

PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

RESEARCH REPORT 2023

This report contains postgraduate training, research, and publication outcomes achieved in 2023 by staff and students of the various academic Departments, Research Institutes, and Research Centers of the University

COMPILED
AND EDITED
BY

PROFESSOR
GARIBA
DANBARO

RESEARCH REPORT

2023

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PROFESSOR GARIBA DANBARO

PNG University of Technology
Private Mail Bag Services
Lae 411, Morobe Province
PAPUA NEW GUINEA
T: +675 473 4456, F: +675 475 7667 www.unitech.ac.pg
For information: info.pgs@pnguot.ac.pg

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FOREWORD

The year, 2023, has been another successful year for PNGUoT in research, publication, and application of innovative research to real-world issues. The theme for this year is “*Inspiring individual and community excellence in research and innovation.*” I truly appreciate the work of the researchers, both staff and students, who have contributed to the academic capacity of the University. PNGUoT is the national knowledge hub of science and technology. Research work must flourish so that the science and technology of all PNG resources, including our people, economy, land and ocean resources, minerals, oil, gas, rivers, mountains, forests, and many more, are banked in the national and international journals for future reference.

In 2023, 75 research papers were published in peer-reviewed journals. In addition, 57 papers were presented at conferences, 20 books and book chapters were published, and 10 reports were submitted to appropriate authorities. Congratulations are in order for the fifty-two students, including 2 PhDs, who have completed different postgraduate programs and will be graduating in April 2024. The PNGUoT Strategy 2020 – 2024 targets each Department to deliver 1 PhD every 2 years. There are 13 Schools and about 30 PhD students currently enrolled. We should expect better numbers of PhD graduates in the near future. In particular, for PNG, there is still a lot of knowledge of all our natural resources that has yet to be researched and uncovered. Our socioeconomic issues pose topics that academics and students can research and provide societal solutions. Improved products are always the desire of companies, and challenges to strengthen business are important research areas that can benefit the industry. While PNGUoT has budgeted a healthy funding for research, the challenge to conduct more research by staff to serve the demand for scientific and technological solutions for industry and communities is still high. A commitment will be made to improve capacity in the research office geared towards identifying relevant research topics within industry and communities. PNGUoT has also made progress in regional recognition in research. I have been appointed to the Establishment Committee of the Pacific Science Academy (PSA), which will be affiliated to the International Science Academy. The objective is to promote the Pacific science to the world stage. The establishment of PSA gives the academic community of the PNG Universities, the opportunity to publish in the PSA journals, which may be easily accessible to the world stage affiliations with the International Science Academy. The opportunities of accessing global funding to research issues on the global stage will be possible with this affiliation. May I also report that the Pacific Islands Universities Research Network (PIURN) held its first research conference in the Cook Islands in July 2023? A wide range of topics were presented in Rarotonga. Topics included the impact of climate change on the environment and societal challenges relating to indigenous knowledge. The next PIURN Conference will be held at PNGUoT in July 2025. This will be another opportunity for researchers to publish and present. I wish you another great year (2024) of research, innovation, and publications.

Professor Dr Ora Renagi, OL

Vice Chancellor

STATEMENT FROM THE CHAIRMAN

POSTGRADUATE STUDIES, RESEARCH AND INNOVATION COMMITTEE (PSR&IC)

I am pleased to present the 2023 research report of the Papua New Guinea University of Technology (PNGUoT). The University remains committed to excellence in research and development that can generally lead to innovation and establish the University as the science and technology knowledge hub of Papua New Guinea. To this end, the university actively fosters mutually beneficial partnerships between its staff and students, on the one hand, and international organizations, other universities, industry, and local communities. The PSR&IC broadly coordinates the research, innovation, publications, and postgraduate training activities of the University in conformity with its Strategic Plan, 2020-2024. The PSR&IC worked tirelessly in 2023 to provide critical support to staff, students, and partners as they make significant progress in all areas of research including engineering, basic and applied sciences, and social sciences. This report contains postgraduate training, research, and publication outcomes achieved in 2023 by staff and students of the various academic Departments, Research Institutes, and Research Centers of the university.

The year 2023 of the Postgraduate School started with an orientation and welcoming program for the postgraduate students on 20th July under the theme “*Research & innovation for sustainable national development*”. The orientation was attended by Heads of Departments, professors, academic staff, and Senior Executive Management (SEM) members. There was an increase in the number of publications by staff and students compared to that of 2022. Staff publications in 2023 were: 75 papers in peer-reviewed journals; 57 presentations at conferences, seminars, and workshops; 20 books and book chapters, and 10 reports and other publications. Fifty-two postgraduate students completed their studies in 2023 and will graduate in 2024. This number includes 2 PhDs, 8 MSc, 9 MPhil, 1 MTech, 4 MSWRM, 1 MCS, 4 MEng, 9 EMBA, 9 MBA, and 5 PGCST.

Enrolment of new students to various programs also increased slightly compared to the previous year, indicating the attractiveness of PNGUoT PG programs. A total of 52 new students enrolled in various PG programs of the University (36 enrolled in Semester 1 and 16 enrolled in Semester 2), including 7 PhDs

The University continues to offer generous assistance to deserving students. Eight newly enrolled PG students were awarded the University’s Graduate Assistance Program (GAP). GAP is a scholarship scheme given to students who are judged to be the best by the University. Realizing the importance of resourcing research and postgraduate training, the University allocated one million kina to support postgraduate research, attendance at conferences and seminars, and purchase research-related equipment. Out of this, K697,796.10 was disbursed to staff and students to buy equipment, carry out research, and attend conferences and seminars in 2023. Furthermore, the Management of the University applied for and won a bid of PIP funds to support PhD training at the University. The Government of PNG provided one million kina in PIP funding to support PhD training at the University. These funds will be utilized in 2024 to support students enrolled in various PhD programs of the University

In 2023, the Postgraduate School organized the usual Annual Postgraduate Research Seminar on the 3rd and 4th of October. PG students made a total of 54 presentations during the seminar. The Seminar was a big success, and the presentations showcased the research capabilities, communication, and presentation skills of our PG students. For the first time in its history, the seminar went online via Zoom and reached participants worldwide. This outcome reflected one of PNGUoT's core values of disseminating research findings to the broader community.

The number of presentations made at the weekly research seminar series organized by the PG School also increased from 13 in 2022 to 16 in 2023. Presenters were from PNG and overseas institutions, including Australia and the USA.

One new master's program was approved by the Academic Board and started in 2023, while another one was being developed to begin in 2024. The new Master's program in Architecture and Construction Management, developed by the Department of Architecture and Construction Management of the University was started in 2023. In addition, another new master's program titled "*Climate Change and Renewable Energy Access*" was being developed in 2023 by the Department of Applied Physics with start-up grant from the UK government under the *Transforming Energy Access – Learning Partnership (TEA-LP)* project.

The University continues to support conferences and workshops where open discussions on important national issues can be held and recommendations can be formulated for consideration by policy makers and other stakeholders. In 2023 the Papua New Guinea Chamber of Mines and Petroleum and the University's Department of Mining jointly organized a national conference titled "PNG Community Affairs and National Content Conference and Expo (CANCONEX, 2023)". The theme of the conference was "Promoting national participation for sustainable communities". The conference was attended by the Prime Minister, sectoral ministers, and notables in the oil and gas industries. The conference discussed updates on the petroleum industry and reflected on regulatory functions in the context of national content. Staff and students of the university had the opportunity to present papers at the conference and to interact with potential employers.

PNGUoT continues to be a proud member of the Associations of the Commonwealth Universities (ACU), and the 2 foreign students admitted in 2022 to a master's program under the Queen Elizabeth Commonwealth Scholarships (QECS) of ACU have made good progress and hope to complete their studies in 2024.

The newly refurbished International Postgraduate Students Hostel was officially opened by the Vice Chancellor, Professor O. Renagi at a short ceremony on 31st May 2023. The Senior Executive Management Team of the University attended the ceremony.

As part of its internationalization program, PNGUoT continues to partner with the University of Valladolid, Spain, and the University of Porto, Portugal, under the EU-funded Project ERASMUS-Plus. PNGUoT also has bilateral agreements with several universities in Australia, India, Japan, China, Fiji, Romania, and the Czech Republic for staff/student mobility.

I wish to express my gratitude to the Vice Chancellor Professor Ora Renagi and his senior management team for setting the direction and resourcing of the Postgraduate School and the PSR&IC; the Heads and staff of the various Departments who produced the research output, postgraduate training, and publications; other sections of the University who enabled all the work to be done successfully and finally staff of the Postgraduate School for handling all the administrative work.

Professor Gariba Danbaro
Dean of Postgraduate School

Postgraduate Studies, Research and Innovation Committee (PSR&IC)

Responsibilities: The responsibilities of the PSR&IC encompass postgraduate studies, research, and publications. Specific responsibilities of the committee are:

1. To formulate or review the postgraduate admission policy of PNGUoT at least once every three years.
2. To vet appointments of supervisors and thesis examiners of each postgraduate student.
3. To consider and approve examination arrangements for each postgraduate program and the results for each student.
4. To organize an annual postgraduate students' research presentation.
5. To ensure compliance of postgraduate programs with the PNG National Qualifications Framework (NQF).
6. To recommend to the Academic Board names of students eligible to graduate with postgraduate qualifications.
7. To formulate or review the research policies of the University at least once every three years.
8. To consider and approve or reject applications for research funding.
9. To consider and approve or reject applications for conference funding.
10. To edit and publish the University's Annual Research Report
11. To consider and approve the objectives of all academic publications produced under the auspices of the university for dissemination beyond the university.
12. To consider and approve the terms of reference of the editorial board for each academic publication of the university.
13. To call for and receive reports from each editorial board for academic publications of the university.
14. To consider and recommend to the Vice Chancellor's Committee for approval an annual maximum amount of funding for each editorial board.

Constitution of the PSR&IC

Membership of the PSR&IC will consist of the following:

Ex Officio Members:

1. Vice Chancellor
2. Deputy Vice Chancellor
3. Pro Vice Chancellor (Academic)
4. Pro Vice Chancellor (Administration)
5. Dean of Postgraduate School
6. Dean of Engineering
7. Chairman, Academic Ethics and Integrity Committee

Appointed Members:

1. One person appointed by the Vice Chancellor who will be Chairperson
2. Two Heads of Department
3. Two Professors
4. One academic staff with a strong background in research from each of the Natural Sciences, Natural Resources, Engineering, Business Studies, and Environment groups.
5. A postgraduate student elected by the postgraduate students.

Membership: Members of the PSR&IC for the period January 1, 2021 to December 31, 2022:

Ex Officio Members:

1. A/Prof Ora Renagi – Vice Chancellor
2. A/Prof Garry Sali – Deputy Vice Chancellor
3. Professor Shamsul Akanda –Pro Vice Chancellor (Academic)
4. Professor Kaul Gena – Pro Vice Chancellor (Administration)
5. Professor Gariba Danbaro, Dean of Postgraduate School
7. Professor Tom Okpul - Chairman, Academic Ethics and Integrity Committee

Memberships:

1. Professor Gariba Danbaro – Chairman
2. Professor Cletus Gonduan
3. Professor Eric Gilder
4. Professor Tom Okpul
5. Dr Mirzi Betasolo
6. Mr Mathew Kuusa
7. Dr Dapsy Olatona
8. Dr. Sujoy Jana
9. Dr Ghulam Arshed
10. Dr Gwendolyn Ban
11. PG Student representative...

Executive Officer: Miss Lucy Aisi, A/Senior Assistant Registrar (Academic)

Executive Summary

The PNG University of Technology (PNGUoT) remains committed to excellence in research, development, and postgraduate training. The main highlights for 2023 are itemized below.

1. The year 2023 of the Postgraduate School started with an orientation and welcoming program for the postgraduate students on 2nd March under the theme “*Research & innovation for sustainable national development*”. The orientation was attended by Heads of the Departments, professors, academic staff, and Senior Executive Management (SEM) members.
2. Staff publications in 2023 were: 75 papers in peer-reviewed journals; 57 conference and seminar presentations, 20 books and book chapters, and 10 reports and other publications.
3. Total of 52 postgraduate students completed their studies in 2023 and will graduate in 2024. This number includes 2 PhDs, 8 MSc, 9 MPhil, 1 MTech, 4 MSWRM, 1 MCS, 4 MEng, 9 EMBA, 9 MBA, and 5 PG CST.
4. A total of 52 new PG students enrolled in various PG programs (36 enrolled in Semester 1 and 16 enrolled in Semester 2), including 7 PhDs
5. Eight newly enrolled PG students were awarded the University’s Graduate Assistance Program (GAP). GAP is a scholarship scheme given to students who are judged to be the best by the University
6. The University allocated one million kina to support postgraduate research, attendance at conferences and seminars, and the purchase of research-related equipment. K697,796.10 was disbursed to staff and students to buy equipment, carry out research, and attend conferences, seminars, and workshops.
7. In 2023, the Postgraduate School organized the usual Annual Postgraduate Research Seminar on the 3rd and 4th of October. A total of 54 presentations were made by PG students in the two days of the seminar. The presentations were successful and, they showcased the research capabilities, communication, and presentation skills of our PG students. For the first time in its history, the seminar went online via Zoom and reached participants from all over the world. This outcome reflected one of PNGUoT's core values of disseminating research findings to the broader community.
8. Sixteen presentations were made at the weekly research seminar series in 2023. The presenters were from both PNG and overseas institutions.
9. The new Master’s program in Architecture and Construction Management, developed by the Department of Architecture and Construction Management of the University was started in 2023. In addition, another new master’s program titled “*Climate Change and Renewable Energy Access*” was being developed by the University’s Department of Applied Physics with a start-up grant from the UK government under the *Transforming Energy Access – Learning Partnership (TEA-LP)* project.
10. The Government provided one million kina in PIP funding to support PhD training at the University. These funds will be utilized in 2024 to support students enrolled in various PhD programs.
11. The Papua New Guinea Chamber of Mines and Petroleum and the University’s Department of Mining jointly organized a national conference titled “PNG Community Affairs and National Content Conference and Expo (CANCONEX, 2023)”. The theme of the conference was “Promoting national participation for sustainable communities”. The conference was attended by the Prime Minister, sectoral ministers, and notables in the oil and gas industries. The conference discussed updates on the petroleum industry and reflected on regulatory functions in the context of national content. The university staff and students had the opportunity to present papers at the conference and interact with potential employers.

12. PNGUoT continues to be a proud member of the Associations of the Commonwealth Universities (ACU), and the 2 foreign students admitted in 2022 to a master's program under the Queen Elizabeth Commonwealth Scholarships (QECS) of ACU have made good progress and hope to complete their studies in 2024.
13. The newly refurbished International Postgraduate Students Hostel was officially opened by Vice Chancellor Professor O. Renagi at a short ceremony on 31 May 2023. The ceremony was attended by the university's Senior Executive Management Team.
14. As part of its internationalization program, PNGUoT continues to partner with the University of Valladolid, Spain, and the University of Porto, Portugal, under the EU-funded Project ERASMUS-Plus. PNGUoT also has bilateral agreements with several universities in Australia, India, Japan, China, Fiji, Romania, and the Czech Republic for staff/student mobility.

Some administrative changes also occurred in 2023. Professor Gariba Danbaro was appointed Dean of the PG School.

Acknowledgements:

1. Vice Chancellor A/Prof Ora Renagi and his senior management team for setting the direction and resourcing the postgraduate school and the PSR&IC.
2. Heads and staff of the various Departments who produced the research output, postgraduate training and publications;
3. Other sections of the University that enabled all the work to be done successfully.
4. Staff of the Postgraduate School (Miss Lucy Aisi and Mr. Terence Kaupa) for handling all the administrative work.

Professor Gariba Danbaro
Dean of Postgraduate School

SUMMARY OF RESEARCH OUTPUT 2023

Name of Department / Institute / Centre	Journal articles	Conference papers & Seminars	Book / Book chapters	Reports / Other publications	Patents	PG students graduated		
						Certificate	Masters	PhD
Agriculture	4	5		2			4	1
Applied Physics	8						1	
Applied Sciences	4						2	
Architecture & Construction Management								
Business Studies	10	2	3	2			13	
Civil Engineering	1	3					1	
Communication & Development Studies	4	10	1	1		12	3	
Electrical & Communication Engineering	5						3	1
Forestry	4	7						
Mathematics and Computer Science	3	6	5					
Mechanical Engineering	27	14	11				1	
Mining Engineering		5		2				
Surveying & Land Studies	5	5		3			7	
SERI								
ERMC								
UBC								
Total	75	57	20	10	0	12	29	2

Departmental Research Reports

Department of Agriculture	1
Department of Applied Physics	12
Department of Applied Sciences	15
Department of Architecture and Construction Management	22
Department of Business Studies	26
Department of Civil Engineering	37
Department of Communication and Development Studies	43
Department of Electrical and Communication Engineering	54
Department of Forestry	61
Department of Mathematics and Computer Science	78
Department of Mechanical Engineering	88
Department of Mining Engineering	97
Department of Surveying and Land Studies	106

DEPARTMENT OF AGRICULTURE

Head of Department: Dr Macquin Maino

The Department of Agriculture is one of the 13 Academic Departments at Papua New Guinea University of Technology. 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. Three postgraduate degree programs- Master of Science in Agriculture (MScAg), Master of Philosophy (MPhil), and Doctor of Philosophy (PhD) are also offered by the Department. The MSc in Agriculture program combines course work and research, while PhD and MPhil studies are fully research-based degrees.

The Department has 16 qualified academic staff members (12 with PhDs and 1 with Masters and 3 MPhils). In 2023, 2 students graduated with MScAg. The Department of Agriculture is committed to delivering quality teaching, research, outreach activities, and post-graduate studies. Department's activities are well guided by the Department's Five-Year Strategic Development Plans (2005 – 2010, 2011 – 2015, 2016-2020, and 2021-2024). Now, with the Unitech's Strategic Plan 2020-24, an implementation plan has been prepared to carry forward research activities. The curriculum is enhanced through regular and periodic reviews 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. Publication of the volumes of the scientific journal '*Niugini Agrisaiens*' and academic staff publishing scientific papers regularly confirm the department's strong commitment to research and development at PNGUoT. Strong collaborative research exists with the PNG National Agricultural Research Institute (NARI), Australian Centre for International Agricultural Research (ACIAR), Charles Sturt University (CSU), University of Queensland (UQ), Commonwealth Scientific and Industrial Research Organization (CSIRO), and other NGOs, industries, and institutions further cements our strong leadership in agricultural research. Other publications, a compilation research abstracts done by the post-graduate students, Annual Reports, Farm Reports, and Strategic Plans on an annual basis also strengthen the department's research capacity.

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 aimed at strengthening research and innovations for sustainable agricultural development in Asia and Pacific.

The following research focus areas have been identified, and much of the staff and student research revolves 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 soil-borne pathogens
- Study of the production technology and practices of selected crops by farmers in different agro-ecological regions of Papua New Guinea
- Study of the production technology and practices of selected vegetables by farmers in different agro-ecological regions of Papua New Guinea
- 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 a suitable weaner piglet 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 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	Professor Macquin Maino	Plant Pathology, Nematology, Plant Viruses, Biocontrol Agents
2	Dr Rajashekhar Rao B.K.	Soil Science, Soil Quality, Soil fertility, Soil pollution, Agricultural Chemistry

3	Mr Nick Kewa	Agricultural Economics, Climate Change, and Supply Chain Management
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	Professor Peter Manus	Agricultural Economics, Agribusiness Management
8	Dr Veronica Bue	Agricultural Extension, Women in Agriculture, Rural Sociology
9	Dr Patrick Michael	Natural Resource Management, Field Crops, Agriculture and Environment
10	Dr Ronnie Dotaona	Agricultural Entomology, Integrated Pest Management, Biocontrol Agents
11	Dr Gwendolyn Ban	Plant Pathology, Biocontrol Agents
12	Mr Spencer Poloma	Crop Physiology, Agronomy
13	Dr Janet Pandi	Animal Nutrition, Feed and Nutrition for Chicken, Smallholder Farming Systems.
14	Dr Frank Vidinamo	Agricultural Engineering, Field Engineering, and Appropriate Farming Implements.
15	Mr William Nano	Agricultural Extension, Animal Nutrition, Aquaculture, On-farm Training
16	Mrs Betty Tiko Mоторо	Agricultural Extension, Rural Sociology

LIST OF JOURNAL ARTICLES PUBLISHED

Stella, B.P. and Rajashekhar Rao, B.K.* (2023). Ecotoxicological risks of metals in the subsistence food garden soils of Watut River floodplains, Papua New Guinea. *Environmental Geochemistry and Health*, 45(11): 8403-8415. DOI: 10.1007/s10653-023-01735-0.

Michael, P.S. (2023). Sustainable use of acid soils in the humid tropic. *Ecofeminism and Climate Change*, 4: 39-50.

Peter, T.M. and Michael, P.S. (2023). Sweet potato is a strategic root crop for food and nutritional security under climate change: A synthesis of the past and future production research directions. *SAINS-TANAH-Journal of Soil Science and Agroclimatology*, 20: 51-65.

Ahizo, J., Amben, S., Lobao, M.W., Roberts, A.D. and Pandi, J. (2023). Restricting conventional feed intake for pasture-raised broilers in Papua New Guinea: Effect on growth

parameters and carcass yield. *Journal of Animal Science and Veterinary Medicine*, 8(6): 247-254.

RESEARCH REPORTS/WORKSHOPS

WORKSHOPS/CONFERENCES/SYMPOSIUMS

Kaupa, P. and Rajashekhar Rao, B.K. (2023). The role of green manures in sustaining soil health and crop productivity in PNG – A review. 2023 PNG UPDATE, August 16th to 17th 2023, University of Papua New Guinea, Port Moresby, Papua New Guinea.

Michael, P.S., Reid, R. and Fitzpatrick, R. (2023). The roots of common terrestrial and aquatic plants can mitigate the stresses of acid sulfate soils. The 9th International Acid Sulfate Soils Conference. 26th – 31st March, 2023, Hotel Grand Chancellor, Adelaide, South Australia, Australia.

Peter, T. and Michael, P.S. (2023a). Use of organic matter in composted sweet potato mounds is a sustainable soil health and fertility management practice under climate change. PNG 2023 Update Conference – Resilient and Diverse Development. 16th – 19th August, 2023, UPNG, PNG.

Peter, T. and Michael, P.S. (2023b). The importance of organic matter in composted sweet potato mounds in the highlands of Papua New Guinea. Postgraduate Research Seminar, 2nd – 3rd October, 2023, PNGUoT, Lae, PNG.

WORKSHOPS/CONFERENCES/SYMPOSIUMS

Danbaro, G. (2023). HoDs Workshop. 30 Aug to 2nd Sept 2023. Bulolo University College, Bulolo, Papua New Guinea.

POSTGRADUATE RESEARCH

POSTGRADUATE STUDENTS' RESEARCH

Presenter	Program	Research Title	Funding source	Supervisor
Spencer Poloma	PhD	Effects of mycorrhizal symbiosis on macronutrient absorption, physiological parameters and yield of rice (<i>Oryza sativa</i>).	Research Funds, PNGUoT	Prof. M Maino
Robin WINGWAFI	PhD	Land suitability assessment for commercial rice development in Markham Valley.	Research Funds, PNGUoT	Dr R Rao
Francis N'DREWEI	PhD	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.		Dr V Bue & Dr P Manus

Benson Mirou	PhD	Development of e-crop disease app for farmers in Papua New Guinea.	Research Funds, PNGUoT	Prof. M Maino (Co-supervisor)
Michael Gaoma:		Cultural intelligence and transitional physics education in Papua New Guinea.	Research Funds, PNGUoT	Prof. M Maino (Co-supervisor)
Paula Kaupa	PhD	Green manure integration as an INM option in sweet potato: Effects on soil properties, crop nutrition and productivity.		Dr R Rao
Sinafa Robby	PhD	Characterization of <i>Leptospira</i> spp. (Bacteria) in cattle population in the Morobe Province.	Research Funds, PNGUoT	Prof. M Maino (Co-supervisor)
Shienel Samuel	MPhil	Investigating the effects of ants (<i>Wasmannia auropunctata</i> & <i>oecophylla smaragdina</i>) as potential biological control agents against cocoa pod borer (<i>Conopomorpha cramerella</i>) in Madang & East Sepik Province.		Dr R Dotaona
Shen Sui	MPhil	Maximizing sweet potato yield in the swidden fields along an altitudinal gradient in Papua New Guinea.	Research Funds, PNGUoT	Dr P Michael
Vincent Koddy	MPhil	Concentration of alkaloids, arecoline, arecaidine and guvacine in <i>Areca</i> nuts from Papua New Guinea.		Prof. M Maino
Tata Talewika		Biological application and assessment of seaweed mediated green-synthesized of silver nanoparticles.		Prof. M Maino (Co-supervisor)
Inia Bunsu	MPhil	Investigating association of arbuscular mycorrhizae fungi on <i>Piper aduncum</i> .	Research Funds, PNGUoT	Prof. M Maino
John Komek	MSc	Assessing the effects of marketing decisions by contact and non-contact farmers.	Research Funds, PNGUoT	Dr V Bue
Mr. Jeffry Tanakae	MSc	Potential of vetiver grass in phytoremediation of some toxic heavy metals in soil.		Dr Rao
Dollah Inapo	MSc	Biodiversity and phylogeny of <i>Trichoderma</i> isolates in Papua New Guinea.	Research Funds, PNGUoT	Dr G Ban
Roberta Sio	MSc	Megatherium as a potential biological control agent for		Dr R Dotaona

		coconut rhinoceros beetle in PNG.		
Topas Malapin	MSc	Soil to Nutrition-the importance of composted mounds for sustainable production of sweet potato in Papua New Guinea.	Research Funds, PNGUoT	Dr P Michael
Kayman Kiwa	MSc	Resources use efficiency of smallholder coffee farmers within and outside of CIC-PPAP funded Warapena coffee project in the Kaupena-Nebilyer Districts of Papua New Guinea.		Dr P Manus
Levy Kasa	MSc	Agricultural use of treated piggery sludge (TPS) to minimize negative environmental impacts under humid lowland tropical climatic conditions.		Dr P Michael
Gossie Powae	MSc	The effect of afforestation with <i>Eucalyptus pellita</i> biomass plantation on the soil carbon, nitrogen and phosphorus stocks in Papua New Guinea.		Dr R Rao
Monare Mathew	MSc	Morphological characterization and frequency of kappa casein gene in some local goat populations of Chimbu Province, Papua New Guinea.	Research Funds, PNGUoT	Prof. G Danbaro
Obert Lou	MPhil	Assessment of live weight gains, feed intake and feed digestibility for goats fed elephant grass (<i>Pennisetum purpureum</i>), mixed with <i>Leucaena leucocephala</i> in Papua New Guinea.	SARDI	Prof. G Danbaro
Willie Peilyn	MPhil	Estimation of apparent metabolizable energy and growth performance of broiler chickens fed sorghum-based diets.	SARDI	Prof. G Danbaro
Shirleya Aipa	MSc	Evaluating the importance of organic matter and inorganic fertilizer (NPK) application on growth and bean yield of cocoa produced under lowland agro-climatic conditions in PNG.		Dr P Michael
Luke Jeffery	MSc	Agricultural use of treated domestic sewage effluent (TOSE) wastewater to minimize negative environmental impacts under		Dr P Michael

		lowland tropical climatic conditions.		
Joseph Kondave	MSc	An investigation on the impact of African swine fever on the rural pig farmers in two selected districts of Southern Highlands Province of Papua New Guinea.		Dr V Bue
Cybill Poiya	MSc	Assessing the genetic relationship of the wild relatives of rice maintained at the Unitech Biotechnology Centre using simple technique repeat markers (SSR).		Prof. T Okpul
Peter Kerowane	MSc	Value chain analysis of bulb onion in Gembogl, Simbu Province, Papua New Guinea.		Mr. N Kewa
Miriam Otto	MSc	Developing an information system for Morobe's smallholder cattle farmers towards sustainable cattle production.		Mr. N Kewa
Timothy Ngembil	MSc	Effects of climate change on food security: An investigation into temperature, rainfall, and topographical paradigm in three Highlands Provinces of Papua New Guinea.		Dr P Michael

THIRD YEAR UNDERGRADUATE STUDENTS' RESEARCH PROJECTS

Names	Topics	Supervisor
Junior Peng	Analyze the profitability of cocoa farmers in the Umi District, Morobe Province.	Mr. Kewa
Godfrey Omape	Target market analysis for Australorp chicken among the Asian population living in Lae City	Mr. Kewa
Aggie Kora	Assess the entrepreneurship skill, behavior and attributes of full-time market retailers at the Lae main market	Mr. Kewa
Peru Tonny	Determinants of marketing margins of Highlands and Morobe sweet potato	Dr. Manus
Zubydah Luluaki	Characteristic profile of fresh food vendors at East Taraka Market	Dr. Bue
Emanuel Brian	Perception of farmers in Apere village on the impact of cocoa production on their livelihood	Ms. Parau
Natasha Kilis	Effects on the livelihood of Tablebirds contract farmers after the ceased of the Tablebirds contract farming	Ms. Tiko
Valentine Diikuk	Effects of integrated fertilization on phenological parameters of sweet potato	Dr. Rao
Tony Alaupa	Determining ideal growth state of green manure crops for soil incorporation	Dr. Rao

Silvia Kenesi	Effects of arbuscular mycorrhiza fungi treatment by seed soaking on seedling growth of rice under nursery conditions	Mr. Poloma
Gemaimah Kots	Time-course effects of <i>Imperata cylindrica</i> invasion on soil properties	Mr. Poloma
Daniella Morola	Effects of arbuscular mycorrhiza fungi treatment by basal application on seedling growth of rice under nursery conditions	Mr. Poloma
Isaiah Huasihawa	Effects of arbuscular mycorrhiza fungi treatment by seed soaking on seedling growth of cocoa under nursery conditions	Mr. Poloma
Doreen Wesi	The effect of <i>Trichoderma</i> on plant growth under saline conditions	Dr. Ban
Christina Suke	Decomposition of plant organic matter sampled along seacoast areas using <i>Trichoderma</i>	Dr. Ban
Philo Sega	Testing of <i>Bacillus</i> species on the germination and growth of NARI rice varieties	Dr. Ban
Bradley Warebu	The effect of <i>Trichoderma</i> on sweet potato weevil	Dr. Ban
Samuel Lolobia	The effect of <i>Trichoderma</i> on the growth and production of bean under field conditions	Dr. Ban
Arnold Kopep	Time-course of effects of <i>Chromolaena odorata</i> invasion on soil properties	Dr. Michael
Bill Wena	Time-course of effects of <i>Phragmites australis</i> on saline soil properties	Dr. Michael
Gemaimah Kots	Time-course effects of <i>Imperata cylindrica</i> invasion on soil properties	Mr. Poloma
Delisha Moka-Singakou	Micropropagation of elite balsa planting materials in vitro using seeds	Dr. Michael
Prisca Tiru	Screening of saline tolerance of sugarcane micro-propagated in vitro	Dr. Michael
Martha Faith Dom	Survey of goat management practices by subsistence farmers in my locality	Prof. Danbaro
Anna Lisa	Nutritional quality of some natural forages eaten by goats in my locality	Prof. Danbaro
Jeremiah Lavai	Effect of three stocking densities on performance of Cobb 500 under humid tropical environment	Dr. Pandi
Lydia Raupuri	Effect of Cobb 700 broilers and time taken to reach market weight of 2 kg when fed a commercial finisher diet at 14 days post hatch	Dr. Pandi
Basemath Wapi	Effect of two stocking densities on growth of male Muscovy ducks	Dr. Pandi
Lorenica Mahin Kakehe	Growth performance of muscovy drakes fed on two different diets (Commercial vs Concentrate) in a semi-extensive system	Dr. Pandi
Helen Koi	Different levels of goat manure on tilapia fingerling performance	Mr. Nano

Harry Lui	Investigation of taste preference for microwave and CD dried sample	Dr. Vidinamo
Jackson Oropa	Effect of storage condition on the nutritional quality of fruits	Dr. Vidinamo
Edwin Epenge	Effect of drying methods on phytochemical properties of fruits	Dr. Vidinamo
Donovan Goru	Improving postharvest technology through storage system of rice to maintaining 14% moisture content	Dr. Mohamed
Zachariah Liet	Improving postharvest technology through storage system of rice to maintaining 14% moisture content	Dr. Mohamed
Japhet David	Improving postharvest technology through storage system of rice to maintaining 14% moisture content	Dr. Mohamed
Jonathan Gau	Taro anther culture for production of dihaploid plants	Prof. Okpul
Quinnia Mariko	potato aeroponic culture	Prof. Okpul
Dianne Lihai	Rice plant regeneration using silicon	Prof. Okpul
Tanao Iyo	Isolation and identification of entomopathogenic nematodes	Prof. Maino
Vagi Poka	Incorporation of Agri-biproduct in boiler ration	Dr. Jayaprakash
Marlene Wangum	Effects of <i>Bacillus thuringiensis</i> on <i>Haritalodes derogata</i>	Dr. Dotaona
Brian Peakari	Isolation of <i>Metarhizium</i> in various soils	Dr. Dotaona
Dominic Kiu	Isolation of <i>Metarhizium</i> in different weed species rhizosphere	Dr. Dotaona
Junior Peng	Analyse the profitability of cocoa farmers in the Umi District, Morobe Province.	Mr. Kewa

REPORTS

Gariba Danbaro (Ed.). (2023). 2022 Research Report. The Papua New Guinea University of Technology.

Dora Jimela Kialo, Frieda Siaguru, Imelda Ambelye, Jillian Blacker, Lydia Yalambing, Mirzi Betasolo, Rachel Aisoli-Orake, Sgoing Denano, Susan Gasson, and Veronica Bue. (2023). Creating Successful Higher Degree Researcher Pathways in a Developing Country – Papua New Guinea.

INTERNAL RESEARCH COLLABORATIONS

Ongoing: Rao & student (2023). The Postgraduate Studies, Research & Innovations Committee of the PNG University of Technology granted K 20,000 for the student research project entitled “Green Manure Integration as an INM Option in Sweet potato: Effects on Soil Properties, Crop Nutrition, and Productivity”

Ongoing: Prof. Maino & Team (2021-2024). Award of Unitech Research Funds: (a) K57,988.40, for collaborative research on betel nut (I am the Team Leader). Participating Departments are: Agriculture, Mechanical, Applied Sciences, and Communication and Development Studies.

EXTERNAL RESEARCH COLLABORATORS

Rao & Team (2023). Co-investigator/Team member of CSIRO-ACIAR-Unitech project (ACIAR Project number-SLAM/2019/106) entitled “Better soil and land information for improving PNG’s agricultural production and integrated land use planning – building a revitalized PNGRIS2.”

NUMBER OF PAPERS REVIEWED FOR JOURNALS/CONFERENCES/SEMINARS

Dr R Rao	14
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DEPARTMENT OF APPLIED PHYSICS

Head of Department: Dr. David Kolkoma

Introduction

The Department of Applied Physics used to be relatively small compared to other academic departments. It is no longer small as the number of intakes for both undergraduate and postgraduate is equal to and exceeding other departments in postgraduate programs. The Department runs two courses: the Bachelor of Science in Applied Physics with Electronics and Instrumentation (BSAP) and the Bachelor of Engineering in Biomedical Engineering (BEBE). The Applied Physics Department also provides service courses to other academic departments of the University. The Bachelor of Engineering in Biomedical Engineering (BEBE) was introduced as a new program. The program initially started with only fifteen (15) students in 2020. This year, 2023, the first batch of students doing the Biomedical Engineering program are now in their fourth year, with seven students making it to the final year from the initial fifteen, with six anticipated to graduate in April 2024.

The Applied Physics course with Electronics and Instrumentation emphasizes the principles of application to Physics. The students are well-equipped with analytical skills and all the applications of Physics principles. The Applied Physics graduates work all over the country and overseas. They are employed in any specialty related to Physics with electronics and instrumentation. Some work in the telecommunication industry, Airline industry, education, tertiary institutions, mining industry, and PNG Power, with many employed in manufacturing plants in process control and instrumentation. Many past graduates have accumulated skills and knowledge and are now in private consultancy work, creating more job opportunities and industrial training pathways for our undergraduates. The feedback from our past graduates' performance in the industry is very encouraging.

The new Biomedical Engineering graduates will find employment in the National Health sector. All pioneers of this program have been absorbed into the National Department of Health to serve their respective general hospitals across the country. Their job is to become specialists in different types of equipment used in the hospital. The equipment must be in good running condition for diagnosis, treatment, or monitoring of sick patients under medical supervision.

The Department of Applied Physics currently has four Postgraduate programs: research-based Doctor of Philosophy (PhD), Master of Philosophy (MPhil), and course-based Master of Science (MSc) in Electronics and Instrumentation, and Master of Technology (MTech) in Exploration Geophysics.

There is enormous interest among the students in the Department's Post Graduate Program. In 2023, two (2) students progressing well with their Doctorate's degree (PhD) studies, one is a staff member, two (2) are MSc, one (1) MPhil, and three (3) MTech, Masters in Exploration Geophysics. The Department is proud of all the achievements so far in research and publications by publishing more than a minimum of three (3) publications per year for the academic 2023. The Department is committed to further strengthening and accelerating the PG

programs and research with the appointment of the Dept. Research Coordinators Associate Professor Velusamy Senthikumar and Associate Professor Felix Pereira.

Research Areas of the Academic Staff

No.	Name of the Academic Staff	Area of Research
1	Prof. Manoj Mukhopadhyay	Applied Geophysics: Geophysical Modeling, Earthquake Seismology, Crustal Geophysics
2.	A/Prof Felix Pereira	Astrophysics, Atmospheric physics, Radiation physics, and Electronics.
3.	A/Prof Dapsy Olatona	Energy and spectroscopy
4.	A/Prof.Velusamy Senthikumar	Energy nanomaterials, 2-D materials, Solar cells, and Oxide resistive memories
5.	Dr. Gabriel Anduwan	Energy applications, Geophysics, Nanotechnology, Environmental Physics, Physics Education, Condensed Matter, and other applications of Physics using Microcontrollers and Electronics.
7.	Dr. Ali Mohamad	Applied Geophysics in Oil, Gas, and Minerals
9.	Mr. Suame Ampana	Applied Geophysics and Non-Destructive Test (NDT)
10.	Dr. David Kolkoma	Medical Physics, Radiation Physics
11.	Mr. Michael Gaoma	Education
12.	Mr. Sylvester Tyrones	Microcontrollers and Microprocessor applications
13.	Mr. Kenson Tonny	Microcontroller based projects, Smart Hybrid Renewable Energy Systems, Data Acquisitions and smart monitoring mechanisms for Renewable Energy Systems and Aircraft Tracking Systems in PNG.

A. Research Publications (Journal)

1. Mukhopadhyay, M., Basab, M., Saad, M., Krishna, N.B., Saju, V., & Elkhedr, I. (2023). Geophysical modelling detects an intrusive magmatic body in the lower crust atop an underplated Moho at the Red Sea rifted margin, Central Saudi Arabia. *Journal of African Earth Science*, 202,104914. <https://doi.org/10.1016/j.jafrearsci.2023.104914>
2. Mukhopadhyay, M., Basab, M., Saad, M., & Elkhedr, I. (2023) High velocity lower crust with anomalous rheological parameters under the Red Sea Passive Margin, SW Saudi Arabia – insight into the evolution of the Hijaz-Asir

- Escarpment Zone. *Geophysical Journal International*, 236, 711–726. <https://doi.org/10.1093/gji/ggad451>
3. Kolkoma, D., & Pereira, F.(2023). Assessment of Dose rate in the mining waste samples of Simberi gold mines in Papua New Guinea using Gamma ray observations. *Pollution Research*, 42(1), 7-11. <http://doi.org/10.53550/PR.2023.v42i01.002>
 4. Osora, H., Kolkoma, D., Anduwan, G., Waimbo, M.N., & Senthilkumar, V.(2023). Hydrothermally Grown SnO₂ and SnO₂/rGO Nanocomposite and Its Physio-Electrochemical Studies for Pseudocapacitor Electrode Applications. *Journal of Cluster Science*. <https://doi.org/10.1007/s10876-023-02517-5>
 5. Kolkoma, D., & Pereira, F.(2023). Gamma Radiation Measurements and Dose rate in Waste soil samples of Ok Tedi Gold-Copper mine in Western Province of Papua New Guinea. *Melanasian J. of Geomatics and Prop. Studies*, 8&9, 1-8.
 6. Jojo J.P, S. R. Soniya, Sunila Abraham,(2023). **Gamma radiation profile of the high background radiation area along southwest coastal India and its neighbourhood** *Pollution: 9,4,* 1867-1879. <http://doi.org/10.22059/POLL.2023.360416.1937>
 7. Jojo. J. P, S. R. Soniya, Mayeen Uddin Khandaker (2023) Study of radium content and radon exhalation rates in raw building materials used in southern India, *Physics Open, Scopus*. <https://doi.org/10.1016/j.physo.2023.100169>
 8. Jojo. J.P S. R. Soniya,(2022) Natural radioactivity assessment of surface soil collected from Poovar village of Kerala, India Proceedings of ICMPMA, IOP, Scopus 1263, 012034 <https://doi.org/10.1088/1757-899X/1263/1/012034>

B. Conference

C. Post Graduate Projects

1. Michael Gaoma (PhD) - Cultural Intelligence and Transitional Physics Education in Papua New Guinea
2. Helen Osora Herivi (PhD) - Synthesis and Characterization of Metal Oxide with Graphene Nanostructures for Pseudocapacitor Electrode Applications
3. Gideon Aiyowa (PhD)- Geophysical survey of the Ramu-Markham Fault Zone and the Raised Coral Terraces, eastern Papua New Guinea
4. Shameka Banta (M.Sc)- Assessment of radiation dose due to primordial radionuclides observed in Lae
5. Galemo Fredie (M.Tech)-Magnetic Resonance Fluid Analysis of Hydrocarbon Reservoir

D. Undergraduate Projects

1. AP 80 Kw Solar Power System Design
2. iFix installation scada systems design for AP Solar Power System online monitoring
3. On-ground Solar Measurement and Data Comparison with NASA datasets.
4. Integrating CCTV with iFix Scada to monitor AP Solar Power System.
5. Design of Hydraulic Ram Pump Project to pump water up to 15 m.
6. Busaman Hydro Feasibility Study.
7. Analyses of the Internet Data available for Solar Power Generation in Morobe Province.

8. Smart Home Power Monitoring and Appliance Control Using Graphical User Interface
9. NDT Ultrasonic Testing – Distance Amplitude Correction.
10. Comparison of Copper and Optical Fibre as the medium for Telecommunication.
11. A detail analysis of the design and working mechanism in a typical double beam spectrophotometer compared to a single beam spectrophotometer.
12. Automatic Machine of packing & delivering medicine using prescriptions in the hospitals.
13. The Feasibility Study of Providing Hydro-Power using Busu River.
14. Design of Intelligent Fault Alarm System for a Blood Bank.
15. Proteus Simulations and Design of a Footstep Power Generation System.
16. Exploration of Hydrocarbons using Geophysical Method for finding different types of TRAPS in a geological Basin.
17. Electrodeposition of oxide films and its uses in Energy storage applications.
18. Design & Implementation of rural water supply system using microcontroller and solar energy.
19. Weld Integrity Assessment via Magnetic Particle Testing.
20. Design of a Mini Portable Vaccine Fridge for Rural PNG.
21. Reviewing the state of Biomedical Engineering in PNG and the Biomedical Equipment in the centered Hospitals in PNG.
22. Application of Gamma Ray (GR) in Geological Formation and Petroleum Industry using NGS tool.
23. Welding Integrity Testing of AP Solar Project via Ultrasonic NDT.
24. Smart DC Power Monitor.

DEPARTMENT OF APPLIED SCIENCES

Head of Department: Dr. Lydia R. Yalambing

Introduction

The Department offers two (2) degree programs: a Bachelor of Science degree in Food Technology and a Bachelor of Science degree in Applied Chemistry. It also offers Master of Philosophy and Doctor of Philosophy programs.

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 on strengthening and enlightening the community”.

In recent years, we have seen an increase in intakes in our postgraduate MPhil program and in our engagements in community, church, and industry related partnership programs. The focus of most of our community and industry partnership research projects have been in translating science and technology (in the areas of Food Technology & Applied Chemistry) into products, technologies, and or outcomes that transform the lives of everyday Papua New Guineans. To use what is available to develop and provide better, affordable, and accessible alternatives for communities.

The focus of the research in recent years in Applied Chemistry has been more in the areas of material science, organic chemistry, and environmental chemistry.

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	Dr. David Timi	Organic chemistry, phytochemistry
2	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.
3	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.
4	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

- (a) **Bathula, Srikanth.**; Muduli, K.; Das, S.N.; Nanda, J.; Choudhury, A. Investigation of sustainable production opportunity in fabrication of hybrid Aluminum metal matrix composites by Powder Metallurgy technique. Int. J. Mater. Eng. Innov. 2023,1(1). DOI:[10.1504/IJMATEI.2023.10055926](https://doi.org/10.1504/IJMATEI.2023.10055926).
- (b) **Narimbi, J.; Balakrishnan, S.**; Perova, T.S.; Dee, G.; Swiegers, G.F.; Gun'ko, Y.K. XRD and Spectroscopic Investigations of ZIF—Microchannel Glass Plates Composites. Materials 2023, 16, 2410. <https://doi.org/10.3390/ma16062410>.
- (c) John Ape and **Srikanth Bathula**, Impact of leachate on Bore Wells along the perimeter of Papua New Guinea University of Technology due to Open Dump site. Interdisciplinary Journal of the PNG University of Technology, IJPNGUoT, 2023, Vol 1, paper 3.
- (d) Hoang A. L; **Balakrishnan S**; Hodges A; Tsekouras G; Al-Musawi A; Wagner K, C.; Lee C; Swiegers G.F and Wallace GG. High-Performing Catalysts for Energy-Efficient Commercial Alkaline Water Electrolysis. Sustainable Energy Fuels, 2023, 7, 31-60, DOI: 10.1039/D2SE01197B.

Post Graduate projects (2023)

No.	Student	Degree	Topic	Principle Supervisor
1	Justin Narimbi	PhD	Synthesis and applications of novel zeolite imidazolate framework (ZIF) hybrid materials.	Dr. S. Balakrishnan
2	Sogoing Denano	PhD	Ecological risk assessment of selected rivers in Papua New	Dr. Timi & Professor Okpul

			Guinea: A case study in relation to heavy metals contamination, severity of sediment perturbation, and food safety.	
3	Nigel.K.Kiaka	MPhil	Designing a Suitable Drying System for Higher Altitude Conditions: Using Gembolg District, Chimbu Province as a Model.	Mr Reilly Nigo
4	Ben Paul	MPhil	A study into how Histamine (scombrotoxin) Formation is Controlled in Tuna onboard Purse Seiner's in Papua New Guinea. Research work has been completed and thesis submitted.	Mr. Reilly Nigo
5	Salvina Ku	MPhil	Analytical Capillary Electrophoresis for Environmental applications in Papua New Guinea. Thesis submitted for examination.	Dr. Timi
6	Ruthia Kisi	MPhil	Quality Evaluation of selected commodity products from PNG using ICP-OES & Capillary Electrophoresis.	Dr. Balakrishnan
7	Esther D. Tuweyo	MPhil	The determination of optimum methane generation from the co-digestion coffee pulp and treated chicken manure – a BMP analysis.	Dr S. Bathula
8	John Ape	MPhil	Impact of Leachate on Bore wells along the perimeter boundary of PNG University of Technology due to open Dumpsite.	Dr. S. Bathula
9	Stephanie Anis	MPhil	Chemical and biological activities of the five (5) plant species of Xanthostemon (MYRTACEAE) found in PNG.	Dr. D. Timi
10	Samson Hege	MPhil	The importance of cysteine proteases as defence mechanisms of tropical trees against insect herbivores.	Dr. D. Timi

Completed Undergraduate (Final Year Students) Research Projects (2023)**Chemistry Section**

No	Student Name	Supervisor	Topic
1	ABIN Elijah	Dr. Siva	Preparation and characterisation of porous LaPO ₄ ceramic materials
2	ARINO Ricky	Dr. Kemung	Determining the presence of Phytochemical composition antibacterial properties and antibiofilm activity of the antimalarial compound (Artemisinin) from <i>Artemisia annua</i> grown in Eastern Highlands Province.
3	ATASOA Kelvey George	Dr. Siva	Preparation and characterisation of Samarium doped Metal-Organic Frameworks (MOFs)
4	BOSSIP Kency	Dr. Kemung	Characterization of PNG Cassava starch from five (5) varieties
5	CIVIL Nathan	A/Prof. Bathula	A quality assessment of ascorbic acid (vitamin C) brands available in Lae, Papua New Guinea
6	DANIEL Robert	Dr. Siva	Preparation of carbon materials from Metal-Organic Frameworks and their adsorption studies
7	DICKSON Lorraine	Dr. Timi/Dr. Kemung/Ms. Ku	A case study on the assessment of water quality and occurrence of antibiotic resistance bacteria in Bumbu River, Lae Morobe Province.
8	EZRA Windu	Dr. Timi	Synergistic effect of Plumbagin with biosynthesized silver nanoparticles via <i>Euphorbia geniculata</i> .
9	HOMATE Steven	A/Prof. Bathula	Quality assessment of Physico-Chemical analysis of various soils
10	IRE Benjamin	Mr. Narimbi	Erbuim doping of ZIF-8 framework for potential luminescence application
11	LAVEIL Mark	Dr. Timi	Antibacterial Screening of the Leaves, Stem And Bark of <i>Xanthostemon-Crenulatus</i>
12	PARU Angeline	A/Prof. Bathula	An assay of Methyl dopa (antihypertensive) drug available in Lae.
13	ROHNGKIREA Dianne	Dr. Siva	Dysprosium Doping into Zeolitic Imidazole Framework
14	SARWOM Serah	Dr. Timi	<i>In-Vitro</i> Antidiabetic Assessment of Rokobada Herbal Product
15	SILIKEN Anne	Mr. Wau	Method development for the extraction and purification of vanillin from cured vanilla bean.
16	SONGOM Larse	Dr. Kemung	Synthesis of Aspirin and Compatibility Studies with Native Cassava Starch
17	SUNANA Andrew	A/Prof. Bathula	Impact of seawater intrusion onto the coastal aquifers and fresh waters along the seaside town of Lae, PNG.
18	TAI Revina	Dr. Timi	Proximate Analysis of The Edible Leaves Of <i>Ficus Damaropsis</i> In Papua New Guinea
19	TAPU Esther	Dr. Kemung	Evaluating the Antibacterial and Antibiofilm Activity of Endophytic Bacteria from the Leaves

			of <i>Thunbergia grandiflora</i> from Papua New Guinea.
20	TEKA Sam	A/Prof. Bathula	Determination of Physical, Chemical and Microbiological Parameters of different water sources in Goroka.
21	VAVA Juanita	Mr. Narimbi	Seeding/secondary growth of ZIF-8 crystals on silicon support.
22	VINCENT Jason	Ms. Ku	Confirmation of high Fluoride ion Concentration Occurrence in Erap, Yalu, Omsis, Markham River and Tap Water.
23	WAILAPU Luellyn	Dr. Timi	Synergistic Activity Of 7-Methyl Juglone with Amoxicillin
24	WILLIE Mary	Mr. Wau	Preliminary Studies on The Efficiency of Vanilla Extraction Via Continuous Hydro distillation, Optimization of Vanilla Extraction
25	YAKIP Leighanne	Dr. Siva	An investigation into the Europium doping into the matrix of Metal-Organic Frameworks (MOFs)

Food Technology Section

Completed Undergraduate (Final Year) Research Projects, 2023

No	Student Name	Supervisor	Topic
1	HAMBUK Ellie	Mr. Nigo	Biscuit development & shelf-life studies using sago & sweet potato
2	KAMA Abaijah	Dr. Yalambing	Infant feeding practices; a Case Study; Omili Clinic, Kamkumung, Lae.
3	KAEOK Warao	Mr. Kiaka	Suitable packaging for PNG taro
4	JOSEPH Hannah	Mr. Nigo	Non-edible product development as a means of waste management using cocoa pod waste.
5	MAIMA Solomon	Mr. Nigo	Production of sweet potato flour from locally grown sweet potato
6	MAITA Stephanie	Mrs. Denano	Food safety of vending cooked food and public health concerns of food borne diseases (typhoid)
7	MANINGA Brigit	Dr. Yalambing	Food formulation studies – development of high protein and high energy product.
8	MAORA Mario	Dr. Yalambing	Assessment of iron loss due to the different cooking methods of fortified rice in PNG.
9	MOSES Yaung	Mrs. Sipou	Further studies on antibiotic resistance of <i>E.coli</i> isolated from locally produced and imported chicken.
10	PARU Maryjane	Mrs. Sipou	Comparative studies on the microbiological quality of raw imported and locally produced chicken.

11	POESI Diane	Dr. Yalambing	Physicochemical properties of rice (<i>oriza sativa</i>) locally grown in PNG.
12	POPO Daniel	Mrs. Sipou	Microbiological quality and efficacy of locally produced herbal products.
13	SAMSON Faith	Mr. Nigo	Sorption and shelf-life studies of cocoa and white copra using solar drying system.
14	SIAPE Methuselah	Mr. Kiaka	Identifying, characterizing, and classifying waste disposal systems of some food manufacturers in PNG.
15	SIMON Japhet	Mr. Kiaka	Production and Determination of Functional Properties of Cassava Flour
16	SIMON Mark	Mr. Nigo	Further studies on chicken and duck feed development from coffee pulp and brewery waste.
17	TAPILI Geraldine	Mr. Nigo	Hygienic human and food waste facility for methane production and sustainable land use for high population settings in PNG.
18	WAU Faith	Dr. Yalambing	Food composition of locally grown PNG crops: cassava, potato and pumpkin

Research projects with External Stakeholders:

1. NFA–Unitech. Accreditation of the NFTMC Laboratory

Initial laboratory accreditation assessment was done by PNG Laboratory Accreditation Service on the 12-13th of December 2023. Four (4) microbiology and 1 Chemistry test methods were evaluated and satisfactorily met the requirements of accreditation. Staff are working on resolving identified conformities and anticipate full accreditation status in March 2024. Full accreditation status will greatly impact the analytical services provided by the Laboratory as well as research in the related areas.

2. Food Safety Courses / Training for Industries

The Food Safety short course is our popular short course, which is conducted three times annually. Its main objective is to enable understanding and appreciation of food safety and hygiene principles in the food and allied industries, participants come from the food service establishments, food industries, regulatory bodies, education agencies, and even small business entrepreneurs.

3. Chemical and Biological Investigation of the Leaves of Xanthostemon Species of PNG. Dr. David Timi is a collaborating partner in an ongoing research project between the University of New Caledonia, James Cook University Australia, and Applied Sciences, PNGUoT. Two (2) of the recorded four (4) species in PNG have been subjected to the study. The chemical analysis of the third one is yet to be done and the remaining fourth one is yet to be sampled and studied due to the remoteness of the sampling location that is in the Western Province. One of our MPhil students is currently carrying out this study under the supervision of Dr. Timi.

4. Bioprospecting and Product Development – a collaborative project between Dr. David Timi and the Research, Science & Technology Secretariat of PNG. The project is on searching and identifying beneficial biomolecules via related bioassays techniques from natural

biological sources and turning promising ones into products for use as pharmaceuticals, pesticides, cosmetics, nutraceuticals etc. The National Government has approved and will be funding the project for the next 5 - 10 years through the Department of Research Sciences & Technology from 2024 onwards. Invitation will be extended to the other science departments at PNGUoT for assistance in funding for any research relating to the project title. The project will be hosted by the Department of Applied Sciences, PNG University of Technology. Post Graduate students will be recruited and engaged to carry out the research studies.

DEPARTMENT OF ARCHITECTURE AND CONSTRUCTION MANAGEMENT

Head of Department: Professor Cletus K. Gonduan, PhD

Introduction

Several research projects were undertaken in the subjects: AR491, AR492, and AR591 under the *Design Research Agenda*. Many architecture and urban design development scenarios in the 4th and 5th year of the Architecture undergraduate program under supervision and co-supervision were given by staff who had both research and professional expertise in several development scenarios in the fields of architecture, building and Urban Planning/ Development and Urban Design. Similarly, the 5th year Bachelor in Building students also conducted their research in the subject AR 591 Research Projects (Special Study).

Research project for the current 5-year Bachelor Program in Architecture is introduced in the first semester of the 4th year and is conducted over three semesters into the first semester of the 5th year program. The Bachelor in Building Program has only one semester in the 5th year because, the 4th year students are taking a year out in the industry. Because of these arrangements, research interests and topics are chosen every semester and/or, - topics are chosen in the 1st Semester of the 4th year and are conducted in the three-semester segments into the 1st Semester of the 5th year. This is followed by a Design Thesis outcome in the 2nd semester of the 5th and final year for Architecture Students. This is an undergraduate degree prerequisite set by the Commonwealth Association of Architects (CAA) Accreditation Requirement in which the current 5-year undergraduate architecture program was designed and accredited from 1997 – 2010.

Design Research

Design Research is a ‘way of enquiring on producing knowledge; this means it is a way of researching.’ It is asserted that Architectural Design is to Architecture what Research is to Science, and the ‘process of architectural design is close to the process of knowledge creation in the sciences’. On this note, design research is often a prerequisite to any design outcome; it enables, architects in practice to conduct every design project in making an ‘informative’ investigation into new and/or a retrofitting design project. This research looks into many design issues, variables, constraints, physical, social, cultural, behavioral, geotechnical, lateral and horizontal forces and superstructure consideration, material science, economic, ecological consideration, climate change impact and building design expectations, energy rating, green energy rating and other ‘built environment ‘issues’ in which the building will be subjected to in the building use life-span.

Well researched and published documents are then captured in a Research Report (DESIGN BRIEF), which gives credibility and added value to the end product (the Building Types and Scales). All the above is addressed and captured in the DESIGN RESEARCH PROCESS over two semesters. A detailed Design Brief is developed and documented in AR591 in the third semester. This is then utilized in the final *Design Thesis Production* by each student under close supervision and advice by Thesis Supervisors, meeting all expectation are captured in the - *Final Assessment Rubrics* that capture the knowledge base that was required and addressed in the Design Thesis.

Undergraduate Research Undertake in 2022

Staff and Student	Research undertaken & Subject Code	Design Thesis 2023
	<i>Research was conducted over three Semesters in AR 491, AR492 and AR 591 to Documentation of Thesis in AR502 Design Thesis.</i>	<i>All completed Design Thesis are held as record and are published the dated Departmental undergraduate Design Thesis Publication Series. The Architectural Concept – Digital Thesis Publications 2023</i>
Supervising Staff	ARCHITECTURE PROGRAM	
<i>Professor Gonduan</i>	The following research and publication were carried out by final year students in both the Architecture and Building undergraduate programs.	
Students		
<i>AISA Joseph</i>	<i>Multi-purpose Commercial Development in Lae</i> <i>The Architectural Concept – Digital Thesis Publications 2023</i>	Design Thesis - Completed
<i>CHARLES Shandra</i>	<i>Urban Residential Apartment Development in Lae</i> <i>The Architectural Concept – Digital Thesis Publications 2023</i>	Design Thesis - Completed
<i>GAIA Manuel</i>	<i>Cultural Centre – Morobe show Grounds - Nadzap</i> <i>The Architectural Concept – Digital Thesis Publications 2023</i>	Design Thesis - Completed
<i>GIYDRERA Myrah</i>	<i>The SME Business HUB - Lae</i> <i>The Architectural Concept – Digital Thesis Publications 2023</i>	Design Thesis - Completed
<i>KOLEALA Nawam</i>	<i>Urban Strata Titled Occupancy Apartments – Port Moresby</i>	Design Thesis - Completed

	<i>The Architectural Concept – Digital Thesis Publications 2023</i>	
KOIFI Gideon	<i>The Lutheran Church Complex – Nawai Community Lae</i> <i>The Architectural Concept – Digital Thesis Publications 2023</i>	Design Thesis - Completed
SASUARA Wochinwai	<i>The Yangoru -Sausia Electorate Cultural Centre Complex -East Sepik Province</i> <i>The Architectural Concept – Digital Thesis Publications 2023</i>	Design Thesis - Completed
SENO Jemimah	The Lae Public Library – Lae <i>The Architectural Concept – Digital Thesis Publications 2023</i>	Design Thesis - Completed
SIGGING Jacob	The Wampa Local Government Office Complex – Nadzap <i>The Architectural Concept – Digital Thesis Publications 2023</i>	Design Thesis - Completed
TONGI Lyani	Women’s Hospital – Honiara Solomon Islands <i>The Architectural Concept – Digital Thesis Publications 2023</i>	Design Thesis - Completed
YUWOM Jacob	<i>The Marine Police Head Quarters and Operation Base - Voco Point Lae</i> <i>The Architectural Concept – Digital Thesis Publications 2023</i>	Design Thesis - Completed
Supervising Staff	BUILDING PROGRAM	
Dr. J. Walliah	<i>Research was conducted during the 4th Year Industrial Training Period Semesters 1 & 2 and documented in AR 591 as Research Report under Supervision in the 5th and final year of studies.</i>	Completed Research Reports are cataloged and kept in the Departmental Research Report Collection: <i>The Building Concept – Building Research Report Publications 2022</i>

Jeremiah APISAI	Conceptualizing a Proactive Approach in Managing Papua New Guinea University of Technology Residential Accommodation	Research Project - Completed
Sairus ROBERT	Factors causing the regular maintenance of residential buildings in Papua New Guinea University of Technology- Taraka Campus. Lae, PNG Understanding Cost of Prefabricated Residential Buildings in Papua New Guinea (PNG)	Research Project - Completed
Stanley RIKIS	Research Project -Completed Blaise MINIO UNDERSTANDING THE STUDENTS ACCOMODATION	Research Project - Completed
Blaise MINIO	UNDERSTANDING THE STUDENTS ACCOMODATION LIVING SATISFACTION IN PAPUA NEW GUINEAUNIVERSIY OF TECHNOLOGY	Research Project - Completed
Kauge DAMBE	FACTORS MOTIVATING CONSTRUCTION WORKERS' PERFORMANCE ON A CONSTRUCTION SITE IN LAE, PNG	Research Project - Completed
Solomon WILBERT	The effect of Tradesmen Shortage on the Construction Projects in Lae City, Papua New Guinea	Research Project - Completed
Caleb FUNUMARI	Effectiveness of Utilizing Sustainable Building Materials in Lae, Morobe Province, Papua New Guinea	Research Project Completed
Amanda KIAP	Effect of Communication Barriers on Project Success in Small Local Contractors in Lae, Morobe Province, Papua New Guinea	Research Project - Completed
Alba Peter	The Impact of Construction Project Workmanship on the Building Project Delivery in Lae, Papua New Guinea	Research Project - Completed
Bobby ROBERT	UNDERSTANDING THE IMPACT OF CONSTRUCTION ACTIVITIES ON THE ENVIRONMENT OF LAE CITY.	Research Project - Completed

NEWMAN KERUA	Identifying the effective cost saving approach of dormitory maintenance (Case study – PNG University of Technology - Lae – Male student accommodation)	Research Project - Completed
Willie LALO	Issues Causing Delay of Building Projects in Papua New Guinea University of Technology.	Research Project - Completed
Joel KERUA	FACTORS AFFECTING COST OVERUNS ON CONSTRUCTION PROJECTS IN PAPUA NEW GUINEA	Research Project - Completed
Kenneth JEFF	The Impact of Departments Workshop Redevelopment to Enhance Learning at the Papua New Guinea University of Technology	Research Project - Completed
Allan KUORO	Improving educational buildings accessibility for person living with disability at the Papua New Guinea University of Technology.	Research Project - Completed
Malipin PORAICALI	The Effects of Motivation in Local Medium Sized Construction Companies in Enga Province	Research Project - Completed
Alpha PAMUNDA	THE IMPACTS OF COVID-19 ON ANGAU MEMORIAL REDEVELOPMENT PROJECT, LAE, PAPUA NEW GUINEA	Research Project - Completed
Georgina PETER	THE CAUSES OF DELAYS OF FULLY FUNDED PUBLIC CONSTRUCTION PROJECTS IN PAPUA NEW GUINEA (CASE STUDY – IMBONGU DISTRICT, SOUTHERN HIGHLANDS PROVINCE)	Research Project - Completed

DEPARTMENT OF BUSINESS STUDIES

Head of Department: Mr Mathew Kuusa

1 Introduction

The Department of Business Studies is the largest one among the thirteen academic departments of the Papua New Guinea University of Technology (PNGUOT), with approximately 700 undergraduate and postgraduate students, including Ph.D. and M. Phil students, EMBA, and MBA students each year. The DBS is a multidisciplinary department with a proven track record of producing national and Pacific regional leaders who have been instrumental in leading the private and public sectors for decades.

The Department of Business Studies undergraduate programs consist of Bachelor of Business in Accounting (BBAC), Applied Economics (BBAE), Information Technology (BBIT), and Management (BBMA). The courses are designed to equip students to integrate the knowledge, skills, and dispositions in their four years of study with actual business practices. The Department of Business Studies also offers postgraduate programs, including Ph.D. 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. In addition, the Department of Business Studies is developing comprehensive postgraduate programs, including CPA-combined MBA, Master in IT, Accounting and Economics, and Ph.D. programs in Accounting and Management, which will be rolled out soon. All DBS 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 Department of Business Studies comprises national and international academics. They are dedicated, motivated, and committed to ensuring that quality standards are maintained with a focus on continuous innovation, entrepreneurship, and digital technology-centered teaching and learning through active participation in relevant industries and supporting memberships with professional associations. Research has been the cornerstone of the DBS's commitment and is the driving force in producing quality graduates. This has cultivated a competitive research environment that complies with national and international research standards.

The Department of Business Studies currently has the Research Centre of Big Data Analytics and Intelligent Systems (BAIS) (founded in 2015) and the Centre of Innovation and Entrepreneurship (CIE) (founded in 2019). Both centres provide the platform for research collaboration among national and international colleagues in the field of big data, big data analytics, AI, business intelligence, intelligent systems, innovation, and entrepreneurship. BAIS circulated the ITCS-BAIS Vol 8, Issues 1-4 to its members and beyond to share the state-of-the-art big data analytics, data science, AI, and intelligent systems in 2023. BAIS has its presence at <https://www.researchgate.net/lab/Zhaohao-Sun-Lab>. In 2022, BAIS published 4 Preprints on big data, AI, big data analytics, business intelligence, and intelligent systems at <https://www.researchgate.net/profile/Zhaohao-Sun/publications>, a few of which have been indexed by Google Scholar. BAIS has drawn increasing attention in international academia.

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

The DBS's 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 Department of Business Studies collaborates closely with many overseas universities, including Federation University, Charles Sturt University, and James Cook University of Australia, Handong University of Korea, Hebei University of Science and Technology of 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 DBS during the 2023 Academic year: 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 Research of DBS

2.1 Priority Areas of Research for DBS

The potential priority research areas for the Department of Business Studies are listed below. Topics are focused on all four Sections provided by individuals within the Section.

1. Agricultural economics.
2. Economics and Financing of the Agro- based industries.
3. Digital citizen development.
4. Women entrepreneurship.
5. Human capital and national development, marketing management
6. Leadership management
7. Green marketing and Green HRM
8. Economic development (income inequality and poverty) in Papua New Guinea
9. Big data analytics and artificial intelligence
10. Cloud computing & cybersecurity.
11. Higher education KPIs, strategic planning and funding.

2.2 Current Ongoing Research Topics and Areas

Department of Business Studies academic staff members are undertaking the following research projects (Scholar name, research project).

1. Adimuthu, R., A study on quality of work-life (QWL) and its influence on job satisfaction, organizational commitment and overall organizational performance in the premier universities in PNG.
2. Adimuthu, R., A study on the factorial influence on sustainable small business enterprises (SMEs) practices in PNG
3. Alamil, L. Strategic implementation management of SMEs

4. Bomoteng, B., Financing in tertiary education in PNG
5. Bomoteng, B., Managerial accounting for socio-economic development in PNG
6. Cosmas, I. and Sun, Z: cloud computing, IOT, NOT & cybersecurity.
7. Gipe, G., Key measures and trends in economic development in Papua New Guinea
8. Gipe, G., Key opportunities, challengers and enablers for economic development in PNG
9. Kuusa, M., The impact of tax evasion on revenue collection in PNG.
10. Naro, R., Digitisation of PNG's informal economy: Table markets and SMEs;
11. Naro, R., Preservation of cultural inheritance through digital rights management (DRM): Distributed ledger technology (DTL) smart contracts.
12. Naro, R., Feasibility analysis of policy draft via datafication: PNG context (Public Sector).
13. Sun, Z and Pambel, F., Big data driven cybersecurity for securing citizen and society in PNG.
14. Viswanadham N., Tax policy and incentives towards rural SME business a critical study.
15. Viswanadham N., Impact of management accounting practices in the manufacturing industry in PNG: A survey study.
16. Viswanadham, N., Kuusa, M., Root cause analysis of rural entrepreneurial finance policy failures.
17. Yamarak, L., Strengthening capacities to investigate and prosecute trafficking offences and improve protection and direct assistance for victims of trafficking.
18. Yamarak, L., "Pacific Perspectives on the World" project, which aimed "to learn from a cross- section of Pacific islanders about their perspectives on the world and their place in it and how other countries (notably Australia) can best contribute to their future." A DBS scholar is a lead researcher here at PNG University of Technology. This is research sponsored by Western Sydney University, with all the universities in PNG.
19. Yamarak, L., A mining perspective and a case in point of Porgera mining review on project appraisal of the one hectare model nuclear family hybrid cocoa projects of the Yekora people in Morobe sub-district, Huon district, 2022-2027

These ongoing research projects will lead to corresponding research outputs for DBS in 2023.

2.3 Research Interests of DBS Staff

The following table lists the current research interests of DBS Staff.

DBS Academic Staff Name	Research Interests
Abraham, Lulu Bokutoai	Education and Labour Economics, Fiscal Policy, Governance, Development Economics
Adimuthu, Ramasamy	Human Resource Development and Organisational Behaviour Management, Leadership Management, Management of SMEs and Change Management
Alamil, L.	The Strategic Service Delivery Management of Local Level Government Towards Small and Medium Enterprises (SME) Development In Eastern Highland Province Of PNG.

Alamil, L.	The success factors of strategic intents and strategic implementation management of SMEs in Eastern Highlands Province, PNG
Ambelye, John A.	Supply Chain challenges of Fresh food marketing in PNG, Manufacturing in PNG - supply chain challenges, Labour Productivity of Factory workers in Lae, PNG, Billboard advertising in PNG: effective ness and challenges.
Bomoteng, Bapa	Higher Education Financing and Management “Key Performance Indicator’s in higher education in association with funding and strategic planning
Cosmas, Ian	Cyber Security, Artificial Intelligence, Cloud Computing
Gipe, Gomi J	Economic Development in PNG, Development Economics, GDP and National Public Expenditure and their Impacts on Poverty in PNG, Income and Expenditure and their Impacts on Weight, Height and Body Mass Index (BMI)
Kale Kaupa	Development Economics on Economic Impact of Land Scarcity, Eviction and Urban Development in the 21st Century and Sustainable Development Strategies in High-Yielding Agriculture in the Highlands of Papua New Guinea.
Konafo, Ken	Small and Medium Enterprises, Online Marketing, Fresh Produce Marketing
Kuusa, Matthew	THE Impact of Tax Evasion on Revenue Collection Performance IN PNG
Naro, Rodney	Cybersecurity, Artificial Intelligence, Cloud Computing, network engineering and management
Pambel, Francisca & Sun, Zhaohao	Big data driven cybersecurity
Pinjik, Paul	Organisational ICT Security Policy, Cybersecurity
Prabhakar, Akhilesh Chandra	Sustainable and Inclusive Economic Development, Regional Economic Cooperation (Investment, Trade and Technology), Agricultural and Rural Development, Social Entrepreneurship Development, Macroeconomic Policy and Economic Development Related Issues and Challenges.
Sun, Zhaohao	Business Analytics and Big Data Analytics, Cybersecurity, Data Science, Artificial Intelligence, Cloud Computing
Tiki, Samson	Forensic Accounting and Investigation, Anti-money Laundering and Regulation, Financial Inclusion and Sustainability, Financial Forensic and Business Intelligence
Viswanadham, Nadiminti	Tax research, Asset pricing, Corporate governance, Strategic Management and SMEs.

Yamarak, Londari	Population Growth and its impacts on Economics Development in PNG, Covid19 and Gender Inequality: Economics and social impacts. Impacts of gender discrimination on gender development and poverty in PNG, Mining Impacts in PNG, 2023 National Elections.
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3 Research Publications of DBS

In 2023, the Department of Business Studies published 2 books, 10 peer-reviewed (refereed) journal articles, 2 peer-reviewed international conference proceedings papers, 1 book chapter, and 2 preprints.

3.1 Journal Articles Publications

- [1].Devarakonda, S., Viswanadham, N., & Vijaya, T. Customer Centricity: A Strategic Necessity or Challenge for the Banks? (2023) Academy of Marketing Studies Journal, 27(5): 1-8. (ABDC Journal).
- [2].Prabhakar, A.C. (2023) India and ASEAN: Visions and Perspectives, Journal of Indian Ocean Studies, 31(3): 223-239
- [3]. Prabhakar, A.C. (2023) An Analysis of Intra-Trade Among ASEAN Countries since 2000, Asian Profile, 51(4): 329-337
- [4].Prabhakar, A.C., Gomi Jaungere Gipe., John Ambelye., Mathew Kuusa (2023) India-South Pacific Economic Partnership Towards Sustainability with Special Reference to Papua New Guinea, International Journal of Novel Research and Development: An Open Access, Peer reviewed, refereed Journal: 2456-4184 (IJNRD), 8 (11): 203-210
- [5].Ramasamy, A. Siaguru, F., Konafo, K. and Kelvin, D. (2023), Sustainable Operational Practices in Food and Beverage Sector in Papua New Guinea: Challenges and Prospects, Empirical Economics Letters, 22: (June 2023) ISSN 1681 8997 <https://doi.org/10.5281/zenodo.8079172> (ABDC & ERA)
- [6].Ramasamy, A. Kelvin, D. and Ambelye, J.A. (2023) Investigating the Potential for Increased Consumer Trust in Processed Food Products Facilitated by Blockchain Technology: A Papua New Guinea Case; Empirical Economics Letters, 22, (June 2023) ISSN 1681 8997 <https://doi.org/10.5281/zenodo.8078607>(ABDC & ERA)
- [7].Ramassamy, A., Inore, I., Muduli, K., Singh, S. (2023), Evaluation of Factors Affecting Job Satisfaction Pathways for Improved Sustainable Business Performance in Emerging Economies, 1, Source Title: International Journal of Social Ecology and Sustainable Development (IJSESD) 14(1): Pages: 17 DOI: 10.4018/IJSESD.328217 (Scopus).
- [8].Sun Z. (2023) Data, Analytics, and Intelligence, Journal of Computer Science Research; 5(4):43-57
- [9].Sun, Z. (2023) Similarity Intelligence: Similarity Based Reasoning, Computing, and Analytics. Journal of Computer Science Research (bilpubgroup), 5(3): 1-14.
- [10]. Viswanadham Nadiminti, Mr. Bapa Bomoteng, Ms.Tipeo Othlyn The negative effects of application of increase taxes: A case of residents of The Papua New Guinea University of Technology.July2023,12(5):437-445 DOI:10.20525/ijrbs.v12i5.2700 International Journal of Research in Business and Social Science (2147-4478) 12(5):437-445.

3.2 Book and book chapter publications

- [1].Das, R.P., Muduli, K., Singh, S., Behera, B.C., Ramasamy, A. (2023) Unveiling the Role of Evolutionary Technologies for Building Circular Economy Based Sustainable

Manufacturing Supply Chain, Digital Transformation and Industry 4.0 for Sustainable Supply Chain Performance (pp. 51-78), Springer ISBN978-3-031-19711-6; DOI: https://doi.org/10.1007/978-3-031-19711-6_2.

[2]. Muduli., K., Ramasamy, A., Das, M.R., Ray, M. Project Management and Economics, RLK Enterprises, India, 2023, ISBN: 978-8119489961.

[3]. Viswanadham Nadiminti and Sayi B.L., 2023, Reviews on Strategic Innovative Work Behaviour” AKNIK Publication, India, ISBN 9789355705549.

3.3 Conference paper publications

Viswanadham N, Mathew, Kuusa, Mr. Bapa Bomoteng, 2023. Examine the importance of personal financial planning and financial literacy trainings towards improved personal savings in PNG. The 5th International Conference on ‘Impact of Current Events on the Future of Business’ (April 27th - 29th, 2023). Vignana Jyothi Institute of Management, India, ISBN: 978-81-956810-4-4, DOI: 10.17492/jpi.vjim.230401, pp:32-50.

3.4 Invited Presentations

1. Viswanadham Nadiminti, 22/11/2023, Role of Debt Financing on SME'S financial performance in Papua New Guinea, Paper presented at the International Conference on Accounting, Auditing and Finance, University of Western Australia, Perth, Australia.

4 Research Grants Received

1. Sun, Z., 2022-2023 Research Project: Big data Analytics-Driven Socio-Economic Development in PNG, National Science and Technology Secretariat (PNG STS). PNG STS granted another K50,000.00 (November 2022 to support research in 2023) to PNG UoT.

5 HDR Student’ Achievements and Supervisions

5.1 HDR Students

Student	Program	Research Title	Funding source	Supervisor
Bapa Bomoteng	PhD	Key Performance Indicators in higher education in association with funding and strategic planning	PNGUOT (LNSDC)	Viswanadham Nadiminti
Peter Helebi	PhD (IT)	Leveraging socio-economic development in PNG through big data analytics: A data science approach	Self-funded	Zhaohao Sun
Mike Yandit	Ph.D.	Exploring the challenges of financial Inclusion and management on SMEs in PNG.	Self-funded	Viswanadham Nadiminti
Desmond Narongou	M.Phil (IT)	Big data Analytics-driven Smart Airport Development in PNG	PNG STS grant	Zhaohao Sun, Francisca Pambel

Mathis Piru	M.Phil- Accounting	An Investigative study of tax policy and its Implications on PNG economy.	IRC (Internal Revenue Collection), PNG	Viswanadham Nadiminti
Philip Fukatine	M.Phil (IT)	Driving SMEs' Development in PNG with Big data Analytics-	PNG STS grant	Zhaohao Sun, Francisca Pambel

6 Undergraduate supervision

Completed Undergraduate Research Projects (Final year Accounting) 2023

Student Name	Supervisor	Project title
Pamela Anio	Dr. Viswanadham Nadiminti	The Impact of Corporate Governance Practices of Financial Firms in Papua New Guinea on Firm Performance
Christina Bonamedura	Dr. Viswanadham Nadiminti	A comparative study of Operational risk management practices in commercial banks in Papua New Guinea
MARTHA LOMBU	Dr. Viswanadham Nadiminti	Budget and Budgetary Control Mechanisms in Non-Profit Organisations
Emmalize Nerius	Dr. Viswanadham Nadiminti	A critical review on Environmental Accounting
Patricia PAE	Dr. Viswanadham Nadiminti	Corporate Governance and Investors' Confidence in Commercial banks in Papua New Guinea
Maicy Peter	Dr. Viswanadham Nadiminti	Inventory Control Mechanism and Its Impact on the Growth of Firm.
Esley Sasa	Dr. Viswanadham Nadiminti	Tax policy and Financial Inclusion in Papua New Guinea
Joshua SENT	Dr. Viswanadham Nadiminti	Financial Management of a public University
Fergustean Wesley	Dr. Viswanadham Nadiminti	Challenges of tax collection in developing countries: A case of Papua New Guinea
Everlyn Timana	Dr. Viswanadham Nadiminti	Adoption of Technology and its impact on Bank Performance

7 National and International Outreach

- Prof Sun, Z. has been a member of the Academic Board of Chongqing Key Lab of Big Data Analytics and Intelligence Finance since 2021, Chongqing, China.
- Prof Sun, Z. collaborated with Professor Andrew Stranieri of Federation University Australia and Prof Kenneth Strang of USA and developed a few research papers on intelligent analytics and AI in 2023. A few of them will be published soon.
- Prof Sun, Z. has been working on the Editorial Board of following International Journals.
 - Editors-in-Chief of PNG UoT interdisciplinary Journal.
 - Editor of Journal of New Mathematics and Natural Computation (<http://www.worldscientific.com/worldscinet/nmnc>). (SCOPUS, WoS indexed)

- Editorial Review Board of Journal of Computer Information Systems (SCOPUS, WoS (i.e. SCI) indexed)
 - Associate Editor of Journal of Intelligent and Fuzzy Systems (SCOPUS, WoS indexed)
 - Associate Editor of International Journal of Systems and Service-Oriented Engineering (IJSSOE). (DBLP, ACM indexed)
 - Associate Editor of International Journal of Business Intelligence Research (<http://www.igi-global.com/journal/international-journal-business-intelligence-research/1168>).
 - Associate Editor of International Journal of Risk and Contingency Management (IJRCM).
5. As a member of PC, Prof Sun, Z. has been actively engaged in organizing international conferences including ICAART 2023, ITS, ACSW (and HIKM) 2023, etc. He has reviewed several papers for each of them.

8 Memberships of Professional Associations.

Prof Sun, Z. is a senior member of ACS, Australia, a senior member of IEEE, A distinguished member of AIS, a member of ACM.

Mr Cosmas, I. is a member of IEEE.

Dr. Viswanadham Nadiminti is a life member, Indian Finance Association, a Member of Accounting and Finance Association of Australia and New Zealand.

DEPARTMENT OF CIVIL ENGINEERING

Head of Department: Dr. Mirzi Betasolo

Introduction

Civil Engineering Department offers a four-year refreshed undergraduate degree (UG) program, Bachelor of Civil Engineering (Honours), with provisional accreditation under the Washington Accord directed by Engineers Australia in 2019 and for full accreditation by 2024. It also offers a two-year postgraduate program either by coursework under the programs Master of Science in Solid Waste and Resource Management and Master in Engineering with specializations in Structural Engineering, Environmental Engineering, Construction and Project Management, Transportation Engineering, Water Resources Engineering, Geotechnical Engineering. It also offers a Master of Philosophy by Research, and PhD program on campus. The Department of Civil Engineering has well-equipped laboratories and continues modernizing the laboratory with the latest equipment and software through the assistance of the Industrial Advisory Board.

The Department had 9 full-time academic staff (4 with PhDs, 1 on PhD schooling, 4 with Master's degrees, and 2 others doing Masters of Philosophy (MPhil) in Civil Engineering but already had Masters in another engineering field.

Enrolled in the master's degree are as follows: there were 1 Ph.D., 4 MSc in Solid Waste & Resource Management degrees, 1 MEng, 4 MPhil (Civil Engineering) degrees, and 189 (46 in year 1, 51 in year 2, 47 in year 3, 45 in year 4) undergraduate students.

A. Area of Specialization of Department of Civil Engineering Academic Staff

- **Environmental Engineering**
 - Dr Revanuru Subramanyam
 - Dr Mirzi Betasolo
 - Mr Willie Doaemo
- **Structural Engineering**
 - Dr Alak Patra
 - Dr Jallipali Prasad
 - Dr Mirzi Betasolo
 - Ms Grace Wantepe
- **Transportation Engineering**
 - Dr Mirzi Betasolo
 - Dr Alak Patra
 - Mr Murray Konzang
- **Geotechnical Engineering**
 - Dr Mirzi Betasolo
 - Mr Murray Konzang
- **Construction & Engineering Management**
 - Dr. Mirzi Betasolo
 - Mr Murray Konzang
 - Mr Roboam Pebuar
 - Ms Stephanie Konts
 - Ms Grace Wantepe

- **Water Resources Engineering**

- Dr Mirzi Betasolo
- Ms Stephanie Konts
- Mr Roboam Pebuar
- Ms Grace Wantepe

B. The PNGUoT Department of Civil Engineering's priority research areas are as follows:

- **Environmental Engineering**

- ❖ Solid Waste Management
- ❖ Water & Wastewater Testing and Treatment
- ❖ Sediment Analysis to Know the Pollution Status of Rivers
- ❖ Design of water/sewage treatment systems
- ❖ Design of air pollution control systems
- ❖ Anaerobic Treatment
- ❖ Environmental Impact Assessment
- ❖ Recycling, waste to material resource

- **Structural Engineering**

- ❖ Engineering properties of steel, concrete, gravel, cement, timber, coconut timber, etc.
- ❖ Earthquake impact on structures
- ❖ Structural Stability

- **Transportation Engineering**

- ❖ Traffic surveys & Design of roads
- ❖ Econometrics

- **Geotechnical Engineering**

- ❖ Engineering properties of soil, slope stability, etc.
- ❖ Geosynthetic material

- **Construction & Engineering Management**

- ❖ Engineering properties of soil, slope stability, etc.
- ❖ Geosynthetic material

- **Water Resources Engineering**

- ❖ Aquifer stability, drinking water sustainability
- ❖ Impact of waves on structures

C. List of Journal Publications in Indexed journals.

Willie Doaemo, Mirzi Betasolo, Jorge F. Montenegro, Silvia Pizzigoni, Anna Kvashuk, Pandora Valappil Femeena, and Mishun Mohan. 2023. "Evaluating the Impacts of Environmental and Anthropogenic Factors on Water Quality in the Bumbu River Watershed, Papua New Guinea" Water 15, no.3:489. <https://doi.org/10.3390/w15030489>

D. List of Conferences

Structural Assessment on Buildings Vulnerability to Seismic Hazards in the Lae City, the Industrial Hub of Papua New Guinea. AEES 2023 Conference. <https://aees.org.au/aees->

conference-2023/

Seismic Vulnerability Assessment of Selected High-Rise Building in Lae City, Papua New Guinea. AEES 2023 Conference. Poster. <https://aees.org.au/aees-conference-2023/>

Grace Wantep, Mirzi Betasolo. 2023. "Structural Monitoring of Bumbu and Butibam Bridges of Lae City, Papua New Guinea. AEES 2023 Conference. Poster. <https://aees.org.au/aees-conference-2023/>

E. List of PhD students and their research topics.

Name of Student	Research Title	Supervisor
Mr. Murray Konzang	Optimization of Road Infrastructure in Momase Region (as an economic zone) by Econometrics Modelling	Dr. Mirzi Betasolo

F. List of Postgraduate students and their research topics.

Name	Supervisor	Program	Research Title
Roboam Pebuar	Dr Mirzi Betasolo	MPhil-2	Analysis and Modeling Engineering Methodology Applied to the Design and Reliability Assessment of Structures in Coastal Engineering
Stephanie Kots	Dr Mirzi Betasolo	MPhil-2	Vulnerability Assessment of Engineering Groundwater to Pollution-Taraka
Wesley Jacob Wambi	Dr Mirzi Betasolo	MPhil-2	Understanding the Behaviour and Engineering Courses of Mudflow through Numerical Simulation using GIS Applications and Implement controls through detail ground Survey using GNSS instrument and Applicable Geotechnical Modelling
Bomai Kobil	Dr. Revanuru Subramanyam	MSc-SWRM-2	Phytoremediation potential of Native Terrestrial plants at Hidden Valley mine site in Morobe Province of Papua New Guinea.
Edward Miall	Dr. Revanuru Subramanyam	MSc-SWRM-2	Assessing the phytoremediation potential of Vetiver grass on hidden valley mine waste rock dump in Papua New Guinea
James Jubilee Damwatt	Dr. Revanuru Subramanyam	MSc-SWRM-2	Solid Waste Management of Wewak Town in East Sepik Province, Papua New Guinea

IKI Agoname	Dr. Revanuru Subramanyam	MSc-SWRM-2	Assessment of heavy metal pollution in sediments, surface water and fish species around Yonki reservoir area, Papua New Guinea
Sujan Ghimire	Dr. Revanuru Subramanyam	MPhil-1	Comparative assessment of seismic performance of concrete gravity dam and Rock filled dam founded in different ground conditions located in high seismic zone within Ring of fire, Papua New Guinea: Finite Element Analysis approach
Francis Martin	Dr Mirzi Betasolo	MPhil-1	An Analysis of the Engineering Procurement and Contract Management in Papua New Guinea
Jesmah Kepou	Dr Alak Kumar Patra	MPhil-1	Investigation of alternate materials for better performance of laminated composites
Michelle Silip	Dr Alak Kumar Patra	MPhil-1	Comparative study on natural and artificial core materials for advanced composites

G. Final Year Undergraduate Research Projects.

Fourth-year BEng(Civil Engineering) students undertake research work for partial fulfillment of the Bachelor's degree program in 2023 as is shown in Table below:

GROUP NO.	Student NAME	TOPICS	SUPERVISORS
1	Ray Junior Yandi, Terence Enja, Adam Kayabe and Tanya Bang,	Impact of Flooding Due to Poor Condition of Bridges in The Rural Areas: Case of Menyamya District, Kapao LLG	Mr Roboam Pebuar Dr Mirzi Betasolo
2	Hudson Bai, Joshiah Bigilam, Davelyn Katu and Mary Nou	Evaluation of the Hobu Water Supply System	Murray Konzang

	Ismael Nupiri, Leilla Lialu and Mark Kuni, Murray Konzang	A Study of Geosynthetics Applicable in Pavement Design in Lae City Road Networks	Murray Konzang
3	Jacob Benga and Solomon Pam	Study on Structural Health Parameters for monitoring and rehabilitation of the health status of Bailey bridges in Papua New Guinea	Grace Wantepe
4	Rosevita Topal, Shane Malai Wakson Francis,	Research on the Stress, Displacement, Strain, Shear and Moment Experienced by Kamkumung Bridge in Lae City, Papua New Guinea	Grace Wantepe
5	Fillary Keri and Stevan Eugenio	Investigation on the Localized Aggregate for Kinim Wharf Rehabilitation	Dr Alak Kumar Patra
6	Emmanuel Oroto, Jason Samuel, Cliff Mandau, Rodney Peter	Preliminary Site Investigation and Research in Proposing a Bridge Across a River System in Rural Places in Papua New Guinea: A Case Study of Kumalu River Along Wau Bulolo Highway in Morobe Province of Papua New Guinea	Murray Konzang
7	Labson John, Elijah Ambelye, Philomena Yapi and Genevieve Mara,	Design an Overhead Pedestrian Bridge in Mount Hagen City, Papua New Guinea Best Practices and Challenges	Grace Wantepe
8	Gamai Bal, Matthew Sekamine, Awal Ryan Kamane and Dennis Napitalai	Evaluation of washed-out Bridge: A case study of Bagahinupa/Hofaga Bridge - Unggai Bena District, Eastern Highlands Province.	Grace Wantepe
9	Bradley Nalei, Alexander Hitolo, Jeremiah Ama and	Assessment and mitigation of scouring effects on Kamkumung Bridge: A Case Study in Lae, Papua New Guinea	Grace Wantepe

	Jeremiah Kulu Tomadek,		
10	Christopher Tyson	Noise Pollution in Lae City	Dr. Revanuru Subramanyam
11	Imex Konge, Jerry Jack, Daniel Minimao, Mayson Maio	Cracking Analysis and Repair Solutions for Kamkumung Bridge in Lae, Papua New Guinea	Grace Wantepe
12	Jimmax Yole, Felix Soto, Jeremiah Tanda, and Kayson Camillus	Assessment and Optimization of Structural Health Parameters for Enhanced Design and Performance of Deck Slabs in Existing Concrete Highway Bridges in Morobe, Papua New Guinea	

DEPARTMENT OF COMMUNICATION AND DEVELOPMENT STUDIES

Head of Department: Dr Rachel Aisoli-Orake

Regarding *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).

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 Sociology, research foci include fieldwork, health, corrections, communication theory and practice, media studies, critical-cultural studies, and comparative higher education studies. Another thread concerns 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 interests 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, etc., as well as 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 an international peer-reviewed organ, the *JCDS: Journal of Communication and Development Studies* under the editorship of Professor Gilder, 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 Interests
Prof Dr <i>habil.</i> Dr Eric Gilder	Professor, Editor-in-Chief, <i>JCDS</i>	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/Deputy Vice-Chancellor	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
Michael Winuan	Lecturer II	English for Academic Purposes, Farming and community/national development
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, Disaster and Risk Management, and Workplace Safety and Risk Management
Nagiob Jesse	Lecturer I	Engineering & Sustainable Development Practices, Research Methods & Skills, Workplace/Business Communication, Development Studies, Communication for Development. Socioeconomic Development Research, Strategic Planning, Implementation, Monitoring & Evaluation
Lucy Maino	Lecturer II	Participatory Development Communication (PDC) for engaging stakeholders (individuals, groups, and institutions) in socio-economic change processes, Participatory Social Mapping for community development, environment and agricultural innovation, and English for Academic Purposes (EAP).
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	Sports as a vital tool in behaviour change of young people in communities: A perspective of rugby league, Development from a perspective of guided strategy: A perspective of a developing nation - Papua New Guinea; Urban sociology in consideration of Sustainable Development Goals
Ruth Moka	Lecturer I	English for Academic Purposes, community development, Secondary education in PNG
Wilma Molus (on study leave)	Lecturer I	Sociology of children, sociology of deviance and crime
Adrian Sangundi	Lecturer I	English for Academic Purposes, collegiate debate
Mispher Nanu	Tutor	Use of triggering tools with effective results for CLTS-Community Led Total Sanitation approach in PNG societies; Assessing the sustainability impact of CLTS-Community Led Total Sanitation approach in Nawaeb District: A Report based Analysis.
Starza Paul	Lecturer I	Journalism theory and practice; national development
Jack Yaro	Lecturer I	Development, Work & Safety training
Ian Yengki	Tutor	Sustainable practices in development

Ongoing Community Partnership Projects:

Beginning in January 2020, the CDS Department at PNGUoT began a cooperation with the Wesleyan Bible College (WBC) in Mt Hagen, focusing on developing the (English-Language) Academic Writing Skills of theological instructors at WBC and partner theological schools, including Christian Union Bible College (CUBC), Christian Leaders Training College (CLTC) and others. Professor Eric Gilder, Dr Aisoli-Orake, and Ruth Moka have been involved in this program from the beginning, which started as a conversation of missionary Cheri and Don Floyd asking for specialist expertise in developing the program. The Department is engaged and committed to continue this project as part of its community outreach and development mission, and trusts that sound, applicable action-research can be generated by it. In 2022, Professor Gilder had given academic writing advice to Father Newton Ekoda, as he completed his Master's degree in theology at the Christian Leadership Training College, Mt. Hagen.

In 2023, the CDS Department continued its support of Hamara Village at Kokoda (Oro Province) for the establishment of a Community Resource Centre. This new partnership is another community outreach project of the department jointly with the Agriculture Department at PNGUoT. It enables our final-year students to do their practical field attachments there to learn about the people's social/cultural activities, and their general way of life, as well as

enabling each student to give something back to the community, obtained by performing various activities for the village. These include: Engaging in participatory social mapping, resource and environment mapping, and performing community needs-analysis for development efforts (all done under the close supervision of the subject coordinators in consultation with the village leaders and elders), among other activities.

In 2023, Ms Wilma Langa conducted a workshop training on women, election and leadership in partnership with Yumi Sanap Strong, a community-led-initiative that supports gender equality and human rights in PNG and UN Women PNG. The workshop training privileged a pedagogical approach to participatory communication where participants of both genders from Ahi Local Level Government Lae PNG reflected women's rights to political leadership. This grew out of screenings conducted in 2022.

Dr Rachel Aisoli-Orake and Ms Imelda Ambelye continued in 2023 their participation (with other women colleagues from PNGUoT) in the PNGUoT WIHE Special Interest Group (SIG), contributing to the publication *Confident supervisors: Creating independent researchers*, by James Cook University (noted below).

In concert with Professor Dr. *habil.* Silva Florea of LBUS, in 2023 Professor Gilder taught in the online CIDASE Masters program in Sino-European Intercultural and Business Communication, which is done under the organizational umbrella of the Confucius Institute there.

Peer-Reviewed Publications:

Edited Journal:

Gilder, E., Florea, S., Tirban, E. (Eds.). (2022-2023). *JCDS: Journal of Communication and Development Studies*, Vols. IX-X. Published in cooperation with the UNESCO Chair in Quality Management of Higher Education and Lifelong Learning of "Lucian Blaga" University of Sibiu, Romania. ISSN 1992-1322

Journal/Book Chapters:

Ambelye, I. (2023). Impacts of COVID-19 on increased household inequality in Papua New Guinea (PNG). *JCDS: Journal of Communication and Development Studies*, Vols. IX-X (2022-2023).
https://www.academia.edu/114876920/JCDS_Journal_of_Communication_and_Development_Studies_Vols_IX_X_2022_2023_Preprint_of_article_by_Imelda_Ambelye_PNGUoT

Kialo, D. J.; Siaguru, F.; **Ambelye, I.**; Blacker, J.; Yalambing, L.; Betasolo, M.; **Aisoli-Orake, R.**; Denano, S.; Gasson, S., & Bue, V. (2023). Creating successful higher degree researcher pathways in a developing country – Papua New Guinea. In S. Gasson, J. Blacker, I. Stoodley, A. Winter, & C. Bruce (Eds.), *Confident supervisors: Creating independent researchers*. James Cook University (pp. 69-86).
<https://jcu.pressbooks.pub/confidentsupervisors>

Gilder, E. (2023). Book review: *Neopragmatism and Postliberalism: A Contemporary Weltanschauung* (Bilingual Edition: *Postliberalism Neopragmatism: un*

Weltanschauung Contemporan), by Serban, H. A. *Appraisal* 13(1) (Spring).

<https://www.britishpersonalistforum.org.uk/131-book-henrieta-serban.html>

Sali, G. (2023). Understanding the escalation of tribal fighting in the Enga Province: Is control slipping away from the Papua New Guinea government? *JCDS: Journal of Communication and Development Studies*, Vols. IX-X (2022-2023).
https://www.academia.edu/114875223/JCDS_Journal_of_Communication_and_Development_Studies_Vols_IX_X_2022_2023_Preprint_article_by_Garry_Sali_PNGUoT

Wambu, E. & Paul, S. (2023). Effective communication strategies and community engagement in resolving conflict of interest between Porgera landowners and Barrick Ltd Mining Company, Papua New Guinea. *International Journal of Innovative Science and Research Technology* 8(5) May: 3459-3470.
<https://www.ijisrt.com/assets/upload/files/IJISRT23MAY2067.pdf>

Scholarly Presentations:

Aisoli-Orake, R. & Milba, J. (2023). Strategic Thinking. PNG Association of Administrative Professionals 22nd National Conference – “Developing Mindsets for Equitable Outcomes”. Papua New Guinea University of Technology, Lae. 26-27 June.

Ambelye, I. & Maino, L. (2023). Corporate Responsibility. PNG Association of Administrative Professionals 22nd National Conference – “Developing Mindsets for Equitable Outcomes”. Papua New Guinea University of Technology, Lae. 26-27 June.

Avram, S. & Gilder, E. (2023). New times, new knowledge, and finding the ‘NorthStar’ of success in a changing world of learning, 19th LUMEN RSACVP2023 Iasi, Romania, 21-23 September. (Online participation)

Gilder, E. (2023). An intersectional identity not to be “ordered off the combo menu” (the cross-cutting humor of Ryan O’Connell): A Burkeian turn of possible life tragedy into a comic frame of fame and fortune. AICED-24: The 24th Annual International Conference of the English Department, University of Bucharest, Literature and Cultural Studies Section: ‘Humour and Pathos in Literature and the Arts’-In memoriam Mihaela Irimia, Irina Pană and Octavian Roske, 9-11 June.

Gilder, E. (2023). Camp displays via a post-war technological *bricolage* of screen and sound: the semiotics of Scopitone’s video jukebox. Fourth edition of the International Conference, Semiosis in Communication: “New Challenges of Multimodality in the Digital Age,” National University of Political Studies and Public Administration (SNSPA), Bucharest, Romania, 22-24 June.

Langa, W., Thomas, V., Kauli, J. & Laurie, B. (2023). Indigenous Melanesian values and safety: stories from market vendors in urban settlement communities in Lae, Papua

New Guinea. International Graduate Student Conference at the East/West Center, The University of Hawaii at Manoa, 18 February.

Langa, W., Thomas, V., Kauli, J., & Laurie, B. (2023). Community strategies and safety: Stories from market vendors in urban settlement communities in Lae, Papua New Guinea, PNGUoT, 25 February.

Langa, W., Thomas, V., Kauli, J. & Laurie, B. (2023). AWAGASI: Our market stories: Using visual creative methods to understand market vendors' perspectives. University of Papua New Guinea, 17-18 August.

Wrondimi, G. H. & Paul, S. (2023). Negotiation skills and knowledge at the workplace, PNG Association of Administrative Professionals Conference, PNGUoT, 26-27 June.

Wrondimi, G.H. (2023). Planning made simple for local development planners and administrators in Papua New Guinea. CDS Research Seminar, PNGUoT, 17 August.

Post Graduate Certificate in Student-Centered Teaching (PGCSCT) 2023

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 nominated academic staff of the university: CD 511: LMS and Flipped Classroom (Dr Shoeb Ahmed Syed); CD 512: Project/Problem-Based Learning (Ms Dora Kialo); and, CD 513: International Trends in Higher Education Teaching and Learning (Ms Ruth Moka). Four enrollees completed all subject requirements for the course, and will thus obtain a PG Certificate in April 2024:

Last Name	First Name
Maino	Lucy
Periwork	Charles
Tiki	Samson
Tiko	Betty

In 2024, the PGCSCT offer will be expanded to a one-year program.

Postgraduate Research Supervision/Examining

External

Year	PhD Candidate	Research Title	Commission Member	Institution
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2023	Scott EASTMAN (Year V)	Standardized Methodology for Implementing Applied Critical Geopolitical Discourse Analysis to Improve Forecast Accuracy	Prof Eric Gilder	“Lucian Blaga” University of Sibiu (Romania)
2023	Ecaterina Lia ILIȘ (Year IV)	An Overview of Critical Discourse Analysis: Conceptualization, Methods and Instruments	Prof Eric Gilder	“Lucian Blaga” University of Sibiu (Romania)
2023	Iulia Sărbătoare STĂICUȚ (Year III)	Disseminating Extremism in Online Radicalization Discourse (2016 - 2021)	Prof Eric Gilder	“Lucian Blaga” University of Sibiu (Romania)
2023	Nassir MORADI (Year IV)	An Investigation of Metadiscourse Markers in “Suggestions for Further Research “ of Ph.D Dissertations written in Applied Linguistics by Iranian and Romanian Doctoral postgraduates.	Prof Eric Gilder	“Lucian Blaga” University of Sibiu (Romania)

Internal

CDS Department Postgraduate Supervision

Candidate	Program	Year	Supervisor(s)	Research Topic
Lucy MAINO (Began studies August 2022)	PhD	2	Dr Bue (Agriculture)/ Prof. Gilder	Impacts of Integrated Development Approaches on the Livelihood of Rural People: A Case Study in the Oro Province of Papua New Guinea.
Michael AGUM (Began studies August 2022)	MPhil	2	Prof Gilder/ Dr Aisoli-Orake	Evaluating the Current Practice of Social Mapping in Papua New Guinea.
Stephanie TRINGIN	MPhil	2	A/Prof Garry Sali/Dr Francis Essacu (UNRE)	Assessing the Process for Internal Accreditation of Academic Programs at PNG University of Natural Resources & Environment
Desley ALU	MCS	Graduated	Dr Aisoli-Orake/Prof Gilder	The Impact of Morobe Provincial Education Department and The Teachers in Morobe Province of Papua New Guinea.
James YAWING	MCS	3	Ms Ambelye/ Dr Aisoli-Orake	Effects of High Illiteracy Rate of School-aged Children in the

				Rural Areas of Mumeng LLG, Bulolo District, Morobe Province, 2021: A Case Study.
Derrol BUGEN	MCS	Graduated	Ms Ambelye/ Dr Aisoli-Orake	Assessing the Efficacy of Theoretical and Logical Frameworks Used in NGOs BCI Programs in Papua New Guinea
Bethelle KASIR	MCS	Graduated	Prof Gilder/ Dr Aisoli-Orake	Challenges to Military Capabilities of the PNGDF Engineer Battalion, 2022. A Strategic Communication Approach.
Noah KILIP	MCS	3	A/Prof Sali/ Prof Gilder	A Study on White-Collar Crime as a Challenge towards Morobe Provincial Government Development Strategies: The Case of Governor's Office in 2020.
Linneth A. MANE	MCS	2	Dr Aisoli-Orake/ Ms Ambelye	The Challenges in Teaching English as a Second Language in Papua New Guinea (PNG): A Case study of Upper Secondary Schools Teachers in the National Capital District (NCD).
Elias MOKA	MCS	2	Ms Ambelye/ Dr Aisoli-Orake	Communication Strategies for Entrepreneurial Self-Reliance Projects in Papua New Guinea Educational Institutions: A Case Study for Educational Institutions in Lae, Morobe Province.
Tania PETER	MCS	2	Prof Gilder/ Dr Aisoli-Orake	Assessing the key required competencies of public relations communication practitioners in PNG today: A survey of PR professionals employed by UN-accredited NGO's in Port Moresby.
Charles ALIKANG	MCS	1	Prof Gilder/ Ms Ambelye	Communication Strategies on Ploy Techniques Used by Asians to Succeed in Business In the Country: A Case Study of Success of Asian Businesses In Maprik District, East Sepik Province.
Lonia BANDI	MCS	1	Dr Aisoli-Orake/ Ms Ambelye	Assertive Parenting for a Better and Quality Education - A Case Study of Parents in

				Selected Primary & Secondary Schools in PNG.
Joanne YANDIMOWA L	MCS	1	Ms Ambelye/Prof Gilder	Strategic Communication for developing the Informal Economy Sector of the economy 2023: A Research on Impact of Media Strategies to Usage of Public Goods and Services by the Vendors of Urban and Rural Markets.

Undergraduate Supervision

CD 423: Dissertation – Communication for Development

	Name	Supervisor	Dissertation Title
1	AGILO, Samuel	Professor Gilder	Improving Academic and Administrative Support Services and Facilities for Non- residential student: A case study at the PNG University of Technology Taraka Campus, Lae Morobe Province.
2	BAL, Shirely	Mrs Moka	Impacts of youth unemployment. A case study of Lae District
3	BAL, Paul	Dr Aisoli-Orake	Increased crime rates in informal settlements: A case study of Kundiawa Town.
4	BLAKE, Elizah	Mr Winuan	Students' perception on the lack of discipline and conduct of police officers in Mt Hagen, Western Highlands Province; A comparison between two effects of police brutality in Papua New Guinea
5	BOJA, Tristiropsis	Mr Kuri	The effects of limited accommodation on the performance of non-residential female students at the Papua New Guinea University of from 2021- 2023.A case study.
6	BUIBUI, Ammie	Mr Paul	Community- Based awareness needed to minimize alcohol in Tertiary Schools: A case study of Youth Violence.
7	DILU, William	Ms Ambelye	A Study on the Relationship Between Politics and Unsustainable Practices of Community Members Towards Government Initiated Development Projects: A Research Based on the Gumine District of Simbu Province.
8	ELLY, Iesha	Mrs Maino	Investigation into increased illiteracy and its correlation to juvenile delinquency throughout settlements in Papua New Guinea. A case study on the backroad community in Lae, Morobe Province.
9	ESRON, Bianca	Mr Wrondimi	The impact of gender-based violence on woman's economic empowerment in dauli community, Hela Province

10	GABI, Gethrude	Mrs Maino	Social media's role in disseminating information in Papua New Guinea: A look at Facebook's role in disseminating information on covid-19.
11	GIMA, Jesse	Mr Paul	Identifying the factors that contribute to Ineffective Implementation of Camp Standing Orders (CSOs) and to develop Measures to improve and Maintain CSOs, Discipline and Security of Civilians and Service Personnel at Igam Barracks.
12	GOROGO, Heinz	Mr Sangundi	Mental Pressure and its Impacts on student behavior. The Research study is based specifically students of the Papua New Guinea University of Technology, Taraka Campus, Year 2023.
13	IRUINU, Lissah	Mrs Moka	Impacts of school fights in Lae, Morobe Province. A case study for Lae City Secondary Schools.
14	JACK, Joyce	Mr Jesse	Assessing the effectiveness of information dissemination on the development programs for Tutuwe Ara woman association in North Fly District, Western Province.
15	KAIDOGA, Faustina	Mr Milba	Gender Inequality in PNG Universities: A case study on the Communication for Development Studies Department.
16	KARO, Shealtiel	Mr Paul	Media studies should be taught at high school level: A case study on year 11 students of Gordon Secondary School.
17	KALAKASI, William	Mr Yaro	Awareness on gender inequalities in Engineering-Oriented Programs in the higher learning institutions in PNG: A case study of female engineering students at PNG University of Technology, Lae Taraka Campus.
18	KAVO, Moses	Mr Iko	Socio- Economic Development and its impacts on law and order stability in rural communities of Papua New Guinea.
19	KAVO, Trevor	Mr Kuri	Enhancing Community Impact and sustainability in Water, Sanitation, and Hygiene (WASH) Projects.
20	KEZOKA, Clyde	Mr Sefo	Review of Valuer General Compensation Plan on improvements in Mining Impacted Areas.
21	KIKIT, Belinda	Professor Gilder	The Impact of Child Abuse on Mental Health and Well- being.
22	KIRUHIA, Joanna	Dr Aisoli-Orake	Causes and effects of post traumatic stress disorder [PTSD] to military personnels: A case study of soldiers at 1PRIR- Taurama Barracks.
23	KOPI, Bradley	Mr Wrondimi	Unemployment and economic activity [A case study of ward 6 as a sample of Lae, Morobe Province, Papua New Guinea].
24	KUNAI, Shadrach	Mr Winuan	Challenges faced by Health Centers in PNG: A comprehensive analysis of Wampar Rural Health Centre.

25	LASENI, Lionel	Mr Kuri	The PNG Government's Tuition Fee Free Education (TFFE) Policy and its negative implications on the Academic Performance in Primary Schools: A case study on St. Paul's Primary School (Lae, Morobe Province) in 2023.
26	LAURIE, Keidi	Mr Wrondimi	Implementation of better opportunities for youths in Lae to Eradicate Petty Crime Activities in the City.
27	LUNEN, George	Ms Ambelye	Safety measures on campus and the prevention of crime by the University Security and Police in PNG Unitech: A case study for students, staff and security personnel of UNITCH.
28	LUPISA, Frank	Mrs Maino	Lake of rural infrastructural development in Wagang village ward # 6&7 OF Burum-Kwiat LLG in Lae Morobe, PNG.
29	MALIPU, Felicita	Mr Sangundi	Challenges faced by landowners' company hides gas development Case study: To support PNG LNG project operated by Exxon Mobil.
30	MANUEL, Jenny	Mrs Moka	An Analysis of Communication Strategies used in implementing policies to address Youth unemployment: A case study of Awagasi Community in Lae, Morobe Province.
31	MASING, Dondaniels	Mr Jesse	Visible school security measures enforced by the unforce and its effects on students of the Papua New Guinea University of Technology: An analysis of university students.
32	MONMAI, Samuel	Mr Milba	Effective Communication as a vital tool to address communication barriers between Landowners and Developers.
33	NA'AL, Rachael	Ms Nanu	The effect of peer pressure on the academic performance of primary school students in tent city, ward 5 of Lae district.
34	NAIME, Brittany	Mr Yaro	Creating awareness of HIV/AIDS and its affects and impacts on people affected. A case study of female students residing at University of Technology Adventist Residential College [UARC], Lae, Morobe. 2023
35	NAMARO, Zimmah	Mr Jesse	Importance of communication in assisting local SME farms market their produce: A case study for the impacted communities of K92 mine in Kainantu, Eastern Highlands Province, Papua New Guinea.
36	NAMEAN, Elinda	Mr Sefo	"Accommodating non-residential female students have increased problems within female student dormitories". A study for the female students at the Papua New Guinea University of Technology
37	NEGEVA, Zebalyn	Mr Wrondimi	Effective strategies to improve adult literacy programs: a case study on K92 mining adult literacy program students at Barinengka village, Agarabi

			Local Level Government, Kainantu, Eastern Highlands Province.
38	NORM, Lillian	Professor Gilder	Evaluating the effectiveness of Community- led total sanitation (CLTS) programs in improving hygiene practices and sanitation infrastructure. A case study of Apo Village in Bukawa, Morobe Province.
39	PARU, Celphas	Mr Sangundi	Analyzing the impact of Low- Graded Road Condition on Health Care and Emergency Services in Papua New Guinea: “A case study of the Mumeng Health Centre along the Bulolo National Highway”.
40	REU, Shamila	Dr Aisoli- Orake	Economic inequality and its impact on the development in Lae city, Morobe.
41	SALI, Tanya	Mr Wrondimi	Analyzing the challenges and opportunities of woman empowerment through communication in education: The case of Enga female students at the Papua New Guinea University of Technology
42	SATARO, Jamela	Mr Winuan	Investigating the impacts of gender-based violence: A case study of the literacy lever of woman in Kurumbukari, Ramu [Mining project impact area] in Madang
43	SENEVE, Thalia	Mr Kuri	The effects of the relationship between Low Employment and the rise in petty theft in Papua New Guinea.
44	SIMEWA, Faustina	Ms Ambelye	Knowledge and attitude towards contraceptive use among Undergraduates Female Students in PNG UoT.
45	SINGKEP, Melva	Mrs Maino	Addressing gender equity and social inclusion in employment at the Papua New Guinea University of Technology: Challenges and strategies for a more inclusive workplace.
46	SITAPAI, Jan-Khyara	Mr Sangundi	Investigating the potential impacts of mine closure on health services and infrastructures relatively to the mine impact communities of the Ok Tedi mining project.
47	SUI, Gedion	Mr Sefo	Social and environmental impacts of logging in PNG: A case study of Aumo village, Kandrian Gloucester District, West New Britain Province.
48	TOM, Douglas	Mrs Moka	Integrating participatory communication into rural infrastructural development project in Papua New Guinea; A case of bridges and building in Lowalai in Wapenamanda District – Enga Province
49	UAPIPI, Aleena	Mr Milba	Energy Poverty in rural areas and peri-urban societies: A case study of Yanga Village, Lae Morobe Province.
50	UYASSI, Grace	Mr Yaro	Gender inequality: Effects of Gender discrimination towards female staff of Papua New Guinea, Lae City, Morobe Province.
51	WANGI, Ishmael	Mr Milba	Water challenges in rural district station in Papua New Guinea: An insight from Kwikila Station, Rigo District, Central Province.

52	WANI, Jonah	Mr Yaro	Effective communication strategies in addressing law and order issues in Madang Province: A case study of law -and -order issue in Madang Town
53	WAPU, Joy	Mr Paul	The use of effective communication to improve safety system in the workplace: the case of rainforest habitat [RHF] at Papua New Guinea University of Technology [PNGUOT] 2023.
54	WAWAH, Beverly	Professor Gilder	“Analyzing the influence of social media on the academic performance of upper secondary students: A case study of Tusbab Secondary School in Madang Province”.

DEPARTMENT OF ELECTRICAL AND COMMUNICATION ENGINEERING

Head of Department: Dr. Joseph Fisher

Introduction

The Department of Electrical Engineering offers both undergraduate and postgraduate courses. The undergraduate courses cover mathematics and physics in addition to the core curriculum in either power engineering or communication engineering and other required electives. The program enables students to specialize in one of the following two areas: Communication 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 various topics, building prototypes, undertaking simulation models, and presenting their work at the end of the academic year. The projects are designed to trigger the engineering curiosity of students and find new methodologies to foster innovative design that employ the synergistic effect between design and innovation as the key to promoting engineering ingenuity.

Further, the ECE Department has a thriving postgraduate program comprising a Master of Philosophy by research, a Master of Science in Communications Engineering by coursework, and a Ph.D. program. The Department is proud to have two postgraduate students who are the recipients of the GAP scholarships awarded by the university through the Postgraduate School. Four candidates are enrolled in the Ph.D. programs and six students are undertaking Master's degrees.

The research programs in the Department are continually developing to keep pace with technological advancements. In embracing digital transformation, the Communication Engineering stream has embarked on research on networking through mobile and wireless systems, data communications, and Internet-of-Things applications in Smart Cities. The Department is also excited to introduce a new stream in Computer Engineering that will encompass micro-controller-base embedded systems design, big data analytics, robotics, and machine learning. Furthermore, as the world embarks on measures to mitigate the abyssal climate disasters, our research programs on energy are aligned towards innovative sustainable energy of the future. The introduction of AI in energy systems will revolutionize renewable energy, making it reliable, efficient, clean, and environmentally friendly. The research on sustainable energy is oriented towards microgrids in off-grid systems for remote and fragmented communities in addressing the lack of electricity in PNG where 80% of the 9 million population have no access to electricity. Further, research on Power Systems includes the reliability of PNG power grids.

One of the key priority areas is the implementation and sustainability of staffing where the Electrical Engineering Department plans to have about 70% of the full academic cadre to be filled by national members of staff. The Department is focused on the next 10 years to have 90 % of national Ph.D. degree holders who will be able to work together giving significant research leadership nationally and globally.

Further, the ECE Department is embarking on establishing a Computer Engineering program. The Department has advertised for Professors in Computer Engineering to assist in developing the courses and also recruit graduate students to supervise for Masters and Ph.D. programs in 2024. The course will empower graduates with the knowledge and skills to find better solutions to challenges in the design, construction, and maintenance of software and hardware components of computing and computer-controlled devices, equipment, and systems. The outcome of this course is to develop, prototype, and test microchips, circuits, processors, conductors, and any other component used in computer devices or systems (e.g. supercomputers, smartphones, laptops, servers, IoT gadgets, Artificial Intelligence applications, etc).

Our 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.

Our Values

In pursuit of our vision, we will be guided by the following values:

- Providing equal opportunity for education to students in Electrical and Communication Engineering through academic merit and character
- Developing and maintaining partnerships with industries, professional groups, and other educational and research institutions at both national and international levels
- Encouraging a climate of transparency, fairness, and cooperation among the staff members and the students.
- Practising sustainable use of resources
- Fostering an ethical workplace environment.

Academic Priorities

The major **academic priorities** are:

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 and retention of talented national and international academic staff.

Academic Staff Research Areas.

Professor Paul Hoole	Artificial Intelligence in engineering systems, Sensors including antennas, Lightning engineering, electromagnetic signals in safety and security systems, and 5G/6G wireless technology for smart cities.
Professor Kanthavel Radhakrishnan	Artificial Intelligence, Deep Learning, Big Data, Wireless Sensor Networks, High Performance Communication Networks, and Cloud Computing
Dr. Ashish Luhach	Soft Computing, Networks, Sustainable Computing, and Cyber and Physical Systems.

Dr Joseph Fisher	Interactions of Lightning with Aircraft and Structures, Power System Analysis, High Voltage Engineering, Power Electronics and Machines, Renewable Energy, Transmission/Distribution Line Design, Energy Audit and Energy Efficiency Technologies
Dr. Ravindra Luhach	Digital Filters and VoIP, IOT, Electronics Engineering and Microwave and Radar
Mr. Sammy Aiau	Control Systems Engineering, Industrial Process Control, Electrical Power Systems, Renewable Energy (hydro, solar & wind), Smart Grids Energy Management, Virtual (Smart) Instrumentation Systems
Mr. Herman Kunsei	Adaptive Array Antenna Systems for 5G and 6G Networks, Electromagnetic Health Hazards, Propagation Measurements for Wireless Systems, Computer Network Security, Reliability in Networks, and Data Security
Mr. Gibson Kupale	Technical & non-technical losses in Power Systems, Power System Protections, Renewable energy systems, and Distributed Renewable Energy Generation. System Reliability & Security, and Field Excitation & Governor Control
Mr David Chen	Big Data Processing, Compiler Design, Internet of Things Wireless Networking and Signal Processing, Hardware Design, Data and Network Security, Business Process Modelling, Knowledge Management, and e-learning.
Mr. James Dugumari	Data Communications and Networks, Computer Architecture & Interfacing, and Computer Communication, Database, eCommerce and Inventory tracking applications
Mr Joshua Yuanko	Optimization and Auto Scheduling Algorithms, Power Flow Control and Automatic Topology Reconfiguration, Power Systems Static and Dynamic Reliability, Grid Connected PV Plant Design and Modelling, Instrumentation and Microcontroller electronics.

Postgraduate Research Areas

The major research areas undertaken at postgraduate level include the following:

- (i) Electric Power Systems,
- (ii) Renewable Electric Energy Sources, and
- (iii) Advanced Wireless Technology.

Progress of Postgraduate Research

Researcher's Name	Degree	Research Title	Status
Mr. David Chen	PhD	Robotic Arm on Open-Source Platforms	In progress
Mr. Sammy Aiau	PhD	Renewable Energy Sources for Morobe Province and Future National Smart Grid for PNG	In progress
Mr. Gibson Kupale	PhD	Challenges in PNG Electricity Network Security and Reliability Trends	In progress
Mr. Herman Kunsei	PhD	Using Perception ANN with Different Triggering Functions for Linear and Non-linear Array Arrangements	In progress

Mr. Charlie Urame	MPhil	Design and Implementation of Hybrid Pico-hydro-Photovoltaic Power Plant in Massy-Gahuku LLG.	In progress
Mr. Mathew Pua	PhD	Data Management and Analysis in an Optimized and Efficient Diverse Distributed Energy Resources	In progress
Ms. Jacqueline Tantapua	MPhil	Interference Mitigation in Wireless Networks Co-ordinated MultiPoint (CoMP) Transmission Techniques	Graduated
Ms. Olive Antonio	MPhil	Wireless IoT Application in Healthcare in PNG	In progress
Mr. Benjamin Tigom	M. S. Comm, Eng	Modified Artificial Intelligent Equalizer Algorithms for Optical Downlink Dense Wavelength Division Multiplexing Network Dispersion Mitigation.	In progress
Mr. Richard Kalia	M. S. Comm, Eng	Analysis of Cybersecurity Aspect in Process Control Domain Network-Papua New Guinea Perspective.	Graduated
Mr. Ernest Pokau	MPhil	Design and Development of a Low-Cost Cellular Connected Quadplane for Maritime Applications in Manus Province, Papua New Guinea.	In progress
Ms. Rani Maeoaka	MPhil	Load Flow and Contingency Analysis of the Proposed Mongi-Burum Hydropower Infeed on Ramu Grid	In progress
Mr. Elijah Kapma	MPhil	Sustainable Energy Charging Station for Electric Vehicles in PNG	In progress

List of Final Year Undergraduate Research Topics undertaken in 2023.

Student Researcher	Project Title and Abstract	Supervisor
Mr. Philemon TAINOLE	Stability of Power Grid	Prof Paul Hoole, Dr Joseph Fisher, and Mr. Herman Kunsei
Ms. Deborah JINUMBO	Evaluating system security of POM grid through LODF and PI using Matlab	Mr. Gibson Kupale
Mr. Glenn HARO	Design and simulation of a Voltage Source Inverter (VSI) using an Induction Motor Drive System	Mr. Gibson Kupale
Ms. Elisha SAMSON	Energy Assessment and design of a hybrid renewable energy system for Jimi District in Papua New Guinea	Mr. Gibson Kupale
Mr. Greg POLAPAN	Cost Effective and Energy Efficient Upgrading of Gatop Mini Hydro in Tewai-Siassi District, Morobe Province	Mr. Gibson Kupale and Mr. James Jacob Zoriong (External Supervisor)
Ms. Mikal SILAS	Design and Implementation of a Renewable Energy Monitoring System (Solar) using Arduino	Mr. David Chen
Mr. Cassius GIBERE	Design and Implementation of a Smart Mushroom Growing System using ESP32	Mr. David Chen
Mr. Spencer PUPUNE	Design and Implementation of a wireless Arm Muscle Tension Monitoring System using ESP32	Mr. David Chen

Ms. Inna FAYO	Design and Implementation of a Palm Tree Health Monitoring System using Computer Vision	Mr. David Chen
Mr. Edward MATI	Evaluation of Mobile Networks on Unitech Campus	Mr. Herman Kunsei and Mrs. Jacqueline Kalate (NICTA External Supervisor)
Ms. Casey YAKI	Identifying the Effective Financial Model for Sub Urban and Rural-Based Community Wi-Fi Networks	Mr. Herman Kunsei, Mr. Louis Kevin, and Mr. Alex Roalakona (External Supervisor of KINETIC)
Mr. Edwin LYAMBI	Dimension of the Space Program in Papua New Guinea in Remote Sensing	Mr. Herman Kunsei
Ms. BURIN Erikca	Green House Monitoring and Control Systems	Mr. Mathew Pua
Mr. Edan MELEKE	Reading of Automated Wireless Meter for Monitoring & Controlling of Power Consumption	Mr. Mathew Pua
Mr. Omenefa EKA	Solar Powered Battery Charging with Reverse Current Protection	Mr. Mathew Pua
Mr. Jowas KANDESAH	Power Grid Failure Detection Based on Voltage or Frequency Variance Detection	Mr. Mathew Pua
Ms. Anneliese LO	Design and Implement PLC automatic control on laboratory-based mimic panel for alcohol distillation and filling process	Mr. Joshua Yuanko
Mr. Robert WESLEY	Design, Install, and calibrate liquid level measurement system on an existing mini laboratory plant using capacitor probe and RIA45 controller	Mr. Joshua Yuanko
Mr. Aurther ERE	Model in MATLAB, Active, and Reactive Power control for Grid-tied 1200kW Power Inverter using Reference Frame Control System	Mr. Joshua Yuanko
Mr. Luxton CALEB	Design, Fabrication, and Testing of a Light Weight Weather Station	Mr. Sammy Aiau and Dr. Markus Ulrich (External Supervisor)
Mr. Mathew HOSEA	Design and Simulation of a Microgrid Photovoltaic Power System Using ETAP Photovoltaic Array Analysis Software	Mr. Sammy Aiau
Mr. Frank LOPSON	Stream Diver Low Head Hydropower System for Sakin Village Community, Tsak Valley, Wapenamanda District, Enga Province	Mr. Sammy Aiau
Ms. Lamela TAU	Solar and Wind Power Interactive Map for Papua New Guinea	Mr. Sammy Aiau
Mr. Rolan PETER	Physical Layer Security Techniques of 5G Network	Associate Professor Asish Luhach
Mr. Aaron GOREO	Laboratory Studies of Smart Grid Technologies in Power Systems	Dr. Joseph Fisher
Mr. Robert KORUL	Investigation of Transmission Line String Insulator Breakdown due to Environmental Contaminations	Dr. Joseph Fisher

List of Publications

- (1) Arora, S., Batra, I., Malik, A., Luhach, A. K., Alnumay, W. S., & Chatterjee, P. (2023). Seed: Secure and Energy Efficient Data-collection method for IoT network. *Multimedia Tools and Applications*, 82(2), 3139-3153.
[Seed: secure and energy efficient data-collection method for IoT network | Multimedia Tools and Applications \(springer.com\)](#)
- (2) Herman Kunsei, Paul R. P. Hoole, K. Pirapaharan, S. R. H. Hoole, Tracking Everyone and Everything in Smart Cities with an ANN Driven Smart Antenna, Machine Learning Techniques for Smart City Applications: Trends and Solutions, 2022

ISBN: 978-3-031-08858-2

- (3) Kandasamy Pirapaharan, W. H. Sasinda C. Prabhashana, S. P. Pramuka Medaranga, Paul R. P. Hoole, and Xavier Fernando, A New Generation of Fast and Low-Memory Smart Digital/Geometrical Beamforming MIMO Antenna *Electronics* 2023, 12(7), 1733; <https://doi.org/10.3390/electronics12071733>
- (4) Rashmi Prava Das, Tushar Kanta Samal, Ashish Kr. Luhach, An Energy Efficient Evolutionary Approach for Smart City-based IoT Applications, *Mathematical Problems in Engineering*, Hindawi, Volume 2023 | Article ID 9937949 | <https://doi.org/10.1155/2023/9937949>
An Energy Efficient Evolutionary Approach for Smart City-Based IoT Applications (hindawi.com)
- (5) Sanjoy Choudhury, Ashish kr. Luhach *, Joel J. P. C. Rodrigues, Mohammed Al-Numay, Uttam Ghosh, Diptendu Sinha Roy, A Residual Resource Fitness Based Genetic Algorithm for Fog-Level Virtual Machine Placement for Green Smart City Services, *Sustainability* 2023, 15(11), 8918; <https://doi.org/10.3390/su15118918>
Sustainability | Free Full-Text | A Residual Resource Fitness-Based Genetic Algorithm for a Fog-Level Virtual Machine Placement for Green Smart City Services (mdpi.com)

DEPARTMENT OF FORESTRY

Head of Department: Dr. Cossey K. Yosi

Introduction

The Department of Forestry (DoF) at the Papua New Guinea University of Technology (PNGUoT) has built a strong reputation for exceptional tropical forestry training. The institution is located on the traditional Ahi lands, making it even more culturally significant. Regardless of which campus students attend - Taraka or Bulolo - they can expect a consistent and comprehensive curriculum. Bulolo University Campus (BUC) has a three-year Diploma in Forestry (DipFor) program with a proven track record of producing highly skilled graduates. The Diploma program is now being phased out and BUC has expanded its offerings and introduced the Bachelor of Forest Resource Management in Forestry (BFRM) program, which commenced in 2023.

On the other hand, the Taraka campus offers the four-year Bachelor of Science in Forestry (BScF) program, known for its comprehensive field coverage. These programs are designed to equip students with the aptitude and expertise to excel in tropical forestry. Additionally, within the Department, the Taraka campus offers resources and guidance for postgraduate studies, from MPhil to Ph.D.

The Forestry Department's primary focus is to offer students a comprehensive education. The faculty comprises experienced professionals who have made significant contributions to the field of forestry. The Department provides access to outstanding resources that facilitate practical learning for students. Furthermore, the Department has established strong connections with the industry, enabling students to participate in projects and interact with industry experts for research, professional experiences, or employment opportunities.

At the heart of our educational mission lies cultivating competent forestry experts. Our focus is on providing students and professionals with the essential technical skills to tackle challenges in the field. To achieve this, our Department prioritizes research initiatives crucial to developing problem-solving abilities. As a result, the DoF emphasizes ensuring that our faculty is well-versed in research and actively involved in utilizing their expertise through various research projects and programs.

Forestry Research Themes

The Department of Forestry has recognized the diverse value of Papua New Guinea's forests and has incorporated it into its academic and research programs. Achieving sustainable forestry in PNG requires an interdisciplinary approach that blends economic, social, environmental, and climate change aspects. To this end, DoF has developed a Research Development Plan and Postgraduate Study Program focusing on several research themes. The following are some crucial themes related to forests and the environment:

- Ecosystem and Environmental Services
- Sustainable Forest Management
- Forest Biology, Ecology, and Biodiversity
- Forest (Health) Protection

Wildlife Management, Community-Driven Forest Conservation
The Role of Forests in Climate Change
Silviculture (including Reforestation and Plantation Management)
Agroforestry, Social and Community Forestry, Multiple Land Use
Wood Science and Technology, Timber Products, and Industries/Utilization
Forest Engineering
Forest Policy, Economics, and Forest Product Marketing
Appropriate Technology
Remote Sensing and Geographic Information Systems
Biomass Energy

Faculty Members

During the academic year 2023, the Department of Forestry had a faculty of 22 academic staff members (Table 1). Table 1 presents a comprehensive list of the academic staff at the Department of Forestry and BUC, their respective positions, qualifications, and areas of research interest. It is worth noting that the Department of Forestry oversees both Taraka Campus and BUC in academic matters.

Table 1: List of academic staff at the Department of Forestry (Taraka Campus and BUC).

Name	Position	Qualifications (Degree)	Research Interest(s) / Specialization
Dr. Cossey Yosi	HoD and Senior Lecturer	Ph.D., MSc., BScF, DipFor, PGCSCT	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 (on study leave)	Lecturer 2	MScF, DipFor, BScF, PGCSCT	Wood Science and Technology; Forest Management.
Mr. Haron Jeremiah	Lecturer 2	MSc., DipFor, BScF, PGCSCT	Forest Economics and Marketing.
Mr. Diaiti Zure	Lecturer 1	MScF, MAgr, BScF	Silviculture, Forest soils, Ecological Agriculture, Environmental Biotechnology, Environmental Virology
Mr. Leonard Wana	Lecturer 1	MSc., BScF, DipFor, PGCSCT	Forest Inventory and Geographic Information Systems.
Mr. Billy Bau	Lecturer 2 Deputy HOD & Curator – Herbarium	MSc., BScH, BSc., PGCSCT	Plant Botany; Herbarium Curation; Plant Taxonomy; Botanical Collection with Ecological and Biodiversity studies.
Mr. Eko Maiguo (will start his Ph.D. study in 2024)	Principal of Bulolo University College (BUC) Lecturer 2	MSc., BScF, DipFor, PGCSCT	Silviculture and Forest Management.

Mr. Louis Veisami	Lecturer 1	MPhil, BScF, DipFor, DipEPA, CertFMP, PGCSCT, Cert Advance Research Method 2.	Forest Mensuration and Inventory.
Mr. Benson Gusamo	Lecturer 2. Postgraduate Coordinator	MSc., BScF., DipFor, PGCSCT	Wood Science and Technology, Forest Products and Industries, Non-timber Forest Products, Bio-energy, Forest Protection, Timber Business, and SMEs.
Mr. Bazakie Baput	Lecturer 1	MFSc., PGCert., BScF	Community Forestry and Policy, Agroforestry and Forest Ecology.
Mr. Olo Gebia	Lecturer 1 Deputy Principal BUC	MPhil, DipFor., PGCSCT	Forest Ecology and Plant Biology; Forest Biodiversity.
Mr. Tombo Warra (on study leave y)	Technical Instructor 1	BScF.	Plant Eco-physiology and Conservation Ecology.
Ms. Priscilla Menin. (started MPhil study in 2023)	Technical Instructor 1	BSc., PGCSCT	Community Forestry, Communities Response on Forest Plantation and Projects.
Mr. Leonard Hans	Technical Instructor 1	BScF	Phytoremediation - Plant/soil and Toxic Chemical Relationship.
Professor Yusuf Sudo Hadi	Professor	Ph.D., MSc, BSc.	Wood Science and Technology; Forest Management.
Dr. Jimmy Moses	Lecturer 2	Ph.D., MSc., BSc.H., BSc.	Entomology, Spatial Ecology, Macroecology, Data Science

Mr. Gibson Sosanika	Lecturer 1	MPhil, BSc., PGCSCT	Botany, Forest Ecology, Forest Conservation, Ecosystem restoration
Mr. Leroy Moripi	Lecturer 1.	MPhil., BSc., PGCSCT	Soils and Soil Carbon, Climate Science and Climate Change
Mr. Charles Feriwok	Lecturer 1	MPhil, BScF, DipFor	Forest Biomass and Energy
Martin Karikara	Technical Instructor 1	BScF.	Forestry, Soil, and Ecology
Mr. Koniel Alis	Technical Instructor 1	BScF.	Forestry and Ecology
Mr. Rapo Pokon	Part-time Lecturer	BScF, MPhil	Forestry and Ecology

Research Programs

The Department of Forestry is dedicated to advancing research in the environmental and forestry management field in Papua New Guinea. The Department's continuous research efforts aim to tackle crucial environmental and forestry management concerns in Papua New Guinea. By teaming up with external organizations, the Department secures funding and support for these long-term studies, ensuring thoroughness and collaboration.

The Department of Forestry actively partners with external agencies to secure research funding and facilitates staff pursuing postgraduate studies during their leave. We aim to advance environmental and forest management research by implementing a dynamic research program that ensures the production of high-quality research through a collaborative approach and various activities.

Table 2: The Department of Forestry ongoing research programs for 2023.

General Theme	Research Project / Topics	Principal Investigator	2023 Status
1. Ecosystem and Environmental Services	1. 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.	Dr. Cossey Yosi	Paper completed and presented in the Huon Seminar in August 2022. Manuscript submitted to IJPNGUoT in 2023.
2. Sustainable Forest Management	1. Estimating Exploitation Factors associated with Annual Allowable Cut (AAC) in timber concessions in PNG.	Dr. Cossey Yosi	The first component was completed. Final report submitted to ACIAR in 2022. The Unitech Research Fund funded the second component, and the study is continuing into 2023.
3. Forest Biology, Ecology & Biodiversity	1. New Guinea species of Ficus in section Malvanthera (Moraceae).	Mr. Billy Bau	The paper was presented at the 2021 ASBS Virtual Conference.
	2. Investigate the dynamics and characterization of biodiversity, ecology, and soil physical attributes within the natural green break forests of Bulolo Plantation, Morobe Province in PNG.	Mr. Olo Gebia, Mr. Sam Aguadi, and Mr. Martin Karikara	Work is still in progress, especially with preliminary data collection

	3. Seed Conservation of Trees in Papua New Guinea Tropical Rainforests	Mr. Gibson Sosanika	The online database was established in 2018. Work is still in progress. Further training attained at Kew Gardens, UK, Oct 2022.
	4. Secondary succession and elevation affect ant communities in Papua New Guinea's rainforests.	Dr. Jimmy Moses	The manuscript is in preparation for journal submission in 2024.
4. Mensuration	1. Validating a model developed to estimate volume from the weight of Klinkii logs in Bulolo pine plantations.	Mr. Louis Veisami and Mr. Eko Maiguo	Gathered data and analyzed for validation of the multiple linear regression model equation. Write-up in progress.
5. Silviculture, including Reforestation and Plantation Management	1. Importance of Araucariaceae for plantation development in Papua New Guinea	Mr. Benson Gusamo	Submitted a book chapter and is awaiting publication. Work is in progress.

Postgraduate Research Projects

The DoF has achieved significant progress in postgraduate research, with eight ongoing studies in 2023 (Table 3), including two PhD and six MPhil projects.

Table 3: Ongoing postgraduate research projects in 2023.

No.	Student Name	PG Code	Thesis / Research Topic	Principal Supervisor	External Supervisor	2023 Status
1	Nathan WAMPE	MPhil 2	Causes and motivation of Anthropogenic Grassland Fires in the Ramu-Markham valleys	Dr. Cossey Yosi	TBC	No progress report was submitted in 2023.
2	Ben RULI	MPhil/2	Interlinkages between logging, forest conservation, health, well-being, and livelihoods in PNG and tropical forests globally.	Dr. Cossey Yosi	Dr. Jo Middleton and Prof. Vojtech Novotny	The research study has been extended from 2022 to 2023 and is almost complete. The student is expected to submit final thesis in 2024.
3	Cassey UVAU	MPhil/2	Plant-Caterpillar Interactions in a primary lowland forest of New Guinea.	Dr. Cossey Yosi	Prof. Vojtech Novotny	Study completed in 2023. Student's thesis is now being examined in 2024 by external examiners.
4	June MANDAWALI	MPhil/2	The Social and Cultural influences on Sustainable Forest Management in Papua New Guinea indigenous forest communities.	Dr. Cossey Yosi	TBC	Study completed in 2023. Student's thesis is now being examined in 2024 by external examiners.
5	Hayden WAGIA	Ph.D./3	The effect of a 20-year El Nino extreme on the dynamics of lowland tropical rainforest in Papua New Guinea.	Dr. Cossey Yosi	TBC	Ph.D. study continued in 2023. One year extension to end of 2024.

6	Russel TARUTIA	Ph.D./2	Deep Learning (AI) and Drones: A New Approach to Monitoring Forest Health on Plantations in PNG.	Dr. Cossey Yosi	Dr. Sailesh Samanta	Study suspended
7	Ms. Priscilla Menin	MPhil/1	Assessing the Socio-Economic Impact of Forestry Pine Plantations on Local Communities: A Case Study of the Manki Clan in Papua New Guinea.	Dr. Jimmy Moses	Dr. Rachel Aisoli-Orake	The study began in the second semester of 2023 and is ongoing.
8	Ms. Ivy Kiele	MPhil/1	Impacts of the root system of selected PNG tree species on soil erosion and maintenance of essential plant growth nutrients	Mr. Eko Maiguo Mr. Haron Jeremiah	TBC	The study began in the second semester of 2023 and is ongoing.

Undergraduate Research Projects

The undergraduate research projects conducted in 2023 spanned a diverse range of topics (Table 4). This demonstrates the students' eagerness to explore various fields of study. The projects delved into various subjects, such as black mangroves' ecological impacts, the influence of nutrient sources on mushroom growth, and the use of mangroves to mitigate the risks of rising sea levels. Students also compared the productivity of *Juncao* mushrooms, established a mini-arboretum, determined the germination rate of *Pleurotus spp.*, and investigated the correlation between tree diversity and slope and aspect levels in the forest. These projects contributed to the student's academic development and offered valuable insights into research inquiries.

Table 4: Research topics undertaken by 43 final-year students and their supervisors.

No.	Student Name	Title	Principal Supervisor	Co-Supervisor(s)
1	Meredith Gwampom	Ecological Effects Affecting Black Mangroves in Bukawa, Northern Coastal Region of Morobe Province, Papua New Guinea.	Mr. Billy Bau	

2	Boida Konny	Effects of different nutrient sources on the growth and development of mushroom fruiting bodies	Mr. Billy Bau	Mr. Haron Jeremiah
3	Dennis Mauliningi	Minimizing the risk of rising sea level through planting mangroves along coastal areas. A case study in Salamaua Lagui, Huon Gulf District Morobe Papua New Guinea	Mr. Billy Bau	
4	Aron Mentai	Comparison of Juncao mushroom productivity under different tuber planting positions.	Mr. Billy Bau	
5	Julie Philip	Establishing a mini-arboretum for community-based forest preservation and utilization.	Mr. Billy Bau	
6	Damien Wala	Determining the Germination Rate of <i>Pleurotus</i> spp (<i>Oyster mushroom</i>) Under Different Culture Setups.	Mr. Billy Bau	
7	David Maravila	Investigating the relationship of tree diversity to the levels of slope and aspect effect in the forest.	Mr. Olo Gebia	Mr. Gibson Sosanika
8	Maryclaire Micheal	Quantifying seed bank size and composition across different forest types in a tropical rainforest; implications for restoration and management.	Mr. Olo Gebia	Mr. Billy Bau
9	Joshua Weibi	Seed Dormancy and Germination Patterns of Soil Seed Bank of <i>Geijera salicifolia</i> in Bulolo Rainforest.	Mr. Olo Gebia	
10	Eugene Dinip	Why are trees in the Bulolo plantation degraded in value and size after the first and second rotations?	Mr. Gibson Sosanika	Mr. Diaiti Zure

11	Xangthesha Edimani	Assessment of <i>Piper aduncum</i> Invasion on Plant Diversity of Secondary Forest ecosystem	Mr. Gibson Sosanika	Dr. Jimmy Moses
12	Benjamin Fafale	Post Logging Effect of Soil Compaction on Natural Regeneration under Plantation at different Slope Gradient in Abandoned Major Skid Tracks in Bulolo, in Papua New Guinea	Mr. Gibson Sosanika	Mr. Diaiti Zure
13	Elizah Marahau	Investigating the association between different woody species in the forest community in Bulolo, Morobe Province	Mr. Gibson Sosanika	Mr. Olo Gebia
14	Natasha Hiob	Reproductive Ecology of native tree species (<i>Finschia chloroxantha</i>) at Unitech Campus: a study of flower biology and pollination.	Dr. Jimmy Moses	Mr. <u>Diaiti Zure</u>
15	Adrian Chiru	A Policy Framework for a Forest Ranger Program in PNG: A case study in Lae, Morobe Province	Dr. Cossey Yosi	Mr. Louis Veisami
16	Vegil Kipma	Investigating and research base on the Poor Stocking Compartments of National Forest Services in Wau Bulolo Plantation.	Mr. Louis Veisami	Dr. Jimmy Moses
17	Clyde Komboi	Waste assessment of the merchantable timbers at the harvested sites	Mr. Louis Veisami	Mr. Charles Feriwok
18	Ronah Rambu	The sustainable practice of Bulolo plantation and its development from harvesting perception.	Mr. Louis Veisami	Dr. Jimmy Moses

19	Simon Teine	Detecting the effects of Land-use change on soil carbon levels: An assessment of forest conversion to native grassland.	Mr. Leroy Moripi	
20	Jackson Muli Willie	Estimation of Aboveground Biomass and Carbon Storage in <i>Casuarina equisetifolia</i> using Non-destructive Sampling Method.	Mr. Leroy Moripi	
21	Duncan Miall	Vetiver as a green solution for soil stabilization along the Markham river bank.	Mr. Leroy Moripi	Dr. Jimmy Moses
22	Junior Ezidor Glawe	Assessing the skid trail network to reduce skidding costs and soil disturbance for ground-based timber harvesting operations in Bulolo plantation.	Mr. Leonard Wana	Mr. Russel Tarutia
23	Tenson Kerari	Estimating Aboveground Biomass in Lae Botanical Garden using Remote Sensing and GIS technologies	Mr. Leonard Wana	Mr. Russel Tarutia
24	Gideon Ketefa	Land suitability study for hoop pines in Eastern Highlands province	Mr. Leonard Wana	Mr. Diaiti Zure
25	Nathan Sangau	Using GIS & remote sensing to Estimate above grown Carbon stock of pine trees (Hoop, Klinki, and Pinus) at Bulolo pine Plantation.	Mr. Leonard Wana	Mr. Russel Tarutia
26	Kepas Augustus	Creating a standard geo-database system in Bulolo plantation using geographical information system (GIS)	Dr. Jimmy Moses	Mr. Russel Tarutia

27	Roger Mala	Carbon Trade - the benefit of sustainable forest management in mitigation of climate change.	Dr. Cossey Yosi	Dr. Jimmy Moses
28	Oskari Sesiguoc	Estimating the carbon sequestration potential of the tree species <i>Araucaria cunninghamii</i> and <i>Araucaria hunsteinii</i> at Bulolo/Wau plantation.	Mr. Bazakie Baput	Dr. Cossey Yosi
29	Lorenzo Lahai Herold	Effects of arbuscular mycorrhizal fungi inoculum on growth performance of <i>Ochroma pyramidale</i> seedlings in a nursery	Mr. Haron Jeremiah	Mr. Billy Bau
30	Samuel Kaumu	Quality of Rooting Development from the Stem Cuttings of <i>Intsia bijuga</i> (Kwila) through vegetative propagation.	Mr. Haron Jeremiah	Mr. Anton Lata
31	Samuel Kiram	The effect of seaweed concentrates on the growth of <i>Araucaria hunsteinii</i> (klinkii pine) seedlings.	Mr. Haron Jeremiah	Mr. Anton Lata
32	Essineth Tuhu	Assessing the presence of mercury resulting from small-scale mining in Bulolo plantation soils	Mr. Bazakie Baput	Mrs. June Mandawali
33	Joshua Suruk	Central Province Logged-over Areas Rehabilitation	Mr. Eko Maiguo	Dr. Jimmy Moses
34	Finely Toroiye	The Effect of Six Native Tree Species for Reforestation in Degraded Forest Land of <i>Saccharum spontaneum</i>	Mr. Eko Maiguo	Mr. Diaiti Zure

35	Enna Mathias	Variations of height and diameter in Hoopines of Bulolo Plantation over 30 years period.	Mr. Gibson Sosanika	Dr. Jimmy Moses
36	Johnson Nerit	The application of moss plant on plantation seed (<i>A. Hunsteinii</i> , <i>A. Cunninghamii</i> & <i>Pinus sp.</i>) propagation and germination rate.	Mr. Bazakie Baput	Dr. Jimmy Moses
37	Pitesh Pesh	Evaluating the Efficiency of Low-Cost Drip Irrigation Techniques on Root Growth and Water Use in Commercial Pine Species in Omssis plantation nursery, Papua New Guinea	Dr. Jimmy Moses	Mr. Diaiti Zure
38	Joren Gore	Determining wood density using destructive and non-destructive sampling techniques	Mr. Benson Gusamo	Mr. Diaiti Zure
39	Taluson Kitalu	Assessing the quality of softwood trees in Papua New Guinea for high-quality paper production.	Mr. Benson Gusamo	Dr. Jimmy Moses
40	Rigo Tau	Production and Marketing of Essential Oils Derived from Eaglewood in Papua New Guinea (PNG): A desktop review.	Mr. Benson Gusamo	Mr. Diaiti Zure
41	Malakai Parom	Identification of major pests and diseases of seeds of commercial trees during storage and their simple control measures, National Tree Seed Centre, Bulolo Papua New Guinea	Mr. Benson Gusamo	Mr. Anton Lata
42	Harry Kamare	Assessing the efficacy of <i>Nicotiana tabacum</i> and <i>Azadirachta indica</i> extracts as natural termite (<i>Coptotermes elisae</i>) repellents in Bulolo plantation	Dr. Jimmy Moses	Mr. Diaiti Zure

43	Mamellie Elivap	Investigating inoculation effects on nodule development and nitrogen fixation in <i>Oryza sativa</i> in tropical regions: A desktop review	Mr. Gibson Sosanika	Dr. Jimmy Moses
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Research Collaborations

The Department of Forestry has been actively involved in numerous research projects despite having yet to conduct research collaborations with external partners in 2023. In fact, in the past, the DoF has successfully partnered with its external counterparts, such as the Australian Center for International Agricultural Research (ACIAR) Alumni Research Support Facility (ARSF), headed by the esteemed Dr. Cossey Yosi. This collaboration resulted in a research grant for their joint project (Table 5). To promote research collaboration further, the Department has also proposed an MPhil study program in 2023 to foster cooperation between CIFOR-ICRAF and the DoF. Additionally, the DoF collaborates with various national research partners on different projects. These external partners include the PNG Forest Authority (PNGFA), Forest Research Institute (FRI), Santos (formerly PNG Biomass Ltd), TotalEnergies-PNG, and Binatang Research Center (BRC).

Table 5: Research projects and collaborations in 2023.

Research Project Title	Specific Research Topic / Principal Investigator	Collaborating Partners	Funder / Sponsor	2023 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 (PI)	Professor Rodney Keenan, University of Melbourne, Australia.	ACIAR Alumni Research Support Facility (ARSF)	The first component was completed. The final report was submitted to ACIAR in 2022, and the manuscript is in preparation. The Unitech Research Fund funded the second component, and the study continued into 2023.

2. Butterfly-host plant distributions and interactions.	Assessing the Distribution and Ecological Interactions of the Queen Alexandrae Birdwing Butterfly (QABB) and Aristolochia host plants along an Elevational Gradient in Papua New Guinea. Ms. Christine Pokana and Dr. Jimmy Moses	CIFOR-ICRAF, Department of Forestry, PNGUoT.	This is an MPhil project in its early stage, and funding will be Supported by CIFOR-ICRAF and PNGUoT.	Research Project Planning initiated in 2023. The first phase will begin in early 2024.
3. Sterile Insect Technique (SIT) Program	Evaluation of the effectiveness of the sterile insect technique on Cocoa Pod Borer (CPB) and Fruit-fly populations in PNG Dr. Jimmy Moses as a member of the program since 2021	IAEA, Cocoa Board, UNRE, DAL, PNGUoT, NARI, and NAQIA	International Atomic Energy Agency (IAEA) and Government of PNG through DAL.	This is a long-term program initiated in 2017 and is ongoing.

Publications

In 2023, the Department of Forestry published four papers in high-impact factor journals (Table 6).

Table 6: Department of Forestry (DoF) publication details in 2023.

Staff Name(s)	Title / Status / Summary / Citation
Dr. Jimmy Moses	<p>Title: <i>Nutrient use by tropical ant communities varies among three extensive elevational gradients: A cross-continental comparison.</i></p> <p>Status: <i>Published in 2023</i></p> <p>Summary:</p> <p><i>The study examined the relationships between ant community structure, nutrient use, and seasonality along three elevational gradients in different continents. The researchers found that the structure of ant communities changed similarly with elevation, but the seasonal and elevational effects on nutrient use by ants differed between continents. Regional differences in climate and nutrient availability, rather than ant functional composition, shape nutrient use by ants.</i></p> <p>Citation:</p> <p><i>Moses, J., Peters, M. K., Tiede, Y., Mottl, O., Donoso, D. A., Farwig, N., Fayle, T. M., Novotny, V., Sanders, N. J., & Klimes, P. (2023). Nutrient use by tropical ant communities varies among three extensive elevational gradients: A cross-continental comparison. <i>Global Ecology and Biogeography</i>, 32, 2212–2229. https://doi.org/10.1111/geb.13757.</i></p> <p>Additional Info:</p> <p><i>Media coverage of the research was also published in an international scientific news agency: https://phys.org/news/2023-11-ants-hungry-sugar-oil-team.html.</i></p>

Mr. Diaiti	<p>Title: <i>Occurrences of similar viral diversity in campus wastewater and reclaimed water of a university dormitory.</i></p> <p>Status: <i>Published in 2023</i></p> <p>Summary:</p> <p><i>The study found novel viral genomic information in campus wastewater and reclaimed water samples, with bacteriophages being the predominant hits. Pathogenic viruses related to human skin infections, the digestion system, and the gastrointestinal tract were also found, raising safety concerns about reusing reclaimed waters. Revolutionary disinfection approaches and new regulations are needed to secure pathogen-correlated water quality for safer reuse of reclaimed waters.</i></p> <p>Citation:</p> <p><i>W. D., Zure, D., & Lin, C. R. (2023). Occurrences of similar viral diversity in campus wastewater and reclaimed water of a university dormitory. Chemosphere, 330, 138713.</i> https://doi.org/10.1016/j.chemosphere.2023.138713</p>
Mr. Gibson Sosanika	<p>Title: <i>Hunting skills and ethnobiological knowledge among the young, educated Papua New Guineans: Implications for conservation.</i></p> <p>Status: <i>Published in 2023</i></p> <p>Summary:</p> <p><i>This article analyzes the hunting abilities of young individuals in Papua New Guinea (PNG). The study indicates that their hunting expertise is currently low and may further decrease due to socio-cultural factors such as education and transportation accessibility. The loss of hunting skills in PNG's indigenous communities may lead to a decline in ethnobiological knowledge and the removal of traditional motivations for conservation.</i></p> <p>Citation:</p> <p><i>Kik, A., Duda, P., Bajzekova, J., Baro, N., Opasa, R., Sosanika, G., ... & Novotny, V. (2023). Hunting skills and ethnobiological knowledge among the young, educated Papua New Guineans: Implications for conservation. Global Ecology and Conservation, 43, e02435.</i></p>

Professor Yusuf S. Hadi	<p>Title: <i>Physicomechanical Properties Enhancement of Fast-Growing Wood Impregnated with Wood Vinegar Animal Adhesive.</i></p> <p>Status: <i>Published in 2023</i></p> <p>Summary:</p> <p><i>The study aims to investigate the physicomechanical properties of fast-growing jabon wood impregnated with kak at two concentrations (8% and 10%) in wood vinegar or water as a solvent with and without 4% borax. The wood impregnated using a mixture of kak in wood vinegar presented better physical and mechanical properties than wood impregnated with a water solvent or untreated wood. Wood density increased, and the anti-swelling efficiency and mechanical properties improved significantly.</i></p> <p>Citation:</p> <p><i>Basri, E., Mubarak, M., Darmawan, W., Balfas, J., Adalina, Y., & Hadi, Y. S. (2023). Physicomechanical Properties Enhancement of Fast-Growing Wood Impregnated with Wood Vinegar Animal Adhesive. Journal of the Korean Wood Science and Technology, 51(6), 542-554.</i></p>
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Congresses

The Department of Forestry (DoF) undertook various academic and research initiatives in 2023, outlined in the following sections. These encompass a wide range of events, such as seminars, workshops, and conferences, all aimed at promoting excellence in academics and research within forestry. The DoF remains steadfast in its dedication to providing exceptional educational and research opportunities for students and faculty alike, as evidenced by the events organized throughout the year. These sections provide information on the accomplishments and contributions of the DoF in advancing forestry and cultivating a dynamic academic growth and development environment.

Seminar

In 2023, the Department of Forestry (DoF) hosted a single seminar for postgraduate students (see Table 8), featuring only one student as a presenter. Additionally, an extensive seminar series was arranged to assess the oral and poster presentations of 43 BSCF-4 students throughout the first and second semesters of 2023. Additional details are provided in Table 4.

Workshop

The Department also offered a two-day workshop on inferential statistics and data analysis in 2023, drawing in eager academics and postgraduate students from Taraka Campus and an external partner. A total of 14 participants joined in on the valuable learning experience, as shown in Table 9. The group comprised six hardworking postgraduate students and eight dedicated staff members.

Conference

DoF did not conduct any conferences in 2023; however, three academic staff members attended international conferences in 2023. Details of these conferences are provided in Table 7.

External Seminar Presentations

In 2023, despite the active research conducted by academic staff members at the Department of Forestry (DoF), no seminar presentations were held outside its premises. This may have

been due to limited time, resources, or competing priorities. However, the Postgraduate Department from Papua New Guinea University of Technology (PNGUoT) organized a Postgraduate Seminar, offering a platform for three postgraduate students to showcase their research, exchange ideas with peers, and receive valuable feedback from the audience. While the lack of presentations at DoF may have been a missed opportunity, the Postgraduate Seminar proved an excellent alternative for students to share their research and engage with others in the field. Several DoF staff attended this seminar.

Attendance and Participation

Staff from DoF and BUC who attended any seminar, workshop, or conference in 2023 are listed in Table 7. Three academic staff were able to attend international conferences.

Table 7: Department of Forestry and BUC Staff attendance in Congresses in 2023.

Date	Workshop / Seminar / Conference (indicate)	Presenter / Participant Name	Host Organization	Presentation Title	Funding source	2023 Status
15 th -19 th October 2023	Conference	Mr. Eko Maiguo	Australian Institute of Forestry (Australia)	Community Planting Initiatives for supporting forest systems and household needs in the Upper Mape area, Finchaffen District, Morobe Province	PNG Unitech Research and Conference Committee	Participated in-person: Represented the PNG University of Technology & Department of Forestry and BUC
27 th -30 th November 2023	36 th Japan Society of Microbial Ecology (JSME)/13 th Asian Symposium of Microbial Ecology (ASME)	Mr. Diaiti Zure	Japan Society of Microbial Ecology (JSME), Act City, Hamamatsu, Nagoya, Japan.	<i>In-vitro</i> , <i>in-vivo</i> , and <i>in-silico</i> assessments of antiviral capabilities and mechanisms of selected embryophytes and macrophyte herbs.	PNG Unitech Research and Department of Forestry	Participated in person: Represented the Tunghai University, PNG University of Technology & TSME, presented in the Young Scientist Multidisciplinary Session

28 th -29 th October 2023	Annual Conference	Mr. Diaiti Zure	Taiwan Society of Microbial Ecology (TSME), I-Shou Medical University of Medicine, Taiwan.	Insights on the antiviral mechanisms of Rutin revealed by <i>in-silico</i> assessment of <i>Ocimum basilicum</i> miRNAs.	Taiwan Society of Microbial Ecology (TSME)	Participated in person: Presented a poster and gave a 3-minute talk. Received a merits award for The Outstanding Research Poster Presentation.
11 th -19 th December 2023	National Conference	Professor Yusuf S. Hadi	IPB University, Bogor, Indonesia	Resistance of Polystyrene-Impregnated Glued Laminated Lumbers after Exposure to Subterranean Termites in a Field.	PNG Unitech Research and the Department of Forestry	Participated in person. He was awarded the Directorate of Research and Innovation Certificate of Merit for best researcher by the Ministry of Education and Culture.
24 – 25 August, 2023	Research Conference	Dr. Cossey K. Yosi	PNGFA / PNGFRI	Forestry Education in PNG: Benchmarking and Accreditation of the Bachelor of Science in Forestry Degree Program.	Conference held in Lae	Presented paper
30/08/23 – 01/09/23	Workshop for HODs held in Bulolo	Dr. Cossey K. Yosi	PNGUoT	Workshop on Annual Plan and PNGUoT Strategic Plan 2024-2028	PNGUoT	Participated

Table 8: List of presenters, organizations, and presentation titles with their respective supervisors and status in 2023.

Date	Presenters Name	Organization	Presentation Title	Supervisor(s)	2023 Status
13.10.2023	43 BSCF-4 Students	DoF, PNGUoT	See Table 4.	See Table 4.	The seminar series was delivered
29.09.2023	Ms. Ivy Kiele	DoF, PNGUoT	Impacts of the root system of selected PNG tree species on soil erosion and maintenance of essential plant growth nutrients	Mr. <u>Eko Maiguo</u> Mr. Haron Jeremiah	Seminar was delivered

Table 9: List of participants who attended the two-day workshop from the 29th to the 30th of August 2023.

Participants	Organization	Position	Status
Ms. Ivy Kiele	DoF, PNGUoT	Postgrad	Participated
Mr. Shen Sui	BRC	Postgrad	Participated
Mr. Ben Ruli	BRC	Postgrad	Participated
Mr. Cassey Uvau	BRC	Postgrad	Participated

Mr. Samson Hege	BRC	Postgrad	Participated
Ms. Sheinel Samuel	BRC	Postgrad	Participated
Ms. Christine Pokana	DoF, PNGUoT	Staff	Participated
Mr. Israel Penu	DoF, PNGUoT	Staff	Participated
Mr. Leonard Wana	DoF, PNGUoT	Staff	Participated
Mr. Haron Jeremiah	DoF, PNGUoT	Staff	Participated
Mr. Leroy Moripi	DoF, PNGUoT	Staff	Participated
Mr. Raymond Warebu	DoF, PNGUoT	Staff	Participated
Mr. Benny Darua	DoF, PNGUoT	Independent	Participated
Mr. Billy Bau	DoF, PNGUoT	Staff	Participated

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

Head of Department: Dr. Mohsen Aghaeiboorkheili

The Department of Mathematics and Computer Science is one of the largest Departments of Papua New Guinea University of Technology, with 24 academics and six support staff. The Mission of the Department of Mathematics and Computer Science is: To produce quality research and graduates in Computer Science and Applied Mathematics, moreover to give suitable Service Courses in Mathematics and Computing, to all other Departments at the University. In addition, the aim is to produce graduates in Computer Science and Applied Mathematics of a high standard and comparable with similar graduates from other Universities in the Pacific Region, and who can provide the development, critical evaluation, and application in their field for Papua New Guinea, and the Pacific.

This Department focuses on the training of graduate in Computer Science/IT and Applied Mathematics and is located within the Taraka campus. The Department offers a four-year degree program leading to a Bachelor of Computer Science Degree and Applied Mathematics. This Mathematics Program – Bachelor of Science in Applied Mathematics (BSAM) is started on 2022.

The world is accelerating with cutting-edge and innovative technologies, with the Internet proving to be of greater importance in everyday life – making information accessible instantly on media, such as smartphones, enabling us to access emails and social networks anywhere. To keep pace with technological development, the Department is committed to producing quality Computer Science and Applied Mathematics graduates at the national and international level to be part of the wider community in designing and developing systems in the Tech industry. Our graduates are at par with other graduates from around the country and the Pacific because we train them to be the best they can be in their roles as IT Specialists.

Education is the University's principal mission. The Mathematics & Computer Science Department aims to provide high-quality academic and administrative support services not only for undergraduates but with an increasing focus on the training of postgraduate students. Our postgraduate programs will continue to strengthen and develop research skills that our undergraduate students learn through Year 4 (Final Year Research Project).

All in all, the educational challenge in Mathematics & Computer Science is to produce professionals, both men, and women, with the necessary technical skills, up-skilling its students to have the ability to analyze and solve problems. With this Department's interest in developing its problem-solving capacity, the Department's research activities fit into its education mission statement: producing professionals who can best critically analyze and evaluate to solve problems that need solving. To achieve the Department's aim, the Department themselves are not only are they well vested in research, but they apply that knowledge through active participation in research projects and programs.

PRIORITY RESEARCH AREAS OF THE MCS DEPARTMENT

1- Numerical Analysis and Scientific Computing

Many practical problems in science and engineering cannot be solved completely by analytical means. Research in the area of numerical analysis and scientific computation is concerned with the development and analysis of numerical algorithms, the implementation of these algorithms on modern computer architectures, and the use of numerical methods in conjunction with mathematical modeling to solve large-scale practical problems.

Key research includes: PDEs, ODEs, boundary value problems, integral equations

2- Theoretical Mathematics

Theoretical mathematics is the study of abstract mathematical structures which form the basic framework for the rest of the mathematical sciences. In large part, theoretical mathematics is inspired by intellectual curiosity. Theoretical mathematics provides the tools for scientific discoveries in the future, often in unexpected ways. Algebra and Number Theory are the two oldest fundamental branches of mathematics that are at the very center of mathematics.

Key research includes: Discrete Mathematics, Analysis, Geometry and Topology, Number Theory, Algebra.

3- Curriculum Management System (CMS)

A Curriculum Management System (CMS), in its broadest sense, is an automated system which supports the entire curriculum process from planning to implementation to assessment and provides clear guidelines and procedures for significant areas related to standards-based teaching and learning.

Key research includes: Curriculum Design, Curriculum Mapping, Curriculum Collaboration, Curriculum Publishing

4- Software Engineering

Software engineering is the application of engineering concepts to software development. Its main goal is the creation, improvement, and maintenance of software. Software engineering takes into account engineering aspects like the hardware and software environment when working on a program.

Key research includes: Data mining semantic-web-mining, distributed computing, Database, Distributed system, Data warehousing, Green computing, GUI-graphical-user-interface, Mobile computing.

5- Statistical Science

The central purpose of Statistical Science is to convey the richness, breadth and unity of the field by presenting the full range of contemporary statistical thought at a moderate technical level, accessible to the wide community of practitioners, researchers and students of statistics and probability.

Key research includes: inter alia, the disciplines variously known as Statistics (and all sub-disciplines such as Biostatistics, Biometrics, Econometrics), Operations Research, Management Science, Quantitative Methods, Decision Science, and Analytics and for the application of the Statistical Sciences in all areas of human endeavor.

6- IoT

Since digital devices such as computers are vulnerable to attack by criminals, digital forensics is increasing in importance. Understanding digital forensic procedures will help to capture vital information which can be used to prosecute a suspect that compromises a digital devices or network. The diversity of this group is reflected in its research interests, which range over such areas as numerical analysis of partial differential equations, adaptive methods for scientific computing, and simulation of stochastic reaction diffusion systems.

Key research includes: Intersection of IoT, Bigdata, Computer Network, Network Management, Human Computer Interaction, Computer Organization, machine learning and social science.

7- Mathematical modeling:

Mathematical modeling is the research core of most of the scientific research. It is a method that represents and explains natural systems and occurrences using math formulas, descriptions,

and approaches. It involves formulating real-life situations or converting problems into mathematical explanations of real or believable situations. It gives precision and strategy for problem-solving and enables a systematic understanding of the system modeled. It also allows for better design, control of a system, and the efficient use of modern computing capabilities.

Key research area includes: Dynamical systems, ODE, PDE, Lyapunov function, Mathematical Biology, Actuarial science, computational mathematics and data science, Operation Research, stochastic process, Numerical Analysis and scientific computations.

SUMMARY OF FACULTY MEMBERS 2023

In 2023, Mathematics & Computer Science Department had 24 Academic Staff (Table 1).

Table 1: Academic Staff

NO	NAME	POSITION	RESEARCH INTERESTS
1	Dr. Mohsen Aghaeiboorkheili	HoD & Senior Lecturer	Numerical Methods, PDE, Boundary Value Problems
2	Dr. Chris Wilkins	Senior Lecturer	Programming Languages, Statistics, Probability Models
3	Dr. Arun Kumar Singh	Associate Professor	IoT, Bigdata, Computer Network, Network Management, Human Computer Interaction, Computer Organization, machine learning and social science
4	Dr. Rajendran Bhojan	Lecturer II	Big Data mining, Data in Network Intrusion and Bioinformatics
5	Dr. Samuel Dunstan	Lecturer II	Numerical Analysis, Scientific Computing
6	Dr. Mansoorh Kazemilari	Senior Lecturer	Topological Network Analysis, Econometrics
7	Benson Mirou	Senior Lecturer	Software Engineering, Computer Networks, e-Agriculture
8	John Lanta	Lecturer	Differential Equations, Statistical Modelling, Topological groups and rings
9	Yaling Tapo	Lecturer	Computer Networks, Data Science
10	Boaz Andrew	Lecturer	Statistics & Probability, Boolean Algebra, Algebraic Systems applied in Informatics
11	Lenz Nerit	Lecturer	Software Engineering, Reverse Engineering, Artificial Intelligence
12	Peter Helebi	Lecturer	Big Data and Analytics, Machine Learning, Predictive Modelling, Data Science, Artificial Intelligence
13	Raymond Kuna	Lecturer	Mathematical Modelling, Differential Equations, Topological groups and rings.

14	Doris Benig	Lecturer	Statistical Modelling, Probability Methods
15	Sankwi Abuzo	Lecturer (TI)	Internet Programming, Online Examination Systems
16	Bobby Angopa	Temporary Full Time (STI)	Applied Statistics
17	Nicholas Puy	Lecturer (STI)	Image Processing, Machine Learning, Deep Learning, Data Science, Internet of Things (IoT)
18	Joel Tahie	Lecturer (STI)	Discrete Mathematical Structures, Graph Theory, Differential Equations
19	Vincent Mbuge	Temporary Permanent Lecturer 1	Artificial Intelligence, Statistics
20	Issac Angra	Part-Time Tutor	Linerisation of Nonlinear Systems using Numerical Approximation Techniques, Mathematical Modelling, Differential Equations, Complex Analysis.
21	Luke Kolalio	Temporary Full Time – Technical Instructor	Cyber Security, Computer Networking, Database, AI
22	Siporah Tienare	Part Time Tutor	Differential Equations
23	Jacob Sauan	Part-Time Tutor	Differential Equations
24	Jean Vava	Part-Time Tutor	ODE, PDE
25	Kenneth Ranyeta	Part-Time Tutor	Numerical Methods

POSTGRADUATE RESEARCH PROJECTS

In year 2023, the Department has on record twelve (12) postgraduate research studies undertaken here at this University either as an ongoing program, in the final stages of thesis submission, corrections being carried out, or candidates awaiting graduation (Table 2). All of the studies are undertaken by students from within the Department (Mathematics and Computer Science) of this University. In addition, these researchers have undertaken PhD, MSc, MPhil levels. Of these 12 postgraduate students, four (4) undertaking PhD, one (1) MSc, seven (7) MPhil levels.

Table 2: Postgraduate Research Projects

NO	STUDENT NAME	PROGRAM	THESIS / RESEARCH TOPIC	PRINCIPAL SUPERVISOR	STATUS
1	Benson Mirou	PhD/4	Development of e-Crop Disease App for Farmers in Papua New Guinea: Development of e-Crop Disease App for Farmers in Papua New Guinea	Dr. Macquin Maino	Study in progress
2	John Lanta	PhD/2	Bohr compactification of Alternative and Jordan rings	Prof. Mihail Ursul	Study in progress
3	Raymond Kuna	PhD/1	Economic Modelling with Fractional PDEs	Dr. Mohsen Aghaeiboorkheili	Yet to register
4	Bobby Angopa	MSc/2	Applied Statistics: Use of time series methods to determine a model to forecast Immigration rates into the capital city of PNG, Port Moresby.	Mr. John Wamil	Yet to register
5	Issac Angra	MPhil/2	Differential Equations	Dr. Mohsen Aghaeiboorkheili	On hold
6	Luke Kolalio	MPhil/2	Cyber Security – How to detect intrusion in a network	Dr. Ashish Kumar Luhach	Study in progress
7	Alois Wemin	MPhil/2	Topological Ring	Dr. Mohsen Aghaeiboorkheili	Yet to register
8	Sankwi Abuzo	MPhil/2	Designing a suitable online proctoring system for PNG University of Technology	Dr. Chris Wilkins	Study in progress

9	Vincent Mbuge	Mphil/1	Simulation of queueing Theory	Dr. Chris Wilkins	Study in progress
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UNDERGRADUATE RESEARCH PROJECTS**Table 3: Final Year Student Research Projects**

NO	STUDENT NAME	TITLE	PRINCIPAL SUPERVISOR
1	Natasha Alfred	Network Security and Privacy in Hybrid Cloud (Cryptography)	Dr. Arun Kumar Singh
2	Agatha Nop	An analysis of Cloud Security problems	Dr. Arun Kumar Singh
3	Joshueen Nui	Software-Defined Wide Area Networks (SDWAN).	Dr. Arun Kumar Singh
4	Angopa Ismael	Exploring Decentralized Data Collection Approaches to Enhance Census Data Accuracy	Dr. Rajendran Bhojan
5	Jacob Jnr Klawe	Secure File Transfer System with Emphasis on Encryption and Data Security	Dr. Rajendran Bhojan
6	Mary-Gorethy Nakau	Avionics Data Analysis and Diagnostics	Dr. Rajendran Bhojan
7	Pewali Angopa	Online Shop in PNG	Dr. Chris Wilkins
8	Leanardo Toliken	Huffman Coding: An Efficient Data Compression Technique	Dr. Chris Wilkins
9	Thelma Zeming	The Rise of Software Defined-Wide Area Network (SD-WAN) Technology in PNG	Mr. Benson Mirou
10	Inota Nosi	Instant LAN Messenger	Mr. Kenneth Ranyeta
11	Kevin Gabi	The Clinic Assistant	Mr. Lenz Nerit

12	Bosco Rai Kalen	Online Voting System	Mr. Lenz Nerit
13	Napa Mandet	RYU (SDN) Firewall controller	Mr. Luke Kolalio
14	Frederick Young	Blockchain: Enabling Decentralization in Distributed Systems	Mr. Luke Kolalio
15	Dwayne Kolinjin	Neural Networks in Facial Recognition Software	Mr. Nicholas Puy
16	Johnny Meninga	Vehicle License Plate Recognition System.	Mr. Nicholas Puy
17	Steven Paal	System Software Creation in PNG	Mr. Nicholas Puy
18	Isaac Aua	Car Rental Web Application	Mr. Peter Helebi
19	Carlos Duma	Online Scholarship Application for WHP Provincial Government	Mr. Peter Helebi
20	Lulume Thomas	Student Association Database Records App	Mr. Yaling Tapo
16	Johnny Meninga	Vehicle License Plate Recognition System.	Mr. Nicholas Puy
17	Steven Paal	System Software Creation in PNG	Mr. Nicholas Puy
18	Isaac Aua	Car Rental Web Application	Mr. Peter Helebi
19	Carlos Duma	Online Scholarship Application for WHP Provincial Government	Mr. Peter Helebi
20	Lulume Thomas	Student Association Database Records App	Mr. Yaling Tapo
21	Christopher Antipas	Visualizing code competency of contributions made to resolve security vulnerability issues in PyPI libraries	Mr. Sankwi Abuzo
22	Adrianna Mapena	Visualization of Transitive Security in Treemap Charts	Mr. Sankwi Abuzo
23	Paul Patan	Contributions Congruent to Library Dependency Changes in a Software Ecosystem	Mr. Sankwi Abuzo

24	Solomon Hizetille	Credit Card Fraud Detection System	Mr. Yaling Tapo
25	Jaja Kara	Grid Computing	Mr. Yaling Tapo
26	Eileen Turkai	Computer Networking Using Wireless Network	Ms. Siporah Tieneri
27	Garry Yasa	Insurance Management System	Mr. Lenz Nerit

PUBLICATIONS IN JOURNALS / PUBLISHED PROJECT REPORTS

Our Academic staff in the Department have been involved in publishing scientific articles in 2023. The details of these publications are contained in Table 4.

Table 4: List of Publication

STAFF NAME	PUBLICATION DETAILS
Sumit Kumar Banerjee and Boaz Andrews	Sumit Kumar Banerjee, Boaz Andrews (2023). Analysis of SEIR Epidemic Model Engraft with Incompatible Incidence Rate. Biomedical Statistics and Informatics. Vol. 8, No 3, pp 37-41
Sumit Kumar Banerjee and Boaz Andrews	Sumit Kumar Banerjee, Boaz Andrews (2023). Mathematical Analysis of Regression Model Epidemiolog. American Scientific Research Journal for Engineering, Technology, and Sciences. Vol. 93, No 1, pp 39-49
Arun Kumar Singh, Benson Mirou, Sankwi Abuzo, Yaling Tapo, Peter Helebi	Arun Kumar Singh, Benson Mirou, Sankwi Abuzo, Yaling Tapo, Peter Helebi (2023). Use of ICT tools and technology in PNG to support climate change and environmental sustainability education. University of Papua New Guinea's School of Business and Public Policy and the Australian National University's Development Policy Centre-2023
Arun Kumar Singh	Arun Kumar Singh (2023). Chapter 9. The Accreditation Process and Framework in Higher Education: Quality Education with an Analytical View. NOVA Science Publisher. Series: Education in a Competitive and Globalizing World, Publication 27.

	Arun Kumar Singh (2023). Chapter 16. Digital Era in Papua New Guinea (PNG): Novel Strategies of the Telecom Service Provider Companies. Social Capital in the Age of Online Networking: Genesis, Manifestations, and Implications. IGI Global Publisher. pages 230-248 (Scopus)
	Arun Kumar Singh (2023). Chapter 11. Applications of the Internet of Things and Machine Learning using Python in Digital Marketing. Global Applications of the Internet of Things in Digital Marketing. IGI Global Publisher. pages 213-232
	Arun Kumar Singh (2023). Chapter 4. A Basic Process of Python Use for IOTAP, Data Science and Rapid Machine Learning Model Development. : Fraud Prevention, Confidentiality, and Data Security for Modern Businesses. IGI Global Publisher. pages 84-104
	Basu Dev Shivahare, Arun Kumar Singh et al. (2023). Survey Paper: Study of Natural Language Processing and its Recent Applications. 2022 2nd International Conference on Innovative Sustainable Computational Technologies (CISCT), Date of Conference: 23-24 December 2022, Date Added to IEEE Xplore: 22 February 2023. (Scopus)
Mohsen Aghaeiboorkheili	Mohsen Aghaeiboorkheili (2023). Solving Robin condition using a method based on integral equation. Journal of Interdisciplinary Mathematics. 26(8), pp. 1777–1785 (Scopus)

SEMINAR/WORKSHOP AND CONFERENCE

The details of the seminar presented by the Mathematics & Computer Science Department's staff this year 2023 are provided in Table 5.

Table 5: Mathematics & Computer Science Department Seminar

SEMESTER	DATE	VENUE	TIME	PRESENTER	TOPIC
1	01-March-2023	MCS203	2-3pm	Mr. Joel Tahie & Mr. Bobby Angopa	Online BSAM1 advisory presentation

1	15-March-2023	MCS203	2-3pm	Mr. Lenz Nerit	tSMAS Learning Management System
1	03-May-2023	MCS203	2-3pm	Dr. Mohsen Aghaeiboorkheili & Dr. Samuel Dunstan	AQAT awareness and new paper
1	10-May-2023	MCS203	2-3pm	Dr. Sumit Kumar Banerjee	Bifurcation analysis of an SIR epidemic model through differential equation approach
1	24-May-2023	MCS203	2-3pm	Dr. Mohit Saxena	Tensor Analysis

DEPARTMENT OF MECHANICAL ENGINEERING

Head of Department: Dr. Shoeb Ahmed Syed, Ph.D.

Introduction

The Department of Mechanical Engineering considers engineering research to be very important as it leads to an expansion of knowledge and discoveries of new products and services. It is 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 knowledge to devise new applications.

Engineering research is the systematic investigation and study of materials and sources to establish facts and reach new conclusions, so it shapes people's understanding of the world around them. Research involves testing hypotheses and predictions using testable data and a full package 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. *Computer-Aided Design and Engineering Modeling*
- iii. *Energy and Environment*
- iv. *Control Engineering and Mechatronics*
- v. *Materials Characterization*
- vi. *Engineering Education and Management*

The department encourages faculty to conduct their research by 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 based 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 Dr. Nicholas Lambrache	3D Computer-Aided Design, Engineering Modeling, Robotics, Mechatronics, Materials Science, Experimental Engineering.
Kamala K. Muduli, Ph.D.	Operations Management, Decision Sciences, Machining, Sustainable Development, Health Care, Waste Management, and Ergonomics.
Ghulam Arshed, Ph.D.	Numerical Analysis, Fluid Dynamics, Heat Transfer.
Aezeden Mohamed, Ph.D.	Corrosion Engineering, Machine Design, Non-Destructive Technologies, Biomedical Engineering, Failure Analysis, Materials and Manufacturing Processing. Engineering Education.

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
Dr. Jack Khallahle, PhD	Computational Fluid Dynamics, Thermodynamics, Thermal Power Systems, Heat Transfer, Engineering Economics, Engineering Noise Control and Machine Design
Dr. Steve Ales Korokan, PhD	Materials Science & Engineering: Friction Stir Welding (FSW) Al-Al and Al-high Temperature Alloys; Smart Materials and other Alloys, Design, and Manufacturing; Production of Fiber-reinforced Polymer Composites, Renewable Energy - Geothermal, Bio, Wind, and Solar - and Energy Policy.
Dr. Bikash Ranjan Moharana	Welding, Mechanical and metallurgical analysis, Process Optimization, Advanced Machining Processes, and Sustainable Manufacturing Technology.
Mr. Brian N'Drelan	Renewable energy – Solar, Tidal, and Wind. Failure of Components and Systems in Alluvial Mining Engineering, Experimental Engineering, and Operations Management.

Undergraduate Research Projects

No.	Suggested Description	Suggested by Lecturer	Number of Students
1	Hybrid System Powered by Wind and Solar Energy	Dr Aezeden Mohamed	1
2	Design of garlic Seeder machine	Dr. Shoeb Ahmed Syed	2
3	Tailing Treatment and Design of Deep-Sea Tailing Placement Facilities at Wafi-Golpu Gold and Copper Mine In Morobe Province Papua New Guinea	Brian N'Drelan	2
3	Designing of Sustainable Water Pump for Kopen Secondary School by Using Natural Flow Energy of Stream	Dr Aezeden Mohamed	3
4	Solar Seawater desalination Machine	Dr. Shoeb Ahmed Syed	1
5	The Design and Fabrication of a Pyrolysis Reactor	Dr Kamalakanta Muduli	2
6	Upgrade of The Solar Powered Rice Mill System for Trukai Industry	Dr Aezeden Mohamed	2

7			
8	Design of Water Supply Scheme for Vanimu	Dr Aezeden Mohamed	2
9	Design of Biogas plant for Unitech Mess	Dr. Shoeb Ahmed Syed	1
10	Design of Railway Transportation System for Freight Transportation – Hi Rail Freight Transportation System: (Ramu to Lae Port)	Dr Aezeden Mohamed	2
11	Design of Permanent Access platform for Hidden Valley Mine Primary Jaw Crusher and Wobbler	Dr. Shoeb Ahmed Syed	3
12	Design of a Smart Helmet for Improving Safety in the Mining Industry	Dr Kamalakanta Muduli	1
13	Design of Manual winnower to Automated (power operated/Solar and Self-recharging battery powered).	Dr Aezeden Mohamed	1
14	Designing of A Kernel Blower for Gusap Oil Palm Mill	Dr. Aezeden Mohamed	2
15	Water Supply for Coastal Villages Affected by High-Tides and Lack of Fresh Water Sources	Brian James N'Drelan	2
16	Municipal Waste Management and Unitech Campus as an Experimental Site	Brian James N'Drelan	1
17	Design and Fabrication of a Safe and Less Hazardous Flue Gas/ Smoke Incinerator for the PNG Unitech Campus	Brian James N'Drelan	1
18	Sensor Control of a Robotic Arm with 5 Degrees of Freedom on Arduino Platform	Professor Dr Nicholas Lambrache	8
19	Designing a Light weight Aircraft Cabin Seat Using Balsa Fibre Reinforced Glass Epoxy Composite	Dr. Steve Ales	2
20	Pipe Belt Conveyor System for Transportation of Ores	Dr. Aezeden Mohamed	2
21	Design of a Prosthetic Leg	Dr. Aezeden Mohamed	2
22	Designing A Rice Planter Machine for Efficient Planting	Dr. Aezeden Mohamed	2

23	Design of an Air Conditioning System for an Office with Restaurant Facility at PNG Unitech	Dr Jack Khallahle	2
24	MotuKea Reefer Points Upgrade & Relocation project	Mr. Brian N'Drelan	1
25	Review & Establishment of maintenance program for Exxon Mobil donated 560KVA Genset	Mr. Brian N'Drelan	2
26	Review & Establishment of maintenance program for 2 x 500KVA Gensets	Mr. Brian N'Drelan	1

Postgraduate Students Research

The following projects are being conducted by our Postgraduate Students:

No	Research Projects	Status	PG Student
1	Failure of Components and Systems in Alluvial Mining Engineering	Continuing, External Examiners Review	Brian N'Drelan, PhD
2	Digital Technology Enabled Maintenance Practices for Enhanced Sustainable Organizational Performance: Myth or Reality?	Continuing	Granville Embia(PhD)
3	Waste and Cost Reduction Pathway for Enhanced Overall Equipment Efficiency	Completed	Granville Embia
4	Proposed Framework for Implementing Remaining Useful Life Estimation-based Predictive Maintenance Strategy in Papua New Guinea	Continuing External Examiners Reviews received.	Kialakun Galgal
5	Design of Manual Interlock Brick Mold and Analysis of different PNG clay Bricks	Continuing External Examiners	Paul Kuri

		Reviews received.	
6	Evaluation of Weldability and Optimization of TIG Welding Process Parameters for Maximized Yield Strength	Continuing External Examiners Reviews received.	Guambo Mondo
7	To be Decided	Continuing	John Kamit

Journal Publications

1. Bihari, A., Dash, M., Kar, S. K., Muduli, K., Kumar, A., & Luthra, S. (2023). Exploring behavioural bias affecting investment decision-making: a network cluster based conceptual analysis for future, research. *International Journal of Industrial Engineering and Operations Management*, 4(1/2), pp. 19-43.
2. Das, S., Barve, A., Sahu, N. C., Muduli, K., Kumar, A., & Luthra, S. (2023). Analyzing the challenges for sustainable food grain storage management: a path to food security in emerging nations. *International Journal of Food Science and Technology*, 58(10), 5501-5509.
3. Das, S., Myla, A. Y., Barve, A., Kumar, A., Sahu, N. C., Muduli, K., & Luthra, S. (2023). A systematic assessment of multi-dimensional risk factors for sustainable development in food grain supply chains: a business strategic prospective analysis. *Business Strategy and the Environment*, 32(8), 5536-5562.
4. Das, S., Barve, A., Sahu, N. C., Muduli, K., (2023). Enabling Artificial Intelligence for Sustainable Food Grain Supply Chains: An Agri 5.0 and Circular Economy Perspective, *Operations Management Research*, 16, 2104-2124.
5. Helebi, P.J. and Mohamed, A. Text Classification on General Expense Dataset using Machine Learning in Business Operations. *Empirical Economics Letters*, 22 (Special Issue 1): (June 2023). ISSN 1681 8997. <https://doi.org/10.5281/zenodo.8077874>
6. Heilala, J. Parchegani, S., Mohamed, A. and De Freitas, A.G. A sustainable system of systems in space. *AHFE, Human-Centered Aerospace Systems and Sustainability Applications*, Vol. 98, 2023, 94–100. <https://doi.org/10.54941/ahfe1003923>
7. Gupta, S., Pani, S. K., Muduli, K., Vaish, A., & Kumar, A. (2023). Risk managed cloud adoption: an ANP approach. *International Journal of Mathematical, Engineering and Management Sciences*, 8(1), 78-93.
8. Issac, I and Mohamed, A. Sustainable Management Practices for Audit Enhances the Performance for Service Improvement Programmed, *Empirical Economics Letters*, 22 (Special Issue 1): (June 2023) ISSN 1681 8997. <https://doi.org/10.5281/zenodo.8075881>
9. Kelvin, D. and Mohamed, A. Enhancing Sustainable of Work-Life Programs Increases Operational Organizational Performance: A Case of National Academics at PNG University of Technology, *Empirical Economics Letters*, 22 (Special Issue 1): (June 2023) ISSN 1681 8997. <https://doi.org/10.5281/zenodo.8075591>
10. Kelvin, D. and Mohamed, A. Green Marketing Approaches and their Impact on Consumer Behaviour towards the Environment: A Case of Staff and Students of the University of Technology. *Empirical Economics Letters*, 22 (Special Issue 1): (June 2023) ISSN 1681 8997. <https://doi.org/10.5281/zenodo.8076551>
11. Mishra, D., Muduli, K., Raut, R.D., Narkhede, B.E., Shee, H., Jana, S.K. (2023) Challenges Facing Artificial Intelligence Adoption during COVID-19 Pandemic: An Investigation into the Agriculture and agri-food Supply Chain in India, *Sustainability*, 15(8), 6377.

12. Mishra, D., Muduli, K., Sevcik, L., Jana, S.K. and Ray, M., 2023. Combating of Associated Issues for Sustainable Agri-Food Sectors. *Sustainability*, 15(13), p.10096.
13. Mohamed A, Kuri P, Rout SK, Muduli K. (2023), Assessment of ec-toxicity potential of fuel by exhaust gas analysis. *Journal of Thermal Engineering*, 9(3):669-678.
14. Mohamed A. and Martin, N. Effects of Electrochemical Machining Parameters on Aluminium Hybrid Composites, *NanoWorld Journal* 9(S3): S83-S86. October 03, 2023 <https://doi.org/10.17756/nwj.2023-s3-015>
15. Mohamed, A. and Martin, N. Optimizing Mechanical Properties of Metal Matrix Composites Using Taguchi's Technique. *NanoWorld Journal* 9(S3): S79-S82. October 03, 2023. <https://doi.org/10.17756/nwj.2023-s3-014>
16. Moharana, B. R., Mohapatra, K. D., Muduli, K., Biswal, D. K., Moharana, T. K. (2023), Multi-response Optimization of Machining Parameters in WEDM using Hybrid Desirability based TOPSIS Concept, *International Journal of Process Management and Benchmarking*, 14(4), 439-459.
17. Muduli, K Luthra S., Garza-Reyes J. A & Huisingh, D. (2023) Application of blockchain technology for addressing reverse logistics challenges: current status and future opportunities, *Supply Chain Forum: An International Journal*, 24(1), 1-6.
18. Muduli, K., Syed S.A, Kommula, V. P, Moharana, B.R. Behera, B. C. (2023) Assessment of Musculoskeletal Disorder in Food Service Industry in Emerging Economies, *International Journal of Process Management and Benchmarking*, Vol. 14, No. 4, pp. 558-580.
19. Nayak, S., Mohapatra, J., Muduli, K., Khuntia, S. K., Malla, C., Patra, S. K., & Jena, P. K. (2023). Mechanical and thermal properties of Careya arborea bast fiber–reinforced chitosan composites for packaging industries. *Biomass Conversion and Biorefinery*, 1-8
20. Pattnaik, P. K., Syed, S. A., Mishra, S., Jena, S., Rout, S. K., & Muduli, K. (2023). Flow of viscous nanofluids across a non-linear stretching sheet, *J Ther Eng*, 9(3): 593-601.
21. Ramasamy, A., Inore, I., Muduli, K., Singh, S.(2023) Evaluation of Factors Affecting Job Satisfaction Pathways for Improved Sustainable Business Performance in Emerging Economies, *International Journal of Social Ecology and Sustainable Development*, 14(1), 1-17
22. Sethy, S., Behera, R.K., Rana, J. and Muduli, K.,(2023). Experimental investigation on the performance variations of three different work piece materials in EDM with variation of thermo-physical properties, *International Journal of Process Management and Benchmarking*, 15(1), 46-72.
23. Sethy, S., Behera, R. K., Muduli, K., Kandasamy, J., Davim, J. P., & Rana, J. (2023). Bio-dielectrics to improve the performance of electro discharge machining—an investigation for cleaner production opportunities. *Advances in Materials and Processing Technologies*, 1-20.
24. Singh, P.K., Maheswaran, R., Virmani, N., Raut, R.D., Muduli, K. (2023) Prioritizing the solutions to overcome lean six sigma4.0 challenges in SMEs: A contemporary research framework to enhance business operations, *Sustainability*, 15(4), 3371-3390.
25. Singh, S., Barve, A., Muduli, K., Kumar, A., Luthra, S. (2023), Evaluating Roadblocks to Implementing a Green Freight Transportation System: An Interval Valued Intuitionistic Fuzzy Digraph Matrix Approach, *Transactions on Engineering Management*, 71, 2758-2771.
26. Smacker, K. and Mohamed, A. Provincial Government Credit Guarantee Scheme: An Assessment of Factors Affecting SMEs on Loan Repayment. *Empirical Economics Letters*, 22 (Special Issue 1): (June 2023) ISSN 1681 8997. <https://doi.org/10.5281/zenodo.8077701>
27. Syed, S. A., Ales, S., Behera, R. K., & Muduli, K. Challenges, Opportunities and Analysis of the Machining Characteristics in hybrid Aluminium Composites (Al6061-SiC-Al2O3) Produced by Stir Casting Method, *International Research Journal on Advanced Science Hub*, 4(8), 205-216

Conference Proceedings

1. Allirani P, Yogapriyaa S., Vishali. M, Aezeden Mohamed, Akhmedov Abdulaziz, Classification of Chest X-Ray Images Using Convolutional Neural Network, ICONNECT-

- 2023, E3S Web of Conferences 399, 04048 (2023) <https://doi.org/10.1051/e3sconf/202339904048>
2. Akshaya, TAM, Sreeja, P. P., Jayashankari, J., Mohamed, A. and Iroda, S. Identification of Brain Tumor on Mri images with and without Segmentation using DL Techniques, E3S Web of Conferences 399, 04049, 2023. E3S Web of Conferences 399, 04049, 2023. <https://doi.org/10.1051/e3sconf/202339904049>
3. Biswal, D.K., Muduli, K., Biswal, J.N. (2023). Analytical Hierarchy Process Strategy for Assessment of Overall Equipment Effectiveness. In: Deepak, B., Bahubalendruni, M.R., Parhi, D., Biswal, B.B. (eds) Recent Trends in Product Design and Intelligent Manufacturing Systems. Lecture Notes in Mechanical Engineering. Springer, pp. 303-313, Singapore.
4. Biswal, D.K., Muduli, K., Biswal, J.N. (2023). Plant Layout Improvement Using CRAFT: A Case of Food Packaging Unit. In: Deepak, B., Bahubalendruni, M.R., Parhi, D., Biswal, B.B. (eds) Recent Trends in Product Design and Intelligent Manufacturing Systems. Lecture Notes in Mechanical Engineering, pp. 315-326. Springer, Singapore.
5. Mohamed, A., Piso, K., Mogili, U., Muduli, K. (2023). OEE in Sustainable Can-Making Manufacturing. In: Deepak, B., Bahubalendruni, M.R., Parhi, D., Biswal, B.B. (eds) Recent Trends in Product Design and Intelligent Manufacturing Systems. Lecture Notes in Mechanical Engineering, pp 353-369. Springer, Singapore.
6. Mohamed, A., Galgal, K. and U Mogili, Programmable logic controllers in flexible manufacturing system (FMS), AIP Conference Proceedings 2917 (1) 040003 (2023). <https://doi.org/10.1063/5.0175867>
7. Mohamed, A., Mogili, U., Kasup, C., How to reduce production Losses-South Pacific Brewery limited and paradise foods limited, AIP Conference Proceedings 2917 (1). 040005 (2023). <https://doi.org/10.1063/5.0175869>
8. Mohamed, A., and Mogili, U. Developments of models of tooling for machining centers, AIP Conference Proceedings 2917 (1), 040004 (2023). <https://doi.org/10.46254/an13.20230681>
9. Mogili, U. and Mohamed, A. Artificial intelligence and machine learning in the fields of education, medical, and smart phones, AIP Conference Proceedings 2917 (1). 050012 (2023). <https://doi.org/10.1063/5.0175660>
10. Nirmala, D G.Pooja, U.Sowmya, Aezeden Mohamed, Avazova Durdona, System For Water Quality Monitoring And Distribution, ICONNECT-2023, E3S Web of Conferences 399, 01016 (2023) <https://doi.org/10.1051/e3sconf/202339901016>.
11. Reena, R., Srishti, R. Harini, M., Mohamed, A. and Surayyo, E. IoT-Based Assistant for Alzheimer's Patient with Reminder System and Tracking Using GPS, E3S Web of Conferences 399, 04053, 2023. <https://doi.org/10.1051/e3sconf/202339904053>
12. Sasirekha, R. Kaviya R, Saranya G, Aezeden Mohamed, Utaeva Iroda, Smart Poultry House Monitoring System Using IOT, ICONNECT-2023, E3S Web of Conferences 399, 04055 (2023) <https://doi.org/10.1051/e3sconf/202339904055>
13. Shalini M, Rithika. S, Nivetha. S, Aezeden Mohamed, Yuldasheva Feruza, Intelligent Medicine Box, ICONNECT-2023, E3S Web of Conferences 399, 01011 (2023), <https://doi.org/10.1051/e3sconf/202339901011>
14. Tiko, B. and Mohamed, A. Evaluating the knowledge and perceptions of local farmers in Tanam Village, Morobe Province regarding Fall Armyworm infestation, E3S Web of Conferences STAR'2023, 477, 00021 (2024). <https://doi.org/10.1051/e3sconf/202447700021>

Book Chapters

1. Das, R.P., Muduli, K., Singh, S., Behera, B.C., Ramasamy, A. (2023). Unveiling the Role of Evolutionary Technologies for Building Circular Economy-Based Sustainable Manufacturing Supply Chain. In: Kamble, S.S., Mor, R.S., Belhadi, A. (eds) Digital Transformation and Industry 4.0 for Sustainable Supply Chain Performance. EAI/Springer Innovations in Communication and Computing. Springer, Cham. Pp 51-78. https://doi.org/10.1007/978-3-031-19711-6_2;

2. Embia, G., Moharana, B.R., Mohamed, A., Muduli, K., Muhammad, N.B. (2023). 3D Printing Pathways for Sustainable Manufacturing. In: Nayyar, A., Naved, M., Rameshwar, R. (eds) *New Horizons for Industry 4.0 in Modern Business. Contributions to Environmental Sciences & Innovative Business Technology*. Springer, Cham. Pp 253-272. https://doi.org/10.1007/978-3-031-20443-2_12;
3. Embia, G., Mohamed, A., Moharana, B. R., & Muduli, K. (2023). Edge Computing-Based Conditional Monitoring. *Intelligent Manufacturing Management Systems: Operational Applications of Evolutionary Digital Technologies in Mechanical and Industrial Engineering*, 251-270. ISBN: 978-1-119-83624-7
4. Martin, N. and Mohamed, A. Optimization of Cathodic Protection Design for Oil and Gas System, Optimization of Cathodic Protection Design for Oil and Gas System, Recent Trends in Product Design and Intelligent Manufacturing Systems pp 831–840, 2023. https://doi.org/10.1007/978-981-19-4606-6_76
5. Moharana, B.R., Behera, B.C., Syed, S.A., Muduli, K., Barnwal, S. (2023). Experimental Investigation of Machining NIMONIC 80 Alloy by WEDM Process via Multi-objective Optimisation Techniques: A Sustainable Approach. In: Kandasamy, J., Sakthivel, A.R., Davim, J.P. (eds) *Progress in Sustainable Manufacturing. Management and Industrial Engineering*. Springer, Singapore. pp. 81-96. https://doi.org/10.1007/978-981-99-0201-9_6..
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7. Swain S., Muduli K., Mohamed A.(2023) Blockchain Technology as a Tool for Prediction and Prevention of the Spread of COVID-19, Blockchain Technology in Healthcare Concepts, Methodologies, and Applications, Vol 1, pp 142-168. Bentham Books

Books

1. Behera, B.C., Moharana, B. R., Muduli, K., Islam, S.M.N. *Smart Technologies for Improved Performance of Manufacturing Systems and Services* CRC Press, June 2023; UK, ISBN: 9781032386898
2. Muduli, K., Ramasamy, A., Das, M.R., Ray, M. *Project Management and Economics*, RLK Enterprises, India, 2023, ISBN: 978-8119489961
3. Muduli, K., Kommula, V. P., Yadav, D.K., Selvan, C.P., Kandasamy, J., *Intelligent Manufacturing Management Systems: Operational Applications of Evolutionary Digital Technologies in Mechanical and Industrial Engineering*, Wiley Scrivener Publishing, June 2023, USA, ISBN: 9781119836247
4. Sinwar, D., Muduli, K., Dhaka, V.S., Singh, V. *Computational Intelligence based Optimization of Manufacturing Process for Sustainable Materials*, CRC Press, Sep 2023, UK. ISBN 9781032191041

DEPARTMENT OF MINING ENGINEERING

Head of Department: Dr Jim Lem

Introduction

Amongst the four engineering departments at the Papua New Guinea University of Technology, Mining Engineering Department is the newest, established in 1988. The Department offers two Degree programs: Bachelor of Mining Engineering (Honors) and Bachelor of Mineral Processing Engineering (Honors). In addition, it also offers postgraduate programs in Mining and Mineral Process Engineering at the Masters and PhD levels. The postgraduate programs offered are mainly by research: research based master of philosophy (MPhil) and doctor of philosophy (PhD).

To date, there are far fewer top graduates who did post graduate studies and took up academic positions in the Department. Our graduates have had high preferences for employment in the industries owing to the far superior salaries and other benefits, particularly in the mining and petroleum industries. This has seen less output in research in the Department over the years. Our mining and mineral processing engineers work in many parts of the world, such as Australia, America, Canada, Africa, Indonesia, Thailand, Mongolia, Sweden, and the Solomon Islands.

Currently, we have four (4) students enrolled in Master of Philosophy in the Department embarking on research in Mining and Mineral Processing areas. The Department is committed to delivering quality teaching, research, and outreach activities, including Government and Industry based projects and postgraduate research and development studies.

The Mining Department continues to enjoy healthy industry partnerships and collaborations, propelling staff and students to engage in real-industry-based research projects and consultancies. The Department signed MoUs with K92 Mine, the University of Queensland (Australia), the Mineral Resources Authority (MRA), and local alluvial resources landowners. A major project being undertaken by the Department is the “Development of alluvial gold resources evaluation model” in partnership with the Mineral Resources Authority (MRA).

RESEARCH THEME AND FOCUSED AREAS

The Department's research focus and interests are 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 behavior
- Alluvial mining techniques and resources evaluation
- 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

- Mineral processing
- Froth flotation
- Hydrometallurgy of gold and base metals – copper, nickel, chromium, cobalt, etc.
- Process plant design & optimization
- Froth flotation of base metal sulphides and gold
- Process data analysis and statistical modelling
- Processing of industrial minerals
- Mine & mill waste management
- Alluvial gold extraction, process optimisation with a focus on fine gold recovery and elimination of mercury (Hg)
- Fundamentals of froth flotation
- Gravity concentration of gold
- Pyrometallurgy
- Reprocessing of mill/mine waste

INDUSTRY FUNDED AND INDUSTRY BASED COLLABORATIVE RESEARCH PROJECTS

1. Third Independent Peer Review Project for PanAust Frieda River Copper Project on Environmental Impact Statement (EIS) - Independent Peer Reviewer
Dr G. Arpa, Dr O. Renagi, Dr J. Lem, Mr Kenny Michael, (2022)

The PNG Unitech appreciates the opportunities provided by PanAust Frieda River Project in fully supporting CEPA's suggestion for the inclusion of the Unitech-led IPR team. This continues to support the PNG University of Technology's mission and vision to grow world-class technocrats through high-quality experimental teaching, research, and ardent application of science, technology, and innovation through industry-based projects

PanAust Frieda River Project conducted the East Sepik Province (ESP) Consultation from June to October 2022 as part of the **EIS** (Environmental Impact Statement) Awareness, a prerequisite for the grant of the Environment Permit for the Frieda River Mine. To ensure the best outcome for the Consultation, which was run and overseen by CEPA, a Unitech team was invited as strategic Independent Observers. The Unitech Team acted as a technical representative on behalf of the company addressing clarifications over matters or issues arising of a technical nature.

2. **Hidden Valley Mine Closure Planning Project: TSF Leachate quality analysis**

J. Lem, J. Witne, Dr. W. Koba, Dr G, Arpa (2021 -2022)

The Hidden Valley Mine is an open pit gold and copper mine in production since 2010. The Hidden Valley Mine a wholly owned subsidiary of Harmony Gold Mining Company Limited. The run-of mine ore, after size reduction, is subjected to a combination of gravity separation, froth flotation, and cyanide leaching to recover gold and silver values. In addition, Hidden Valley Mine has constructed and operates a Tailings Storage Facility (TSF) within which the processing residue, tailings, is stored. Hidden Valley Mine is forecast to close production in the year 2026. Currently, a work program is in place to develop a mine rehabilitation and closure plan. The Tailings Leachate Trial is one part of this program undertaken by the Environmental Division section of the mine to inform the closure planning for the TSF.

The tailings leachate trial set-up consisted of four 1000 liters of plastic tank open at the top and exposed to the atmosphere. The tanks are each filled with a known weight of tailings material. The bottom end of the tank is opened and connected to a tank of similar dimension and size by a pipe, where the leachate volume is monitored and ports installed for regular sampling. The tanks were directly exposed to climatic conditions such as incidental rainfall, temperature, etc. Samplings were done weekly in January 2021 and then monthly until March 2022. The samples collected were analyzed by ALS in Australia.

The Morobe Consolidated Goldfields (MCG) then engaged the Mining Engineering Department of PNG UNITECH to analyse and interpret the 12 months Tailings Leachate Trial data. The 12 months of data received consisted of field data (rainfall, temperature, pH, EC, ORP, DO, turbidity, salinity, the volume of leachate, etc.) and chemical assay data from ALS.

The scope of this project was to evaluate the 12 months of Leachate Trial data to provide an indication of:

- Changing leachate volumes as a function of climatic conditions
- Temporal trends in key leachate parameters (particularly, pH, SO₄, cyanide, and dissolved metals).
- Any correlations between pH and other key parameters, i.e., SO₄ and dissolved metals (i.e., is pH (or some other function) the driver of the observed changes to water quality

This project was completed with final payment made on November 30, 2022

3. Process Mineralogy of fluorine in K92 Gold Ore

Jim Lem (2020-2023)

A potential metallurgical issue at the K92 Gold Mine related to the undesirable accumulation of fluorine, a penalty element in the Au-Ag-Cu Concentrate, was investigated by the Mining Engineering Department. The research aimed at identifying the gold-bearing minerals, the distribution, and association of gold minerals across the size range, the major F-bearing minerals, the association of F-bearing minerals with gold minerals, and eventually establishing 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. The mineralogical analysis was performed using a combination of MLA, and chemical assay and the findings were 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. The mine took action: Stopped application of carboxymethyl cellulose – a depressant for talc

4. Rio Tinto Ilmenite Ore Upgrade – World Challenge on Process Innovation

Eric Agorhom, Clement Owusu*, Jim Pae Lem (2020 – 2023)*

**Senior lecturer, Minerals Engineering Department, UMaT, Tarkwa, Ghana*

This open process innovation challenge managed by HEROX is worth US\$ 350,000.00. Rio Tinto is seeking ideas for how to cost-effectively improve TiO₂ content in their ilmenite ore (from 32% TiO₂ content to 50% or better) by isolating and separating out lower-quality hematite inclusions (lamellae) from the ore matrix and liberating gangue (non-valued) material. This was a two-stage challenge. The details can be seen in this link: <https://www.herox.com/OreUpgrading/updates>. Our research team (Eric Agorhom team), which is a collaboration between PNG University of Technology and the University of Mines & Technology, Tarkwa, Ghana, won the Stage I challenge worth US\$50,000.00. Although a successful process was not defined in the stage (II) component of the challenge, our research team is currently exploiting techniques of froth flotation and process mineralogy to ultimately achieve the intended goal.

5. K92 Mine Gold Ore Bond Work Index Test Work

J. Lem, F. Kisai (2019 – 2023)

This technical project is continuing since 2019. As a result, the K92 Gold Mine is forecast to increase production in the year 2023 onwards with a target annual gold production of 400 to 500 000 ounces. The work demand for this increase, the Mining Department purchased new comminution equipment, including a continuous grinding mill, steel balls, and rods for grindability or bond work index tests.

These ore grindability test results are so critical for the mine as it directly affects the overall plant performance and, eventually the daily gold production. The Mining Engineering Department is playing a vital role in ensuring success at K92 Gold Mine in this space.

STAFF RESEARCH ACTIVITIES, ABSTRACT

1. Studies of Aggregates from PNG: Materials from Bumbu, Busu & Yalu Rivers of Morobe Province
Francis Kisai, J. Lem, 2019 to ongoing research
2. 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. (Yawas Dekba & Gabriel Arpa) 2019 to --- ongoing research.

RESEARCH/PROJECT REPORT

1. Lem, J. Kobal, W., Witne, J., Arpa, G., (2022). **Hidden Valley Mine Closure Planning Project: TSF Leachate Quality Analysis Report**

2. Lem.J., (2021). **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

WORKSHOPS/CONFERENCES/PUBLICATIONS/MEETINGS ATTENDED

- Yowa, G. (2022). **Natural Pozzolans.** International Journal of Geosynthetics and Ground Engineering
<https://link.springer.com/article/10.1007/s40891-022-00400-3>
- Kobal, W. (2022). **Pyrite and AMD.** Presented during the Geoscience, Exploration & Extraction (GEE) Conference, Port Moresby, November 2022
- Yowa, G. (2022). **Bena Serpentinite, Manus Scoria, Simbu Kondaku Tuff and Rabaul Volcanics,** Presented during the Geoscience, Exploration & Extraction (GEE) Conference, Port Moresby, November 2022
- In partnership with Papua New Guinea Mineral Resources Authority, the Mining Engineering Department hosted the 5th National Alluvial Mining Convention here in Unitech. The Theme of the convention was: **“INCORPORATING A SAFER, SUSTAINABLE AND FORMALIZED ALLUVIAL MINING SECTOR IN PNG AS AN SME ACTIVITY” 21st to 22nd September 2021.** <https://postcourier.com.pg/lae-hosts-alluvial-miners/>
- Lem, J. (2021). Mineralogical analysis of K92 Gold Ore: Aspects Promoting Fluorine Accumulation Presentation of findings at the K92 Gold Mine. *December 12, 2021*

POSTGRADUATE RESEARCH

The research topics, supervisors, sponsors, and funding sources are presented.

Student	Research Topic	Funding Source	Supervisor
Tracey Vokain	Environmentally benign lixiviant for gold leaching	Self	Dr J Witne & Dr J Lem
Mr. Mondu Akura*	Hydrometallurgical extraction of gold in the K92 Gold Ore	GAP	Dr. J. Lem
Francis Kisai*	Evaluation of aggregate quality	self	Dr J Lem
Michelle Maiti**	Recoverable gold loss through TPP plant	OTML	Dr J Lem

* *Finalizing MPhil thesis*

** *Currently a project metallurgist at OTML, application for admission awaiting approval*

FINAL YEAR UNDERGRADUATE STUDENTS' RESEARCH PROJECTS

Mining Engineering

#	TOPIC/TITLE	STAFF	STUDENTS
1	Time study analysis of production mucking. (K92 Mine)	Dr Arpa	1. Emoni Hadassha 2. Kamare Gomez

2	Ground water modeling (K92 Mine)	Dr Arpa, Y.Ramsey & D. Yawas	1. Kongo Fabien 2. Kuk Jason
3	Ultraterne Open pit mine design for Irimufimpa. (K92 Mine)	Mr Pakne, Dr Ail, Dr Arpa, Hans Matarab	1. Morehari Gilmore 2. Nonah Nonah
4	Optimization of Mine ventilation network analysis. (K92 Mine)	Dr Arpa & Philip Rimits	1. Paia Joel 2. Pim Joshua
5	Economic analysis of proposed twin incline design. (K92 Mine)	Dr Ail & Mr Pakne	1. Rumints Jordan
6	Equipment Selection. (K92 Mine)	Dr Ail and Mr Pakne	1. So-onwai Henry
7	Strength of Rockmass model. (K92 Mine)	Dr Arpa, D. Yawas and Y. Ramsey	1. Wilson Toros
8	Stability analysis of Dam extension design. (K92 Mine)	Dr Arpa, Dr Ail & H. Matarab	1. Taimi Sedrick
9	Swell Factor and Rock Density. (K92 Mine)	Dr Arpa, D. Yawas, and Ramsey Y.	1. Salvado Leonie

MINERAL PROCESS ENGINEERING

Hidden Valley Projects

Final year students research projects. 2022

#	TOPIC/TITLE	STAFF	STUDENT(S)
1	Determination of bond work index for Hidden Valley sulphide ores	Dr. J. Lem	Rosemary Kiminja
2	Sulphidisation of oxidized Cu – Au ores	Dr. J. Lem	Abigail Mileng
3	Leaching kinetics of K92 Gold ore	F. Kisai	Basil Taubuso
4	Effects of clayey minerals on gravity concentration of gold	Dr J. Lem	Billy Wosuwo
5	A baseline study on the crystallization of jarosite – Lihir Mine working condition	Dr W. Kobal	Brian Nokondopa
6	Production of ferric alum from Mt Bai Cu – Au ore	Dr W. Kobal	1. Claudia Solok 2. John Jr. Lepus 3. Johnson Yasa
7	Investigating thickener design using flocculants made from local materials	Dr J. Witne	Elijah Oa

8	Optimization of gold recovery in in porphyry copper ore	Dr J. Lem	Isaac Nindil
9	Application of DETA (Diethylenetriamine) to minimize the effect of copper on gold cyanidation	Dr J. Lem	Kathleen Aruma
10	Flotation of OK Tedi Skarn ore	Dr J. Witne	William Webster
11	Studying adsorption kinetics of locally produced activated carbon	Dr J. Witne	Elizah Namba
12	The hydrometallurgical processing of base metals: the positive side of Fe	Dr W Kobal	Scholastica Towal
13	Leaching kinetics of K92 gold ore	Dr J Witne	Simon James
14	Process mineralogy of K92 Au ore	Dr J Lem	Gibson Kaupa
15	Leaching of K92 gold ore	Dr J Lem	Kristy Maxine
16	Mineralogy study of K92 mine tailings	Dr J Witne	John Ioba
17	Determination of optimum collector dosage for K92 Gold ore	Dr J Lem	Nickita Kawage
18	Reduction of talc in copper flotation from locally produced depressant (cassava starch)	Dr J Witne	Paul Nopro
19	Investigation alternative sources for pH modifier	Dr J Witne	Nyoka Seseare
20	Optimising alluvial Au recovery: Wau - Bulolo	Dr J Lem	Tracy Paisat
21	Mineralogical study for K92 copper concentrate	Dr J Witne	Kawale Walai
22	Determination of optimum grind size for K92 Au ore	Dr J Lem	Renof Puio
23	Processing of refractory gold ore	Dr J Lem	Benjamin Mangip
24	Mineralogical study of K92 copper concentrate	Francis Kisai	Brian Tauvasa

DEPARTMENT OF SURVEYING AND LAND STUDIES

Head of Department: Dr. Andrew Pai

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, and 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 programs, 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 programs, 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
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
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
Dr. Tingneyuc Sekac	Lecturer	Renewable and Clean Energy, Disaster Management, Climatology, Rural Development Planning, Urban Planning, Remote Sensing, Geospatial Data Science, GPS, and GNSS
Mrs. Rosemary Adu McVie	Lecturer	Knowledge and Innovation place/spaces - 'knowledge (community) precincts', 'innovation and cultural districts', 'science and technology parks', 'high technology districts', and 'innovation clusters'. 'Property Management, Corporate Real Estate Management, Property Valuation, and Urban and Regional Planning.
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. Glen Yali	Lecturer	Geospatial Forest Biomass (Carbon) Modelling & Assessment for REDD+ Implementation, Pre-exploration Mineral Remote Sensing Detection, Customary Land Boundary Survey, Spatial Data Science, Marine Remote Sensing Detection, Soil Fertility Mapping, GPS Vehicle Tracking & Telematics
Ms. 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	Principal 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. Adu-McVie, R., Yigitcanlar, T., Erol, I., & Xia, B. (2022). How can innovation district performance be assessed? Insights from South East Queensland, *Australia. Journal of Place Management and Development*, <https://doi.org/10.1108/JPM-D-06-2022-0053>. (SCOPUS INDEX)
2. Adu-McVie, R., Yigitcanlar, T., Xia, B., & Erol, I. (2022). Innovation district typology classification via performance framework: insights from Sydney, Melbourne, and Brisbane. *Buildings*, 12(9), 1398. <https://doi.org/10.3390/buildings12091398>. (SCOPUS INDEX).
3. Jana, S.K., Varo, J., Kaloumaira, J., Suka, M., Vela, L., Odrovakavula, S., Tuiono, I., & Sekac, T. (2022). COVID-19 national response on tourism sector: a case study of Western division of Vitilevu, Fiji Islands. *Pandemic Risk, Response, and Resilience, COVID-19 Responses in Cities Around the World*, 427-442. <https://doi.org/10.1016/B978-0-323-99277-0.00019-X>.
4. Sekac, T., Jana, S.K., & Pal, I., (2022). Spatio-temporal vegetation cover analysis to determine climate change in Papua New Guinea. *International Journal of Disaster Resilience in the Built Environment*. <https://doi.org/10.1108/IJDRBE-05-2022-0045> (SCOPUS INDEX)

5. Yatu, G. & Samanta, S. (2022). Modeling of potential renewable energy in Papua New Guinea: Biomass and solar energy. *Spatial Information Research*. <https://doi.org/10.1007/s41324-022-00436-7> (SCOPUS INDEX)

D. Book Chapter/Editor

1. Kaloumaira. J., Suka. M., Varo. J., Naikatini. M., Sekac.T and Jana. S.K (2022). Artificial Intelligence and its Importance for College of Engineering, Science, and Technology, Fiji National University During COVID-19 Pandemic, 2023 Apple academic press, Inc. CO-published with CRC Press (Taylor & Francis).
2. Pani. S.K., Muduli. K., Jana.S.K., Bathula.S., and Khan.G.L (2022). Advancements in Artificial Intelligence, Blockchain Technology, and IoT in Higher Education. Mitigating the Impact of Covid – 19. AAP Advance in Artificial Intelligence and Robotics, CRC Press, Taylor & Francis Group, Apple Academic Press. **Hard ISBN: 9781774910924**
E-Book ISBN: 9781003300458
3. Samanta, S. . (2022). Exploration of Solar Energy in Papua New Guinea through Remote Sensing and GIS. Current Advances in Geography, Environment and Earth Sciences Vol. 8, 26–48. ISBN 978-93-5547-966-2 (eBook).

E. List of Conference Proceedings/Workshop/Seminar

1. Den, E., Samanta, S. (2022), Solid Waste Dumping Site Suitability Analysis using Multi-Criteria Decision Approach in Lae City, Morobe Province, Papua New Guinea, 9th Huon Seminar, The PNG University of Technology, Lae, Morobe, 30-31st August, 2022.
2. Lal, R.R., Varo, J., & Jana, S.K. (2022). Earthquake Characteristics and Ground Motions in Christchurch, New Zealand. In: Pal, I., Kolathayar, S., Tawhidul Islam, S., Mukhopadhyay, A., Ahmed, I. (eds) Proceedings of the 2nd International Symposium on Disaster Resilience and Sustainable Development. Lecture Notes in Civil Engineering, vol 294. Springer, Singapore. https://doi.org/10.1007/978-981-19-6297-4_5. (SCOPUS INDEX).
3. Pai. A (2022) A culturally inclusive valuation model for assessing compensation in the compulsory acquisition of customary land, 9th Huon Seminar, The PNG University of Technology, Lae, Morobe, 30-31st August, 2022.
4. Pai, A (2022). Whiter customary land, dressed in the emperor's robe or disclosed in its cultural splendour?. PNG UoT Research Seminar Series 5, Rose Kekedo Foyer, Dated: 12th-April 2022.
5. Sekac, T., Jana, S., Sutherland, M., & Samanta, S (2022). Spatio-temporal analysis of Climatic Variables and Vegetation Cover to determine climate change in Papua New Guinea. PNG UoT Research Seminar Series 8, Rose Kekedo Foyer, Dated: 17th-May 2022.

F. Winning Project

1. Ongoing collaboration research Project: PIURN

Project Title:

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

Research Team Members and Affiliations

1. Dr Krishna Kumar Kotra, Lecturer, School of Biological and Chemical Sciences, FSTE, The University of the South Pacific (USP) – Principal Investigator
2. Dr Sailesh Samanta, Associate Professor, Dept. of Surveying and Lands, PNG University of Technology (PNGUNITECH) – Co-Investigator / Co-funder
3. Dr Srikanth Bathula, Senior Lecturer, Dept. of Applied Sciences, PNG University of Technology (PNGUNITECH) – Co-Investigator
4. Mr Erie Sammy, Hydrogeologist, Dept. of Water Resources, Govt. of Vanuatu – Co-Investigator / Co-funder
5. Lokesh Padhye, Senior Lecturer, Oceania Water Research Consortium (OWRC), Dept. of Civil and Environmental Engineering, University of Auckland, New Zealand – Co-Investigator / Co-funder
6. 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

2. Collaboration research Project: ACIAR Program

Project Title:

Better soil information for improving PNG's agricultural production and land use planning – Building on PNGRIS and linking to the Pacific Regional Soil Partnership Towards National Drinking Water Standards in Vanuatu: Applied Research and Capacity Building (Collaboration UNITECH – DSLS and Agriculture).

Research Team Members and Affiliations (DSLS)

1. Dr. Sailesh Samanta, Associate Professor at Department of Surveying and Land studies, PNG University of Technology. Co- Investigator.
2. Dr. Tingneyuc Sekac, Lecturer at Department of Surveying and Land studies, PNG University of Technology. Co- Investigator.

F. Undergraduate Research Projects for Year 2022

Year 4 BTSR Research Project

Student Name	ID	Supervisor	Research Topic
Andrew Kevin	18400807	Mr Heva Honeaki	Designing Road Alignment Along start from Sarawaget street to Laloki street at Cooperate Unit.
Benjamin Tiri	19400727	Mr Edward Buidal	Proposed Drill & Blast - Set Out
Isaiah Nekiau	19400830	Mr Edward Buidal	UAV Monitoring of Shoreline Erosion at DCA Beach Shoreline, Lae MP
Narol Jnr Akis	17400545	Mr Heva Honeaki	Cattlefarm, besides Sogeri Market. (Subdivision & Proposal of new staff houses, a mini mart, and a new extended market)
Brian Pedro	19400683	Mr Edward Buidal	Proposed Bridge site survey in Upper Baiune, Bulolo way District
Infiniti Roga	19400854	Mr Edward Buidal	Drilling & Blast Design

Ronald Yanewai	19400789	Mr Joseph Yapakae	Creating a Proposed Residential Subdivision on the Cricket Field behind Security Office
Gideon Kambao	14400378	Mr Clifford Jnr Mespuk	Integration of drone with RTK GPS techniques for road engineering surveys
Eleazar Kandiki	19400645	Mr Edward Buidal	Proposed Design of an Open-Cut Pit Mine
Shanaya Tivon	19400734	Mr Joseph Yapakae	Identification Survey of Portion 446 - Taraka Primary School, Lae, MP
Guna Barime	17400576	Mr Clifford Jnr Mespuk	Road Design along Independence Drive- Taraka to Bumayong Alignment
Louis Kangol	19400652	Mr Edward Buidal	Design of Tailing Storage Facility at Unitech Sports Field
Solo James	16400341	Mr Joseph Yapakae	Proposed a subdivision Design of a Commercial area/Shopping area around Unitech Sogeri
Samuel Paku	16400416	Mr Edward Buidal	Unitech Sports Field
Henry Yoke	18400869	Mr Clifford Jnr Mespuk	Road Alignment along Unitech Fence
Clayrick Steven	19400861	Mr Edward Buidal	How to carry out Subdivision Design in Occupied Area - Playing field to Habitat
Janetha Sirias	19400710	Mr Edward Buidal	Volumetric Stockpile Surveying using Drone Technology within the Aggregates and Construction Industries
Victor Nakanol	19400669	Mr Edward Buidal	PNG Unitech Campus Sewerage Outlet
Solomon Wailyo	19400752	Mr Clifford Jnr Mespuk	Oil Palm along Independence Drive
Martin Gaso	17400723	Mr Clifford Jnr Mespuk	Redesigning of existing road alignment from 2nd gate to Warangoi Drive
Nelson Patrick	19400847	Mr Edward Buidal	Portion between Oil Palm Plantation and Temporary existing Road
Samuel Abert	19400614	Mr Clifford Jnr Mespuk	Proposing a New Carpark on Vacant Area in front of Sandover Building
Wayne Warka	19400758	Mr Clifford Jnr Mespuk	New Road Alignment
Terry Yaks	19400885	Mr Edward Buidal	Road Alignment that will connect Fly Drive and Sarawaged Road beside Rainforest Habitat
Oscar Kabieng	18400636	Mr Clifford Jnr Mespuk	PNG Unitech gate to Lae Biscuit

Year 4 BGIS Research Project - 2022

SURNAME	NAME	Topic	Supervisor
Danwer	Jaiel	CONTINGENCY PLANNING AND EMERGENCY PREPAREDNESS OF WATER RESCUE- MADANG AIRPORT.	Dr. S. Samanta
Gam	Flora	FLOOD ZONE MODEL OF KINGS TIDE AND NORMAL TIDE ALONG THE COASTAL OF LAE CITY	Dr. C. Koloa
Imo	Joshua	IDENTIFYING THE REGISTERED INVESTMENT PROMOTION AUTHORITY (IPA) CERTIFICATE AGAINST UNREGISTERED FOR THE RENTAL HOMES AT EAST TARAKA.	Mr. Glen Yali
Kasau	Jude	SOIL EROSION AND RIVER ASSESSMENT ON BUMBU RIVER BESIDE LAE CHRISTIAN ACADEMIC	Dr. T. Sekac
Kaupā	Tatyanna	UTILIZING GIS & RS PRINCIPLES AND TECHNIQUES TO PROPOSE AN OPTIMAL ROAD LINK FROM SAIDOR STATION TO MADANG TOWN.	Mr. Lewi Kari
Kore	Amos	COASTAL FLOODING AND RISK ASSESSMENT OF GULF PROVINCE: USING GIS SPATIAL METHODS ON COASTLINE.	Dr. T. Sekac
Peter	Merolyn	IMPACT OF SHIFT IN RIVER COURSE TO THE SURROUNDING AREA USING REMOTE SENSING AND GIS TECHNIQUES - A CASE STUDY OF BUMBU RIVER IN MOROBE PROVINCE OF PAPUA NEW GUINEA	Dr. S. Samanta
Pondros	Clintis	GEO- SPATIAL ASSESSMENT AND MONITORING OF INDUSTRIAL WASTE AND ITS RELATED IMPACT. A CASE STUDY IN LAE CITY, PAPUA NEW GUINEA.	Dr. T. Sekac
Sakep	John Jnr.	CRIMINAL ANALYSIS USING GEO-INFORMATION APPLICATION	Mr. Glen Yali
Tagaga	Apisai	THE APPLICATIONS OF GIS AND REMOTE SENSING IN TOURISM MANAGEMENT; A CASE STUDY IN EAST NEW BRITAIN PROVINCE, PAPUA NEW GUINEA.	Mr. Glen Yali
Tolulu	Dessiederia	CHANGE DETECTION IN VOLCANIC DEPOSITS OVER TIME USING GIS AND REMOTE SENSING TECHNIQUES: CASE STUDY IN RABAU CALDERA EAST NEW BRITAIN PROVINCE	Dr. S.K. Jana
Wamil	Jacob	A GEOSPATIAL TECHNOLOGY APPROACH TO DETERMINE	Mr. W. Antonio

		HOUSEHOLD WATER DISTRIBUTION AND THEIR POSSIBLE MITIGATION FACTORS.(A CASE STUDY OF NAWAEB BLOCK).	
Wayne	Anderson	TO USE G.I.S AND REMOTE SENSING APPLICATIONS TO DETERMINE AND ASSESS FACTORS AFFECTING CELLULAR COVERAGE IN BULOLO DISTRICT.	Mr. Lewi Kari
Wesley	Jeffrey	SITE SUITABILITY ANALYSIS USING GIS AND REMOTE SENSING TECHNIQUE FOR SOLID WASTE MANAGEMENT IN LAE CITY.	Mr. W. Antonio
Yafalibubu	Dorah	COASTAL MANAGEMENT: SHORELINE DELINEATION AND CHANGE ANALYSIS ALONG THE COAST OF ALOTAU TOWN USING GIS AND REMOTE SENSING TECHNOLOGY	Dr. C. Koloa

Year 4 Property Studies Research Project - 2022

	STUDENT	TOPIC	SUPERVISOR
1	Allan Bond	Not yet submitted; advised to do so urgently	Mr. Jerry Mille
2	Berolyn Ropa	The value of properties in Port Moresby during the past 4 years, present value and the value that will be in the next 4 years	Mr. Suman Holis
3	Charlie Kisisp	Formalizing informal property rental market into real estate market in PNG. A case study of 9 mile blocks, Lae	Mr. Lapan Karigawa
4	Eddie Martin	Assessing the Factors that have Impacts on Compensation for Land Acquisition in Mining Industries: A Case of Morobe Province – Hidden Valley	Mr. James Seniela
5	Eliab Sangundi	Entitlement of traditional landowners in PNG to the full benefits of their land and trees cut down for logging activities	Mr. Paulus Mоторо
6	Elvina Peleti	Impacts of urban growth on residential property values in Lae, Morobe Province. (A case study of Kamkummu)	Dr. Andrew Pai
7	Eshrol Moreo	Improving Access to Water and Sanitation Provision in the Urban Area of Simbu Province. A Case Study of Kundiawa Town	Mr. Jerry Mille
8	Ezekiel Panosi	Real estate market cycle: Where is Port Moresby currently in the property market cycle?	Mr. Suman Holis
9	Faith Pu	Assessing the impact of informal settlements on property values of neighboring	Mr. Lapan Karigawa

		residential properties in urban Areas: A Case Study of Kamkumung, Lae City	
10	Gideon Kulanji	Is the customary land tenure system hindering economic development in Papua New Guinea?	Mr. James Seniela
11	Gregory Ita	Incorporating Customary land in Lae Urban Growth, and Sustaining it the Papua New Guinean Way	Mr. Paulus Mоторо
12	Jamishcha Allan	Urban Land Tax as a source for financing infrastructural development: A case study of Lae City	Dr. Andrew Pai
13	Jerothy Kapipi	Increase in rentals and prices of residential properties and its effects on the lives of middle-income and low-income residents in Lae City	Mr. Jerry Mille
14	Kepas Maibon	Informal real estate housing development and the impacts that exist in urban settlement within the formal sector of urban setting	Mr. Suman Holis
15	Larson Kosi	Ascertaining the sustainability of Incorporated Land Groups in Papua New Guinea: Wapicguhu and Wapigehu Incorporated Land Group in Lae City (Case Study)	Mr. Lepan Karigawa
16	Luther Aki	Redevelopment of Existing Police Accommodation to modern standards (Bumbu Police Barracks)	Mr. James Seniela
17	Lydia Dindi	The impact of Covid 19 on renting commercial properties (retail space) in Lae City	Mr. Paulus Mоторо
18	Marywens Koni	Factors affecting the value of real estate market for residential properties in Lae	Dr. Andrew Pai
19	Melrose Gilbert	Assessing impact and affordability on standalone rental residential house in Eriku, Lae City	Mr. Jerry Mille
20	Nazaleng Yawing	Analysis of intra urban traffic congestion stretched along the Eriku to Kamkumung junction road	Mr. Suman Holis
21	Paul Ariaka	Assessing the base of value: Customary Land Valuation in Rural Areas	Mr. Lepan Karigawa
22	Robert Komni	Rental Markets in two major cities of Papua New Guinea (Lae and Port Moresby) based on the increasing demand placed by population growth, urbanization and industrialization.	Mr. James Seniela
23	Victor Napilua	Land Tenure of the Kilenge, a West New Britain people	Mr. Paulus Mоторо

G. Postgraduate Students Research Project, 2022

PG Student Research Project 2022.

SL No	Name of the Student	Course	Title of the thesis	Supervisor (S)
1..	Imen Papa	Ph. D in Property Studies/1	Sustainability of Gold and Copper mining project on state and customary lands in PNG-A case study of Ok Tedi Gold and Copper mine	Dr. Jacob Babarinde Dr. Andrew Pai
2.	Lennie Dimo Kiap	Ph. D in Geomatics/3	Remote Sensing and GIS Application in Crude Oil and Ground Water Pre-Exploration Analysis and Mapping: A Case Study at Okapa- Wanikanto and Ebigo Village & Rainforest, Eastern Highlands Province, PNG	Dr. Sujoy K. Jana Dr. Sailesh Samanta Dr. Tingneyuc Sekac
3.	Nebare Poi	Ph. D in Geomatics/4	GIS and Computer Based Spatially Connected GeoInformation System for Resources Management and Rural Development Planning at Micro Level	Dr. Sujoy K. Jana Dr. Tingneyuc Sekac
4.	Clifford Mespuk Jr.	Ph. D in Geomatics/2	The application of unmanned Aerial Vehicles (UAV Drone Technology) for Remote Sensing as a tool for Rural and Urban development in PNG: A case study of Wapenamanda town planning	Dr. Sujoy K. Jana Dr. Tingneyuc Sekac
5.	Ashemah Malagh	MPhil/2	Determination of a Feasible Road Alignment from Erap to Lowai and Dinangat as an Economic Corridor (Morobe Fisika Road) Using Engineering Survey & GIS Techniques - A Case Study of Erap/Lowai/Dinangat Economic Corridor, Morobe, PNG.	Mr. Navua Vali Kapi Mr. Lewi K Kari
6.	Edwin Nidkombu	MPhil/2	Upgrading Settlement to a proper subdivision	Mr. Navua Vali Kapi Dr. Tingneyuc Sekac
7.	Resila Karipal	MPhil/2	Using GNSS & GIS Applications combined with UAV technology to create a Digital Cadastral	Mr. Navua Vali Kapi Mr. Lewi K Kari

			Database for a Peri-Urban settlement - A case study of Igam -Block, Lae City	
8.	Heva Honeaki	MPhil/2	The Importance of Identification Surveying Identify Encroachment; Case Study of Encroachment to the Boundary of PNGUOT Taraka Campus	Mr. Navua Vali Kapi Mr. Job Suat

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ENVIRONMENTAL AND RESEARCH MANAGEMENT CENTRE (ERMC)

Acting Director: Assoc. Prof. Patrick S. Michael, PhD

Introduction

The Environmental Research and Management Centre (ERMC), was established in 1993, and mandated to conduct environmental research and management programs involving faculty and students from the PNG University of Technology (PNGUoT) and sister institutions. The ERMC's mandated areas of research and development are in environmental, climatic, and natural resources sciences. In line with this, specific research focuses on environmental sustainability and sustainable use of natural resources with minimal negative impacts. Sustainable use and management of natural resources are impossible when the general environment is adversely impacted, and for that reason, most of the research focus on understanding the management of degraded environment using environment-friendly techniques and strategies. Most of them are underpinned by climate change and environmental sustainability. *The management component includes contributions to* policy and strategies, e.g., biodiversity conservation, protected area establishment, regulation and control, monitoring and risk management, biosecurity and transboundary movement, and border surveillance, which are part of the management mandates. Developing regulatory frameworks for proper administration and management towards benefit sharing, capacity building, research and development, and conservation and management underpin the overall management responsibilities of ERMC.

Research and Development Despite the existence of ERMC for the last 29 years, only a little has been achieved in environmental research, and the output (publication, student training, fund generation, and contribution to policy development) has not been impactful. Part of the problems has been the need for more establishment of scientific officers, insufficient laboratory space, and lack of state-of-the-art scientific equipment. This includes standardizing a handful of equipment already available in the labs that have never been installed. Progress has been made to ensure missing parts of these equipment are identified and standardized. The dire research and developmental needs of ERMC have led to plans to recruit research students from within the University directly, e.g., top final students, and externally from the community or industry to do research from ERMC.

To address some of these problems, ERMC has formed a working group of staff from academic departments with interests in environmental research and management, e.g., the Department of Civil Engineering, Mining, Agriculture, and Applied Sciences, to name a few. The roles of this working group are to develop a funding proposal, propose projects, supervise project students, respond to calls for proposals, and get involved in the research and development activities of ERMC. The group members take up ERMC-proposed projects, supervise students from their departments, and co-supervise with other members in the group.

Current Research and Projects

Significant progress has been made over the last twelve months, and more projects at higher levels are coming up:

- (i) **Certificate II in Project Planning and Management** – The syllabus of this course has been written in consultation with Global Green Growth Institute (GGGI) and Climate Change and Development Authority (CCDA). The first thirty-five students have been

- sponsored by GGGI and the course is taught by staff of ERMIC, Agriculture and Civil Engineering Departments online.
- (ii) **The PNGRIS2** – The PNG Resource Information System 2 (soil) with ACIAR has started and ERMIC, Agriculture and Surveying and Lands Studies Departments are involved. The Director of ERMIC is the team leader of the PNGUoT team.
 - (iii) **Project examining climate impact in PNG with Climate and Security Policy Centre at the Australian Strategic Policy Institute (Climate and Security Policy Centre, Australian Strategic Policy Institute (ASPI.))** In partnership with ASPI, a concept paper was written for further advancement.
 - (iv) **Climate change, sustainable energy, and nuclear safety** – This is an EU project at its very early stage. A Table of Partners Form was filled and sent with the CV of the Director.
 - (v) **Irrigation and mechanisation of sweet potato production in PNG – opportunities and limitations.** ERMIC and NARI have partnered with the University of Queensland to develop the concept notes, and submitted to ACIAR for consideration.
 - (vi) **Improved sweet potato production management project** – This project has advanced and further discussion with leaders from ACIAR and CSIRO are ongoing.
 - (vii) **New Guinea Islands Cocoa Project** – This is an ACIAR project where the first component has been completed, but ERMIC will be involved in several studies in the second component. Initial discussions have been held, and more direct involvement will occur as the second component of the project kick start in 2024. One Master of Philosophy student is in the final year of student on strategic management of aging cocoa plantations in Rabaul.
 - (viii) **Effects of climate change on food production systems in the central highlands of Papua New Guinea: An investigation into the causes of change in production of staple food crops and the establishment of opportune crops across different agro-ecological zones.** Video <https://www.pacificsos.org/climate-stories/118b74dc-f8a3-4cac-8328-a3732b7907f8>
 - (ix) **Development of stereo-intelligent agricultural ecosystem monitoring system and its application with Yantai Institute of Coastal Research, Chinese Academy of Science, China.** This project has reached the advanced stages and the Chinese team are seeking funding from their end.
 - (x) **A targeted and structured genetic and agronomic traits improvement approach for winged bean to contribute to food and nutritional security in PNG under climate change.** The full project proposal has been submitted to PNG PRAP and CCDA and under consideration for funding.
 - (xi) **Capacity building in the higher education sector (ERASMUS-EDU-2024-CBE) – Proposal submitted with list of equipment with costs for environmental research.**
 - (xii) **The effects of climate change on the altitudinal shift of lowland crops into the highlands of Papua New Guinea: An investigation into the changes in agroclimatic conditions causing the altitudinal growth of lowland crops along the Okuk Highway – Pacific Development Research Grants, New Zealand.**
 - (xiii) **Turtle conservation project with Wafi Golfu** – Discussion has advanced and arrangement for site visit in place, including training for students.

Postgraduate Projects

A number of postgraduate projects supervised out of the Department of Agriculture and ERMIC, most of which are in the final stages and others ongoing are listed in Table 1.

Table 1. The total number of PG students studying under the supervision of the Director.

Names of students	Titles of the projects under taken
Topas Peter (MSc)	The assessments of the effects on soil chemistry and responses of sweet potato in biomass production to organic matter in composted mounds in Papua New Guinea.
Luke Jeffery (MSc)	Agricultural use of treated human waste water to minimise environmental impact under humid lowland tropical agroclimatic conditions.
Levy Kasa (MSc)	Agricultural use of treated piggery sludge to minimise environmental impact under humid lowland tropical agroclimatic conditions.
Elisha Napu (MPhil)	Comparative assessment of the effects of Coffee and Oil Palm based agroecosystems on soil health under tropical agroclimatic conditions in PNG.
Shen Sui (MPhil)	Organic matter amendment of swidden fields to maximize the yield of sweet potato along an altitudinal gradient in Papua New Guinea
Timothy Ngembil (MSc)	Effects of Climate Change on Food Security: An Investigation into Temperature, Rainfall, and Topographical Paradigm in three Highlands Provinces of Papua New Guinea
Shirelyna Aipa (MPhil)	Evaluating the roles of organic matter application on soil fertility under cocoa and crop productivity under humid lowland agroclimatic conditions in Papua New Guinea.

Undergraduate Projects

The undergraduate students from the Department of Agriculture who have undertaken researches related with ERMIC are listed in Table 2.

Table 2. The total number of PG students studying under the supervision of the Director.

Names of students	Titles of the projects under taken
Bill Wena	Time course of effects of <i>Phragmites australis</i> on selected soil properties.
Arnold Kopeap	Time-course of effects of <i>Chromolaena odorata</i> invasion on selected soil properties.
Delisha Moka-Singakou	Micropropagation of elite balsa (<i>Orchroma pyramidale</i>) planting materials using seeds <i>in vitro</i> .

Publications

(i) Journals

Michael, P. S. (2023). Sustainable use of acid soils in the humid tropic. *Ecofeminism and Climate Change*, 4, 39 – 50.

Peter T. M. and Michael, P. S. (2023). Sweet potato is a strategic root crop for food and nutritional security under climate change: A synthesis of the past and future production research directions. *SAINS-TANAH-Journal of Soil Science and Agroclimatology*, 20, 51 – 65.

(ii) Conferences and Seminars

- Kasa, L. and Michael, P. S. (2023). Agricultural use of treated piggery sludge to minimise environmental impact under humid lowland tropical agroclimatic conditions. Postgraduate Research Seminar, 2nd – 3rd October, 2023, PNGUoT, Lae, PNG.
- Michael, P. S., Reid, R. and Fitzpatrick, R. (2023). The roots of common terrestrial and aquatic plants can mitigate the stresses of acid sulfate soils. The 9th International Acid Sulfate Soils Conference. 26th – 31st March, 2023, Hotel Grand Chancellor, Adelaide, South Australia, Australia.
- Peter, T. and Michael, P. S. (2023a). Use of organic matter in composted sweet potato mounds is a sustainable soil health and fertility management practice under climate change. PNG 2023 Update Conference – Resilient and Diverse Development. 16th – 19th August, 2023, UPNG, PNG.
- Peter, T. and Michael, P. S. (2023b). The importance of organic matter in composted sweet potato mounds in the highlands of Papua New Guinea. Postgraduate Research Seminar, 2nd – 3rd October, 2023, PNGUoT, Lae, PNG.
- Sui, S., Novoty, V. and Michael, P. S. (2023). Maximising sweet potato yield in swidden gardens along an altitudinal gradient in Papua New Guinea. Postgraduate Research Seminar, 2nd – 3rd October, 2023, PNGUoT, Lae, PNG.

UNITECH BIOTECHNOLOGY CENTRE (UBC)

Acting Director: Professor Tom Okpul

Introduction

The UNITECH Biotechnology Centre (UBC) was established by the Council of the Papua New Guinea (PNG) University of Technology (PNGUT) in 1997 in recognition of the immense role that modern biotechnology could play in contributing to national development. Although it operates under the auspice of the School of Agriculture, it reports to the Office of the Deputy Vice Chancellor.

Biotechnology is a powerful enabling technology, with applications that have the potential to revolutionize many industry sectors (including agriculture, forestry, fishing, pharmaceuticals and health, chemicals, textiles, food processing, environmental industries, energy, and mining). Appropriately, the current vision for the UBC that encompasses the nation's current developmental issues in the face of the changing climate is "to be leaders in the use of agricultural biotechnology to improve livelihoods". Hence, it strives to accomplish high quality research, training and development outcomes with an entrepreneurial characteristic that emphasizes the application of agricultural biotechnology in addressing issues associated with food and livestock production, forestry, and the environment in PNG.

Areas of Research The following research focus areas have been identified for staff and student research:

- Evaluation of promising rice varieties for Papua New Guinea
- Crop improvement and adaptation to stress environments caused by climate change
- Development of a maize seed system for PNG
- Gene discovery in PNG wild rice: seed and grain characteristics
- Genetic transformations of taro and rice
- Development of fungal inoculum for artificial agar wood production in PNG
- Improving potato seed scheme.

RESEARCH INTERESTS OF ACADEMIC STAFF MEMBERS

No	Academic staff	Areas of research interest
1	Maino, Macquin	Plant Pathology, Nematology, Plant Viruses, Biocontrol Agents
2	Okpul, Tom	Plant Breeding and Genetics, Tissue Culture, Biotechnology
3	Dotaona, Ronnie	Agricultural Entomology, Integrated Pest Management, Biocontrol Agents

4	Ban, Gwendolyn	Plant Pathology, Biocontrol Agents
5	Poloma, Spencer	Crop Physiology, Agronomy
6	Inapo, Dollah (FPDA Staff)	Potato Tissue Culture

Research Reports/Workshops

Okpul, T., Mulagen, E. and Kamen, T. (2023) Standardization of *in vitro* potato microtuber production to complement the potato seed scheme of Papua New Guinea. Annual Report. Unitech Biotechnology Centre, Agriculture Department, PNG University of Technology, Lae, Papua New Guinea.

Workshops/Conferences/Symposiums

Pitiki, M., Maino, M. K., Buyoyu, P. and Okpul, T. (2022) Isolation, identification, evaluation of prevalent fungal endophytes for Garwood induction Eaglewood tree of Papua New Guinea. A paper presented at the Ninth Huon Seminar, held on 30-31 August 2022, Rose Kekedo Lecture Theatre, PNG University of Technology, Lae, Papua New Guinea.

Poiya, C., Caleb, C., Manus, R., Kabiwaga, M., Buyoyu, P., Bugajim, C., Paofa, J. and Okpul, T. (2022) Wild relatives of the rice plants in Papua New Guinea: Their distribution, conservation and use. A paper presented at the Ninth Huon Seminar, held on 30-31 August 2022, Rose Kekedo Lecture Theatre, PNG University of Technology, Lae, Papua New Guinea.

Wera, B., Tuma, G., Komolong, B., Deros, M., Paofa, J., Waki, J., Uberawa, L., Walters, C., Pilon, J., Pakatul, J. and Okpul, T. (2022). Selection and Evaluation of Core Samples of sweet potato for Participatory Variety Selection in the lowlands and highlands of Papua New Guinea. A paper presented at the Ninth Huon Seminar, held on 30-31 August 2022, Rose Kekedo Lecture Theatre, PNG University of Technology, Lae, Papua New Guinea.

Okpul, T. and Maino, M. (2023). Potato Research & Development Activities at Agriculture Department, PNG University of Technology. Potato Research & Development Workshop [16-17th May], Mt. Hagen, Papua New Guinea.

Internal Research Collaborations

Ongoing: Poiya, C. & Okpul, T. (2023). The Postgraduate Studies, Research & Innovations Committee of the PNG University of Technology granted K10,774.50 for the student research project entitled, “Assessing the extent of genetic diversity among the wild relatives of rice maintained at the Unitech Biotechnology Centre using universal rice SSR markers.”

Ongoing: Okpul, T. (2023-2024). Award of Unitech Research Funds of K22,127.40, for acquisition of the “Nano Drop Spectrophotometer” for DNA research at the Unitech Biotechnology Centre.

External research collaboration

ACIAR Small Research Activity (ACIAR CROP-2023-194): “Enhancing drought tolerance and food security in Papua New Guinea: the potential of new taro germplasm” Investigators: Campbell, B., Okpul, T., Smith, M. and Godwin, I. Partners: University of Queensland and

PNG University of Technology. Grant: AUD 500,000. Period: 15th November 2023 to 31st January 2025.

Weekly Research Seminar Abstracts

	Title	Author(s)	Page
1	Community Strategies, Safety and Urban Markets: Stories from Market Vendors in Urban Settlement Communities in Lae Papua New Guinea	Mrs. Wilma Langa	
2	Evaluation of the Learning Process of Village Community Educators (VCEs) in Chicken Feed Making in Jiwaka Province	Mr. William Nano	
3	Digital Literacy in India: Initiatives, Status and Challenges	Professor Geetha Prakasam	
4	Bifurcation analysis of an SIR epidemic model through differential equation approach	Professor Sumit Kumar Banerjee	
5	PNG Voices: Listening to Australia's Closest Neighbor, Papua New Guinean perspectives on Australia and the world	Dr Londari Yamarak	
6	Hydropower potential site selection and Electrification Supply-Demand Analysis Using Geospatial Technology - A Case Study in the Yabem/Mape Rural of Finschhafen District, Papua New Guinea	Dr. Tingneyuc Sekac	
7	How to get patent protection over your technology	Mr. Wilfred Amai	
8	Experimental Investigation of Machining NIMONIC 80 Alloy by WEDM Process: Exploration of Sustainable Machining Opportunities	Dr. Kamalakanta Muduli	
9	The use of Blockchain based self-sovereign digital Identity (SSID) for patient registry in Papua New Guinea.	Ms. Samania NED	
10	A Methodology for Identifying Typologies to Improve Innovation District Outcomes- The Case of South East Queensland	Dr. Rosemary McVie	
11	Impact of COVID-19 on incomes, Livelihoods, and Food Security: Case in Point of Port Moresby and Lae	Dr. Londari Yamarak	
12	The roots of common terrestrial and aquatic plants can mitigate the stresses of acid sulfate soils under varying moisture regimes	Dr. Patrick Michael	
13	Do the Indigenous Peoples of PNG Benefit from Mining?	Dr. Londari Yamarak	
14	Understanding the Digital Ecosystem in India: Lessons for PNG	Professor Geetha Prakasam	
15	Understanding the Role of Payment Gateways in the Digital Marketing Space	Professor Geetha Prakasam	
16	Driving Innovation in the Classroom	Professor Robin Garret Tuchscherer	

COMMUNITY STRATEGIES, SAFETY AND URBAN MARKET: STORIES FROM MARKET VENDORS IN URBAN SETTLEMENT COMMUNITIES IN LAE PAPUA NEW GUINEA

¹Wilma Langa (PhD Candidate)

¹Queensland University of Technology

²Professor Verena Thomas (Principal Supervisor)

²Edith Cowan University

³Associate Professor Jackie Kauli (Associate Supervisor)

¹Queensland University of Technology

Professor Laurie Buys (Associate Supervisor)

³Australian Catholic University

Abstract

Urban settlements constitute an essential part of the urban landscapes in developing countries as they play a vital role in urban economies. Much of the literature has focused on the physical and social deficiencies of urban settlements. Increasingly however, projects investigate local contexts from the perspective of residents and how they innovatively create their own place and space in the face of urban challenges. This research project investigates understandings of urban settlements in Papua New Guinea, which are homes to an estimate of 50 percent of the urban population. Some are considered to be residing illegally, and spaces are frequently named in conjunction with deficit model. However, it can be argued that such negative perceptions have limited our understanding of urban economies as a positive contribution from urban settlements to development processes. This research aims to capture and share the perspectives of urban settlement residents and market vendors on how they utilise and interact within an urban market space. Drawing on focus group discussions, interviews and creative workshops foregrounding photovoice research method and storytelling with settlement residents, market vendors and relevant stakeholders at Awagasi market Kamkumug settlement in Lae city in Papua New Guinea, the research applies the lens of Melanesian values to obtain a better sense of the situations and internal support mechanisms. The research demonstrates how local values contribute to providing safety for residents and market vendors in an urban market environment.

Key words: Urban settlement, deficit model, urban market, community strategies, safety, market vendors

EVALUATION OF THE LEARNING PROCESS OF VILLAGE COMMUNITY EDUCATORS (VCEs) IN CHICKEN FEED MAKING IN JIWAKA PROVINCE

William Nano¹, William Kerua², Veronica G. Bue³

Agriculture Department PNG University Technology, PMB. Lae PNG;

Pamphilon Barbara⁴ Mikhailovich Katzi⁵

Australian Centre for International Agricultural Research Canberra, Australia,

Freda Watam⁵

Baptist Union of Papua New Guinea, Mt. Hagen

Lillian Boesof⁶

Voice for Change (VfC) Minj, Jiwaka Province Papua New Guinea

Contacting author: william.nano@pnguot.ac.pg

Abstract

The outcome and impact of agricultural trainings in Papua New Guinea over the last few decades have been questioned by the governments, non-government organizations, donors' organizations and public (tax payers). The challenge above instigates this study in responsible to possible aid to improving agricultural trainings and their outcomes and impacts in Papua New Guinea. A peer learning method of training was tested out on chicken feed making (CFM) training using locally available feed ingredients to selected Village Community Educators (VCEs). The training tries to measure how the VCEs knowledge uptake and application of the knowledge and skills acquired during the training and the possible outcome and impact of an agricultural training and also to evaluate and measure the impact of the learning process of VCEs in Jiwaka Province, Papua New Guinea. The effectiveness of the VCEs in the uptake and application of the knowledge and skills acquired during training was evaluated using KASA framework, which is Knowledge, Awareness, Skills and Attitudes. Bennett's Hierarchy Model of extension training evaluation was used to measure the uptake of knowledge by the VCEs, while Adult learning through ORID discussion groups in extension was used to facilitate the training. The results of this training indicated that the comprehension of the VCEs on the knowledge uptake and application of the knowledge during the training was very high which suggested that peer learning of farmers using adult learning method is an import training method that can be used in transferring knowledge and thus, increases their effectiveness in the uptake and application of the knowledge and skills during the CFM training. It is anticipated that when the VCEs can effectively retained the knowledge during training and apply effectively knowledge gain then in the long run the outcome and impact of agricultural trainings can be realized. However, increases in the correct responses did not occur across all of the knowledge statements. The present study simply identified the level of evidence of impact collected in evaluative outcome study.

Key words: VCEs, ORID, CFM, peer learning, Bennett's Hierarchy, knowledge, skills, KASA

Digital Literacy in India: Status and Challenges

By: Geetha Rani Prakasam¹

Visiting Professor, Department of Business Studies.

Abstract

With the increasingly digitalised world in the fourth revolution, to live a full life in the modern world, one must be digitally literate. Digital knowledge and literacy inevitably play a vital role in every sphere of life. Given these, the meaning and definition of the term ‘digital literacy’ remains stubbornly nebulous. In this light, we try to understand some of the select definitions and approaches to comprehend the term digital literacy and its contribution to economic growth. With this backdrop, we move ahead in understanding the major initiatives of the Government of India since the launch of ‘Digital India’ in 2015. The presentation proposes to cover the following aspects, viz., Internet Growth: India’s Digital Journey; Mobile growth & internet penetration: The path towards digital India; Digital India Initiatives: (i) National Digital Literacy Mission (NDLM) and (ii) Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA). Further, it will attempt to understand the status of digital literacy levels in India, followed by the challenges of addressing digital literacy divide. With the finding of the gap across regions and gender in acquiring the digital literacy skills, the presentation will conclude with some of the ways to address these challenges.

BIFURCATION ANALYSIS OF AN SIR EPIDEMIC MODEL THROUGH DIFFERENTIAL EQUATION APPROACH

Prof. Sumit Kumar Banerjee

Department of Mathematics & Statistics,

Abstract

The well-known SIR models have been around for many years. Under some suitable assumptions, the models provide information about when the epidemic occurs and when it doesn’t. The models can be restructured by incorporating birth & death rate, portion of population vaccinated, carrying capacity of population, saturation rate, growth rate, time delay and immunization to analyze the outcome mathematically. In this regard several SIR models including birth, death and immunization as well as bifurcation analysis associated with disease free and epidemic equilibrium have been studied. Findings of this research are with some suitable assumptions how these incorporated parameters as well as bifurcation analysis can play an important role in determining epidemic status in the population and help the society to take the precaution measures accordingly.

Keywords: SIR models, Epidemic, Carrying capacity, Immunization, Equilibrium, Bifurcation.

PNG Voices: Listening to Australia's Closest Neighbour, Papua New Guinean perspectives on Australia and the world

Dr. Londari Yamarak
Department of Business Studies

Excerpts from: <https://www.whitlam.org/publications/pngvoices>

The recent security agreement between the Solomon Islands and China has raised concerns about Australia's relationships with Pacific Island nations and the changing strategic environment within the region. It also highlights the need for deeper engagement and the importance of listening more and better to the diverse perspectives, priorities, and aspirations of Pacific Island communities.

This new research from the Whitlam Institute captures a wide cross-section of perspectives and experiences from ordinary PNG citizens, including those living in a remote part of PNG, voices that are rarely heard in more official forums.

Research co-ordinator Dr Hannah Sarvasy, Western Sydney University, notes the timely examination of Australia and PNG's relationship. "PNG is Australia's closest neighbour, and the single largest recipient of Australian development assistance. The two nations share a prehistory, and more recently, a colonial history."

But despite this apparent closeness, few Australians today can say that they know how people in PNG feel about their own communities or about Australia.

Overall, respondents were largely positive about Australia, widely praising Australia's role in supporting PNG financially. However, concerns about Australia's perceived lack of respect for PNG sovereignty and cultural norms, were also expressed. Significantly, China was perceived as the country investing the most in infrastructure in PNG.

The report's findings are particularly significant for policy makers and officials working in the region given Australia's historical and cultural ties to PNG and the Australian government's commitment to deepening engagement through the Pacific Step-up initiative.

"While we can take heart from the report's findings that respondents were largely positive about Australia, it would be both foolish and a disservice to these neighbours of ours if we were not to properly listen to what they have to say and to deliberate on what it might mean for our official relationship, the aid we offer, the attitudes we bring to the table and the depth of our understanding," said Eric Sidoti, interim director of the Whitlam Institute.

Hydropower Potential Site Selection and Electrification Supply-Demand Analysis Using Geospatial Technology - A Case Study in the Yabem/Mape Rural of Finschhafen District, Papua New Guinea

Tingneyuc Sekac¹, Sujoy Kumar Jana², Nosare Maika², Sammy Aia³

^{1,2,3}The Papua New Guinea University of Technology

Abstract

The pathways to increase rural electrification supply through renewable energy, off-grid, grid, and hybrid systems still need assessment and evaluation since most rural places, especially in developing countries, are isolated and located in rugged terrain zones with less availability of essential services. Some rural areas or communities in Papua New Guinea (PNG) are challenging to reach and interact with regarding infrastructure development. These are due to a lack of road infrastructure, unsolved customary land issues, the community's minimal willingness to support and participate in infrastructure development, low income, etc. Such challenging factors need comparative evaluation and monitoring for rural electrification development following the stated PNG national pillars to increase electrification in rural places. Data acquisition and planning is one approach if it means expanding rural electrification. The current study approach aims to identify and develop pathways that can bridge and enhance rural electrification development. The holistic approach to assessment was carried out. The researchers use geospatial technology coupled with electric power technology to evaluate future hydropower potential, assess power supply demand, and assess the economic situation of each household in the Mape catchment region of the Finschhafen district. The researchers used Soil, Water Assessment Tool (SWAT) coupling with QGIS involved in flow discharge estimation, and Shuttle RADAR Topographic Mission (SRTM) Digital Elevation Model (DEM) for potential head and site identification within the study region. Researchers conducted a field survey on the sites, verifying all possible river networks. Environmental factors and community responses were further investigated and analyzed to select the most potential sites for hydropower development. The researchers conducted household socio-economic surveys to assess power supply and demand, including sustainability factors. The household economic situation is evaluated, and the results are presented for decision-making. Twenty-nine (29) most feasible potential hydropower sites were selected. The amount of hydropower at a few places was found to be reasonable for supply to nearby communities in line with their respective energy demand and level of economic viability.

Keywords: Rural Electrification, Hydro Power, Geospatial, SWAT Model, Energy Demand, Discharge.

How to get patent protection over your technology

Wilfred Amai
www.skylinkinvent.com

Abstract

This presentation will give an overview of what Intellectual Property (IP) Rights are and how IP is used in Technology Transfer. Several Papua New Guinea implantations of Patent protection will be used as examples to understand the rationale behind the strategies used especially in light of certain limitations of IP protection in Papua New Guinea. References to how the USPTO (US Patent and Trademark Office) as well as IP Australia (Australian Intellectual Property office) will be made reference to in examples of circumstances where the presenter had to use these overseas IP offices to achieve certain strategic outcomes.

Keywords: Intellectual Property (IP) rights, technology transfer, patent protection, IP protection, innovation

Experimental Investigation of Machining NIMONIC 80 Alloy by WEDM Process: Exploration of Sustainable Machining Opportunities

By Dr Kamalakanta Muduli

Department of Mechanical Engineering.

Abstract

The term "sustainable manufacturing" encompasses both "sustainable" and "eco-friendly" product manufacturing, and it is used to describe the creation of goods that are safe, efficient with energy and resources, and ecologically friendly. Because of the rising need for high surface polish and sophisticated form geometries, conventional machining techniques are being phased out in favour of non-traditional machining processes. The Wire Electro Discharge Machining (WEDM) technique is a non-traditional machining process that is gaining importance, and hence researchers are interested in investigating the sustainable machining opportunities using this technique. When it comes to WEDM practises, surface roughness, Material Removal Rate (MRR), and kerf width are all extremely important factors. This study provides a summary of the Taguchi optimisation process, as well as the utility method and confirmation test that were used to optimise WEDM cutting parameters for NIMONIC 80 ALLOY. The goal of optimisation is to reduce the width of the kerf while simultaneously increasing MRR and surface quality. The 0.25mm brass wire is used as the tool. The L9 orthogonal array developed by Taguchi is utilised in this study. An analysis was performed to determine the optimal values for pulse-on, pulse-off, wire feed, and feed wire tension, as well as MRR, surface roughness, and Kerf width. Because there are multiple output parameters, it is difficult to select a single optimal setting for the input parameter. In order to make things clearer, a method known as Taguchi Grey Relational Analysis is utilised as the multi-objective optimisation strategy.

Keywords: NIMONIC 80 Alloy, WEDM, Taguchi-PSI, GRA

The use of Blockchain based self sovereign digital Identity (SSID) for patient registry in Papua New Guinea

Samania Ned (MPHIL Candidate)

Department of Mathematics & Computer Science

Dr. Ashish Kr. Luhach (Supervisor)

Department of Electrical and Communication Engineering.

Abstract

Self Sovereign identity (SSI) is one of the identity models used in Digital Identity to enhance Privacy and security of user data. The field of digital Identity is a multidisciplinary field of research and development. This research is focused on digital identity technology use-case in the health sector where privacy of patient data is at the core of any e-health systems. And with the increased risk of data breach, this research takes a closer look at security in the storage of Digital Identity using a blockchain based SSI model. The SSI model based on blockchain looks at decentralising digital identity management systems. Digital identity is a new area of discovery in Papua New Guinea with no publicity of research available. Despite it being implemented in the financial sector, there is no research or development in its use in health. This research draws from the gap in research in Papua New Guinea and from the research gap of Digital Identity in other developed and developing countries. The research explores blockchain technologies used in the SSI model of digital identity that is fitting for data security and privacy in its use in Healthcare. With the concerns of data privacy, cost of infrastructure and adoption of new technology in Papua New Guinea, this research explores a less costly blockchain technology, fingerprint and pin to secure data and the use of SMS notification for patient update. The methodology used in this research is an in depth literature review in the field of Digital Identity, Technical Discovery Survey of the National Health Information System on how this system could feed accurate data in less time, and the accuracy of data provided through the use of blockchain based SSI. The research draws a conclusion on how the use of blockchain based SSI model of Digital Identity in a patient registry system can provide accurate population data to better plan, monitor and deliver healthcare services transparently.

Key Words: Digital Identity, Self Sovereign Identity, Blockchain, ehealth, fingerprint biometrics, SMS.

A Methodology for Identifying Typologies to Improve Innovation District Outcomes- The Case of South East Queensland

Rosemary S. Adu Mvie

Email: rosemary.adu@pnuot.ac.pg

Department of Surveying & Land Studies

Abstract.

The concept of innovation district is a new urban land use type that has globally taken prominence in many cities' urban policies to develop innovation districts for the economic, social, and spatial benefits. However, despite innovation districts being the 21st century global phenomena embraced by many cities to revitalise their urban areas and improve their competencies in the global knowledge economy, not all of them were successful. Furthermore, they are high-cost and high risk investments which need regular monitoring and assessment of their performance through a classification framework. The current literature confirms that there is a limited classification framework available. This PhD study aims to expand our understanding on systematic classification of innovation districts, through development of a multidimensional classification framework. To address the above mentioned gap, the research developed a multidimensional innovation district classification framework which comprised hard and soft factors. The framework was then employed on thirty existing innovation districts in South East Queensland using following research methods: A Delphi study that engaged 32 international experts to validate the classification framework, and a pilot and case study to test and operationalise the framework. The analytical methods employed include quantitative, qualitative, and descriptive analysis. The findings of this research are fourfold. First, this doctorate study develops and validates a multidimensional innovation district classification framework. Second, the thirty innovation districts from South East Queensland are classed under three performance levels—i.e. desired, acceptable, unsavoury—concerning their form, feature, and function characteristics. Third, innovation districts are ranked according to their performance and fourth, ten innovation district typologies are identified. These results theoretically contribute to the body of knowledge by filling the research gap through a holistic approach for assessing innovation districts' multifaceted forms, features, functions, and context. Practically, the results disclose that the multidimensional innovation district classification framework is a tool for informing planners, developers, and managers on innovation district performances (i.e. to compare the innovation districts' performances and identify areas that need intervention). It also has the capability to guide policymakers on their policy and investment decisions regarding the most suitable innovation district types and characteristics to consider.

The above mentioned framework can be adopted and amended to local context by authorities as a practical tool and guide for stakeholder's concern regarding the planning, development and management of innovation districts.

Keywords: Classification Framework, Innovation District Classification, Performance Analysis Typology Framework, Typology Matrix

THE ECONOMIC IMPACT OF MINING ON INDIGENOUS COMMUNITIES AT OK TEDI AND PORGERA, PAPUA NEW GUINEA

Londary Yamarak

Department of Business Studies,

Abstract:

Mining in PNG has had a controversial past with many negative social, political, environmental and health impacts. Our approach is to acknowledge these problems and move on to focus directly on some measurable effects on the economic well being of the Indigenous population. This was achieved by using a sustainable livelihood framework with mining-poverty-reduction linkages to assess how livelihoods have been impacted by mining operations. We applied four mining-poverty-reduction linkages: inside capital of households (measured by televisions, VCR/ DVD players, refrigerators, freezers, and cars), human capital (measured by years of schooling), security (measured by food eaten in the last 30 days, square meals in 12 months, and income satisfaction), and empowerment (measured by village participation to help and information volunteering). In addition, we measured overall poverty reduction, the fifth component of the mining-poverty-reduction model, according to position on the rich-pool ladder. The question reads: “please imagine a 9-step ladder where the bottom, the first step, stands for the poorest people, and on the highest step, the ninth, stands the rich. On which step are you today?” It is called the Economic Ladder Question. It does not presume that income is the relevant variable for defining who is poor and who is not but leaves that up to the respondent. At the same time, by using the words poor and rich, the question focuses on a broader concept of economic welfare than income. It is a subjective living standard measure. In our analysis we compared four types of communities: those in the Ok Tedi region close to mining operations, those in the Ok Tedi region distant from mining, those in the Porgera region close to mining operations and those in the Porgera region distant from mining. A well-known confounding problem of this type of analysis is that there are no observations prior to the arrival of mining, so how do we measure the impact of mining? If you simply compared current data from mining households and non-mining households, it would not be possible to claim that the differences between them are entirely due to mining. The approach is to use a technique called matching, whereby similar households from different regions are first paired with each other. Then, the differences observed can be diagnosed effectively. We briefly introduce the method of propensity score matching and emphasise the way in which it overcomes the biases of ordinary least squares (OLS) regression and dummy variable regression. The results show that residents of mining villages have received some small improvements in their wellbeing (more at Ok Tedi than Porgera). Two important questions flow from this work: Is the small improvement worth the disruption that has taken place? Are there ways to improve things so that new mining ventures can deliver more substantial improvements in wellbeing for Indigenous people, perhaps with less disruption?

Keywords: Livelihoods, Mining, Poverty, Indigenous, Papua New Guinea

The roots of common terrestrial and aquatic plants can mitigate the stresses of acid sulfate soils under varying moisture regimes

Patrick S. Michael^{1, 2, 3, 4*}, Rob J. Reid¹, Rob W. Fitzpatrick²

School of Earth and Environmental Sciences,¹ and Acid Sulfate Soils Centre², The University of Adelaide, South Australia, Australia, Department of Agriculture³, and Environmental Research and Management Centre⁴, The PNG University of Technology, Papua New Guinea

patrick.michael@pnguot.ac.pg, <https://orcid.org/0000-0003-4068-7276>

Abstract

Understanding the long-term roles of live plant roots in mitigating acid sulfate soil stresses is still being investigated. Three studies lasting twelve months were conducted using *Melaleuca armillaris* and *Phragmites australis*. In the first, alkaline sandy loam soil was mixed into sulfuric soil and increased the pH to 6.7, and *Melaleuca* seedlings were planted. In the second and third studies, *M. armillaris* and *P. australis* were planted in sulfuric and sulfidic soils and maintained at 75% water-holding capacity and flooded soil conditions. All the studies were set using 300 mm stormwater tubes with sealed bottom ends. The treatments were replicated four times, set up under a glasshouse in a completely randomized design, and harvested after 12 months. pH and root biomass were measured from the surface, middle, and deep profiles. The results showed the neutralization obtained by mixing alkaline sandy loam soil into sulfuric soil was stable and deteriorated with plants. The root distribution was even compared to the sulfuric soil. Planting *Melaleuca* in aerobic sulfuric soil increased pH by 1.0 units, whereas in the sulfidic soil lowered it to <4 units. The root biomass within the surface soil was 2 g and in the deep was variable. Planting *Phragmites* increased the pH of the soils, and roots accumulated in the deep. The pH of the sulfidic soil was 5 – 6 units under *Phragmites*, and there were more roots at the deep. The results showed common terrestrial and aquatic plants maintain a characteristic distribution of roots to mitigate the stresses of acid sulfate soils.

* Correspondence: patrick.michael@pnguot.ac.pg

Understanding the Digital Ecosystem in India

Professor Geetha Rani Prakasam

Visiting Professor, Department of Business Studies

Abstract

India's digital journey is one of exuberance. The country's application of digital journey started in 2009 with Aadhaar, which is the world's largest biometric digital identity system. It provides the foundation on which India's digital ecosystem is being built. A range of digital goods, infrastructure, platforms and services are available within this ecosystem. In this backdrop, this research makes an effort to understand the foundations of this fastgrowing domain in India. With this backdrop, this presentation will cover the following aspects, viz., Digital India Journey; Digital Ecosystem: Digital Public Infrastructure and Platforms; Growth Story of Digital Public Infrastructure; UPI: The Game Changer – Universal coverage of the payment gateways; BharatNet Challenges and Directions. This knowledge and inferences will be useful and relevant to many developing countries including Papua New Guinea.

Driving Innovation in the Classroom

Professor Robin Garret Tuchscherer

Summary

The purpose of this presentation is to discuss, from the perspective of a U.S University Professor, five factors which foster technological innovation: 1) financial support 2) leadership 3) training 4) community support and 5) stakeholder involvement.

Allocation of Research and Conference Funds

No	Date	Payee Details	Supervisor	Research/Conference	Approved in Meeting No.	Approved Amount
		Mr. James J. Damwatt (MSc2)/	Dr. R Subramanyam	Research	11	15,015.50
		Mr. Vagi Vagi (MPhil2)/	Dr. Tingneyuc Sekac	Research	11	5,909.00
		Miss Stephanie Anis (MPhil2)/	Dr. David Timi	Research	11	10,000.00
		Dr. Londari Yamarak & Dr. Vidinamo	Staff	Research	11	40,000.00
		Miss Ruthia Kisi (MPhil2)/	Dr. Sivakumar Balakrishnan	Research	12	7,918.51
		Josiah O. Ayodele (MSc2)/	Dr. Veronica Bue	Research	Special meeting #2	8,443.70
		Esther O. Eze (MSc2)/	Dr. Veronica Bue	Research	Special meeting #2	4,625.00
	18/9/2023	Dr. Tingneyuc Sekac	Staff	Research	13	37,404.76
	18/9/2023	Den Einstein (MPhil1)/	Dr. Saliesh Samanta	Research	13	15,440.00
	18/9/2023	Diandra-Joy Oli (MPhil1)/	Dr. Tingneyuc Sekac	Research	13	11,619.65
	18/9/2023	Guambo Mondo (MEng2)/	Dr. Kamalakanta. Muduli	Research	13	5,820.00
	18/9/2023	Mr. Justin Narimbi (PhD)/	Dr. Visakumar Balakrishnan	Research	13	29,000.00
	18/9/2023	Dr. Tingneyuc Sekac	Staff	Conference	13	25,628.23
	18/9/2023	Professor Geetha Rani Prakasam	Staff	Conference	13	2,441.80
	18/9/2023	Dr. Viswanadham Nadiminti	Staff	Conference	13	14,213.77

	18/9/2023	Mr. Eko Maiguo	Staff	Conference	13	13,212.73
	7/11/2023	Mr. Job Sam (MSc1)/	Prof. Macquin Maino	Research	Special meeting # 3	10,000.00
	7/11/2023	Mrs. Sgoing Denano (PhD2)/	Dr. David Timi	Research	Special meeting # 3	30,000.00
	7/11/2023	Dr. Ahmed Shoeb Syed & Team	Staff	Research	Special meeting # 3	179,668.94
	7/11/2023	Ms Grace McCoy Wantepe	Staff	Conference	Special meeting # 3	4,446.20
		Mr Diati Zure	Staff	Conference	Exec approval	9288.5
		Wesley J Wambi	Dr Mirzi Betasolo	Research	Exec approval	9097.00
					Total	489,193.29

Actual amount disbursed in 2023, including payments for ongoing research was K697,796.10