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INNOVATIVE POLICY REFORMS FOR SUSTAINABLE DEVELOPMENT: EMPIRICAL EVIDENCE FROM PICS

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SUMMURY

The science and technology capabilities inculcate economic growth in a country through various processes engaged with absorption and utilization of existing knowledge, and creation of new knowledge. The Pacific Island Countries consisted of many small developing island nations naturally have limited S&T capabilities and narrow development agenda. The present study explores how different island nations in the Pacific configure themselves and design development initiatives in the global economy. Recent policy initiatives, S&T establishments and innovative approaches in PICs are visited to derive reasonable conclusive remarks. The analysis disclose existence of focussed but partially fragmented move towards sustainable development rather than driving the economy for generating a competitive edge in the business world. The fabric of the economic growth in small developing nations is naturally blended with the social and cultural interests and hence innovations across specific segments of economic sectors are chosen based on their capabilities and access to resources. Hence, the evidence reimpose that fact that the small developing nations, in particularlythe PICs, select the path of development to generate the competitive advantage in the global market, while emphasizing sustainability as a priority.

Keywords: sustainable development, Pacific Island Countries, Innovations in small developing nations

INTRODUCTION

The Pacific island countries which consisted of 21 islands nations that are divided into three main territories namely Melanesia; Micronesia and Polynesia. Fiji, PNG, New Caledonia, Solaman Islands and Vanuatu forms the territory on Melenesia which contains more than 97% of the total land area and 89% of the population in the PICs. Nauru (499 persons per sq km), Tuvalu (420 persons per sq km) and Guam 323 persons per sq km) reports the highest population densities in the region while Fiji, Niue, New Caledonia, PNG Palau, Solomon Islands and Vanuatu reports less than 50 persons per sq km (Prism 2013). Due to its narrow resources and production capabilities, Pacific Island Countries concentrate on a few primary commodities for production and export, such as, mineral resources, fishery resources, timber and sugar. Very little S&T capabilities are consciously built around either for sustain the existing production or value addition.

Like most developing economies, much of the production across the PICs takes place in the informal economy. The innovation process, which is generally backed up by S&T inputs, are affected by

relatively weak and informal relationship between local knowledge and new S&T knowledge (Turpin etal 2015). With a high proportion of the workforce in subsistence or self-employed production, such relationships are further weakened or in many cases, non-existent. (Thomason and Hancock 2011). Hence, flows of knowledge between the expectations of farmers, fishers, foresters, and related knowledge producers and the nascent scientific and research community remain an important policy task(Turpin and Amaradasa 2018). Hence, the main purpose of this study was to assess the desires of the PICs to integrate inputs from S&T and drive the nations through a development path.

METHODOLOGY

The published material in the main steam of Science and Technology Policy analysis documents such as UNESCO World Science Reports were used as the primary source of information. Secondly, the related web material that can be accessed through internet were used for further investigation and analysis. These documents cover recent policy initiatives, S&T establishments and several innovative approaches in PICs. These documents are gone through extensively to identify intended key objectives and target of different nations and the region in general.

OBSERVATIONS

COLLECTIVISM VERSUS NATIONALIZATION

Due to limitations in access to S&T resources and limited capabilities to organize those resources for productive use, it is eminent that PICs need collective mechanisms to handle their common issues. In the recent past, several collectively organised initiatives could be observed in PICs to address development challenges though there is considerable diversity related to economic growth orientationacross the PICs.

"It is only recently that regional issues have led to some collective policy action and progress towards monitoring regional capability. For example, there are significant opportunities for science and technology to deliver benefit in areas associated with climate change. These collective actions have focused mainly on the impact of climate change and natural disaster such as hurricane or tsunami, renewable energy, fisheries, agriculture, telecommunication and environmental sustainability" (Turpin and Amaradasa 2016).

The climate change presents significant challenges in the Pacific. It threatens not only livelihoods and living standards, but the very viability of communities. Although the role of PacificIsland states in the causes of climate change is small, the impact on them is great. Many PacificIslands face new challenges such as access to water due to contamination of ground water with sea water. Some habitats and island states face potential obliteration. There is considerable faith in the capacity of science to ameliorate the impacts of climate change, but little metric based evidence to guide a coordinated way forward.

SEAP (2012) has drawn attention to the ways that climate change has impacted differently on various regions around the world. For example in the Pacific, climate change concern is mostly around marine subjects such as sea levels and increased salinity. Climate change seems to be the most influential single environmental factor affecting all Pacific Island countries across almost all sectors of their economies. Consequences of climate change in agriculture, food security and even in spread of communicable diseases (MOHF 2012) are under investigation by several stakeholders. The SPC which is one of the leading organizations that support programmes on Development Partners in Climate Change (DPCC) planned activities to tackle problems associated with climate change. Science and technology underpins potential progress in most of these. Some of these projects include the following (ICCIP 2017):

- Capacity Building for the Development of Adaptation Measures in Pacific Island Countries Project;
- The Pacific Islands Framework for Action on Climate Change;
- The Pacific Hydrological Cycle Observing System;
- The Pacific Islands Global Climate Observation System;
- The Pacific Community- Focused Integrated Disaster Risk Reduction;
- Global Climate Change Alliance: Pacific Small Islands States;
- Pacific-Australia Climate Change Science and Adaptation Planning Program; and
- Pacific Climate Change Science Program.

Other collaborative initiatives such as Secretariat of the Pacific Regional Environment Programme(SPREP) and Development Partners in Climate Change (DPCC) coordinated by UNDP and powered by regional collaboration are also underway. As global climate change scientific knowledge progresses it provides an important resource for effective national policy planning and for researchers working in this area in universities, research institutions and the business sector. At the COP23 UN climate change conference held in November 2017, Mr Bainamarama, Prime Minister of Fiji, emphasised the relationship between climate change and health. Five of the eight objectives of Fiji's National Climate Change Policy seek to reduce the vulnerability of Fiji's population, its health systems and public health environment to the impacts of climate change. Accordingly, strengthening health service infrastructure, making medical careers more attractive and supported through scholarships, and taking initiatives to reduce carbon emissionsare a focus of current policy actions (Bainimarama, 2017).

Access to, and local contributions to this resource requires both regional and international collaboration. The current major challenge is to increase national capacities to access and apply this information to national planning strategies and monitoring their productive impact. In this regard,Vanuatu has recently established a Ministry of Climate Change and now embarked on teaching climate change as a subject at the Vanuatu Institute of Technology. There is a focus here to use knowledge the students gain to help their communities to become resilient to the impact of climate change. The University of South Pacific (USP) in Fiji provides postgraduate level education in many similar areas such aspostgraduatecourses in Climate Change and Renewable Energy.

RECENT INITIATIVES BY INDIVIDUAL NATIONS

The public investment in Science, Technology and Research are relatively low in PICs(UNESCO 2010). However, there were several new initiatives to establish institutional set up to S&T capabilities with a view to generate inputs for economic growth. The Pacific Science, Technology and Resources Network was formed in 2017 to promote Science and Technology development and take measures to address connections between S&T and national policies in the region (STAR 2017).

Considering the socio-economic indicators in the Pacific Region and the limited capacity of the sophisticated S&T infrastructure, these nations have little option but to become a user rather than a developer of scientific knowledge. Nevertheless, the nations in the pacific region seems to have strengths in identifying and selecting appropriate technological know-how which can provide socio-economic benefits in the long run. For example, mining extractive sector in PNG local communities face considerable social and economic change with the development of mining operations in their area (Thomason and Hancock 2011).These PNG now plans to operate commercial scale gas industry from the year 2018.

Table 1 Institutionalization of Science, Technology and Innovations in PICs

Country	Institution	Year of establishment	Purpose
Samoa	The Scientific Research Organization of Samoa	2008	value addition, product /process development, S&T education and commercial interests
Samoa	The National University of Samoa (NUS)	1984	offers courses in Science, Engineering, Maritime, Nursing & Health Sciences.
PNG	The Research, Science and Technology Council	2008	to embark on research, science and technology innovations as a way forward to industrialization in the light of the major development projects in mining, petroleum and gas.
Fiji	Centre for Renewable Energy at the University of Fiji	2013	research and postgraduate education in renewable energy

Source: (Turpin and Amaradasa 2018)

Table 1 summarizes several initiatives taken by PICs to enhance capacity to deal with science, technology and innovations leading to sustainable development. Continuation of converging initiatives is evident from different corners of the PICS. For example, a workshop on "Science & Technology for sustainable development" was held in Samoa with a view to provide a platform to bring together scientists, researchers and experts in the Pacific to share and profile their research for sustainable development (NUS 2017).

The few nations in PICs also show evidences in increasing trend in R&D capacity building, especially in the higher education sector, concentrate most research and postgraduate education on sustainable development, and social and cultural issues. For example, the UOF in collaboration with private sector partners provides a platform to increase the application of solar energy in rural areas, especially in schools. The objective is to integrate the production of solar energy into national policy guidelines (e.g. National Energy policy and Green Growth Framework of Fiji) in order to further promote sustainable development initiatives. The Government of Fiji in its 2017/18 budget allocated approximately FD 10.4 million targeting 2600 rural community households for the installation of new Solar Home Systems as well as setting aside 10 per cent of the budget to maintain and purchase spare parts for previously installed systems (Waqairadoru 2018).

Apart from energy and climate change, the other related regional priority issues are agriculture, food security, forestry, and fisheries. Fiji has worked on a "Green growth Framework (GGF)" which was passed by the Cabinet of Ministers in November 2014 and produced as a public document in August 2015. This GGF is taken as a guideline for all new initiatives in the country for sustainable development.

In line with the emphasis on the use of S&T for sustainable development, the parallel changes in education at high school level and tertiary level has grown across many PICs through the past decade. The PNG Higher Education Plan III 2014-2023 focused very much on transforming Tertiary Education, Research and Development through Quality Assurance and Innovation. Strategies (8) have been spelt out to overcome what was described as a lack of robust and comprehensive quality assurance systems and limited research and development capacity in PNG (Mellam 2014).

In Fiji, the fishing sector is applying new knowledge in order to expand overseas markets. It has become a major focus of the fisheries industry. The national fishing 'catch' is at present dominated by Tuna for the Japanese market. Efforts to diversify into other forms of production and markets through aquaculture, inshore fishery and other off shore fishery products such as sunfish and

deep-water snapper require significant private sector investment. This process also demands S&T investment in order to comply with EU Fish export standards. S&T inputs to fisheries development such as Hazard Analysis and Critical Point (HACCP) plan, Single-Strand Confirmation Polymorphism (SSCP) Analysis & Good Manufacturing Practices and Procedures (GMPP) will be required for future monitoring fish stocks and establishing sustainable management procedures. There is a different approach in Kiribati where despite the impact and effects of climate change the Kiribatians, a nation of seafarers and fishermen, have focused on enhancing a responsible fisheries industry with an emphasis on the need to support, improve and sustain the people's livelihood, food security and economic growth through conservation. One of the islands in the Kiribati group is considered a world-class destination for recreational fishing site and is now declared as the largest marine protected area in the world (Source: Kiribati National Fisheries Policy 2013 -2025).

Across the Pacific, the region has been heavily dependent on imported food items due to a decline in per capita food production and an imbalance in demand for local food items. This appears to be consistent phenomena across many island nations (Sharma 2006). In line with this observation, the Pacific Islands Forum Action Plan 2009 emphasized the need to sustain a momentum toward improving diet patterns across the Islands as well as maximizing sustainable economic returns from fisheries resources and designing an appropriate disaster risk management programme to minimize any adverse climate impact (PIFS 2009). The "Fiji 2020 - Agriculture Sector Policy Agenda" in Fiji (MOAF 2014) highlighted the need to build sustainable communities and gave high priority to ensuring food security was central to the national development agenda. In this context, strategic action articulated in 'Fiji 2020' included:

1. Modernizing Agriculture in Fiji;
2. Developing integrated systems for agriculture;
3. Improving delivery of agriculture support systems;
4. Enhancing innovative agricultural business models; and,
5. Strengthening the capacity of the country in policy formulation.

Strategic action 3 in the above included curriculum development toward the needs of industrial research programmes. Proposed action also pushed for the expansion of scientific output in agriculture by promoting the Fiji Agricultural Journal in the region (MOAF 2014).

Fiji has taken initiatives to shift the country's economic focus from primary production to commercial agriculture and agro-processing. The composition of output from the agriculture sector is now shifting from sugar to non-sugar comprised of root crops, tropical fruits, vegetables, spices, horticulture and livestock. The Agriculture School at the Fiji National University (FNU) use different incentives to attract students to enrol in their degree courses. Such incentives include student scholarships, loan packages for graduate students to cover the cost of basic farm implements, shed/house and start-up funds. The ultimate objective of this initiative is to attract more young people to farming and establish themselves with sustainable livelihoods and boost the nation's food security, reduce dependency on imported food, and encourage commercial farming.

The efforts in Fiji to cater for a high value product niche in agriculture and meet the organically grown fresh food market are underway. For example, a Korean based charity organization in Fiji, in collaboration with Fiji National University has embarked on using organic farming technology for the cultivation, production and delivery of goods on a commercial basis. The approach is already being diffused more widely throughout the country. The Fiji Development Bank (FDB) is currently working on developing new lending policies, specifically designed for organic farming and further develop this niche area in Fiji (Fiji Sun Online 2018).

Forestry is another important primary resource in Fiji and PNG. In Fiji, the forest covers more than 50 per cent of the land area. Export earnings from primary forest products are the fifth highest in national export earnings, after sugar, fish, mineral water and garments. Most exports are from mahogany and coconut palm wood from over-aged palms.However, forestry in both countries substantially uses low and semi intensive technological inputs. As a result, the product range is

mainly limited to sawn timber, veneer, plywood, block board, moulding, poles and post, and wood chips. Only a limited range of finished value added products are exported. Most is used by the local hotel industry. A lack of automated machinery coupled with inadequate technically skilled local manpower supply to operate such automated machinery and limited design capabilities limit development of value adding in the sector. The Government of Fiji provides incentives for importation of specialized machinery directly used for fisheries and forestry purposes (Investment Fiji, 2018). The role of technology, imports of new machinery and access to technically skilled personnel will be significant factors in enabling innovation in these sectors. Monitoring the impact of policies directed toward enhancing this innovative capability will demand some new approaches to S,T&I indicators directed toward these sectors.

Improvement of health service delivery to minimize child mortality, maternal mortality, obesity as well as HIV/AIDS issues remain high priorities across the region. Obesity seems to be a key health problem among the Pacific Islanders, and is consuming large components of health budget. Regional collaboration around health and medical research is also growing in the Pacific. The Fiji School of Medicine (FSM), is the key health research school in the region and has taken initiatives to establish a Pacific STI and HIV Research Centre in 2008 in collaboration with the National Centre in HIV Social Research (NCHSR) of the University of New South Wales, Sydney, Australia (FNU 2008). Subsequently, FNU has establishedthe Centre for Health Information, Policy and Systems in 2010 at FSM (FNU 2013).

CONCLUSIONS

As the UNESCO Science Report highlighted in 2015, PICs still have limited capacity to use global developments in global science and technology. Through the last decade, however, there is some evidence of regional policy initiatives developed and under development focussing on sustainable development and survival strategies. Parallel policy initiatives at individual economy perspective are also blossoming up to reimpose the regional initiatives.Concentrated efforts to develop S&T capabilities in an economically advantageous and resource intensive sectors, such as fisheries sector in Fiji and Vanuatu, are also visible in PICS. Development projects which are identified as such priority projects by individual countries are generally supported by regional bodies through foreign aid or grants. Sustainability of those capabilities in the long-run may need different set of initiatives through an integrated approach.

The S&T developments across the Pacific Island Countries discussed above carry an imperative for national and regional monitoring. The task is necessary to provide evidence for continual policy assessment and improving the policy process. Despite limited capacity to produce new innovations driven by new S&T knowledge, the PICs have developed capabilities to access and absorb S&T for application in key development areas, especially focusing sustainable use of available resources. The process entails both access to and the transmission of new knowledge. The role of science institutions and training institutions play important complementary roles in gaining access to and transmitting new knowledge.Hence, the large informal productive sector operating across PICs also demands somewhat different approaches to the transmission of knowledge. Organisational approaches that make considerable use of 'knowledge transfer agents' agricultural extension officers have potential use across other sectors such as fishing and forestry are also important for the wider transfer of knowledge. These are all social processes requiring on-going innovative approaches. The assessment of effectiveness and progress of these innovative social processes need a new set of business approaches nurtured on social responsibilities to deal with sustainable development objectives.

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