Formation and Microstructure in Acetylene-Air Laminar Inverse Diffusion Flames*. (Manuscript communicated to the journal *Fuel*, 2013).

Praveen Pandey, Sanjeev Jain and R S Aggarwal, Use of Propane and Carbon Dioxide for Low Temperature Refrigeration. (Manuscript communicated to the *International Journal of Air-Conditioning and Refrigeration*, 2014).

Praveen Pandey and A. K. Chakrabarti, Material Characteristics, Manufacturing Processes and Product Performance: A review of some experimental studies (Manuscript communicated to the *Jordan Journal of Mechanical and Industrial Engineering*, 2014).

DEPARTMENT OF MINING ENGINEERING

Acting Head of Department: Mr M. Saki

The Mining Engineering departments offer two degrees- bachelor of Engineering in Mining Engineering and Mineral Processing Engineering. It is currently functioning without a full pledge head of department for the last 5 years. There are 15 academic staff, 5 Technical staff, 3 Administrative staff and two auxiliary staff. Two of the 15 academic staff are currently on study leave pursuing PhD studies in Australia. The current staffs of the department are pursuing research activities in their areas of expertise as outlined below.

Dr. Kaul Gena, Associate Professor

Research Priority Areas

- Geochemical characteristics of lavas from the Northern Seamount Province (NSP) of the Mariana Arc, Japan
- Mineralogical and fluid inclusion studies of rock samples from the deeper part of OkTedi Porphyry Copper Deposit, Western Province, Papua New Guinea
- Mineralogical and geochemical studies of Bulago Porphyry Copper Deposit, Western Province, Papua New Guinea
- Mineralogical studies of Singsing Creek high sulphidation Epithermal deposit , Morobe Province, Papua New Guinea

Dr. Gabriel Arpa, Senior Lecturer

Research Priority Areas

- Feasibility study of Kassam Pass Underground Tunnel Construction., Lae Papua New Guinea.
- Site Blasting specification for Hidden Valley open pit mine using blast vibration monitoring. Morobe Mining. Lae Papua New Guinea.
- A comparative study on ventilation efficiency in dead space in both laboratory model and underground mine condition. Lae, Papua New Guinea.
- Modeling of the Deep Sea Tailing Placement System and Practice in Papua New Guinea.
- Sedimentation Studies of the Watut and Markahm River system and their effect on the environment and Lae Wharf system. Lae Papua New Guinea

Mr. Wilson Kobal, Lecturer

Research Priority Areas

- Studies in Sulphating roasting of Ramu laterite ore, PNG Unitech

- Studies in the extraction of nickel and cobalt from Ramu laterite ore using Ok Tedi pyrite concentrate as the source of sulphuric acid, PNG Unitech

Mr. Stanley Rungwa, Technical Instructor

Research Priority Areas

- Assessment and Evaluation of Tailing Disposals and Contaminants (Heavy Metals) into Bulolo and Markham River Stream, Morobe Province, Papua New Guinea.
- Hyper-accumulator Plant Species Identification along Bulolo and Markham River, Morobe Province, Papua New Guinea.
- Biotechnology/Genetic Study of Hyperaccumulators to increase their Heavy Metals Absorption Activities, Morobe Province, Papua New Guinea.

Ms. Mary Kama, Senior Technical Instructor

Research priority Areas

- Calcination and Quality tests on Elimbari lime stone from Chuave in Simbu Province.
- Isothermal carbothermic reduction of iron oxide and production of sponge iron from 4 different material from Ok Tedi magnetite Skarn Ore (MPhil Research Project).
- Further research activities to extract iron from tails from other existing Mines in PNG.
- Further research to increase grade of sponge iron produced from pyrite concentrates- mini steel industries.
- Calcination & quality testing for Manus & Finshafen lime stone deposits

List of Publications

Bradley Vali, Gabriel Arpa (2013) "Finding the Relationship between RQD and the Fracture Frequency in the Different Ok Tedi Lithologies". *Procedia Earth and Planetary Science*, ELSEVIER Science Direct. Vol. 6, pp. 403 – 410. <http://www.sciencedirect.com/science/article/pii/S1878522013000544b>

Gena K., (2013) Deep Sea Mining of Submarine Hydrothermal Deposits and Its Possible Environmental Impact in Manus Basin, Papua New Guinea, Elsevier. *Procedia Earth and Planetary Science* 6, 226 – 233,

Gena K., Chiba H., Kase K., Nakashima K., Ishiyama D., (2013) The Tiger sulfide chimney, Yonaguni Knoll IV hydrothermal field, Southern Okinawa Trough, Japan: The first reported occurrence of Pt-Cu-Fe-bearing bismuthinite and Sn-bearing chalcopyrite in an active seafloor hydrothermal system. *Resource Geology*, 63, 360-370.

Gena K. and Ishiyama D. (2013). Mining industry contribution to the development of Papua New Guinea, Soc. of Res. Geol. Abstract with Programs, p 21, Tokyo, Japan

Kobal, W., Tongamp, W., Arpa, G., Shibayama, A., (2013) Extraction of nickel and cobalt from Ramu laterite ore – Papua New Guinea. XXVI International Mineral Processing Congress (IMPC) 2012 Proceedings, 2468 - 2477

Stanley Rungwa, Gabriel Arpa, H. Sakulas, A. Harakuwe and D. Timi (2013). "Phytoremediation – An Eco-Friendly and Sustainable Method of Heavy Metal Removal from Closed Mine Environments in Papua New Guinea". *Procedia Earth and Planetary Science*, ELSEVIER ScienceDirect. Vol. 6, pp. 269 - 277 <http://www.sciencedirect.com/science/article/pii/S1878522013000374>

Rungwa, S., G. Arpa, H. Sakulas, A. Harakuwe and D. Timi (2013). Assessment of Phragmite karka (pitpit) as Possible Phytoremediation Plant Species for Heavy Metal Removal from Mining Environment in PNG. A Case Study on Closed Namie Mine Wau, Morobe Province". The 7th Huon Seminar Proceedings, November 13th – 14th, 2013, PNG University of Technology

Rungwa, S., G. Arpa, H. Sakulas, A. Harakuwe and D. Timi (2012). Phytoremediation – An Eco-Friendly and Sustainable Method of Heavy Metal Removal from Closed Mine Environments in Papua New Guinea", The Papua New Guinea Research, Science and Technology 5th Conference Proceedings (PAU), 25th – 29th of July, 2012.

Rungwa, S., G. Arpa, H. Sakulas, A. Harakuwe and D. Timi (2012). Phytoremediation – An Eco-Friendly and Sustainable Method of Heavy Metal Removal from Closed Mine Environments in Papua New Guinea", The 10th International Earth Science and Technology Symposium Proceedings (Bundang Institute of Technology – Indonesia), 19th – 20th of September, 2012. Science Direct: <http://www.sciencedirect.com/science/article/pii/S1878522013000374>

DEPARTMENT OF SURVEYING AND LANDS STUDIES

Head of Department: Professor Dilip K. Pal

The department consists in 3 standalone segments, viz. 1. Geographic Information Science, 2. Surveying and 3. Property Studies. Therefore, we propose to treat our strategic research plan separately for each section.

A. RESEARCH STRATEGY OF GISci SECTION- Next 5 years

Geoinformatics comprises many inter-related fields dealing with the capture, processing, management and presentation of spatial data which utilize many innovative technological tools for a wide range of applications. Remote Sensing, Geographic Information System and Global positioning System are some of these fields that provide extremely useful tools for environmental and natural resources management. They are widely recognized supporting tools for the planning, monitoring and management of appropriate utilization of resources at the country, regional and global levels.

Because of the complexity of the technologies together with the heavy dependence on advance computer skill, application specialists need to have a sound knowledge of theoretical and practical approaches to integrate many resources of information that address different applications. These technologies should be familiar with past, present and future satellite systems, their appropriate usage, data acquisition and handling and integration with other sources.

Research Activity

There were a few research activities that have already been executed or are presently being undertaken or to be undertaken in near future by the GIS section. These are listed below.

Past Research

1. Local (Village) level mapping in collaboration with Tree Kangaroo Conservation Program (TKCP)
2. Market Accessibility mapping for entire Papua New Guinea in collaboration with NARI

Ongoing Research

1. Creation of Eda Ranu water and sewerage network asset register and mapping in Port Moresby

(Sponsor: Eda Ranu, Port Moresby).

2. Wall to wall topographic modeling and mapping for entire Papua New Guinea.
3. Land Suitability analysis for Rice cultivation in the entire landmass of Papua New Guinea in medium scale of 1:250000 (Sponsor: TRUKAI Industries Ltd).

Future Research

1. Feasibility study of Rice cultivation in six selected provinces of Papua New Guinea using High resolution satellite data (Sponsor: TRUKAI Industries Ltd).
2. Continuous monitoring of rice growing and monitoring of crop (TRUKAI)
3. Topographic mapping for Entire Papua New Guinea in 1: 100 000 scale (OK TEDI).
4. Lae city cadastral land governance – an analysis of the Digital Cadastral Database (DCDB) accuracy standards and cadastral land boundary encroachments
5. Cost effective and accuracy requirements for ILG boundary mapping for application submissions
6. Examine possible Geo-databases requirements for districts to assist in their district planning
7. Wall to Wall land use/land cover mapping for Papua New Guinea for estimation of Greenhouse gas emission (OCCD).
8. Starting of Digital Photogrammetric activities to carry out high resolution aerial photographic mapping.

Time line/Mile stone

Milestone	Description	Duration (Month)	Date range
M1	Creation of water and sewerage network database and mapping in Moresby (EDA RANU)	18 months	June, 2012 to Dec, 2013
M 2	Land Suitability analysis for Rice cultivation in Papua New Guinea in medium scale of 1:250000(TRUKAI)	9 months	Mar, 2013 to Sept 2013
M 3	Feasibility study of Rice cultivation in Six selected provinces of Papua New Guinea using High resolution satellite data (TRUKAI).	15 months	Jan, 2014 to March, 2015
M 4	Topographic mapping for Entire Papua New Guinea in 1:100 000 scale (OK TEDI)	36 months	Jan, 2014 to Dec, 2016

M5	Wall to Wall land use/land cover mapping for estimation of Greenhouse gas emission (OCCD)	24 months	June, 2014 to June, 2016
M6	Continuous monitoring of rice growing and monitoring of crop (TRUKAI)	48 months	Jan, 2015 to Dec, 2018

B. RESEARCH STRATEGY OF SURVEYING SECTION

2. HARD CORE RESEACH AREAS:

(i) GEODESY; (ii) CARTOGRAPHY; (iii) GEODETIC SURVEYING; (iv) CADASTRAL SURVEYING; (v) ENGINEERING SURVEYING; (vi) TOPOGRAPHICAL SURVEYING; (vii) HYDROGRAPHIC SURVEYING; (viii) MINE SURVEYING

3. SPECIFIC RESEARCH TOPICS:

- Reference Systems (Horizontal & Vertical Datums) – **Geodesy**
- Local & Global Datums – Astronomical & Geocentric Datums - **Geodesy**
- Survey Projections & Map Grid Systems – **Geodesy/Catography**
- Geoid Determination (Concepts, Methods and Applications) – **Geodesy**
- Satellite Geodesy Systems, Mechanics and Orbital Analysis – **Geodesy**
- Earth's Crustal/Structural Deformation – **Geodesy & Geophysics**
- Cadastral Survey Systems & Practice – **Cadastral Surveying**
- Principles & Applications of Cadastral Surveying
- `Cadastre: Survey & Land Record Systems
- Land Information Systems (LIS)
- Land Registration Systems
- Land Tenure Systems
- Land Development & Subdivision Design – **Cadastral Surveying**
- Steel Bands Standardization & EDM Calibration - **Cadastral Surveying/Physics**
- Bridge Structural Deformation Surveys – **Engineering Surveying**
- Drainage Design & Setting Out – **Engineering Surveying**
- Road Alignment Design & Setting Out – **Engineering Surveying**
- Tunneling & Underground Surveying – **Engineering/Mine Surveying**
- As Built or Auditing Surveys – **Engineering/Mine Surveying**
- Datums (Horizontal & Vertical) and Map Grid System – **Topographical Surveying**
- Digital Terrain Modeling (DTM) Surveys – **Topographical Surveying**
- Small Scale Topographical Mapping: Modern Systems and Applications
- Large Scale Topo. Maps/Plans: LIDAR and Automated Surveying & Mapping
- Ocean Tides - Tidal Theory & Tide Gauge: Instrumentation, Installation, Tidal Observations, Recording, Analysis and Transfer of Datum – **Hydrographic Surveying**
- Integrated or Automated System (Real Time Horizontal & Echo Sounder Depths Measurements) – **Hydrographic Surveying**

- New Surveying Systems & Techniques used in Mining Operations – **Mine Surveying**
Automated Systems - Hardware & Software Development: CMS Void Scanner and Minesight Software etc.

C. RESEARCH STRATEGY OF PROPERTY STUDIES SECTION

STAFF RESEARCH INTERESTS

With property studies program designed along the lines of three distinct yet interdependent streams of study, staff research would be pursued on the basis of strengthening the academic program.

Staff Member	Academic Program Focus	Research Interest
Andrew Pai	Valuation	Valuation, Land Administration
Suman Holis	Property Development and Management	Valuation, Property Development, Investment, Management and Land Use Planning
Jerry Mille	Land Administration	Land Administration, Land Economics, Investment and Management
Lepani Karigawa	Valuation and Property Management	Valuation, Land Administration and Property Management

List of publications

Gouri Sankar Bhunia, Nandini Chatterjee and Dilip Kumar Pal. (2013). Identification of Groundwater potential zone of Nawada district, Bihar India- A study based on Remote Sensing and GIS platform (accepted on 13-08-2013), Hydrology Research, IWA Publishing

Giri, S., and Samanta, S., 2013, Geographical Information System for Land Use Development Control Plan, International Journal of Emerging Technology and Advanced Engineering, 3 (9), 580-591.

Koloa, C., and Samanta, S., 2013, Development Impact Assessment Along Merkhram River through Remote Sensing and GIS Technology, International Journal of Asian Academic Research Associates, 5 (1), 26-41.

Pal, D. K. (2013). Space technology in adapting to climate change induced Land use Planning in Papua New Guinea, Presented at the Transparency International hosted workshop on "Our Forest our Responsibility – best practices for Forestry and REDD+", during 2-3 May, 2013 at Forest Research Institute, Lae, Papua New Guinea.

Pal, D. K. and Sailesh Samanta. (2013). Emphasis on harnessing renewable resources through Space technology with special reference to sustainable rice agriculture in Papua New Guinea" Presented at the Department of Environment & Conservation (DEC), Spatial Mapping workshop during 16-19 June, 2013 at Ela Beach Hotel, Port Moresby, Papua New Guinea

Pal, D.K., and Samanta, S. (2013). Prospects of transition to rice land: A RS and GIS suitability in Papua New Guinea, 6th International Congress of Environmental Research (ICER-2013), 19-21 December, Maulana Azad College of Arts, Science and Commerce, Aurangabad, Maharashtra, India.

Samanta, S., and Bhunia, G. (2013). Landslide susceptibility zone identification of Markham Watershed, PNG-A study based on remote sensing and GIS technology, International Journal of Physical and Social Sciences, 3 (1), 307-322.

Samanta, S., and Pal, D. K. (2013): Medium Resolution Studies of Rice Suitability Areas in Papua New Guinea Using Existing GIS Data Base and Satellite Images, 34th Asian conference on Remote Sensing (ACRS 2012), 20-24th November, Bali, Indonesia.

Yali, G., and Samanta, S., (2013): Biomass and carbon stock estimation using high spatial resolution satellite data, 6th International Congress of Environmental Research (ICER-2013), 19-21 December, Maulana Azad College of Arts, Science and Commerce, Aurangabad, Maharashtra, India.

Books / Magazine

Samanta, S., 2013, Climatological Modelling of Temperature and Rainfall: The Remote Sensing and GIS approach, Lambert Academic Publication, ISBN 978-3-8465-9404-9, paperback, 147 Pages.

Completed Research Project

TITLE: Medium resolution studies on mapping rice suitability areas in PNG using existing GIS data base and satellite images

SPONSOR: TRUKAI INDUSTRIES LTD, PNG

Value: PGK 222,500.00 (Total)

Satellite Data Cost Paid: PGK 100,000.00

Remaining Project Cost (Consultants and Others): PGK 122,500.00

OFFICE OF THE VICE CHANCELLOR

Vice Chancellor: Dr Albert Schram

List of Publications

Maino, M. (2013). Relevance of Life Sciences in Achieving PNG Vision 2050; A Keynote address at the 7th Huon Seminar. Proceedings of the 7th Huon Seminar held at Unitech during 13-14 November 2013, Pages 107-110. (ISBN: 978-9980-87-541-9).

Pumwa, J. (2013). Engineering Education in Papua New Guinea. Proceedings of the 7th Huon Seminar held at Unitech during 13-14 November 2013. HS7-2013-095, Pages 86 - 91. (ISBN: 978-9980-87-541-9).

Pumwa, J. (2013). Mathematics as a Tool for National Development. A Paper Presented at the International Conference on Pure and Applied Mathematics (ICPAM) held at Unitech, Lae, during 26 - 28 November, 2013.

Satter, M. A. (2013). Quality Assurance in Engineering Education with Special Reference to Engineering Programs at the PNG University of Technology. A keynote address at the 7th Huon Seminar. Proceedings of the 7th Huon Seminar held at Unitech during 13-14 November 2013. Pages 1-7. (ISBN: 978-9980-87-541-9).

Satter, M. A. (2013). A perspective on the historical development of Mathematics. A Paper Presented at the International Conference on Pure and Applied Mathematics, held at Unitech, Lae, during 26 - 28 November, 2013.

Satter, M. A., Albert Schram, John Pumwa and Veronica Thomas (2013). Developing KPIs for the Papua New Guinea University of Technology. Proceedings of the 7th Huon Seminar held at Unitech during 13-14 November 2013. HS7-2013-035. Pages 282-290. (ISBN: 978-9980-87-541-9).

Schram, A. (2014). Leadership, Strategic Planning and Strategic Management for Higher Education Institutions in Developing Countries. Paper prepared for the World Business and Economics Research Conference, 24-25 February 2014, Rendezvous Hotel, Auckland, New Zealand.

Schram, A., Sosa, J.C. and Kithiia, J. (2013). Development, Environment and Culture: all bones and no meat? Discussion Paper, Cairns Institute, James Cook University, Australia

Schram, A. (2013). Future Consumers, Cellphones and Time Use in India and Papua New Guinea. Paper prepared for the Fourth Asia Pacific Business Research Conference, 30 September - 1 October, Singapore Bayview Hotel

ALLOCATION OF RESEARCH FUND - 2013

Name	Department	Research Title	Amount (K)
Dr S Gopalakrishnan	Applied Science	Green synthesis of silver nano particles, characterizations of phytochemical constituents, biological activities and antimalarial investigation of PNG medicinal plants.	12, 000
Dr Janarthanan Gopalakrishnan	Applied Sciences	Studies on traditional salts used in Eastern Highlands, Western Highlands and Chimbu provinces of Papua New Guinea.	10, 000
Dr K Mulung	Forestry	Developing clonal propagation techniques for selected tree species and improving nursery research.	9, 500
Mr P Edwin	Forestry	Developing drying schedules for two (2) selected lesser known hardwood timber species using newly installed Mini-Pro Solar Kiln drier at Taraka campus, PNG University of Technology.	10, 150
Dr Mex Peki	Forestry	Assessing stand structure and growth characteristics of natural forest in Busama local forest area, Morobe Province, PNG.	4, 060
Mrs Ann W Daniel	GAP, Agriculture	Combination of Thermo-therapy and in vitro meristem elimination of sugarcane Ramu stunt disease-associated protein and RNA-dependent RNA polymerase (RdRp) gene	10, 000
Ms Christine Terim	GAP, Agriculture	Nematicidal activity of medicinal plants against the root-knot nematodes, <i>Meloidogyne incognita</i> .	4, 290
Ms Josephine L Giwar	GAP, Agriculture	Impact of intervention of Lake Murray Village Rubber Project (LMVRP) on farmers' livelihood in Western Province, PNG.	7, 000
Miss Lucy Lapauve	GAP, Agriculture	Effects of urea molasses mineral blocks (UMMB) on the growth performance of goats in Papua New Guinea. (UMMB formulation, testing and training package to improve goat production in Papua New Guinea).	7, 000
Dr Kaul Gena (Api Macotscar Kaiwa-Mphil student)	Mining Engineering	Extraction of copper from concentrates and tailing by chlorodizing roasting, leaching and cementation and/or solvent extraction.	10,000
Dr Rajashekhar Rao (Mr Samuel Kapia – Mphil Student)	Agriculture	Baseline study on the occurrence of some heavy metals and fish tissues in Yonki Reservoir, Eastern Highlands Province	15,000
Mr David Kolkoma	Applied Physics	Design of Marijuana detector based on the odour	7,300
TOTAL			84,700

ALLOCATION OF CONFERENCE FUND - 2013

Name, Designation and Department	Place of Conference	Research Paper	Amount (K)
Mr Nick Kewa Lecturer Agriculture	12 th Pacific Science Inter-Congress, Science for Human Security and Sustainable Development in the Pacific Islands and Rim held at University of South Pacific (USP), Fiji	Assessing Policy Impact on the Smallholder Rice based cash crop production systems in Papua New Guinea.	10,640
Dr K. Nwabueze Associate Professor Mathematics and Computer Science	The Pan African Congress of Mathematician (PACOM 2013), held at Abuja, Nigeria, 30th June -7 th July 2013	Block Decomposition of a Generalized Ring of Coexter Groups with respect to its Parabolic Subgroups.	8,800
TOTAL			19,440

UNITECH RESEARCH COMMITTEE SEMINAR SERIES

2013

The PNG University of Technology (Unitech) has successfully concluded the Research Committee Seminar series for the 2013 Academic year. This is seen as a hallmark event in the history of Unitech, not because the series of seminars could be held without pause, but more importantly due to the emphasis placed on expanding and improving the research capabilities at Unitech. One of the major steps in this regard has been the weekly Unitech Research Committee Series 2013. It is an effective forum to disseminate the research findings to the wider community and thus can contribute to developing the research culture among its academics, staff and students alike.

The Research Committee Seminar Series started in the second semester of 2013. Altogether, 12 seminars were presented on diverse subject matters ranging from highly complex mathematical formulae, land tenure systems to “Diploma Mills”. The seminar forum also hosted a visiting academic who spoke on timely topic of accreditation of engineering programs. Accommodating visiting scholars in the seminar series is also a strategic consideration of the Research Committee as it adds to the diversity of themes, ideas and deliberation quality. There was a lot of enthusiasm in the Unitech community as lively discussion followed every seminar with the participation of academics, staff and students alike.

A compilation of all the research abstracts is posted on the Unitech website (www.unitech.ac.pg) as the resource materials for anyone to access. If anybody needs further information on any of the presentations, please contact the individual staff member at the appropriate email address.

Unitech Research Committee takes this opportunity to thank all the presenters and participants involved with the seminar series. It is hoped that the seminar series will enhance the research culture and reputation of Unitech. With posting of the seminar abstracts on the website, the Unitech Research Committee renews its commitment to make the seminar series sustainable and more attractive in the future.

Lacunary Odd Degree Splines of Higher Order

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In this paper we consider higher odd degree splines of a particular class that solve a special Birkhoff interpolation problem, where the function value, first derivative,.....up to $(n-1)^{\text{th}}$ derivative are prescribed at the nodes and m^{th} derivative is prescribed midway between the nodes. Fundamental polynomials of the above mentioned interpolation problem have also been obtained.

AMS 2000 Subject classification number: 41A15

Key words: Birkhoff interpolation, spline function, incidence matrix.

PALM KERNEL CAKE FOR FATTENING BEEF CATTLE IN PAPUA NEW GUINEA

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Papua New Guinea (PNG) exports about 70% of the Palm kernel cake (PKC) it produces. PKC can be used as a major source of feed for ruminants, PKC was fed to animals at 84, 87 and 90% of their diet to compare the growth performance and carcass quality specially in PNG. The results obtained indicated that there were no significant differences ($P < 0.05$) in the final body weight or the average weight gain between the groups fed different levels of PKC. Including PKC at 90% of the feed resulted in a significant increase in carcass weight, marbling and fat thickness in both male and female animals belonging to Draught master X Brahman finisher cattle at Numundo Cattle Farm of NBPOL. As marbling is increased, it may produce more preferred cuts which have to be determined by organoleptic evaluation.

(Note: This study was a part of the Mphil thesis by Mr. Frank Mepe)

Improving Agricultural Production and Rural Institutions through Farmers' Field Schools (FFS): Experience with Smallholders in Southern Bangladesh

Dr. Mofa Sattar

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The seminar is about the result of an early impact study of a major capacity building project of smallholders in southern Bangladesh. The project was implemented by Ministries of Agriculture, Livestock, Fisheries, and Local Government & Rural Development of the Government of Bangladesh with technical and financial assistance from the Danish Government. The project was initiated in 2007 that supported resource-poor farm households to improve crops, fisheries and livestock production in an integrated way through Farmers' Field School (FFS).

The Impact Study covered the project areas of Noakhali and Barisal regions.

UNITECH RESEARCH COMMITTEE SEMINAR

Improving Agricultural Production and Rural Institutions through Farmers' Field Schools (FFS):



Experience with Smallholders in Southern Bangladesh

Mofa Sattar, PhD
30 July 2013



A Farmers Field School (FFS) is conducted with farmers' group (of ca. 25 men, women or both) through a learning-by-doing approach in actual fields, homesteads and farms over a period of several weeks to improve knowledge and skills in crops, vegetables, livestock, poultry, fish production and related aspects for improving productivity and livelihoods. FFS are conducted by agricultural experts in weekly sessions for 36 or more weeks. The other outcome from these FFS was the creation of CBOs (Community-Based Organizations) comprising the FFS participants. These CBOs were mentored to establish effective linkages with public and private bodies for better access of inputs and services for its members, and to organize proper marketing of their farm products by linking up with market actors.

Top performing members of the CBOs were also encouraged to extend their learning and new skills to newer communities through similar FFS, which further bolstered the capacity building agenda.

The results of the Impact Study demonstrated clearly that the participating farmers had gained a very good knowledge on various farming aspects from the FFS. Consequently their vegetable, livestock, poultry, and fisheries production also increased compared to the pre-project situation that ultimately contributed to their higher annual income.



In course of time, local farmers also developed their expertise and started facilitating the season-long FFS sessions - became known as Local Facilitators (LF)

Implications for PNG:

The seminar prompted a lot of questions and discussion. Upon query of the prospects of applying this FFS experience in PNG, Dr. Sattar informed that it is possible and has a good chance of success.



It was emphasized that the FFS usually comprises of a whole package for any farm production enterprise and needs to be packaged considering the local norms, values, culture and way of life. The FFS modules for PNG need to be developed to suit the local conditions, requirements and demands. Not one single module for one commodity will suit all regions of PNG because of existing agro-ecological, social and linguistic diversity, and therefore the modules will have to be tailored to local situations.

Quantifying the Value of Information through Integration of RFID and GPS Technologies: A Simulation Approach

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This paper discusses the issue of quantifying the value of real time information about location of distribution vehicles through the integration of RFID and GPS technologies in order to reduce lead time and transportation cost which will positively influence the time to market. In addition, actual travel time can be predicted and this could help in reducing transportation cost by avoiding congested sections and increasing the service quality by delivering goods within required time window. In this study a simulation based value assessment framework is suggested for measuring the impact of real time information in the area of transportation and shipping. Therefore, a coupling simulation architecture that connects the simulation model of logistics system and best path algorithm is conceived to realize the benefits of time compression.

Keywords: SCM, RFID, GPS, Simulation, value

MINERAL WASTE RECOVERY

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Recovery of metal values from three different types of waste minerals/materials were discussed. The first part of the lecture dealt with recovery of metal values from red mud, a waste product of aluminium ore bauxite refineries. Altogether three approaches, namely recovery of titanium value as lean grade ferroferrite by thermit reduction, preparation of iron-aluminium-silicon carbide reinforced wear resistant composites and graphitic steels respectively were presented in the lecture. The latter two approaches involved direct smelting and smelting reduction respectively in an electric arc furnace under lime-fluorspar slag cover. The second part of the lecture dealt with characterization, agglomeration and recycling of electric arc furnace dust. The third part of the lecture presented unique microstructures of tiny (0.5 - 1.0 μ m) ferric stainless steel grinding dust particles. SEM-EDAX evidences of growth of oxide nodules on such tiny particles during grinding were provided. Further work being continued on value addition to such dust particles was also highlighted.

Konsevason na Dvelopmen insait Long Papua New Guinea (An Evaluation of Integrated Conservation and Development Projects in PNG)

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Since the signing of the Convention on Biological Diversity in Rio de Janeiro, Brazil during the Earth Summit in June 1992, community participation in the conservation of natural resources, especially in biological diversity, has become the subject of much global discussion. The issue of how participation should be approached depends very much on the different cultural and social contexts from which it is viewed. Similarly there has been much global debate on various models of conservation and how best conservation should be approached. *The Integrated conservation and Development Model* is a new paradigm that supersedes the old paradigm of strict nature conservation. It calls for social and economic incentives for the resource owners, who mainly inhabit the global forest systems of poor and marginalized communities in developing countries. The traditional owners are often willing to make available their forests, as well as human resources in terms of labour and locally acquired traditional knowledge, in order to implement appropriate and applicable practices for the better management or protection of biological diversity in that given area.

While there is a genuine undertaking and desire by the Governments and peoples of the developing countries for conservation of biological diversity, there is however, differing and opposing perspectives between the leaders of developed and the developing countries on what, who, why and how such biodiversity should be managed for the benefit of humankind. Western countries that possess the financial resources and well established institutions of higher learning and research capabilities are often at the helm of a decision making process that often leads to the importation of culturally inappropriate concepts of conservation and natural resource management practices for developing nations. As a result of this dichotomy, the funding criteria for biodiversity conservation projects may be markedly different between the donors and the local stakeholder groups, as the priorities of each group are ranked differently. For example, social and economic benefits are often ranked a high priority by the communities of the poorer countries while the richer donor countries consider research, conferences and short-term informal training courses as a major consideration for the conservation of biological diversity. The research undertaken for this thesis has shown that there is a need for both the project proponents

and the resource owners to agree on what they collectively see as the priority aspects for the integrated conservation and development (ICAD) model to address in Papua New Guinea.

This research examined, employing qualitative social science methodology, three of the ICAD projects in Papua New Guinea: Crater Mountain; LakeKamu; and Kamiali. Apart from looking at various stakeholder participatory roles and the mechanisms of participation, the project also investigated aspects of social and economic incentive packages; the role of funding agencies and level of funding; the ability of the project proponent to raise international donor funding; funding arrangements for a project's continuity; and the resource owners' expectations and perceptions, especially of the short-term social and economic benefits pronounced by the project proponent at the inception of the project. The study shows that, in a society like Papua New Guinea with its complex social system (750 cultural and linguistic groupings) and vastly differing cultural attachments to land and natural resources, much more time than is normal is required to appreciate and understand the appropriate management of these biological resources. Local societies have guarded and managed natural resources over millennia, and it is important to preserve the cultural obligations, responsibilities and requirements of local communities to manage these resources. There has been a lack of Government commitment to the rights and responsibilities of local communities. Meaningful training is needed to assist local communities to initiate and manage natural resources appropriately, in order to achieve lasting environmental, economic and social benefits. Environmentally destructive forms of economic development have been a major set-back to conservation of biological diversity in Papua New Guinea. Now, at the final stage of this write up, it is noted that several of the ICAD communities have decided to invite development companies to their areas, since the much awaited good and services promised by the implementers of the ICAD projects have not arrived.

Engineering Education in Transition

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The environment for engineering graduates is changing around the world as a result of new and different technologies, employment requirements of multinational industries, advanced educational delivery systems, and the emergence of serious global engineering problems. Engineering programs today must educate students for the future – for employment opportunities that are not currently defined; using technologies that have not yet been developed; to create products and systems that have not yet been imagined; and most importantly, to solve problems that have not yet been identified. Clearly, quality engineering programs involve modernized curricula and laboratories that are competitive internationally.

The Washington Accord, an international alliance of nations, was formed to address the equivalence of evaluation and accreditation processes for engineering education programs, and to ensure opportunities for global mobility of engineering graduates. ABET, the accrediting organization for assessment of engineering programs in the United States and a signatory to the Washington Accord, was discussed along with ABET outcomes-based accreditation criteria used for evaluation of all engineering programs. Such accreditation processes lead to outcomes-based education which strengthens the overall educational learning environment. The success of accreditation depends in large part on the support of the University administration, the understanding and involvement of individual faculty members, as well as a continual focus on ensuring educational improvement in all courses and all programs. The benefit of outcomes- based accreditation leads to improved education for all engineering students world-wide, and the increased mobility of these graduates across international boundaries.

Geographic Information Systems for forestry at Unitech –An Alternative

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The forestry department of Unitech has enhanced its capabilities for GIS training after joining a PNGFA program on REDD with JICA assistance, in a time of worldwide massive usage of GIS systems and new high resolution optical sensors and polarimetric radars in almost every field that implies space. GIS markets proved to be very competitive, main vendors offer high quality products and good customer service, however licensing are of high cost. The development of open source GIS software has been on the surge in parallel, several of them offer similar capabilities. Six open source programs are introduced and their comparative advantages and disadvantages in the long run are discussed.

“ICT Services has come a long way, together we achieved things and we will move forward together”

Berry T. Amol

Director

Information and Communication Technology Services

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This seminar was mostly an information sharing session. The Information & Communications Technology Services (ICTS) has been mandated to facilitate ICT services to all users including departments, service units, staff and students. ICTS is made up of dedicated professionals, who are engaged to help the department fulfil its role within the University. Since 2012, the users are given priority as infrastructure improved and Internet facility was boosted, thus increasing the service output. The ICT Services operate from Haus Europa, which is very easy to locate. The notable features include:

- User-friendly access to the help desk in Haus Europa
- Dedicated staff willing to provide required assistance
- Internet/Email services boosted with 2MB uplink and 5MB downlink
- Additional 10MB system boosted for overall capacity
- Overall infrastructure improved through purchasing of better systems
- Training programs in place for the staff
- Access for Academic departments through remote access points deployment
- Launching of our new and dynamic website
- Publishing of student academic results online
- Feedback from student IT representative and IT Officers of academic departments assist in operations

ICTS will continue to acquire emerging and changing technology to find better solutions and means to advance our service delivery. The priorities are to:

- Improve the current speed of the Internet/Email services
- Upgrade and integrate the different databases
- Have online student registration available
- Provide students state of the art computer labs

The PNG University of Technology is also Manager for our country code dot pg domain. This was enacted through Internet Assigned Numbers Authority (IANA) a function of the Internet Corporation for Assigned Names and Numbers (ICANN). The ICT Services strengthened its position through partnerships and relationships with industries and service providers. Our membership with regional organizations like the Asia Pacific Top Level Domain (APTLD) Association amongst many others has provided us avenues for consultancy, trainings through workshops and regular meetings to find help from each other. Among others, Dot PG (.pg) has successfully hosted a first for PNG the '*Girls in ICT*' forum in April 2013; and the first '*.pg Forum*' in June 2013 for sharing and liaising with registrars and other stakeholders who help in this growing industry

DECEPTION BY DEGREES? THE ONGOING PROBLEM OF 'DIPLOMA MILLS' IN HIGHER EDUCATION

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The problem of “diploma mills” has been a perennial one in higher education, beginning with dubious medical and correspondence schools of over a century ago, located mainly in the USA. But it is now a problem that knows no borders. A “diploma mill” has two variants: one that seeks to outright craft false diplomas from recognized and respected institutions of higher learning, and others that, more problematically, seek to offer “legitimate” credentials under their own institutional names (which, however, often piggyback on the similarity of their names and/or locations to more famous institutions). Institutions of the later variant take advantage of varied (and often lax) state regulations of higher education provision, often claiming (by circuitous means) official accreditation via other (seemingly impressive) avenues. It is with this variant of institution that the presentation will mostly deal, for it is one more entrapping for the honest, but unwary, prospective student (often a older, non-traditional student) and the employers or other higher educational institutions that seek to “make sense” of the soupcon of “degrees of deception” granted by bogus institutions and accredited by equally bogus accreditors.

In the present time, the growth and spread of such bogus higher education providers has been made ever easier by the explosive growth of purely virtual colleges (some legitimate); driven by increased demand for flexible and cost-effective learning options for adult learners not only by themselves, but also employers and policymakers. The presentation will deal not only with the obvious “supply side” of diploma mills, but also with the matching false “demand side” drivers for credentials by employers, some of it quite questionable as well.

Individualising Customary Lands: How Theoretically Sound is the policy Prescription?

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Customary land tenure (CLT) is pervasively practised in Melanesia. For example, in PNG, customary ownership accounts for the 97% of the country's land resources. This figure is more or less similar to those in other Melanesian countries: 90% in Vanuatu; 88% in Fiji; 87% in the Solomon Islands and 81% in Samoa.

The contemporary customary land literature overwhelmingly portrays CLT as an impediment to rural development and economic growth. The basic reason, it is argued, is that communal ownership creates tenurial insecurity, which discourages rural people from working harder for bettering their socioeconomic lots.

This theory has guided the post-colonial land reform policies in Melanesia' which have been executed with the technical and financial supports from the international bilateral and multilateral aid agencies. The popular name of this policy is 'individualisation'. It is now well known that these donor-dominated programs did not fructify. Not only that the individualisation programs failed to bear the expected outcomes, in some cases they harmed the interests of the people for whom these programs had been designed. In PNG, Australian Agency for International Development (AusAID) has dramatically changed its own previous policy directions. In a report titled, Making Land Work: Reconciling Customary Land and Development in the Pacific, it has been promoting the idea of balancing the pace of land reforms through accommodating CLT systems with agricultural development plans and schemes.

This policy dilemma about reforming customary lands has raised some serious questions about the economic soundness of 'individualisation theory'. For example, why do the orthodox economists jump to the conclusion that introducing ILT is the only solution to the economic woes of the concerned developing countries? Helen Hughes, one the leading Australian expert on the South Pacific affairs, underlined her opinion in very strong words in the influential Pacific Economic Bulletin: "CLT system means low agricultural productivity and small incomes; it does not permit any country to develop".

This presentation argues that the economic wisdom of 'individualisation' is 'conceptually biased': It follows directly from the microeconomic theory of production that is founded on two fundamental premises. First, the institution of private property motivates individuals in their pursuits of financial gain. Second, human beings are selfish by nature, particularly with respect to wealth creation. Indeed the truth about these premises can hardly be denied. But the fact remains that the customary tenurial system- being practiced in the remote Melanesian rural areas- shares none of these premises. This proposition suggests that the microeconomic theory of production is not an appropriate theoretical framework for analysing customary land issues.

