PNG UNIVERSITY OF TECHNOLOGY

RESEARCH REPORT 2020

Compiled and Edited by

Prof. Shamsul Akanda

Department of Agriculture

THE PAPUA NEW GUINEA

UNIVERSITY OF TECHNOLOGY

RESEARCH REPORT

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FOREWORD

Last year, 2020, was the last one for the Research Committee. It has been subsumed into a new committee called Postgraduate Studies, Research & Innovation Committee (PSR&I). On behalf of the outgoing Research Committee, I am delighted to present the 2020 Research Report of Papua New Guinea University of Technology. This is a compilation of the research activities of the fourteen academic departments and four research units of the university. I am very thankful to the Dean of Postgraduate School, Professor Shamsul Akanda, for compiling and editing the report.

The Research Committee received applications for research funding from staff and students and allocated a total of K350,000 in the year 2020. The committee also funds travel by staff to attend academic conferences, but the Covid-19 pandemic prevented that from happening in 2020.

Research activities at Unitech and at most universities are spurred on by the presence of robust postgraduate programs. Supervision of postgraduate students and doing research go hand in hand. Unitech has the largest postgraduate program in the Papua New Guinea, with more than 200 postgraduate students in 2020. The majority of the students are from Papua New Guinea, but we attract postgraduate students from other Pacific Islands. In 2020, we had two postgraduate students from Africa, Nigeria, who were on Queen Elizabeth Commonwealth Scholarships. The presence of research students creates an atmosphere that is conducive to research.

In the past, the Papua New Guinean postgraduate students at Unitech were either sponsored by the university, by a company or they paid by themselves. Whereas the government had scholarship programs for undergraduate study (HECAS – Higher Education Cost Assistance Scheme - and AES – Academic Excellence Scholarship) no similar schemes were in place for postgraduate study. We are pleased to see that now there is a Higher Education Loan Program (HELP) that is accessible to both undergraduate and postgraduate students. This is a big step in the right direction.

The popular weekly Unitech Research Seminar could not run in 2020, thanks to the pandemic. The pandemic situation is worse this year. The new committee that is responsible for this will look into running the seminar by video conferencing.

I would like to take this opportunity to thank all heads of department, team leaders of research units and members of the Research Committee for their fruitful work during the year 2020. I also wish to thank the Vice Chancellor, Dr Ora Renagi, and his management team for their continued support and commitment of funds. Above all, I thank the Dean of Postgraduate School, Professor Akanda, for compiling the 2020 Unitech Research Report.

Dr Augustine Moshi
Pro Vice Chancellor Academic and
Chairman of the 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)
c. Chairman, ATCDI

Appointed Members

d. One person appointed by the Vice Chancellor who shall be the Chairman of the Committee.
e. Six persons appointed biennially by the Academic Board.

MEMBERSHIP

Ex-Officio Members

Associate Professor Ora Renagi, OL
Associate Professor Augustine Moshi
Associate Professor Ora Renagi, OL

Appointed Members

Associate Professor Augustine Moshi (Chairman)
Professor S. Akanda
Professor C. Gonduan
Professor T. Okpul
Dr. G. Arpa
Dr. M. Peki
Dr. W. Modey

In Attendance

Mr G. Paul, Executive Officer

Executive Summary

The Annual Research Report is a comprehensive compilation of ongoing and completed research from all the 14 academic departments at PNGUoT each year. The 2020 academic year was a big challenge due to the COVID-19 pandemic. However, the university completed the 2020 Academic year, despite all the challenges. The ***Annual Research Report 2020*** contains the research priorities aligned with "Unitech 2030" and PNGUoT Strategic Plan 2020-2024; and national priority areas, ongoing and completed research, publications, national and overseas conference attendance by the academic staff from the 14 academic departments. During 2020, academic staff members published **91** peer-reviewed research articles in reputed indexed and non-indexed journals along with conference publications and book chapters. This number is about **30%** higher than that of the last year. This result shows our faculty members' strong commitment and resilience in research and publication activity, despite funding limitations, heavy teaching loads, disruptions due to the COVID-19 pandemic, and other challenges. The in-depth and thorough research conducted by the PG students, in turn, generates a large volume of peer-reviewed publications in national and international journals.

Research conducted by the final year undergraduate students also constitutes a large proportion of academic departments' research. Many of the research outputs are important and of immense value for tackling Papua New Guinea's problems. Many of these initial studies may lead to in-depth future research to solve complex issues in PNG.

In 2020, the University Research Committee allocated a total of **K349,067** to support staff and student research. It is an increase of more than 1**50%** over 2019. Most of the funds went to the postgraduate students' research. No fund was allocated for conference attendance due to travel restrictions for the COVID-19 pandemic. The total budget for 2021 is **K507,000,** which is very generous. This fact demonstrates PNGUoT's ongoing solid commitment to Postgraduate studies, research, and innovation to develop the scholarship and research culture required to fulfill the goal to become the technological knowledge hub for the country and the South Pacific. The funding increase is in line with the PNGUoT Strategic Plan that emphasizes academic excellence, conducting innovative research in national priority areas of high potential and relevance, and outreach activities. Postgraduate studies are the global conduits for universities to develop research programs to be creative and solve complex problems through innovations leading to sustainable national developments. In view of this, the Committee is

renamed to Postgraduate Studies, Research and Innovation and mandated to accommodate the critical functions of Postgraduate Studies, Research, Publications, and Innovation.

The report contains only three (3) abstracts presented in the "PNGUoT Research Committee Seminar Series" – a hallmark of PNGUoT. This low number of presentations is due to the COVID-19 pandemic-imposed restrictions on gatherings and social distancing. This weekly seminar series running for the last eight years brings the academics, staff, and students together in a common platform to share and disseminate research findings to the broader university community. This seminar series is the best forum for publicizing research outcomes to the wider community and training young academics and postgraduate students in their presentation and communication skills. The seminar series in 2021will be far more challenging, but the Committee must look for other alternative options to overcome this challenge and continue the series.

Summary of Research Outputs - 2020

Department	Journal Articles	Conference Papers/Seminars	Book/Book Chapters	Reports/Other Publications	Patent	PG Student Graduation		
						PGC	Masters	PhD
Agriculture	**15**	**01**	**01**	**02**			**04**	
Applied Physics	**01**	**01**						
Applied Sciences	**03**	**02**						
Architecture and Construction Management	**-**			**03**			**01**	
Business Studies	**12**	**01**		**10**			**05**	
Civil Engineering	**05**							
Communication and Development Studies	**04**	**03**	**01**			**06**	**04**	
Electrical and Communication Engineering	**15**							
Forestry	**04**	**01**		**01**			**03**	
Mathematics and Computer Science	**04**						**01**	
Mechanical Engineering	**18**		**01**		**01**			
Mining Engineering	**01**	**01**		**04**				
Surveying and Lands Studies	**09**	**02**					**09**	

Departmental Research Reports

Agriculture

Applied Physics

Applied Sciences

Architecture and Construction Management

Business Studies

Civil Engineering

Communication and Development Studies

Electrical and Communication Engineering

Forestry

Mathematics and Computer Science

Mechanical Engineering

Mining Engineering

Surveying and Land Studies

DEPARTMENT OF AGRICULTURE

Head of Department: Dr. Rajashekhar Rao

The Department of Agriculture is one of the 13 Academic Departments in Papua New Guinea University of Technology. The Department offers undergraduate and postgraduate degree programs in Agriculture, conducts agricultural research, and disseminates new insights to the community. At the undergraduate level, a four-year study program- the Bachelor of Science in Agriculture [B.Sc.(Ag)] and a hybrid model Open and Distance mode taught Bachelor of Agriculture and Rural Development (B.Ag.&R.D) are on offer. The Department also offers three postgraduate degree programs- Master of Science in Agriculture (MScAg), Master of Philosophy (MPhil), and Doctor of Philosophy (PhD). The MSc in Agriculture program is a combination of course work and research, while PhD and MPhil studies are entirely research-based degrees.

The Department has 15 qualified academic staff members (11 with PhDs, 3 with Masters, and 1 on study leave pursuing PhD studies overseas). In 2020, three students graduated with postgraduate degrees (1 with MPhil and 3 with MSc). The Department of Agriculture is committed to delivering quality teaching, research, outreach activities, and postgraduate studies. Departmental activities are well guided by the Five-Year Strategic Development Plans (2005 – 2010, 2011 – 2015, and 2016-2020). Now, with PNGUoT's Strategic Plan 2020-2024, an implementation plan has been prepared to carry forward research activities. The curriculum is updated through regular and periodic review in consultation with stakeholders and industries in the public and private sectors. The Department has established strong collaborative research links with international developmental partners and stakeholders, including the Australian Centre for International Agricultural Research (ACIAR) and New Zealand AID. Regular publication of the scientific journal '*Niugini Agrisaiens*' and academic staff publishing scientific papers confirm the Department's strong commitment to research at PNGUoT. The Department has a robust research collaboration with PNG National Agricultural Research Institute (NARI), University of South Pacific (USP), Fiji, Charles Sturt University (CSU), Australia; National Research Institute (NRI) of Greenwich University (U.K.), South Australian Research and Development Institute (SARDI),

Australia; University of Canberra, Australia; Curtin University, Australia, many other NGOs, industries, and institutions. Other publications, a compilation of abstracts of research done by the postgraduate students, Annual Reports, Farm Report, and Strategic Plan annually also strengthen the Department's research capacity. In 2016, The Unitech Biotechnology Centre was amalgamated to the Department of Agriculture for administrative oversight.

PNG University of Technology is an Associate Member of the Asia-Pacific Association of Agricultural Research Institutions (APAARI) through the Department of Agriculture. The APAARI is located in Bangkok, Thailand, to strengthen research and innovations for sustainable agricultural development in Asia and the Pacific.

The following research focus areas have been identified, and most of the staff and student research are intertwined around these thematic areas:

AREAS OF RESEARCH

Research Focus Area – 1: Crop Sciences

- Evaluation of promising rice varieties for Papua New Guinea
- Crop improvement and adaptation to stress environments caused by climate change
- Use of *Trichoderma* spp. as a biocontrol agent against some selected soilborne pathogens
- Study of the production technology and practices of selected crops by farmers in different agro-ecological regions of Papua New Guinea
- Examination of the production technology and techniques of selected vegetables by farmers in different agro-ecological regions of Papua New Guinea
- Soil N and composting in sweet potato-based farming systems
- Symbionts as a potential biocontrol agent for cocoa pod borer
- Development of a maize seed system for PNG
- Gene discovery in PNG wild rice: seed and grain characteristics
- Genetic transformations of taro and rice
- Quantification of greenhouse gases (GHG) emissions from soils under major cropping systems of Papua New Guinea
- Development of fungal inoculum for artificial agarwood production in PNG

Research Focus Area – 2: Livestock Sciences

- Conservation of farm animal genetic resources
- Utilization of crop wastes and agro-industrial by-products for feeding livestock and poultry
- Determining digestibility of locally available feed and fodder
- Determination of anti-nutritional factors in the fodder crops of PNG
- Development of suitable weaner piglets diet
- Smallholder Aquaculture development in PNG

Research Focus Area – 3: Agricultural Economics

- Economic efficiency of small-scale rice farming
- Technical efficiency of smallholder coffee farming
- Resource use efficiency among small-scale peanut farmers.

Research Focus Area – 4: Agricultural Extension and Rural Development

- Evaluation of on-going extension approaches in PNG and their effectiveness in rural livelihood improvement
- Problems and prospects of retaining youth in agriculture in PNG
- Identifying the present farming systems in different regions of PNG and scope for improvement
- Examining household food security in peri-urban settlements
- Livelihoods of settlers in peri-urban settlements
- Return from Investment in Higher Education, Extension and Innovations
- Entrepreneurship Development among Rural People
- Women in Agriculture for Food Security
- Diffusion of Agricultural Innovations among Rural Community

Research Focus Area – 5: Post-Harvest Technology

- Survey on the current status of mechanization in PNG: impact study of mechanization on rural livelihood and environment
- Development of post-harvest technology and post-harvest management systems for horticultural crops in PNG

RESEARCH INTERESTS OF ACADEMIC STAFF MEMBERS

No	Academic staff	Areas of research interest
1	Dr Rajashekhar Rao B.K.	Soil Science, Soil quality, Soil fertility, Soil pollution, Agricultural Chemistry
2	Mr Nick Kewa	Agricultural economics, climate change, and supply chain management
3	Professor Shamsul Akanda	Plant Pathology, Integrated disease management, Biological control, Research methods
4	Professor Gariba Danbaro	Animal breeding, Animal management systems, Research methods
5	Professor Tom Okpul	Plant breeding and genetics, Tissue culture, Biotechnology
6	Dr Jayaprakash	Veterinary Science, Animal Nutrition, Animal health and diseases
7	Dr Peter Manus	Agricultural economics, Agribusiness management
8	Dr Macquin Maino	Plant Pathology, Nematology, Biocontrol agents, Plant physiology
9	Dr Veronica Bue	Agricultural extension, women in agriculture, rural sociology
10	Dr Patrick Michael	Natural resource management, field crops, agriculture and environment
11	Dr Ronnie Dotaona	Agricultural entomology, Integrated pest management, Biocontrol agents
12	Dr Gwendolyn Ban	Plant pathology, Biocontrol agents, biochemistry, statistics
13	Mr William Nano	Agricultural extension, Animal nutrition, Aquaculture, On-farm training
14	Mrs Betty Tiko Motoro	Agricultural extension, rural sociology
15	Mr Frank Vidinamo (Study leave)	Agricultural Engineering, Postharvest technology

EXTERNAL PROJECTS

Ronnie Dotaona: ACIAR Project (HORT/2014/083) – Sweetpotato Crop Protection

Ronnie Dotaona: FAO-PNG Project – Fall armyworm Monitoring & Detection in PNG (Project inception in October 2020)

LIST OF PEER-REVIEWED JOURNAL ARTICLES

Danbaro Gariba, & Albert Kish. (2020). Lactation performance of a primiparous Holstein-Friesian herd in Papua New Guinea, *Niugini Agrisaiens*, 10 (1), 1-6

Divuniwaqa, C., & Rajashekhar Rao, B.K. (2020). Biochar application does not improve the biochemical properties of Ni contaminated soil. *Bulletin of Environmental Contamination and Toxicology* 105(4), 633-638. DOI: 10.1007/s00128-020-03001-w

Lewis, L., Hossain, M., & Rajashekhar Rao**,** B.K. (2020). Physicochemical assessment of a waste rock dump in the hidden valley gold mine: a case study for bioremediation in Papua New Guinea. *Environmental Earth Sciences* 79(5): 97. DOI: 10.1007/s12665-020-8841-8

Michael, P. S. (2020). Soil fertility status and sweet potato cultivation in composted mounds under humid lowland tropical climatic conditions. *Soil Science and Agroclimatology*, 17, 144-151.

Michael, P. S. (2020). Organic carbon and nitrogen amendment prevents oxidation of sulfidic soil of acid sulfate soils under aerobic conditions. *Eurasian Soil* Science, 53, 1743-1751.

Michael, P. S. (2020). Plants with modified anatomical structures capable of oxygenating the rhizopshere are threats to sulfidic soils under varying soil moisture regimes. *Asian Journal of Agriculture*, 4, 87-94.

Michael, P. S. (2020). Agriculture versus climate change – narrow staple-based subsistence agriculture is a threat to rural livelihood under climate change. *Journal of Soil Science and Agroclimatology*, 17, 78-93.

Michael, P. S. (2020). Cogon grass biochar amendment and *Panicum coloratum* planting improve selected properties of sandy soil under humid lowland tropical climatic conditions. *Biochar* 2(4), 489-502.

Michael, P. S. (2020). Simple carbon and organic matter addition in acid sulfate soils and time-dependent changes in pH and redox under varying moisture regimes. *Asian Journal of Agriculture*, 4, 23-29.

Michael, P. S. (2020). Effects of organic matter and live plants on sulfidic soil pH, redox and sulfate content under flooded conditions. *Bulgarian Journal of Soil Science*, 5, 34-49.

Michael, P. S. (2020). Co-existence of organic matter and live plant macrophytes under flooded soil conditions acidify sulfidic soil of acid sulfate soils. *Tropical Plant Research*, 7, 20-29.

Michael, P. S. (2020). Management implication of acid sulfate soil under aerobic and anaerobic soil conditions revolves around organic matter and live plant macrophytes. *Annals of Tropical Research*, 41, 1-22.

Rova, Milloicent, & Peter, Manus. **(**2020). Allocative Efficiency of Smallholder Peanut Farming in the Markham Valley, Morobe Province, Papua New Guinea, *Niugini Agrisaiens*, Vol. 10, 14-19.

Rova, Millicent, & Peter, Manus. (2020). Factors Determinants of Profitability of Smallholder Peanut Production in the Markham Valley of Papua New Guinea, *Niugini Agrisaiens*, Vol. 10, 20-27.

Vidinamo, Frank., Sabrina Fawzia & Karim, M. A. (2020). Effect of drying methods and storage with agro-ecological conditions on phytochemicals and antioxidant activity of fruits: a review, Critical Reviews in Food Science and Nutrition, DOI: 10.1080/10408398.2020.1816891

OTHER PUBLICATIONS

Maino, M.K. 2020. Embrace the Ancient Culture: Commentary. *PNG Commodities Magazine* (Launch Edition), June 2020, p. 12.

BOOKS AND BOOK CHAPTERS

Maino, M.K. 2020. *More Than a Fisherman*. Publicious Book Publishing Ltd, Brisbane, Australia, pp. 134.

WORKSHOPS/CONFERENCES/SYMPOSIUMS

Liu J., Wilson B. A. L., Ash G. J., Komolong, B., Geno R., Wau, W., Pitiki M., **Dotaona R**., Culas R., Agiwa A., Gurr G. (2021). Working with smallholder farmers in Papua New Guinea to protect sweetpotato crops using habitat manipulation, organic mulches, and entomopathogens. A paper submitted to the 26th International Congress of Entomology. 18th – 23rd July, Helsinki, Finland.

POSTGRADUATE STUDENTS' RESEARCH

Student	Research topic	Funding source	Supervisor
PhD Program			

Robin Wingwafi	Land suitability assessment for commercial rice development in Markham Valley.	Self-sponsor /Trukai	Dr. R Rao
Benson Mirou	Development of e-crop disease app for farmers in Papua New Guinea: Co-supervisor; PhD (2019-2022).	LNSDC-PNGUoT	Dr. M Maino
Spencer Poloma	Effects of mychorrhizal symbiosis on macronutrient absorption, physiological parameters and yield of rice (*Oryza sativa*); Principal Supervisor; PhD (2019-2022).	Self-sponsor /Trukai	Dr. M Maino
Francis N'Drewei	Examining the Effectiveness of Agricultural Extension Approach Implemented by the Manus Provincial Division of Agriculture and Livestock: A Case Study of Lele Bupi Chupeu and Balopa Local Level Government Areas (2020-2023).	Self-sponsor	Dr. V Bue & Dr. P Manus
MPhil / MSc. Agri. Programs			
Stanley Yane	Characterizing soil water holding capacity of oil palm growing soils in PNG, MPhil (2019-2020).	PNGOPRA	Dr. Banabas/Dr. Rao
Sharon Agovaua	Investigating the Life Cycle and Control Options of the Coconut Flat Moth (CFM), *Agonoxena* sp. nov. (Lepidoptera: Agonoxenidae) on Oil Palm (2018-2020)	PNGOPRA	Dr. Ero/Dr. Dotaona
Lawrencia Kitikam	Ecology and the management of top-shoot borer, *Scirpophaga exerptalis* Walker in sugarcane in PNG (2019-2020)	RAIL	Dr. Dotaona/Dr. Kuniata
Vincent Koddy	Concentration of alkaloids: arecoline, arecaidine and guvacine in Areca nuts from Papua New Guinea; Principal Supervisor; MPhil (2020-2021).	Self-sponsor	Dr. M Maino
Humphrey Saese	Impact of late leaf blight and web blotch foliar diseases of peanut (*Arachis hypogea* L.) in Papua New Guinea;	Self-sponsor /Trukai	Dr. M Maino

	Principal Supervisor; MPhil (2020-2021).		
James Tarabu	Bioremediation of wastewater from piggery systems using aquatic plants; Principal Supervisor; MPhil (2020-2021)	Self-sponsor	Dr. M Maino
Stella Puri	Assessing the risks of soil and food contamination from upstream mining activities in the lower Watut Area, MSc (2019-2020)	Trukai	Dr Rao
Lisa Paskalis	Investigating the inheritance pattern for the gene(s) conferring resistance to the storage weevil, *Sitophylus zeamais* Motschulsky from a locally inbred maize population in Papua New Guinea (2019-2020)	GAP	Prof T Okpul
Raylin Gena	Examining the success and constraints of women fresh produce resellers at Lae Urban Market in Morobe Province, Papua New Guinea(2019-2020)	ACIAR	Dr. Bue
Raymond Manus	Investigating seed shattering gene in *Leersia hexandra*.	GAP	T. Okpul
Gerry Faure	Investigating crossability between *Theobroma cacao* and its relative using their late-acting self incompatability mechansims.	GAP	T. Okpul

FINAL YEAR UNDERGRADUATE STUDENTS' RESEARCH PROJECTS

#	**Name**	**Supervisor**	**Title of the research project**
1	Margareth Salala	Dr. R Rao	Effects of cardboard mulching on soil.
2	Philip Mondo	Dr. R Rao	Nickel bioavailability in biochar amended polluted soil.

3	Asenaomi Maika	Dr. R Rao	Crop response to biochar amendment in a Ni polluted soil.
4	Emmanuel Misina	Dr. M Maino	Optimization of callus production and plant regeneration from K9 sweetpotato variety.
5	Benjamin Pusahai	Dr. M Maino	Uptake of heavy metals from contaminated soil using species of mycorrhiza.
6	Monare Mathew	Dr. M Maino	Effects of salinity on germination and early seedling growth in rice varieties.
7	John Gilbert	Dr. M Maino	Investigation into the endemic nature of mycorrhiza fungi on *Piper aduncum*.
8	Caleb Norm	Dr. M Maino	Properties of the pericarp of *Areca* nuts from different ecologies in Papua New Guinea.
9	Kayman Kiwa	Dr. P Manus	Gross margin analysis of livestock production at Unitech Farm.
10	Cedric Niato	Dr. P Manus	Gross margin analysis of crops production at Unitech Farm.
11	Minbua Kola	Dr. R Dotaona/ Prof. T Okpul	Insect mimicry studies – taro plant hopper and taro lace bug.
12	Nick Kupulu	Dr. R Dotaona	Nutsedge weed control with *Tephrosia* plant residue mulching.
13	Koi Tonny	Dr. R Dotaona	Feeding behaviour of grey weevils, *Oribius cruciatus* and *O. cinereus* on *Cordyline* plants.
14	Saufi Seginar	Dr. R Dotaona/ Mrs B Motoro	Distribution and use of pesticides (insecticides and herbicides) in Lae, Morobe Province.
15	Diana Steven	Dr. R Dotaona	Identification of fungus pathogenic to coffee berry borer.
16	Gloria Hombunaka	Mrs B Motoro /Dr. R Dotaona	Farmers' perception of vegetables and fruit crop pests and their management in Tanam, Markham District.
17	Lidia Sawang	Dr. P Michael	Phytoremediation of selected heavy metals by wild sweet potato plants in contaminated wetlands.
18	Hayavi Ikati	Dr. P Michael	Phytoremediation of selected heavy metals by fern plants under humid lowland tropical climatic conditions.
19	Heni Smith	Dr. P Michael	Composting to nutrition – time course assessment of nutrient release from organic matter decomposition under sweet potato (residue-based).
20	Steven Jnr Pupune	Professor S Akanda	Screening of rice varieties/lines against sheath blight disease.
21	Gossie Powae	Professor S Akanda	The effect of *Drechslera oryzae* and *Curvularia oryzae* on the germination of rice seed.

22	Melricha Augustine	Dr. G Ban	Isolation and screening of rhizobacteria from farm soil as potential for organic fertilizer.
23	Shannen Banka	Mrs B Motoro	Strategies used to withstand financial vulnerabilities by unemployed households at Uni Block Settlement in Lae.
24	Othniel Eraone	Dr. R Dotaona	Allelopathic effect of *Tephrosia* on weeds in a taro cultivated field.
25	Graffy Hataba	Prof T Okpul	Are *Colocasia esculenta* variety *antiquorum* triploid (3x) types?
26	Roilyn Kepike	Dr. G Ban	Isolation and screening of fungal endophytes on the leaves of *Theobroma cacao* at the Unitech farm.
27	Wakai Kua	Mrs B Motoro	Spin-off benefits from the Table birds Contract Farming and its impact on the livelihood of people at Tanam village.
28	Christine Laupu	Prof T Okpul	Regenerating rice for transformation at Unitech Biotechnology Center.
29	Emmanuel Mong	Prof T Okpul	Developing seedless watermelon seed stock for Agriculture Farm.
30	Michelle Tawian	Dr. V Bue	Problem confrontation by live chicken vendors during the sale of their product at the Lae Urban Markets.
31	Charles Walando	Dr. G Ban	Isolation and identification of *Trichoderma* and testing its effect as biocontrol against important pathogens.
32	Jemima Wase	Prof T Okpul	Studying nastic movements in wild rice.
33	Paulyn Win	Dr. Jayaprakash	Testing the potential for cassava root meal, *Moringa oleofera* leaf meal, peanut meal as substitute feed to commercial feeds from broiler chicken.
34	Manuel Yamasombi	Mrs B Motoro	Assess the impact of agricultural information delivered to members of Coffee Cooperatives at Boana village.

AWARDS

Dr Rao (2020). GrowPNG soils project- The consultancy work on soil survey, analysis, and reporting was completed in 2020 and the technical/analytical report was successfully submitted in 2020.

DEPARTMENT OF APPLIED PHYSICS

Head of Department: Dr. Gabriel Anduwan

The Department of Applied Physics is relatively small compared to other academic departments, but it serves many students just like other service departments. The Applied Physics department has two undergraduate programs, the Bachelor of Science in Applied Physics with Electronics and Instrumentation (BSAP) and Bachelor of Science in Radiation Therapy (BSRT). However, the BSRT program is temporarily shelved until the Health department submits further needs of graduates for the country in the coming days. While running the BSAP program, we teach service courses to 10 of the 13 academic departments of the University. Last year the department started the Bachelor of Engineering in Biomedical Engineering (BEBE) with only fifteen (15) school leavers. This year the second batch of students are doing the Biomedical Engineering program.

The Applied Physics course with Electronics and Instrumentation with more emphasis on applying to Physics is imparted to students. The students are equipped with analytical skills and all the application to Physics principles. The graduates of Applied Physics are working all over the country and a few overseas. The graduates are working in all industries related to Physics. Some are working in the Airline industry, education, mining industry, PNG Power, and private consultants.

The new Biomedical Engineering graduates will find employment in the Health Department. As soon as they graduate, the Health Department will employ them in all the general hospitals across the country. Their job is basically to ensure all types of equipment in the hospital is up and running for the services needed almost every day by health workers and sick patients.

The department of Applied Physics has four Postgraduate programs; research-based Doctor of Philosophy (PhD), Master of Philosophy (MPhil), and course-based Master of Science (MSc) in Electronics and Instrumentations, and Master of Technology (MTech) in Exploration Geophysics. The department has 20 PG students in different PG programs. The department has three PhD students, including two departmental staff, and 2 staff members are doing Master. The department is committed to strengthening the PG programs and research further.

A. Journal Publication

1. Waimbo, M., G. Anduwan, O. Renagi, S. Badhula, K. Michael, J. W. Park, S. Velusamy, & Y. S. Kim. (2020). Improved charge separation through H_2O_2 assisted copper tungstate for enhanced photocatalytic efficiency for the degradation of organic dyes under simulated sun light. *Journal of Photochemistry and photobiology*. B, Biology, 07 Jan 2020, 204:111781, DOI: 10.1016/j.jphotobiol.2020.111781

B. Conference Publication

2. Ampana, S. & Mukhopadhyay, Manoj. (2020). The Insar data detect shallow dyke intrusion at the Rabaul Volcano, Papua New Guinea - Potential site for caldera geothermal field. Proc. World Geothermal Congress. Reykjavik, Iceland, April 26 – May 2, 2020.

DEPARTMENT OF APPLIED SCIENCES

Head of Department: Mr Reilly Nigo

Introduction

The Department offers two (2) degree programs, Bachelor of Science in Food Technology and a Bachelor of Science in Applied Chemistry.

Our Vision: "To become a quality department that produces intellectual manpower for Papua New Guinea's development and sustenance."

Our **Mission**: "To focus on high-class teaching and quality research, continuously striving to produce future leaders rich in intelligence and innovations in the field of Applied Chemistry and Food Technology and simultaneously concentrate in strengthening and enlightening the community."

The Department has a strong emphasis on research. Our target is to publish one paper in an international journal annually. To encourage research activities and eventual publication, the Department has taken on a new initiative to reward those who publish internationally with a cash prize of K200 per publication and K100 for national journal publication.

The Department has actively engaged industries through Industrial Advisory Committee (IAC) for their input on curriculum review and few industry-based research projects undertaken through the final year research projects and MPhil projects.

Broad Research Interest Areas of the Department:

(a) **Chemistry:** Environment, material science, water, and organic chemistry-related research.
(b) **Food Technology:** Food processing, clean energy, quality control, and nutrition-related research.

Research Interest Areas of academic staff members of the Department

Applied Chemistry Section

No.	Name	Research interests
1	Prof. Subramaniyam Gopalakrishnan	Organic chemistry, medicinal chemistry, petroleum chemistry, nanotechnology and Spectroscopy

2.	Associate Professor William Modey	High Resolution chromatographic separations; Air pollution research; Ambient particulate sampler design and evaluation; Determination of trace contaminants in aquatic media (particularly heavy metals, and the global emerging issues on pharmaceutical contaminants); Determination of toxic organic pollutants in air and aquatic media; Supercritical fluid technology for extractions and chromatographic separations; Environmental and social impact assessment (ESIA) for regulatory assessment.
3	Dr. Srikanth Bathula	Chemical Speciation and Bioavailability, Environmental studies, Geomorphological impact assessment on groundwater quality, Coastal Ground-waters–A Geo-hydro Chemical Exploration, photocatalytic activity and degradation, Synthesis and characterization of nano-materials. Investigation of Oil samples at seawater sources.
4	Dr. Sivakumar Balakrishnan	My research interest falls on five main themes – Metal-Organic Frameworks (MOFs), Porous silicon, Carbon materials, Ceramics and Phosphors. All of these materials find applications in a variety of fields. I am mainly interested in exploring the composite materials made out of these materials. For example, one of the projects that I am investigating is the anchoring of MOFs on to porous and crystalline silicon. It is envisaged that this will create new materials with added properties from their individual starting materials.
5	Dr David Timi	Organic chemistry, phytochemistry
6	Mr. Justin Narimbi	Analytical chemistry, environmental chemistry, instrumental methods for analysis, Water quality assessment and monitoring, Laboratory quality management.

Food Technology Section

No.	Name	Research interests
1	Mr. Reilly Nigo	Renewable and Clean Energy, Animal Feed Development, Thermal Processing, Food Drying Studies Using Solar and Clean Energy Systems, Food Product Development Processes.
2	Dr. Lydia Yalambing	Nutrition intervention studies, compliance studies in terms of food fortification and food nutrition labels;

		Complementary/supplementary food development and Food Composition studies.
3	Mrs. Sogoing Denano	Food safety and food security; compliance studies.
4	Mr. Nigel Kiaka	Industrial solid and liquid waste management
5	Mrs. Rag Gubag-Sipou	Food microbiology, microbial quality of food and water, medicinal studies of indigenous plants.

Research Output: Peer Reviewed Journals

1. Balakrishnan, S., Gun'ko, Y.K., Swiegers, G. F., & Perova, T. S. (2020). Preparation and Characterisation of Metallorganic Precursors Derived Iron Oxides on Porous Silicon Layers. *Materials Science Forum*, Trans Tech Publication Ltd Switzerland, 995, pp. 63-68.

2. Philip, K., & Gopalakrishnan, J. (2020). Bioadsorption of Copper and Lead unto Sweet Potato Peels and related Equilibrium and Kinetic Studies. *Journal of the Institute of Chemist*, PNG. 9. pp.70 - 93.

3. Waimbo, M., Anduwan, G., Renagi, O., Badhula, S., Michael, K., Park, J., Velusamy, S., & Kim, Y.S. (2020). Improved charge separation through H2O2 assisted copper tungstate for enhanced photocatalytic efficiency for the degradation of organic dyes under simulated sunlight. *Journal of Photochemistry and Photobiology* B, 204:111781.

Conference Presentations 2020

1. Kotra K, Bathula S, Padhye L, Samanta S, Andersen MS, Sami E. (2020 August 25-27). *Towards building National drinking water standards of Vanuatu: Applied Research and Capacity building.* Poster presented at: Commonwealth Chemistry Posters - Building the Partnership. Bridging Chemistry Across the Commonwealth to Tackle the SDGs; Virtual Conference, Hosted by The Royal Chemical Society.

2. Philip, K. (2020). *Equilibrium and Kinetic Studies of Bioadsorption of Copper and Lead unto Cassava Root Husk.* Poster presented at: Commonwealth Chemistry Posters - Building the Partnership. Bridging Chemistry Across the Commonwealth to Tackle the SDGs; Virtual Conference, Hosted by The Royal Chemical Society.

Post Graduate projects (2020)

No.	Student	Degree	Topic	Principal Supervisor

1.	Nigel.K.Kiaka	MPhil	Designing a Suitable Drying System for Higher Altitude Conditions: Using Gembolg District, Simbu Province as a Model	Mr Reilly Nigo
2.	Anne Anonga	MPhil	Determination of WAD and FREE Cyanide and environmental assessment of selected water bodies in Papua New Guinea.	Dr W. Modey
3	Salvina Ku	MPhil	Analytical Capillary Electrophoresis for Environmental applications in Papua New Guinea	Dr W. Modey
4	Ruthia Kisi	MPhil	Quality Evaluation of commodity products from PNG using HPLC and ICP-MS	Dr W. Modey
5.	Nadia Tiaga	MPhil	Fermentation and Quality Studies of Cocoa	Mr Reilly Nigo/Mrs Rag G. Sipou
6.	Dilkay Bau	MPhil	Macro Nutrient Profiling and Product Development Studies of Sweet Potato In PNG	Dr L. Yalambing/ Mr Reilly Nigo
7.	Esther Dujambi	MPhil	Production of Biogas from Chicken Wastes in PNG	Dr S. Bathula

Completed Undergraduate (Final Year Students) Research Projects (2020)

Chemistry Section

No.	Student	Project Tile	Supervisor
1	Vagiriki Dickson	Equilibrium Studies of the Bio-adsorption of Dyes by Activated Carbon derived from Coconut Husk as a Cost-effective method for water purification.	Mr. Kaupa Philip
2	Rodrick Kia	A quality assessment of packaged drinking water of different brands in Papua New Guinea.	Dr.Srikanth Bathula
3	Dylan Kolima	A quality assessment of Physico-Chemical analysis of various soils	Dr.Srikanth Bathula
4	Nellie Kui	A novel direction in making luminescent hybrid organic-inorganic materials	Dr.Sivakumar Balakrishnan
5	Nicole Maku	Assessment of metal mobility in contaminated soil from the Lae City Municipal Dump using Toxicity Characteristic Leaching Procedure (TCLP)	Mr. Justin Narimbi

6	Stephanie Meyab	Re-examination of Bumbu River Sediments by Inductively Coupled Plasma- Mass Spectrometry (ICP-MS)	Dr. William Modey
7	Elohim Milling	Phytochemical screening and green synthesis of Silver nanoparticles, comparison of antifungal activities against peanut fungi using alcoholic extract prepared from medicinal plant *Clematis clemensiaeEicher*by homogeneous method.	Professor Subramaniyam Gopalakrishnan
8	Mervlyn Mohe	Phytochemical screening, phytosynthesis of silver nanoparticles and comparison of antimicrobial activities against human pathogens using aqueous extract prepared from medicinal plant *AlphiniaoceanicaBurkill* by homogeneous method and heating method	Professor Subramaniyam Gopalakrishnan
9	Steven Papala	Synergistic effect of phytosynthesized silver nanoparticles from *Euphorbia geniculata.*	Dr. David Timi
10	Delma Ronald	Chemical screening of leafy vegetables for poly phenolic compounds	Dr. David Timi
11	Nikints Thomas	Porous silicon as a template for MOF synthesis	Dr.Sivakumar Balakrishnan
12	Otto Topaiman	Investigating the nature of host-pathogen interaction between five fungal species and 10 Eaglewood trees for eaglewood oil production	Mr. Justin Narimbi
13	Daniel Wali	Quality assessment of Chemical Analysis of various types of steel	Dr.Srikanth Bathula
14	Isaiah Yamai	Phytochemical screening, Green synthesis of silver nano particles from medicinal plant *Ficus pungens Reim and c*omparison of antimicrobial activities of crude aqueous extract and silver nanoparticles	Professor Subramaniyam Gopalakrishnan

Food Technology Section

No.	Student	Project Tile	Supervisor
1	Rachel Nagual	The antibiotic resistance of *Escherichia coli* isolated from fresh poultry and meat	Mrs Rag Gubag Sipou
2	Ezekiel Fifine	Product Development Studies of Sweet Potato (Kaukau)-Ice Cream	Mr Reilly Nigo
3	Moses Puap	Design, Construction and Installation of a Portable Biogas Plant.	Mr Reilly Nigo
4	Clarissa Begin	Heavy metal and mineral profile of commercial rice samples sold in the shops in and around the city of Lae.	Dr Lydia Yalambing

5	David Efale	Supplementary food formulations using peanuts, sago, banana and fish.	Dr Lydia Yalambing
6	Irene Eluap	Compliance Studies – Develop a Traceability program for Potato Plantlets for Fresh Produce Development Agency (FPDA)	Mrs Sogoing Denano
7	Victoria Mosi	Compliance Studies – Fresh Produce Supply Chain Analysis	Mrs Sogoing Denano
8	Joshua Pieta	Evaluating the effect of orientation difference for some solar absorbing materials to be used as solar collectors in solar dryers	Mr Nigel Kiaka
9	Giwen Seberai	Product Development Studies from Cocoa in the Morobe Province Using Chocolate and Cocoa Drink as Model**.**	Mr Reilly Nigo
10	Konia Ben	Development of Slow Solar Cooking System Using Local Materials.	Mr Reilly Nigo
11	Mendingo Lafana	Micronutrient (beta-carotene) profiling of commonly consumed (orange & deep yellow fleshed) banana varieties sold at the Lae market.	Dr Lydia Yalambing
12	Monica Kono	An investigation into the Health dangers of sugar contained in the common soft drinks on Papua New Guineans – case study looking at amount of soft drinks sold at the 3 retail outlets at the PNG University of Technology and the preference and soft drink consumption of students.	Dr Lydia Yalambing
13	Joe Kirime	Compliance Studies: Further survey and data collection of labelling information on food products in compliance with Food Sanitation Regulation 2007.	Mrs Sogoing Denano
14	Diane Peter	Determining of Heavy Metal Traces along the Markham River.	Mrs Sogoing Denano
15	Emmanuel Taim	Design and Fabrication of a Spray Dryer for use in Product Development Studies of Morobe Coffee	Mr. Reilly Nigo

Research Projects with External Stakeholders:

1. **NFA–Unitech – Laboratory Accreditation** – The progress was slow in 2020 due to Covid19. However proficiency testing was done for certain analysis methods in both the microbiology and chemistry laboratories. NFA continues to provide yearly budget available for continuity of the work.

2. **2017-2021** Dr. Bathula is a research team member, collaboration project, Pacific Island universities network (PIURN): Towards National drinking water standards in Vanuatu: applied research and capacity building (on-going).

3. **2018-2021** Dr. Bathula is a co-investigator, collaboration project, University South Pacific Theme (SRT): Enhancing USP's Emalus Campus building in Learning and Teaching Research and consultancy (upcoming project).

4. **2018-2021** Dr. Bathula is a Co-Investigator, in the collaboration project; Impact Assessment of Monaro Volcano Eruptions on Water Quality in Ambae Island alongside with Building the Capacity of National Water Quality Monitoring in Vanuatu (upcoming project). External collaborative consultancy activity refers to on-going and upcoming projects listed above (collaborators from USP Vanuatu, Dept. of Water Resources, Govt. Vanuatu, Oceania Water Research Consortium, The University of Auckland, and University of New South Wales).

5. **2021 -2022** Dr. Bathula is involved in a collaborative project with the **National Maritime Safety Authority, Papua New Guinea.** on the investigation of oil samples collected from spills at sea to link with possible sources and oil content in water and sandy substrates.

6. **Food Safety Courses / Training for Industries** – Coordinator: Mr. R. Nigo. This is a program running in three stages annually. Conducted by the senior Food Technology staff of the Department. The team has written modules and delivered training to various food Industries. The training is becoming popular in food and allied industries and government / semi-government organizations like NAQIA and Department of Health.

DEPARTMENT OF ARCHITECTURE AND CONSTRUCTION MANAGEMENT

Head of Department: Professor Cletus Gonduan, PhD

Introduction

The research and publication in the Department are progressively taking motion amidst the changing educational landscape in the country, the Australasian Region, and the greater global educational developments. The School of Architecture and Building at PNGUoT underwent a rigorous program, and syllabus review with the renaming of Program structure and Department name from the Architecture and Building to Architecture and Construction Management in line with the need for external 'benchmarking' and 'program accreditation' within the region under and benchmarked to the rest of the global practice.

The Architecture program is now offering a 3-year Bachelor and a +2-year professional Master Degree Program, while the Construction Management program is offering a 4-year Bachelor and a +1-year Master Degree Program. These graduate programs are planned to become available in 2022/2023 academic year(s) with input from the industry (The professional governing bodies, PNGIA, PNGIOB, and Board of Architects PNG) and partners (AACA and AIB) within the Australasian Region.

Research and Publications are partial prerequisites of the benchmarking and accreditation requirements. Thus, the staff and students are required to be actively involved in this critical need. This is also built-in the syllabi and curriculum being offered.

Research Undertaken and Continuing

Professor Dr. Cletus Gonduan **With MPhil. Student Research** **Davida Thomas in 1.0** **Jackson Taviri 5.0**	**Research works are currently being undertaken**	**Progressive Report 2021**
	1. User Behavior in Institution Housing: a periodic observation and assessment of indigenous user behavior in PNGUOT housing. 2018 – 2019/2021	**Research Completed and paper being published**
	2 Environmental Stress: An assessment of the built environment wear and tear in response to user overload. 2016 - 2021	**Research is current and requiring additional work and delays due to unexpected developments like high COVID virus transmission within the community.**
	3 Shifting Cultural Influence in Domestic Architecture Design in Indigenous Environments and Societies	
	4 Local Fibers with Fiber-Reinforced-Polymer (FRP) as Potential Building Material 2019 – 2023	**Research on halt due to unavailability of research partners in related disciplines.**
	5 Portable Design Modules for Remote Rural Health Facilities 2018 - 2021	**This is still being pursued as M. Phil research work**
Dr. Andrew Sariman	**Research works are currently being undertaken.** 1. Thermal Performance of UNITECH Housing 2. Design Faults in Existing Housing 3. Climatic Data for Architects in Papua New Guinea 4. Effectiveness of Shading Devices 5. Design Studio Learning 6. Thermal Performance Comparison Between Steel Metal and Traditional Thatched Roofs 7. Quality of Concrete Masonry Block Manufactured from Sand Obtained from Sea Shore around Papua New Guinea	**It is anticipated that this will pick-up momentum with the funding from the Vice Chancellor's Office. The Researcher is currently collaborating with other participants in the other academic departments in 1, 2, 3 4 & 6**

Ken Polin	1. Hybrid Design System for developing state-owned buildings in PNG 2. Stakeholder management model for building projects in PNG.	
Austin Polin **and Prof. Gonduan** **MPhil.** Research 2**.0**	**Research works are currently being undertaken:** *1.* PNG Vernacular Spatial Domestic Design Experience, *"Formal versus Informal"* – A Potential knowledge base towards *"Melanesian Academia"*. 2. *"Floating Architecture"* of the Titan People of Manus - Past, Present & Future 3. Culture as a Social Indicator in Melanesian Spatial Architecture – A Case Study on Alhoga Village, Misima Island	**This staff has left the Department**
Mathew Pomoso	**Research works are currently being undertaken 2017 – 2018** 1. Building Project Management – PNG Experience – Master Thesis UNRE	**This is still being pursued under the Master Program at UNRE**
Magdalyne Kuluwah	**Research works are currently being undertaken 2017 – 2018** 1. **Concrete application** 'ON SITE' in accordance with design and documentation specification by tradesmen in construction sites.	**No progress has been made in this research area.**
Cherket Jerry	**Thermal Comfort in PNG Urban Domestic Houses.**	**This staff is no longer with the Department**

Davida, Thomas D. (2020). Retrofitting Brown Economy Buildings to Meet the Standard of Green Buildings: A post occupancy evaluation of Residential Buildings at the Papua New Guinea University of Technology Green Architecture - **a Master of Philosophy in Architecture RESEARCH Thesis.**

Jackson, Taviri J. (2021). PreFab-Design and Portability: A case for Health Buildings in Remote Rural Papua New Guinea – **a Master of Philosophy in Architecture RESEARCH thesis.**

Polin, A. K. (2020/2021). Critical Transitory Interface between Traditional (Melanesian) Vernacular Architecture and its congruence and non-congruence in the Modern Dwellings Occupied and Behavioral Considerations in Urban Housing for Indigenous People in Papua New Guinea**: A M.Phil. research on a case study of the Floating Architecture of the Titan People in the Bismarck Archipelago.**

Gonduan, C. K. (2020 -2021). Matheson Library Post Occupancy Research – The RETRO-FIT- an applied research analysis and Design. **Architectural Design Research AR491, AR492 – Research with 4th / 5th Year Architecture Students.**

Gonduan, C. K. (2020). Critical Transitory Interface between Traditional (Melanesian) Vernacular Architecture and its congruence and non-congruence in the Modern Dwellings Occupied and Behavioral Considerations in Urban Housing for Indigenous People in Papua New Guinea**:** A second Phase re-assessment of the Iatmul people in urban housing communities. (*this paper is completed and is ready for publication).*

Sariman, A. C. (2020/2021). Climate Change and Variations of Thermal Comfort in the Warm Humid Tropical Buildings: This is a collaborative study between a number of interactive Departments and professionals in Agriculture, Engineering, Surveying and lands Studies and Applied Science. This research has received K100, 000.00 support from the PNGUoT Vice Chancellors' Office.

Walliah, J., & Gonduan, C. (2020). The Need for Leadership Practice in Papua New Guinea in Enabling the Indigenous Building Contractors to venture into Higher Potential Markets.

Walliah. J. (2020). Understanding the Behaviour of the Australian Retirement Village Industry; A System Dynamic Modelling Approach. **PhD Research Thesis, Queensland University of Technology, Brisbane Australia**

DEPARTMENT OF BUSINESS STUDIES

Head of Department: Mr. Anthony Anugu

1 Introduction

The Department of Business Studies (DBS) is the largest Department among the thirteen academic Departments of the Papua New Guinea University of Technology, with approximately 600 undergraduate and postgraduate enrolments each year. The DBS is a multidisciplinary department with a proven track record of producing national and Pacific regional leaders who are instrumental in leading the private and public sectors for many years.

The DBS programs are designed to equip students to integrate the knowledge, skills, and values in their four years of study with the actual business practices. The Department's undergraduate programs are Accounting, Applied Economics, Information Technology, and Management. The DBS also offers postgraduate programs, including PhD programs in Information Technology, Economics, Finance, and Banking; Master of Philosophy in Information Technology, Economics, Finance, and Banking; Master's in Business Administration (MBA), and an Executive Masters in Business Administration (EMBA) program. The DBS is developing comprehensive postgraduate programs, including Masters in IT, Accounting and Economics, and PhD programs in Accounting and Management, will be rolled out soon. The programs are designed to drive PNGUoT's strategic visions and the government's development efforts, as well as push for regional and global competitiveness, innovation, and entrepreneurship in an increasingly complex business environment.

The DBS comprises both national and international academics who are dedicated, motivated, and committed to ensuring that quality standards are maintained with focus on continuous innovation, entrepreneurship, and digital technology-centered learning through active participation in relevant industries and maintaining membership with professional associations. Research has been the cornerstone of the Department's commitment and continues to be the driving force in producing quality graduates. This approach in learning has cultivated a competitive research environment that complies with national and international research standards.

The DBS currently has the Research Centre of Big Data Analytics and Intelligence Systems

(BAIS) and the Innovation and Entrepreneurship Center (CIE). These centers will provide the avenue for research collaboration among national and international colleagues in the field of big data, big data analytics, AI, business intelligence, and intelligent systems. BAIS distributed the ITCS-BAIS Vol 7, Issues 1-4 to its members to share the state of the art big data analytics, data science, AI, and intelligent systems in 2019. BAIS has its presence at https://www.researchgate.net/lab/Zhaohao-Sun-Lab. In 2019, BAIS published 12 Preprints (Working papers) on big data, AI, big data analytics, business intelligence, and intelligent systems at https://www.researchgate.net, 5 of which have been indexed by Google Scholar. BAIS has drawn increasing attention in international academia.

The DBS is working tirelessly on building a PNG–China Centre of Business Studies, a PNG-Australia Centre of Governance and Policy Development, and a Student Centre of Digital Innovation.

The DBS commitment to our students is evident in providing excellent learning opportunities aided by state-of-the-art ICT technology and support infrastructure. The Department strives for excellence in teaching/learning, research, consultancy, and services to the community combined with innovation and interaction technological expertise necessary for progress. Our faculty is fully committed and engages in research and development, focusing on understanding the dynamics and innovations that shape the volatile business environment.

The DBS has close cooperation with many overseas universities, including Federation University in Australia, Handong University of Korea, Hebei University of Science and Technology, and Chongqing Normal University, China.

Research across the four main disciplines of the DBS, viz. Economics, Management, Information Technology, and Accounting is highly encouraged. The following research activities were undertaken by academic staff members in the Department of Business Studies during the 2020 Academic year: The report demonstrates that the number of peer-reviewed publications has increased from 10 to 19. Almost all of them have been indexed by SCOPUS or ERA or ISI (SCI). The main contributors to the DBS research outcome are six academic staff members, more than those in 2018 and 2019. However, many academic staff at the DBS

have no record of publications, attending national and international academic conferences, or delivering any research seminar presentations in the past four years (2017-2020). Therefore, how to activate, reactivate and encourage the research passion of the academic staff and increase outcome of quality research taking into account SCOPUS, ERA or SCI (WoS), and Google Scholar is still a significant and lasting challenge for the DBS. Academic staff's research performance is an essential index for international or national accreditation of undergraduate and postgraduate programs, not only for teaching at universities.

2.0 Research Outcome

2.1 List of Publications in 2020

In 2020, the DBS published 12 peer-reviewed (refereed) journal articles, one peer-reviewed international conference proceedings, and nine preprints in Research gate with global visibility.

2.2 Published Journal Articles

1. Chandini., Jhanjhi, N. Z., Verma, S., Talib, M. N., Kavita, & Kaur, K. (2020). A Canvas of 5G Network Slicing: Architecture and Security Concern. *IOP Conference Series: Materials Science and Engineering, 993, 012060. (Scopus journal) DOI:10.1088/1757-899X/993/1/012060*
2. Ghosh, G., Kavita., Verma, S., Jhanjhi, N. Z., & Talib, M. N. (2020). Secure Surveillance System Using Chaotic Image Encryption Technique. *IOP Conference Series: Materials Science and Engineering, 993, 012062. (Scopus journal) DOI:10.1088/1757-899X/993/1/012062*
3. Kumar, K., Verma, S., Kavita., Jhanjhi, N. Z., & Talib, M. N. (2020). A Survey of the Design and Security Mechanisms of the Wireless Networks and Mobile Ad-Hoc Networks. *IOP Conference Series: Materials Science and Engineering, 993, 012063. (Scopus journal) doi:10.1088/1757-899X/993/1/012063*
4. Onyeka, I., Ramasamy, A., Muduli, K., Tochukwu, N., & Oyekola, P. (2020). A Comparative Analysis of Natural Scorpion Repellents. *Solid State Technology: 63(5) Archives Available @ www.solidstatetechnology.us*
5. Srivastava, A., Verma, S., Kavita., Jhanjhi, N. Z., Talib, M. N., & Malhotra, A. (2020). Analysis of Quality of Service in VANET. *IOP Conference Series: Materials Science and Engineering, 993, 012061. (Scopus journal) DOI:10.1088/1757-899X/993/1/012061*
6. Strang, K., & Sun, Z. (2020). Hidden Big Data Analytics Issues in the Healthcare Industry. *Health Informatics Journal (SAGE) 2020, 26(2), pp. 981-998. DOI: 10.1177/1460458219854603.*
7. Sun, Z. (2020). A Service-Oriented Foundation for Big Data. *International Journal of Systems and Service Oriented Engineering (IJSSOE), 10(1): 1-17.*

8. Sun, Z. & Huo, Y. (2020). Intelligence without data. *Global Journal of Computer Science and Technology C: Software & Data Engineering, 20(1): 25-35.*
9. Sun, Z. & Huo, Y. (2020). The spectrum of big data analytics. *Journal of Computer Information Systems. DOI. 10.1080/08874417.2019.1571456. Online published on 12 Feb 2019. (WoS, Scopus)*
10. Sun, Z., Strang, K.D. & Pambel, F. (2020). Privacy and security in the big data paradigm. *Journal of Computer Information Systems. 60(2): 146-155. DOI: 10.1080/08874417.2017.1418631.*
11. Talib, M. N., Akhtar, M., Jhanjhi, N. Z., & Suseendran, G. (2020). Trust Framework for Online Products and Services Using Grain Level Comparison: A Solution to Boot-Strapping Problem. *IOP Conference Series: Materials Science and Engineering, 993, 012115. (Scopus journal) DOI:10.1088/1757-899X/993/1/012115*
12. Tiki, S., Luke, B., & Mack, J. (2020). Examining bribery in Papua New Guinea's public sector: forms and accountability implications. *Journal of Public Budgeting, Accounting & Financial Management, https://doi.org/10.1108/JPBAFM-11-2019-0169; ISSN: 1096-3367 (Emerald publishing).*

2.3 Publication of Thesis

Yamarak, L. (2020). An Investigation of the Impacts of Mining Projects in Papua New Guinea on Livelihoods and Poverty in Indigenous Communities. *(Phd Thesis), Charles Sturt University. https://researchoutput.csu.edu.au*

2.4 Published Conference Articles

1. Sun, Z. & Huo, Y. (2020). Teaching Delivery and Deployment Models for Higher Education in the Digital Age, accepted by *International Conference on Teaching and Learning Methodologies (ICTLM) Lae, Papua New Guinea, 23rd - 24th Apr 2020, but not attended due to COVID-19 pandemic.*

2.5 Research Thesis Completed

1. Londari Yamarak had successfully received his PhD degree from Charles Sturt University, Australia. The effective date of the award is 04th December, 2020. The title of his PhD thesis is "*An investigation of the impacts of mining projects in Papua New Guinea on livelihoods and poverty in indigenous communities*".

2.6 Preprints Published

1. Sun, Z. (2020). 10 Coronavirus Driven Big Challenges for Global Development. *PNG UoT BAIS 5(2): 1-9. Google Scholar, 19 04 20 DOI: 10.13140/RG.2.2.20742.93766/3, https://www.researchgate.net/publication/340583347_10_Coronavirus_Driven_Big_Challenges_for_Global_Development. Google Scholar cited,*

2. Sun, Z. (2020). An Art of Editing Thesis and Book Manuscript: Adding an Automatic Chapter Number and Name to the Header in Word. *PNG UoT BAIS 5(4): 1-7. DOI: 10.13140/RG.2.2.12564.53127, https://www.researchgate.net/publication/343390854_An_Art_of_Editing_Thesis_and_Book_Manuscript_Adding_an_Automatic_chapter_number_and_name_to_the_header_in_Word.*
3. Sun, Z. (2020). Big Data Analytics Thinking and Big Data Analytics Intelligence. *PNG UoT BAIS 5(6): 1-11. DOI: 10.13140/RG.2.2.15678.31041, https://www.researchgate.net/publication/344085831_Big_Data_Analytics_Thinking_and_Big_Data_Analytics_Intelligence. Google Scholar cited,*
4. Sun, Z. (2020). Business Analytics Intelligence: An Emerging Frontier for Innovation and Productivity. *PNG UoT BAIS 5(5): 1-8. DOI: 10.13140/RG.2.2.33400.88325/1https://www.researchgate.net/profile/Zhaohao_Sun/publication/343876626_Business_Analytics_Intelligence_An_Emerging_Frontier_for_Innovation_and_Productivity. Google Scholar cited.*
5. Sun, Z. (2020). Digital Computing and eSMACS Computing. *PNG UoT BAIS 5(7): 1-9. DOI: 10.13140/RG.2.2.19412.83846. Google Scholar cited, https://www.researchgate.net/publication/344527557_Digital_Computing_and_eSMACS_Computing*
6. Sun, Z. (2020). Service-oriented Thinking in the Digital Age. *PNG UoT BAIS 5(8): 1-9. https://www.researchgate.net/publication/344680421_Service_Oriented_Thinking_in_the_Digital_Age*
7. Sun, Z. (2020). The Calculus of Intelligent Analytics: The State of Art. *PNG UoT BAIS 5(3): 1-9. DOI: 10.13140/RG.2.2.19360.61442/1. Google Scholar cited, https://www.researchgate.net/publication/343229178_The_Calculus_of_Intelligent_Analytics_The_State_of_Art*
8. Sun, Z. & Stranieri, A. (2020). Knowledge Discovery in the Digital Age. *PNG UoT BAIS 5(1): 1-11. Google Scholar, 09 02 20 DOI: 10.13140/RG.2.2.11118.56643/1. Google Scholar cited. https://www.researchgate.net/publication/338911423_Knowledge_Discovery_in_the_Digital_Age.*
9. Yamarak, L. (2020). Impact of COVID-19 on Food Security and the Livelihoods: A Papua New Guinea Perspective. *Department of Business Studies, PNG University of Technology (Working Paper). https://www.researchgate.net/.*

2.6.1 DBS Research Seminar Presentations

DBS did not conduct any seminar presentations in 2020 due to the Coronavirus Pandemic (COVID 19) outbreak. Only one Seminar was conducted on Moodle.

Sl. No.	*Date*	*Name*	*Topic*	*Venue*
1	31.08.2020	Dr. Tindi Seje Nuru	PNGUoT Academic Staff Training on the capacity to integrate MOODLE to support efficiency in the management of the teaching process from students enrollment, progression and retention through timetabling, budgeting and organizing teaching activities, to reporting within and outside the university.	EMBA Room 1
			Due to COVID 19 pandemic, no seminar was conducted in the Department	

3 National and International Engagement (Outreach)

3.1 Editing Journal & Other Research Activities

1. Prof Zhaohao Sun has been editing a new book titled intelligent analytics with Multi-Industry Applications. This book has been officially released by IGI-Global in February 2021.
2. As a member of PC, Prof Zhaohao Sun has been actively engaged in organizing international conferences including ICBDSC 2020, ICE-B 2020, i3e 2020, CONFENIS 2020, SMC 2020, ICAART 2020, ACSW (and HIKM) 2020, ITS 2020, etc. He has reviewed a number of papers for each of them.
3. Prof. Zhaohao Sun is member of the Editorial Advisory Board (EAB) for the edited book titled "Opportunities and Strategic Use of Agribusiness Information Systems ", IGI Global (www.igi-global.com). The editor is Ferdinand Che ferdinand.che@gmail.com, Oct 2020.
4. Prof. Zhaohao Sun has been servicing on the Editorial Board of Journals

- Editor of Journal of New Mathematics and Natural Computation (http://www.worldscientific.com/worldscinet/nmnc).
- Associate editor of Journal of Intelligent and Fuzzy Systems
- Associate editor of International Journal of Systems and Service-Oriented Engineering (IJSSOE).
- Associate editor of International Journal of Business Intelligence Research (http://www.igi-global.com/journal/international-journal-business-intelligence-research/1168).

- Associate editor and Strategic Advisor of International Advisory Board (IAB) at International Journal of Risk and Contingency Management (IJRCM).

5. Prof Thomas Paul edited the "Stock Market Development and Nexus of Market Liquidity: The Case of Fiji". *International Journal of Finance and Economics***.**

6. Prof Thomas Paul edited the "Examining the mediation Effect of Exogenous variables over Brand switching Behavior: Evidence from Indian Women Consumers**".** *Inderscience Journal*

3.2 Visiting other universities

1. Prof. Zhaohao Sun visited Federation University Australia in January, November and December 2020 and collaborated with Professor Andrew Stranieri there and developed 3 research papers in intelligent analytics and knowledge discovery.
2. Prof Zhaohao Sun also visited Johns Hopkins University, MD (01 01 20), St John's College, MD founded in 1896 (3rd oldest higher institution of USA) (04 01 20), United States Naval Academy, Annapolis, MD (04 01 20).

3.3 Consultancy

- Prof Zhaohao Sun was invited to complete the annual QS Global Academic Survey at https://qsnetwork.az1.qualtrics.com/jfe/form/SV_74AsDQ3iIwx3Ybz?Q_lang=EN&Root=IBIS. It asked him to Best Research in Engineering & Technology. Please select: up to 10 domestic (Papua New Guinea) universities and up to 30 international universities that you regard as producing the best research in the Engineering & Technology subject area

Prof Zhaohao Sun had been invited to review book proposals for Routledge, Bentham Science Publishers in 2020.

- Routledge, Book Title: Data Analytics: The Engine of Efficient Business Operations' by Dr. Joseph Bon Sesay and Dr. Fenio Annansingh, completed on 8 May 2020
- Bentham Science Publishers, Book Title: Advanced optimization control in Business Analytics for Sustainable Management. Completed on 18 June 2020

3.4 Organize and attend National/international conferences

As a Steering committee, Prof Zhaohao Sun has organized 14th Australasian Conference on Health Informatics and Knowledge Management (HIKM), Sydney, February 2020 http://www.hikm.net.au.

3.5 Journal reviewers

Prof Zhaohao Sun reviewed several papers in 2020 for the following journals.

- Journal of Intelligent and Fuzzy Systems (JIFS)
- IEEE Transactions on Data Engineering (TKDE)
- J of Big Data
- European J of Education Research
- International Journal of Risk and Contingency Management (**IJRCM)**

DEPARTMENT OF CIVIL ENGINEERING

Head of Department: Dr. Mirzi L. Betasolo

INTRODUCTION

The Department offers Undergraduate and Postgraduate Degrees in Civil Engineering. The undergraduate program consists of a four-year study program- Bachelor in Engineering in Civil Engineering (BECV) refreshed program (2019) and the 2017 program. The undergraduate program is now in its second year of accreditation process to the Washington Accord accrediting body through Engineers Australia.

There are four (4) postgraduate programs that the Department is offering, which include Master of Engineering in Civil Engineering (MEng.CE), Master of Science in Solid Waste & Resource Management (MSc.SWRM), Master of Philosophy (MPhil), and Doctor of Philosophy (Ph.D.). The MEng (CE) and MSc. The SWRM programs combine course-work and research-based degree programs, while MPhil and Ph.D. studies are entirely research-based degrees.

The Department has six full-time academic staff (2 with PhDs, 2 with Master's Degree and 2 doing MPhil) and six part-time faculties. There were 3 MSc in Solid Waste & Resource Management program and 3 MEng (Civil Engineering) degree. Altogether, 188 (46 - year 1, 55 - year 2, 34 in year 3, and 53 in year 4) undergraduate students in 2020.

The Department of Civil Engineering is committed to delivering the seven strategic domains. Equipping our classroom with modern teaching tools such as an in-place overhead projector in each classroom and fully utilizing the University Learning Management System (LMS) is one strategy that the Department pursues. Research, innovation, and training is the third of the Strategic Domain of the University. For this reason, both undergraduate and postgraduate have research components. We commit to deliver Strategic Domain 7 (Community, Industry, and International Partnerships) for outreach activities where the Village of Ngarianrian for its village development and Labu mangrove protection has been attended through meetings and consultation.

The number of postgraduate students in semester 1which is in line with our commitment to foster higher training. However, the number declined in the second semester due to Covid 19. Continuing

the in-house industrial training started last year had doubled the number of participants to 20 Civil Engineering Students, of which six came from year 4, 6 from year 3, and 8 from year 3.

RESEARCH FACILITIES

The Civil Engineering Department is housed in four main buildings containing research laboratories, a separate workshop, and a field laboratory. These research laboratories are:

- Structural Laboratory
- Hydraulics Laboratory
- Environmental Engineering Laboratory
- Geotechnical Laboratory
- Concrete Laboratory, and
- General Workshops:
    - Welding
    - Carpentry
    - Fabrication
- Field Laboratory (CRI-Yalu Site):
    - Asphalt Laboratory
    - Cement Testing Laboratory
    - Concrete Test Laboratory

The Field Laboratory is supported under a Memorandum of Understanding finalized in 2014 with the China Railway International (CRI), which is contracting the four-lane road project from Nadzab Airport to Lae. The partnership of the industry working on Morobe's major road allows the Department of Civil Engineering to have an extended laboratory research facility on Asphalt and Concrete Plant. The department laboratory also operates on commercial work to service the industry. The laboratory equipment mechanical equipment such as testing machines, pressure, and force measuring devices and torque wrenches are re-calibrated by NISIT regularly. It also offers a comprehensive range of material testing for soils, concrete, and metals.

The research of significant interests in the Department includes Concrete innovations, Material Resources, Cable-Stayed Bridges, Steel Structures, Timber Structures, Sewage Lagoons, Roads

Pavement Materials, Earthquake Resistant Structures, Soil Properties, Disaster Research, Accident Analysis, Pavement Design, Cost-Benefit Criteria for Developing countries, Rural Water Supply and Sanitation and Waste Management, and Engineering Education.

A. Final Year Undergraduate Research Projects.

Research work as undertaken by the fourth-year BECV students for partial fulfillment of the Bachelor's degree in 2020 is shown in Table 1.

Table 1

No	Name	Supervisor	Title of the Research Project
1	Fredrick Bosuk William Kula Malachi Taviri John Robert Villegas	Dr Mirzi Betasolo	Busamang Hydro Power Project
2	Stephanie Kiene Mark Timkang Roy Kua		Polyethylene (HDLPE & LDPE) kerb/drainage model
3	Lawrence Yaa, Eliden Aheng, Stanley Umbu and Jack Kala	Ms. Grace Wantepe	Redesign and Analysis Of Gumanch River Bridge In Mul District Of Western Highlands Province
4	Yolenda Iga Faith Kutkue Brolin Lae Terry Ale	Dr.R. Subramanyam	i) Studies on sea water pollution at LAE city. & ii) Designing a small anaerobic digester for the PNG University of Technology mess facility using kitchen food waste.
5	Michelle Adewat		i) Studies on removal of toxic compounds by adsorption. & ii)The design of incinerator for the treatment of biomedical waste in the major hospitals in Lae City, PNG.
6	Nema Kapiri Jr Elaizah Kalogen Samuel Yalo Richard Puset	Mr Murray Konzang	Identifying probable cause of traffic congestion at the Lae Main Market (air Corps Road / Kisere Street Intersection) and providing adequate design and planning to minimize the effect
7	Elizah Dujambi Simeon Ganifiri Exton Balson Ilaiamo Kali Alu		Improvement of Milford Haven Road / Bumbu Road Intersection at Bumbu Polie Barracks and Kamkumung Market in Lae City

8	Samson Kueyak Anja Leso Kesian Tira Joshua Kanawa		Low carbon development strategy for sustainable and green transport scheme of Lae City
9	Jerry Tiki Justin Unda Gransen Wapu Nicholas Wareka		Stabilization of weak subgrade soil against liquefaction in the design of rigid and flexible pavement
10	Joanne Tangabi George Leo Wate Vianney Upa		Evaluation of conventional pavement design and geosynthetic application in Lae City
11	Max Yamoria Sharon Tobby Nema-John Mackenzie	Mr. Jedge Kasadimi	A study of heavy metal contamination in soil in Lae City Second Seven Dump, study of the level of concentration, and proposal of possible methods of remediation
12	Micha Imbu, Mandella Nale, Erwin Erick and Jerry Kaiya		Production of aggregates for High Performance Concrete (HPC) using soil contaminated with Heavy Metal
13	Remton Albert Allowyn Kumbiye Ivan Manuel Edward Mana Max Emmanuel		Redesigning of the Yalu Bridge, Huon Gulf District, Morobe Province
14	Taure Yambe Justin Tofunama Francis Toss		Planning and design of 23.4 km proposed road from Markham Bridge to Labu 3

B. A list of Postgraduate students presented their research topics in 2020.

Name	**Supervisor**	**Program**	**Research Title**
Esther Dujambi	Dr.R. Subramanyam	MPhil/1 (Applied Science Deptt.)	Production of electricity from chicken waste.
Grace WANTEPE	Dr. M. Betasolo	MPhil/2	Health Monitoring of Steel Girder Bridge: A case study of Bumbu & Butibam Bridge of Lae City
Jedge Kasadimi	Dr.R. Subramanyam	MPhil/2	Investigating the remediation of contaminated soil with the application of the stabilisation and solidification (S/S) technique through high performance concrete (HPC). Case Study: Closed Namie Mine, Wau, Morobe Province.

Charles Feriwok	Dr. M. Betasolo	MScSWRM/2	Rehabilitation of a 49 yr-old Sewage Pond
Nathaniel Dasyal	Dr. W. Modey/ Dr. M. Betasolo	MScSWRM/2	Investigation into phytoremediation characteristics of seven selected plant species being used in the Tailing Waste Rehabilitation Trials

C. List of Journal Publications

Elena, C., Mirzi, B. (2020). Flow Duration Curves and Recession Curves Connection through a Mathematical Link. *World Academy of Science, Engineering and Technology International Journal of Aerospace and Mechanical Engineering*, 14(12), 502-507.

Subramanyam, R. (2020). Start-up performance of upflow anaerobic sludge blanket reactor in biodegradation of glucose bearing synthetic wastewater. *International journal of environment*, 9(1), 32-51.

Subramanyam, R. (2020). Performance evaluation of sewage treatment plant at JUET campus, Guna (MP), India– A case study. *International Journal of Advanced Engineering Research and Science*, 37(10), 17-322.

Subramanyam, R. (2020). A case study on wastewater from automobile service stations in Madurai city, India. *International Journal of Innovative Research in Science, Engineering and Technology*, 9(11), 10344-10350.

Subramanyam, R., & Michelle, A. (2020). Design of an incinerator to treat biomedical solid wastes in Lae City, Papua New Guinea. *International Journal of Innovative Research in Science, Engineering and Technology*, 9(11), 10223-10231.

D. Journal Review

Dr. R. Subramanyam reviewed a few papers in 2020 for the following Science Citation Index journals

- Waste Management (Elsevier)
- Environmental Engineering Science

DEPARTMENT OF COMMUNICATION AND DEVELOPMENT STUDIES

Acting Head of Department: George Wrondimi

As concerns *teaching activities*, the Department offers a 4-year professional program and has two sections: A Communication for Development (C4D) Studies and a service-course sequence in English for Academic Purposes (EAP) for students across all disciplines of the University; and, a professional program Communication for Development degree program to train liaison and community development and public relations officers for resource development companies, government departments and non-government organizations. It also presently administers the Postgraduate Certificate Course in Student-Centered Teaching for the further specialized training of academic staff at PNGUoT.

In 2009, the Department began offering a Masters in Communication Studies (MCS) program. This program has both a course work and a dissertation component, where the students write a research paper on an appropriate topic in the final semester of their second year. In addition, a Masters of Arts in Organizational Leadership is periodically offered in cooperation with Development Associates International (DAI), The Christian Leadership Training College of Papua New Guinea (CLTC), and the Pioneers of Australia. Furthermore, a growing PhD program is underway, with one graduate to date and two others currently enrolled.

As concerns *research activities*, the Department of Communication and Development Studies at the Papua New Guinea University of Technology is a department that blends three broad academic strands (Language and Communication Studies, Sociology, and Communication for Development). Through its individual members of staff, research is conducted in under general umbrellas (Linguistics and Culture, English for Academic Purposes/EAP, English for Special Purposes/ESP, Sociology, and Communication for Development). General and sub-topics include:

In Linguistics and Culture, focus is given to PNG national languages, comparative linguistics, and the interface between society and language across time. In EAP or ESP, research topics include: classroom research, EAP/ESP methodology, course design, material design, genre analysis, rights analysis, critical EAP/ESP, reading and writing, testing and evaluation, computer-mediated language learning, EAP/ESP research, and socio-linguistic influences on the teaching and learning of EAP/ESP.

In the general area of Sociology, research foci include fieldwork, health, corrections, communication theory and practice, media studies, critical-cultural studies, and comparative higher education studies. Another thread is concerned with the problems of youth in society, especially on topics such as integration, sex education, and social behavior.

In the Communication for Development (C4D) area, the sub-topics of research interest include: communication in education, communication and gender, communication in resource management, conflict resolution, negotiation skills, partnership building, communicating development in such sectoral contexts as economic industries, healthcare, agriculture, and so forth, democracy and human rights, and HIV/AIDS.

Both empirical (quantitative) or qualitative approaches to relevant topics are employed by our academics, with trans-disciplinary innovations (such as action research) encouraged. The Department publishes a peer-reviewed organ, the *JCDS: Journal of Communication and Development Studies* in cooperation with the UNESCO Chair of Quality Management of Higher Education and Lifelong Learning of "Lucian Blaga" University of Sibiu, Romania, and its Director, Prof *habil*. Dr Silvia Florea.

Name of the Faculty Member/Position/Research Interests

Name of the Faculty Member	Position	Research Interest

Prof Dr *habil*. Dr Eric Gilder	Professor	Higher education policy, scientific communication, technology and society, 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 Garry Sali	Associate Professor	Sociology of crime and deviance, prison systems, crime and development, and law and order problems in PNG.
Dr Rachel Aisoli-Orake	Senior Lecturer	English as a Second Language writing, Education/English curriculum and pedagogy, English for Academic Purposes, Cross-Cultural communication, development and responsibility and participatory research.
Rhonda Lakele Eva-Gwale .	Principal Technical Instructor	Information management, traditional knowledge, changing societies and gender issues. Graduate of Masters in Organizational Leadership (MAOL) Program.
Mary Kunenda Aisi	Lecturer II	Development communication, gender and leadership, and mass media.
George Wrondimi	Lecturer II	Social work; social policy and planning; social mapping; community development.
Imelda Ambelye	Lecturer I	Education and community empowerment (women and youth),

		natural resources (mining and other extractive industries) in PNG.
Joshua Frank Kuri	Lecturer I	Language development and practices via bilingual education; practices and effects of communication across developing societies.
Lucy Maino	Lecturer I	Participatory development communication (PDC) whereby communication processes, techniques and media are used to engage stakeholders (individuals, groups, and institutions) in socio-economic change processes, cross-cultural communication, communication for agricultural innovation, participatory social mapping, community development, English for academic purposes.
Sheryl S. Makara (on study leave)	Lecturer I	Emotional intelligence and leadership, critical thinking, communication in crime and sociology with relations to development, community development and participation.
John Milba	Lecturer I (since June 2020)	Development Studies, forestry, land issues.
Wilma Molus (on study leave)	Lecturer I	Sociology of children, sociology of deviance and crime.
Starza Paul	Lecturer I	Journalism theory and practice; national development.

Ngawae Mitio	Technical Instructor	Local community affairs/local governance.

Ongoing International Partnership Research Projects:

Aisi, M. (co-researcher). "The project entitled 'Addressing Family and Sexual Violence in Lae: The Potential of a Family Centred Approach', built upon a pilot study conducted in 2018, which examined the relationship between women's experience of seeking support for family and sexual violence (FSV) and their children's wellbeing and opportunities for education in Lae, PNG's second largest city.

Journal Articles:

Ambelye, I. (2020). English and its Power in Papua New Guinea. *Journal of Communication, Politics & Society* (COMPOS) 1 (2): 45-63. Retrieved: http://composjournal.com/currentissue/ISSU.pdf

Gilder, E. (2020). Towards a Post-Pandemic Postmodern Society: Is the Pandemic a Deconstruction of the Postmodern Society? *Postmodern Openings* 11 (2): 1-11, DOI: https://doi.org/10.18662/po/11.2/153 Retrieved: https://lumenpublishing.com/journals/index.php/po/article/view/2924/pdf

Milba, J. & Essacu, F. (2020). The Role of Communication in Forest Management Agreement and Timber Rights Purchase Acquisition Processes and Practices in Papua New Guinea, *Journal of Communication, Politics & Society* (COMPOS) 1 (3): 13-24. Retrieved: http://www.composjournal.com/currentissue/Final%20File.pdf

Starza, P., & Sali, G.W. (2020).Communicating an Integrated Clan Based Approach to Tribal Warfare in the Enga Province, PNG, *Journal of Communication, Politics & Society* (COMPOS) 1 (3): 1-12. Retrieved: http://www.composjournal.com/currentissue/Final%20File.pdf

Book:

Sali, G. (2020). *A Public Intellectual's Collection of Policy Discourses on Crime and Corrections in Papua New Guinea*. Sibiu [RO]: Editura Universităţii "Lucian Blaga" din Sibiu. ISBN: 978-606-12-1780-9.

Scholarly Presentations:

Aisoli-Orake, R., Bue, V., Aisi, M., Ambelye, I., Betasolo, M., Nuru, T., Kialo, D., Akanda, S., Denano, S., Yalambing, L. (2020). Women in Higher Education: A Case of the PNG University of Technology. A Conference Reflection Paper presented at the PNGUoT Women in Higher Education (WIHE) Seminar, PNGUoT, Lae (PNG). August 11).

Gilder, E. (2020). Public Defense of Habilitation Dissertation, "Rhetorics in English Literary and Non-Literary Discourse" (Philology), "Lucian Blaga" University of Sibiu, School of Doctorate and Postdoctoral Studies. Centrul de Reuniune Academică, Str. Banatului nr. 6 (Sibiu: Romania), 28 January. Program: https://doctorate.ulbsibiu.ro/wp-content/uploads/an-gilder.pdf

Gilder, E. (2020). Logos, Pathos and Ethical Practices across Selves, Time and Space in a Pandemic Era (Plenary Speaker), 14th LUMEN International Scientific Conference "Rethinking Social Action. Core Values in Practice RSACVP2020", Iasi, Romania, 22-23 May. Online Presentation: Retrieved: https://youtu.be/s66waZzhVh8; Program: http://conferinta.info/wp-content/uploads/2020/05/Program_14th_LUMEN_RSACVP_2020.pdf; Abstracts: http://conferinta.info/wp-content/uploads/2020/05/Working_papers_volume_LUMEN_RSACVP_2020.pdf

Post Graduate Certificate in Student Centered Teaching (PGCSCT) 2020

Taught at the TLMU Center under the supervision of Prof Eric Gilder, the PGCSCT consisted of the following modules, offered to registered staff members at the University as an after-hours instructional course to fulltime academic staff of the university: CD511: LMS and Flipped Classroom (Dr Mohamed Talib); CD512: Project/Problem Based Learning (Dr Aisoli Orake and Ms Dora Kialo); and, CD513: International Trends In Higher Education Teaching and Learning

(Dr Tindi Nuru). Eleven (11) enrollees completed all requirements for the course, and will obtain a PG Certificate in 2021:

1. Cathy Koloa
2. Ashish Kumar Luhach
3. Haron Jeremiah
4. Joel Tahie
5. Lenz Nerit
6. Leonard Wana
7. Luke Kolalio
8. Malkom Domapim
9. Millicent Rova
10. Sivakumar Balakrishnan
11. Starza Paul

Postgraduate Research Supervision/Examining

External

Year	PhD Candidate	Research Title	Commission Member	Institution
2020	Scott EASTMAN (Year III)	Standardized Methodology for Implementing Applied Critical Geopolitical Discourse Analysis to Improve Forecast Accuracy	Prof Eric Gilder	"Lucian Blaga" University of Sibiu (Romania)
2020	Ecaterina Lia ILIȘ (Year II)	The Pandemic and the Infodemic: A Critical Discourse Analysis of Coronavirus-Related Fake News Published in English-Language Mass Media between January-May 2020	Prof Eric Gilder	"Lucian Blaga" University of Sibiu (Romania)
2020	Adina-Florina MILEA (Year II)	Language and Identity in American Sitcoms: Language and Culture	Prof Eric Gilder	"Lucian Blaga" University of Sibiu (Romania)
2020	Iulia Sărbătoare STĂICUȚ (Year II)	Discourse Analysis of Radical Muslim Clerics and its Role in the Online Era (European Impact: 2016 - 2020)	Prof Eric Gilder	"Lucian Blaga" University of Sibiu (Romania)

2020	Andreea Cotîrlea DIETRICH (Year I)	Theories of Politeness in Chinese and English PhD Thesis Acknowledgments	Prof Eric Gilder	"Lucian Blaga" University of Sibiu (Romania)
2020	Isabelle Nicole VOICU (Year I)	A Discourse Analysis of Paraphrasing.	Prof Eric Gilder	"Lucian Blaga" University of Sibiu (Romania)
2020	Nassir MORADI (Year I)	An Investigation of Metadiscourse Markers in "Suggestions for Further Research" Sections of PhD Theses	Prof Eric Gilder	"Lucian Blaga" University of Sibiu (Romania)
2020	Daniela Lazăr DĂLĂLĂU (Year I)	A Literature Review of Metaphor Translation Studies	Prof Eric Gilder	"Lucian Blaga" University of Sibiu (Romania)

Internal

CDS Department Postgraduate Supervision

Candidate	Program	Year	Supervisor(s)	Research Topic
Elymas BAKUNG (Suspended study, February 2020)	PhD	3	Prof Gilder, A/Prof. Sali	The Propagation of Socio-economic Restructure by Cult Doctrines and its Threats to the Future of the Existing Formal Socio-economic Structures in Morobe Province.
Mary K. AISI	PhD	2	Prof Gilder, Dr Aisoli-Orake	Effective Strategic Management: Catalyst for Organizational Efficiency and Accountability in Educational

				Institutions in Papua New Guinea.
David GELA	PhD	1	A/Prof Sali, Prof Gilder	Effective Organizational Communication is a Tool to Drive Efficient Services: A Case Study of Simbu Province in Papua New Guinea.
Nermann KALOWA	MCS	2	Prof Gilder, A/Prof Sali	A communicative approach to moral issues in Kabwum Area: A case study of Selepet LLG in Kabwum District, Morobe Province.
Justina KUMASI	MCS	2	Ms Ambelye, Dr Aisoli-Orake	Investigating the challenges of communication process translation from English to Pidgin in rural developing areas: A case study of Zindiga community of the Bulolo District.
Liksen MANDALI	MCS	2	Prof Gilder, Ms Ambelye	Teachers' views on special education needs children entering Primary Schools: A case study of selected schools in PNG.
Regine YAMASOMBI	MCS	2	Prof Gilder, Ms Ambelye	Educational issues impacting female social and intellectual performances: A case study of Education system in Yangoru-Saussia District,

Jacob ZUA	MCS	2	A/Prof Sali, Dr Aisoli-Orake	The effectiveness of Developing English (L2) Competency using Four Communicative Approaches in the Standard-Based Curriculum: A case study of students in the remotest Primary Schools in Kabum District.
Desley ALU	MCS	1	Dr Aisoli-Orake, Prof Gilder	Communication in the Division of Education of Morobe Needs Improvement for Development in this Technology Era.
Chevelyne ANTONIMBI	MCS	1	A/Prof Sali, Ms Ambelye	Cultivating Students' Deviant Behaviors in Educational Institutions in Papua New Guinea through Communication. A Case Study of Secondary Schools In Lae City, Morobe Province.
Harry EGIMBARI	MCS	1	Prof Gilder, Dr Aisoli-Orake	Listening to Learn: A Case Study of Listening Comprehension Lessons in Primary and Secondary Schools of Lae District, Morobe Province, Papua New Guinea.
Kimson LAZARUS	MCS	1	Prof Gilder, Ms Ambelye	Impact Of Ineffective Communication On Social

				And Economic Development For Logging Industries In Papua New Guinea: A Case Study Of Amanab Forest Management Agreement (FMA) Project In Vanimo, West Sepik Province From 2018-2021.
Hendrix NEKI	MCS	1	A/Prof Sali, Prof Gilder	Impacts of Tribal Fights on Development in the Eastern Highlands Province: A Case Study of Kainantu District From 2020-2021.
Rebecca N POMAT	MCS	1	Dr Aisoli-Orake, A/Prof Sali	Investigation into the Newly Introduced Degree Program in Primary Teachers College to Develop an Understanding of its Effective Implementation in 2020-2021.
James YAWING	MCS	1	Ms Ambelye, Dr Aisoli-Orake	Effects of High Illiteracy Rate of School-Age Children in the Rural Areas of Mumeng, Bulolo District, Morobe Province, 2020: A Case Study.
Ngawae MITIO	MPhil	2	A/Prof. Sali, Prof. Gilder	An investigation of challenges of sustainable development in Bulolo District: A case study of seven Biangai villages of the Wau Rural LLG of the Bulolo District.

Notes:

1. For MCS research students the principal supervisor is mostly responsible for the research outcome; the co-supervisor is available for student consultation.
2. For MPhil and PhD scholars both principal supervision and co-supervisor are responsible but the former directs the research project.

Undergraduate Final Year Research Supervision (CD 472)

STUDENTS, SUPERVISORS, RESEARCH TOPICS - 2020

	Student	Gender	Supervisor	Research Topics
1	AMBELYE, Kyleen	F	Dr Aisoli-Orake	The Impact of Covid-19 in the Informal Sector, in Lae, 2020.
2	APO, Heather	F	Prof Gilder	The Effects of Parental Negative Lifestyles Upon Children's Learning and Development. The Case Study of Limiki Settlement in Lae Morobe Province.
3	BATIN, Gilbert	M	Dr Aisoli-Orake	The Implementation of Religious Education in Catholic Sponsored Primary School the Influence of the Available Teaching and Learning Resources on.
4	DICKSON, Christine	F	Mr Paul	Effective Communication Strategic Required to Address Poor Water Supply and Anitation at Five Mile Settlement in Lae, Morobe Province.
5	JIMMY, Janice	F	Dr Aisoli-Orake	Challenges in Meri-Blouse Business (Sme): Case Study in Lae City
6	KANGUP, Ezekiel	M	Mr Sangundi	Effective Communication Strategies for Identifying Challenges Faced in the Financial Literacy Inclusive Program and School Engagement at Middle-

				Ramu in Madang Province of Usino Rural LLG.
7	KANI, Brendan	M	Mr Wrondimi	The Impacts of Problem Gambling Among the Settlers at Madang Block in Lae City.
8	KATI, Samantha	F	Mr Sangundi	The Impacts of Youth Unemployment. The Case Study Of Youth of Tenth City in Lae Urban, Morobe Province.
9	KEMARI, Marryanne	F	Mrs Aisi	Communicating the Health Implication of Sever-Spillage On Human Life
10	KOE, Saul	M	Mr Mitio	Significance of Strategic Community Development in Reducing Property Crime in Gigo-Laleki, Ward 1 (Kimbe).
11	KOIWA, Fergie	F	Ms Ambelye	Most Prevalent Issues In Squatter Settlements Of Lae City.
12	KOUSE, Anesia	F	Mrs Maino	Communication the Psycholgical Effects of Physical Violence on Children's Development: A Case Study of 11-16 Year Old Children in Tent City, Lae, Morobe Province
13	MADANA, Susan	F	Dr Aisoli-Orake	The Effects of Settlements on State Lands Within Town of PNG: A Case Study Of Uni-Madang Block and East Taraka Settlement in Lae, Morobe Province in.
14	MATHEW, Issac	M	Mr Sefo	Sme Training is the Facilitator That Will Encoverage the Local Economy And Local Business to Prosper in Papua New Guinea: A Cas Study on The Urban.
15	MINJUK, Gibson	M	Mr Sangundi	Economic Empowerment of Women and Girls in Png: A Case Study in Nawae Block, Lae Morobe Province.

16	NAIPAO, Clinton	M	Mr Paul	The Effects of Criminal Activities of Service Delivery: A Case Study In East Taraka Settlement of Lae City of Morobe Province.
17	NAUHET, Marry-Anne	F	Prof Gilder	Development Communication as a Catalyst to Promoting Community Participation in Sustainable Development in Mining Impacted Communities - The Case of Hidden Valley Mine and Nakuwi Villages 2020.
18	NONE, Serah	F	Mr Sefo	Developments Impacts of Poor Accessibility of Portale Ater and Basic Saniation in Ahi Rural. "A Case Study at Bumbu Settlement - Ward One.
19	ORERE, Jairus	M	Mr Wrondimi	The Effect of Inadequate Adult Literacy Education on Adults Living at Laukanu Village in Morobe Province 2019-2020.
20	OROSAMBO, Sherntelly	F	Dr Aisoli-Orake	The Negative Effects of Urbanization on Urban Communities: The Case Study of East Taraka.
21	PAZE, Cameron	M	Mr Wrondimi	Promoting Human Development Role of Communication in Welfare Outreach Services In Lae District.
22	POLIPA, Charlie	M	Ms Gwale	Evaluating Sustainable Socio-Conomic Impacts of Royalties in Nakuwi Villages: A Case Study of Hidden Valley Gold Mine (Morobe Province).
23	PONDUK, Lilian	F	Mrs Maino	Effectiveness of Interim Protection Orders (Ipo) on Domestic and Family Violence: A Case Study of Lae 2020.
24	POTANE, Illa	M	Mr Kuri	Understanding the Importance of Communication Strategies to Prevent Tribal Fights: A Case

				Study of Sopas Village in Wabag District 2020.
25	RUAM, Joshua	M	Mr Sefo	Identifying Consequal Victimless Crime in Bumbu Settlement Which Should Be Legalize and Enforced In Bumbu Settlement.
26	SAI, Elsie	F	Mr Sangundi	Undertanding the Impacts of Development Programmes and Projects Implementation In Livelihood Of Women In Mining Areas: A Case Study of Women in Middle Fly Trust Region in Western Province, 2020.
27	SAUTEN, Joanna	F	Mrs Maino	Impact of Communication Barriers in Social and Economic Development for Lae Urban LLG: A Case Study of East Taraka.
28	SIONI, Shirley	F	Mr Kuri	Impacts of Deteriorating Housing Conditions on Police Officers and their Families from 2010 -2020: A case Study of Bumbu Police Barracks.
29	SIPENDI, Douglas	M	Prof Gilder	Social Wellbeing Recovery Program; Alcohol and Marijuana Consumption in Komia Village, Upper Mendi LLG Mendi, Southern Highlands Province.
30	WAEKI, Niruk	F	Prof Gilder	Impacts of Corona Virus on the Beneficiaries of Informal Sector of Lae City Main Market In the Year, 2020: A Case Study of the Lae City Main Market in the Year 2020.

DEPARTMENT OF ELECTRICAL AND COMMUNICATION ENGINEERING

Head of Department: Dr Moses Kavi

Introduction

Electrical and Communications Engineering is a science-oriented field concerned with many disciplines, such as power systems engineering, electronics, communications engineering, electromagnetics, control systems engineering, and computer engineering. This subject also covers many other sub-disciplines, such as electric machines, power electronics, antennas and propagations, instrumentation and process control, mechatronics and robotics, industrial electronics, automation biomedical engineering, consumer electronics, sensors and measurements, and computer networking. The electrical engineering curriculum is built around a robust essential core of mathematics, physics, and engineering provides teaching and training activities in the classroom and the laboratory exercises.

Here at the PNG University of Technology, the Electrical Engineering Department offers undergraduate programs leading to a Bachelor in Electrical Engineering (B.E.E). It provides teaching and training activities in the classroom and laboratory exercises. The Department also offers postgraduate degree programs leading to Master of Philosophy (MPhil) and the newly approved Master's by course work leading to the Master of Science (M.Sc.) in Communications Engineering. The Department also offers a PhD program both in Communications and Power Engineering.

The courses taught in Communications Engineering are aimed to deepen the knowledge and skills of students on the basic concepts and theories to equip them in their professional work involving analysis, systems implementation, operation, production, and maintenance of the various technologies, namely computer network, the cellular services that include the Global System for Mobile (GSM) communications, Code Division Multiple Access (CDMA) protocols used in 2G and 3G wireless communication, and the Long Term Evolution (LTE). The LTE is a high-speed wireless communications technology that many modern cell phones and cellular devices use as in 4G and 5G. Further, the students also broaden their knowledge in other technologies such as radar and sonar, which are detection systems that use radio waves

to determine the range, angle, or velocity of objects in air or water. Radar systems can be used to detect aircraft, ships, spacecraft, guided missiles, motor vehicles, weather formations, and terrain. The students also study computer networking and intelligent electronics devices that drive the Internet of Things (IoT). IoT is simply a network of devices such as vehicles and home appliances that contain electronics, software, sensors, actuators, and connectivity which allows these things to connect, interact, and exchange data.

Similarly, power systems engineering is a discipline of Electrical Engineering that deals with the interconnections of generation, transmission, distribution, and utilization of electric power and electrical equipment. It is an electrical grid that delivers electricity from producers to consumers. The electrical grid is currently going through a drastic transformation into what is known as a Smart Grid. The shift in traditional power systems grids to integrate renewable distributed generations significantly reduces carbon dioxide emissions and provides a secure and resilient power supply. The development of smart grid systems allows for two-way communications between the electric utility and its customers, and the sensing along the transmission lines makes the grid more efficient, more robust, and more resilient to disruptions.

The PNG University of Technology is the only University in Oceania apart from the universities in Australia, New Zealand, and Hawaii (a State of USA) specializing in Engineering and Technology. Its research plan focuses on producing undergraduate and postgraduate students who are competent to be top-class engineers and managers. The graduate engineers should position themselves as advisors and wealth generators for the country and the region. Moreover, recognizing the importance of both research and research-intensive universities to the development of knowledge economies, it is pertinent that the university generate new knowledge and new technology relevant to national needs. This will alleviate dependence on hiring expertise from abroad enabling national engineers and researchers the needed technical and research expertise to attract foreign industries to invest in Papua New Guinea and produce a local job market that is of economic benefit to the nation.

The undergraduate program covers mathematics and physics in addition to the core curriculum in either power engineering or communications engineering and other required electives. The program enables students to specialize in any one of the following two areas: Communications and Power Engineering. In the final year of the studies, students undertake research projects on various topics in Electrical Engineering. The students show their ingenuity and innovation in

researching on various topics and building prototypes or undertaking simulation models and presenting their work at the end of the academic year. The research projects are designed to trigger engineering curiosity of students and finding new methodologies to foster innovative design that employ the synergistic effect between design and innovation as the key in promoting engineering ingenuity.

The postgraduate research activities is on-going with four (4) candidates enrolled in the PhD programs and 7 students undertaking master's degree. One of the key priorities areas is the implementation and sustainability of staffing where the Electrical Engineering Department plans to have about 70% of the full academic carder to be filled by national members of staff. The Department is focused on the next 10 years to have a minimum of 90 % of national PhD degree holders who will be able to work together giving significant research leadership in the global scenario. A list of postgraduate candidates is provided in Table 1.

Table 1 List of 2020 Postgraduate Research within the Department

	Researcher's Name	Degree	Research Title
1	Mr. David Chen	PhD	Robotic Arm on Open Source Platforms
2	Mr. Samy Aiau	PhD	Renewable Energy Sources for Morobe Province and Future National Smart Grid for PNG
3	Mr Gibson Kupale	PhD	Challenges in PNG Electricity Network Security and Reliability Trends
4	Mr. Herman Kunsei	PhD	Using Perception ANN with Different Triggering Functions for Linear and Non-linear Array Arrangements
5	Mr Sylvester Tyrones	MPhil	Design of Microcontrollers Based Smart Battery Management System Enhancement for Off-grid Remote Homes
6	Charlie Urame	MPhil	Design and Implementation of Hybrid Pico-hydro – Photovoltaic Solar Power Plant in Massy-Gahuku LLG.
7	Mr Mathew Pua	MPhil	Rural District Electrifications with PV/Diesel Integrated System.
8	Mr Issiah Koldai	MPhil	Design of Renewable Energy Based Micro-grid for Rural Electrification: A case study on Salamua LLG Centre.
9	Mr. Wilson Kepa	MPhil	Design of GSM Based Remote Distribution Transformer Condition Monitoring System
10	Ms Serah Mako	MPhil	Analysis of Signal Strength and Bandwidth for Enhancement of Quality of Service in PNG University of Technology

11	Jacqueline Tantapua	MPhil	Interference Mitigation in Wireless NetworksCo-ordinated MultiPoint Transmission Techniques(CoMP)

The Department's basic commitments, in keeping with these priorities are:

1. A department that is fully integrated with Papua New Guinea industry and community, changing society and creating wealth.
2. Depth of quality and multidisciplinary in learning and applications through class room, laboratory and research programs which have measurable outcomes.
3. Research and Innovation work that is beneficial to the local community and contributes to knowledge and experience to international challenges in science and technology and their functions in society.

Vision

To be at the cutting edge in teaching and research in the generation and application of electrical engineering knowledge in graduating globally competent professional electrical engineers of high ethics and human values.

Academic Priorities and Basic Commitments

The major **academic priorities** for **phase one (2019-2020)** of the research plan was the following:

1. Integrate Research with Teaching and Learning
2. Connecting the academics with the community for its service
3. Make the teaching and learning process compatible with industry
4. Recruitment of the best talents nationally and internationally and retaining them.

Postgraduate Research Areas

The major research areas undertaken at postgraduate level are:

(i) Electric Power Systems,

(ii) Renewable Electric Energy Sources, and

(iii) Advanced Wireless Technology.

Note that the descriptions cover the research topics in progress. Other topics are still in the proposal development stage are being undertaken in the following areas.

Electric Power Systems

We have made significant progress in electric power systems in the realm of inter-disciplinary areas including wireless technology applied to power system monitoring, renewable energy generators such as micro-hydro electric generators and DC grids and power system grid extension involving the AC power grid and renewable electric energy generators. The work has been reported in a journal. Moreover, we were given partial grant from the University for a major interdisciplinary research project.

Renewable Electric Energy Sources

A working pico-Hydroelectric generator was designed, installed and controlled. The work has been reported in a journal. A related published work was on a comparative study of different ways of connecting distributed solar panels supplying electricity to a village with clustered loads. Work on the use of Drones to monitor and control the remote renewable energy systems has also been initiated.

Further, we are looking at the overall PNG grid from the perspective of systems reliability and contingency, as well as to improve the systems reliability, studies are under way, looking at the Ramu, POM (NCD_ and Gazzle electric grids in PNG. The work will also consider the system performance from a reliability and sustainability perspective when grid extension is undertaken, and with the possible connection of renewable energy DC/AC grids to the main power grid.

Advanced Wireless Technology

Advanced wireless technology work has developed several powerful and new software tools for beam controlling in 4G and 5G wireless systems. Work on studying and improving the wireless systems in Lae City as well as on the University campus is underway, as well as design of better date capacity and speed at economic costs and the possible use of the 5G system to replace the present system. Moreover, research work on the Port Morseby Jackson airport aircraft to control tower communication and signalling systems, particularly addressing single glitches or interruptions, is underway.

List of Publications (2020)

(1) Kaur, M., Kumar., & Luhach, A**.** (2020). Optimum Design of PID Controller Using Multi-Objective CBBO Algorithm. *International Journal of Scientific & Technology Research*, 9(01), 68-73.
http://www.ijstr.org/final-print/jan2020/Optimum-Design-Of-Pid-Controller-Using-Multi- objective-Cbbo-Algorithm.pdf

(2) Kavi. M., Mishra. Y., & M. Vilathgamuwa, (2020). DC Arc Fault Detection For Grid-Connected Large-Scale Photovoltaic Systems. in *IEEE Journal of Photovoltaics*, 10(5), 1489-1502, doi: 10.1109/JPHOTOV.2020.2998868.

(3) Khamparia, A., Singh, S. K., Luhach, A. K., & Gao, X. Z. (2020). Classification and analysis of users review using different classification techniques in intelligent e-learning system. *International Journal of Intelligent Information and Database Systems*, 13(2-4), 139-149.
https://www.inderscienceonline.com/doi/abs/10.1504/IJIIDS.2020.109451

(4) Maratha, P., Gupta, K., & Luhach, A. K. (2020). Improved fault-tolerant optimal route reconstruction approach for energy consumed areas in wireless sensor networks. *IET Wireless Sensor Systems*, 10(3), 112-116.
https://digital-library.theiet.org/content/journals/10.1049/iet-wss.2019.0152

(5) Mishra, S. K., Mishra, S., Alsayat, A., Jhanjhi, N. Z., Humayun, M., Sahoo, K. S., & Luhach, A. K**.** (2020). Energy-Aware Task Allocation for Multi-Cloud Networks. *IEEE Access*, 8, 178825 – 178834.
https://ieeexplore.ieee.org/document/9205994

(6) Pande, S.K., Panda, S.K., Das, S., Alazab, M., Sahoo, K.S., Luhach, A.K., & Nayyar, A. (2020). A Smart Cloud Service Management Algorithm for Vehicular Clouds. *IEEE Transactions on Intelligent Transportation Systems, doi: 10.1109/TITS.2020.3021075.*
https://ieeexplore.ieee.org/document/9210815

(7) Reddy, K. H. K**.,** Luhach, A. K., Pradhan, B., Dash, J. K., & Roy, D. S. (2020). A genetic algorithm for energy efficient fog layer resource management in context-aware smart cities. *Sustainable Cities and Society*, 63, 102428.
https://www.sciencedirect.com/science/article/abs/pii/S2210670720306491

(8) Sahoo, K. S., Tiwary, M., Sahoo, B., Mishra, B. K., RamaSubbaReddy, S., & Luhach, A. K. (2020). RTSM: Response time optimisation during switch migration in software-defined wide area network. *IET Wireless Sensor Systems*, 10(3), 105-111.
https://digital-library.theiet.org/content/journals/10.1049/iet-wss.2019.0125

(9) Sankar, S., Srinivasan, P., Luhach, A. K., Somula, R., & Chilamkurti, N. (2020). Energy-aware grid-based data aggregation scheme in routing protocol for agricultural internet of things. *Sustainable Computing: Informatics and Systems*, 28, 100422.
https://www.sciencedirect.com/science/article/abs/pii/S2210537920301499

(10) Sennan S., Ramasubbareddy, S., Luhach A. K., Deverajan G. G., Alnumay, W., Jhanjhi, N. Z., Ghosh, U., & Sharma, P. (2020). Energy Efficient Optimal Parent Selection in RPL using Firefly Optimization for Internet of Things. *Transactions on Emerging Telecommunications Technologies* IF 1.594, https://doi.org/10.1002/ett.4171 https://onlinelibrary.wiley.com/doi/10.1002/ett.4171

(11) Sennan, S., Ramasubbareddy, S., Luhach, A. K., Nayyar, A., & Qureshi, B. (2020). CT-RPL: Cluster Tree Based Routing Protocol to Maximize the Lifetime of Internet of Things. Sensors, 20(20), 5858. https://www.mdpi.com/1424-8220/20/20/5858

(12) Sharip.M.R.M., Sakawi D.K.A, Zaidel, D.N., Hoole P.R. P ., Saad , M.H.I., Abdullah,, A. S., Karim, A. H. A., Halim, H. H. A, & Rahman, A. K. (2020). "Distribution Voltage in DC Microgrid System based Solar PV Topologies Config uration in Sarawak, Malaysia." *International Journal of Integrated Engineering*, 12(6), 80-86.

(13) Singkang, L.M.B., Ping, K.A.H., & Hoole, P.R. P. (2020). Electric Discharges Localization for Substation Fault Monitoring Using Two Elements Sensor. *Journal of Computational and Theoretical Nanoscience*, 17(2-3), 1009-1013.

(14) Tripathy, B. K., Sahoo, K. S., Luhach, A. K., Jhanjhi, N. Z., & Jena, S. K. (2020). A virtual execution platform for OpenFlow controller using NFV. Journal of King Saud University-Computer and Information Sciences. (https://www.sciencedirect.com/science/article/pii/S1319157820303219)

(15) Urame, U., & Hoole, P.R.P. (2020). "Design and Implementation of Hybrid Pico-Hydro – Photovoltaic (PV) Solar Power Plant in Massy-Gahuku LLG," European J of Electrical Engineering, Volume 22, Number 6, pp. 395-403, December 2020 http://www.iieta.org/journals/ejee/paper/10.18280/ejee.220601

DEPARTMENT OF FORESTRY

Head of Department: Dr. Mex Peki

The Department of Forestry at the PNG University of Technology is the only institution in the South Pacific region that offers training in tropical forestry at the professional level. The Department has integrated Degree and Diploma curricula offered at the Taraka and Bulolo campuses, respectively. The *three-year* course leading to Diploma in Forestry is completed at Bulolo. In contrast, the *four-year* course leading to the Bachelor of Science Degree in Forestry is completed at the Taraka campus.

The Mission Statement of the Department is: *Recognizing the capacity of forests to generate a large number of jobs for a given level of investment, the Forestry Department at Unitech was established to produce professionals, both men, and women, with technical production skills and expertise needed to manage PNG's forest resources sustainably. A well-managed forest is an asset to local and national economies and the well-being of current and future generations.*

Education is the University's principal mission. The Forestry Department aims to provide high-quality academic and administrative support services for undergraduates with an increasing focus on postgraduate students' training. Our postgraduate program further develops research skills that our undergraduate students 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. The Departmental research activities fundamentally fit into our educational mission to develop this problem-solving capacity. Achieving this goal requires the faculty to be well-versed in research and apply that knowledge through active research projects and programs.

Although the University's 2020 academic year has been affected by the National Government imposed State of Emergency (SOE) due to the Global Pandemic COVID-19, the 2020 Forestry Department Research year has been guided by our Department's Five-Year Strategic Plan. This Plan is our first departmental articulation of the strategies and mechanisms by which we hope to enhance our Department's research activity component. The Plan also points out significant

current constraints in attaining our objectives, and the University must be proactive in resolving these constraints. While most of our Department's research activities in 2020 have been affected by the COVID-19 Global pandemic and the associated SOE rules and restrictions, the Department maintained its ongoing research activities throughout the 2020 academic year. Regardless of the uncertainties and set-back due to COVID-19, the Forestry Department still recognizes the University's overall Vision, "*To* Grow *World-Class Technocrats for the Real World by 2024 and Beyond,"* in line with the implementation of the University's Strategic Plan 2020-2024. The Forestry Department will continue to implement its academic and research activities at the Departmental level, thereby contributing to its overall Strategic Plan in 2021 and beyond.

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 several specific research themes as follow:

- ✓ 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/Utilization
- ✓ Forest Engineering
- ✓ Forest Policy, Economics and Forest Product Marketing
- ✓ Appropriate Technology
- ✓ Remote Sensing and GIS
- ✓ Biomass Energy

SUMMARY OF FACULTY MEMBERS 2020

In the academic year 2020, Forestry Department had 22 Academic Staff (Table 1).

Table 1: Academic Staff at Forestry Department (Taraka Campus and BUC)

Name	Position	Research Interests
Dr. Mex Peki	HOD & Senior Lecturer	Forest inventory including measurements and estimation of timber volume, biomass and carbon in plants (above ground).Sustainable Forest Management and Planning
Dr Osia Gideon	Professor	Present interests in research are broad, but can be grouped into the following broad areas: Plant systematics (specialist in the families Rubiaceae, Costaceae, Zingiberaceae, Portulacaceae & Begoniaceae); Plant diversity and Conservation; Reproductive ecology of PNG Plants; New Guinea Biogeography; History of New Guinea Botany (exploration and biographies of botanists); Sustainable use of biodiversity (traditional and contemporary uses); Forest Policy for responsible sustainable development.
Dr. Mohammed Jashimuddin	Professor	Wood Science and Technology; Climate Change; Land-use Change and Classification; Forestry and Livelihoods; Co-management of Forest; Forest and Environmental Economics; and Ecosystem Services.
Dr. Cossey Yosi	Senior Lecturer	Tropical Forests Dynamics; Natural Forests Management; Forest Policy, Law and Legality; Natural forest Silviculture; Forest sampling; Payment for Forest Ecosystem Services; Climate Change and REDD+; Social and Community Forestry; Forest certification; Environmental impact studies
Mr. Peter Edwin	Lecturer 2	Wood science and technology; Forest management (Currently on PhD study leave at University of Melbourne)
Mr. Haron Jeremiah	DHOD & Lecturer 2	Forest Economics and marketing
Mr. Diaiti Zure	Lecturer 1	Natural forest Silviculture; Forest Genetics; Soil-plant-microbial interactions and nutrient dynamics under

		changing environmental conditions; Ecological and molecular responses of plants and trees (crops) to climate change; and Evolution, phylogenetic and diversity of secondary medicinal plant metabolites (Currently on PhD study leave in Taiwan)
Mr. Leonard Wana	Lecturer 1	Forest Inventory & GIS
Mrs. Maureen Nuru	Part-time Lecturer	Animal Biology
Mr. Billy Bau	Part-time Lecturer Principal Technical Officer	Plant Botany; Herbarium Curation; Plant Taxonomy; Botanical Collection; and Ecological and Biodiversity studies.
Mr. Eko Maiguo[1]	Principal Bulolo University College & Lecturer 2	Silviculture and Forest Management
Mr. Louis Veisami[1]	Technical Instructor 2	Forest Mensuration and Inventory
Mr. Benson Gusamo[1]	Lecturer 2	Wood Science & Technology, Forest Products, Non-timber Forest Products, Bio-energy
Mr. Bazakie Baput[1]	Lecturer 1	Community Forestry, Agro forestry and Forest Ecology
Mr. Olo Gebia[1]	Lecturer 1	Forest ecology and plant biology; Forest biodiversity
Mr. Tombo Warra[1]	Technical Instructor 1	Plant Eco-physiology and Conservation Ecology
Mr. John Beko[1]	Technical Instructor 1	Silviculture and Plant Propagation
Miss Pricilla Menin1	Technical Instructor 1	Community Forestry, Communities response on forest plantation and projects
Mr. Leonard Hansutan1	Technical Instructor 1	Phytoremediation - plant/soil and toxic chemical relationship
Mr. Samson Aguadi[1]	Technical Officer 1	Forest Enumeration through Imagery, Forest App Development and Forest Harvesting Operation Planning.
Mr. Koniel Alis[1]	Technical Officer 1	Bio-energy and Sawmilling

Note: [1] Faculty members based at Bulolo University College (BUC)

ON-GOING RESEARCH PROGRAMS IN THE DEPARTMENT - 2020

The Forestry Department has several on-going research activities. Still, most of them have been affected by the National Government-imposed SOE restrictions due to the COVID-19 Global Pandemic. Our Department's on-going research activities are segregated according to the general theme and briefly described in Table 2, noting the principal investigators involved.

The details of the on-going research programs in the Department include the general theme of the research study, research project or topic, the principal investigator's name, and the research status in 2020 (Table 2).

The 2020 status indicates whether the particular research activity was active as of 2020 or an on-going research study. On-going research studies are mainly those that are being undertaken on a long-term basis, most of which are collaborative research projects funded by external agencies.

Table 2: On-Going Research Programs in the Forestry Department - 2020

GENERAL THEME	RESEARCH PROJECT / TOPICS	PRINCIPAL INVESTIGATOR	2020 STATUS
1. Ecosystem and Environmental Services	1. Payment for Forest Ecosystem Services (PFES) in a community forest in PNG: A case study in Sogeram, Madang Province. 2. Estimating CO_2 sequestration from permanent sample plots: an investigation to inform the potential of payment for environmental services (PES) for Papua New Guinea communities.	**H. Scheyvens** **C. Yosi** **M. Winai** **S. Serawe** **C. Yosi**	Completed. Report published in 2020 (APN-IGES) Completed but not published yet.
2. Forest Biology, Ecology & Biodiversity	1. A review of genius Ixora in Papuasia region with an exploration of sources of species richness including flower-dependent niche partitioning. 2. Patterns of Fern Species Richness and Beta Diversity in Highlands Ecosystems of PNG. 3. New Guinea species of Ficus in section Malvanthera (Moraceae). 4. Floristic inventory of the Forestry Department Arboretum at the PNG University of Technology 5. Investigating Dynamics and Characterization of Biodiversity, Ecology, and Soil physical attributes within the natural green break forests of Bulolo Plantation, Morobe Province in PNG.	**Heveakore & O. Gideon** **G. Sosanika & O. Gideon** **B. Bau** **B. Bau** **O. Gebia, S. Aguadi and M. Karikara**	Published in 2019. Pytotaxa 409 (3) 172-178. Completed Unpublished Work still in progress Work still in progress

	6. Variation in tree diversity across green break forests within Bulolo Plantation.	**J. Anoh & O. Gebia**	Completed
3. Forest (health) Protection	1. Fruit fly community observation and assessment in PNG forests for forest health analysis.	**R. Opasa & R. Pokon**	Completed
4. Wildlife Management, Community-Driven Forest Conservation	1. The Role of Indigenous Knowledge in Forest Management: Implication for the Multi-purpose National Forest Inventory in PNG.	**C. Bigol & M. Peki**	Mphil awarded in 2020
5. Role of Forests In Climate Change and Carbon Trade	1. Modeling of Forest Soil Carbon on Primary Forest Types in Morobe Province using Terrain Attributes.	**L. Moripi & M. Peki**	Mphil awarded in 2020
6. Silviculture, including Reforestation and Plantation Management	1. The reliability of determining accurate volume from green weights of merchantable Klinkii logs. 2. Validating model developed to estimate volume from weight of Klinkii logs in Bulolo pine plantations.	**L. Veisami, E. Maiguo & M. Peki** **L. Veisami & M. Peki**	Mphil awarded in 2020 Work still in progress
7. Wood Science and Technology; Timber Production/Utilisation.	1. Physical, Mechanical and Wood Working Properties of *Trema orientalis* (L) Blume in PNG. 2. Evaluating treatability of 28 plantation and secondary forest wood species of Papua New Guinea	**S. Komut & M. Peki** **B. Gusamo**	Mphil/2 Re-enrolled 2020 Completed. Paper submitted to *Madera Ciencia y Technologia* for publication

POSTGRADUATE RESEARCH PROJECTS IN 2020

In 2020, the Department had on record fourteen (14) postgraduate research studies being undertaken either as an on-going program, in the final stages of submission of the thesis; corrections carried out, or candidates graduated (Table 3). Most of these studies were undertaken by students from other organizations outside of the University, including PNG Forest Authority, PNG Forest Research Institute, New Guinea Binatang Research Center, and Ramu Agribusiness-ENBPOL. These researches were undertaken at MSc, MPhil, and PhD levels. In 2020, twelve (12) postgraduate students undertook MPhil studies; one (1) postgraduate student studied for an MSc, and one (1) student undertook a PhD study by research. Of these postgraduate studies, five (5) were continuing studies in 2020, and the Forestry Department recorded three (3) of the candidates successfully graduating in November 2020. The candidates who graduated in 2020 were Leroy Moripi and Louis Weisami of the Forestry Department; and Constin Bigol of PNG Forest Authority.

The other postgraduate research studies will continue into 2021 (Table 3).

Table 3: Postgraduate Research Projects - 2020

#	STUDENT NAME	PG CODE	THESIS / RESEARCH TOPIC	PRINCIPAL SUPERVISOR	EXTERNAL SUPERVISOR	2020 STATUS
1	Nathan WAMPE	MPhil/2	Causes and motivation of Anthropogenic Grassland Fires in the Ramu-Markham valleys	Dr. Cossey Yosi		Proposal submitted, Research continuing
2	Ben RULI	MPhil 1	Interlinkages between logging, forest conservation, health, well-being, and livelihoods in PNG and tropical forests globally	Dr. Cossey Yosi	Dr. Jo Middleton Prof. Vojtech Novotny	Proposal submitted, Research continuing
3	Constin BIGOL	MPhil/2	The Role of Indigenous Knowledge in Forest Management: Implication for the Multi-purpose National Forest Inventory in PNG	Dr. Mex Peki	Dr. Ruth Turia	Graduated in 2020
4	Steven KOMUT	MPhil/2	Physical, Mechanical and Wood Working Properties of *Trema orientalis* (L) Blume in PNG	Dr. Mex Peki	Professor M Hossain	Re-enrolled in 2020
5	Leroy MORIPI	MPhil/2	Modeling of Forest Soil Carbon on Primary Forest Types in Morobe Province using Terrain Attributes	Dr. Mex Peki	Dr. Peter McIntosh and Mr. Nalish Sam	Graduated in 2020
6	Reedley S. OPASA	MPhil/2	Fruit fly community observation and assessment in PNG forests for forest health analysis	Mr. Rapo Pokon	Prof. Novotny	Completed
7	Jason PALIAU	MPhil/2	Using distribution of geomatridae moths to understand the changes in forest along the latitudinal gradient in PNG	Mr. Rapo Pokon	Prof. Novotny	Completed
8	Miller KAWANAMO	MPhil/2	Tree species diversity and forest structure in different vegetation types and disturbance levels	Prof. OG Gideon	Prof. Novotny	Study Terminated
9	Louis WEISAMI	MPhil/2	The reliability of determining true volume from green weight relationship for Klinkii pine logs	Eko Maiguo	Dr Mex Peki	Graduated in 2020
10	Daniel OKENA	Mphil/2	Ecology of Mammal Communities Along Altitudinal Gradient in Papua New Guinea	Prof. O.G. Gideon	Prof. Novotny	Study in progress

11	Gabriel PETUAL	Mphil/2	Ecological role of alien species in early successional vegetation along a rainforest altitudinal gradient in Papua New Guinea	Prof. O.G. Gideon	Prof. Novotny	Study in progress
12	Alfred MANI	Mphil/2	Ecology of Plant-insect food webs in tropical forests of PNG	Dr. Cossey Yosi	Prof. Novotny	Study in progress
13	Hayden WAGIA	MPhil/2	The effect of 20-years El Nino extreme on the dynamics of lowland tropical rainforest in Papua New Guinea.	Dr. M. Peki	Prof. Novotny	Study upgraded to PhD

UNDERGRADUATE RESEARCH PROJECTS IN 2020

Table 4: Final Year Student Research Projects

No.	Student Name	Title	Principal Supervisor(s)	External Supervisor
1	Belmain Topul	Diffusion of inorganic salts in selected hardwood species using industrial Dip treatment practice of Papua new Guinea: A review.	Mr. B. Gusamo	
2	Moses Tiroro	Fungal Decay Resistance of selected plantation and secondary species of PNG	Mr. B. Gusamo	
3	Murina Moses	Assessing the Cause of Black Stem on *Eucalyptus pellita* Seedlings	Mr. R. Pokon	
4	Eroy Kotipe	Investigate the impact of *Piper aduncum* (piperaceae) on tree biodiversity.	Professor M. Jashimuddin	
5	Jayford Annoh	Variation in tree diversity across green break forest within Bulolo Plantation	Mr. O. Gebia	Mr. M. Kamar
6	Pamela Naro	Provenance Variation In Growth of 5-year-old Teak (*Tectona grandis*) in Morobe Province, Papua New Guinea.	Dr. C. Yosi	Mr. Anton Lata
7	Ceiline Figa	Growth performance of *Eucalyptus Pelita* seedlings on used fiber cells	Mr. H. Jeremiah	
8	Sebby Bayuve	Comparative study of growth performance of seedlings between direct sowing and transplanting of *Eucalyptus pellita* F.Muel seeds.	Mr. H. Jeremiah	
9	Sinare Nicknal	Assessment economic loss of fertilizer application on *Eucalyptus pelitta* seedlings using seedling trays	Mr. H. Jeremiah	
10	Mais Helmut	Comparing stand structure and characteristics of a Man-made planted forest in Unitech Arboretum and a natural forest stand in Busama area.	Dr. M. Peki	
11	Wesley Benson	Determination of erodibility Index (K) of soil in the Busama Area using the Revised Universal Soil Loss Equation	Mr. L. Wana	

		(RUSLE)		
12	Duncan Hulala	Investigating effect of floral sources on colour and quality of honey produced in the eastern highlands province, PNG.	Mr. L. Wana	
13	Tina Brunga	Comparison of soil carbon content in three different vegetation sites around Unitech campus	Dr. M. Peki	
14	Rodney Frank	Measuring Above Ground Biomass (AGB) and Carbon Stock for Yalu Community Forest.	Dr. C. Yosi	
15	Nawak Joe	Above ground biomass for the Forestry Department arboretum at Unitech	Mr. L. Wana	
16	Samoa Sita	Planning characteristics of PNG *Eucalyptus pelitta* from plantation and regrowth forest.	Professor M. Jashimuddin	TFTC Instructor
17	Iffiso Maeoka	A Review on Energy Generation through Wood Gasification	Dr. M. Peki	Mrs. R. Maeoka, Electrical Engineering Dept
18	Rexton Kurai	Climate Change Mitigation and Adaptation in PNG: A review of national strategies.	Professor M. Jashimuddin	
19	Fauka Hefompa	Ethnobotanical survey on traditional medicinal plants used by the Ahi people within the Lae and Huon Gulf District, Papua New Guinea.	Mr. B. Bau	
20	Wie Arang	Assessing growth and life cycle of annual seed bank	Mr. H. Jeremiah	
21	Joshua Solomon	Global Warming Effects on Forest Litter Decompositions in Papua New Guinea. A Review	Professor M. Jashimuddin	
22	Waike Waike	Functional Variation of Secondary Regenerants along Altitudinal Gradient in PNG Tropical Rainforest	Mr. Olo Gebia	Mr. M. Kamar
23	Philemon Warambukia	Effect of El-Nino induced drought on plant diversity and structural dynamics of lowland tropical rainforest in northern New Guinea (Wanang)	Professor O. Gideon	

ON-GOING RESEARCH COLLABORATION WITH EXTERNAL PARTNERS

Forestry Department is also active in collaborative research with external partners over the years. 2020 has been awful for the Department due to the uncertainties created by COVID-19 and the National Government imposed SOE restrictions and rules.

As of 2020, Forestry Department had two (2) research collaborations with external partners. These research projects are funded by international organizations, including the Australian Center for International Agricultural Research (ACIAR) and the Asia Pacific Network for Global Change Research (APN).

The details of the two (2) internationally supported research projects in the Forestry Department in 2020 members of the staff who are currently participating in these projects are given (Table 5).

Table 5: Research Collaboration with External Partners

RESEARCH PROJECT TITLE	SPECIFIC RESEARCH TOPIC / PRINCIPAL INVESTIGATOR	COLLABORATION PARTNERS	FUNDER / SPONSOR	2020 STATUS
1. Sustainable levels of timber harvesting in PNG	Estimating Exploitation Factors associated with Annual Allowable Cut (AAC) in Timber Concessions in PNG. Dr. Cossey Yosi – Principal Investigator	Professor Rodney Keenan, University of Melbourne, Australia.	ACIAR Alumni Research Facility (ARF)	Grant awarded in December 2020
2. APN Research Project: Effective Models for Payment Mechanisms for Forest Ecosystem Services in PNG, Philippines and Thailand.	Payment for Forest Ecosystem Services (PFES) in a community-managed forest in PNG: A case study in Sogeram, Madang Province. **Henry Scheyvens – IGES, Japan** **Cossey Yosi – Unitech, PNG** **Mark Winai – FPCD, PNG** **Stewart Serawe – FPCD, PNG**	Asia-Pacific Network for Global Change Research (APN); Institute for Global Environmental Strategies (IGES); UNITECH Forestry Department; Foundation for People and Community Development (FPCD)	Asia-Pacific Network for Global Change Research (APN)	Completed and final Report Published in 2020. *(www.apn-gcr.org/resources/)*

PUBLICATIONS IN JOURNALS / PUBLISHED PROJECT REPORTS - 2020

Our Academic staff in the Department have been involved in the publication of scientific articles in 2010. The details of these publications are presented in Table 6.

Table 6: List of Journal Publication in 2020

STAFF NAME	PUBLICATION DETAILS
Prof. Dr. Mohammed Jashimuddin	1. Chowdhury, F.I., Islam, K., Al Faroque, M. Islam, K.N., Rahman, M.F., Arif, M.T.A., Nath, T.K., & **Jashimuddin, M**. (2020). Assessing the impacts of co-management on protected area landscape under socio-imagery lens: Evidence from Bangladesh. *Journal of Sustainable Forestry*, https://doi.org/10.1080/10549811.2020.1747497 [Taylor & Francis Online, UK]. 2. Islam, K., Rahman, M.F., Islam, K.N., Nath, T.K., & **Jashimuddin, M. (**2020). Modeling Spatio-temporal Distribution of *Dipterocarpus turbinatus* Gaertn. F in Bangladesh Under Climate Change Scenarios. *Journal of Sustainable Forestry*, **39**(3): 221-241. https://doi.org/10.1080/10549811.2019.1632721 [Taylor & Francis Online, UK] 3. Islam, K.N., Rahman, M.M., **Jashimuddin, M.**, Islam, K., & Zhang, Y. (2020). Impact of co-management on tree diversity and carbon sequestration in protected areas: Experiences from Bangladesh. *Trees, Forests and People*, 2 (2020), 100033, ISSN 2666-7193, https://doi.org/10.1016/j.tfp.2020.100033 [ELSEVIER] 4. Nath, T.K., **Jashimuddin, M.,** & Inoue, M. (2020). Achieving sustainable development goals through participatory forest management: Examples from South-Eastern Bangladesh. *Natural Resources Forum - A United Nations Sustainable Development Journal*, 44(4): 353-368. https://doi.org/10.1111/1477-8947.12209 [John Wiley & Sons, Inc.]

OTHER PUBLICATION/REPORT

STAFF NAME	PUBLICATION DETAILS
Dr. Cossey Yosi	1. Scheyvens, H., Winai, M., Serawe, S. and **Yosi, C.K.** (2020). Effective Models for Payment Mechanisms for Forest Ecosystem Services in Madang Province in PNG. In: Kawasaki. J. and Scheyvens. H. (Eds,). 2020. Effective Models for Payment Mechanisms for Forest Ecosystem Services in Papua New Guinea, Philippines and Thailand. Kobe, Japan: Asia-Pacific Network for Global Change Research (APN) and Institute for Global Environmental Strategies (IGES). *(www.apn-gcr.org/resources/*

SEMINAR /WORKSHOP AND CONFERENCE

FORESTRY DEPARTMENT SEMINARS HELD IN 2020

The Forestry Department Seminars for 2020 were affected dramatically by the uncertainties associated with the COVID-19 global pandemic. The Department was unable to get seminar presenters outside of the University to present their research studies. However, the Department maintained the on-going research by our postgraduate and undergraduate students and our academic staff at both the Taraka and Bulolo campuses. Considering the restrictions associated with the National Government-imposed SOE, the Department had the opportunity to have a seminar delivered by one of its Mphil students. Table seven (7) gives details of the seminars presented by the Mphil student.

To compensate for our Postgraduate students' lack of presentations at the seminar in 2020 due to the restrictions associated with COVID-19, our Department-based Research Supervisors had several face-to-face consultations with the postgraduate students.

The details of the seminar presented by one of our postgraduate students and the face-to-face consultations held between our Department based Supervisors and postgraduate students in 2020 is shown in Table seven (7) below;

Table 7: Forestry Department Seminar Conducted in 2020

DATE	PRESENTERS NAME	ORGANISATION	PRESENTATION TITLE	SUPERVISOR	2020 STATUS
18/06/2020	Hayden Wagia	Forestry Department, PNG Unitech	Population ecology of New Guinea rainforest trees: mortality, growth and recruitment.	Dr. Mex Peki	**Seminar delivered**
FACE TO FACE CONSULTATION BETWEEN SUPERVISOR AND POSTGRADUATE STUDENT					
	NAME OF POSTGRADUATE STUDENT	**PROGRAM**	**RESEARCH TITLE**	**SUPERVISOR**	**2020 STATUS**
10/06/2020	Nathan WAMPE	MPhil/2	Causes and motivation of Anthropogenic Grassland Fires in the Ramu-Markham valleys	Dr. Cossey Yosi	Research continuing
26/11/2020	Ben RULI	Mphil 1	Interlinkages between logging, forest conservation, health, well-being, and livelihoods in PNG and tropical forests globally	Dr. Cossey Yosi	Research continuing
26/11/2020	Gabriel PETUAL	MPhil/2	Ecological role of alien species in early successional vegetation along a rainforest altitudinal gradient in Papua New Guinea	Prof. O. Gideon	Indicated to PG School to submit thesis in January 2021
26/11/2020	Alfred MANI	MPhil/2	Ecology of Plant-insect food webs in tropical forests of PNG	Dr. Cossey Yosi	Indicated to PG School to submit thesis January 2021

STAFF SEMINAR PRESENTATIONS OUTSIDE THE FORESTRY DEPARTMENT

Departmental staff continued the research activities during 2020, despite the COVID-19 Global Pandemic and the National SOE's associated restrictions. Only a few staff members managed to participate in research-related meetings outside the University. The details of the research related meeting participation by the Forestry Department staff in 2020 is presented below;

Presentation of Research Papers:

NIL

Workshop, Seminar, and Conference Attendance by academics in 2020:

1. Dr. Mex Peki

a) Workshop on Review of the PNG National Forestry Act 1991, held at the PNG Forest Research Institute in October 2020.
b) Workshop on Writing Teacher's Guide in teaching Agriculture in Grade 9 to Grade 12. Organized and sponsored by PNG Department of Education, held at Sogeri Lodge, Central province from 03-13 March 2020.

2. Dr. Cossey Yosi

a) Meeting funded by UNDP GEF Small Grant Program, National Steering Committee Meeting, held in Port Moresby's Grand Papua Hotel, 02 December 2020.

3. Professor Osia Gideon

a) Attended Workshop on Review of the PNG National Forestry Act 1991, held at the PNG Forest Research Institute in October 2020.

4. Mr. Haron Jeremiah

a) Attended Workshop on Review of the PNG National Forestry Act 1991, held at the PNG

Forest Research Institute in October 2020.

CONSTRAINTS

World-competitive research today occurs only when specific, mandatory infrastructure is present. Because forestry relies so much on fieldwork, reliable personal transport (4-wheel drive vehicle) is our foremost constraint. While lab space and overall research funding are general issues at PNGUoT, high-quality research is often possible in forestry at a surprisingly low cost. Our lab space is good compared to other departments.

Less mentioned but probably most fundamental to achieving world-competitive research is access to relevant primary literature that is woefully inadequate at PNGUoT. We rely on antiquated interlibrary loan hardcopies, which themselves are limited, plus a few free access journal networks provided by non-profit institutions that do not access many forestry journals. In contrast, researchers overseas enjoy electronic access via an appropriate subscription level to the Web of Science, including a spectrum of high caliber Forestry and related journals. Expatriate faculty and some senior national faculty suffer less from this deficiency if they have library connections (via overseas schools they attended, overseas advisors they studied under, etc.) or can pull in literature during overseas annual leaves (i.e., Expatriates). Faculty lacking such connections are at a disadvantage within the Forestry Department and, more generally, in the University. The national faculty have not recently gone on overseas study leave who suffer disproportionately. This inequality must be recognized and addressed through much-improved university-wide access to the primary literature.

Generally, the major constraint for research in the Department in the academic year 2020 was the restrictions and rules imposed by the National Government under the SOE as part of the control measures of the COVID-19 Global Pandemic.

The Forestry Department hopes that as the Global Community and PNG adapt to the new normal resulting from COVID-19, academic life at Unitech and the associated activities, including research, will return to normal in 2021, so that activities at our Department will operate smoothly without disruption.

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

A/Head of Department: Mr. John Lanta

Introduction

The two-core functions of the University that is related to academia is Teaching and Research. Whilst teachings have been adequately covered with the staff, we have on hand year in year out, research has been our weakest in general. Several factors that contribute to this:

(i) Most staff mainly citizen staff have qualifications no higher than Master's degree. Therefore, research experience is very limited and writing a paper for a journal is almost impossible without supervision and direction. Therefore, they look upon the non-citizen staff to take lead and provide the opportunity.

(ii) With the exception of a few, most non-citizen staff we have had so far helped out mostly in the teaching function and so provided little to no help in the research area. Two reasons from my observation, one either the non-citizen staff we recruited have no experience themselves in producing research papers or two, very conservative in opening to invite citizen colleagues for possible post graduate research opportunities. This has limited the growth of research in this department for ages.

1. **Area of specialization for the academic staff members**.

Mr. John Lanta	Differential equations
Dr. Chris Wilkins	Probability theory
Prof. Dr Mihail Ursul	Topological groups and rings, applications of topology, Banach algebras, Abelian groups
Dr. Moshen Aghaeiboorkheili	Partial differential equations
Mr. Raymond Kuna	Discrete mathematics, topological rings
Mr. Joel Tahie	Discrete mathematics, Boolean algebras and Boolean spaces
Mr. Isaac Angra	Cryptography
Mr. Boaz Andrews	Statistics

Mr. Benson Mirou	Computer Science – Software Engineering
Mr. Nicholas Puy	Computer Science
Mr. Nerit Lenz	Computer Science
Mr. Yaling Tapo	Computer Science
Mr. Sankwi Abuzo	Curriculum Management System

2. **Priority research areas of the Department**:

Members of the Department are interested in the following domains of mathematics:

(a) Applied mathematics including areas: probability theory, ordinary and partial differential equations, numerical methods.

(b) Theoretical mathematics including topological rings, groups and lattices. Moreover, some members of the department are working in cryptography. Supplementary to this, the department has activated weekly departmental seminar in which new results from research paper are discussed. Senior staff members are giving lectures for young members of the department.

3. **Research Projects of Post Graduate Students**:

Student	**Research topic**	**Founding Source**	**Supervisor**	**Remarks**
Joel Megusa Tahie (MSc in Mathematics	Bohr Topology on Boolean Rings	Self-sponsored	India	Currently on study leave under ICCR Scholarships in MSc (Maths) Prog
Isaac Angra	Secret Sharing Schemes Over Elliptic Curve Cryptography	Self-Sponsored	Dr Moshen Aghaeiboorkheili	PG program delayed
Sankwi Abuzo	Curriculum management System	LNSDC	Dr Wilkins	
Benson Mirou (PhD)	Development of e-Crop Disease App for farmers in PNG (E-Agriculture)	LNSDC	A/Prof. Maino	
Nicholas Puy MSc in Computer Science		Scholarships	India	Currently on study leave under ICCR Scholarships in

				MSc (Computer Science) Prog
Boaz Andrews		Self-Sponsored	Professor Mihail Ursul	
Malcolm Dopaim		Self-Sponsored		
John Lanta	Discrete Mathematics, Topological Rings	LNSDC	Professor Mihail Ursul	

4. The list of Journal publications

1. Aghaeiboorkheili, Mohsen. (2020). Solving mixed boundary values problem on simply connected regions. *Advances in Mathematics: Scientific Journal*, 9(10), 8725–8748.

2. Martin, Juráš., & Mihail, Ursul. (2020). On commuting probabilities in finite groups and rings. arXiv preprint arXiv:2010.01188.

3. Mohamed, A., Oyekola, P., & Aghaeiboorkheili, M. (2020). Effective Engineering Education Accreditation and Industrial World Challenges. *Solid State Technology*, 63(4), 1524-1531.

4. Mohamed, Aezeden., Peter, Oyekola., & Mohsen, Aghaeiboorkheilh. (2020). Engineering Students Performance and Assessment of Mathematics Courses, *Solid State Technology*, vol. 63 (4), 1532-1539

DEPARTMENT OF MECHANICAL ENGINEERING

Head of Department: Professor John Pumwa, PhD

Introduction

The Department of Mechanical Engineering considers engineering research very important as it leads to an expansion of knowledge and discoveries of new products and services. It is through research that leads to breakthroughs in engineering and technology. Research and experimental development comprise creative work undertaken systematically to increase the stock of knowledge, including knowledge of man, culture, and society, and the use of this stock of knowledge to devise new applications.

Engineering research is the systematic investigation and study of materials and sources to establish facts and reach new conclusions, shaping people's understanding of the world around them. Research involves testing hypotheses and predictions using testable data and a whole battery of scientific and engineering tools and methods.

Focused Research Areas

The department has decided to concentrate and focus on the following areas of research in mechanical engineering:

i. *Design and Manufacturing*
ii. *Energy and Environment*
iii. *Materials Characterization*
iv. *Engineering Education and Management*

The department encourages faculty to conduct their research concentrating and focusing on the above areas.

Research Seminars

Departmental staff and postgraduate students are encouraged to present seminars regularly and as often as possible. The research coordinator is encouraged to schedule regular research seminars basing on the above areas of research interest.

Faculty Research Interests

The following Table provides research areas of interest for the current faculty members:

Academic Staff Members	Research Areas
Professor John Pumwa, Ph.D.	Tribology (Friction, Wear and Lubrication), Failure Analysis, Energy, Biodiesel, Vehicle Emission Effect on the Environment, Engineering Education.
Professor Nicholas Lambrache, Ph.D.	3-D modeling of weak parts and subsystems, Finite Element, Simulation on stresses – including dynamic stresses and fatigue, Fatigue experiments on computer controlled devices, Statistical interpretation based on accumulated data from the mine site, Material Science interactive research on minerals affecting strength of metal alloys in mining equipment.
Kamala K. Muduli, Ph.D.	Operations Management, Decision sciences, Supply Chain Management, Sustainable Development, Health Care, Waste Management, Ergonomics.
S. Wahid, Ph.D.	Research in the Broader Area of Energy, Renewable/Sustainable Energy, Environment and Pollution, Heat Exchanger's, Behavior/Control of Heat Flow at the Interface of Materials, , Tribology, MEMS in Energy Exchange Applications.
G M. Arshed, Ph.D.	Numerical Analysis, Fluid Dynamics
A. Mohamed, Ph.D.	Corrosion
Shoeb Ahmed Syed, Ph.D.	Numerical Modeling, Computational Fluid dynamics and Heat transfer, Combustion, Fluid-Structure Interaction, Turbulence, 2 or 4 stroke reciprocating engines, Renewable energy

R.S. FonoTamo, PhD	Design and Manufacturing, Materials Development Characterization, Tribology.
Mr. Jack Khallahle	On Study leave
Mr. Samuel Dunstan	On Study leave
Mr. Steve Ales Korokan	On Study leave
Mr Kingsford Karo Komuna	
Mr. Brian N'Drelan	Renewable energy – use of solar to provide power, efficiency management of renewable energy, 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, Safety Analysis of Causes of Accidents leading to analysis of design and even management of existing practices – looking at ethical implications.

Undergraduate Research Projects

The following are final year Mechanical Engineering Students projects offered in 2019 as part of the partial fulfillment of their degree:

Title No.	**Suggested Description**	**Suggested by (Lecturer)**	Number of Students
1	Mini hydro power plant	Professor John Pumwa	2
2	Biodiesel Production Using Waste Cooking Oil (from student's dining facilities)	Professor John Pumwa	2
3	Robotic Platform For Non-Destructive Inspection	Dr A. Mohamed	2
4	Application of Computer Vision in Failure and Crack Detection	Dr A. Mohamed	3
5	Analysis of Marine Corrosion in PNG Ports Using Cathodic Protection	Dr A. Mohamed	2
6	Waste Management - Waste Used Engine Oil from Mining Operations	Mr. Brian N'Drelan	3

7	Design of oyster device for conversion of tidal wave energy for power generation	Dr G M. Arshed	2
8	water treatment in rural areas	Dr G M. Arshed	2
9	Micro-hydro for teremara village	Mr Kingsford Karo Komuna	2
10	Humidification-dehumidification Desalination	Mr Kingsford Karo Komuna	1
11	Biogas Production from Chicken Manure for Outgrowers	Mr Kingsford Karo Komuna	3
12	Assessment of Musculoskeletal Disorders (MSDs) of factory Workers in Papua New Guinea	Dr Kamala K. Muduli	3
13	Life Cycle Assessment on Healthcare Waste and Its Problems in Select Cities of Papua New Guinea.	Dr Kamala K. Muduli	2
14	Design of Suitable Plant Layout using CRAFT.	Dr Kamala K. Muduli	2
15	Construction of an Automatic Hand Sanitizer Dispenser Using HC-SR04 Ultrasonic Sensor	Dr Kamala K. Muduli	2
16	Robotic Arm on Arduino Platform	Professor Nicholas Lambrache,	
17	Mini hydro power plant	Dr S. Wahid	3
18	Design and fabrication of heat exchanger	Dr S. Wahid	3
19		Dr S. Wahid	2
20	Study of the Pyrolysis Process of Converting the Plastics into Bio-Fuel to use in Automobiles	Dr Shoeb Ahmed Syed	3
21	Water Lifting Technologies without Electricity Applicability to Highlands in PNG	Dr Shoeb Ahmed Syed	2
22	Design of Vegetables Storage Unit Based on Renewable Energy to Reduce the Wastage of Vegetables in the Market due to High temperature.	Dr Shoeb Ahmed Syed	2

23	Design of Solar Cooker	Dr Shoeb Ahmed Syed	2
24	Design of Automatic feeder of fuel to the boiler	Dr R.S. FonoTamo	2
25	Design and Fabrication of Paper Shredder	Dr R.S. FonoTamo	2

Postgraduate Students Research

The following projects are being conducted by our Postgraduate Students:

Item	Research Projects	Status	PG student
1	Mechanical Component Failure In Inventory Management	Continuing	Brian N'Drelan (PhD)
2	Robotic Detection of Failure on Ferromagnetic Structures	Continuing	Peter Oyekola Oluwatosin (PG)
3	Chloride Enhanced Corrosion of Steel in Marine Environment of Papua New Guinea	Continuing	Rolland Mark (PG)
4	Investigating the Effect of Preventive Maintenance on Machine Reliability in a Beer Processing Plant	Continuing	Jacob Ben (PG)

List of Publications

1. Agarwal A., Seretse O. M., & Pumwa, J. (2020). "Finite Element and Tagushi Response Analysis of the Application of Graphite Aluminium MMC in Automotive Leaf Spring", *Journal of Mechanics of Continna and Mathematical Sciences,* ASSN (online): 2454-7190, 15 (7), pp 168-179. ISSN (Print) 6973-8975.
2. Arshed, G.M. & Khan, O.U. (2020). Robust low-dissipative scheme for curvilinear grids, *International Journal for Numerical Methods in Fluids,* pp.1–24. https://doi.org/10.1002/fld.4941
3. Behera, R. K., Samal, B. P., Panigrahi, S. C., & Muduli, K. (2020). Microstructural and Mechanical Analysis of Sintered Powdered Aluminium Composites. *Advances in Materials Science and Engineering, Article* ID 1893475, https://doi.org/10.1155/2020/1893475
4. Ben, J., Mohamed, A. & Muduli, K. (2020). Optimizing Bottle Washer Performance in Cleaning Returnable Glass Bottles for Reuse in Beverage Packaging. *International Journal of Advanced Science and Technology*, 29(7), 8149-8159.

5. Dash, S., Sarangi, M. K., Dash, M., Sahoo, D. S., & Muduli, K. (2020). Role of Dairy Cooperative Society in Empowering Women in Rural Odisha. *International Journal of Advanced Science and Technology*, 29(7), 461 - 467. http://sersc.org/journals/index.php/IJAST/article/view/13245.
6. David, S. K., Biswal, J. N., Muduli, K., Peter, O., & Pumwa, J. (2020), Design and Analysis of an Hydraulic Trash Compactor, *Test engineering and Management*, 82, Jan-Feb, pp. 8877-8888.
7. Fono-Tamo R. S. (2020). Influence of Fly Ash Particles on Surface Roughness and Friction Coefficient of Magnesium Metal Composites. *International Journal of Darshan Institute on Engineering Research and Emerging Technologies*. 9(1), 19-23
8. Joseph, O., Muduli, K., Olutola, F., Peter, O., & Pumwa. J. (2020). Considerations for the Design of a Budget Automotive Service Shed. *International Journal of Advanced Science and Technology*, 29(7), 195 - 203. http://sersc.org/journals/index.php/IJAST/article/view/13207
9. Khan, O.U., & Arshed, G.M. (2020). Simulation of Acoustic Radiations Over an Open Cavity Using High-Resolution Numerical Scheme, 2020 AIAA SciTech Forum, *AIAA 2020-1750*, Orlando, Florida, USA
10. Mallick, P., Muduli, K., Biswal, J. N., & Pumwa, J. (2020). . Broiler Poultry Feed Cost Optimization Using Linear Programming Technique. *Journal of Operations and Strategic Planning*, 3(1), 31-57.https://doi.org/10.1177/2516600X19896910
11. Mangla, S. K., Luthra, S., Jakhar, S., Gandhi, S., Muduli, K., & Kumar, A. (2020). A step to clean energy-Sustainability in energy system management in an emerging economy context. *Journal of Cleaner Production*, *242*, 118462.
12. Mohamed, A., Oyekola, P., & Aghaeiboorkheili, M. (2020), Effective Engineering Education Accreditation and Industrial World Challenges, *Solid State Technology*, Vol. 63 No. 5.
13. Mohamed, A., Oyekola, P., & Aghaeiboorkheili, M. (2020), Engineering Students Performance and Assessment of Mathematics Courses, *Solid State Technology*, Vol. 63 No. 4.
14. Muduli, K., Luthra, S., Kumar Mangla, S., Jabbour, C. J. C., Aich, S., & de Guimarães, J. C. F. (2020). Environmental management and the "soft side" of organisations: Discovering the most relevant behavioural factors in green supply chains. *Business Strategy and the Environment*, *29*(4), 1647-1665.
15. Peter, O., Muduli, K., Pumwa, J., Maryam, O., Tochukwu, N., & David, S. K. (2020). Solar Powered Wheel Chair for Lower Limb Amputee. *International Journal of Advanced Science and Technology*, 29(7), 369 - 377. http://sersc.org/journals/index.php/IJAST/article/view/13231
16. Pumwa, J., & Mohamed, A. (2020). Importance of Mathematics in Developing Science, Technology and Engineering Education in Papua New Guinea, *Solid State Technology*, Vol. 63 No. 5
17. Panigrahi, R. R., Tanty, G. Behera, J. R. Dash, M. Mohanty, A., & Muduli K. (2020) Analyzing the Impact of Inventory Management System on Economic Growth of Manufacturing Firms in India. *Test engineering and Management*, 83(March-April), pp 17439 – 17448

18. Sahoo, A. Moharana, S. Dash, M., & Muduli, K. (2000), Impact of Macroeconomic Variables on Performance of Nifty in Indian Stock Market. *Test engineering and Management*, 83(March-April), pp 9404 – 9413

Book Chapters

1. Agarwal, A. Seretse, O. M., Letsatsi, M. T. & Pumwa, J. "Optimization of Rectangular Plate with Circular Opening to Improve Buckling Characteristics", In a book: Advances in a Lightweight Materials and Structures, October 2020, pp 97 - 105

Patent

1. Behera, R.K., Muduli, K, Mohamed, A., et al.(2020) A NOVEL ALUMINUM METAL MATRIX COMPOSITE PRODUCED BY POWDER METALLURGY METHOD, No.-202031044353A; International classification :B22F3/10

DEPARTMENT OF MINING ENGINEERING

Head of Department: Dr Gabriel Arpa

The Mining Engineering is one of the 13 Academic Departments in the Papua New Guinea University of Technology. The Department offers two Degree programs - Bachelor of Engineering in Mining Engineering, and Bachelor of Engineering in Mineral Processing Engineering. It offers undergraduate as well as postgraduate degree programs in Mining (B.Eng.Mining) and Mineral Process Engineering (B.Eng. Mineral Process). The postgraduate program has a robust Master of Philosophy (M.Phil) and started enrolling Doctor of Philosophy (PhD) candidates. The M.Phil and the PhD programs are research-based degree programs.

The Department has 13 academic staff (5 with PhD, 1 enrolled in PhD here in the department (Mary Kama) and 1 enrolled in Queensland University of Technology, (Wilson Kobal) and is expected to graduate this year 2021. We have 4 Technical staff, 2 Administrative staff and two auxiliary staff. One of our Mining engineering staff member, Mr. Gideon Yowa has just graduated with Masters of Science in Mining Engineering under the Australian Awards Scholarship at the James Cook University, Australia. Three (3) of our academic staff are currently on study leave doing their M.Phil studies here in the department.

Currently, we have 7 students enrolled in Masters of Philosophy in the Department embarking on research in Mining and Mineral Processing field and 1 staff enrolled in PhD. The Department is committed to delivering quality teaching, research and outreach activities including Government and Industry based and postgraduate research and development studies. The Department established a five year Strategic Development Plan (2016 -2020) and another Development Strategic Development Plan in alignment with the University's Strategic Plan (2020- 2025) as well as the long term plan. As all Engineering Departments are undergoing International Accreditation of their Degree program in line with PNG National Qualification Frame work Level 8 and Washington Accord for four year degree, the Department is continuously reviewing its programs for each year level since 2017. Its curriculum is reviewed annually in consultation with international standards and key national stakeholders, both Government, Industry as well as other national and international institutions and private partners. As a result, the Accrediting body, (Engineers Australia, EA) assessed our programs and granted Provisional Accreditation of our two programs in 2019.

The Department has a very strong Industry partnership and collaboration which resulted in staff and students engaged in real-industry based research projects, as well as providing research-based consultancies, particularly in the Mining Industry. The Department signed MoUs with K92 Mine, University of Queensland (Australia), Mineral Resources Authority (MRA) as well

and local resource land owners. A significant project under taken the the Department was the management of the Independent Peer Review (IPR) of the Environment Impact Studies (EIS) for the world class Wafi/Golpu Gold and Copper deposit in the Morobe Province.

RESEARCH THEME AND FOCUS AREAS

The Department's research focus and interest is centered on resource exploitation and extraction techniques, environmental solutions to mining-related waste and safety. The main focus areas are;

Mining Engineering

- Environmental engineering
- Mining production optimization
- Geological modelling and evaluation of uncertainties
- Engineering geology
- Geomechanics and rock mass deformation and behaviour
- Alluvial mining techniques and resources evaluation
- Optimization of gold recovery system
- Innovative solution to Acid Rock Drainage (ARD) problems from mine waste.
- Mineral Economics
- Mineral Taxation Policy
- Underground Mining Methods and Optimization
- Ore Reserve Estimation
- Rock Slope Stability Analysis

Mineral Process Engineering

- Hydrometallurgy of gold and base metals – copper, nickel, chromium, cobalt 2.
- Process mineralogy, plant optimization & design.
- Froth flotation of base metal sulphides and gold
- Froth flotation of ilmenite.
- Optimization of alluvial gold extraction with focus on elimination of mercury (Hg)

- Flotation characteristics of sericite.
- Effect of clayey minerals on gravity concentration of gold
- Pyrometallurgy

INDUSTRY FUNDED AND INDUSTRY-BASED RESEARCH COLLABORATIVE PROJECTS

1. Independent Peers Review (IPR) of the Environment Impact Studies (EIS) for the world class Wafi/Golpu Gold and Copper project. (2018-2020). *Gabriel Arpa, David Pakne, John Witne, Ramsey Yehimen. (2018 -2020)*

   This first of its kind National Impact World Class Mining Project managed by the Department commencing 2018 and completed the review and submitted to the Council for Environment Protection Authority (CEPA) in 2020. The Project involved reviewing of the 7000-page document as Independent Peer Reviewers (IPR). Department managed seven PNG National consultants in this project and submitted the findings with summary and recommendation, including risks, gaps in the report and further work required to CEPA.

2. **Process Mineralogy of fluorine in K92 Gold Ore.** *Jim Lem (2020)*

   Process Mineralogy of fluorine in K92 Gold Ore A potential metallurgical issue at the K92 Gold Mine related to undesirable accumulation of fluorine, a penalty element in the Au-Ag-Cu Concentrate was investigated at the Mining Engineering Department. The research aimed at identifying the gold-bearing minerals, the distribution and association of gold minerals across size range, the major F-bearing minerals, the association of F-bearing minerals with gold minerals and eventually establish the potential mechanism promoting F recovery. Ultimately devise potential strategies to reduce F recovery with the caveat that gold-silver-copper recovery is not impacted negatively. This work is complete and the findings was presented at K92 Gold mine site on February 12, 2020. The investigation established the following; (i) Chief gold-bearing mineral is calaverite, AuTe2 (ii) Major F-bearing mineral is sericite, KAl2(AlSi3O10)(OH,F)2 (iii) Talc does not contain F (iv) The plant is recovering high amount uneconomic pyrite which can be rejected. **Action taken by the mine: Stopped application of carboxymethyl cellulose – a depressant for talc**

3. **Effect of density on hydro-cyclone classification** *Jim Lem (2020)*

It is well known that the specific density of minerals has adverse influence on the classification performance of a hydro-cyclone, mainly when liberated high density minerals such as gold or uranium are present in sulphide ores. These liberated heavy minerals often misreport to the underflow and recirculate to the system. Such phenomena do result in serious issues in closed-grinding circuits, such as overgrinding, leading to production of flaky particles (as in gold) or ultra fines. In plants which present gold liberated at coarser size, loss of gold due to overgrinding is sometimes prevented by incorporating gravity concentrators into the grinding circuit to recover the gold. This work looked at whether density effect will affect successful rejection of liberated U-bearing particles in the -10 μm size range of a plant recleaner feed, which is a strategy to minimize penalty U accumulation in a copper concentrator. The study was carried out using a cyclone rig with spigot diameter of 0.25 inches. It was found that density effect is almost negligible at particle sizes below 10 μm. Consequently, the liberated U-bearing particles finer than 10 μm were successfully removed in the overflow stream as rejects and hence U grade in the copper flotation concentrate remarkably reduced, by 19 ppm. Based on the results, de-sliming of the recleaner feed was recommended for plant trial and implementation.

4. Optimization of Gold Recovery in the Carbon-in-Leach circuit of Hidden Valley Au-Ag-Cu Mine. *Jim Lem. (2020)*

Silica factor determination This project for Harmony Hidden Valley Mine is currently being carried out at the department. The work aims at defining a best approach to carry out sand factor determination in the carbon-inleach tank. Carbon-in-leach (CIL) refers to a gold leaching (cyanidation) system whereby leaching of gold by cyanide and adsorption of gold solution by activated carbon occurs simultaneously in the same tank. In the Hidden Valley operation, increase content of silica in the leach feed results in sand build-up or clogging of inter-tank screens. This gives rise to overflow of CIL tanks resulting in low carbon inventory and high losses of gold in solution.

The work being done at the department involves sizing, gravity concentration using Shaking Table and muffle furnace roasting.

5. The recovery of Fe and S from pyritic waters such as AMD and pyrite (*Wilson KOBAL***.** *Queensland University of Technology 2020***)**

Acid mine drainage (AMD) forms predominately from the oxidation of pyrite (FeS_2), and other mineral sulfides in the presence of water, oxygen and bacterial species, and results in an iron-rich solution that is a global environmental challenge being faced after the closure and abandonment of mines. Utilisation of pyrite ores and concentrates to produce secondary products, which avoids stockpiles of pyrite and the potential for AMD formation, would

provide one possible solution to addressing the AMD global challenge. The overarching aim of this work involves the recovery of Fe and S from pyritic waters such as AMD and pyrite and utilising them to produce a double sulfate salt which has wide applications in tanning and dyeing, metal fabrication, refrigeration and most importantly as a coagulant in wastewater treatment**.**

6. K92 Mine Grindability Test Work (*Francis Kisai 2019 – 2020*)

Supervised to completion of this test in the Mining Departments Kainantu Laboratory. Ore Grindability results were obtained that will help the company in its decisions in the selection of optimum liberation Grind Size and increase in Tonnage in its mill upgrade operations.

STAFF RESEARCH ACTIVITIES, ABSTRACT

Formation Mechanism, Ore Genesis and its Implication on the Milling and Recovery Processes, and the Environment, of the Mt Bai Porphyry Copper Gold Deposit in Rai Coast, Madang Province, Papua New Guinea

The Mt Bai Porphyry Copper Gold Deposit is situated approximated 40 kilometers due Southwest of the township of Madang and 8 kilometers inland from the Astrolabe Bay (Melanua Harbour) along the Rai Coast. The deposit was recently discovered within an area that was not previous covered (interpreted) by geological survey of Papua New Guinea (Regional Geology Map of PNG 1:250K, Madang Sheet).

The Mt Bai Intrusive complex intrudes the recent Pleistocene to middle Miocene sediments and the mineralization is generally hosted within an older metadiorite stock to late diorite and porphyry stocks. The deposit is longitudinal in nature which runs northwest to south easterly direction having a strike length of 7km by 1km wide. From recent field work done so far (Dekba Y, Neinen E, Sumaiang R, Unpublished, 2019) mineralization is from surface down to about 700m (from first-pass surface mapping with variation in (RL) relative to sea level) and still open down depth and along strike length. The mineralization comprises of an earlier phase quartz + pyrite + chalcopyrite with a later multiple phase overprinting of massive chalcopyrite bornite + quartz + carbonate + (bms) galena + sphalerite replacing the earlier mineralization.

this study aims to determine and understand the fluid chemistry (magma source), formation mechanism, i.e. structural setting and interaction of magmatic fluids, and the emplacement of different intrusive, phases of mineralization events the will characterized the different ore types. The understanding of these parameters will help determine the milling and recovery process in terms of mining purposes and handling and discharge of tailings in to the environment when the project is developed into the mining stage. Also on a regional scale the outcome of the study will help to try to explain why most of the island arc magmatism and volcanism in the Bismarck seas, New Ireland and New Britain Island etc. are Rhyolitic in composition (felsic-intermediate) in nature (continental crust) than mafic in nature (Oceanic crust). These will strengthen the idea that part (or fragmented parts) of the Australian Craton

still extends further out then initial thought and may give weight to the idea that collision margin between the Australian and Pacific Plate may in fact be further out along the Ontong Java Plateau and the Pacific Plate boundary than initial thought (On mainland PNG)

LIST OF PUBLICATION

Reaction Kinetics of Iron Oxides in Ok Tedi Magnetite Skarn Ore *(2020)*

(Asian Journal of Physical and Chemical Sciences 8(4): 1-13, 2020; Article no.AJOPACS.60593 ISSN: 2456-7779)

Mary Kama, Kaul Gena and Tindi Seje Nuru

Abstract

Magnetic skarn ore (MSO) is one of the major copper-bearing ore extracted by the Ok Tedi Copper Mine in Papua New Guinea (PNG). Copper minerals are recovered by flotation while the iron not associated with copper are discarded as tailings. The objective of this investigation was to determine the iron ore reduction kinetics for the Ok Tedi MSO and ascertain if it can be processed to produce sponge iron for a mini steel plant in Papua New Guinea. SEM-EDAX analyses of the Ok Tedi MSO indicated 10.1% C, 30% O, 0.6% Mg, 1.1% Si, 21.1% S, 0.8% Ca and 36.2 % Fe. Most of the iron is in sulfide form. Both naturally occurring and roasted sinters of Ok Tedi MSO samples of different particle sizes were reduced by charcoal carbon at three different temperatures and seven different reduction times. Analyses of the reduced products indicated a metallic iron content of more than 65 wt. % on an average. Results showed that there was no significant difference in reduction between fluxed and control materials. Only a slight increase in kinetics with reduced particle size, hence the reaction rate constant (K) did not vary much within the temperatures investigated. Reaction kinetics increases with increasing reduction time at 900°C. Therefore, more iron reduction is observed with particles of 106 µm size. In addition, the results also confirmed that Original Research Article Kama et al.; AJOPACS, 8(4): 1-13, 2020; Article no.AJOPACS.60593 2 the reduction energy used was higher at 800°C and lower at 1000°C. In conclusion, iron reduction can be improved but close monitoring of temperature and reduction times are essential to determine the reaction kinetics of the Ok Tedi MSO.

Investigation into strength, rheology, and microstructure of cemented paste fill using pozzolanic waste products and polycarboxylate plasticizer as partial cement replacement. *(2020)*

G.G. Yowa, N. Sivakugan, & R. Tuladhar Civil Engineering, James Cook University, Townsville, Australia

Note* Paper was not presented due to COVID 19 travel restrictions.

Abstract

When ore is extracted underground, large voids are created which are backfilled with waste rocks or tailings to stabilise the voids. This study focuses on mix designs of cemented paste fill, one of the most popular backfill types that uses tailings. Tailings have substantial clay content and a small dosage of cement binder in the order of 3-7% is added to increase the strength. Even this small cement dosage adds significantly to the cost of backfilling. Partial replacement of cement with pozzolanic waste products such as slag, fly ash or pitchstone can result in significant cost savings, and make backfilling more environmentally friendly. Therefore, this study investigated the possibilities of partially replacing cement with these supplementary cementitious materials (SCMs). Unconfined compressive strength (UCS) values of samples that used blended pitchstone, slag, and fly ash exceeded 1 MPa after 28 days curing and were comparable to control mixes that used 100% Portland cement. Use of polycarboxylate plasticizer improved the workability of paste significantly. Results indicated that apart from fly ash and slag, natural pozzolans like pitchstone has similar potential to be used as SCM in mine backfilling. The findings are useful for mining industry.

Key words: cemented paste fill, pozzolans, supplementary cementitious material, pitchstone fines, polycarboxylate plasticizer

RESEARCH/PROJECT REPORT

Arpa G., Pakne. D, Witne J., Yehimen R. (2020). **The Independent Peer Review of the Environment Impact Studies of the Wafi/Golpu Gold Copper Project**. Report submitted to the Council for Environment Protection Authority, Papua New Guinea.

Arpa G, Ora. R. (2018-2021). **Independent Peer Review of the Wafi/Golpu Gold Copper Project on the Terrestrial Tailing Dam Design**. A collaborative project with University of Queensland for the Wafi/Golpu Gold Copper Project. Phase 1 report has been submitted and work on the second phase is in progress.

Lem.J., (2020) **Optimization of Gold Recovery in the Carbon-in-Leach circuit of Hidden Valley Au-Ag-Cu Mine.** A report on test work for the Hidden valley Gold and Silver Mine

Lem.J., (2020). **Process Mineralogy of fluorine in K92 Gold Ore.** A report on test work for the K92 Mine

WORKSHOP/CONFERENCES/MEETINGS ATTENDED

● Arpa, G., Presentation of the Wafi/Golpu Gold and Copper Project EIS IPR report to Papua New Guinea Council for Environment Protection Authority. *(4^{th}-5^{th} August 2020)*

● Arpa, G., Alluvial Mining School Meeting. Presentation to Mineral Resources Authority (MRA) seeking support for the new proposed Alluvial Mining School to be established by Unitech. Port Moresby. *October 3rd 2020*

● Arpa, G, Pakne D., Assessing the Use of Mercury in the Alluvial Mining Sector in PNG. A review of practice in small scale Mining section according to Minamoto Convention. *March 2nd -3rd 2020.* (https://postcourier.com.pg/mra-launches-project-on-reducing-mercury-use/)

● Arpa, G., Michael, K., Represented PNG Unitech in presenting Unitech involvement in the Wafi/Golpu Gold and Copper Project on the EIS IPR to Morobe Provincial Government. *July 23 2020*

● Lim, J., Mineralogical analysis of K92 Gold Ore: Aspects Promoting Fluorine Accumulation Presentation of findings at the K92 Gold Mine. *February 12, 2020*

POST GRADUATE RESEARCH

Below is the list of postgraduate students register for the year 2020. The research topics, supervisors, sponsor and their funding source are presented.

Student	**Research Topic**	**Program**	**Funding Source**	**Supervisor**
Mr. Manau Saki	Metallurgical Characterization of Crater Mountain Gold ore	MPhil	CDO (PNGUoT)	Dr. J. Lem
Mr. Yawas Dekba	Genetic Modeling of the Bauxite Deposit, Manus Province, PNG	MPhil	CDO (PNGUoT)	Dr. G. Arpa
Mrs. Blacky	The effect of copper minerals in gold cyanidation. A case study on Ore from Kainantu	MPhil	GAP	Dr. J. Lem
Mr. Hans Matarab	Innovation Mine Design and Production Scheduling of Industrial Minerals – Case study on the Bauxite Deposit in the Manus Province, PNG	MPhil	CDO (PNGUoT)	Dr. G. Arpa
Mrs Chinta Kasendimi	Process Mineralogy of fluorine in K92 Gold Ore.	MPhil	GAP	Dr. J. Lem
Ms Marry Kama	Production of ferrochromium from Hessen Bay chromite ore in Papua New Guinea	PhD	CDO (PNGUoT)	Dr. J. Witne

FINAL YEAR UNDERGRADUATE STUDENTS RESEARCH PROJECTS

MINING ENGINEERING

K92 MINE INDUSTRY BASED PROJECT FOR OUR FINAL YEAR MINING ENGINEERING STUDENTS. TWO STUDENTS WORKING ON ONE PROJECT AND MORE THAN ONE STAFF SUPERVISING THE PROJECT. (2020)

#	TOPIC/TITLE	STAFF	STUDENTS
1	Haulage model and time motion study. *(K92 Mine)*	Dr Arpa, D Pakne & Hans Matarab	1. ALEX Eva Natalie 2. BOBO Amos
2	Hydrology model *(K92 Mine)*	Dr Arpa, Y.Ramsey & D. Yawas	1. AMORE Nania 2. BOFUAPE Nimrod
3	Open pit mine design for Irimufimpa. *(K92 Mine)*	Mr Pakne, Dr Ail, Dr Arpa, Hans Matarab	1. ELKINA Jayson 2. FRANCIS Lavinia
4	Mine ventilation network analysis. *(K92 Mine)*	Dr Arpa & Philip Rimits	1. GAROAU Ambrose 2. GARRY Martin
5	Cost benefit analysis of proposed twin incline design. *(K92 Mine)*	Dr Ail & Mr Pakne	1. Hauta Gideon 2. Irahibu Joshua
6	Equipment Selection. *(K92 Mine)*	Dr Ail and Mr Pakne	1. Ismuel Paul 2. Malol Lois
7	Rock strength model. *(K92 Mine)*	Dr Arpa, D. Yawas and Y. Ramsey	1. Masi Aaron 2. Matthias Ngaran
8	Tailings Dam extension design. *(K92 Mine)*	Dr Arpa, Dr Ail & H. Matarab	1. Melton Paul 2. Mosek Pamela
9	Swell Factor and Rock Density. *(K92 Mine)*	Dr Arpa, D. Yawas, and Ramsey Y.	1. Mura Samuel 2. Pirano Ertaan

MINERAL PROCESS ENGINEERING

Final year students research projects. 2020

#	TOPIC/TITLE	STAFF	STUDENTS
1	Effect of copper on gold cyanidation	Dr. J. Lem Mr. F. Kisai	1. BATEMAN Emmanuel 2. BULU Philemon
2	Investigation of an environmentally benign chemical to replace cyanide in pyrite depression	Dr. J. Lem Mrs. M. Kama	1. GIMISEVE Jehu 2. JOB Dwayne
3	Optimization of gold recovery in in porphyry copper ore	Dr. J. Witne Mr. M. Saki	1. KAILE Cyrus 2. KAMASO Alexander
4	Application of DETA is treatment of mill tailings	Dr. J. Lem Dr. J. Witne	1. LAPIWARE Jediah 2. MAWATI Ismael
5	Atmospheric pressure leaching of nickel laterite	Mr. W. Kobal Mrs. M. Kama	1. NAMIRA Jeremy 2. NIHIN Recy
6	Effect of density of hydrocyclone classification	Mr. F. Kisai Dr. J. Lem	1. POEMA Micah 2. PONGIE Quinten
7	Effects of Other Metal Ions in the Gold-Silver Cyanidation of Kainantu Ore.	Dr. J. Lem Dr. J. Witne	1. SIBIYAH Louise 2. SILIH Joseph
8	Grindability of Busu and Bumbu gravel. by Mr. Peter Rylie	Mr. F. Kisai Dr. J. Witne	1. SIO Enoch 2. TAKIS Francisca
9	Hydrometallurgical Investigation of Kainantu ore: Cyanidation	Mr. F. Kisai Dr. J. Lem	1. TONGOPE Kolen 2. YAMO Angeles
10	Leaching of Simberi Gold Ore: Investigating the Effect of Grind Size on Gold Recovery.	Mr. M. Saki	P1. ETER Rylie

DEPARTMENT OF SURVEYING AND LAND STUDIES

Head of Department: Professor Jacob A. Babarinde

A. Priority Research Areas of the Department

The Department's research activities revolve around the pivot 'Land and allied resources' optimum utilization, management and valuation, Climate studies, Disaster Risk Reduction and Disaster Risk Management. The Department is primarily involved in developing human resources adept in the holistic management of land resources and in eking out the best value out of them in a sustainable manner through coordinated research activities. It is also actively involved in finding Disasters, Risks, and Disaster Management, Disaster linked to climate change, tectonic activities. The human resources developed in the Department have broad exposure to the state-of-the-art technology, e.g., recent developments in Remote Sensing, Geographic Information Systems, Photogrammetry, Global Positioning System / GNSS, use of latest Total Stations and allied implements of the digital era.

The Department is also involved in many research areas, including densification of Benchmark points for PNG using the latest GPS / GNSS technology, GIS, remote sensing, and cartographic communication through thematic maps, property valuation, and land management research, and student projects.

Some specific areas are given below:

1) Climate change studies
2) Land suitability for rice cultivation in PNG using Remote Sensing and GIS
3) Forest Biomass monitoring using Remote Sensing and GIS
4) Forests and Societal management
5) Inventorying Environmental Resources
6) Disaster Risk Reduction / Disaster Risk Management (DRR & DRM)
7) Urban sprawl detection
8) Groundwater mapping
9) Land use planning and management
10) Land Administration studies
11) Migration studies
12) Asset valuation studies
13) Cadastral Data Modeling
14) Management of incorporated land groups (ILG)
15) GNSS Survey and Vertical Adjustment of Madang Network
16) GIS In Customary Land Tenure Investigation
17) RS & GIS in Urban and Regional Planning
18) Mining and Its Impacts on Property Market
19) Residential Property Management
20) Public Educational Facility Management
21) Property Development Process in Papua New Guinea

22) Low Income Housing in PNG: Challenges and Opportunities
23) AHI land mobilization policy
24) Impacts on customary landowners under Plantation Redistribution Scheme
25) Impacts & effects of special agriculture and business lease (SABL) on customary landowners
26) Causes and effects of urban land values
27) Road Alignment (Horizontal/Vertical)
28) Drainage Design
29) Subdivision Design
30) Control Surveys using GPS/GNSS
31) Local Geoid study using GPS heighting on heighten MSL Benchmarks
32) GPS/GNSS to Cadastral Surveying in PNG
33) Infrastructure Development Surveys
34) Geodetic Control Surveying using GPS/GNSS
35) ILG (Integrated Land Groups) Customary Land Registration,
36) Renewable energy needs Feasibility study, etc.

B. Name of the Faculty Member/Position/Area of Specialization/Research interests

Name	**Position**	**Area of Specialization**
Prof. Jacob Babarinde	Professor and Head of Department	Asset Valuation/Appraisal & Estate Agency, Property Management & Development, Land Management/Administration, Urban & Regional /Rural Planning, Land Use & City Sustainability, Project Viability & Feasibility Studies, Intra-Urban Industrial & Residential Relocation/Mobility, Urban Policy Analysis, Environment & Energy Policy
Dr. Sujoy Kumar Jana	Associate Professor	Hazard and Disaster Management, Resource Planning and Management, Geography and Management
Dr. Sailesh Samanta	Associate Professor	Remote Sensing, GIS, Climatology, Geography, Natural Disaster, Disaster management, Site Suitability, Environment, Renewable energy
Mr. Job Suat	Senior Lecturer	Remote Sensing, GIS, Cartography, Survey, Infrastructure Development Surveys, Cadastral Data Modelling, Survey Practice -Laws & Regulations.
Mr. Wycliffe Antonio	Lecturer	GIS, Cartography, Geospatial Database modeling and development
Mr. Suman Holis	Lecturer	Property Valuation, Property Development, Land Administration

Mr. Samudra Gupta	Lecturer	Physics of Remote Sensing, Digital Image Processing, Photogrammetry / Drone, Global Positioning System, Geoinformatics, Geodesy, Spatial Analysis in GIS, Critical Pedagogy in classroom learning
Dr. Andrew Pai	Lecturer	Property Valuation, Land Administration
Dr. Cathy Koloa	Lecturer	Planning, Spatial Modeling, Hazard Management, Hydro geomorphology
Mr. Lewi Kari	Lecturer	Vegetation monitoring, Remote Sensing, GIS, Digital Image Processing, Manual Image Processing, Aerial Photogrammetry, Geography, Cartography, CAD, ILG. Web Mapping, Route Analysis
Mr. Jerry Mille	Lecturer	Land Administration, Social Mapping, ILG Creation, Land Disputes & Settlement
Mr. Tingneyuc Sekac	Lecturer	Renewable and Clean Energy, Disaster Management, Climatology, Rural Development Planning, Urban Planning, Remote Sensing, GIS, GPS, and GNSS
Mr. Robert Rosa	Lecturer	GPS/GNSS and Engineering Survey
Mrs. Rosemary Adu	Lecturer	On study leave
Mr. Navua Kapi	Lecturer	Engineering Surveys and Designs, Lease Surveys, Remote Sensing & Photogrammetry, Urban and Regional Planning & Subdivision, Mine Survey, Geodesy and GPS, Hydrographic Surveying, UAV Surveying, and Mapping, Deformation monitoring, Underwater Lease Surveys, Construction Surveys, Rural and Urban Valuations, Survey Hardware and Software Maintenance and technician, Claims and BOQ for any Engineering and Construction services
Mr. James Seniala	Lecturer	Property Valuations, Property Management
Mr. Lepani Karigawa	Lecturer	Rural Valuation, Urban Valuation, Incorporated Land Groups, Property

		Management, Customary Land Registration
Mr. Clifford Jr Mespuk	Lecturer	Engineering Survey, ID Survey, Drainage Hydrology
Mr. Paulus Motoro	Lecturer	Property management, Property Valuation, Property Economics/Finance
Mr. Glan Yali	Lecturer (Temp.)	Natural Resource Management, Assets Management, Forest Carbon (Biomass) Assessment for REDD ++, Development Planning
Mrs. Camilla Yanabis Kwaudi	Senior Technical officer	Cartography, GIS DBMS, Web mapping
Mr. Heva Honeaki	Senior Technical Instructor	Hydrographic Surveying, Computer-Aided Drafting, EDM Calibration, GPS GNSS, Cadastral Surveying, Automated Surveying
Mr. Adward Buidal	Principle Technical officer	Certified UAV Pilot (Drone Pilot), Surveying Profession, specifically Mining and Civil Engineering Survey with a fair bit of Cadastral Surveying.
Mr. Joe Yapakae	Senior Technical officer	Cadastral Surveys and Engineering Surveys

C. List of Scientific Paper Publications in Peer-Reviewed Journals

1. Awat, W., Sekac, T., & Jana, S. K. (2020). Spatial assessment and identification of suitable landfills for solid waste disposal in Madang Urban, Papua New Guinea. *Melanesian Journal of Geomatics and Property Studies,* Volume 6, pp. 18-30.

2. Mespuk, C. Jr., Kapi, N., Sekac, T., & Jana, S.K., (2020). Design of Storm Water Drainage System: A study in Lae City, Papua New Guinea. *Melanesian Journal of Geomatics and Property Studies*, Volume 6, pp. 1-17.

3. Mille, J. K., & Babarinde, J. A. (2020). Analysis of land boundary and ownership disputes and settlements in Simbu Province, Papua New Guinea, Melanesian Journal of Geomatics and Property Studies, Volume 6, pp. 48-60.

4. Morea, H., & Samanta, S. (2020). Multi-criteria decision approach to identify flood vulnerability zones using geospatial technology in the Kemp-Welch Catchment, Central Province, Papua New Guinea. Applied Geomatics, 10:159–171. https://doi.org/10.1007/s12518-020-00315-6.

5. Otto, M., Babarinde, J. A., & Motoro, P. (2020). In Search of a Conventional Urban Model for Explaining Factors Determining Residential Property Rentals and Prices in Lae City, Papua New Guinea, Melanesian Journal of Geomatics and Property Studies, Volume 6, pp. 31-47.

6. Petrus, J., Babarinde, J. A. & Karigawa, L. (2020). Analysis of Mechanisms for Sustainable Land Taxation in Lae City, Papua New Guinea, *Urban Studies and Public Administration*, 3(3), 38-55. doi:10.22158/uspa.v3n3p38

7. Sekac, T., Jana, S.K., Sutherland, M., & Samanta, S. (2020). Temperature Variability and Trends Assessments parts of Highland and Momase region of Papua New Guinea. International Journal of Advanced Science and Technology, 29(7), 323 - 341. http://sersc.org/journals/index.php/IJAST/article/view/13224

8. Yarope, B., & Karigawa, L. (2020). An Assessment of the Impacts of Special Agriculture and Business Leases (SABLs) on Customary Land in PNG: A Case Study of Ramu Sugar Agro- Industries Limited. *Melanesian Journal of Geomatics and Property Studies*, Volume 6, pp. 61-73.

9. Varo, J., Sekac, T., & Jana, S.K. (2020). Flood Hazard Micro Zonation from a Geomatic Perspective on Vitilevu Island, Fiji. *Internationa Journal of Geomatics, Vol 16, Issue 3.*

D. List of Conference Proceedings/Workshop/Seminar

1. Kotra, K. K. Bathula, S., Padhye, L., Samanta, S., Andersen, M.S., & Sami, E. (2020). Towards Building National Drinking Water Standards of Vanuatu: Applied Research and Capacity Building. Commonwealth Chemistry Congress, 25 – 27 August 2020.

2. Pai, A. (2020). Cultural value as a compensable entitlement and its valuation in compulsory acquisition of customary Land, at PNG University of Technology Seminar No. 4 on 17th – March – 2020.

E. Winning Project

Ongoing collaboration research Project: PIURN

Project Title

Towards National Drinking Water Standards in Vanuatu: Applied Research and Capacity Building

Research Team Members and Affiliations

Ø Dr Krishna Kumar Kotra, Lecturer, School of Biological and Chemical Sciences, FSTE, The University of the South Pacific (USP) – Principal Investigator

Ø Dr Sailesh Samanta, Associate Professor, Dept. of Surveying and Lands, PNG University of Technology (PNGUNITECH) – Co-Investigator / Co-funder

Ø Dr Srikanth Bathula, Senior Lecturer, Dept. of Applied Sciences, PNG University of Technology (PNGUNITECH) – Co-Investigator

Ø Mr Erie Sammy, Hydrogeologist, Dept. of Water Resources, Govt. of Vanuatu – Co-Investigator / Co-funder

Ø Dr Lokesh Padhye, Senior Lecturer, Oceania Water Research Consortium (OWRC), Dept. of Civil and Environmental Engineering, University of Auckland, New Zealand – Co-Investigator / Co-funder

Ø Dr Martin S. Andersen, Senior Lecturer, School of Civil and Environmental Engineering, and director of Connected Waters Initiative (CWI), University of New South Wales, Sydney, Australia – Co-Investigator / Co-funder

Budget: 43,311 Fiji Dollars

Project Duration: On going

F. Undergraduate Research Projects

Year 4 BTSR Research Project 2020

SURNAME	NAME	Topic	Supervisor
MALI	Richard	UPDATING THE OLD PERMANENT SURVEY MARKS (PSM) AROUND LAE CITY BY USING GNSS/GPS TECHNOLOGY AND ORTHOMATRIC LEVELING	Mr. Robert M Rosa
MALAGA	Ashemah	PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY SEWER REHABILITATION PROJECT-MANHOLES COORDINATION & VOLUME DETERMINATION	Mr CJ Mespuk
BETTY	Amemai	SURVEY AND DESIGN OF SEWER AND DRAINAGE OF NEW FEMALE 200 BED SPACING DORMITORY	Mr CJ Mespuk
CLYDE	Gordon	IDENTIFICATION SURVEY OF SOUTH EASTERN PART OF PORTION 453.	Mr. Navua Kapi
DANIEL	Kaplimut	RE-PLANNING AND DEVELOPMENT SURVEY OF TARAKA PRIMARY SCHOOL, LAE CITY	Mr. Navua Kapi
EDWIN	Landi	DESIGN SET-OUT AND SUBDIVISION OF THE GIRL'S	Mr CJ Mespuk

		DORMITORY IN PNG UNITECH FEMALE RESIDENTIAL AREA.	
EMANUEL	Himbuke	AS-BUILT SURVEY AND COMPARISON OF THE CATCHMENT VOLUME WITH THE AVERAGE RUNOFF FOR THE NEWLY BUILT DRAINAGE SYSTEM FROM UNI-GATE TO TARAKA PRIMARY SCHOOL TO DETERMINE THE POSSIBLE OF OVERFLOW WATER.	Mr CJ Mespuk
FRANCIS	Villie	NEW SUBDIVISION OF PART PORTION 50, KAVIENG TOWN.	Mr. Navua Kapi
GIBSON	Jack	PROPOSED AERODROME SURVEY IN RURAL DISTRICT OF MOROBE PROVINCE.	Mr. Heva Honeaki
JAPHET	Norm	GNSS ROAD CONTROL SURVEY ALONG THE BUTIBUM / INDEPENDENCE DRIVE TO ERIKU COMMERCIAL CENTER.	Mr. Robert M Rosa
JESSE	Suat	UAV DRONES OR HRSI (LIDAR) COULD BE USED AS A POSSIBLE TOOL FOR IDENTIFICATION SURVEY THROUGH THE METHOD OF PHOTOGRAMMETRY AT 9 MILE, LAE.	Mr CJ Mespuk
JONATHAN	Urap	ADJUSTMENT OF EDM CALIBRATION PILLAR IN PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY	Mr H Honeaki
MATHIAS	Kisokau	USING GNSS TO PRODUCE DIGITAL CADASTRAL DATABASE FROM GROUND TO ELLIPSOID ON THE COMMON GEODETIC DATUM PNG 94	Mr. Robert M Rosa
NOEL	Peya	REDESIGN OF THE Y INTERSECTION OF MILFORD HAVEN ROAD ALONG THE BUMBU ROAD NEAR BUMBU BRIDGE LAE, MOROBE PROVINCE	Mr CJ Mespuk
RALPH	Yari	STOPE CMS (CAVITY MONITORING SYSTEM) SURVEYS TO VERIFY AND DETERMINE VOID PROFILES (UNDER BREAK & OVER BREAK), GEOMETRY OF THE VOID IN UNDERGROUND MINE FOR	Mr CJ Mespuk

		ENGINEER'S STOPE RECON, FOR GEOTECHNICAL SAFETY CONCERNS AND FOR EFFICIENT UNDERGROUND MINE TO TAKE PLACE.	
TREVOR	Yapu	REDEFINITION SURVEY OF TARAKA PRIMARY SCHOOL	Mr. Navua Kapi
TOATA	Shem	TOPOGRAPHIC SURVEY OF PNGUOT SEWERAGE SYSTEM.	Mr CJ Mespuk
SAMSON	Heta	SUBDIVISION DESIGN OF UNITECH SPORTS FIELD	Mr. Navua Kapi
SONO	Nip	THE STORM WATER MANAGEMENT OF NEW PROPOSED GIRLS DORMITORY. A case study of female residence png uot campus	Mr CJ Mespuk
ALBERT	Tau	DEFORMATION MONITORING OF BRIDGE STRUCTURES	Mr. Robert M Rosa
NICKY	Pilyo	A LOCAL GEOID MODEL OF PNG UNITECH	Mr. Robert M Rosa
IMMANUEL	Waundi	CONNECTING BOUNDARY SURVEY TO A LOCAL FRAMEWORK (PNG94) - A case study of Andawa village near Lae Urban.	Mr. Robert M Rosa

Year 4 BGIS Students Research Project 2020

SURNAME	NAME	Topic	Supervisor
BINAS	Atrolyn	REMOTE SENSING AND GIS BASED SITE SUITABILITY ANALYSIS FOR DISPOSAL OF SOLID WASTE ". A Case Study of Goroka Urban in Eastern Highlands Province	Dr Samanta
BUKA	Gibson	APPLICATION OF GIS AND REMOTE SENSING TECHNOLOGY TO ANALYSE AND IDENTIFY CRIME HOTSPOT USING LAW AND ORDER ENFORCEMENT. Case Study of Lae City Area	Mr. Gupta
ELOMI	Kate	SPATIAL-TEMPORAL ASSESSMENT OF BUSU RIVER CHANNEL SHIFTING & ITS IMPACT	Mr. Sekac
GERRY	Jessica	ESTIMATION OF SOIL LOSS USING REMOTE SENSING AND GEOGRAPHIC	Mr. Gupta

		INFORMATION SYSTEM TECHNIQUES- Case Study of Wahgi River, Chimbu, Papua New Guinea	
HAEA	Sharon	CAMPUS SECURITY AND LIGHTING MANAGEMENT USING THE APPLICATION OF GIS AND REMOTE SENSING: A Case Study of Unitech	Dr Samanta
KAIPARE	Levai	GIS ANALYSIS AND SPATIAL MODELING FOR OPTIMAL PIPELINE ROUTE. A CASE STUDY OF PROPOSED PORGERA GOLD MINE TAILINGS PIPELINE ROUTE	Dr Koloa
KUWIMB	Milah Akol	FUTURE URBAN DEVELOPMENT LAND SUITABILITY ANALYSIS USING GIS AND REMOTE SENSING APPLICATION.	Mr. Gupta
LEIA	Analolo	USING GIS AND REMOTE SENSING TO MODEL SOLAR RADIATION IN ALOTAU DISTRICT, MILNE BAY PROVINCE	Dr Samanta
LORANATHA	Lional	APPLICATION OF REMOTE SENSING IN URBAN PLANNING ASSESSMENT. A Case Study of Lae, PNG	Dr Jana
MATAGARAKIKAI	Fanny	APPLICATION OF GIS & REMOTE SENSING TECHNIQUES IN MANAGING URBAN SPRAWL: A Case Study of Port Moresby, NCD	Dr Jana
MILE	John Junior	APPLICATION OF GEOSPATIAL TECHNOLOGY TO IDENTIFY SUITABLE SITES TO ESTABLISH SMALL SCALE HYDRO - A Case Study of Sinasina Yongomugl District of Simbu Province, PNG	Mr. Sekac
MISON	Mike	DEVELOPING A GEO-SPATIAL INFORMATION SYSTEM & A COMMUNITY OUTREACH IMPACT ITS PARISHIONERS	Mr. Gupta
OLEKA	Gillian	GIS - BASED APPROACHES ON COASTAL VULNERABILITY AND IMPACT ASSESSMENT TO SEA LEVEL RISE; A Case Study of Labu.	Dr Koloa
PANE	Benedict	MAPPING ABOVE GROUND BIOMASS (ABG) FOR NATURAL FOREST USING	Dr Samanta

		REMOTE SENSING DATA: A case study for Purari, Kikori District Gulf Province	
PAPU	Alex	LAND USE AND LAND COVER CHANGE DETECTION – Morobe Urban	Dr Samanta
SAKATO	Paul	MONITORING AND CONTROLLING CRIME RATES USING ONLINE DATABASE SAVER WITH THE HELP OF GIS TECHNOLOGY AND APPLICATIONS	Mr. Gupta
SAKI	Taten	AN APPLICATION OF REMOTE SENSING IN DETERMINING THE EFFECTIVENESS OF VEGETATION INDICES TO MEASURE THE HEALTH OF OIL PALM PLANTATION. A Case Study of Ramu Agro-Industries Oil Palm Limited	Mr Yali
SUKAP	Lionel	A GEOSPATIAL WEB APPLICATION FOR MAPPING & MONITORING CRIME ON PNGUOT CAMPUS	Mr Antonio
SUNGI	Moses	SITES SUITABILITY ANALYSIS FOR A HYDROPOWER PLANT DEVELOPMENT IN NUKU CATCHMENT, Sandaun Province, Png.	Mr Sekac
UNJISI	Gary	USING GIS AND RS APPLICATIONS TO IDENTIFY OUTBREAK-PRONE REGIONS FOR CHOLERA: A Case Study of Unitech and Surrounding Communities.	Mr Kari
WEMIN	Giriyu	"EFFECTIVE IDENTIFICATION OF GROUNDWATER POTENTIAL SITES USING REMOTE SENSING AND GIS TECHNIQUES IN LAE, MOROBE PROVINCE, PNG	Mr Yali

Year 4 Property Studies Research Project 2020

Surname	Name	Research Topic	Supervisor
GAHARE	Shilvina	COMPULSORY REGISTRATION OF CUSTOMARY LAND: A case study of Kamayufa Village, Goroka, Eastern Highlands Province	Prof. Babarinde
PETER	Sebastian	FACTORS CAUSING FLUCTUATION IN PRICES OF RESIDENTIAL PROPERTIES	Prof. Babarinde

		IN PAPUA NEW GUINEA: A case study of Eriku, Lae city	
KANDAKI	Steven	STUDY ON THE IMPACTS OF URBAN DEVELOPMENT ON RESIDENTIAL LAND USE IN LAE CITY	Prof. Babarinde
RUABA	Natasha	PROVING THE CURRENT TREND OF PROPERTY MARKET ANALYSIS FOR RESIDENTIAL PROPERTIES. A case study of Lae City.	Prof. Babarinde
MINALA	Salamat	IMPROVING PROPERTY TAX IN PAPUA NEW GUINEA	Prof. Babarinde
HAITA	Rebecca	THE LANDLORD AND TENANT ACT 1954 AND ITS IMPACT ON RESIDENTIAL PROPERTY VALUES IN LAE	Prof. Babarinde
SAKIS	Charlie	AN EXPLORATORY STUDY OF UNITIZATION OF REAL ESTATE INVESTMENT IN PAPUA NEW GUINEA	Prof. Babarinde
HAILAI	Esther	INVESTIGATING LAND LEGACY ISSUES IN AGRICULTURE BUSINESS IN NEW IRELAND PROVINCE: A case of Laubul Plantation	Prof. Babarinde
KAUGA	Israel	ISSUES OF SECURITY OF TENURE UNDER INFORMAL LAND SALES IN PAPUA NEW GUIONEA. A case study of Lae city	Mr. Karigawa
YAROPE	Brendan	IMPACTS OF SPECIAL AGRICULTURE AND BUSINESS LEASES (SABL) ON AGRICULTURE DEVELOPMENT. A case study of Ramu Sugar Agro Industry Limited.	Mr. Karigawa
NYO'O	Allan	AN ANALYSIS OF EFFECTS OF FORCED EVICTION ON INFORMAL SETTLEMENTS AFFECTING THE	Mr. Mille

		ECONOMY: A Case Study of Morata Settlement, Port Moresby	
TOKILE	Terence	THE MANAGEMENT OF SPECIAL AGRICULTURE AND BUSINESS LEASE AND ITS SOCI-ECONOMIC STATUS IN PAPUA NEW GUINEA. A case study of New Britain Palm Oil Limited, West New Britain Province	Mr. Mille
MARCUS	Justin	ISSUES OF INDIVIDUALS ACCESSING CUSTOMARY LAND. A case study of 9 mile, Lae Morobe Province	Mr. Mille
UGU l	Nathanie	A STRATEGIC APPROACH IN FORMALIZING INFORMAL SETTLEMENTS: A case study of 8 Mile informal settlement in Port Moresby, National Capital District	Mr. Mille
ORAWI	Anderson	CAUSES AND POSSIBLE SOLUTIONS TO LAND DISPUTES IN PNG: A case study of Porgera Land, Enga Province	Mr. Holis
VEI	Boi	A COMPREHENSIVE REVIEW OF LAND USES IN PORT MORESBY USING THE THEORY OF LAND URBAN RENTS AND CONCENTRIC ZONE THEORY.	Mr. Holis
PAUL	Nathan	EVALUATING THE PROVISION OF PUBLIC HOUSING IN LAE CITY, PAPUA NEW GUINEA	Mr. Holis
WADUNAH	Lawrence	URBAN PLANNING - GOVERNMENT STRATEGY TO FORMALIZE INFORMAL SETTLEMENTS: A Case Study of Morata Settlement, Port Moresby.	Mr. Holis
ANDREW	Emmanuel	INAPPROPRIATE PHYSICAL PLANNING APPLICATION IN GAGIDU TOWN, FINSCHAFEN, MOROBE PROVINCE	Mr. Seniela

SUAT	Shennen	APPLICATION OF LAND INFORMATION SYSTEM APPROACH TO PROPERTY MANAGEMENT: A Case Study of Papua New Guinea University of Technology	Mr. Seniela
BUIA	Joshua	ANALYSIS OF THE EFFECTS OF GOVERNMENT INPUTS INTO HOUSING IN PAPUA NEW GUINEA: A Case Study of Port Moresby.	Mr. Seniela
LENNY	Basila	URBANISATION AND ITS IMPACT ON RESIDENTIAL RENTAL HOUSING AFFORDABILITY: A case study of Lae city	Mr. Motoro
TOKOPAE	Kenny	GRABBING OF STATE LAND IN URBAN AREAS. Case study of Lae city	Mr. Motoro
PETER	Nelson	IDENTIFICATION OF THE CAPACITY TO STRENGTHENING LAND ADMINISTRATION IN PAPUA NEW GUINEA TO RESOLVE LAND GRABBING ISSUES: A case study of Gumanch Coffee Plantation, Western Highlands Province.	Mr. Motoro
WRASAUSE	Jethro Yuambari	AN ANALYSIS OF SPECIAL AGRICULTURE AND BUSINESS LEASE AND LAND GRABBING IN PAPUA NEW GUINEA: A case study of Urimo Oil Palm Project in East Se4piuk Province	Mr. Motoro
KALAMIN	Peniel	CAUSES AND EFFECTS OF VARIANCE IN MARKET VALUE ASSESSMENT IN PAPUA NEW GUINEA	Dr. Pai
MAIO	Jaymah	PURCHASING, RENOVATION AND REDEVELOPMENT OF RUN-DOWN NATIONAL HOUSING CORPORATION RESIDENTIAL PROPERTIES FOR LEASING	Dr. Pai
SAOR	Joshua	LAND VALUE CAPTURE AS A STRATEGY FOR FINANCING	Dr. Pai

		INFRASTRUCTURAL DEVELOPMENTS. A case study of Lae City	

G. Postgraduate Students Research Project, 2020

PG Student Research Project 2020.

SL. No.	Name of the Students	Research Project Title	Program	Supervisor(S)
1	Tingneyuc Sekac	Spatio-Temporal Climatic and Geographic Variables Assessment for Climate Change impact evaluation and monitoring in Papua New Guinea	PhD in Geomatics	Ass. Prof. Dr. Jana and Ass. Prof. Dr. Sailesh Samanta
2	Imen Papa	A comparative analysis of land dealings in agricultural-forestry and extractive resource project areas of Western and Hela Provinces in PNG: Modelling a Unified Land Dealing System.	MPhil in Property Studies	Professor Babarinde
3	Glen Yatu	Assessment and Modeling of Potential Renewable Energy in PNG: Biomas and Solar Energy	MPhil in Geomatics	Ass. Prof. Dr. Samanta
4	Wilson Kumne	Flood Susceptibility Mapping Using GIS Model: A case Study of Busu River.	MPhil in Geomatics	Ass. Prof. Dr. Samanta
5	Michealla Otto	Analysis of Social, Economic and Cultural Factors Affecting Residential Property Prices and Rentals in Lae-Morobe Province.	MPhil in Property Studies	Professor Babarinde

THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

THE RESEARCH COMMITTEE
ALLOCATION OF RESEARCH FUND 2020

No.	Applicant/Supervisor	Sponsor	Department	Approved Amount (K)
1	**Bapa Bomoteng, PhD/2** Prof. Paul Thomas	**LNSDC (staff)**	Business Studies	K8, 000.00
2	**David Kolkoma PhD/3** Dr. Felix Pereira	**LNSDC (Staff)**	Applied Physics	K7, 050.00
3	**Muteng Mugang MSc/3** Prof. M. Mukhopadahyay	**Self (PG student)**	Applied Physics	K5, 000.00
4.	**Suame Ampana, PhD/1** *Cardiff University, UK*	**Commonwealth Scholarship Commission (Staff on study leave)**	Applied Physics	K13,100.00
5	**Rena Lovo MTech/2** Dr. Dapsy Olatona	**Self (Student)**	Applied Physics	K5, 000.00
6	**Steve Ales, PhD/4** *Auckland University of Technology, New Zealand*	**LNSDC (Staff on study leave)**	Mechanical Engineering	K30, 000.00
7	**Liksen Mandali (MCS/2)** *Prof. Eric Gilder*	**Self (PG student)**	Communications & Development Studies	K1, 160.00
8	**Nerman Kaloa Wopo (MCS/2)** *Prof. Eric Gilder*	**Self (PG Student)**	Communications & Development Studies	K1, 300.00
9	**Jacob Zua (MCS/2)** *Dr. Rachael Aisoli -Orake*	**Self (PG Student)**	Communications & Development Studies	K1, 510.00
10	**Sylvester Tyrones (MPhil/2)** *Dr Moses. Kavi*	**Self (PG student)**	Electrical and Communication Engineering	K2, 630.32

11	**Dr Garry Sali (Staff)** *(CDS Dept HOD)*	**Staff**	Communications & Development Studies	K14, 913.10
12	**Rolland Mark (MTech/2)** *Dr. Aezeden Mohamed*	**Self (PG student)**	Mechanical Engineering	K4, 217.10
13	**Gideon Aiyowa, (MTech/2)** *Prof. M. Mukhopadahyay*	**GAP** **(PG student)**	Applied Physics	K5, 000.00
14	**Chinta Ezra (MPhil/2)** *Dr Jim Lem*	**GAP (PG student)**	Mining Engineering	K8, 719.90
15	**Louis Veisami (Staff)** Dr Peki/Mr Maiguo	**Staff**	Forestry – Bulolo Campus	K7, 330.00
16	**Dr Ronnie Dotaona (staff)**	**Staff**	Agriculture	K13, 104.19
17	**Salvina Ku (MPhil/1)** Dr William Modey	**GAP (PG student)**	Applied Science	K88, 800.00
18	**Dollar Inapo (MPhil/1)** *(Dr Gwendolyn Ban)*	**GAP (PG student)**	Agriculture	K16, 889.21
19	**Jerry Paraka (MPhil/1)** Navua A. Kapi	**GAP (PG student)**	Surveying & Land Studies	K5, 343.49
20	**Herman Kunsei (PhD/1)** Prof. Paul Hoole	**LNSDC (Staff & PG student)**	Electrical & Communications Engineering	K110,000

Total Approved for 2020 **K349,067.31**

Total Allocated for 2020 **K350,000.00**

Unused funds **K932.69**

ABSTRACTS

PNGUOT SEMINAR SERIES

2020

TRAGEDY IN THE BUMBU RIVER?

William Kojo Modey[ll] and Justin Narimbi[†]
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ABSTRACT

Monitoring of river, estuarine, and ocean sediments is a critical environmental requirement, as surface sediments play a key role in the exacerbation of human health endpoint. The reason is sediments are prolific environmental sinks for toxic metals and organic pollutants, and numerous aquatic fauna enjoy tremendous livelihoods in surface sediments, and so may significantly impact the human food chain. In furtherance to this reason, sediments are a preferred monitoring tool since pollutant concentrations are orders of magnitude higher than in water because of long-term accumulation. Still further, pollutant concentrations in sediments exhibit less variation with respect to time and space, and so allow for consistently spatial and temporal assessment of the environment.

In this presentation preliminary studies on the determination of select trace metal concentrations from Bumbu river sediments using the analytical instrumental technique of Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) will be discussed. From these results, potential ecological risks will be discussed based on legislated Sediment Quality Guidelines (SQG) and sediment contamination indices. In the end we will conclude if indeed there is **"Tragedy in the Bumbu River."**

FEEDING VALUE OF SWEET POTATO AND CASSAVA TO GROWING PIGS

Dr. Michael Dom
National Agriculture Research Institute (NARI)
michael.dom@nari.org.pg

ABSTRACT

Sweet potato root with or without vines and cassava roots in blended diets relied on 38% to 50% wheat-based protein concentrate to provide feeding value suitable to both commercial (CG) and local mixed genotype (MG) growing pigs. This is the first indication that the current hybrid pool of pigs may have an improved capacity for crude fibre digestion. Moreover, there is good indication that in MG pigs improved digestibility of dietary fibre advantages N utilization, energy retention and growth performance. Primarily the better N balance in CG pigs reflects their higher lean growth potential, with higher N requirements leading to greater ileal digestion and absorption. MG growing pigs may not require the higher levels of protein as CG pigs. This means that nutrition gained from root crop feeds may be further adjusted to MG pig requirements. Root-based diets provided more soluble fibre and undigested starch. There was probably greater microbial N input from gut bacteria in the MG pigs and this requires further study for taking advantage of potential nutrition and health benefits of hind gut fermentation to locally farmed MG pigs. In the highlands environment it may be possible to improve the growth performance of growing pigs by including SP vine in the silage mixture to increase dietary fibre since the MG pigs have displayed a better nutrient and energy utilization of this mixed feed. Similar blend feeding may be recommended for smallholder pig production in the Pacific Island Countries where wheat-based concentrate diets are used. Furthermore, utilizing locally grown root crops as ensiled (fermented) feed produced on-farm may contribute to reducing the costs of feeding growing pigs, whereas sourcing protein concentrate feeds in bulk may ease the transportation and storage needs of smallholder farming in tropical environments.

CULTURAL VALUE AS A COMPENSABLE ENTITLEMENT AND ITS VALUATION IN COMPULSORY ACQUISITION OF CUSTOMARY LAND

Andrew Pai, PhD
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Papua New Guinea University of Technology
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ABSTRACT

Compensation and its valuation with respect to the compulsory acquisition of legal property is a settled matter. However, the same cannot be said for customary land as there is no established universal valuation standard or guidance due to its anomalous nature. Also, the unquestionably rigid tenure incompatibility between legal property and customary land further confounds compensation and valuation of customary land in compulsory acquisition. The prevailing status quo unfortunately presents a predicament in land compensation and valuation considerations in plural land tenure societies where customary land tenure is active and predominant. This is reflective of the case in Papua New Guinea (PNG).

Moreover, in this vacuous state, compensation and its valuation with respect to customary land acquisition is contextually and empirically defined, however, the default position has always been a reliance on conventional market value concepts and methods. Compensation construed purely and singularly on this construction is, however, questionable as a measure of equitable compensation. This is because cultural imperatives that are profoundly important to and inherent in customary land tenure are conspicuously excluded or obviated due to its subjective nature and inscrutability. These cultural imperatives, however, epitomise the cultural values that are contextualised and inherent in the people–land relationship particularised to the indigenous people concerned.

Against this backdrop, a Culturally Inclusive Valuation Method (CIVM) is developed that recognises and accounts for cultural values that are inherent in customary land as a compensable entitlement. The empirical valuation of cultural value loss in this respect is based on the cumulative logistic regression formulation of deprived customary land owner's willingness to accept compensation.

In addition, the compensable value for the compulsory acquisition of customary land based on CIVM in essence integrates market value compensation of tangible and conventional assets and compensation for cultural values inherent in customary land. In this respect, CIVM is inevitably responsive to the normative equity standard of compensation and cultural imperatives in customary land and tenure. The compensable value assessed in this manner is, therefore, considered meaningful in essence and adequately justified.

2020 Research Report

RESEARCH COMMITTEE OF THE ACADEMIC BOARD
PNG UNIVERSITY OF TECHNOLOGY
PMB, UNITECH, LAE 411
MOROBE PROVINCE