Title:

Repositioning the PNG University of Technology for National Impact: The Role of Higher Education in Advancing Livelihoods Through Science, Technology, and Policy in Papua New Guinea.

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Abstract:
This paper argues that in the 21st century, the relevance and success of the Papua New Guinea University of Technology (PNGUoT) must be measured not only by academic outputs but by its tangible impact on societal well-being. Drawing parallels from global best practices and the Times Higher Education Impact Rankings, the paper positions PNGUoT as central, not only to deliver its programs, benchmarked to international or accredited industry standards but also to ensure that its research is applied in practice through policy formulation achieving Sustainable Development Goals (SDGs) in the country.

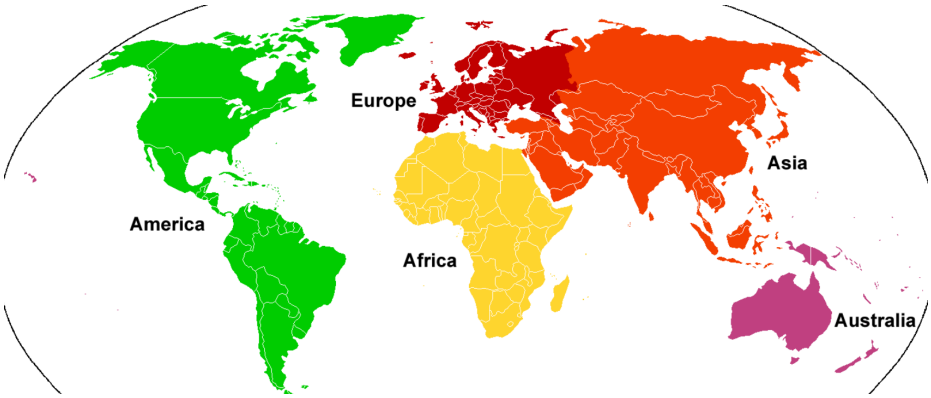
Grounded in the motto "standards of higher education is synonymous with higher standards of living," this study explores how PNGUoT can act as a driver for national development. It calls for systemic reforms in PNG's education and research ecosystem to enable solution-driven engagement with communities and policymakers.

Keywords: PNG University of Technology, Societal well-being, Accredited Industry Standards, Sustainable Development Goals SDG.

1 Introduction

The vantage point of being a participant at the Papua New Guinea University of Technology (PNGUoT) and being a member of a small Island, Coastal or Highland rural community in a developing country provides a unique perspective on how Technocrats, Lecturers and Administrators of PNGUoT can posit the role of higher education in advancing livelihoods through Science, Technology, and Policy in Papua New Guinea and in deed other similar Technology Universities in similar circumstances in the Small Island Developing States (SIDS).

In this work, the extensive study carried out is focused on the roles that several Technology Universities (in six continents) have played in their various constituencies to impact their societies and assist government policy formulations. The analyses of the findings led to the proposition that in certain cultures and circumstances, the traditional 'textbook role' of Technology Universities may need to be adapted, modified and tailored to meet the immediate needs of a targeted society and a group of people that the Universities are set up to serve.



The six continents of interest to this study

The propositions put forward here is not for a complete overhaul of the traditional role of Technology Universities but a modification that would enhance its relevance to its immediate society. This study provides a comprehensive way forward on how PNGUoT as a

Technology University in the Pacific Island community of states can actively engage with its *immediate* communities and societies to drive positive change in the social, economic and cultural outlook that would lead to a more comfortable livelihood of the residents of the society. Consequently, PNGUoT will be able to assist the government in proposing policies that will positively influence the standard of living especially in rural and remote islands of PNG.

2 The Traditional Role of Technology Universities (TU)

Historically, Technology Universities have always been known traditionally as the global centers of cutting-edge research, innovation, knowledge creation, dissemination, and skill development for the advancement of technology and economic growth. They have played a fundamental role in producing competent industry professionals that would contribute to economic growth and technological advancement in industry, communication and e-commerce. As expected, Technology Universities continue to fuel rapid technological advancements, globalization, and complex socio-economic and information technology infrastructure modernization and wealth creation. As complex as this may seem, the accomplishment of the traditional role is made possible because, through adequate funding by government and industry, Technology Universities possess sufficient intellectual resources, research capabilities, and a diverse pool of talent that can be harnessed to tackle complex challenges simultaneously[i].

It is very well known that Technology Universities have played a direct role in advancements that have led to new industries, mind boggling products and state-of-the-art infrastructures. The outcome is increased productivity, improved efficiency in existing industries, economic growth, job creation, and higher living standards especially in the developed nations.

Courtesy: https://digitalfragrant.medium.com/the-role-of-technology-in-a-nations-development-and-its-future-fe120b139272 Courtesy Photo by Denys Nevo Zhai

The photo is a visual perspective of the pace and complexity of the exponential transformatory role of science and technology universities in the global sphere. This research work appreciates the importance and the need to maintain this role. The proposition is therefore not for a paradigm shift. Rather, this work takes the view that there is also an inherent need to align the goals, the curriculum design and implementation of a Technology University located in a developing country such as PNG with the needs of the global society as well as the needs of the people in the immediate environment of the Universities.

In PNG the people in the immediate environment of PNGUoT (by democracy) are the rural dwellers with basic means, simple aspirations and whose needs are the (taken for granted) essential commodities of life such as electricity, digital communication and portable water supply... not super highways, fly-overs, globalization and not tunneled-trainlines.

The challenges that would be encountered by universities wishing to address the basic needs of the inhabitants of developing nations such as PNG have been described and summed up in previous work as University Social Responsibility (USR)[ii].

This work is an expansion and further development of this framework with a special focus on the Pacific Island State of PNG and its University of Technology PNGUoT as a case study.

3. Beyond The Traditional Role of Technology Universities

This work takes the view that the conventional role of Technology Universities as a frontier center for cutting edge research, scholarship, and drivers of global innovation and economic-development are vital. Therefore, these roles need to be maintained in PNGUoT.

In this work, the betterment of the immediate society of the location of a Technology Universities is argued as an equally important scope that should be in the forefront of the list of aspirations of a university. PNGUoT and other Technology Universities in the Pacific should therefore look beyond the realm of its traditional and global academic functions and set additional 'indigenous' goals that will impact the primary society it was inaugurated to serve.

The Pacific Island State of Papua New Guinea is home to about two million city dwellers and about nine million rural and remote island inhabitants[iii]. The latter number should therefore be regarded as the immediate society that should benefit significantly from the intellectual, research and infrastructural assets of PNGUoT.

3 ii. Similar Pioneering work by other Technology Universities

The inspiration for this research work stems from the findings that several other Universities in several continents have attempted similar challenges successfully. A neighboring Australian University exemplified the Triple Helix Model of Innovation by developing different core programs such as 'knowledge exchange', 'UNSW Founders Program' etc., with a focus on University-Community Collaborations to create a vibrant Entrepreneurship Ecosystem[iv].

PNGUoT is encouraged to emulate and formulate a similar comprehensive structure for technology transfer and science-to-policy translation that can serve as a sustainable model in the quest to enhance the impact of PNGUoT research outcomes in the rural and remote island communities. This can be achieved if dedicated offices, leadership roles, and collaborative programs are established to bridge the gap between academic discovery and practical application, ensuring that scientific

advancements contribute meaningfully to societal progress and policy development.

Massachusetts Institute of Technology (USA) 'Energy Initiative' is another community-focused program[v] that provides an example of how PNGUoT can lead in energy innovation, policy development, and education in PNG to address its unique energy challenges. It is also proposed that the MIT example be complemented with the experience provided by Columbia University data-driven 'Center on Global Energy Policy'[vi]. The center provides a 'policy lab' for academics to engage with policymakers and industry leaders to address energy challenges through appropriate policy formulation. This is at par with the UCLA Center for Health Policy Research focusing mainly on health issues.

The University of the Philippines – Technology Transfer and Business Development Office (TTBDO)[vii] is another Government-Academia-Industry Tripple Helix Innovation set up to connect university researchers with SMEs and government agencies for real-world solutions. They have a wide scope of activities ranging such as issuance of licenses to technologies and supporting spin-offs for local application, particularly in agriculture, public health, and disaster response; this includes research on typhoon forecasting and community early warning systems to provide and help shape governments national disaster policies. A similar comprehensive initiative is proposed for PNGUoT to focus on localized scientific innovations—say, in weather or earthquake forecasting, food preservation, or pest control. These can easily be fed into provincial disaster preparedness plans or SME toolkits.

This work also carried out an in-depth study of the activities of Indian Institutes of Technology (IITs) – Rural Technology Action Groups (RuTAGs)[viii] which was set up to work with state and local governments to adapt and implement technologies suitable for rural development (e.g., renewable energy, low-cost housing, water purification etc). The success of the program is seen in how the projects directly inform rural development policy and funding priorities. Taking a cue from this, it is proposed that PNGUoT could establish similar rural technology demonstration hubs and advise district development authorities (DDAs) on technology investment aligned with LLG needs.

In Peru, Uganda, Kenya and Cape town, there are several Poverty and Inequality Initiative- (PII). They all provide examples of Community-Based Learning Hubs. Backed by Government-Funded Applied Research for Policy Impact, Makerere University – Outreach

Department and Village Demonstration sites (in Uganda)[ix] provides an excellent proto type of how PNGUoT can carry out Integrated Research, Training and Extension by running village demonstration farms where new methods are piloted and taught. This can easily be steered by PNGUoT students from rural and Island localities yearning for a worthwhile opportunity for them to live and work in their villages. Such outreach programs could be tailored to be accepted as a part of the Industrial Training or Work Experience aspect of PNGUoT degrees in engineering, agriculture, and environmental science programs. The Land-Grant University Rural Outreach program of Cornell University[x] is another similar example. The program has successfully reached out to all 62 counties in New York State, offering farmers and rural youths' practical education on crop production, animal husbandry, health, nutrition, and business.

All pioneering work by other Technology Universities reviewed here align well with the proposal and vision of this study in translating science and technology into practical impact through provincial and rural engagement. Hands-on Digital Technology and Digital Communication that can be incorporated into Tertiary and Vocational Education and Training (TVET) is another area that is calling for attention which can be provided by PNGUoT. The pioneering work in this area is not farfetched. The University of the South Pacific (USP) in Fiji Island[xi] and the Charles Darwin University (CDU)[xii] in Australia have demonstrated how universities can participate actively in Vocation Education Training (VET) alongside its traditional higher education programs. The Pacific Technical and Further Education (Pacific TAFE) run by USP in Fiji delivers technical and life skills training across remote islands via TAFE centers and mobile units. It also Partnered with local government, NGOs, and faith-based groups to deliver programs in community leadership, climate resilience, and fisheries using radio, mobile phones, and printed materials for outreach. The Australian (CDU) program targets indigenous communities and disadvantaged students by offering fee-free TAFE places in certain industries where the chance of employment is high due to skill shortage. A similar strategy should inspire PNGUoT to use digital and hybrid methods to provide modular training in rural energy, sanitation, construction, and SME management. These could be supported by DDA funds or donor programs.

4. The PNGUoT Proposal and the Modus-Operandi

The main proposition of this study is for a PNGUoT Rural Innovation and Extension Service **(RIES):** with the concept note theme;- *"Taking Knowledge to the People: Strengthening Livelihoods through Science, Technology, and Community Partnerships"*.

4i. Proposal Background and Rationale of RIES

Papua New Guinea's rural majority faces persistent challenges in agriculture productivity, small enterprise development, access to appropriate technologies, and sustainable livelihoods. Universities, especially PNGUoT, hold a reservoir of expertise in engineering, science, ICT, and applied technologies that must be harnessed for rural transformation. Drawing on the international models provided earlier, PNGUoT should propose the establishment of RIES as a tool to operationalize its research, teaching, and innovation functions through community-centered engagement.

4ii. Proposal Objectives

The objectives would be to extend PNGUoT's technical expertise to rural communities through training, demonstration projects, and community-based innovations. In addition, final-year students and staff should be engaged in applied rural service-learning activities to ensure knowledge transfer while enriching academic programs. Partnerships with provincial governments, SMEs, and district authorities (DDAs) for inclusive, evidence-based development is another main objective of this proposal. This will support the translation of research into local policy and practice through rural piloting, community validation, and local governance feedback loops.

4iii. Structure of RIES

It is proposed that RIES will operate under the *Directorate of Extension and Community Engagement,* and be implemented through Provincial Technology Centers (PTCs) based in existing PNGUoT satellite campuses or new partner sites. The locations will offer modular short courses (2–4 weeks) in areas such as solar energy and rural

electrification, water and sanitation systems, food processing and preservation; low-cost construction methods, SME bookkeeping & digital literacy. The centers will be staffed by full time PNGUoT faculty and trained extension officers. They will be positioned to propose appropriate Village Demonstration Sites and Partner with DDA's and Ward Councilors to pilot the technologies demonstrations on-site. Emphasis would be on local adaptation of tools, practices, and innovations developed by PNGUoT researchers. Final-year students from Agriculture, Engineering, Business, and Environmental Sciences will undertake supervised 6 to 12-weeks rural internships on these sites. The Policy and Practice Feedback Mechanism should be used to provide 'policy briefs' to local and national government.

4iv. RIES Potential Partners

It is proposed that target partners will include Provincial Governments and DDAs, Department of Agriculture and Livestock (DAL), Small and Medium Enterprise Corporation (SMEC), National Planning Department, Faith-based development agencies (e.g., Caritas, Lutheran Development) and international donors organizations (e.g., UNDP, EU, ADB, World Bank, JICA etc)

4v. Proposed Pilot Provinces (2025–2026)

The proposed pilot province is Morobe. This will leverage PNGUoT's proximity and enhance immediate rollout. The Central Province would follow next by targeting areas around Kapari and Rigo, with strong cultural links and development needs. The Eastern Highlands, East Sepik and Southern Highland Provinces would become the follow-up pilot provinces due to the interest, prominence and needs of the provinces in agribusiness, cocoa, fisheries, and rural infrastructure, water, health, post-conflict recovery and market access to the other highlands regions.

4vi. Budget, Resource Mobilization, Outcomes and Impact

An initial K3–5 million seed fund is estimated to actualize this proposition. This is proposed to be sought through Government

appropriations (e.g., Higher Education, Agriculture, Provincial cost-sharing agreements, international donor project proposals, private sector sponsorship and other areas such as alumni contributions and university grants.

The envisaged outcome and impact of this study is that it will allow about 100 rural communities to receive regular extension services and over 1,000 villagers per year will receive training in practical technologies that will transform their lifestyle and improve their standard of living.

6. Conclusion

In this work, the extensive study and analyses carried out on the roles that several Technology Universities worldwide have played in their various constituencies to impact their immediate society and assist government policy formulation suggests that PNGUoT is endowed with what-it-takes to implement similar programs that are applicable to the needs of its communities; especially in rural education, renewable and sustainable energy access, digital communication, economic growth, poverty alleviation, inequality, climate change mitigation, natural disasters forecasting and prevention, environmental degradation and sustainable use of natural resources.

The RIES strategies that are proposed to achieve these are succinctly summarized in this work and reasons are adduced as to how and why the proposal will enhance robust partnerships with government and donors to achieve interdisciplinary community focused research centers, capacity building and promote knowledge translations from PNGUoT to the PNG rural communities.

We conclude by postulating that the relevance and success of the Papua New Guinea University of Technology (PNGUoT) and indeed other Pacific Island Universities of Science and Technology must be measured not only by the number of graduates produced and absorbed by industry but also by its tangible impact on societal well-being.

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