Assessment of the Potential Impact of the ICT Revolution in the Pacific on Economic Growth, Employment, and Government Revenue

Pacific Possible Technical Note
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Contents

Introduction .............................................................................................................................................. 3
The ICT Sector ........................................................................................................................................... 3
ICT-enabled Activities ............................................................................................................................... 9
Economy-wide Productivity Impacts of ICT .......................................................................................... 13
Overall Growth Impact of ICT in the Pacific .......................................................................................... 16
What is Needed to Harness ICT for Economic Growth? ........................................................................ 18
Annex 1: Quantifying the growth enhancing impact of ICT ................................................................. 19
Annex 2: Islands in a Sea of Knowledge (by Ron Duncan) .................................................................... 20
Annex 3: Pacific Islands in a Sea of Knowledge: Seizing Opportunities for New Development Paths (by Jean Eric Aubert and Eriko Suzuta) ................................................................................................................. 71
Annex 4: Smarter, More Connected Islands in a Sea of Opportunity (by Natasha Beschoner) ...... 103
Introduction

1. In recent years, PICs have improved connectivity by investing in underwater fiber optic cables and reforming their telecommunication sectors, allowing greater competition to improve services and reduce costs. There is still scope for improvement, particularly affordability of services, however, progress in connectivity is tangible across the region. Pacific Possible examines whether and how improved connectivity and enhanced use of ICT, coupled with other advances in digital technologies—some of which have not yet reached the Pacific islands—can be expected to translate into accelerated economic growth and job creation and what needs to be done to harvest these “digital dividends.”

2. With respect to the impact of the ICT revolution on economic growth and employment, we distinguish three broad areas:

• The ICT sector itself, comprising mobile network operators, infrastructure service providers, distributors and retailers of ICT services, content and service providers.

• ICT-related activities, which include a broad category of economic activities that are either made possible or otherwise enhanced by technologies, particularly the Internet. This ever-expanding range of activities includes, for example: e-commerce (online business transactions), online offshoring and outsourcing (including freelancing), application-based activities (for example, shared economy transactions) and financial technologies (fintech). As the development of the broader digital economy in the Pacific is still at an early stage and, therefore, difficult to quantify effectively, this report focuses primarily on potential opportunities arising from participation of the PICs in online offshoring and outsourcing.

• Economy-wide impacts of ICT, capturing the impact of ICT on increasing productivity, enhancing products and services, and facilitating the adoption of new knowledge.

3. We discuss for each of these three areas their current contribution to growth, employment and government revenue and describe scenarios for their evolution over the next 25 years. This is followed by a brief discussion of necessary complementary investments to fully harness the benefits of ICT, including enhanced skills and the enabling environment for the digital economy. It is important to note upfront that projecting the economic impact of increased ICT penetration in the Pacific is fraught with many uncertainties. This is the result of the fast pace of technological developments, with significant further innovations likely over the next 25 years.

4. Some of the new technologies that are already commercially available—such as 3-D printing—combined with improved connectivity could open entirely new opportunities for the PICs. Others such as artificial intelligence/machine learning are currently over the horizon, but possibly not for long, and, again with adequate connectivity, could have significant implications for addressing such challenges as institutional capacity constraints and skills shortages. In addition, the relationship between increased ICT penetration and economic growth is contingent on the structure of the economy and a large range of other factors.

The ICT Sector

5. The ICT revolution has brought rapid growth of the ICT sector, and especially of mobile services, in most PICs. While fixed-line communications were stagnant, the advent of mobile technologies two decades ago has led to a rapidly growing ICT sector in most PICs. This was supported by the liberalization of the telecommunications sector. Until recently, telecommunications were largely state-owned monopolies in most of the PICs, however, an active deregulation policy has been a key driver of increased ICT penetration since 2003. Tonga was among the first PICs to deregulate its telecoms sector in 2003 and
most of the other PICs followed suit over the next 15 years. This has led in a few years to a drastic
reduction in the price of mobile phone subscription and a rapid expansion of subscribers, resulting in near-
universal penetration—except in very remote locations. Markets are now largely competitive and private
sector led, although monopolies can still be found in the Marshall Islands, the Federated States of
Micronesia, Tuvalu (state-owned), and Nauru (private), while many countries have no more than two
operators.

6. **Connectivity at present is delivered through a combination of mobile and fixed networks, with
close emphasis to international networks either ensured through satellites or undersea cables.** The
geographic and physical limitation of fixed networks means that mobile has the best opportunity to drive
connectivity and Internet access throughout the Pacific Islands (GSMA 2015).¹ Most countries have
invested or are investing in undersea fiber optic cables as a lower-cost, higher-capacity and more reliable
long-term option, compared to satellite connections, although satellite pricing models have become
increasingly flexible. As most PICs are archipelagos comprising a large number of islands, however,
satellite connections will remain an important option to bring telephone and Internet services to the
remotest and least-populated islands. Increased Internet penetration has also facilitated the development
of new communications service offerings (“over the top services”) including social media platforms.

7. **The PIC11 show large differences with respect to penetration of ICT services.** Fiji has the highest
unique subscriber penetration rates² for mobile phones (83 percent), followed by Palau (64 percent) and
Tonga (58 percent (Table 1). In most of the other countries, about one-half of the population has a mobile
phone subscription. Only Kiribati (40 percent), PNG (32 percent), and the Federated States of Micronesia
(16 percent) still have relatively low penetration rates, which are below the 39 percent reached by Sub-
Saharan Africa. About 50 percent of Fiji’s population also has access to the Internet through mobile
phones, while for most of the other countries mobile broadband subscriptions are less common.

8. **It is, however, important to note that mobile penetration rates are very dynamic and have been
growing rapidly, especially following market liberalization and the introduction of new technologies.**
Fixed phone line penetration remains very low for most of the PIC11 and has, in fact, been declining in
most countries as more people use mobile phones. The same holds true for fixed broadband subscriptions.
While traditional fixed-line copper networks may be increasingly uneconomic to maintain, there is scope
for increased deployment of optical fiber access networks to businesses and, prospectively, households
in the medium term.

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¹ The GSMA (“Groupe Speciale Mobile Association”) represents the interests of mobile operators worldwide, uniting nearly 800
operators with more than 250 companies in the broader mobile ecosystem.

² Since individual users of mobile phone services (unique subscribers) often use several SIM cards, mobile penetration rates can
either be calculated with respect to connections or unique subscribers. According to GSMA (2015), on average, every subscriber
in the Pacific holds 1.5 connections; that is, penetration rates with respect to connections are 1.5 times as high as unique
subscriber penetration rates.
## Table 1: Status of ICT Services (2016)

<table>
<thead>
<tr>
<th>Country</th>
<th>Mobile Telephone Unique Subscribers per 100 Inhabitants</th>
<th>Mobile Telephone Unique Subscribers (3G) per 100 Inhabitants</th>
<th>Mobile Telephone Unique Subscribers (&gt;3G) per 100 Inhabitants</th>
<th>Fixed Telephone Subscriptions per 100 Inhabitants</th>
<th>Fixed Broadband Subscriptions per 100 Inhabitants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiji</td>
<td>82.7</td>
<td>16.1</td>
<td>32.3</td>
<td>8.1</td>
<td>1.4</td>
</tr>
<tr>
<td>Kiribati</td>
<td>40.0</td>
<td>-</td>
<td>-</td>
<td>1.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Marshall Islands</td>
<td>48.6</td>
<td>20.9</td>
<td>0.0</td>
<td>4.5</td>
<td>1.9</td>
</tr>
<tr>
<td>Micronesia, Fed. Sts.</td>
<td>16.3</td>
<td>7.0</td>
<td>0.0</td>
<td>6.5</td>
<td>3.1</td>
</tr>
<tr>
<td>Palau</td>
<td>64.1</td>
<td>10.4</td>
<td>0.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PNG</td>
<td>31.5</td>
<td>6.7</td>
<td>8.7</td>
<td>2.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Samoa</td>
<td>43.4</td>
<td>4.9</td>
<td>22.3</td>
<td>5.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Solomon Islands</td>
<td>47.2</td>
<td>6.9</td>
<td>15.5</td>
<td>1.3</td>
<td>0.2</td>
</tr>
<tr>
<td>Tonga</td>
<td>57.9</td>
<td>24.2</td>
<td>1.1</td>
<td>12.4</td>
<td>2.3</td>
</tr>
<tr>
<td>Tuvalu</td>
<td>47.8</td>
<td>21.7</td>
<td>0.0</td>
<td>20.2</td>
<td>10.1</td>
</tr>
<tr>
<td>Vanuatu</td>
<td>52.8</td>
<td>16.1</td>
<td>7.7</td>
<td>1.8</td>
<td>1.6</td>
</tr>
</tbody>
</table>

*Source:* GSMA database, ITU database.

*Note:* Data for fixed telephone subscriptions and fixed broadband subscriptions are for 2015.

### 9. Internet bandwidth was highest in Fiji and PNG, at 11,332 Mbps and 5,500 Mbps, respectively, in 2015. The combined internet bandwidth for the other nine PICs was close to 3,000 Mbps in 2015, but has been growing rapidly in recent years in Samoa, Tonga, the Marshall Islands, and Vanuatu, as these countries got connected by undersea fiber optic cables (Figure 7-1). In the whole PIC area, the profile of broadband technology is projected to be as follows in 2020: 18 percent for 2G (in comparison with 22 percent for the developing world overall), 30 percent for 3G (43 percent), and 52 percent for 4G (35 percent) (GSMA 2015).
10. Based on estimates by GSMA (2015), in 2014 the mobile ICT sector contributed about US$700 million or 3.5 percent to the GDP in the 11 PICs. The bulk of this, about US$440 million, is contributed by mobile operators. Related industries, including infrastructure and support services, distributors and retailers, content, applications, and other services are estimated to contribute the remaining US$260 million to GDP. The mobile ICT sector is estimated to provide employment for more than 10,000 people and to generate public revenue of close to US$200 million in the form of VAT on mobile services, corporation tax, and employee income tax and social security contributions.

Outlook

11. Over the 2016-40 period, most Pacific Island citizens will be connected to faster, cheaper Internet services. They will use the Internet for many transactions: selling or buying goods, accessing information, transferring money, acquiring skills, and engaging with governments. Pacific Island
economies will be based increasingly on knowledge and innovation, including more diversified services sectors, innovation and entrepreneurship, and more skilled and productive workforces.

12. GSMA (2015) projects that subscriber growth in the PICs will slow to 3.8 percent over the period 2014-20 compared to growth of 12.6 percent over the period 2009-14. This slowdown reflects the fact that some countries have already reached relatively high levels of market penetration and that further growth will require efforts to reach additional customers and, in particular, more remote islands. For our projections, we assume as our BAU scenario subscriber growth during the period 2016-20 of 6 percent for countries with penetration rates below 40 percent in 2016 and 3.8 percent for countries with penetration rates higher than 40 percent in 2016. For the period 2020-40, we assume that the number of unique subscribers grows annually by 3.8 percent for all countries. At these growth rates, the average mobile penetration rate for the PIC11 grows from 36 percent in 2014 to 43 percent in 2020 and 53 percent in 2040. The six countries with the highest penetration rates in 2016—Fiji, Palau, Tonga, Vanuatu, the Marshall Islands, and Samoa—would each be able to reach an 85 percent penetration rate before 2040. All other countries, however, would still not reach a penetration rate of 85 percent by 2040. Two countries—the Federated States of Micronesia, and Papua New Guinea—would still not reach a penetration rate of 50 percent by 2040 (Figure 2).

13. Given that currently projected growth rates of unique subscribers for some countries would maintain low levels of mobile penetration by 2040, we also examine a scenario where all countries reach a penetration rate of 85 percent—the average penetration rate for European countries in 2015—by 2040 (the opportunity scenario). With a penetration rate of 82 percent, Fiji is the Pacific country that is already quite close to the European average, indicating that an 85 percent target is indeed realistic and achievable. It is, however, also important to note that the dispersion of many PICs across many islands implies that once the main population centers are covered, expanding mobile access to remote regions and islands will entail significant cost and effort.

Figure 2: Unique Subscriber Penetration Rates (2016 and 2040)(BAU)
14. Figure 3 shows the required annual growth rates in unique subscriptions which would be necessary to reach a penetration rate of 85 percent by 2040. The Federated States of Micronesia and Papua New Guinea, who had the lowest mobile penetration rates in 2016, would require annual growth in unique subscribers of more than 6 percent annually until 2040. While such growth rates are well within what other countries have achieved, these countries face particularly severe challenges in terms of geography and affordability for low-income populations. For the other countries, increasing unique subscriber penetration rates to 85 percent seems within reach.

Figure 3: Required Annual Growth in Unique Mobile Subscribers to Reach a Penetration Rate of 85 Percent by 2040

Source: World Bank staff calculations

15. Achieving faster growth under the opportunity scenario would require addressing key remaining connectivity issues:

- **Completing market liberalization**, enabling additional investment in infrastructure and services in the northern Pacific, particularly in the Federated States of Micronesia and the Marshall Islands;

- **Increased and more affordable international bandwidth for Papua New Guinea, Kiribati and Tuvalu** (cable/satellite connectivity, as appropriate), requiring mobilization of public and private investment;

- **Targeted approaches to connect remote/outer islands**, particularly in Kiribati, Tuvalu and the northern Pacific, including Public/Private Partnership investments and, where feasible, mobilization of new technologies;

- **Commencement, or continuation of regulatory reforms that focus on expanding broadband Internet access**, including, for example, those relating to radio spectrum management; infrastructure sharing and technological convergence (for example, of broadcasting and telecoms); and

- **Anticipating a gradual shift towards more regional or subregional telecommunications markets**, cross-regional (or subregional) harmonization of legal/regulatory instruments and institutions to
stimulate increased investments, provide stable market environments and serve the interests of consumers.

16. Under the BAU scenario, the contribution of the ICT sector to GDP would increase from an estimated US$700 million in 2014 to US$1.8 billion in 2040, employment would increase from about 10,000 to 27,000 jobs, and government revenue from the ICT sector from less than US$200 million to about US$500 million. Under the opportunity scenario, a more rapid expansion of the mobile subscriber base could generate nearly US$1.2 billion in additional revenue, an additional 18,000 jobs, and more than US$300 million in additional government revenue from the ICT sector (Table 2).

Table 2: Contribution of the ICT Sector to GDP, Employment, and Government Revenue (2014 and 2040)

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP (Constant 2014 US$ millions)</th>
<th>ICT Sector Contribution to:</th>
<th>Government Revenue (Constant 2014 US$ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2014 BAU</td>
<td>2040 BAU</td>
<td>2040 Opportunity Scenario</td>
</tr>
<tr>
<td>Fiji</td>
<td>117</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>Kiribati</td>
<td>3</td>
<td>23</td>
<td>28</td>
</tr>
<tr>
<td>Marshall Islands</td>
<td>3</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Micronesia, Fed. Sts.</td>
<td>3</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>Palau</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>PNG</td>
<td>465</td>
<td>1,309</td>
<td>2,425</td>
</tr>
<tr>
<td>Samoa</td>
<td>23</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Solomon Islands</td>
<td>55</td>
<td>143</td>
<td>186</td>
</tr>
<tr>
<td>Tonga</td>
<td>8</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Tuvalu</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Vanuatu</td>
<td>21</td>
<td>70</td>
<td>80</td>
</tr>
<tr>
<td>ALL</td>
<td>702</td>
<td>1,809</td>
<td>2,990</td>
</tr>
</tbody>
</table>

Source: World Bank staff calculations.

Additional transformational impact in 2040

| Expansion of mobile phone services | 6m additional mobile subscribers | US$1.1b receipts | 17,000 jobs | $300m taxes |

Source: World Bank staff estimates

ICT-enabled Activities

17. Improved ICT connectivity opens new opportunities, including for local development and export of knowledge services. Global Outsourcing Services (GOS) range from relatively low- to mid-skill activities, such as business process outsourcing (BPO, for example, data entry, call centers, software and mobile apps programming) to skill-intensive knowledge process outsourcing (KPO, for example design and research) (Table 3).
Table 3: Definition and Classification of ITO/BPO/KPO

<table>
<thead>
<tr>
<th>Classification</th>
<th>Definition and Service Areas</th>
<th>Required Skills Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Outsourcing (ITO)</td>
<td>Outsourcing of IT services; such as software development, remote infrastructure management, custom application development, systems integration, package software implementation and support, IT consulting, embedded systems, project design, plant engineering, and products.</td>
<td>The range of services can require low- to high-skilled personnel.</td>
</tr>
</tbody>
</table>
| Business Process Outsourcing (BPO) | Service functions that are information intensive and that are transferred outside a company to a third party. It includes services such as customer relationship management, human resource management, and enterprise resources management supporting the varied business processes in different sectors such as banking, finance, health, or tourism. The types of services provided are broad, and include:  
  • Voice-based services, such as call centers/helpdesks, and telemarketing.  
  • Nonvoice-based services; such as data entry, digitization, graphics rendering, and accounting. | Mostly falls into the low- to middle-skills range (for example, call centers to complex financial services). |
| Knowledge Process Outsourcing (KPO) | Encompasses specialist activities that are knowledge intensive, such as research and development (R&D), market intelligence, and legal services, and comprises core information-related business activities that are competitively important or form an integral part of a company’s value chain. | Requires advanced analytical and technical skills as well as a high degree of specialist expertise.       |

Source: Beschorner et al. 2015 based on Bardhan et al. 2013.

Table 4: Economic Contribution of the GOS Sector in Selected Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Direct Jobs Created</th>
<th>Population (million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>3,100,000</td>
<td>1,252.1</td>
</tr>
<tr>
<td>Philippines</td>
<td>926,000</td>
<td>98.4</td>
</tr>
<tr>
<td>Mauritius</td>
<td>23,000</td>
<td>1.3</td>
</tr>
<tr>
<td>Jamaica</td>
<td>22,000</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Source: Beschorner et al. 2015; Board of Investment Mauritius 2017; JAMPRO 2017.  
Note: Data for India and Philippines are for 2014, data for Mauritius and Jamaica for 2016.

18. While large players, such as India and the Philippines, have traditionally dominated the global outsourcing market, some small island economies are also competitive and benefitting from this global industry (Table 4). Mauritius and Jamaica are recognized among the offshoring leaders in their respective regions. New GOS industry approaches have also emerged in recent years, owing to continual advances in technology and connectivity (Kearney 2014). Fiji already hosts major offshoring operations that employ
about 3,000 persons in 2017, including ANZ Bank’s Pacific Operations Centre, Mindpearl, Centrecon and the Packleader Group.

19. **The online outsourcing (OO) approach refers to the performance of tasks conducted over the Internet by workers from anywhere in the world, using online marketplaces or exchanges, and is a particularly promising channel for job creation in the Pacific Islands.** Online outsourcing provides individuals and firms the opportunity to contribute to overseas projects and global value chains without having to relocate. Aside from the convenience of being able to work from one’s home base, it also helps to overcome the typical hurdles to overseas employment, including the need for visas and work permits. The global OO industry already has over 48 million registered workers, of which an estimated 10 percent (4.8 million) are active. The OO industry is projected to grow rapidly, from an estimated market size of US$2.2 billion in 2013 to US$4.8 billion in 2016 and US$15 to 25 billion by 2020 (World Bank 2015a).

**Outlook**

20. **ICT-related opportunities could generate a significant number of jobs and income.** Of those countries that have been able to develop a significant GOS industry, Mauritius is the most relevant country for the PICs, as it shares the characteristics of being a small island developing state and remote from most major markets. Mauritius has proactively invested into the development of its GOS sector for more than 20 years, including investments into fiber optic cables to establish the necessary bandwidth for a GOS industry, a supportive regulatory regime, and industry specific incentives. By 2016, the GOS sector in Mauritius comprised 750 companies employing 23,000 professionals and generating about 5 percent of GDP. The contribution of the GOS sectors of the Philippines and India is similar, at 5.9 and 4.6 percent, respectively. The share of population employed by the ICT/BPO sector in Mauritius at 1.8 percent is significantly higher than the share of the population employed by the sector in the Philippines (0.9 percent) and India (0.3 percent) (Table 4).
Box 1: Outsourcing to Fiji? How Does a Company Decide?

Mindpearl is a BPO specialist focusing on international, high-quality contact center operations. Numerous global brands across several industries including aviation, leisure, telecommunications, retail and waste management are supported by the company. Mindpearl chose Suva as its base to offer high-quality, low-cost alternatives for outsourcing, after carrying out an extensive 15 country search, based on: having a highly literate workforce, a neutral accent and a high degree of fluency in English, and the necessary ICT infrastructure. Mindpearl “follows the sun” across the globe with other offices in Brisbane, Barcelona and Cape Town—thus offering 24 hour/seven day a week coverage across the globe. Furthermore, since Fiji is located exactly 12 hours ahead of GMT, it makes it an ideal location for supporting activities in Western Europe and the United States.

**ICT Infrastructure.** A key part of this infrastructure puzzle includes Fiji’s connectivity through the Southern Cross Cable that connects Fiji to Australia, New Zealand and the United States. Construction of the Southern Cross Cable took over three years and was finished in 2001. Given the dramatic growth in data utilization, however, the network has been constantly upgraded from the initial design of 20Gbps to the current system potential of about 12 Tbps.

**Labor and Skills.** The decision to locate such a business always rests on the availability of relatively cheap and highly qualified labor. Labor costs in Fiji for such work are about one-fifth of the cost that companies would have to pay in Australia or New Zealand. Other competitors include the Philippines, India and Mauritius. Fiji boasts very high levels of literacy compared with most of its competitors and, perhaps most importantly, is a country where English is taught from a very early age. As a former British colony, Fijians also have a neutral accent which makes it easier for them to be understood in countries such as Australia, New Zealand, England and the United States. This is not true for key competitors such as India and the Philippines, where English is not necessarily the first language.

**Incentives.** The government has made an effort to make Fiji BPO friendly by offering a range of incentives. These include tax exemptions and deductions, rebates, duty reductions and exemptions, and a simplified registration process for foreign investment projects which is being further strengthened now to allow online registration of firms.

**Other Key Factors.** Mindpearl’s decision to set up shop in Suva was also because Fiji has a stable and reliable business and regulatory environment, supported by sound macroeconomic policies, modern and enforceable contract laws, well-developed and integrated banking and financial institutions, and the necessary infrastructure to run such a business including electricity, water supply, transportation, and excellent medical facilities.


21. **Among the PICs, Fiji, Samoa, and Tonga may have the greatest potential for the development of a significant GOS sector.** These countries already have in place the key factors necessary for the development of a GOS sector, including adequate skills, sufficient Internet bandwidth, and an adequate business and regulatory regime. While, in principle, most of the PICs could, and potentially will, develop knowledge export services, they will have to overcome more significant hurdles than Fiji, Samoa, and Tonga. Some of the smaller PICs simply lack the scale to develop an organized GOS sector and the biggest opportunity may be the participation of individuals in OO activities. Several of the PICs also would require
very significant investments in enhancing the skills of their labor force and improving the business environment and regulatory regime.

22. Over the 25-year Pacific Possible time horizon, it seems possible for Fiji, Samoa and Tonga to develop their GOS sectors to about the size of the GOS sector in Mauritius with a contribution of 5 percent to GDP and employment opportunities for 1.8 percent of the population. For Fiji, this would imply a growth of the GOS sector to contribute close to US$400 million to GDP in 2040 and provide employment for about 15,000 Fijians compared to 3,000 jobs in 2017. For Samoa and Tonga, this would mean a GOS sector that contributes US$65 million and US$35 million to GDP and provides employment for about 3,000 and 2,000 professionals, respectively (Table 5). Since these countries will not be able to compete purely on price with larger competitors such as India and the Philippines, their biggest opportunities are likely to lie in more specialist niche knowledge service exports. The example of Mauritius is again instructive. While in the early days of the industry, most activities were rather low-skill BPO activities such as call centers, in recent years the IT and KPO segments of its industry have seen faster growth than traditional BPO activities (Board of Investment Mauritius 2017).

Table 5: Economic Contribution of the GOS Industry by 2040 in Fiji, Samoa, and Tonga

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiji</td>
<td>15,000</td>
<td>1.8</td>
<td>376</td>
<td>5.0</td>
</tr>
<tr>
<td>Samoa</td>
<td>3,000</td>
<td>1.8</td>
<td>65</td>
<td>5.0</td>
</tr>
<tr>
<td>Tonga</td>
<td>2,000</td>
<td>1.8</td>
<td>35</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Source: World Bank staff calculations.

Additional transformational impact in 2040

Global Outsourcing Services

US$500m revenue 17,000 jobs

$150m taxes

Source: World Bank staff estimates.

Economy-wide Productivity Impacts of ICT

23. Aside from opening new activities, the digital revolution contributes to increased productivity in many sectors and enhances the quality of existing activities. ICT can help to improve competitiveness across industries, such as finance, trade, and logistics by reducing transaction costs and speeding up processing times. E-governance can improve the efficiency and transparency of public service delivery,
enhance the quality of services and, of particular importance for the PIC11, facilitate the provision of services to remote regions and islands (for example, through remote diagnostics in the health sector or access to massive open online courses). To realize these benefits, however, it is important that an expansion of ICT services is accompanied by what the World Development Report on Digital Dividends labels “analog complements.” These include appropriate frameworks to foster competition that drives firms to adopt efficiency gains made possible through ICT, adequate skills, and accountability mechanisms (World Bank 2016i).

24. **ICT also facilitates the acquisition and use of knowledge that is an important pathway to improved productivity and growth.** This is particularly relevant for the larger economies in the Pacific, whose economies are often characterized by large productivity gaps compared to other countries. For example, by using ICT farmers can receive real-time information on market prices and conditions, disease outbreaks, and agriculture and fishing-specific weather forecasts (PRIF 2015).

25. **ICT plays a critical role in realizing the opportunities discussed in Pacific Possible.** For example, improved connectivity allows better marketing of the tourism sector, including to new markets. Availability of Internet services is also an important element in tourists’ overall satisfaction with a hotel or destination. ICT also plays an important role in monitoring fishing activities and the adherence to catch limits, and facilitates the matching of employers and employees under labor-mobility schemes. Many activities outside those discussed in Pacific Possible—especially in the larger economies with larger and more diversified private sectors—could also draw significant improvements in productivity and access new customers and markets with ICT. A development of major importance is mobile banking. After making its debut in Fiji, it is now spreading to other islands, transforming the conditions of financial transactions.

26. **Samoa, Tonga and the Melanesian countries stand to gain most from greater use of knowledge because of their larger size, more diversified nature of their economies, and relatively large productivity gaps in agriculture.** In research carried out for Pacific Possible, Duncan (Annex 2) examined the potential increase in economic growth that the 11 PICs could achieve if they moved towards becoming knowledge economies. A greater focus on the acquisition and use of knowledge—be it domestically generated or imported—would allow the PICs to bridge gaps in productivity and performance which often exist in comparison to similar developing countries.
27. **Productivity increases in agriculture could generate between 0.4 to 1.1 percent more in annual growth for Tonga, Vanuatu, Papua New Guinea, and the Solomon Islands (Figure 4).** Fiji, Samoa, Tonga, Papua New Guinea, Vanuatu, and the Solomon Islands could also see additional growth in their manufacturing sectors of between 0.1 and 0.3 percent annually. The financial sector in Fiji and Papua New Guinea could generate additional annual growth of around 0.1 percent as the result of increased use of ICT and knowledge. Because of the very small size of their agriculture, manufacturing, and financial sectors, the Micronesian economies and Tuvalu have only a very limited opportunity to generate faster growth in these sectors. ICT and knowledge clearly also play an important role for the development of tourism in the region. These impacts are, however, already captured in our projections for the tourism sector and thus not included in the ICT-related projections.

28. **For the purposes of this paper, we construct BAU and opportunity scenarios for the economy wide impact of the ICT revolution.** We assume that the knowledge economy growth impacts would be achieved if countries reach a mobile penetration rate of 85 percent. For countries that are projected to reach a mobile penetration rate of 85 percent under the BAU scenario (Figure 2), all growth impacts of ICT would already be captured under the BAU scenario. For countries that are projected to not reach a mobile penetration rate of 85 percent under the BAU scenario, we apportion the potential growth impacts estimated by Duncan in relation to the growth in mobile penetration under the BAU scenario and the additional growth in mobile penetration required to reach 85 percent as the opportunity scenario. To illustrate this point, we take the case of a country that has a mobile penetration rate of 35 percent in 2016 and for which Duncan projects that KE related reforms could generate additional economic growth of 2 percentage points. If the mobile penetration rate under the BAU scenario is projected to increase by 25 percentage points by 2040, i.e. reach 60 percent, an additional increase by 25 percentage points would be required to reach a mobile penetration rate of 85 percent by 2040. In this case we would apportion 50 percent of the growth impact projected by Duncan to the BAU scenario and 50 percent to the opportunity scenario. In our example this would mean that of the total 2 percent projected by Duncan, one percentage point would be achievable under the BAU scenario and another percentage point would
be achievable under the opportunity scenario. It is important to note that in this methodology the change in the mobile penetration rate stands as a proxy for a country’s overall effort to move towards greater use of knowledge in the production of goods and services.

29. In total, we estimate that under a BAU scenario, the growth in ICT penetration could trigger productivity gains that amount to about US$4 billion by 2040 (equivalent to 15 percent of GDP in 2015). Under the opportunity scenario, where all countries reach a mobile penetration rate of 85 percent by 2040, there would be an additional productivity gain of about US$3 billion (most of it accruing to PNG because of the relatively large size of the economy, large productivity gaps in key sectors, and the large difference between the BAU and opportunity scenarios with regard to projected mobile penetration rates), an additional 250,000 jobs, and an additional US$700 million in tax revenue.

<table>
<thead>
<tr>
<th>Additional transformational impact in 2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased productivity</td>
</tr>
<tr>
<td><strong>US$3.5 billion</strong></td>
</tr>
<tr>
<td><strong>250,000 jobs</strong></td>
</tr>
<tr>
<td><strong>$700m taxes</strong></td>
</tr>
</tbody>
</table>

Source: World Bank staff estimates.

**Overall Growth Impact of ICT in the Pacific**

30. **ICT has the potential to be a significant driver of growth in the PICs.** The contribution of ICT to growth under the BAU scenario would be highest for the Melanesian countries, Kiribati and Tonga where ICT has the greatest potential to generate growth effects, either because the ICT sector is still relatively small and, therefore, has significant potential to grow, or productivity in key sectors is low with significant potential for productivity increases made possible through greater ICT penetration. We estimate that ICT could contribute between 0.6 and 1.2 percentage points to average annual real GDP growth under the BAU scenario (Figure 5). Since, under the BAU scenario, mobile penetration rates would still be significantly below 85 percent by 2040 in the Solomon Islands and Papua New Guinea, additional efforts to reach a penetration rate of 85 percent could and additional 0.8 percentage point increase in real GDP growth for Papua New Guinea and of 0.5 percentage points for the Solomon Islands (Figure 6). Taking advantage of opportunities created by the GOS industry could generate additional average annual real GDP growth of around 0.3 percentage points for Fiji, Samoa, and Tonga.
By 2040, ICT-related impacts are estimated to contribute about US$5 billion to GDP, generate more than US$1 billion in government revenue, and provide employment for around 250,000 people under the BAU scenario. Under the opportunity scenario, faster than BAU mobile penetration growth could generate more than US$5 billion in additional GDP, another US$1 billion in government revenue, and close to 300,000 additional jobs (Table 6). Most of these gains would be accruing to PNG, where the combination of relatively large gaps in mobile penetration and productivity combined with the size of the country offer significant upward potential.
Table 6: Additional GDP, Government Revenue, and Employment by 2040 due to ICT

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP (US$m)</th>
<th>Government Revenue (US$m)</th>
<th>Jobs</th>
<th>GDP (US$m)</th>
<th>Government Revenue (US$m)</th>
<th>Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiji</td>
<td>848</td>
<td>226</td>
<td>28,100</td>
<td>376</td>
<td>100</td>
<td>11,600</td>
</tr>
<tr>
<td>Kiribati</td>
<td>22</td>
<td>3</td>
<td>500</td>
<td>5</td>
<td>1</td>
<td>200</td>
</tr>
<tr>
<td>RMI</td>
<td>8</td>
<td>1</td>
<td>200</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>FSM</td>
<td>9</td>
<td>1</td>
<td>200</td>
<td>13</td>
<td>2</td>
<td>300</td>
</tr>
<tr>
<td>Palau</td>
<td>6</td>
<td>1</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>PNG</td>
<td>3,384</td>
<td>707</td>
<td>189,000</td>
<td>4,522</td>
<td>945</td>
<td>257,400</td>
</tr>
<tr>
<td>Samoa</td>
<td>83</td>
<td>19</td>
<td>2,800</td>
<td>65</td>
<td>15</td>
<td>3,200</td>
</tr>
<tr>
<td>Solomon Islands</td>
<td>363</td>
<td>102</td>
<td>24,000</td>
<td>178</td>
<td>50</td>
<td>12,000</td>
</tr>
<tr>
<td>Tonga</td>
<td>76</td>
<td>16</td>
<td>2,700</td>
<td>35</td>
<td>7</td>
<td>1,800</td>
</tr>
<tr>
<td>Tuvalu</td>
<td>2</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Vanuatu</td>
<td>152</td>
<td>27</td>
<td>7,100</td>
<td>33</td>
<td>6</td>
<td>1,600</td>
</tr>
<tr>
<td>Total</td>
<td>4,952</td>
<td>1,103</td>
<td>254,700</td>
<td>5,226</td>
<td>1,125</td>
<td>288,100</td>
</tr>
</tbody>
</table>

Source: World Bank staff estimates.

What is Needed to Harness ICT for Economic Growth?

32. Harnessing ICT for economic growth will require sustained investment, by the private and—where additional stimulus is needed—public sectors, in the following foundational elements (Beschorner 2015):

- **Improved connectivity** – ensuring that Pacific Islands enjoy high-speed, low-cost international bandwidth, and that a supportive policy and regulatory environment stimulates additional private investment in broadband access;

- **Enhanced skills** – starting at the primary level, and with educational establishment at levels able to access high-quality and relevant teaching and learning materials to develop the capacity of students to meet the demands of the changing workplace in the Pacific region and beyond, and to stimulate innovation and entrepreneurship locally;

- **Enabling environment for the digital economy** – including legal/regulatory frameworks supporting online transactions and facilitating secure e-commerce; payments and transactional systems;

- **Connected governments** – that can leverage developments in information systems and ICT tools to deliver services to citizens and businesses more efficiently and effectively through a variety of user platforms, particularly mobile devices. This will also help to stimulate markets for Internet-based services in local economies.
Annex 1: Quantifying the growth enhancing impact of ICT

33. Quantifying the growth enhancing impact of ICT is fraught with many difficulties. The World Development Report (World Bank 2016) entitled Internet for Development highlights the complexity of understanding the impact of ICTs on economic growth. The authors state: “The rapid adoption of digital technologies in the economy has meant that its benefits are widely dispersed and its indirect growth impacts difficult to estimate. Like energy or transport, the internet has become an essential part of a country’s infrastructure, and thus a factor of production in almost any activity in a modern economy. Isolating the impact of digital technologies in the economy is therefore difficult at an aggregate level. Firm-level analysis provides a more reliable picture. Such detailed data show that the internet enables many small firms to participate in global trade, thus leading to more inclusion; it makes existing capital more productive, raising efficiency; and by stimulating competition, it encourages innovation.”

34. Research suggests that for developing countries, a 10 percent increase in the mobile penetration rate leads on average to an increase in GDP growth between 0.59 percent (Waverman et al. 2005) and 0.81 Qiang et al. (2009). PRIF (2015) applies these findings to a sample of Pacific Island countries and finds that the contribution of increased ICT penetration may have contributed between 0.28 (Tonga) and 1.1 percentage points (Samoa and Fiji) to GDP.

<table>
<thead>
<tr>
<th>Effect size</th>
<th>Fiji</th>
<th>Samoa</th>
<th>Solomon Islands</th>
<th>Tonga</th>
<th>Vanuatu</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.59</td>
<td>0.84%</td>
<td>0.80%</td>
<td>0.43%</td>
<td>0.28%</td>
<td>0.44%</td>
</tr>
<tr>
<td>0.81</td>
<td>1.1%</td>
<td>1.1%</td>
<td>0.6%</td>
<td>0.4%</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

Source: Author’s calculations based on PRIF (2015)

35. Applying the average effect of the impact of ICT penetration on GDP growth to individual countries is, however, likely to lead to misleading results in the case of the smaller Pacific Island countries. As is amply demonstrated in the literature (World Bank 2016i), the specific impact of an increase in ICT penetration is influenced by a range of factors. These include the structure of the economy where in small island economies with a small private and large public sector the growth enhancing effects of ICT are likely to be much smaller than in economies with a larger private sector. In addition, productivity enhancing effects of ICT are likely to small to be able to overcome the huge differences in productivity between small island economies and larger economies (Winters and Martins 2004) imposed by geography. Furthermore, the impact of ICT penetration on economic growth depends also on a range of complementary factors, including the availability of appropriate skills, an environment that fosters competition, and accountable institutions.
Islands in the Sea of Knowledge

by Ron Duncan (Consultant)

October 30, 2015

Executive Summary

This report takes a look ahead over a period of 25 years to imagine what economic development could be possible in 11 Pacific Island Countries (PICs) if they adopt the philosophy of becoming Knowledge Economies. The possibilities for the PICs to acquire knowledge, whether imported or developed domestically, and to innovate and build businesses are examined. Also examined are the constraints on the acquisition and use of knowledge. In the case of the PICs, much the same forces that inhibited the acquisition and use of knowledge prior to the Industrial Revolution are at work: unfortunately, in these largely traditional societies the acquisition of knowledge is often not held in high regard and freedom to create businesses is penalised by the social norm of sharing. The important question, therefore, is how to bring about a change in the ideology of the PIC societies so that innovation and enterprise are highly valued. Fortunately, ICTs have become fairly widespread throughout the PICs, opening the way for Pacific peoples to access knowledge from around the world and to share it within the country. Hence, ICTs may help to break down the resistance to the use of knowledge for economic growth.

The (very limited) number of successful businesses in the Pacific have a high reliance on what might be called “Pacificness”. That is, successful activities rely heavily on associating the product or service with the attributes of the Pacific—culture, the attractiveness of natural features such as coral reefs, white sands, and sunshine, lifestyle, etc. By taking advantage of this branding, these internationally-competitive businesses are able to sell at a price that more than compensates for the high trade facilitation costs of the PICs.

For some of the PICs, particularly those comprised of atolls and coral islands such as Kiribati, FSM, and RMI, tourism may be the only opportunity for exploiting their existing comparative advantage. However, the many ways in which all PICs are constraining investment by the private sector does not easily allow for the introduction of new ideas and new technology that could lead to other means of structural transformation.

The low capacity of the atoll and coral islands for the absorption of waste materials severely restricts their potential economic opportunities and makes non-waste producing forms of innovation even more important. These limitations point strongly to the need for development of their human capital for economic transformation. Thus, the long-term opportunities for these
states appear to rest heavily on education and training and a business-friendly environment, facilitated by the opportunities opened up through high-speed internet.

Another obvious grouping of PICs as regards opportunities for structural transformation is the Melanesian countries, Fiji, PNG, Solomon Islands, and Vanuatu, and, to a lesser extent, Samoa and Tonga. The first four countries are rich in natural resources, including arable land and physical tourist attractions, as well as having relatively large populations—albeit poorly educated at present. These countries could follow to some extent the path to structural transformation followed by the land- and labor-rich countries of East and Southeast Asia, such as China, Indonesia, Malaysia, Thailand, and Vietnam; that is, by facilitating productivity growth in their agricultural sector and allowing the savings from this productivity growth to flow through into other sectors. However, in order for this to happen they need knowledge developed from agricultural research and an institutional environment that will facilitate growth in their agricultural sectors, upon which most of their population depends at present.

Given the fast-increasing populations in some of these countries, particularly PNG, Solomon Islands and Vanuatu, growth in agricultural output is desperately needed for food security. But domestic agriculture could also make a useful input into the growing tourist industries in Fiji, Samoa, Tonga, and Vanuatu. This has failed to take place, largely because the quality of the local farm produce is poor and the resorts find that they cannot rely on the supplies of foodstuffs from local farmers and therefore they rely on imports. Thus, research is needed to improve the quality of the existing farm output and increase the variety of output, as well as develop appropriate farm management systems and domestic supply chains.

Most of the PICs are prone to various kinds of natural disasters—cyclones, earthquakes, tsunamis, floods, and drought—which can cause major setbacks in their economic development and growth. Research to improve resilience to such disasters is important for the health and safety of the local people as well as for the islands’ attractiveness to tourists.

Marine resources such as the coral reefs and inshore fisheries, harvested for products such as pet fish, crustaceans, and sea cucumber, are important sources of foreign exchange and tourism expenditures and need to be protected. Unfortunately, some of these resources have already been adversely affected: e.g. sea cucumber has been over-harvested in several PICs and its sustainability has to be recovered for this activity to be continued; coral reefs and fishing stocks have been damaged by fishermen using dynamite; and pollution from resorts has damaged coral reefs. Research is needed to ensure the maintenance of the earning potential of these resources.

It is the ‘capabilities’ of the PICs—importantly, the human capital, i.e. the knowledge and skills of the people—that will determine how rapidly the countries will be able to achieve progress through producing and exporting more advanced products and services. To move on from past experience there has to be change across all areas of human endeavour in the PICs: in research and other forms of knowledge acquisition, in innovation, and in labor force skills. With few exceptions, knowledge acquisition—from primary school education through to tertiary education—has been poor. In some of the PICs—particularly, FSM, Kiribati, PNG, RMI, Solomon Islands, Tuvalu, and Vanuatu—significant improvement is needed across the board in
education performance. But looking ahead 25 years, it is unlikely that education systems will be able to bring about a major increase in the general skill level of the population of the PICs. Therefore, it is likely that innovations that will be new sources of growth will have to be of a kind that uses mainly less-skilled labor.

Moreover, it is most likely that knowledge useful for economic growth in the PICs will be of a form that is based on natural resources and uses relatively little labor. As the PICs do not have large supplies of capital, innovations will also likely not be capital-intensive. The likely areas for knowledge accumulation appear to lie in the exploitation of ‘Pacificness’ of agricultural products (such as seen with coconut-based cosmetics) and tourist attractions.

Education for the tourism market should include the development of ‘people’ skills and language skills, so that labor in the tourist sector is able to interact well with tourists from different countries. Given the very rapid growth of international tourism expected from China and other fast-growing East and Southeast Asian countries, skills in languages from these countries would be useful in promoting tourism to the Pacific. Also needed are ‘office’ skills to ensure that tourists have an enjoyable experience. For example, being able to check into and out of airports and resorts quickly is an important attribute of a good tourist experience. Use of the internet is a key part of these kinds of activities. Mostly, these are not highly-developed skills but they are important.

Knowledge development for the tourist sector could also include the identification of sites and relics that could be of interest to tourists from the US, Japan, Australia, and New Zealand—the homelands of defence force personnel who participated in World War II. For example, given a marked improvement in law and order and infrastructure in PNG and Solomon Islands, the WWII sites of conflict could become significant tourist attractions to people from the US and Japan. The generations who fought in WWII will soon disappear, along with their knowledge about the war in Pacific. Therefore, to inform future generations who may be interested in visiting these sites, it is necessary to record information about the sites. It is also necessary to preserve the sites as well as possible. Use of the internet to broadcast to the world the availability of such sites could be an important means of attracting tourists to the Pacific.

Indeed, innovation is particularly needed in the PICs in developing activities of interest for tourists. Tourist revenues grow when tourists can be enticed to stay longer and to spend more on a daily basis. Tourist expenditure within the PICs is important, particularly as the airline fares and accommodation costs are mostly paid in the source countries and do not accrue within the destination countries. Presently, tourist venues in the PICs have little in the way of tourist activities. Ideas to increase the attractiveness of venues are a high priority. Fostering of creative or cultural industries could be a pathway to the development of Pacific activities of interest to tourists.

An important practical question occupying the minds of policymakers even in the developed countries is how and where to bring together knowledge generated through research, innovation based on the research results, and capital to fund such start-up enterprises. Even in advanced countries such as Australia, start-ups often go to the US because they cannot obtain the venture
capital to support them within Australia. Thus, the economic rents generated through such innovations are often lost to Australia. The reason(s) for the lack of venture capital in Australia is not clear. Can the PICs provide an enabling environment for new knowledge-based enterprises, or will they have to look to the US or elsewhere?

One form of venture capital that could be useful in the small-country situation of the PICs is ‘crowd funding’. Through this mechanism, made possible by social media use of the Internet, it has been shown to be possible for start-ups to gain access to capital from the contributions of many small investors.

The key condition for innovation and enterprise in most PICs is to make the mostly custom land available to individuals on a secure, long-term basis. Only then will individuals be willing to put in the effort, investment, and innovation needed. Importantly, this would unleash the ability of women to contribute to agricultural growth. Women already do much of the work in agriculture but their contribution is heavily constrained by their lack of formal access to farmland.

The greatly increased availability of mobile phones and the Internet could have a significant role to play in productivity growth. For example, through these means farmers can quickly access information from agricultural researchers and extension officers. Farmers can transmit photos to identify plant and animal pests and diseases and receive advice on their control. Market information can also be made more quickly and widely available. Agricultural productivity growth has excellent potential to reduce poverty and improve the welfare of women, given the reliance of the large lower-income segments of the populations of the PICs on agriculture and the important role of women in their agriculture.

The provision of secure individual rights to land in PICs where there is substantial migration and remittances could stimulate the economies and improve the welfare of the bulk of the population. Samoa and Tonga are two countries where households receive relatively high levels of remittances but where secure access to land is not available. As in other countries receiving remittances, the funds are used by households on improved diets, education of children, and housing; however, remittances are rarely used for investing in businesses. Samoans and Tongans migrating to Australia and New Zealand, for example, have been shown to be quite entrepreneurial. So, as Mancur Olson (1996) argued, it is most likely the lack of appropriate institutions holding back such entrepreneurial behavior in their home countries. Pacific islanders working on Seasonal Worker schemes in Australia and New Zealand are learning farming skills as well as financial skills and therefore, given an encouraging domestic business environment, could make a substantial contribution to productivity and output.

Non-communicable diseases (NCDs) have increased quickly in the PICs, due mainly to poor diets. Length of working life and even life expectancies are being adversely impacted, reducing the productivity of the countries’ labor force. Further, public health costs of NCD incidence are having a damaging effect on government budgets. Education has proven to be one of the best ways to improve public health through preventative measures. Use of ICTs to educate people about diets and health should be effective in the PICs, given the increased availability of mobile phones and the Internet. The public and private benefits could be considerable.
ICTs could also assist in the provision of medical services on a regional basis. With ICT facilities becoming more widely available regionally, Fiji, with its developed medical training facilities, could play a central role as a medical hub for the PICs, just as Cuba is doing in Latin America.

In the Annex to this report the status of the KE resources (education, innovation, ICT, and their policies and institutions) of the 11 PICs are discussed, either singly or in groups, and the possibilities for innovation are identified. The benefits that could arise from these innovations over the period to 2040 are then estimated, based upon hopefully realistic assumptions.
I. Introduction

This report takes a look ahead over a period of 25 years to imagine what economic development could be possible in the 11 small Pacific Island Countries (PICs) if they adopt the philosophy of becoming Knowledge Economies. The report recognizes but does not go into detail about the current weaknesses in their business environment but considers what avenues could be followed to harness development-enhancing knowledge and the kinds of policies and institutions that would best promote it. While the main focus of the report is on the economic growth impacts of adopting a Knowledge Economy (KE) philosophy, the possible impacts on the natural environment, poverty, employment, and gender are carefully considered.

The acquisition of knowledge has always been important in improving the wellbeing of societies. However, as McCloskey (2010) has so effectively made clear, it wasn’t until the entrepreneur was allowed free rein to use existing and new knowledge to innovate and establish businesses that the capacity for rapid economic growth was developed. Thus, McCloskey claims, the Industrial Revolution came into being and this combination of knowledge, innovation, and entrepreneurship has driven economic progress since; culminating most recently in the rapid increases in incomes and reductions in poverty in various parts of Asia. McCloskey attributes the fundamental change to a change in societal attitudes towards innovation and markets: merchants, as innovators and the developers of new businesses, were no longer a despised class but given respect (‘dignity’) and freedom to function (‘liberty’).

Therefore, in this report we look at the possibilities for the 11 PICs to acquire knowledge—whether imported or developed domestically—and to innovate and build businesses. We look at the constraints on the development and acquisition of knowledge. In the case of the PICs, much the same forces that inhibited the acquisition and use of knowledge prior to the Industrial Revolution are at work: unfortunately, in these largely traditional societies the acquisition of knowledge is often not held in high regard and freedom to create businesses is penalised by the social norm of sharing. The important question, therefore, is how to bring about a change in the ideology of the PIC societies so that innovation and enterprise are highly valued.

The report looks at the possibilities for people in the PICs to acquire knowledge and to use the knowledge to build businesses. Fortunately, ICTs have become fairly widespread throughout the PICs; thus opening the way for Pacific peoples to access knowledge from around the world and to share it within the country. Hence, the report looks at the possibilities for the acquiring and sharing of knowledge to be enhanced through the use of ICT.

It can be argued that innovation is even more important in the PICs than in many other developing countries. The rapidly-growing developing countries of East and Southeast Asia and elsewhere basically began their recent phase of rapid growth by the establishment of labor-intensive industries based on technology that was in use elsewhere and brought into the country by foreign investors. An important reason for the success of this kind of investment was the availability of large supplies of low-cost labor. The PICs do not have such supplies of low-cost labor and therefore this avenue of economic growth is not available to them. Investors, domestic and foreign, may use other forms of known technology in establishing businesses but it has to be
used in a way that is not labor-intensive, which makes the creation of employment opportunities difficult.

As noted in this report, the (limited) number of successful businesses in the Pacific have a high reliance on what might be called ‘Pacificness’. That is, activities that are successful rely heavily on associating the product or service with the attributes of the Pacific—e.g. culture and the attractiveness of physical features such as coral reefs, white sands, sunshine, and lifestyle. These internationally-competitive businesses—i.e. businesses able to sell at a price that more than compensates for the high trade facilitation costs of the PICs—heavily utilize ‘Pacificness’ to create the necessary premium.

If innovation is to contribute strongly to economic growth and development in the PICs, the economic rents from the innovations have to be retained within the countries. In the case of the labor-intensive investment strategies so successful in East and Southeast Asia, the economic rents generated were to a large extent not retained in these countries. The foreign investors and the sellers of the goods realized the majority of the benefits. The developing countries benefitted largely through the higher productivity and wages of the workers who were able to move out of agriculture and into the factories. Therefore, for the PICs to benefit from the needed innovation, mechanisms have to be in place to ensure that the rents are retained within the country.

In the remainder of this report, we discuss the ways in which a knowledge economy can be developed in the 11 PICs and how such knowledge (technology, in other words) can lead to innovation and enterprise, resulting in income growth, employment, and poverty reduction. What policies and institutions are needed to stimulate such a structural change? In particular, how might the expansion of ICTs help to promote such change?

The framework of analysis is economic structural transformation and the changes in comparative advantage that underpin such transformation. The discussion covers the existing constraints to such structural change and how these constraints may be overcome; the kinds of activities that may be promoted through the acquisition of knowledge and innovation based upon such knowledge (without being too specific in terms of ‘picking winners’); and which groups of countries may be more amenable to the development of different kinds of activities.

II. Structural Transformation

Recent research into the structural transformation and growth of economies has studied how an economy’s comparative advantage changes over time and what drives such change. The structural transformation and rapid growth of East and Southeast Asian countries mentioned earlier is consistent with changes in the comparative advantage of these economies. For example, for those economies with a relative abundance of rural labor and arable land, as in Southeast Asian countries such as Indonesia, Malaysia, and Thailand, comparative advantage initially lay in agricultural production and exports. As labor was able to move out of agriculture following agricultural productivity growth, and was paired with increases in capital financed by foreign investors and the savings coming from the growing agricultural sector incomes, comparative advantage shifted to the production and export of manufactured products. Over time, up-skilling of labor and upgrading of capital led to the production and export of more and more sophisticated products and services.
What drives this process of upgrading of comparative advantage and why have such a large number of developing countries not been able to take advantage of this process? In recent research on structural transformation (Hausmann and Klinger 2007) it is hypothesized that such upgrading of comparative advantage will only take place if the economy has the necessary inputs that will allow it to move to more sophisticated forms of products and services. These necessary inputs (‘capabilities’) are said to include knowledge, property rights, infrastructure, intermediate inputs, and regulatory requirements and other public goods. Of course, a necessary ingredient is entrepreneurship. The question also arises as to the role governments should play in the process of such comparative advantage upgrading. Some argue that there are substantial externalities associated with ‘pioneer’ firms and therefore governments have to take a lead role in providing the infrastructure essential to the upgraded comparative advantage; thereby pointing the way for ‘pioneer’ firms to follow (see, for example, Lin 2012). Others argue that governments should not endeavour to ‘pick winners’ in this way and that governments should allow investors to determine which activities should develop and only provide supporting infrastructure.

Tests of this hypothesized process of comparative advantage upgrading have been undertaken through studies using the concept of ‘product space’. In these studies of production technology or exports, it is hypothesized that the ‘distance’ between goods in the product space will be closer together the more similar their ‘capabilities’ and therefore that it will be easier for firms to move into producing more advanced goods or services (Hausmann and Klinger 2007). Where the capabilities required for producing a more advanced good or service are ‘far’ from the existing capabilities of a country, the more difficulty the country will have in moving to these products; and therefore will have difficulty in achieving structural transformation.

Changes in the economic structure of the PICs as seen through changes in the value added of the agricultural, manufacturing, and services sectors (as a percentage of GDP) are shown in Table 1 for the period 1995 to 2012. The data are drawn from ADB’s Key Indicators 2014 and are limited to this period, as prior to 1995 the base for their derivation was changed. Three-year averages are taken to smooth out fluctuations due to weather and other factors.

Before commenting on the changes or lack of change in the economic structure of these economies, some qualifications should be made. Whereas we expect to see the share of the services sector increasing with structural transformation and growth, and for advanced countries to have services sector accounting for 70-80 per cent and more of GDP, the high services percentages shown for several of the economies in Table 1 are highly misleading because of the large part that aid plays in these economies. Kiribati, FSM, Palau, RMI, and Tuvalu receive high levels of aid with respect to their GDP.

While the aid/GDP ratio is not as high in Kiribati and Tuvalu as in the three US Compact states (FSM, RMI, and Palau), the share of government expenditure in GDP is very high in Kiribati and Tuvalu because government revenues are supplemented by tuna fishing licence revenues and overseas trust fund revenues (in 2009, government revenues, including grants, as a percentage of GDP were 77.3 per cent in Kiribati and 119 per cent in Tuvalu). In all of these economies, therefore, the share of the government in services—in direct government expenditure and state-
owned enterprise activity—is very large. Reflecting this, most formal employment is government-related and there is little private sector activity.

As can be seen in Table 1, the agricultural sector shares in FSM, Kiribati, RMI, Palau, and Tuvalu have changed little and their industry sectors are small. Further, agricultural subsistence activity comprises a large part of their agricultural value added. In the absence of development assistance, their agricultural sectors would account for a much larger share of a much smaller GDP. Therefore, except for Palau, where tourism has experienced quite substantial growth, there has been little in the way of structural transformation.

Of the remaining countries in Table 1, Fiji, PNG, Samoa, Tonga, and Vanuatu (there is no comparable data for Solomon Islands), we can see that the share of the agricultural sector has declined in all, with the exception of Vanuatu. However, there has been little change in the industrial sector share in these countries, except for PNG. The industrial sector’s share has risen strongly in PNG; but this is mainly because mining is included in the industry sector. Manufacturing as such has not increased very much. In Fiji, regarded as the most industrialized of the Pacific island economies, the industrial sector share fell from 23.1 per cent in 1995-97 to 19 per cent in 2007-09 but rose again to 21.3 per cent in 2010-12. The share of services in Fiji, Samoa, Tonga, and Vanuatu has increased steadily, reflecting the increasing importance of tourism.

Table 1: Structure of Output, PICs’ Value Added, 1995-2012 (%GDP)

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<td>11.7</td>
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<td>12.0</td>
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<tr>
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<tr>
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<td>5.2</td>
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</tr>
<tr>
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</tr>
<tr>
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<tr>
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<tr>
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<td>9.6</td>
<td>10.5</td>
<td>73.2</td>
<td>65.0</td>
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</tbody>
</table>

Source: ADB, Key Indicators 2014.

Notes: na = not available

These brief details on the changes in sectoral value-added shares in these PICs essentially tell the story of their structural transformation over this period. In Fiji, Samoa, Tonga, and Vanuatu, tourism has been the most important source of growth. Indeed, in Fiji, tourism was the most important source of growth for many years prior to 1995. In Samoa, Tonga, and Vanuatu, tourism has been the most important source of growth since the mid-2000s. Palau has also
experienced reasonably good growth due to the development of its tourism industry. Samoa, Tonga, Palau, and Vanuatu have been able to follow in the path of Fiji in developing a substantial tourism sector by abandoning their national airline monopolies and/or by providing security to land for resort developers. The liberalization of mobile phone and internet markets has also assisted in the development of the tourism sector. PNG has seen a substantial decline in the importance of the agricultural sector and a smaller decline in the services sector as mining has grown in importance.

As there has been so little structural transformation of the PICs, it is unsurprising that research into the sophistication of countries’ export baskets has shown that Pacific island economies are to be found in the poorly-connected, unsophisticated-product part of the ‘product space’ map, i.e. in a so-called ‘low product trap’ producing raw materials or low-technology manufactures (see, e.g. Felipe et al. 2010). Furthermore, Hausmann, Hwang, and Rodrik (2007) showed that countries with a more sophisticated export basket grow faster. Therefore, it is also not surprising that most PICs have relatively and absolutely slow growth rates. The exception is the recent experience of PNG where there has been rapid growth over the past seven years due to its participation in the mining boom. However, this growth was due to the export of raw materials, not to an upgrading of its export basket.

For some of the PICs, particularly those comprised of atolls and coral islands such as Kiribati, FSM, and RMI, tourism may be the only opportunity for exploiting their existing comparative advantage. However, the many ways in which they are constraining investment by the private sector does not allow for the introduction of new ideas and new technology that could lead to other means of structural transformation. Their low capacity for the absorption of waste materials severely restricts their potential economic opportunities and makes non-waste producing forms of innovation even more important. These limitations point strongly to the need for development of their human capital for economic transformation, following the examples of Hong Kong and Singapore. Thus, their long-term opportunities appear to rest heavily on education and training and a business-friendly environment, facilitated by the opportunities opened up through high-speed internet.

Another obvious grouping of PICs as regards opportunities for structural transformation is the Melanesian countries, Fiji, PNG, Solomon Islands, and Vanuatu. These countries are rich in natural resources, including arable land and physical tourist attractions, as well as having relatively large populations—albeit poorly educated at present. These countries could follow to some extent the path to structural transformation set by the land- and labor-rich countries of East and Southeast Asia, such as China, Indonesia, Malaysia, Thailand, and Vietnam; that is, by facilitating productivity growth in their agricultural sector and allowing the savings from this productivity growth to flow through into other sectors. However, in order for this to happen they need the knowledge and an economic environment that will facilitate growth in their agricultural sectors, upon which most of their population depends at present.

III. The resource base

Marine resources
Most of the PICs have both substantial inshore and deep-water marine resources. Properly managed, these resources are valuable sources of domestic food supplies as well as earners of foreign exchange. Harnessing the income potential of the high-seas fishery (tuna) and the opportunity for seabed mining is the subject of another ‘Pacific Possible’ paper. Other marine resources such as the coral reefs and inshore fisheries, including pet fish, crustaceans and sea cucumber, are important sources of foreign exchange and tourism expenditures and need to be protected. Unfortunately, some of these resources have already been adversely affected: e.g. sea cucumber has been over-harvested in several PICs and its sustainability has to be recovered for this activity to be continued; coral reefs and fishing stocks have been damaged by fishermen using dynamite; and pollution from resorts has damaged coral reefs.

Tourism

The Pacific Ocean, with its many islands, and its sun, surf, and sand provides the basis for the tourist industry, which in recent years has become important for several PICs. This combination of natural resources, together with the varied island culture should also provide the basis for products and services that can build on the idea of ‘Pacificness’. This idea has been used in the branding and promotion of products such as Fiji Water and its many followers exporting bottled water, by Pure Fiji cosmetics and its many followers, and by high-end clothing designs coming out of Cook Islands and Fiji. Whereas the majority of the rents earned from the export of bottled water from Fiji is earned by overseas investors, Pure Fiji and similar firms are largely local and the rents are mostly retained in Fiji. In the case of Pure Fiji, for example, local employment is promoted through the harvesting of the coconuts and the extraction of coconut oil and butter, the manufacture of the cosmetics, the handicrafts used as decorative containers of the cosmetics, and the related activities of spas and massages. This related set of activities is a prime example of how innovation and enterprise can be developed to promote incomes and employment and reduce poverty. It is also a prime example of how it is possible through innovation to create huge value-adding opportunities; and an example of providing reasons for tourists to spend more money in Fiji; as well as of the use of the internet to sell Fiji products to the world.

Agriculture

The Melanesian (Fiji, PNG, Solomon Islands, and Vanuatu) and Polynesian (Samoa and Tonga) countries of the South Pacific have relatively substantial agricultural land; whereas, the Micronesian countries of the Northern Pacific, FSM, Kiribati, Palau, RMI, and Tuvalu, are wholly or largely comprised of low-lying coral or atoll islands and therefore have very little arable land.

Even in the PICs with relatively substantial arable land, agricultural productivity growth has languished (Reddy and Duncan 2006). Fiji exploited its comparative advantage in arable land for

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[4] Global exports of Essential oils & resinoids, perfumery, cosmetic or toilet preparations, a category that presumably includes the range of traditional hair and skin products produced by Pure Fiji and its followers, increased from US$0.8 million in 2000 to US$5.4 million in 2012.

[5] For example, Pure Fiji Online stores are available in Australia, Czech Republic, New Zealand, the UK, and the US.
many years through the development of its sugar industry but this comparative advantage appears to have been forfeited, in part because of the collapse of its system of long-term leasing of customary land in 1997—an institutional problem—and the loss of preferential markets in the EU more recently. But going further back in history, the coups of 1987 in Fiji led to the wholesale loss of the agricultural research capacity of the Fiji Agricultural Department (Duncan and Wah SingYee 2009) with the rapid migration of skilled labor—a loss from which the Department has never recovered.

PNG has had substantial output and exports of coffee, cocoa, tea, and palm oil over many years. However, the only commodity that has experienced significant growth is palm oil. Its success appears to lie in the fact that it is run on an estate basis—many smallholders producing palm kernels for a central, privately-run refinery—together with a private research institute focussed on the needs of the industry.

By comparison with the PICs, the rapidly-growing, land-rich countries of East and Southeast Asia took early measures to increase agricultural productivity, which became critical to their eventual rapid growth and development. Thus, for the PICs with the potential for agricultural output growth, it is important that productivity is increased, as this will provide the savings for investment in the structural transformation process and allow labor to move from formal or subsistence agriculture to other activities.

Creative industries

Much hope has been held out for the economic development potential of creative industries, particularly in small island economies such as in the Caribbean. Creative industries can include music, dance, art, storytelling, clothing, and handicrafts. However, there has been little success in the way of creative arts leading to economic growth. Reggae music in the Caribbean was seen as a means of achieving this end. However, the local benefits have been small. The major benefits appear to be generated further along the supply chain in the large consumer markets.

The economic benefits to be derived from creative industries has been only a recent interest in the Pacific. Aside from the success of fashion clothing design, however, there have been no major applications. If the PICs are to retain the bulk of the benefits from any creative industries, they must have in place appropriate intellectual property rights legislation and the ability to enforce them to ensure that the rents accrue domestically. They also need appropriate domestic branding and distribution mechanisms. Given the lack of tourist activities in the Pacific, linking the development of creative industries to tourism may be the best means of exploiting innovations in this area.

Capabilities

The human capital of the PICs is, potentially, by far their most important resource. It will be through the accumulation of knowledge and the use of this knowledge in making innovative uses of the physical resources of agriculture, forestry and mining (including seabed mining), tourism attractions, and marine resources that economic growth will be enabled.
As noted above, it is the ‘capabilities’ of the PICs—importantly, the human capital, i.e. the knowledge and skills of the people—that will determine how rapidly the countries will be able to achieve progress through producing and exporting more advanced products and services. To move on from past experience there has to be change across all areas of human endeavour in the PICs: in research and other forms of knowledge acquisition, in innovation, and in labor force skills. With few exceptions, knowledge acquisition—from primary school education through to tertiary education—has not performed well. In most of the PICs, therefore, significant improvement is needed across the board in education performance.

The PICs do have capabilities that could help to foster economic growth. Some Pacific islanders have considerable inherent skills in the form of seamanship. Kiribati and Tuvalu, for example, have taken advantage of these skills by establishing marine training centers to train people (both men and women) for work on merchant vessels operating internationally and to send remittances to their families. Perhaps these skills can be used in activities that are undertaken within the island countries. Pacific islanders are also renowned internationally for their sporting skills, which also generate substantial remittances. Perhaps these skills can also be directed internally.

Infrastructure is also seen as an important capability for upgrading production and exports. In recent years, several of the PICs (Fiji, Kiribati, PNG, Samoa, Solomon Islands, Tonga, and Vanuatu) have opened their mobile phone and Internet markets. But as Duncan (2004) has argued, the monopolisation of Pacific telecommunications until recently effectively locked out the PICs from the ‘second industrial revolution’ of the 1980s and 1990s when inexpensive telecommunications allowed firms to locate different activities in those countries with the lowest costs. The low-cost telecommunications allowed firms to run globally-dispersed activities economically from a central office. The PICs may have missed out on the great wave of industrial fragmentation but, hopefully, there are still some activities in which they may be able to find market niches now that their telecommunications costs are much lower; for example, through taking advantage of their longitudinal position to participate in global supply chains that link countries in different time zones.

As noted, innovation performance is poor in the PICs. Admittedly, the task is challenging. However, there are many constraints in the way of improvements in innovation performance that could be addressed. As discussed below, cultural and social constraints severely weaken innovation impulses. Other constraints are the lack of finance supporting innovation; restrictions on the entry of foreign investors with innovative ideas, new technology, and capital; and restrictions on the entry of skilled expatriate labor that could enhance the skills of domestic labor.

IV. Capacity constraints
Constraints on competition

It was noted earlier that recent literature on the structural transformation and growth of economies has focused on the notion of ‘capabilities’ in the form of the availability of knowledge, infrastructure, intermediate inputs, property rights, and regulatory requirements. However, the liberalization of markets can also be important in leading to structural
transformation, as demonstrated by the opening of international airline services and telecommunications markets in the Pacific.

Several PICs have recently experienced growth in their services sector through growth in tourism. This growth and structural transformation has been triggered by the opening-up of their markets for international airlines services, following the abandonment of national monopoly airlines. In the case of Samoa the more competitive and cheaper air fares triggered the entry of international resort hotel chains after their demand for secure access to custom land was granted. In the case of Vanuatu, secure, individual, long-term land rights to custom land were already in place.

Fiji has long had the essential ‘package’ of policies in place for a tourist industry to thrive in the Pacific islands environment (i.e. secure land rights, competitive international airline services, and the necessary airport infrastructure). Recently, Fiji has complemented this policy package by opening its mobile phone and internet markets. While opening the mobile phone market was not essential for the development of tourism, it may well be important in fostering other economic activities.

These experiences illustrate the importance of identifying the most binding constraint to the growth of an industry or sector and the need for the prioritization of reforms. It is clear that most PICs have a comparative advantage in tourism. For those economies that do not have a substantial tourism industry, the key question is: what is the binding constraint that needs to be overcome? FSM and RMI, for example, do not have tourism industries of any significance, yet they have features that should make them attractive to tourists (e.g. wreck diving in Chuuk state of FSM). From the experience in other PICs, it is likely that the factor most constraining them from developing a vigorous tourism industry is the lack of competition in international airline services.

While monopolies in international airline services were the binding constraint to the development of the tourism sector in several economies, the Samoan experience described below shows that this constraint was industry-specific. Sustained growth across Samoa appears to have been obstructed by the lack of secure individual access to land in agriculture (Duncan et al 2014). The lesson is that binding constraints analysis most likely needs to be undertaken on a sector- or industry-wide basis to provide a thorough understanding of the policy reforms needed in an economy.

Education

Recent research of the ADB (2013) on structural transformation of economies in the Asia and Pacific regions points to the poor quality of primary education and the poor development of skills being obstacles that will constrain the development of all economic activities in the PICs. The poor educational outcomes limit the options and opportunities available, including restricting the ability of islanders to adopt new knowledge and to emigrate for work and send back remittances. It is recognized, however, that the improvement in educational and skills
outcomes needed will take a long time. Change to the current methods of education also needs to be considered.

The ADB (2013) research uncovered the following important issues about education and training: first, investment in education facilitates industrial upgrading to more advanced products and services, which is crucial for economic success. Second, years of schooling and economic diversification are related; but it is primary education and the quality of this education that matters most for diversification. Third, a key role for education and training is to assist the workforce to learn unfamiliar functions and thereby become more able to produce more sophisticated exports—in other words, developing new comparative advantages.

These findings indicate that investment in education and human capital is key for further economic development in the PICs. The finding with respect to the importance of primary education and its quality adds weight to the long-held belief in some quarters that primary education in the Pacific had been failing in its fundamental task. The conclusion that it is important to provide workers with opportunities to acquire new skills in order to move to more sophisticated products and services strongly suggests that the introduction of skilled expatriate workers is important, as their presence provides a learning environment for local workers. However, many of the PICs have been very restrictive with respect to work visas for skilled expatriates.

Health

In many PICs, rapid increases in non-communicable diseases, such as diabetes and heart disease, are leading to very high expenditures on medical treatments (often off-shore). Better health outcomes, which often go hand in hand with better education, are important for maximizing the opportunities for Pacific labor to have long, productive working lives and to migrate for work, which is essential at present given their demographic ‘youth bulge’ on the one hand and their poor investment and employment growth on the other.

Environment

A major constraint to the kinds of economic development and structural transformation possible in the PICs is their low pollution-absorption capacity. Economies such as Kiribati, RMI, FSM, Samoa, Tonga, and Tuvalu are comprised wholly or to a large extent of low-lying coral islands or atolls. Thus, they have almost no capacity to dispose of waste on land and disposal at sea creates problems for their coral reefs and fish-breeding areas, which are in various ways the source for much of their livelihoods. Hence, the idea of establishing sizeable waste-producing manufacturing industries in these economies is virtually unthinkable.

Population growth and migration of outer-island populations to urban areas have already led to significant environmental problems in some of these countries. Underground freshwater sources have been contaminated or depleted due to increased demand and poorly-controlled use. Lagoons in the more heavily populated atoll islands, a major source of daily food needs, have also been contaminated—leading to significant infectious disease problems.
Tourism, which has become an important source of economic growth for many of the Pacific island economies, is already causing damage to coral reefs as the result of waste disposal. Coral reefs are the basis of many of the tourist activities, such as diving and fishing. Such damage could undermine the development of tourism, which may be one of the few opportunities for economic growth. This threat could be multiplied by the outcomes of climate change.

The major threats to the Pacific island economies posed by climate change, particularly to the low-lying island groups, are expected to be from rising sea temperatures and sea levels, increased frequency and intensity of storms, and greater fluctuations in land temperatures and rainfall, leading to more intense droughts and flooding. As well, rising sea levels could be expected to adversely affect the fresh water ‘lenses’ that are the main source of fresh water on the atolls and coral islands. Due to their low elevations, the atolls and coral islands of the Pacific are expected to be some of the first countries to experience the changes caused by climate change, such as intrusion of sea water into agricultural areas and erosion, and be forced to adapt or abandon their habitats. Moreover, because of their increasing populations and habitation of areas of land more exposed to rising sea levels and other natural disasters, PICs are becoming more vulnerable in the sense that more of their population is exposed to these threats.

Fisheries and aquaculture are expected to be at risk from climate change due to alterations in sea temperatures and currents, as well as oxygen sources and food sources. These changes can be expected to affect the food chain that supports tuna stocks and other fisheries. These expected effects from climate change are likely to result in socio-economic costs beyond the capacity of most economies to bear and in the end may threaten the very existence of some. Kiribati is in the most vulnerable situation, with its low-lying islands, rapid population growth, heavy dependence on in-shore and ocean fisheries, and lack of emigration access to metropolitan countries. Others are affected by these factors to various degrees. For Kiribati and others in a similar situation, gaining better migration access and improved education to take advantage of migration opportunities, appears critical to long-term national climate change adaptation strategies.

Cultural and social constraints

In the PICs there are cultural and social issues that impede innovation and economic growth. First, communal and egalitarian values are held very strongly. While contributing a social safety net, the strength of egalitarian values makes it socially difficult for individuals to demonstrate enterprise and accrue wealth. This attitude is an additional obstacle to private sector development on top of the widespread lack of secure individual title to land and the lack of respect for contracts (Duncan and Wah Sing Yee 2009). Joint ventures with foreign investors may help by quarantining the assets and income of the indigenous business owners from these social obligations, which again points to the need to loosen constraints on foreign investors.

Second, despite the egalitarian philosophy, political and economic power is typically concentrated among the elite within the communities. North, Wallis, and Weingast (2009) describe elite control of an economy as a natural state. In such a state, an elite group holds power and tightly restricts the access of most people in society to resources and institutions. This is contrasted to what they define as open access orders: a democratic, market-based society in
which there is open competition for all resources and institutions. An underlying reason for the difficulty of achieving economic reform in the Pacific has been the lack of motivation to take collective action because of the adherence to cultural obligations—fostered by the elite—which are given priority over any other obligations or considerations. Thus, efforts to improve the efficiency and governance of the public sector are resisted because they would diminish the ability of the elite to control the resources managed by the public sector. Actions to promote individual enterprise, such as trade liberalization, privatization of state-owned enterprises, and providing more secure individual access to land, are resisted because they would also weaken the power of the elite. Hence, in order to bring about change, this resistance has to be recognized and considerable thought given to how best to implement change.

Another problem that is making economic reform very difficult in some PICs is the ‘welfare dependency’ that has developed from the receipt of large volumes of aid over many years. This problem is particularly acute in the micro-states (on Kiribati, see Duncan et al. 2014, on FSM and RMI, see Johnson and Graham 2011). For instance, interviews with former Presidents of FSM, RMI, and Palau led to the following assessment: ‘The former presidents stressed that reform proponents need to be cognizant of the pervasive and long-standing “welfare state” attitudes developed over many years of the United States’ (US) Compact aid and the way in which these attitudes shape perceptions about the role of government and the direction of national development’ (Johnson and Graham 2011).

Finally, concern over the loss of sovereignty has been used by some in the Pacific island states as an argument against collective action for change. This argument may be justified, given that these states have been independent for only a relatively short time. However, it is more likely that it is an excuse used to justify the maintenance of vested interests.

V. Fostering innovation

*The development and acquisition of knowledge*

Knowledge may be generated informally by individuals or formally through private and public research organisations. As noted earlier, it is most likely that knowledge useful for growth in the PICs will be of a form that is based on natural resources and uses relatively little labor. As the PICs do not have large supplies of capital, economically-efficient innovations will likely not be capital-intensive. The likely areas for knowledge accumulation appear to lie in the exploitation of ‘Pacificness’ of agricultural products (such as organic products and coconut-based cosmetics) and tourist attractions.

Looking ahead 25 years, it is unlikely that education systems will be able to bring about a major increase in the general skill level of the population of the PICs. Therefore, it is likely that innovations that will be new sources of growth will have to be of a kind that uses mainly less-skilled labor. As with Pure Fiji, productions skills and skills in branding and marketing will be essential but these will be supplied by domestic or expatriate expertise—emphasising the importance of countries being open to expatriate skills.

Education for the tourism market should include the development of ‘people’ skills and language skills, so that labor in the tourist sector is able to interact well with tourists from different
countries. Given the very rapid growth of international tourism expected from China and other fast-growing East and Southeast Asian countries, skills in languages from these countries would be useful in promoting tourism to the Pacific. Also needed are ‘office’ skills to ensure that tourist have an enjoyable experience. For example, being able to check into and out of resorts quickly is an important attribute of a good resort experience. Use of the internet is a key part of most of these kinds of activities. Mostly, these are not highly-developed skills but they are important.

Knowledge development for the tourist sector could also include the identification of sites and relics that could be of interest to tourists from the US, Japan, and Australia and New Zealand—the homelands of defence force personnel who participated in World War II. For example, given a marked improvement in law and order and infrastructure in Solomon Islands, the WWII sites of conflict could become significant tourist attractions to people from the US and Japan. The generations who fought in WWII will soon disappear, along with their knowledge about the war in Pacific. Therefore, to inform future generations who may be interested in visiting these sites, it is necessary to record information about the sites. It is also necessary to preserve the sites as well as possible. Use of the internet to broadcast to the world the availability of such sites could be an important means of attracting tourists to the Pacific.

Innovation is particularly needed in the PICs in developing activities of interest for tourists. Tourist revenues grow when tourists can be enticed to stay longer and to spend more on a daily basis. Tourist expenditure within the PICs is important, particularly as the airline fares and accommodation costs are mostly paid in the source countries and do not accrue within the destination countries. Presently, tourist venues in the PICs have little in the way of tourist activities. Ideas to increase the attractiveness of venues are a high priority. Fostering of creative industries could be a pathway to the development of Pacific activities of interest to tourists.

Fostering research

As noted above, agricultural productivity growth has been virtually non-existent in the PICs; further, agricultural research capacity is at a very low level. Given the fast-increasing populations in some of these countries, particularly PNG, Solomon Islands, and Vanuatu, growth in agricultural output is needed for food security. But domestic agriculture could make a useful input into the growing tourist industries in Fiji, Samoa, Tonga, and Vanuatu—and PNG if it can mobilize tourism. However, consumption of agricultural products in resorts has failed to take off, largely because the quality of the local farm produce is poor and the resorts find that they cannot rely on the supplies of foodstuffs from local farmers and therefore rely on imports. Thus, research is needed to improve the quality of the existing farm output and increase the variety of output, as well as develop appropriate farm management systems. However, as Duncan and Wah Sing Yee (2011) noted in the case of Fiji, indigenous farmers have difficulty in honouring

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6 ACIAR (Australian Centre for International Agricultural Research) projects in the Pacific have been implemented to try to improve the situation. Post-graduate scholarships for agricultural, forestry, and fishery studies have been directed toward USP. ACIAR has also funded agricultural research through the South Pacific Community: in particular, to assist in overcoming phyto-sanitary constraints on the export of agricultural products to Australia and New Zealand.
contracts for sales of their output, largely because of the community pressures on them. This lack of respect for contracts is widespread throughout the Pacific.

Agricultural research is also needed to ensure that diseases and pests that are constraining exports to metropolitan markets are brought under control. Australia, through the ACIAR PHAMA project has begun to implement such research. The research needed may be basic or applied. Given its level of sophistication, the basic research may be best carried out in metropolitan universities. However, the more applied research should be able to be undertaken in the PICs. Education on meeting export standards can also assist in seeing that they are met.

Most of the PICs are prone to various kinds of natural disasters—cyclones, earthquakes, tsunamis, floods, and drought—which can cause major setbacks in their economic development and growth. Research to improve resilience to such disasters is important for the health and safety of the local people as well as for the islands’ attractiveness to tourists.

‘Maintenance’ research is also needed by the PICs in order to protect their existing sources of income, particularly tourist sites and arable land. As noted earlier, tourism is already causing some problems for marine resources, particularly reefs. Research is needed to ensure the maintenance of the earning potential of these resources. Control of pests and diseases affecting crops, animals, and humans can also be seen as a form of maintenance research.

An important practical question occupying the minds of policymakers even in the developed countries is how and where to bring together knowledge generated through research, innovation based on the research results, and capital to fund such start-up enterprises. Even in advanced countries such as Australia, potential start-ups often go to the US because they cannot obtain the venture capital to support them within Australia. Thus, the economic rents generated through innovations are often lost to Australia. The reason(s) for the lack of venture capital in Australia is not clear. Can the PICs provide an enabling environment for new knowledge-based enterprises, or will they have to look to the US or elsewhere?

VI. Innovation possibilities

It is important to understand that investment and openness to foreign investment per se are not the primary factors in economic growth. It is innovation that leads to increased incomes. However, investment is the main vehicle for innovation. Therefore, it is critical that PICs are open to investment and the new ideas and new technology that sometimes accompany investment. Further—and this is perhaps the most important point to understand with respect to the PICs—innovation is even more important for them to achieve growth than it has been for the Asian economies. Because of their much larger size, the Asian economies have been able to achieve ‘catch-up’ growth over many years by adopting innovations from the industrialized countries that apply to large-scale, standardized production activities, such as manufacturing. This kind of investment-growth nexus is not possible in the PICs as they will never be producers of volume-based manufactures. The PICs need innovation that can develop premium-priced, niche markets for new products; thus, these countries face a much greater challenge in generating growth than the Asian economies.
If the PICs are to enter niche markets based on primary products from the region, this will only come about through innovation that is highly value-adding and is within the ‘capabilities’ of the PICs. As Hausmann and Klinger (2007) argue, the PICs will only more to more sophisticated activities that are close to the activities undertaken with their existing capabilities. Applied research that could contribute to this end is likely to be promoted best on a regional rather than an individual country basis. The University of the South Pacific (USP), with its campuses in most of the island countries, is the obvious locus for such research. Thus, it is important that USP’s research is concentrated on possible new sources of comparative advantage in the PICs. Is it possible that the USP and the Kalabu Tax Free Zone in Fiji (see below) could get together to provide an enabling environment for start-up enterprises? A source of venture capital would be needed to make this possible. One form of venture capital that could be likely in the small-country situation is ‘crowd funding’. Through this mechanism, made possible by social media use of the Internet, it has been shown to be possible to gain access to capital from the contributions of many small investors.

For some of the PICs, particularly those comprised of atolls and coral islands, the development of tourism may be the only opportunity for exploiting their comparative advantage. However, the many ways in which they are constraining investment by the private sector does not allow for the introduction of new ideas and new technology that could lead to structural transformation through tourism or through other activities. In addition, their low capacity for the absorption of waste materials severely restricts their potential economic opportunities. Thus, their long-term opportunities appear to rest heavily on education and training and a friendly business environment, perhaps facilitated by the opportunities opened up through high-speed Internet.

**Agriculture**

For the land-rich countries—Melanesian countries in particular—putting the conditions in place to foster agricultural productivity is essential to providing a broad basis for economic growth and overcoming hardship. The key condition for such progress in most countries is making land available for individuals on a secure, long-term basis. Only then will individuals be willing to put in the effort, investment, and innovation needed. Importantly, this would also unleash the ability of women to contribute to agricultural growth. Women already do much of the work in agriculture but their contribution is heavily constrained by their lack of formal access to farmland.

The greatly increased availability of mobile phones and the Internet could have a significant role to play in productivity growth in agriculture. Through these means farmers can quickly access information from agricultural researchers and extension officers. For example, farmers can transmit photos to identify quickly plant and animal pests and diseases and receive advice on their control. Market information can also be made more quickly and widely available. Agricultural productivity growth has excellent potential to reduce poverty and improve the welfare of women, given the reliance of the large lower-income segments of the populations of the PICs on agriculture and the important role of women in their agriculture.
The provision of secure individual rights to land in PICs where there is substantial migration and remittances could stimulate the agricultural sector and improve the welfare of the bulk of the population. Samoa and Tonga are two countries where farm households receive relatively high levels of remittances but where secure access to land is not available for such households. As in other countries receiving remittances, the funds are used by households on improved diets, education of children, and housing; however, remittances are rarely used for investing in businesses. Samoans and Tongans migrating to Australia and New Zealand, for example, have been shown to be quite entrepreneurial. So, as Mancur Olson (1996) argued, it is most likely the lack of appropriate institutions holding back such entrepreneurial behavior in their home countries. Pacific islanders working on Seasonal Worker schemes in Australia and New Zealand are learning farming skills as well as financial skills and therefore, given an encouraging business environment at home, could make a substantial contribution to agricultural productivity and output.

**Marine resources**

Given they are in a ‘sea of islands’, the PICs have ample possibilities for developing marine-based enterprises. The coastal communities and the people living on the atolls and coral islands of the Pacific are heavily reliant for their semi-subsistence existence on the many forms of marine life that they harvest from the inshore fisheries. As well as the fish, shell fish, and crustaceans that they harvest for consumption, cash income is earned from the sale of products such as reef fish, aquarium fish, beche-de-mer (sea cucumber), clams, green snail, seaweed, and cultured pearls. Aquaculture is undertaken on a limited basis and results in the sale of prawns and fish (tilapia).

The problems associated with the exploitation of the inshore fisheries are similar from country to country: low yields, over-harvesting, destructive fishing practices, and abuse of marine habitats (for example, harvesting of mangroves, dynamiting of reefs, and pollution from rapid population growth, urbanisation, erosion, mining, and tourism). It is clear that governments understand that these problems exist; although given the difficulties with assembling accurate and comprehensive information in the Pacific, it is also clear that the extent of the problems is little understood.

The successful outcomes of the research that has been undertaken to remedy the problems are disappointingly few and the problems encountered in the research widespread: poor management of research projects, low levels of skill among the Pacific islanders employed on the projects, high incidence of disease and high mortality rates, and difficulties in finding breeding stock. For example, the highly-valued sea cucumber in Kiribati has been so overfished that workers on a project to increase the stock were not been able to find suitable adults for breeding.

On a country basis, the countries that appear to be in most need of research on fisheries and aquaculture and the enhancement of skills are those made up of atolls and coral islands, such as Kiribati, RMI, and Tuvalu. These environments have very limited capacity for agriculture because of the infertile nature of their soils. They also have very limited capacity for manufacturing because their capacity for effective absorption of waste is minimal. Therefore,
their only opportunities for enhancing welfare through increased output are services (including tourism and perhaps internet-based services) and fishery activities. Some small island communities are taking advantage of tourism. However, waste is generated by tourists and tourism’s impact on marine life and beaches has to be considered carefully. While research on fisheries and aquaculture appears to be a high priority in these cases, they are very small communities and unless the research output has wider application, the rate of return to the research will be tiny. Moreover, there are the many obstacles facing the adoption of research results in these communities that need careful consideration. For example, the small scale and high transport costs make intensification of activities economically difficult, if their development implies marketing the product outside the community. As discussed, the difficulties in finding ways to commercialize activities in these traditional societies are also pervasive.

Adding to the difficulty of identifying worthwhile fisheries and aquaculture research is the rapid rural-urban migration taking place. In Kiribati this migration is depopulating the outer islands while rapidly increasing population on the main island. The same is true of other island groups such as Tuvalu. On the one hand, the loss of population from the small communities in the outer islands is making it more difficult to justify research targeted to these communities. On the other hand, the rapid growth of the urbanized areas is creating major problems in the form of pollution of fresh water lenses and of the lagoons that are an important food source, overharvesting of inshore fisheries, and the destruction of marine habitats.

With increases in population and changes in fishing technology, protection of breeding habitats for marine life (such as mangrove areas) has become a significant issue. The difficulty of protecting these habitats has increased with the erosion of the traditional village authority structures as rural-urban migration has increased. Increasing understanding of the need for habitat protection and improving local-level governance appear to be important. There seems to be the need for a twin approach to these problems. On the one hand, yield increases are required to meet the needs for increased incomes and the demands of the increasing populations. On the other hand, preventing the overharvesting and accompanying destruction of the marine habitats is an economic governance problem. Means have to be found to ensure that communities see the benefits of collective action to protect and improve their marine resources and prevent free-riding by individuals. The research and community outreach undertaken by the Foundation for the South Pacific and the Institute of Applied Sciences (USP) on the science and governance associated with improving traditional community management of marine resources (such as mangrove areas) is a good example of the kind of research needed in this instance.

Health

Non-communicable diseases (NCDs) have increased quickly in the PICs, due mainly to poor diets. Length of working life and even life expectancies are being adversely impacted, reducing the productivity of the countries’ labor force. Further, public health costs of NCD incidence are having a damaging effect on government budgets. Education has proven to be one of the best ways to improve public health through preventative measures. Use of ICTs to educate people about diets and health should be effective in the PICs, given the increased availability of mobile phones and the Internet. The public and private benefits could be considerable.
ICTs could also assist in the provision of medical services on a regional basis. With ICT facilities becoming more widely available regionally, Fiji could play a central role as a medical hub for the PICs, just as Cuba is doing in Latin America. Cuba has long had high levels of education and as early as 1915 had a well-developed telephone system. Prior to the Castro takeover in 1959, Cuba had adopted most of the innovations in telecommunications, including submarine cables and long-distance TV transmission; all of which was dominated by US companies. The disintegration of the Soviet Union in 1989 and the loss of Soviet subsidies forced a restructure of the command-and-control Cuban economy, opening it to private traders and foreign investors, particularly in tourism. From 1995, Cuba’s telecommunications system was in transition from state monopolies to mixed public-private ownership.

Since the mid-2000s, Cuban tourism appears to have peaked and professional services have become Cuba’s largest foreign exchange earner, replacing tourism. Cuba has been exporting health services since the 1960s, utilizing its focus on education in medical practice. The development of telecommunications, together with the high level of medical skills, has led to Cuba specializing in tele-diagnoses and tele-consultations, servicing Caribbean and South American countries. Through the linking of medical training and services in Fiji (the Fiji National University has both a Medical School and a School of Nursing) with ICT development in the region, Fiji could become a medical hub for the region.

*Aged care and long-stay tourism*

It has long been suggested that the PICs could become a destination for people from higher-income countries looking for cheaper aged care facilities and even to cater for long-stay ‘grey’ tourists. These activities may only be likely in Fiji because of its higher-skilled medical services. People requiring aged care or elderly people looking for permanent residence place a high value on receiving high-quality medical care very quickly. Therefore, the long distances from such care and the infrequency of air services make the provision of such services difficult in most PICs. This market also has other particular requirements such as reliable energy, water, and sanitation services, and entertainment and facilities suitable for the elderly. Further, the fact that the PICs are prone to various kinds of natural disasters makes permanent living for the aged problematic.
References


Olson, M. Jr., 1996. ‘Big Bills Left on the Sidewalk: why some nations are rich and others are poor’, Journal of Economic Perspectives, 10:3–24.


Annex: Country Analysis

In the following country analyses, the status of the KE resources (education, innovation, ICT, and their policies and institutions) of the PICs is discussed, either singly or in groups, and the possibilities for innovation are identified. The benefits that could arise from these innovations over the period to 2040 are then estimated, based upon hopefully realistic assumptions.

Fiji

Education

Of all the PICs, Fiji is the most economically advanced and diversified and has the most capability with respect to further advancing and diversifying its economic structure. As far as the development of a KE is concerned, Fiji houses the main campus of the 12-member country University of the South Pacific (USP), which was established in 1968. USP has campuses in all 12 Pacific member countries, which are connected through a satellite-based network able to deliver video conferencing to several centers simultaneously. USP is a mature university with established post-graduate and research programs in many areas, studying issues of concern across its member countries. However, given the location of its main campus and the heavy involvement of Fijian-Indian staff and students, there is a concentration of research upon Fiji itself.

As well, there is the Fiji National University (FNU), established in 2010 from the combination of the Fiji Institute of Technology, the Fiji College of Agriculture, Fiji School of Medicine, Fiji School of Nursing, Fiji College of Advanced Education, and Lautoka Teachers College. There is also the University of Fiji, which was established in 2006. FNU and the University of Fiji, being relatively new and without many experienced academic staff, are yet to become of significance in the carrying out of research.

With its well-developed education system, Fiji has a reasonably well-educated, English-speaking population. Following the 1987 coups, there was significant migration (5-6,000 a year) of Indo-Fijians, many of them professionals. This high rate of migration has continued with the subsequent coups. However, the opening up of professional positions through the loss of Indo-Fijians has led to increased participation by indigenous Fijians in tertiary education.

Since the 2006 coup, several government initiatives have been taken to improve the quality of education in Fiji, including the establishment of the Higher Education Commission, the Fiji National Research Council (FNRC), the FNU, and the Fiji Qualifications Framework. The establishment of the FNRC in 2008 indicated a growing awareness by the government of the importance of research in national development.

ICT

Because Pacific island governments were slow to move in opening up their ICT sectors, they lag well behind other regions in the use of ICT in the promotion of economic activities. However, several Pacific economies, including Fiji, have recently opened up their mobile phone and internet sectors and international telecommunication costs have been sharply reduced. Further,
satellite and submarine optical fiber technology is being used to increase the availability and speed of these services. Therefore, the potential exists for Fiji to bring together its increasing ICT resources and its educated labor to provide services such as Cuba has done with medical tele-diagnostics and tele-consultations. The Fiji Government also put some effort into developing its ‘back office’ capability through the establishment in 2006 of the Kalabu Tax Free Zone (KTFZ), a technology park. Firms setting up in the technology park were provided tax holidays. In 2011, when the tax-holiday incentive came to an end, the Fiji Government sold off the KTFZ. It is now mainly a center for garment manufacture for the high-end fashion industry as well as catering to the demand for small ‘runs’ of clothing such as sporting uniforms and school uniforms.7 Fiji has also opened up its commercial banking sector to new entrants and is linking its expanding ICT and banking services to provide banking services to people in rural areas.

Economic and institutional framework

As far as economic policy more broadly is concerned, Fiji’s poor economic growth by comparison with that of Mauritius has often been held to be due to the lack of commitment to good policy. Forty years ago, Mauritius and Fiji had similarly low per capita incomes, with a dependence on sugar production. However, the Mauritius economy has been transformed by first diversifying the agriculture sector, producing textiles, boosting tourism, and recently developing its financial services to become a banking hub for Indian Ocean economies. Its per capita income is now three times that of Fiji’s.

However, apart from their population size and initial dependence on sugar, the political economy of the two countries is very different. With its strongly-entrenched traditional system, there is huge resistance to Fiji becoming a modern, liberal society. According to their established worldview, the Fijian is primarily bound to serve his/her chiefs, the church, and the Fijian administrative body that oversees the running of the 14 provinces. In return, the chief, as custodian of all moral authority, wisdom, resources, and prestige, will ensure all aspects of village life function efficiently and the distribution of wealth is according to accepted ‘traditional’ protocols. This conception of culture/tradition has sustained its legitimacy through oral tradition, accepted cultural norms and practices, and shared communal values. Thus has the status quo been maintained in which the traditional chiefly elite continue to wield power, enforce traditional provincial loyalties through kinship ties, and perpetuate the people’s acceptance of their traditional—and thereby divine—right to ownership of all land, sea, air space, resources, and people within his/her governing domain or confederacy.

Economic reforms are frequently interpreted as attempts to destabilise one or all of the three pillars of indigenous society. Since 1970, this siege mentality has been a powerful defense mechanism for traditional chiefs. Protection of chiefly interests has been the reaction to

7 This move takes advantage of the Fiji garment industry’s ability to undertake at relatively low cost the small runs required by the fashion industry and sports clubs and schools, as opposed to the large runs of standard garments produced by the large, low-cost, labor-intensive industries in countries of South and East Asia. Clothing design has been promoted in Fiji through the efforts of Fiji Fashion Week (Fiji Islands Business, June 2013).
recommendations for land liberalization, reform of the public service, and privatization of underperforming SOEs, to name a few examples. Individual Fijian economic empowerment, particularly through control over land, is often perceived as a threat to sustained social coherence and communalism. In the traditional scheme of things, this would ultimately mean that deference, allegiance, and support (in cash or kind) for the chief, the church, and the government would diminish considerably, if not disappear altogether. After all, a chief is only as good as the popular support, deference, and allegiance received from his/her people.

Trade liberalisation, economic deregulation, and investment promotion have been the focus of economic policy since 1987—at least in terms of rhetoric. After 1989, Fiji removed import licensing requirements and quantitative restrictions. It also undertook a radical shift in its tax system, streamlining import duties and implementing a Value-Added Tax (VAT) system. These changes were designed to reduce the price-distorting effects of the tax system and to broaden the tax base. Fiji became a member of the World Trade Organisation (WTO) in January 1996 and now provides most-favored nation (MFN) treatment to all trading partners.

But since 1999 successive Fijian governments have rolled back trade reforms and there has been inconsistency in the setting of tariffs (Duncan et al. 1999). It is difficult to say whether the trade policy reform that has taken place has led to more internationally-competitive industries that exploit Fiji’s comparative advantage. The fact remains that Fiji’s export performance has remained poor due to lack of investment and the country has not been able to diversify its merchandise export base to any great extent.

However, the Interim Government that was in power until recently following the 2006 coup, opened up the economy to some extent. It liberalized the mobile phone market, with the result that phone costs fell and mobile phone services are now available over most of the country. The Interim Government also attempted to overcome the customary land leasing impasse by creating a ‘land bank’ into which customary owners can assign land they wish to make available for long-term lease for agricultural use. The effectiveness of the system will depend upon whether commercial banks have sufficient confidence in it to use the land lease as collateral for loans; which will depend in turn on there being no conditions placed on the transferability of the lease and the government standing solidly behind the lease contract. The Interim Government also announced that it would privatize most of the remaining SOEs. However, progress on this front has been slow.

The lack of collateral due to the impasse over the renewal of the leasehold system for native land and the need for an improved leasehold system, the loss of human capital due to the emigration of Indo-Fijians following the coups, poor infrastructure and high-cost essential services, the resistance to reform of the public sector and the resistance to trade liberalisation, and law and order problems linked to the poor investment environment and the coups appear to be substantial constraints on investment and growth. However, they appear to be proximate constraints, due in turn to primary, underlying constraints, rather than primary constraints.

_Innovation possibilities_
Agriculture: There appears to be considerable potential for agriculture to make a larger contribution to economic growth in Fiji. However, whether it does will depend in large part on the effectiveness of the regime for long-term leasing of custom land for agriculture. Given this outcome, the re-building of Fiji’s agricultural research system would be required to develop better quality produce, diversification of agricultural output, improved farming systems, improved supply chains, and pest and disease control. There is a large potential internal market in the form of tourist demand for good quality, reliably-supplied foodstuffs, presently being supplied by imports. Being able to supply this market would be good preparation for accessing international markets.

Tourism: With its large number of attractive island settings, Fiji has large potential to expand tourism. Moreover, the likely demand could be very large, given the expected expansion in international tourism from East and Southeast Asia. However, besides increasing tourist numbers, tourism could make a larger contribution if tourists can be attracted to spend more time in Fiji and spend more money each day. Meeting these goals depends to a large extent on developing more activities in which tourists can engage. This will depend upon innovative entrepreneurs. Hence, being open to ideas from foreign investors as well as domestic investors is therefore important.

The protection of the resources being exploited for tourism—reefs, beaches, marine life, etc—is therefore important. Research is necessary to ensure that such resources are maintained.

Marine resources: The livelihoods of people in the coastal areas are heavily dependent upon the inshore fisheries and other marine resources. Development of management systems to ensure the recovery and maintenance of these resources is therefore essential. Again, research has a strong part to play.

Manufacturing and services: Innovative ideas are needed if economically-efficient manufacturing and services are to be established. As noted, it is likely that any such activities will take place through the exploitation of ‘Pacificness’. Given its more educated population, Fiji is more likely than most of the other PICs to be able to move to more advanced products and services. Moreover, its educated population will enable it to take advantage of the opportunities that the development of ICT will offer. Again, being open to the introduction of innovations from foreign investors will be important. As noted, the development of innovations could be enhanced by the bringing together of research, innovators, and venture capital (including the use of ‘crowd funding’).

Creative activities: Fiji is a vibrant locus of creative arts, including music, dance, handicrafts, and fashion. As noted, around the world the creative arts have not been a particularly important source of economic activity. Hence, it is unlikely that significant creative activity will be developed in Fiji. Still, it will be useful to make the most of such activities through the use of ICT to make the world aware of their existence. In this way creative arts could enhance the attractiveness of Fiji as a tourist destination.

A regional ‘hub’: Fiji is already an economic hub for the PICs through its importance in regional shipping and airline services. Because the Pacific islands are unlikely to see bulk
The pay-off from innovation

In the following projections, we assume:

(i) With secure individual land rights and robust growth in agricultural research capacity, and with an improved inshore environment increasing the contribution of marine resources to subsistence livelihoods, agricultural GDP (including agriculture, forestry, and fishing) grows by an additional 2.5 per cent/year from 2020 to 2040

(ii) With enhanced tourism attractions, tourism numbers, and per capita expenditure, tourism GDP increases by an additional 1.5 per cent/year from 2020 to 2040

(iii) Innovations in manufacturing and services increase as a result of the liberalization of investment and the bringing together of research, innovation, and capital; this, together with Fiji acting more as a regional hub, leads to an increase in manufacturing sector output of 1.5 per cent/year from 2020 to 2040

(iv) Innovations in finance, including provision of regional financial services, increase the output of this sector by an additional 1.0 per cent from 2020 to 2040

(v) The benefits of the interventions and innovations will not begin until 2020, which allows time for impacts to begin.

The 2010-12 averages of sector GDP (in constant 2008 prices) are as follows: Agriculture (including agriculture, forestry, and fishing) F$571.8m; Manufacturing F$719.7m; Tourism (proxied by trade + transport, storage and communication) F$1,532.3m; and Finance F$847.9m.

Using the 2020-2040 sector output increases assumed above, the constant-price sector GDP by 2040 is as follows: Agriculture F$937m; Manufacturing F$1,180m; Tourism F$2,063m; and Finance F$1,034.7m.

Accumulated, these output gains increase GDP from F$5,765m in 2010-12 to F$7,308m in 2040—an average annual increase in the GDP growth rate over the period from now to 2040 of 1.0 per cent.

Papua New Guinea

Education

Primary and secondary education in PNG is mostly undertaken by churches. Overall, the quality of education is poor and school attendance is low, particularly in public schools in rural areas—as reflected in the estimated 57 per cent adult literacy rate (ICDE http://www.icde.org/projects/regulatory_frameworks_for_distance_education/country_profiles/png/education_system/). Only about one-quarter of children of school age are enrolled in secondary schools.
There are 26 vocational training centers and six universities, of which four are government-run. ICDE reports that PNG higher education providers face many challenges including, severe funding constraints, poor physical facilities, inadequate IT, libraries, and other teaching resources, problems with recruitment and retention of teachers, safety and other barriers of entry for female students, and limited research capacity.

Internet access for on-line programs is provided through the Papua New Guinea Academic and Research Network (PNGARNET), which is operated by a consortium of private and public tertiary institutions and overseen by the Vice Chancellors Committee. The Network is a satellite-based model with the hub in Hong Kong. The satellite base is necessary because of the difficult terrain, the remoteness of communities, and the frequent seismic activity.

ICT

It was not until 2007 that the government granted two new mobile licences enabling private companies to compete with the government monopoly provider, Telikom PNG. Due to the difficult terrain and the low incomes in rural areas, fixed-line telephony infrastructure is almost non-existent outside urban areas. Therefore, the introduction of mobile phone competition brought about a revolution in phone access. From 3 per cent in 2006, coverage has increased to around 80 per cent in 2015. Over this period, mobile phone penetration has risen from 1.6 per cent to 35 per cent. While the introduction of competition lowered phone costs substantially, costs are still high even by regional standards.

Telikom PNG is the only licensed operator for submarine cables at present, which means that it has a monopoly over wholesale services. There is a cable from Madang to Sydney, which piggybacks on ExxonMobil’s LNG pipeline; there is also a cable connecting Port Moresby and Sydney. While Telikom PNG is the sole provider of broadband services, there are a large and increasing number of ISPs offering data through satellite services.

However, internet access is unavailable throughout most of PNG. Most rural areas only have 2G service. However, the private mobile provider, Digicel, is expanding its 3G and 4G networks, which will give wider access to the internet through mobile phones.

In response to the IMF’s recommendation for the government to replace the Telikom PNG monopoly with a modern regulatory framework, Telikom PNG is being restructured to focus on retail services. The network will be transferred to a new SOE, DataCo. Thus, any ISP will be able to lease bandwidth at wholesale prices from DataCo. Availability of bandwidth will be expanded through the installation of a submarine cable landing in Madang.

With the proliferation of mobile phone services, there has been strong growth in the use of social media. This applies particularly in its use in political activism.

Economic and institutional framework

With respect to how well PNG meets Adam Smith’s four fundamentals for promoting innovation and economic growth (secure property rights, law and order, impartial enforcement of contracts, and contestable markets), PNG has improved significantly in recent years but still has a long way to go. The most significant improvement has been the change to legislation affecting use of
custom land. In 2009 the PNG parliament unanimously approved changes to the legislation that now allows leasing of custom land to individuals for periods up to 99 years. At the same time improvements were made to legislation affecting the settlement of disputes over ownership of custom land and land administration. This is a very significant change in property rights that should allow individual innovation and enterprise. However, the outcome will depend upon the government standing solidly behind the legislation, commercial banks accepting such leases as good collateral, and the people’s acceptance of this change.

Law and order and impartial enforcement of contracts will be hugely important in supporting the change in access to custom land and productivity-enhancing innovation more generally. Aid agencies have put a lot of funding and effort into improving the performance of the PNG police force. However, there has been slow progress on this front, with problems arising from political interference in police affairs. The courts in PNG have been able to function reasonably well, even under severe pressure from frequent political challenges, particularly on constitutional matters.

The competitiveness of markets has been a continuing problem in PNG, with trade restrictions often being used to privilege specific firms. Also, the investment regime is not an open one, with certain activities reserved for nationals. As noted above, there has been improved competition in the mobile phone market and there is movement toward a more open internet market. There has also been some contestability introduced into international airline services with a competitor allowed to enter air services to Australia in 2009. More recently, competition with the government-owned airline has been allowed in flights to the Philippines. But SOEs remain a significant obstacle to private sector development, with the government reluctant to cede control over utility services that continue to have high costs and unreliable service.

With respect to the financial sector, the central bank has been able to operate reasonably independently for over a decade under a managed float regime. At much the same time the banking sector became more open and the operation of the superannuation fund was placed into private hands. The National Superannuation Fund (NSF) was established in 2002 to take over the management of superannuation funds in PNG following severe mismanagement and corruption problems with the National Provident Fund. The NSF is under the control of independent directors. Investment of the funds is outsourced to independent service providers. This arrangement has been very successful.

Innovation possibilities

Agriculture and forestry: Over 85 per cent of the PNG population live in rural areas. Most of these people have a largely subsistence existence. Cash income is generated from surplus food production from home gardens, which is sold in informal markets and is used mostly for school and medical fees. There is also considerable output of cash crops by individual households in the form of betel nut, coffee, cocoa, copra, tea, and palm oil. However, only betel nut and palm oil have experienced significant growth.

There appears to be good scope for productivity improvements in agriculture. This outcome is now more likely given the change in the legislation allowing secure, long-term leases on custom land. Under the terms of the changed legislation, custom landowners will be able to declare
portions of their land available for lease, which will allow domestic and overseas investors to undertake large-scale farming, as well as allowing individuals within a clan to invest their efforts and innovation with confidence that they have secure rights to the output. The palm oil industry has shown how with reasonably secure access to land (on state land) and well-equipped research facilities, it has been able to develop an internationally-competitive industry.

Opportunities for significant innovations and productivity increases will depend upon how effectively research supports the agriculture sector. The National Agricultural Research Institute (NARI) located in Lae is PNG’s main agricultural research provider. However, there has been little in the way of breakthroughs coming from NARI. This poor outcome may reflect the fact that until the recent change in the land legislation there was little security for people to establish farming enterprises. It likely also reflects the very poor infrastructure (roads and bridges, ports) and that fact that supply chain development is very difficult while the infrastructure is so poor. The extension of mobile phones could be an important factor in productivity advances in agriculture in support of research and infrastructure and supply chain developments.

**Marine resources:** Besides PNG’s significant tuna resources and the development of tuna processing activities (discussed in another paper), inshore fisheries and inland fisheries play a significant role in the livelihoods of the PNG people. There are an estimated 10,000 small-scale village farmers engaged in inland aquaculture in PNG. However, despite the keen interest in this activity for both subsistence and cash income, the industry lags similar activities in Asia. The Australian Centre for International Agricultural Research [http://aciarblog.blogspot.com.au/2013/10/ponds-for-prosperity-in-papua-new-guinea.html](http://aciarblog.blogspot.com.au/2013/10/ponds-for-prosperity-in-papua-new-guinea.html) has been undertaking research on aquaculture in PNG for many years and has identified the various problems restricting production (see e.g. Smith 2007). Research is expected to continue.

Inshore fisheries are also important for subsistence livelihoods and cash income for the rural population. However, such fisheries are under significant threat from similar causes as in other Pacific island countries: e.g. over-fishing, pollution, damage caused by destructive fishing methods, and loss of breeding grounds due to reclamation (Govan 2013). Research is also needed here to find appropriate management systems—particularly those based on community governance.

**Mining:** In 2013, mining accounted for 13.5 per cent of PNG’s GDP. With the start of the large LNG project in the Southern Highlands Province in 2014 and full production achieved in 2015, mining’s share of GDP will increase considerably. The revenue flow accruing to the government has thereby also been considerably increased. However, the important issue will be whether these revenues will be spent effectively. PNG has a very poor record on this score. Given this poor record, an important innovation would be to transfer some of the mining revenues directly to the people, whereby it is more likely to improve welfare outcomes.

**Manufacturing:** Manufacturing in PNG is mostly small-scale and focused on processing and packaging foodstuffs for local consumption and for export to some of PNG’s Pacific neighbors. Fish canning is a recent, reasonably-large activity in terms of employment. However, this activity is founded on preferential access to the EU and resulted in attracting Thai investment.
that would be unlikely to remain beyond the loss of the preference. The same is true of foreign investment in sugar refining and cement making, which rely on import protection into PNG.

Economically-efficient innovation in manufacturing in PNG is most likely to be built on adding value to its many natural resources through activities that are not labor-intensive or capital-intensive.

Services: Since opening its financial sector, PNG firms have expanded into other Pacific countries. Most notable is the Bank of the South Pacific (BSP), which has expanded into Fiji and Solomon Islands. It is offering a range of banking services enabled by the use of mobile phones, including for people in rural areas. As noted above, the people of PNG have become avid users of mobile phones and the internet, where available, and therefore it can be expected that telecommunications will play a useful part in future innovations.

Unfortunately, tourism is not an important activity in PNG despite the fact that it has an abundance of activities that would be of interest to tourists such as the incredible scenery, the very colourful birdlife, the highly diversified culture, coral reefs, sports fishing, and WWII sites. There are over 100,000 visitors recorded but these are mostly business people and consultants. It is estimated that there are only around 20,000 genuine tourists each year, by comparison with the 6-700,000 tourists going to Fiji each year.

The availability of custom land for long-term leasing and the freeing up of international airline services has improved the climate for investment in tourism in PNG. However, the widespread perception and indeed the actuality of severe law and order problems now appear to be the binding constraint on the development of a robust tourist industry and related activities.

Creative activities: PNG has a highly diverse and colorful culture featuring dance and costumes, which would be very attractive to tourists under a normal law and order situation. Handicrafts are also varied and widespread, including painting, sculpture, and weaving. Maybe it is possible to set up on-line sales facilities to market some of these handicrafts overseas.

The pay-off from innovation

In the following projections, we assume:

(i) With secure individual land rights and robust growth in agricultural and marine research capacity, and with an improved inshore environment increasing the contribution of marine resources to subsistence livelihoods, agricultural GDP (including agriculture, forestry, and fishing) grows by an additional 2.5 per cent/year from 2020 to 2040

(ii) With gradually improving law and order and additional tourism facilities and attractions, tourist numbers and per capita expenditure would increase substantially so that tourism and related services GDP increases by an additional 5 per cent/year from 2020 to 2040

(iii) Innovations in manufacturing and services increase as a result of the liberalization of investment and expatriate skills and improvement in university research capacity and output, which leads to an additional increase in manufacturing sector output of 3 per cent/year from 2020 to 2040

(iv) Innovations in finance, including provision of regional financial services, increase the output of this sector by an additional 2 per cent from 2020 to 2040.
The 2010-12 averages of sector GDP (in constant 1998 prices) are as follows: Agriculture (including agriculture, forestry, and fishing) k3,914m; Manufacturing k983m; Tourism and related services k897m; and Finance k602m.

Using the 2020-2040 sector output increases assumed above, the constant-price sector GDP by 2040 is as follows: Agriculture k6,414m; Manufacturing k1,775m; Tourism and related services k2,380m; and Finance k895m.

Accumulated, these output gains increase GDP from k12,698m in 2010-12 to k17,766m in 2040—an average annual increase in the GDP growth rate over the period from now to 2040 of 1.4 per cent.

**FSM, Kiribati, RMI, and Tuvalu**

These four micro-states have been grouped as their KE characteristics are very similar, as are their opportunities for innovation.

*Education*

Kiribati, RMI, and Tuvalu are all members of USP and have USP campuses. However, Kiribati and RMI are the least well-performed students at USP, reflecting their poor performance at primary and secondary school level. Education in FSM and RMI is largely funded by the US. In RMI one-third of primary-school aged children do not attend school due to financial and other reasons. Overall, public education in RMI is considered by the International Council for Open and Distance Education (ICDE) to be in a ‘poor state . . . many teachers are unqualified and teacher absenteeism is a serious problem’.

http://www.icde.org/projects/regulatory_frameworks_for_distance_education/country_profiles/marshall_islands/education_system/

Aside from the USP campus, the College of the Marshall Islands (CMI) is the major post-secondary education provider, offering two-year associate degrees. Enrolments in USP are said to be ‘relatively low’.

FSM is not a member of USP. It does not have a university. The national FSM government’s Department of Education (DOE) sets standards, while the four state government DOEs are in charge of curriculum and instruction. Reflecting the poor early childhood and primary education, secondary school enrolment is low. The main tertiary education organization is the College of the Federated States of Micronesia (COM-FSM). Since 1999, COM-FSM has operated a Fisheries and Maritime Institute in Yap state; but demand for its courses in Navigation, Maritime Engineering, and Fishing Technology are said to be extremely low. There is some interaction between COM-FSM and the University of Hawai‘i and the University of Guam, e.g. in the offer of Certificates in Elementary Education and Telecommunications.

ICDE reports that education in Kiribati is also ‘poor’. A significant proportion of children of primary and junior school (12-15 years) do not attend school. High school fees charged by senior secondary schools (mostly church-run) are said to contribute to the high attrition rate among older children. Besides the USP campus, post-secondary schooling is by TVET organizations
and includes: Kiribati Institute of Technology, Kiribati Police Academy, Kiribati School of Nursing, Kiribati Teachers College, Fisheries Training Centre, and Marine Training Centre (which provides training for work on foreign merchant ships).

With respect to Tuvalu, the ICDE reports that educational outcomes have declined in recent years and that literacy and numeracy rates are generally declining. Only 40 per cent of secondary-aged children are estimated to attend school. Besides the USP campus, the main post-secondary provider is the Tuvalu Maritime Training Institute, which provides training for those seeking employment on foreign merchant ships. The USP campus provides hundreds of distance education courses online via audio or videoconferencing.

**ICT**

In 2010 an undersea fiber-optic cable was connected to the islands of Ebeye and Majuro in RMI, providing these locations with high-speed, reliable Internet access. The Tuvalu Telecommunications Corporation (TCC) is a government monopoly provider of telecommunications services between the country’s islands. Kiribati is linked to the Pacific Ocean Cooperative Telecommunications Network. The Kiribati government is a monopoly provider of telephony and internet services. The FSM government has a monopoly of all forms of telecommunication; and, while it is connected to the Internet via an undersea cable, internet access outside Pohnpei state is scarce.

**Economic and institutional framework**

A common characteristic of these four microstates is the high level of welfare dependency created by the large amounts of aid received over many years. Others are the lack of openness to foreign investment and expatriate labor and the dependence on the public sector for formal employment. FSM and RMI, along with Palau, have a Compact of Free Association with the US, which has delivered them and will continue to deliver them considerable amounts of aid. The Compacts between the three Micronesian states and the US were negotiated over many years (beginning as early as 1969). Compacts with FSM and RMI were eventually brought into effect in 1986. These agreements recognized the sovereignty of FSM and RMI and granted their citizens the right to live and work in the US—but not gain US citizenship. As well, the agreements provided the Micronesian states defined amounts of aid for certain periods. For its part, RMI granted the US exclusive military access in return for a guarantee of defence against third parties. The Compacts were reviewed and amended in 2004 after the first Compact period of 15 years and renewed until 2023. Palau adopted its own constitution in 1981 but did not become independent from the US until 1994 when a Compact of Free Association was agreed with the US.

Given the labor mobility to the US provided through the Compacts, the poor economic performance of FSM and RMI has resulted in considerable emigration to the US (including to Guam and Hawai‘i). By 2011 there were around 56,000 migrants from the Micronesian states living in the US—up from 2,500 prior to the Compacts. More than one-half of these were in Guam and Hawai‘i. The highest net migration rate has been from the poorest of the three countries, the FSM
As far as trade relations with the US are concerned, the three Micronesian states have free access for goods with a domestic value added of greater than 30 per cent. However, there has been little in the way of export activity in these states.

The formal economic structure and growth performance of FSM and RMI reflect largely the influences of the pre- and post-independence activities, with the economic dominance of the public sector the result of the large amount of aid. The high proportion of public servants in total formal employment receiving high wages poses a very difficult obstacle to the establishment of private sector enterprises and employment; as does the predominance of SOEs.

_Innovation possibilities_

As is evident from the section above on education in these countries, the extent and quality of education are at a very low level in all four countries. Therefore, it would be optimistic to expect innovations that are skill-intensive.

Aside from their tuna fisheries, which are discussed in another paper, inshore marine resources are the main physical resources of these four countries. Because of the very limited amount of arable land, agriculture holds little scope for improved economic growth. Thus, innovation possibilities rest on the use of the countries’ inshore marine resources and their human capital. Tourism is only a tiny part of these economies, although some islands, such as Chuuk in FSM, have very attractive diving venues (especially wreck diving). Their remoteness from major markets and the lack of air services is a major factor accounting for the countries’ poor tourism performance. Still, The Maldives has shown how it is possible to turn negatives such as remoteness and the absence of development into positives in attracting tourists. Hence, if obstacles to investment such as access to land and poor air services can be overcome, their tourism sectors could be developed as part of a ‘Pacific Tourism Package’.

As noted earlier, the inshore marine resources that contribute toward subsistence livelihoods and money income have been depleted through overharvesting and damaging fishing practises. Therefore, there is a contribution to be made to maintaining livelihoods through research and extension to improve management of the inshore areas. Such a contribution would also be important if tourism can be developed.

_The pay-off from innovation_

In the following projections, we assume for all four states:

(i) Following research and extension to improve management of inshore resources, output of the Agricultural sector is increased by an additional 0.5 per cent per year over the 2020-2040 period.

(ii) Following improved policy levers with respect to foreign investment, access to land, and air services, integration into a ‘Pacific Tourism Package’ could result in Tourism output increasing by an additional 1.0 per cent per year over the period 2020 to 2040.

(iii) As assumed elsewhere, the benefits from interventions and innovations do not begin until 2020.

_FSM_
The 2010-12 averages of sector GDP (in constant 2008 prices) are as follows: Agriculture (including agriculture, forestry, and fishing) US$60.4m; Tourism US$38.1m

Using the 2020-2040 output increases assumed above, the constant-price sectoral GDP in 2040 are as follows: Agriculture US$66.7m; Tourism US$46.5m

Accumulated, these output gains increase GDP from US$245.9m in 2010-12 to US$260.6m in 2040—an average annual increase in the GDP growth rate over the period from 2010-12 to 2040 of 0.23 per cent.

RMI

The 2010-12 averages of sector GDP (in constant 2004 prices) are as follows: Agriculture (including agriculture, forestry, and fishing) US$18.2m; Tourism US$33.1m

Using the 2020 to 2040 output increases assumed above, the constant-price sector GDP in 2040 are as follows: Agriculture US$20.1m; Tourism US$40.4m

Accumulated, these output gains increase GDP from US$147.1m in 2010-12 to US$156.3m in 2040—an average annual increase in the GDP growth rate over the period from 2010-12 to 2040 of 0.24 per cent.

Kiribati

The 2010-12 averages of sector GDP (in constant 2006 prices) are as follows: Agriculture (including agriculture, forestry, and fishing) A$34.5m; Tourism A$25.9m

Using the 2020-2040 output increases assumed above, the constant-price sector GDP in 2040 are as follows: Agriculture A$38.1m; Tourism A$31.6m

Accumulated, these output gains increase GDP from A$157.2m in 2010-12 to A$166.5m in 2040—an average annual increase in the GDP growth rate over the period 2010-12 to 2040 of 0.22 per cent.

Tuvalu

The 2010-12 averages of sector GDP (in constant 2005 prices) are as follows: Agriculture (including agriculture, forestry, and fishing) A$7.7m; Tourism A$4.7m

Using the 2020-2040 output increases assumed above, the constant-price sectoral GDP in 2040 are as follows: Agriculture A$8.5m; Tourism A$5.7m

Accumulated, these output gains increase GDP from A$33.0m in 2010-12 to A$34.8m in 2040—an average annual increase in the GDP growth rate over the period 2010-12 to 2040 of 0.2 per cent.
Samoa and Tonga

Education

Participation in education and the quality of education in Samoa and Tonga are understood to be reasonable; however, according to the ICDE, ‘Enrolments in primary and secondary schools [in Samoa] have fallen in recent years and many students fail to make the transition from primary to secondary education . . . Transition rates in rural areas are worse than in urban areas.’

The only national university in Samoa is the National University of Samoa, established in 1984. It offers only undergraduate and TVET courses. USP has its agricultural campus in Samoa (the Alafua campus) offering the full range of undergraduate degrees by distance learning as well as graduate degrees in agriculture. There are very few Samoan students studying agriculture at Alafua, which has disappointed the Samoan government as it has given considerable support to the University. Possible reasons for the lack of interest in agriculture are: (i) the lack of high-school teaching of agriculture; (ii) the lack of science teachers in schools; and (iii) the absence of successful business people operating in agriculture. However, the underlying cause may be the lack of secure individual access to land for agriculture and thus no incentive for innovation and individual effort in agriculture.

According to the ICDE, there is widespread belief that the quality of education in Tonga is in decline due to the loss of teachers to migration and decline in the quality of training, both by the local Tonga Institute of Education, which is the government’s teacher training college, and by the local USP campus. The schooling system in Tonga is dominated by the private sector, particularly churches. University education is mostly undertaken overseas. TVET is widely diverse and includes areas such as teacher training, nursing, medical fields, accounting, automotive engineering, architecture, handicrafts, theology, agriculture, IT, and maritime training. Classes appear to be small and the quality of training likely suffers from the attempts to cover all these field.

ICT

The mobile phone and Internet markets have been liberalized in Samoa and Tonga and participation has increased hugely while costs have fallen. Samoa has full geographical coverage for cell phones, with mobile phones in 2009 numbering around 150,000 in a population of 192,000. Samoa is connected to a submarine cable; however, the cable is nearing the end of its life and Internet costs are high. A Samoa-Fiji fiber-optic cable is planned under the Pacific Regional Connectivity Program.

The Tonga-Fiji submarine fiber-optic cable was launched in August 2013, providing Tonga with large bandwidth for Internet uses.

Economic and institutional framework

Samoa’s severely deteriorating economic situation in the early 1990s led to a major review of its economic policies and adoption of a comprehensive economic reform program in 1996. The reform program involved a wide range of structural reforms—including privatization of SOEs—supported by sound macroeconomic policies (Browne 2006). As part of the reform program,
there was a large reduction in tariffs in 1998; except for vehicles, alcohol, and tobacco, the highest tariff rate applied was 20 per cent, as compared with 60 per cent previously.

Financial sector liberalization also began in 1998. Controls on credit and interest rates and on the capital account were removed, while there was a strengthening of prudential supervision. Further reforms in 2003 included the opening up of the telecommunications and postal sectors and in 2004 the liberalization of international airline services. The opening up of the international airlines market involved the sale of the international routes of the state-owned airline, Polynesian Airlines, to Pacific Blue and allowing competition from other international airlines such as Fiji’s Air Pacific (now Air Fiji). In the wake of this introduction of competition, international airfares fell by up to 50 per cent.

With the improved overseas airline services there were many more direct flights from Australia and New Zealand. The tourist hotel occupancy rate soared, inducing interest from international hotel chains. Samoa had constraints on foreign investment in the form of obligations to include local investors in any foreign-invested venture. However, the government relaxed this restriction to allow 100 per cent foreign ownership in the case of resort hotels. It also allowed extended leasing of custom land for the erection of tourist resorts.

An ADB (2007) report argues that the binding constraints on growth in the early 1990s were macro-economic in nature. In support of this claim, the report cites the high inflation rate, which at times exceeded 20 per cent, the distortion of the trade regime due to the high and variable levels of tariffs, and the large fiscal deficit. However, it is difficult to find support for the idea that it was mainly macro-economic management issues that were constraining growth in the early 1990s. The poor GDP performance in the early 1990s was no doubt directly due to the cyclones; and the macroeconomic crisis that the government found itself in was due to its poor management of the after-effects of the cyclones. However, it does appear reasonable to argue that the reforms were triggered by the economic management problems of the government and that they directed the government’s attention to the important performance issues that it should be dealing with in order to improve the country’s economic growth, rather than being so involved in the economy through government businesses. No doubt it was important to adopt fiscal and monetary policies that would provide the private sector with a stable environment for investment and this macroeconomic stability was achieved in the early period of the reforms.

The underlying problem appears to be that the economy was not growing sufficiently strongly to provide the revenues needed to cope with the natural disasters experienced. Hence, the real constraints on growth that the government had to tackle were the ones that were responsible for the poor performance of the economy even prior to the natural disasters of the early 1990s.

In the 2000-04 period, both industry and services did well, growing at 9.7 per cent and 4.9 per cent, respectively. Then in the period 2004-08 growth slowed in both areas, largely as a result of the decline in GDP in 2008 due to the global economic crisis. However, the economic growth that has taken place since 2000 has been rather narrowly-based. The three sectors of the economy that have grown fastest and are now the largest are Trade, Transport and Communications, and Construction. According to Sialaoa (2005), economic growth in the first half of the 2000s was
driven by construction and tourism. The tourism was mostly in the form of overseas Samoans visiting relatives and friends. Growth in the construction sector was due mainly to construction of church residential buildings, most likely funded by remittances, and government spending on facilities for the holding of the 2007 Pacific Games and the construction of the new Development Bank building. As well, through guarantees provided by the Development Bank and the National Provident Fund, the government supported the development of a four-star resort hotel. Thus, it would appear that Samoa’s good growth in the first half of the 2000s was largely dependent upon its overseas workers and government expenditure, rather than the economic reforms. As Sialaoa (2005) noted, ‘the growth of private sector investment has been very slow’.

Therefore, it is reasonable to argue that up to 2005 the binding constraints to economic growth through private sector development had not been overcome. Many reforms were implemented but these do not appear to have contributed significantly to growth up to that point, although the macro-economic reforms served to stabilise the economy.

The introduction of competition in international airline services in late 2004 seems to have been the trigger to unlocking the potential of the tourism industry. Up to 2004 the growth in tourism numbers was not substantial. However, in 2004 and the years following up to the global recession in 2008, there was significant growth in tourist numbers. Moreover, following the opening-up of international airlines services, there has been much greater interest by international hotel chains in building resorts in Samoa.

It appears likely, therefore, that while macro-economic instability was a problem prior to the mid-1990’s reforms, it was probably not the binding constraint to private sector growth. The lack of competition in international airline services appears to have been the binding constraint on private investment in tourism and related activities. Infrastructure development on the main island and the opening of the telecommunications sector likely complemented the opening of international air services to competition in fostering investor interest in the tourist sector, which, in turn, was facilitated by the secure access to custom land.

In some cases the existence of monopoly SOEs may not be a binding constraint, as entrepreneurs may still be able to develop profitable ventures in areas that do not rely heavily on the services provided. However, in the case of tourism, an airline monopoly in the Pacific can dominate all other constraints as there is no possibility that competitive substitutes can be found. The same appears to be true of telecommunications monopolies with respect to many economic activities, as government can effectively prevent the operation of telecommunication competitors and substitutes.

What are the constraints that may have inhibited private sector development in Samoa in the 1990s and do so currently? The ADB (2007) report argued that the binding constraints to improved growth currently are micro-economic in nature, including the following:

- Too much state intervention in the form of monopoly SOEs, which is raising business costs;
• Property rights, particularly to land, are not well-defined. A system for secure leasing of custom land would provide a more secure basis for business development, including in agriculture, as well as collateral for access to commercial credit;
• The financial sector is ‘thin’ and the cost of finance is high, which is related to the weak property rights to land and the consequent lack of security for loans;
• The commercial legal system is costly;
• The failure of the agricultural sector due to weak property rights and excessive state intervention in agricultural production;
• The approval process for foreign direct investment (FDI) is opaque and ad hoc. Barriers to the hiring of skilled expatriates need to be relaxed; secure land leases should be made more easily available to foreign investors; and investment incentives should be eliminated and instead the government should focus on making the investment environment more enabling and low-cost so that it becomes more internationally competitive;
• Consultation between the government and the private is poor.

This is a substantial list and does not provide any priorities for action with respect to relaxing the constraints. The important question, therefore, is that of the necessary sequencing of reforms in addressing the constraints. Several of the constraints the ADB report identifies are very closely related. For instance, unless there is security of land tenure such that commercial banks are willing to accept it as collateral for loans, credit will not be available to domestic and foreign investors, including in the agricultural sector. The key is to make land leases fully transferable so that the commercial banks are willing to use them as collateral. The ‘thin financial sector’ that the ADB report identifies is also closely related, as without the capacity to have secure title to land as the major form of collateral, a country cannot develop a mature financial sector—land titles are by far the major form of collateral for commercial loans.

Thus as the ADB report says, the failure of the agricultural sector to develop appears to be a major factor underlying the poor economic growth in Samoa over many years. This failure is closely tied to the absence of secure individual title to customary land—which comprises around 80 per cent of all land—and, in turn, the absence of collateral for access to commercial credit.

The other binding constraints that the ADB report identifies appear secondary to the absence of secure individual title to land and the related credit issues. The higher costs inflicted on business by the existence of SOEs, the inefficient legal system, and the inhibitions on foreign investment are obstacles to business, but they are not such severe obstacles to growth as the lack of secure title to land and its related issues. Nor would removing them contribute much to growth in the absence of the secure individual access to land that would allow investors to take advantage of their relaxation. Therefore, it appears that providing secure individual title to native land is the most important priority for reform. Improved access to commercial credit, a more developed financial sector, and improved agricultural productivity will follow as a result of mobilising land for development through providing tenure security. Making provision for long-term leasing of native land appears to be the best way of mobilizing native land for development; as has existed in Vanuatu since independence; as existed in Fiji following the colonial administration; and as
has recently become available in Papua New Guinea through the passage of its amended custom land legislation.

Economic growth in Tonga has been poor over many years, with isolated spurts of growth mostly resulting from expenditure of aid on infrastructure following natural disasters or other problems such as the 2006 riots. A significant bright spot has been the democratization of the Tongan Government, with the King and Nobles relinquishing much of their control of the economy since 2010. In the November 2010 elections, voters elected the majority of members of the Legislative Assembly, with the Nobles holding only nine seats. The Nobles have also divested themselves of some of their commercial interests. However, the King retains veto power over legislation.

Several economic reforms have been implemented since 2008, e.g. liberalization of trade and investment, tax reform, opening of the mobile phone market, and reduction of the size of the public service. However, the many SOEs that impose a burden on the budget and that ‘crowd-out’ the private sector remain; and the public sector remains comparatively large and well-paid, which also presents difficulties for the private sector. Access to land for private investment is also difficult: leases of land are mainly of a short-term nature and need the approval of the noble who controls the land and of the Minister of Land. Banks will lend against these leases but all the processes involved are very time-consuming. Further, women do not have formal access to land, infrastructure is poor, and utility costs are high. Investment is controlled by an annual licensing regime that is dependent upon government goodwill. The outcome of all these difficulties facing private investment is that there has been little in the way of domestic or foreign investment.

The welfare of Tongans is highly dependent upon the comparatively high level of remittances. Tonga is near the top in terms of per capita remittances, with workers going mainly to New Zealand, the US, and Australia. While the global financial crisis led to a downturn in remittances, the Seasonal Worker Schemes put in place by New Zealand and Australia has given a fillip to remittances. Another bright spot in the economy has been the increase in tourist arrivals over the past decade. However, tourism is held back by the lack of top quality resorts.

Tonga has good arable land and a range of traditional root crops as well as introduced vegetables can be grown. Squash production was introduced into Tonga in the mid-1980s to supply the off-season (December-January) market in Japan (between the ending of the domestic season in Japan and the start of the New Zealand season). Exports reached a peak of 18,500 metric tons in FY1992 and have since declined.

The rise of the squash industry was dramatic, becoming a major employer with production spread among 2,000 growers and a few large commercial enterprises supplying 14 licensed exporters. The response to this market opportunity is heartening as it shows, despite much argument to the contrary, that given appropriate market incentives Pacific islanders will respond.

The decline in this very narrow market was likely due to competition, in Japan as well as in Vanuatu and New Zealand. Because Tonga’s opportunity derived from such a narrow seasonal ‘window’, it was susceptible to research that extended the growing season in its competitors, especially the adoption of earlier-maturing varieties in New Zealand.
Vanilla is another crop that has had an up-and-down history in Tonga. Earlier attempts at vanilla production in response to high prices resulting from set-backs to vanilla growing in the main producer, Madagascar, ultimately failed due to sharp reductions in prices as production in Madagascar recovered as well as failure to enforce good standards. Currently, Heilala Vanilla, established by a New Zealand company as an aid project following a cyclone in Tonga, is now recognized as a world-class organic producer, exporting to seven countries. It has extended its interests into producing extra virgin coconut oil. The success of this enterprise likely illustrates the importance of expatriate ideas and skills and of joint ventures with expatriate firms in overcoming the drag of social obligations on indigenous enterprise.

Innovation possibilities

The agricultural sectors in Samoa and Tonga are significantly underutilized and much improved returns would be realized from a substantial increase in agricultural research. Such research should improve the productivity of traditional crops consumed domestically as well overseas by the now large diaspora. Diversification of agricultural production would also be worthwhile in meeting the growing tourism market as well as in providing opportunities for niche overseas markets. Secure, individual access to land is essential to provide scope for these improved returns. Improved land access for women is also essential for gender equality as well as for reducing poverty.

Both Samoa and Tonga have been sending substantial numbers of workers to New Zealand and Australia under these countries’ Seasonal Worker schemes. As well as earning remittances for their households, the workers are learning farming skills that will stand them in good stead if there is greater opportunity at home for agricultural activities. The remittances also provide financial scope for the more entrepreneurial households to develop small businesses, particularly if there is more secure access to land.

Privatization of SOEs to stop them crowding out the private sector is essential in both countries, as is the adoption of more open and transparent investment regimes. Doing so would lower the costs of essential services and open up opportunities for both domestic and foreign investors. Many of the Samoans and Tongans who have migrated to Australia, New Zealand, and the US have become successful in business and, given the right incentives, can be a valuable entrepreneurial and financial resource for business development in their home countries. Likely the only incentive needed is for these economies to become more investor-friendly.

The pay-off from innovation in Samoa

In the following projections, we assume:

(i) With secure land access for individual households, enhanced agricultural research and education, use of ICTs for agricultural extension, and improved farming methods, agricultural output to increase by an additional 2 per cent per year from 2020 to 2040

(ii) With a more investor-friendly environment, manufacturing will take advantage of the entrepreneurial diaspora to increase output by an additional 2 per cent per year over the period 2020 to 2040

(iii) With an enhanced tourism experience, particularly as part of a Pacific-wide ‘package’, tourism output increases by an additional 2 per cent per year over the period 2020 to 2040.
The 2010-12 averages of sector GDP (in constant 2002 prices) are as follows: Agriculture (including agriculture, forestry, and fishing) Tala 100.1m; Manufacturing Tala 101.8m; Tourism Tala 402.1m

Using the 2020-2040 output increases assumed above, the constant-price sectoral GDP in 2040 are as follows: Agriculture Tala 149m; Manufacturing Tala 152m; Tourism Tala 597m

Accumulated, these output gains increase GDP from Tala 1,084m in 2010-12 to Tala 1,379m in 2040—an average annual increase in the GDP growth rate over the period 2010-12 to 2040 of 1.0 per cent.

**The pay-off from innovations in Tonga**

In the following projections, we assume:

(i) With secure land access for individual households, enhanced agricultural research and education, use of ICTs for agricultural extension, and improved farming methods, agricultural output to increase by an additional 2.5 per cent per year from 2020 to 2040

(ii) With a more investor-friendly environment, manufacturing will take advantage of the entrepreneurial diaspora and the large remittance flows to increase output by an additional 2.5 per cent per year over the period 2020 to 2040

(iii) With the development of international-quality resorts and an enhanced tourism experience, particularly as part of a Pacific-wide ‘package’, tourism output increases by an additional 1.5 per cent per year over the period 2020 to 2040.

The 2010-12 averages of sector GDP (in constant 2010 prices) are as follows: Agriculture (including agriculture, forestry, and fishing) Pa’anga 131.4m; Manufacturing Pa’anga 44.6m; Tourism Pa’anga 148.4m.

Using the 2020-2040 output increases assumed above, the constant-price sectoral GDP in 2040 are as follows: Agriculture Pa’anga 215m; Manufacturing Pa’anga 74m; Tourism Pa’anga 199m

Accumulated, these output gains increase GDP from Pa’anga 770m in 2010-12 to Pa’anga 884m in 2040—an average annual increase in the GDP growth rate over the period 2010-12 to 2040 of 0.55 per cent.

**Palau**

**Education**

The Palau education system consists of 22 primary schools, one high school, and the Palau Community College. The education system is based upon the US system and is largely funded by the US government. However, the local population has limited vocational and technical skills.

**ICT**
Competition was introduced to the mobile phone market in Palau in 2006. Plans for improvements to Internet connectivity are in place through the World Bank-led Pacific Regional Connectivity Program, with the planned laying of a submarine cable between Palau, Yap, and Guam.

**Economic and institutional framework**

The drivers of growth in Palau are aid, tourism, and revenues from the tuna fishery. Aid per capita is one of the highest in the world and accounts for around 24 per cent of GDP. Because of the importance of tourism and the high level of revenue flowing to the government from aid and fishing revenues, the services sector dominates the economy, with services being around 77 per cent of GDP and around 76 per cent of formal employment in the public sector.

With Palauans having freedom of entry to the US under the Compact arrangements, the loss of local labor means that foreign workers play a large role, especially in tourism. Foreign workers account for around one-half of the total workforce.

The tourism industry is dependent mainly on Japan, Taipai, China, and the PRC. It is highly sensitive to external conditions and thus fluctuates considerably. However, there has been a consistent upward trend. In FY 2014 tourist numbers reached a peak of 123,000, with strong growth from the PRC, the largest source of growth in the last quarter of FY2014. A second air service from Hong Kong, China, helped to increase growth from East Asia. Expanded resort accommodation also helped.

The constraints to faster economic growth in Palau are similar to those in other PICs: poor security of access to land for investors; inhibiting foreign investment rules that are encouraged by vested interests; difficult arrangements for bringing in expatriate labor; inadequate fresh water supplies, poor sanitation and waste management facilities, and costly power infrastructure, which all limit the expansion of tourism; the high public service pay and conditions that ‘crowd out’ the private sector; and, generally, the ‘welfare dependency’ created by the high level of aid from the US.

**Innovation possibilities**

Increased productivity is needed in agriculture and in inshore fisheries for improved subsistence livelihoods and for the development of commercial activities. Research is therefore needed as is the extension of any advances made in management practices.

The most likely avenue for increased GDP growth is tourism. With the prospects of rapidly-increasing tourist numbers from Asia, Palau is in a geographically favourable position to benefit. However, a more favourable investment environment is needed for the expansion of accommodation. However, care needs to be taken to avoid environmental problems resulting from the expansion of tourism.

**The pay-off from innovation**

In the following projections, we assume:
(i) With agricultural and marine research, subsistence output increases, and with improved access to land, commercial agricultural output increases, so that total agricultural and marine output grows by an additional 1.0 per cent over the period 2020 to 2040.

(ii) Palau is able to take full advantage of the growth in tourism due to the Asian Century and increases tourism output by an additional 2.5 per cent per year over the period 2020-2040.

The 2010-12 averages of sector GDP (in constant 2005 prices) are as follows: Agriculture (including agriculture, forestry, and fishing) US$7.8m; Tourism US$71.7m.

Using the 2020-2040 output increases assumed above, the constant-price sectoral GDP in 2040 are as follows: Agriculture US$10m; Tourism US$118m.

Accumulated, these output gains increase GDP from US$190m in 2010-12 to US$238m in 2040—an average annual increase in the GDP growth rate over the period 2010-12 to 2040 of 0.9 per cent.

**Solomon Islands and Vanuatu**

*Education*

The KE status of Solomon Islands is critically low. Education is not compulsory and less than 60 per cent of children enter primary school, while only about 17 per cent of children of secondary school age are enrolled in high school. The ICDE reports that ‘The education system suffers from a lack of qualified teachers, overcrowded classrooms, poor facilities, a shortage of basic teaching materials and an inadequate supply of textbooks. Half of all primary teachers . . .are unqualified or uncertified’.


Higher education in Solomon Islands is composed of the Solomon Islands National University (SINU) and the Honiara campus of USP. SINU was formed in 2012 from the Solomon Islands College of Higher Education and now has Schools in the following areas: Education, Finance and Administration, Marine and Fisheries, Nursing and Health Studies, Industrial Development, Natural Resources, Tourism and Hospitality, and Humanities, Science and Media. These facilities are all in Honiara, which restricts access to the wider population. Those students who are able to do so prefer to go to New Zealand universities.

The schooling attendance rate in Vanuatu is at much the same poor level as in Solomon Islands, with only 20-25 per cent of students who complete primary education going on to secondary school. There are persistent concerns regarding curricula and teaching outcomes, with teacher training standards said to be ‘extremely low’. Over one-third of all teachers in Vanuatu have not completed secondary school.


The dual English-French education system in Vanuatu, a legacy of the colonial past, is a cause for concern—resulting in high unit costs, duplication of effort, and overall inefficiency. With respect to tertiary education, there are a large number of public and private TVET providers.
However, the only provider of university-level education is USP, which has its Law School in Port Vila, and provides Foundation training and undergraduate courses for those students who do not attend the Suva campus.

**ICT**

Solomon Islands is the most recent PIC to open its mobile phone market. In 2010 a license was granted to a joint venture of Vodafone and Bmobile (of PNG). The joint venture will provide competition to the government-owned enterprise, Our Telekom. The Internet market is still under government control through the operator Solomon Telekom. However, through the World Bank-led Pacific Regional ICT Connectivity Project, it is planned to connect Solomon Islands to the submarine optic-fiber cable now connecting Fiji and Tonga. This will allow fast Internet capacity to the global submarine cable network and likely will lead to the opening of the Internet market in Solomon Islands. Solomon Oceanic Cable Company, of which Our Telekom is a partner, aims to have a submarine cable providing a broadband network to three of Solomon Islands’ major urban centers by March 2016. Presently, it is using satellite.

The mobile phone market in Vanuatu was opened to competition in June 2008 with the arrival of Digicel. Between the government-owned mobile phone operator and Digicel, mobile phone coverage in Vanuatu is now said to be at ‘saturation point’.

A vital stage in the provision of Internet was reached in January 2014 with the launch of the Vanuatu-Fiji submarine fiber-optic cable linking to Sydney and providing scope for rapid Internet speeds.

**Economic and institutional framework**

Solomon Islands is one of the poorest countries in the Pacific, with around 85 per cent of the population widely dispersed in rural areas and on the many outer islands in the archipelago. As a result of this dispersion, the provision of services is very high-cost. The tribal diversity and the resulting clan-based politics in Solomon Islands makes achieving collective action on welfare-improving actions for the whole of the society extremely difficult.

Aid, forestry, agriculture, and fishing (both inshore and deep-water) have been the mainstays of the economy. Gold mining has been a contributor to the economy at times. However, due to tribal upheavals, the one major mine, Gold Ridge, has been opened and closed at various times. Presently, it is closed. Solomon Islands, being on the Pacific Rim of Rim, probably has major mineral resources similar to PNG but the tribal tensions make the exploration and exploitation of such resources highly risky.

Besides aid, forestry has been the commercial mainstay of the government and the economy for many years. Despite forecasts of its imminent demise for at least 20 years, logging for export has continued to run at a high level. Attempts to find alternatives to forestry as a major source of government revenue have so far proved fruitless.

Providing secure access to the 87 per cent of the land under customary control has been attempted several times but has been unsuccessful so far. Other constraints to private sector development are the poor state and high cost of services (including inter-island shipping), which
are indeed unavailable to a large proportion of the population; skilled labor is in short supply; and there is a high incidence of very damaging natural disasters. SOEs are also prevalent, with the loss-making enterprises placing a huge burden on the budget. As well, they are used to provide political favors through placements on SOE boards and in management positions.

Hopes for diversification and growth of the economy have been placed on the development of large-scale palm oil plantations but this would depend upon the availability of secure access to land. Other possibilities are smallholder tree crops (cocoa) and fruits and vegetables. Tourism is poorly developed but has considerable potential, given the country’s experiences in WWII.

A comprehensive reform program (CRP) was introduced in Vanuatu in 1998 following a period of poor economic performance. During 1996-98, severe fiscal and monetary difficulties had developed in the midst of political instability. There were two changes of government within a short period after the 1995 elections. Political instability remains a problem. The priorities of the CRP were public sector reform, improved governance, strengthening of public financial institutions, and institutional strengthening (Knapman and Saldanha 1999).

However, there was not a rapid improvement in economic performance in response to the reforms. It wasn’t until 2003 that economic growth turned positive. Fiscal accounts continued to be weak; development expenditure remained high, while foreign borrowing and weak oversight in the selection of projects led to a continuing build-up of debt. Despite the work that had gone into planning for the CRP and generating support for the reforms, there was little progress on the CRP owing to a lack of consensus about the policy direction.

The economy picked up from 2003 with an increase in export prices, increased tourist numbers following expansion in airline capacity, and liberalization of trading in cocoa and copra. This was against the background of the adoption of sound fiscal policies (supported by a strong, determined Finance Department) and sound monetary policy (backed by a strong Central Bank team). These improved institutional arrangements resulted in improved revenue collection and expenditure and debt controls despite severe political instability and despite the occurrence of severe cyclone Ivy in 2004. However, any economic improvement would have been much less substantial without the improved external situation resulting in growth in agricultural exports and tourism.

The key factor in the improvement in tourism appears to have been the liberalization of overseas air services, with initially Pacific Blue beginning operations in the latter half of 2004 and ultimately resulting in five international airlines flying into Vanuatu. These more reliable and cheaper air services improved connections to Vanuatu’s main tourist markets, Australia and New Zealand, as well as opening up the Vanuatu market to tourists connecting internationally through Fiji. The availability of custom land for leasing for up to 75 years, which was established at independence, has also allowed the development of tourist facilities.

According to IMF Consultation IV reports, the good fiscal and monetary policies were maintained from 2005 to 2009, supported by aid commitments including substantial commitments by the US through the Millennium Challenge Account for the development of transport infrastructure. The tourism industry was assisted by the Fiji coup in December 2006,
which led to the redirection of tourists from Fiji. FDI from Australia for investment in tourism facilities and in real estate also supported GDP growth through this period. However, little progress was made on reforms to improve the private sector environment.

All three engines of growth stalled in 2009 and 2010, which brought an end to the sustained growth episode: copra output fell in response to a sharp decline in global prices; infrastructure projects were delayed; and tourism declined after a surge that had been prompted by the global financial crisis of 2009-10, as tourists elected to go to closer/cheaper resorts in Vanuatu rather than further afield.

Economic growth has remained sluggish recently, despite the maintenance of sound macroeconomic policies. Therefore, it appears that the sources of Vanuatu’s sustained growth episode was initially improved agricultural export markets, followed by aid-funded infrastructure investment, liberalization of airline services, and foreign investment in tourism facilities and real estate. As the IMF has said consistently, the development of an encouraging environment for the private sector still has a long way to go.

**Innovation possibilities for Solomon Islands and Vanuatu**

Solomon Islands and Vanuatu need collective action to develop the institutions and policies that will provide a more encouraging environment for the private sector; such improvements include raising the extent and quality of education and training, privatization of their many SOEs, and the better involvement of women in the formal sectors. Secure access to land for individual enterprises is needed in Solomon Islands as well as action to improve the environment for the exploration and development of mineral resources. Both countries also need research and training to improve productivity in the subsistence and formal agricultural sectors. Both countries are involved in the New Zealand and Australian Seasonal Worker schemes and their acquired knowledge of farming will be useful in taking advantage of opportunities for development of their agricultural sectors.

Both countries suffer natural disasters that inflict considerable destruction of physical capital. Action is needed to improve the countries’ disaster preparedness, including the building of more physical disaster-resilient buildings.

Tourism has been significantly improved in Vanuatu through improved policies. However, there remains considerable scope for expansion of tourism activities. Tourism in Solomon Islands has considerable unexploited scope, particularly to make information about the country’s involvement in WWII widely available.

**The pay-off from innovation in Solomon Islands**

In the following projections, we assume:

1. Secure individual access to custom land, improved agricultural research and training, and improved involvement of women in agriculture increases formal agricultural output through the development of diversity in agricultural production (smallholder and plantation crops) to increase agricultural output by an additional 2.5 per cent per year over the period 2020 to 2040
An improved private sector environment (including elimination of SOEs, improved infrastructure and utilities, improved law and order, and improved natural disaster preparedness) increases manufacturing and mining output by 3 per cent per year over the period 2020 to 2040.

Improved exploitation of tourism attractions, improved tourism facilities, and improved law and order increases tourism sector output by 4 per cent per year over the period 2020 to 2040.

The 2010-12 averages of sector GDP (in constant 1985 prices) are as follows: Agriculture (including agriculture, forestry, and fishing) SI$243.0m; Manufacturing SI$10.8m; Tourism SI$64.5m.

Using the 2020-2040 output increases assumed above, the constant-price sectoral GDP in 2040 are as follows: Agriculture SI$398m; Manufacturing SI$24m; Tourism SI$142m.

Accumulated, these output gains increase GDP from SI$455m in 2010-12 to SI$700m in 2040—an average annual increase in the GDP growth rate over the period 2010-12 to 2040 of 1.7 per cent.

The pay-off from innovation in Vanuatu

In the following projections, we assume:

(i) Improved agricultural research and training, training and remittance benefits from involvement in A&NZ Seasonal Worker schemes, and improved involvement of women in agriculture increases formal agricultural output through the development of diversity in agricultural production (smallholder and plantation crops) to increase agricultural output by an additional 2.5 per cent per year over the period 2020 to 2040.

(ii) An improved private sector environment (including elimination of SOEs, improved infrastructure and utilities, improved political stability, and improved preparedness for natural disasters) increases manufacturing output by 3 per cent per year over the period 2020 to 2040.

(iii) Improved exploitation of tourism attractions, improved tourism facilities, and involvement in Pacific-wide tourism increases tourism sector output by 3 per cent per year over the period 2020 to 2040.

The 2010-12 averages of sector GDP (in constant 2006 prices) are as follows: Agriculture (including agriculture, forestry, and fishing) Vatu 12.0 billion; Manufacturing Vatu 2.0b; Tourism Vatu 26.6b.

Using the 2020-2040 output increases assumed above, the constant-price GDP by sector in 2040 are as follows: Agriculture Vatu 20b; Manufacturing Vatu 4b; Tourism Vatu 49b.

Accumulated, these output gains increase GDP from Vatu 58b in 2010-12 to Vatu 90b in 2040—an average annual increase in the GDP growth rate over the period 2010-12 to 2040 of 1.8 per cent.
Annex 3: Pacific Islands in a Sea of Knowledge: Seizing Opportunities for New Development Paths (by Jean Eric Aubert and Eriko Suzuta)

Pacific Islands in a Sea of Knowledge:
Seizing Opportunities for New Development Paths

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Table of contents
Introduction
Understanding knowledge economy
What is knowledge economy
KE is a major factor of economic growth and productivity improvement
KE transforms employment conditions in a global context of jobless growth
KE supports the development of “creative societies”
KE helps small economies but requires also critical mass of resources
KE needs to be adapted to countries’ specificities
Building knowledge economy foundations
Education: increase enrolments and improve quality
ICT infrastructure: expand further telecommunication networks
Innovation: build dynamic ecosystems
Business environment: remove keys obstacles
Migrations: take advantage of diasporas
Developing key sectors and activities
Fisheries
Agriculture
Tourism
Global Outsourcing Services
Public services
Renewable energies

Moving forward

Engage top leadership

Provide attractive visions

Make gradual, transformative strategies

Mobilize foreign aid as change driver

Exchange experiences within PIC and with the rest of the world

Monitor and evaluate

Conclusion

References
Introduction

The Pacific Islands Countries are facing huge challenges: Two key features characterize the Pacific Islands Countries (PIC): their remoteness and their smallness. These have created difficult conditions for economic development. PIC have experienced unstable economic growth and, as a whole, at a much lower rate than the Asia Pacific region. Unemployment is high, notably among the youth (more than 50 per cent of 20-24 years old in some islands). The situation can be even worse in the future as PIC are experiencing high population increases, in fact the highest growth rates of the world. PIC are also subject to serious climate threats; some islands are periodically devastated by natural disasters, while the rise of sea level threatens livelihoods of many inhabitants. Economies are strongly dependent on marine and agriculture resources. Their remote situation induces high transport costs and prevents the development of manufacturing activities. Such challenges are faced by most of small developing island states (SDIS) throughout the world, but they are particularly acute in PIC.

To cope with such challenges, PIC should benefit of the knowledge and technology revolution and should adopt development strategies based on the Knowledge Economy (KE) concept, following a global trend and amplifying initiatives already taken in several PIC. KE is an economy driven by knowledge and innovation that concerns all sectors and activities. It is much more than an Information and Communication Technology-driven growth, although ICT constitute the basic infrastructure of the knowledge society. KE applies to low and medium income countries and not only to high income ones. It is a major source of economic growth and productivity improvement. A KE-based development model will contribute to improve the employment situation in PIC, although it will not provide the massive quantity of jobs needed for absorbing youth bulges affecting a number of islands in the coming decades. It will also offer the possibility of a more entrepreneurial and more decentralized economy, and of a society more respectful of social and environmental values that are embodied in the culture of the islands. Leaders in each country have a key role to play for conducting their peoples on these new development paths.

After presenting the concept of knowledge economy and its relevance for the PIC, the paper discusses the building of KE foundations in PIC, and then provides examples of concrete activities that can be developed by PIC in exploiting opportunities opened by KE, before concluding on actions to be taken to move forward such a development strategy. Drawing upon the international experience, notably from countries comparable to PIC, it complements other background documents prepared for the Pacific Possible study.

Understanding knowledge economy

What is knowledge economy?

Knowledge has always been central to development. But with globalization and the increased pace of technological progress that has been spurred by advances in ICT, knowledge has become the key driver of competitiveness and is reshaping the patterns of the world’s economic growth and activity. According

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8 These countries are the followings (in parenthesis their population in thousands): Papua-New Guinea (7.755), Palau (21), Federated States of Micronesia (517), Marshall Islands (53), Kiribati (105), Solomon Islands (561), Vanuatu (261), Fiji (890), Tonga (106), Samoa (579), Tuvalu (10) and Cook Islands (13).

9 Pacific Possible concept note, World Bank, June 2015

10 Notably the contribution prepared by Ron Duncan, which this paper occasionally draws upon.
to the OECD (1996) and the World Bank (2007), a knowledge economy (KE) is one in which knowledge is acquired, created, disseminated, and applied to enhance economic development.

Making the move to a KE involves more than developing high technology industries, investing in ICT, or acquiring new technologies for use in a narrow fringe of the economy. Rather, it involves a more systemic change in the overall functioning of the economy, in which knowledge (both new and existing) and innovation (development and commercialization of products and processes that are new to the firm, the market, or to the world) penetrate all sectors of economic activity. In so doing, the economy generates new goods and services, increases productivity, gains efficiency in the delivery of services, and improves welfare.

For this to happen, a development strategy based on the KE approach needs to focus on four key policy pillars that include: education, the fundamental enabler of the KE; innovation, the source of continuous renewal of economies; ICT, the key infrastructure of the digital age; and the broader economic and institutional framework, which determines the overall efficiency and impact of investments made in the other three areas. Transitioning to a KE ideally means taking a holistic approach, as well as effective action—reform, investment, and coordination—in all four of these policy areas (World Bank, 2007).

Understood in such a way, it is clear that KE applies to all economies, whatever their level of development. It can even be the foundations of development strategies for low-income countries, if adapted to their specific needs and capabilities.

**KE is a major factor of economic performance and productivity improvement**

KE appears as a major factor of economic growth (World Bank, 2007; OECD, 2013). KE is a source of growth not only for advanced economies. It is also valid for developing countries. KE, measured by intangible investments, is also a key driver of labor productivity growth (more than 25 per cent in developed economies). The impact is significantly greater when all forms of intangible investments, including R&D, training, etc., are considered in addition to ICT, showing the importance of a holistic approach (Corrado and al, 2015).

Investment in ICT alone contributes to economic growth more in low and medium income countries than it does in high income one (World Economic Forum, 2014; Deloitte 2014) -- See figures below. One should note also that the impact of ICT, measured by the network readiness index (benchmarking achievements in infrastructure, contents, literacy, etc.), on the level of economic development become significant only when it reaches a certain threshold. ICT is a foundation infrastructure that supports many pillars of development. Not only would it help overcome the problem of geographical isolation, but it would also contribute to a more systemic transformation through knowledge and innovation.
KE transforms employment conditions in a global context of jobless growth
The impacts of a KE shift on jobs are difficult to quantify: improved efficiency saves a number of jobs in established sectors, KE-related innovations generate new activities that are sources of jobs, etc. Knowledge intensive sectors, measured by the skill and education level of workers, benefit primarily from the KE shift. Knowledge intensive sectors in a given country tend to grow at a higher rate in terms of GDP and employment than the rest of the economy\textsuperscript{11}.

But KE goes with a general trend of automation and computerization of tasks, notably routine ones, limiting opportunities for employment. In advanced economies such as the US, about half of existing jobs have a probability of 50\% and more to be automated in the next one or two decades. More generally, all countries are facing since a decade or two, a job-less growth situation -- both developed and developing countries (OECD, 2015). So, while embarking in a KE-based development process is a must, one should not expect massive job creations solving unemployment issues.

PIC are, and will be, particularly concerned by employment issues. A number of them are facing massive youth bulges, with high demographic growth rates (see figures below). Formal employment opportunities are already limited relative to the labor force in many PIC. A large share of formal employment is in the public sector, ranging from 30\% in the Solomon Islands to nearly 80\% in Kiribati. An ILO study suggests that the percentage of men between 20 and 24 who are not engaged in productive activities is as high as 58\% in Kiribati, 44\% in the Marshall Islands and 46\% in Samoa (ILO, 2013).

\begin{figure}
\centering
\includegraphics[width=\textwidth]{chart.png}
\caption{Proportion of population younger than 15 years of age (\%).}
\end{figure}


\textsuperscript{11} As documented notably by a report on KE in New Zealand, 2009 (Department of Labor. A sector is qualified as knowledge intensive when at least 25\% per cent of the workforce must be qualified to degree level or higher, and at least 30\% per cent of the workforce must be employed in the professional, managerial and scientific and technical occupations)
A knowledge economy-based development model will require a general upgrading of the education and skill levels, and, as seen below (education section) there are already a lot of skill gaps that could be filled up in PIC economies, helping to reduce employment problems. But a KE-based development model will not provide enough jobs to absorb the mass of people adding each year to the working age populations\textsuperscript{12}. Migration flows will have to continue and possibly be expanded. But migrants abroad can be a source of competence and funding of key importance for KE-based projects developed in the islands.

KE supports the development of “creative societies”

At the same time, a very important feature is that KE goes with the development of overall productive systems in which goods and services are produced at a marginal cost that tends towards zero (Rifkin, 2014). This applies in many fields: for instance with 3D printing, with energy generation techniques operating at a very low cost, with the so-called MOOCs in education and so on. The Internet of Things helps also to connect and manage all sorts of activities at distance, reducing considerably costs of logistics, energy, transport, etc.

This new form of economy, which goes genuinely with KE, creates a climate favorable for a broadly spread entrepreneurship, illustrated for instance by the Uber mode of transport in which individuals offer taxi

\textsuperscript{12} A few examples can illustrate the point. Considering the demographic projections given in the two figures above, the increase of jobs for absorbing the additional working age population of 20-24 youth in 2020 would be in the order of 10,000 for the smallest states such as Palau and Cook Islands, 40 to 50,000 for medium size states, such as Tonga and Kiribati, and possibly 300 to 350,000 for a large state like Fiji. These numbers are clearly out of reach in a global context of very low job-growth elasticity, even if a KE model is significantly more efficient from this viewpoint.
services out of established corporations. Thus a new type of society is developing – some may call it a “creative society” – in which people become more autonomous for making their living (OECD, 2015). This supposes providing individuals with adequate skills through flexible education systems, notably for lifelong learning. This requires also new forms of social protection and new types of community support since many people are being involved in intermittent income generating activities -- in other words the new form of economy that goes with KE would lead to true social innovations. These social innovations, including for instance the provision of a kind of minimum income for all (OECD, 2015), need to be actively promoted in PIC.

In parallel, a “share” society is taking shape, in which individuals share goods in function of their needs, as cars and bikes in cities, or directly rent one to each other the goods they have in property, as houses (“airbnb”). This share economy is extending to many fields, including finance with crowd-funding practices through dedicated Internet sites. The Internet-based society is leading to a new form of economy, different from the established capitalism, where the central question is no more one of property, but of access (Rifkin, 2014).

*KE helps small economies but requires also critical mass of resources*

KE benefits small economies, when they are well organized and have made the necessary investments for it, as illustrated by numerous examples around the world, among advanced countries such as Singapore and Iceland, as well less advanced ones such as Mauritius and Seychelles. ICT reduce disadvantages caused by remoteness and allow information reaching local communities that can be very far from urban centers.

However, the experience shows also that effects of agglomeration and cross-fertilization that are inherent to large urban centers continue to play a key role; and the so-called « Information Age » goes with continued urban concentration, and an increased role for large metropolises as source of innovation, loci of investments, etc.¹³ Urban areas tend to attract more private sector employment in knowledge economy, but KE jobs in the public sectors such as education and health are also needed in less urbanized areas¹⁴.

So it is very important for PIC to reach critical masses for certain types of activities, and there is a strong need for active cooperation between PIC. There are several areas where PIC have begun working together, e.g. in the field of education (see below). But there is more to do for coping efficiently with KE challenges, as discussed later.

*KE needs to be adapted to countries’ specificities*

KE should be adapted to country specificities and there is a need to build on their comparative advantages. In this perspective, PIC can build on their “Pacificness” (Duncan, 2015). That entails exploiting exceptional opportunities for tourism and fishing industries, as well as taking advantage of unique cultural traits. Those can be manifested in the so-called “creative industries” (arts and crafts, music, etc).

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¹³ See notably studies by Michael Storper

¹⁴ See the New Zealand Knowledge Economy report (2009)
Cultural specificities, understood from a broader anthropological viewpoint, can find also a place in the design and implementation of KE-based strategies through the exercise of leadership, the sense of community and so on.

Moreover, it is important to adapt KE strategies to peculiarities of each PIC from economical, institutional, political, or sociological viewpoints. Although PIC present a number of common features and face many common challenges, they are relatively diversified. One can identify different sets:

- Fiji which has a relatively large and diversified economy, but which has experienced a certain political instability, affecting its development process;
- Tonga, Samoa and Vanuatu, the Polynesian islands, with significant economic assets, but badly impacted by hurricanes that have affected the growth process;
- The Micronesian islands, including the FSI, The Solomon Islands, Kiribati, and Tuvalu, with limited resources and relatively small populations and much dependant on foreign aid and remittances; Palau is an exception with a large tourism sector.
- Papua New Guinea, with a large population (7 million people), with important natural resources (gas, mining, forests), but still at a low level of development.

**Building the Foundations of Knowledge Economy**

The measurement of KE receptiveness of countries is based on the gathering of data documenting performances achieved in the four pillars mentioned above and benchmarking them against global or regional performances. In the case of PIC, such a systematic effort has been made only for Fiji. Piecemeal information is available for other PIC. Data collected for Fiji and comparing it to other countries of the Asia and Pacific region\textsuperscript{15} show that it is correctly positioned, with a KE performance close to the average of the region (see figure below).

\textsuperscript{15} See Innovative Asia, ADB report, 2015. The ADB report has based its benchmarking on the World Bank Knowledge Assessment Methodology (KAM) which includes three variables under each of the four pillars (See Building Knowledge Economy, World Bank, 2007). ADB has updated the KAM database, with information dating of 2013-2014.
These relatively good performances are noticeable on the knowledge-related pillars, education and ICT notably, while the economic and institutional regime is weaker. Fiji that has a more developed economy than the other PIC is probably also the more advanced on the different KE dimensions. Several other PIC, including Samoa, Tonga and Palau, are likely to be at a similar level. One may think that building solid foundations for a KE-based development in those “more advanced” PIC is not out of reach within a reasonable time period – let’s say one decade. For the less advanced PIC, the time horizon can be significantly larger. Let’s examine the situation of the different KE pillars in various PIC.

**Education: increase enrolments and improve quality**

**Basic education**

An educated and highly skilled workforce is critical in a knowledge economy. In order to take advantage of the youth bulge and avoid future unemployment and social problems, PIC will have to ensure quality education. Although net primary enrollment ratios are fairly even in the region, reaching almost 80% in Palau, PNG, and Solomon Islands, net secondary enrollment ratios diverge significantly and there is still scope for improvement. While about half of the countries count an enrollment ratio of 60-80%, in the FSM, Nauru, PNG and Solomon Islands, the ratio is about 20-30% (ADB, 2008).
Tertiary education

Tertiary education takes place through the South Pacific University, an important achievement with the headquarters based in Fiji, and with campuses in 12 PIC that are owning the university (Cook Islands, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Samoa, Solomon Islands, Tonga, Tuvalu, Tokelau, and Vanuatu). This network supports the deployment of a large and diversified set of distance learning programs, thanks to a satellite-based system.

Prospects of training technology are improving as computer facilities begin to penetrate rural areas. In the Fiji Islands, for example, the Advanced Vocational Training Program is planning to use existing e-learning facilities in 21 rural secondary schools to establish e-community training centers and e-training-cum-production centers to strengthen informal sector training programs. The Fiji Institute of Technology offers a program where students do not have to physically attend the FIT campus for some time. The Fiji Institute of Technology has provided franchise to secondary schools allowing them to offer post secondary programs. The USPNet from the University of South Pacific goes beyond borders, covering over all the 12 countries owning USP through its private satellite communications network. Such programs, however, require good ICT infrastructure and connectivity, ICT-literate teachers and adapted policies.

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16 Established in 1968, the university is organized in three faculties (humanities and law, economics and management, natural and environmental sciences) and has a teaching staff of some 1600 persons, with two thirds at doctorate level.

17 The number of students that have benefited of such programs is not considerable: about 4000 for the period 2001-2006, for 42 franchised establishments (ADB, 2008); the program has been somewhat discontinued afterwards, due to change in fee policies.
Vocational training could also start in secondary education, learning from the experience of Palau and Fiji, which are most advanced in this respect (ADB, 2008). This will expose students to basic skills that could stimulate and prepare them to take more specialized vocational training. Such “prevocational” training will also offer the opportunity for students to better understand the labor market and orient students towards skills that are needed, facilitating their employment later on.

**Skills gaps**

Evidence suggests that there are skills shortages in all PIC (ADB, 2008). Skills shortages are particularly associated with key export-earning economic activities – primarily mining and tourism – and the associated economic sectors such as construction. High vacancy rates are seen in the construction, hotels and restaurant sectors. Finding the right skills becomes particularly difficult in outer islands and in the rural areas of the main islands.

Furthermore, there is a shortage in supervisory and management skills in many cases. The rest depends in large by the growth of the different sectors. For PNG, there is a shortfall of skilled labor in mining and related activities. For Vanuatu, it is tourism-related activities including construction. The most “advanced” countries suffer more from widespread skills shortages in construction trades, plumbing, electrical, refrigeration/air-conditioning repair, and hospitality occupations.

It is important that training institutions stay informed on the labor market and adapt their programs accordingly. Mismatches in the demand-supply balance for technical skills are reported in many countries, particularly those with emigration of labor or surplus of labor. This is due to several reasons: (i) the training delivered does not cover skills needed for both wage and self-employment; (ii) the education quality does not match the needs of the employers.

Furthermore, training programs to increase people’s competences in the rural and informal sector are scarce. Most countries can benefit from improved animal husbandry practices and more advanced agricultural knowledge of the crops they are currently growing or are likely to grow. For PNG, improved skills are needed for growing coffee and cocoa, which are major products, as well as for newer crops such as vanilla and rice. Solomon Islands require skills for improved techniques in coconut and cocoa production. Vanuatu has skills gaps in the growing of coconut, cocoa and vanilla. In Solomon Islands, skills are also required in fishing, aquaculture, and logging. Skills in sustainable approaches are particularly needed. Some initiatives in the informal sector, such as the Integrated Agricultural Training in PNG, and the Mobile Training for Coastal Fishermen in Vanuatu, seem to have been successful (ADB, 2008).

**ICT infrastructure: expand further telecommunication networks**

The Pacific Islands cover a wide geographic area with a large number of small islands. Much of the region is relatively remote and geographically challenging, with a combination of small island countries with large distances from the central island, or in other cases larger islands with difficult and often inaccessible terrain. Connectivity at present is delivered through a combination of mobile, satellite, undersea cables and fixed networks, and these technologies will continue to serve as the backbone of communications in the region in the future. However, the geographic and physical limitation of fixed networks and the
relative expense of satellite connectivity means mobile has the best opportunity to drive connectivity and internet access throughout the Pacific Islands (GSMA, The Mobile Economy, Pacific Islands, 2015)

**Mobile and Internet connectivity**

Although there has been an important progress in the last decade, with only 10 per cent of the Islanders with access to a mobile phone in 2006, the Pacific Islands are amongst the most underdeveloped regions in the world in terms of mobile connectivity. By the end of 2014, only 37% of the population subscribed to mobile services, which is well below the global average of 50%, as well as other developing regions such as Sub-Saharan Africa with 39%. According to GSMA (2015), unique subscriber growth is forecast to be modest over the next few years, approaching 42% by 2020. This will leave the region trailing the broader Asia Pacific where penetration will be over 57%, and the developing world average of 55%.

Mobile phones are being used to access the Internet, listen to radio, receive SMS text information services, take and send photos and video, access social networking sites, download music and even watch television. A development of major importance is the development of mobile banking. Initially pioneered in Fiji is it now spreading in other islands, transforming the conditions of financial transactions.

The Internet bandwidth traffic is particularly developed in Fiji, but is developing rapidly in Samoa, Tonga, The Solomon Islands and Vanuatu (See figure below). In the whole PIC area, the profile of broadband technology generation would be as follows in 2020: 18 % for 2G, 30% for 3G, 52% for 4G while it would be 22% for 2G, 43% for 3G, 35% for 4G for the developing world average (GSMA, 2015)

The major driving force behind this telecommunication development has been an active deregulation policy. This policy began in 2003 in Tonga and then spread rapidly throughout the region. It has led in a few years to a drastic reduction of the price of mobile phone subscription and a rapid expansion of subscribers. Despite this push to open up telecommunications markets, monopolies can still be found in Kiribati, Marshall Islands, and the Federated States of Micronesia. Ten countries have no more than two operators.

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18 The GSMA (“Groupe Speciale Mobile Association”) represents the interests of mobile operators worldwide, uniting nearly 800 operators with more than 250 companies in the broader mobile ecosystem. Note that the sample of Pacific islands covered by the GSMA study includes the French Polynesia and New Caledonia.
Digital inclusion plans have been drawn by GSMA addressing crucial issues:

- Network infrastructure and policy: increasing network coverage to currently un-served areas.
- Affordability and taxation: the combination of low incomes, the cost of the device, charging fees, and data plan payments creates an affordability barrier to accessing the mobile Internet.
- Consumer barriers: Illiteracy, digital illiteracy and lack of internet awareness are consumer barriers to mobile internet adoption.
- Local content: the availability of content that is both local language and locally relevant can play a vital role in the adoption of mobile Internet.

**Economic impact**

Impact of the mobile economy on the whole economy is significant. According to the GSMA (which includes the French Polynesia and New Caledonia in its study), the contribution to GDP is estimated to be 4.7% (USD 2 billion) and to reach 6.2% in 2020 (USD 2.8 billion). This includes an expanded range of impacts, including estimated improvement in productivity (1.7% for the direct contribution of the mobile ecosystem, i.e. mobile operators and support industries). The contribution of the mobile economy in terms of jobs would be 12,000 of direct jobs (infrastructure, distributors, operators, contents and media producers) and 15,200 of indirect jobs (i.e. generated in other sectors, such as in the supply chain of the mobile industry). Projections for 2020 are 34,000 jobs (of which 16,400 direct jobs).

**Computer literacy**

The computer literacy in PIC is relatively high. The percentage of youth using the Internet in Fiji (37.1%), Tonga (35%), and Samoa (15.3%), for example, while the average for the region is around 20%. Facebook penetration is a good indicator of their ability to use computers in a global context and find employment in growing industries such as Global Outsourcing Services (see below, section on new activities).
Innovation: build dynamic ecosystems

This is probably the weakest point of the sub-region within the KE framework. In most PIC, innovation ecosystems are poorly organized and lack needed resources – ideas, talents, knowledge, finance, etc – to build on. In this perspective, it is important to see innovation as the development and dissemination of technologies and practices that are not very innovative in themselves, but that are new to the places, the islands, where they are adopted, and that appear significant for transforming the local conditions, by initiating new economic activities or improving the welfare of populations.

Clusters

In this perspective, several types of drivers can be used to build gradually dynamic ecosystems. A first driver is the presence of foreign firms that develop new activities in operating technology and competence transfers that benefit the local population and stimulate the growth of spin-off firms or of subcontracting businesses along expanded value chains. Tourism, fishing, agribusiness and mining typically benefit of such FDI-led innovation processes. The second driver is the good use of specific, local advantages. These could derive from particular natural conditions, e.g. facilitating the growth of agricultural products, or cultural peculiarities, including special indigenous knowledge (the growing of certain plants, pharmaceutical herbs, etc.). An example is noticeable in Fiji with the Pure Fiji business that exploit a bio-food industry, selling water, agriculture products, and so on (See below section on agriculture).

Efforts to develop innovative business lines seem to have principally consisted in initiating cluster-building operations through focused workshops in Fiji, Samoa, Tonga and Papua New Guinea19. The idea is to emulate other places in the world that have been able to sell unique products and capture large shares of global markets20.

A good way to develop nuclei of innovation ecosystems is to help intending entrepreneurs and innovators with well managed structures that offer a package of services, including management support, technical and commercial assistance, and so on. Such a package can usefully take the form of incubating organizations hosting business creators, to which are associated fabrication laboratories (“Fab Labs”) with 3D printing, and possibly some financing mechanisms, in form of crowd funding. Such an arrangement, which is not very costly, could usefully be put in place in many small islands – the key point is that it be staffed with motivated, competent and well-connected people (see below Infodev and other initiatives discussed below in the IT-enabled public services section).

19 Regional Cluster Initiative in the Pacific, PIPSO, 2014, Cluster building efforts have concerned in PNG ICT, in Samoa the Virgin Coconut Oil, and in Tonga a generalist, cross sector cluster.
20 Examples of clusters of world significance developed in small communities (quoted in the Ifor Ffwocs Williams’s Cluster Manual, 2014) are: Húsavík, Iceland (population 2,500) and Kaikoura, New Zealand (population 2,000) are two of the world’s leading whale tourism clusters; Scone, NSW, Australia (population 5,000) is the world’s #2 thoroughbred horse cluster, accounting for 80% of Australia’s thoroughbred exports; The Caribbean island of Grenada, the Spice Island (population 110,000), has been the world’s leading supplier of high quality nutmegs; Castel Goffredo, Italy (population 11,000) manufactures a third of Europe’s socks; Hay-on-Wye, Wales (population 2,000) is the world’s largest antique book centre.
R&D Structures

The building of R&D structures should be approached in a collective way by the PIC. The South Pacific University can be the orchestrator of a network of R&D centers throughout the region. Important needs and applications can be found in agriculture, energy and environment issues that present common challenges for the region. Also the underdevelopment of science structures can be compensated by programs of information gathering by local people themselves, which are made possible thanks to the development of specialized mobile applications that provide geo-localization of observed features.

PIC can find inspiration in regional science networks established in other parts of the world with similar needs. In the Caribbean, “Cariscience” is a sub-regional network of scientists bent on upgrading the academic excellence of graduate, postgraduate and R&D programs in the Caribbean. Cariscience was launched in June 1999 in Jamaica and operates under the auspices of UNESCO. The network strives to strengthen theoretical and practical knowledge in basic and applied sciences in the Caribbean, to increase the number of postgraduate and R&D programs, and foster ties between these programs. It also fosters linkages with the productive sector. Cariscience coordinates exchanges between researchers, teachers and students, organizes joint research projects and regional courses, supports curriculum development and the training of science teachers. It is also supporting the development of an accreditation and evaluation system for postgraduate science programs.

Economic and institutional framework: remove keys obstacles

Business environment

The business environment and investment climate, documented by the Doing Business exercise yearly undertaken by the World Bank and IFC, is relatively satisfactory in Samoa, Tonga, Fiji, the Salomon Islands, and Vanuatu. On the other hand, the business environment is weak in Kiribati, the Marshall Islands, The Federal States of Micronesia, Palau, Kiribati, and Papua New Guinea. Although issues vary from one country to another, some appear recurrently in the region: starting a business, getting credit, enforcing contracts, protecting minority investors and trading across borders. Measures have to be taken to remove or reduce such barriers to entrepreneurship and business expansion.
Key socio-cultural issues

A key issue – present in all islands – is the relatively small contingent of entrepreneurs and business creators. Interestingly, when people migrate in “metropolitan” countries around, such as people from Tonga in Australia, they are much more entrepreneurial. This contrast points clearly to the institutional weaknesses, as those listed above, rather than to genuine reluctance of individuals to become entrepreneurs in PIC. The traditional culture of “sharing” may be a factor that affects negatively individual entrepreneurial abilities. However, this “sharing” mentality may well become an asset with the “collaborative” and “sharing” economy that is gradually developing with the on-going transformative technological change being experienced worldwide, as discussed above (Rifkin, 2014). At the same time, as also explained above, “intermittent entrepreneurs” can blossom up. It will then be crucial in PIC to adapt social transfers and protection mechanisms to facilitate the emergence and multiplication of such new forms of economic actors, with a community-centered approach.21

Restrictive labor laws have an impact on the creation of new jobs, particularly in innovative industries such as ICT. Samoa’s labor laws already require part-time workers to be entitled to full-time employees’ benefits after 12 months of employment, regardless of the amount of time spent working. In 2014, Fiji introduced its first minimum wage law and Samoa raised its minimum wage. Such restrictions may be

21 As proposed in the OECD Livelihoods report
challenging for start-ups or companies in the ICT industry relying heavily on part-time work (World Bank, 2014, ICT for jobs in PICs)

Another issue is the role of State Owned Enterprises, which are fairly active and present in most PIC. These are generally perceived as obstacles to change and innovation, while enjoying some forms of monopoly in sectors where they operate. These rents situation are damageable, and the concerned authorities should act in consequence. A critical review needs to be undertaken in each country. Some business areas, such as those affecting transport conditions (airlines, ships)\(^{22}\) and telecommunications can be particularly crucial for the economic development of islands. Also the conditions of exploitation and commercialization of natural resources and agricultural productions, often dominated by one or two producers, need to be cleaned of undue monopolistic positions.

Finally there is the controversial question of the land property. Traditionally, in many islands, the land used to belong to communities and could not be privatized or bought by specific individuals or corporations. This may have been an obstacle to business development, notably to foreign investors coming in the islands for building tourism or mining industries. Leasing mechanisms, fitting with traditional laws, have been put in place in several PIC, helping to solve the issue and those arrangements can be emulated throughout the region\(^{23}\).

Basic Services

Basic services are an important part of the business environment and living conditions. The services sector remains to be developed in PIC. In fact, studies show that urbanization is fuelled by the lack of services and living standards in the rural areas. Indeed, infrastructure links between urban and rural areas are weak although they are vital to enable access to basic services to people in rural areas, and economically facilitate the supply of urban markets by rural producers.

\(^{22}\) For instance, in the French Polynesia, the monopolistic situation that air and ship companies enjoy prevents the development of communications and mobility amongst the islands and leads to impoverishment of a number of them, with a concentration of population in a few places, and the island of Tahiti, with the city of Papeete, the capital of the French Polynesia.

\(^{23}\) See Ron Duncan’s note
**Migrations: take benefit of diasporas.**

It is estimated that 16000 Pacific Islanders are leaving their Island countries annually (UNFPA, Population and development profiles). Migrants are typically of working age and tend to be more skilled – although there is a gender impact as it is the men who tend to travel while women stay in their country of origin. (UNFPA, Population and development profiles)

*The net migration rate is the difference between arrivals (immigrants) and departures (emigrants). Almost all Pacific Island countries are subject to negative migration rates, meaning that more people leave*
the country than arrive during a certain time period. High negative migration rates often counterbalance high natural growth rates such as in the Marshall Islands, Samoa and Tonga.

Available evidence from small countries suggests that the countries of origin from emigration of high-performing students and academics generally outweigh the costs, especially when high rates of migration are taken into account. Knowledge transfer is particularly significant. 13 percent of expatriate Tongans from a sample of academic high achievers are providing advice to the Tongan government while overseas; more than 50 percent are providing advice to Tongan residents on study and work opportunities; and 20 percent providing sponsorships for Tongan residents seeking work overseas (World Bank, 2014 (?)).

Furthermore, such labor mobility can enable people to reap the difference in the labor market of neighboring countries. Contrary to the PIC, larger economies are aging and there is demand for the less skilled. In larger economies such as New Zealand, shortages of unskilled labor during the construction boom following the Christchurch earthquake have increased migration opportunities. Such differences in the supply and demand for labor across countries present opportunities, provided that there is a framework enabling mobility. While helping other larger and aging economies meet their labor demand, such opportunities pave the way for establishing necessary transport infrastructure and improving access to larger economies.

At the same time, such opportunities give PIC workers the opportunity to acquire soft skills such as work culture that many employers point out as missing in this less skilled workforce. Samoa and Tonga already show strong results in education and transport infrastructure with New Zealand. Kiribati and the Solomon Island are behind and could largely benefit by enabling emigration. The mere possibility of moving where opportunities exist will empower the PIC and give them access to education, work and thus enable their skills (World Bank, 2014).

With better skills Pacific Islanders could also benefit from overseas opportunities that are available. Development of small countries of the North Pacific could be enhanced if their populations were better skilled. Basic numeracy, literacy, and behavioral skills are transferable across work types and countries. Moreover, PIC governments should ensure that some qualifications are recognized internationally, through the adoption of Australian, New Zealand, or US education standards. The Kiribati Institute of Technology, for example, now offers a curriculum and qualifications fully aligned with those of Technical and Further Education Australia, while international accreditation has been achieved by the Marine Training Centre, allowing graduates to access a wide rage of international opportunities (World Bank, 2014).

At the same time, remittances received by such migrants are not negligible and could also help to build up the country’s revenues. Samoa and Tonga alone receive around US$300 million a year from migrants. This could be used as resources to invest in reinforcing basic services and nurturing domestic human capital, which in turn feeds into the knowledge economy cycle. It is however important to avoid brain drain and not to create a dependence on remittances. In order to maximize the development impact of remittances, the use of new technologies such as mobile banking for money transfer, the provision of entrepreneurial education and financial literacy, and the adoption of disaster-resistant equipment are key.

**Developing key sectors and activities**
Even in the more “advanced” economies of the Pacific, such as the Cook Islands, Fiji, Palau, Samoa, and Tonga, which are characterized by relatively high capita incomes, stronger private sectors, well-developed commercial agriculture, and tourist industries, a significant share of people in the PICs live on the subsistence and informal sector. The informal sector, despite being less significant than the subsistence sector, represents 36% of the economically active population and is more developed in urban areas. Typical informal work is in transport or food processing.

As the formal sector alone will not be able to absorb the rapidly growing working-age population, working age population not formally employed will increase in all countries, except in the Cook Islands. The increase will be particularly serious in PNG, Solomon Islands, and Vanuatu. In many cases, people move to urban areas only to find themselves unemployed and with no other choice but to work in the informal sector. In this context, it is important to recognize the potential of the subsistence sector and related industries, including fisheries and agriculture.

**Fisheries**

The fisheries sector (examined in-depth in a complementary study) offers realistic growth potential. As many as 45,000 Pacific Islanders may be involved in commercial fishing, excluding processing. In some countries, it generates more than 10 percent of government revenue (World Bank, 2014). As part of the fisheries sector, aquaculture, in a global context where it provides 47 percent of fish for human consumption, offers huge potential for the provision of food.

The Vessel Day Scheme was a revolution in the fishing industry. Established by eight Pacific Countries (Kiribati, the Marshall Islands, the Federal States of Micronesia, Nauru, Palau, PNG, the Solomon Islands and Tuvalu), it allocated a fixed number of vessel days through which rights to undertake any fishing activity are allocated to purse seiner vessels for 24 hours. Vessel days can be traded between countries. By imposing such controls on access, some estimates suggest that the value of a fishing day may have increased from around US$1350 in 2004 to more than US$5000 due to the impact of the scheme. Under this system, the industry now generates significantly higher license fees and improved data collection, strengthening prospects for sustainable management.

Such changes lead to more demand in expertise in fisheries management and sustainable management strategies to maintain international competitiveness, including fish processing, storage and marketing facilities. Small investments in business value chains can improve revenues. For example, switching from street or beachside vending to sheltered landing stations can improve handling, sorting and grading of fish prior to sale, thus improving revenues. Cold chain storage and transportation of raw fish can also help to substantially reduce food losses. This requires training of communities, particularly of women who are often involved in harvesting and marketing, while men go fishing (IFAD, 2014). Although the potential for employment in fisheries-related employment is remarkable, much of the specialized labor is provided by expatriates today. Aquaculture is also experiencing increasing labor demand. Its key commodities include black pearls (Cook Islands and the Fiji Islands) and prawns (Fiji Islands, Solomon Islands), and freshwater fish (PNG).

**Agriculture**

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The commercial agricultural sector is growing and short of skilled agricultural labor. In Samoa, agriculture remains the primary area of employment. In the Fiji Islands, the restructuring of the sugar industry required sugarcane farmers to be trained in more modern and diverse agriculture techniques such as greenhouse production, horticulture, floriculture, vegetable production and beekeeping.

Opportunities exist for skilled workers specializing in the production of agricultural niche products such as vanilla, ginger, nangai nuts, and honey. Local markets are untapped for vegetables, poultry, pork, and other farming products, and there is potential for timber processing and the development of other natural forest products. Most skilled workers in these industries are expatriates, but there is considerable scope for localization of this labor, provided the skills are available.

Moreover, farmers need to be trained in business and entrepreneurial skills to run profitable farms. Although commercial agriculture could be further expanded in forging closer links by supplying the tourism industry, farmers lack knowledge in modern production techniques; agricultural extension services and managerial skills are needed to build the linkages between agriculture and tourism.

A success story that has managed to create such an inter-sector link out of a niche, high-end organic product is Pure Fiji, a natural bath and body care products manufacturer, which caters to the salon and spa industry. The company was founded about 10 years ago by an entrepreneur, who tried to capture the benefits of coconut oil and the myriad botanical and herbal curatives and remedies that have been utilized by Fijian people for hundreds of years. It was the first company that was able to successfully package the traditions of the Islands to an international market while supporting local communities (Hamidan Bibi, 2008).

Country-wide initiatives can be developed to promote agribusiness. To take an example from another part of the world, in Sao Tome and Principe, a multi-stakeholder partnership, led by the Government and involving farmers and the private sector, enabled the development of organic-certified cocoa. The Participatory Smallholder Agriculture and Artisanal Fisheries Development Program (PAPAFPA) collaborated with Kaoka, a leading French organic chocolate producer, which provided technical and commercial advice in exchange for organic-certified cocoa that the farmers would produce. Farmers learned how to use solar cocoa dryers and storage facilities to limit the spoilage of cocoa beans. A local research station endorsed the cocoa’s aromatic qualities, and an international certifier began the process of certifying that the cocoa was organic. The program showed that producers can receive up to twice the price that conventional producers receive if they certify their coffee as both organic and fair trade (IFAD, 2014). Institutional changes and improved training and management systems are required to develop such an initiative and help increase agricultural productivity.

More generally there are numerous technology developments that can transform agriculture in the near future and that can benefit small communities as well as large ones: ICT-based monitoring and control for watering and lightning, and operating at distance taking advantage of the “Internet of things”; hydroponic culture systems limiting considerably water use; new pest resistant treatments based on biological methods (in place of chemicals), etc. Those innovations can find application in PIC as they will do in many other developing places around the world.

There are also social and economic innovations by which consumers help directly producers in investing directly in agriculture fields and logistics, and then benefit of low prices when buying fruits and vegetables resulting from these arrangements. These, known as “AMAP” (Associations pour le Maintien d’une
Agriculture Paysanne — in French), have been initiated in Japan and Europe more than 20 years ago and are now spreading in many countries, including in US, thanks to Internet. They should find a receptive socio-cultural environment in PIC, fitting with the features of the local economies. The sharing of risks between suppliers and consumers creates a climate of mutual confidence.

Tourism

The tourism industry (also examined in-depth in another study) is promising as PIC governments compete with each other to attract foreign investors by offering tax or investment incentive packages. There is potential for more development beyond the diaspora tourism from large emigrant populations, which offers large benefits to their original countries. 40 percent of arrivals in Samoa from New Zealand are for visiting friends and relatives and the tourism sector could be much expanded beyond this community of clients.

Today, the tourism industry is short of workers including chefs, cooks, bar people, waiters, and even housekeeper positions. In the Cook Islands, a growing proportion of foreign workers are hired for lower-skilled positions such as housekeeping, as tourism expanding labor requirements cannot be met by locals.

Tourism offers much employment potential as it is labor intensive, hires a large percentage of local workers. Tourism employs a relatively high proportion of labor force, from 10% in the Fiji Islands to about 20% in other countries, and can be integrated into local supply chains with broader economic impacts — including the service sector, which could help to diversify the economic structure of the PIC. Eco-tourism and traditional crafts also have potential for generating employment, particularly in Vanuatu and Solomon Islands. In PNG, for example, the construction activity is also forecast to grow to accommodate the tourists and offer appropriate services.

Some small developing countries can possibly provide useful examples for scaling up rapidly tourism activities; A case in point is Bhutan which has been able to multiply by four in five years the contingents of tourists visiting the country, from some 30,000 in 2009 to more than 120,000 in 2014, in keeping high tariffs for quality stays (USD 200 per days). Key actions have included investment in hotels, improvement of transport infrastructure (roads notably), global marketing campaigns (building on unique cultural and spiritual features, as discussed below) and also, and not least, serious training of guides, support service staffs, etc.

Global Outsourcing Services

Small economies can benefit of the IT-enabled global outsourcing services (GOS) industry, as shown by Mauritius recognized among the off-shoring leaders in Africa. In Mauritius only, the GOS industry has enabled the creation of 18,000 jobs, particularly benefiting women and young people. With a global market size of $952 billion per year, the offshore GOS market size for the Asia Pacific is estimated at $140 billion per year, of which the PIC represented $31 billion per year. This represents 17 percent of the total Asia Pacific market (World Bank, 2015).

In Fiji and Tonga, a small group of GOS industry is already emerging. In 2012, ICT service exports grew to account for 4.3 percent of the Fiji’s total service exports, compared to 2.9 percent in 2010. Tonga also opened a new call center helpdesk set up by Procomm Services in 2013. Although it is still only for the domestic market, there is potential for an international development of the sector (World Bank, 2015).
Among the PICs, Fiji is the most advanced in GOS. The country hosts major offshoring operations for ANW Pacific Operations and Mindpearl, both BPO-focused operations sited in the Kalabu Tax Free Zone operated and administered by the Fiji Trade and Investment Bureau (Investment Fiji). ANZ Pacific currently has 400 workers, while Mindpearl has 660. Fiji won the European Outsourcing Association’s Offshoring Destination of the Year Award in 2014, which acknowledges destinations and operators that have most successfully serviced the UK and other European outsourcing markets. Tonga has asked the Commonwealth Secretariat to develop a strategy to leverage investment in the country’s broadband for economic development (World Bank, 2015).

The above mentioned World Bank report suggests, according to an optimistic estimate, that in Fiji, the GOS industry could create 5809 direct jobs, a fivefold increase of the current direct number of employees in its existing BPO operations. Even a more conservative analysis estimates that GOS will create 1936 jobs, implying more direct formal employment than the combined total of the country’s agriculture, forestry, and fishing industrial sector representing 1604 jobs.

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<th>Country</th>
<th>Population size</th>
<th>Direct jobs</th>
<th>Indirect jobs</th>
<th>Total</th>
<th>Average revenue per worker ($)</th>
<th>Total industry revenue ($)</th>
<th>GDP (current $)</th>
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<td>2,430</td>
<td>2,570</td>
<td>15,650,387</td>
<td>466,259,084</td>
<td>3.35</td>
</tr>
</tbody>
</table>

Source: authors’ calculations.

<table>
<thead>
<tr>
<th>Country</th>
<th>Population size</th>
<th>Direct jobs</th>
<th>Indirect jobs</th>
<th>Total</th>
<th>Average revenue per worker ($)</th>
<th>Total industry revenue ($)</th>
<th>GDP (current $)</th>
<th>% contribution to GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiji</td>
<td>681,065</td>
<td>1,936</td>
<td>4,841</td>
<td>6,777</td>
<td>7,203</td>
<td>14,528,670</td>
<td>3,855,017,107</td>
<td>0.38</td>
</tr>
<tr>
<td>Samoa</td>
<td>190,372</td>
<td>418</td>
<td>1,046</td>
<td>1,464</td>
<td>1,464</td>
<td>3,119,214</td>
<td>801,916,058</td>
<td>0.39</td>
</tr>
<tr>
<td>Tonga</td>
<td>105,323</td>
<td>231</td>
<td>579</td>
<td>810</td>
<td>810</td>
<td>1,756,765</td>
<td>466,259,084</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Source: authors’ calculations.

**Public services**

**Education**

There are considerable possibilities of application of ICT for transforming the education sector, as illustrated by a recent stocktaking of the World Bank’s experiences in the Asia Pacific region (World Bank, 2015b). ICT applications can be helpful for the management of schools: improving accountability mechanism and tracking system for financial management, attendance management for teachers/students, textbook deliveries, civil work construction delivery; specific applications – such as “Check my schools” – are been used by parents in Philippines, Indonesia, and Afghanistan to monitor attendance, performance and other key aspects of primary and secondary school systems. ICT-based devices can also facilitate teaching/learning management: mobile-phone/web-based learning platforms (e.g. MOOCs) and leverage distance learning to access various learning contents, including videos, quizzes, gaming, simulation, and science lab experimentation courses (notably for secondary and higher education).
There are also possibilities to enhance collaboration with ICT industry through catalyzing local ICT innovation communities (e.g. mobile application business contest) and developing public-private partnership and fostering companies’ investment. Universities and TVET institutions can also be connected with local innovation communities to promote commercialization of research and foster entrepreneurship. The M-lab/M-hub initiative of Infodev, experimented in countries as diverse as Armenia, Kenya, South Africa, Vietnam, Nepal, conduct idea generation contests to identify problems to tackle, create a minimum viable application with “hackathons” using the m-Lab and m-Hub network, and follow up with incubation and acceleration on promising applications. Through collaboration with private sector and education institutions, these communities provide a space with digital fabrication tools (e.g. 3D printers, CNC milling machines and laser cutters) to allow everyone to prototype their ideas. They organize events, provide skills training, networking, and mentorship opportunities for future entrepreneurs and those who want to prototype. Some of the members pitch the idea at Demo contests or apply for crowd funding (World Bank, 2015b).

Mobile phone-to-web based technologies can be used to facilitate job-matching services – introduced as a part of career education at universities and TVET institutions.

Online work/microwork platform to get a job can be used as a transitional job and the way to gain on the job, as illustrated by Babajob in India which facilitates job matching between job seekers and employers through mobile-to web technologies). An Online Work/Microwork Platform based in Nepal provides youth an opportunity to earn income through online outsourcing platform.

Finally National Research and Education Networks (NREN) provide an ICT infrastructure for the universities to conduct virtual meetings with different universities around the world and develop joint research opportunities leveraging the network of the NREN. NREN is established in 10 Asia countries, including in poor countries such as Nepal and Cambodia.

**Finance and banking**

The Pacific is one of the least banked regions in the world, with less than 20 percent of poor people (including urban populations) having access to formal or informal financial services (IFAD, 2014). Mobile has played a key role in accelerating the adoption of these services. Today there are a total of 11 live mobile money services available to the unbanked in six different countries across the Pacific region: two in Fiji, five in PNG, one in Samoa, one in Solomon Islands, one in Vanuatu and one in Tonga. Six of the eleven services are operationally run by mobile operators. At the end of 2014, there were a total of 595,000 registered mobile money accounts in the region, though just a quarter of the accounts were active. At the end of 2014, there were almost 4,000 mobile money agents across the region, over 80% of which were active (GSMA, 2015).

As noted in the GSMA report, challenging geography, poor infrastructure and the high costs associated with delivering services to sparse populations are barriers to financial inclusion in the region. A range of players are looking to address the issue of financial inclusion in the region, including governments, mobile operators, financial institutions and other stakeholders. The United Nations Development Program (UNDP) and the UN Capital Development Fund (UNCDF) launched a joint project, the Pacific Financial Inclusion Program (PFIP), to help provide sustainable financial services to low income households in the Pacific. The program, now in its second phase, aims to increase financial inclusion across the region by ensuring that Pacific Islands implement national financial inclusion strategies that address the
affordability of financial services, increase financial literacy and education, and lower barriers to entry.

**Disaster alert and response**

ICT can also be used to support the practice of disaster preparedness and response. This is particularly important for small island countries due to their vulnerability to natural disasters and the geographical and topological constraints they often face.

When the earthquake hit Sumatra in 2004, the Pacific Tsunami Warning Center in Hawaii predicted a major tsunami, but there were no direct channels to communicate a warning to policy-makers, local decision-makers and populations at risk. Of the 200,000 lives lost, perhaps tens of thousands would have been saved if there had been ICT systems available to spread the warning in time.

Initiatives have been taken in some Pacific islands, with the active involvement of operators, to provide warning systems (via SMS), map post disaster responses (shields), or restore rapidly connectivity. Also, again, useful experience can be derived from other parts of the world. The Trinidad and Tobago Office of Disaster and Preparedness Management seems to be most advanced in its use of social networks in the Caribbean region and counts 11500 followers. The Office has been successful in increasing its followers by tweeting a weather forecast every morning and has great potential for the diffusion of information in case of disasters. ICT can be an essential tool for disaster management, provided it is accompanied by established procedures and protocols – which can be made possible with a solid knowledge economy.

**Renewable energies**

Global warming and rising sea levels are a major problem for PIC. Furthermore, the energy sector in the PIC is characterized by long supply lines, price fluctuations, high energy cost to consumers, ageing energy infrastructure, as well as poor economies of scale. Fluctuations in petroleum prices have an important impact on the economy of PIC and household income. The increases between 2002 and 2008 cost most Pacific island countries about 10% of their gross national incomes, with impacts falling disproportionately on those with low incomes. On average, Pacific island households spend approximately 20% of their household income on energy.

At the same time, many small island States have the unique opportunity to pave the way for renewable energy independence. Many are now pursuing domestic renewable energy sources, such as solar and wind for a more sustainable power production system. Through the Sustainable Energy For All (SE4ALL) initiative, many SIDS are undertaking expansion of their renewable energy sector and by 2030, they should increase the deployment, penetration, and efficiencies of renewable sources using existing cost effective technologies.

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25 The Pacific Islands is one of the world’s most vulnerable regions to natural disasters. According to the UN World Risk Index (WRI), Vanuatu is the country with the highest probability in the world that an individual is affected by a natural disaster. This ranking has been underlined by the devastating impact of the cyclone that recently struck the country. Tonga, Solomon Islands and PNG are also among the top ten countries at risk (GSMA, 2015).

technologies. Small PIC are ideal locations for pilot projects in renewable energy and other areas, which can then be rolled out in other countries on a larger scale.

In the Pacific, since 2012, all of the electricity supplied to the inhabitants of the three atolls of Tokelau is generated by a solar power station. New Zealand is offering a good example in the region, by producing three quarters of its electricity from water power and geothermal energy. Geothermal power is a sector which has enjoyed constant growth since the turn of the millennium, as has wind power (which has increased by 30 per cent a year). Bora Bora uses smart technologies to generate electricity for air cooling. By 2020, half of the French Polynesia’s electricity will have to be generated from renewable sources. This objective was enshrined in law, as part of the French Polynesia's energy policy (December 2013).

Small island economies in other parts of the world offer other examples:

- In the Atlantic Ocean, the island of El Hierro in the Canarian archipelago established a power station combining hydroelectricity and wind power in 2013, enabling the country to stop using the 40,000 barrels of oil a year it was previously importing.

- The island of la Réunion aims to become a territory with no fossil fuels from 2030. Currently, 37 per cent of its electricity comes from renewable sources, mainly water and bagasse. Generated in thermal power stations, this residue from crushed sugar cane currently provides electricity for one in ten households on la Réunion.

- Mauritius is implementing the utilization of the pure, nutrient-rich and cold deep sea water to develop Deep Ocean Water Application projects to power the cooling of large buildings, which currently use energy produced from fossil fuels. “By products” are also envisaged, with the development of a large range of downstream business activities including aquaculture, seaweed and algal culture, cosmetics and pharmaceuticals, agrochemicals, water bottling and thalassotherapy also looks very promising. Unpolluted fresh-water is another valuable product.

The unique needs facing small island states call for collaboration and partnership. Some commitments have already been announced. In the Caribbean, the Caribbean Centre for Renewable Energy and Energy Efficiency aims to tackle the challenges of access to affordable energy, energy security, and climate change mitigation and adaptation. Due to happen in 2018, the centre will fall under the remit of UNIDO. Other collaborative projects include the University Consortium of Small Island States, which with the Spanish government and the UNDESA, announced plans to develop a degree in sustainable development through an online portal. The Global Partnership for Oceans is a growing alliance of more than 140 governments, international organizations, civil society groups and private-sector representatives committed to addressing threats to the health, productivity and resilience of the oceans. This SIDS conference in 2014 underlined such partnerships, in order to strengthen the resilience of food value chains, achieving food security (IFAD, 2014).

Moving forward

*Engage actively the top leadership*

It is clear that a move to KE implies a well-coordinated strategy at national level, with investments and reforms in key sectors, even if a gradual approach is recommended (see section below). Therefore a clear, long term and motivating vision has to be articulated, with a strong political will. This militates for a clear
engagement of the top leadership. This point appears particularly relevant in the PIC context where governance structures are solidly organized around top leaders and community chiefs which are the guardians of traditional values as well as of established institutions. A strong adherence to cultural obligations -- fostered by elite groups -- can thus constitute an obstacle to reforms, as experienced in the past.  

On the other hand, when such leaders can be convinced on the advantage of shifting to new development models, with an attractive vision and a mobilizing motto, they can be strong drivers of change. There are a number of examples throughout the world of leaders that have shifted fundamentally the course of development of their countries, notably small ones, at a time when they were at a poor development level, such as Lee Kwan Yu in Singapore and Sheik Maktoub in Dubai. There is no reason why top leaders in PIC cannot be convinced about a KE-based and creative development model, if exposed appropriately to relevant experiences, including in their own islands.

**Make attractive and realistic visions to mobilize people**

In addition to convincing the top leadership, it is important to gather people around attractive visions of the future. Such visions should, however, be realistic and therefore be prepared in being well informed. To adhere such visions, people should see clear objectives, formulated in simple ways. This can take clear economic goals: for instance a doubling of GDP per capita in 10 years, as enounced in a 10 year development strategy formulated by Seychelles (“Seychelles 2017”). A vision can build also on a mobilizing motto, branding the country with an attractive concept. A good example has been the case of Bhutan that has promoted the concept of Gross National Happiness and has attempted to concretize it through specific actions as well to measure it with ad hoc surveys with the support of the international community (such as the UNDP). Visions should be declined in the different sectors with priority actions and programs.

Presenting PIC around the vision of “Innovative Pioneers in a Sea of Knowledge” would make sense, in view of what has been argued above. A short and readable document consolidating goals and actions should then be largely distributed. Active media campaigns should promote the vision, making use of all vehicles, including TV, radio and Internet, offering citizens platforms for discussion and engagement.

In addition to national visions it would be most appropriate to present a collective plan for the PIC as a whole, in which, notably, would be highlighted those measures of joint nature that are essential for the success of KE strategies, e. g. a massive education effort building on the South Pacific University, broad telecom investments benefiting several islands, the creation of a network of R&D centers, etc.

**Implement gradualist, transformative strategies**

A gradual approach, based on selected quick win initiatives, rather than a wholesale multi-sector reforming attempt, has proven to be the most efficient way for promoting and guiding structural change. It combines both a sense of long-term progress and short-term achievements (World Bank, 2007). A good example is provided by Singapore – which has developed itself in starting as a small “entrepot” island some 40 years ago for gradually expanding the nature and quality of services offered to the region and more broadly to the world. An other example is provided by Dubai who has been able to become a very

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27 See Duncan note
dynamic spot of the Middle East in investing in well selected sectors – firstly in ports, tourism and airlines, then in media and internet, and more recently in finance and education services. For sure the financial resources at the PIC disposal are not commensurable with those of Singapore and Dubai, but it is the principle of ambitious vision with gradualist approach that should retain attention and guide action.

Mauritius’ strategy in the early years was to nurture its sugar, textile and clothing sectors, which provided important foreign exchange for the economy and encouraged domestic savings. EPZs in the 1980s and embracing the ICT industry in the 2000s helped diversify and transform the economic structure of the country. Trade reforms, the development of a social welfare system, and policies that favored human capital have also supported the transition. By the time the economy opened up, it had already diversified itself enough for other sectors such as manufacturing exports, tourism and BPO to compensate for them (Mauritius, An Economic Success Story --World Bank, 2011). The graph below captures this transition well.

![Graph of Sectoral Composition of GDP in Mauritius, 1976–2010](source:Mauritius authorities; World Bank 2009.)

There is nothing better than success stories to create efficient dynamics for change. For that, select activities and projects that can produce tangible results in relatively short span – a few years, with visible steps within a few months. An example has been provided by the cluster initiatives taken in Fiji, Tonga, Samoa and PNG, outlined above. But there are many examples of sector projects that can lead to concrete achievements benefiting well identifiable communities, being in tourism, health, education, etc. Success stories help creating a climate of pride and self-confidence that is often necessary to overcome resistance to reforms.

*Use foreign aid as driver for change*

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The Pacific Region receives the highest aid per capita in the world (ADB, 2014). In 2011, it received $237 per person, four times higher than Africa, which sits at second place with $49 per person. It is important that PICs manage this well. It is important that it takes advantage of aid to nurture domestic industries and human development. International donors such as AusAID; European Union; Japan International Cooperation Agency (JICA); New Zealand’s international aid and development agency (NZAID); Taipei, China; and the US; as well as international financial institutions, especially ADB and the World Bank, play a considerable role in education for PIC.

The northern Pacific countries of the RMI, FSM, and Palau have compacts of association with the US, which funds most of their education budgets (more than 50% for the RMI and 90% for the FSM). The Cook Islands, Kiribati, Nauru, and PNG also receive large development assistance grants from AusAID, NZAID, and EU. The Cook Islands particularly depend on the EU and NZAID for TVET funding as only 23% of the TVET budget comes from government funds. JICA has paid for both Samoa and Tonga to extend and refurbish their technology institutes. The Fiji Islands is the recipient of funds from AusAID for the equipping of nine TVET centers and of technical assistance in entrepreneurship education and industry–school compacts. Kiribati has received EU help in constructing anew workshop at TTI. AusAID has been assisting Vanuatu—over 6 years, starting in 2005—with a TVET sector-strengthening program that seeks to improve TVET institutions, including non-formal institutions and VNTC. AusAID’s short-term training program has enabled PIC, such as Kiribati and Tonga, to run programs not otherwise offered in those countries by their TVET systems. This list shows the potentials that donors can have to create top-notch education systems in the Pacific islands.

**Exchange experiences within PIC and with the rest of the world**

In order to speed up the learning process it is of utmost importance to organize systematic exchanges of experience among policy-making communities. That can take place at minister level, of course helping to consolidate a sense of collective vision and approach. But more importantly the exchanges of experience should take place at operational levels between heads of departments and heads of programs. Regular meetings should be organized between PIC around well-defined topics. Also with a single country, meetings should take place regularly among initiators of specific projects conducted in different islands, so that they can learn one from each other. This may concern innovation support measures, sector specific activities, education programs, and so on. An important point is to formalize enough such meetings on a regular and frequent basis in order to ensure an efficient learning process. PIC can find inspiring examples of collective arrangements for peer learning and mutual engagement in Europe, with the Nordic Council (that concerns the six Nordic States) and the Council of Baltic States (involving all states around the Baltic sea).

In complement, study tours should be organized for policy makers of different levels in selected countries in the region and around the world so that they can be informed on good practices. At the same time it is a way to involve in important projects foreign partners – public or private – who can bring in not only some financial resources or technologies, but more importantly competences and expertise in the design and implementation of plans and activities.

**Monitor and evaluate**

A systematic effort of monitoring and evaluation is a must. There is no need to develop hyper sophisticated methods, but there is a need to ensure that minimal sets of information are regularly
collected to observe progress (or absence of progress) on well-defined targets and projects. Publications of data showing progress accomplished in terms of efforts, investments, outputs and outcomes are also needed. This may require adjustments and modernization of statistical apparatus in place in PIC. It could be useful also to put in place advanced methods to track and visualize progress made on well identified projects and initiatives throughout the region such as those tools using GIS (Geographical Information Systems).

Balanced evaluations of progress achieved in the move to KE and structural change that involves should be conducted by national authorities with the help of foreign partners and multilateral institutions familiar with such evaluation and taking advantage of worldwide experiences. In-depth evaluation exercises, of national scope, should be undertaken on a 3-5 year period, a time span necessary for accumulating enough changes and seeing their impacts in the economic, social and institutional systems.

New indicators need to be put in place. In particular, indicators more diversified than the usual economic ones, such as the GDP per capita, need to capture the shift towards more creative, more autonomous, and more sustainable communities. Improved living conditions need to be measured by appropriate surveys and enquiries.30

Conclusion

To sum up, the knowledge and technology revolution that is transforming the global economy offers unique opportunities to the Pacific Countries Islands to engage in new development paths. The deployment and continuous progress of information and communication technologies and myriads of applications provide great development possibilities to small, remote societies. But for exploiting them, countries need to invest in appropriate ICT infrastructure, to upgrade their education systems, to strengthen their innovation capabilities and improve the business environment. These systemic transformations, foundations of knowledge economy strategies, are needed to benefit of job creations, activity expansions, productivity improvements, and so on that are possible in many sectors. The development and dissemination of technological and managerial innovations that will fertilize the PIC economies will have to be accompanied by societal innovations, helping to build more entrepreneurial and more autonomous societies, for instance in retooling the mechanisms of social protection with a community-centered perspective. In so doing, PIC would engage in development paths that seem more in phase with their traditions and cultures, based on values of social sharing and respect for the environment. A sound climate of competition and cooperation between PIC would also stimulate this change. The Pacific Island Countries should envisage their future within a broader vision of “Innovative Pioneers in a Sea of Knowledge” of global significance and relevance.

30 See for instance the world wide Gallup surveys that monitor on a yearly basis how people perceive their quality of life, in its multiple dimensions (economic, social, environmental, etc.). (See OECD, 2015)
References

ADB, 2008. Skilling the Pacific, Asian Development Bank
Duncan, 2015. Ron Duncan, Contribution to Pacific Possible study, June 2015.
Hamidan Bibi, 2008. Leadership Influence in rural development in Fiji, Case Studies in Contemporary Pacific Leadership, USP.
IFAD, 2014. International Fund for Agriculture Development, IFAD’s approach in small island developing states
New Zealand Department of Labor, 2009, New Zealand Knowledge Economy, 2 volumes
OECD, 2015. Securing Livelihoods for All, Development Centre Studies, Paris
PIPSO, 2014, Regional Cluster Initiative in the Pacific, Fiji
World Bank, 2014. Well-being from Work in the Pacific Island countries
World Bank, 2015. ICT for Jobs in the Pacific Islands Countries
World Bank, 2015b, ICT for Education in Asia, Power point, May 2015
World Economic Forum, Global Information Technology Report 2014,
1. Introduction

Over the next 10-15 years the majority of Pacific Island citizens will be connected to faster, cheaper Internet. They will use the Internet for the majority of transactions: selling or buying goods, accessing information, transferring money, acquiring skills, and engaging with governments. The Pacific Islands will become increasingly connected to international markets where a large proportion of the region’s population resides, and to each other. Pacific Island economies will increasingly be based on knowledge and innovation, including more diversified services sectors, innovation and entrepreneurship, more skilled and productive workforces.

Pacific governments will become more internally connected, delivering services via mobile phones and portals, and deploying standardized back-end, cloud services. Policy decisions will become increasingly data-driven. Pioneering Pacific governments will also find ways to share scarce computing services across countries, and at the citizen-facing end, share data and information through jointly-managed web portals, on environmental and natural resources, natural hazards, transport safety, education, and health management.

Achieving this vision will require sustained investment, by private and—where additional stimulus is needed—public sectors, in the following foundational elements:

- **Improved Connectivity**—ensuring that all Pacific Islands enjoy high-speed, low-cost international bandwidth, and that a supportive policy and regulatory environment stimulates additional private investment in broadband access;
- **Enhanced Skills**, starting at the primary level, and with educational establishment at levels able to access high-quality and relevant teaching and learning materials to develop the capacity of students to meet the demands of the changing workplace in the Pacific region and beyond, and to stimulate innovation and entrepreneurship locally;
- **Enabling Environment for the Digital Economy**, including legal/regulatory frameworks supporting online transactions and facilitating secure e-commerce; payments and transactional systems, for example
- **Connected Governments** that can leverage developments in information systems and ICT tools to deliver services to citizens and businesses more efficiently and effectively through a variety of user platforms, particularly mobile devices. This will also help to stimulate markets for Internet-based services in local economies

2. Improved Connectivity
Affordable and reliable access to telecommunications/Internet services is a pre-requisite for a “smart and connected” region. Prospects are encouraging. Following a wave of market liberalization over the past decade (2005-2015), access to telecommunications has been improving all over the region, particularly in the South Pacific. Investments in new networks have been predominantly from the private sector—new entrants and incumbent operators—and governments have facilitated these through pro-competitive policies and new legal and regulatory frameworks for telecommunications/ICT. The majority of citizens in South Pacific islands and PNG now enjoy basic, mobile phone access, at the very least.

Figure 1. Connectivity in Fiji, Samoa, Solomon Islands, Tonga and Vanuatu

Table 1. Current Status of ICT Services

<table>
<thead>
<tr>
<th>Country</th>
<th>Pop.</th>
<th>GDP/cap US$ (PPP)</th>
<th>Mobile % population</th>
<th>Fixed % population</th>
<th>Mobile Broadband % pop.</th>
<th>Fixed BB % Pop.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiji</td>
<td>863,900</td>
<td>4,572</td>
<td>142</td>
<td>6</td>
<td>36</td>
<td>*5</td>
</tr>
<tr>
<td>FSM</td>
<td>106,487</td>
<td>3,482</td>
<td>35</td>
<td>1</td>
<td>1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Kiribati</td>
<td>101,998</td>
<td>1,772</td>
<td>18</td>
<td>2</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Palau</td>
<td>21,032</td>
<td>14,776</td>
<td>70</td>
<td>30</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>PNG</td>
<td>7,000,000*</td>
<td>2,400</td>
<td>47</td>
<td>2</td>
<td>16</td>
<td>&lt;1</td>
</tr>
<tr>
<td>RMI</td>
<td>68,480</td>
<td>3,574</td>
<td>26</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Samoa</td>
<td>199,320</td>
<td>4,165</td>
<td>125</td>
<td>2.5</td>
<td>27</td>
<td>1</td>
</tr>
</tbody>
</table>
Solomon Is  526,000  *1,500  61  1  *9  <1
Tonga  106,146  n.a.  67  1  *50  1.5
Timor-Leste  1,200,000  6,794  *80  *1  *10  *1
Tuvalu  10,619  3,489  *20  15  n.a  <0.5
Vanuatu  227,574  2,880  67  2  10  2

The international bandwidth constraint is being addressed by progressive deployment of submarine optical fibre cables in the Pacific through a combination of private and public funding, plus selective investments by telecom services in low-latency medium earth orbit satellite services (O3B Networks) as well as conventional satellite services. O3B has signed contracts with telecom service providers in Palau, FSM (Yap, Chuuk), Cook Islands, Samoa, American Samoa, Nauru, Vanuatu and PNG. Telecom operators and the government of PNG are currently evaluating options for additional submarine cable capacity. Smaller Pacific island economies (Kiribati, Tuvalu) are considering more affordable long-term connectivity options. Emerging high-altitude platforms such as balloons (Google) and drones (Facebook) may also strengthen the broadband service provision potential for this region, particularly for remote “outer” islands.

Table 2. Main Submarine Cables in the Pacific Region

<table>
<thead>
<tr>
<th>Cable</th>
<th>Ready for Service</th>
<th>Cable Length (km)</th>
<th>Capacity</th>
<th>Owners</th>
<th>Landing Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern Cross</td>
<td>2000</td>
<td>30,500</td>
<td>3.6 Tbps</td>
<td>Telecom New Zealand, SingTel Optus, Verizon</td>
<td>Australia; United States (Hawaii &amp; mainland); Fiji; New Zealand</td>
</tr>
<tr>
<td>American Samoa-Hawaii (ASH)</td>
<td>2009</td>
<td>4,250</td>
<td>1 Gbps</td>
<td>ASH LLC</td>
<td>Pago Pago, Honolulu</td>
</tr>
<tr>
<td>Samoa-American Samoa (SAS)</td>
<td>2009</td>
<td>250</td>
<td></td>
<td>American Samoa Government, ASH LLC</td>
<td>Samoa; American Samoa; Hawaii</td>
</tr>
<tr>
<td>APNG-2</td>
<td>2006</td>
<td>1,800</td>
<td>1.136 Gbps</td>
<td>Telkom PNG, Telstra</td>
<td>Port Moresby, Sydney</td>
</tr>
<tr>
<td>PPC-1</td>
<td>2009</td>
<td>6,900</td>
<td>2.56 Tbps</td>
<td>TPG</td>
<td>Sydney, Madang, Guam</td>
</tr>
<tr>
<td>HANTRU-1</td>
<td>2010</td>
<td>3,500</td>
<td>160 Gbps</td>
<td>Hannon-Armstrong</td>
<td>Guam, Pohnpei, Majuro, Ebeye, Kwajalein</td>
</tr>
<tr>
<td>Gondwana-1</td>
<td>2008</td>
<td>2,151</td>
<td>640 Gbps</td>
<td>OPT New Caledonia</td>
<td>Noumea, Sydney</td>
</tr>
<tr>
<td>Cable</td>
<td>Ready for Service</td>
<td>Cable Length (km)</td>
<td>Capacity</td>
<td>Owners</td>
<td>Landing Points</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------</td>
<td>-------------------</td>
<td>-----------</td>
<td>-------------------------------------------------------------------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>Honotua</td>
<td>2010</td>
<td>4,805</td>
<td>640 Gbps</td>
<td>OPT French Polynesia</td>
<td>Papeete (Tahiti), Honolulu</td>
</tr>
<tr>
<td>Tonga-Fiji</td>
<td>2013</td>
<td>827</td>
<td>320 Gbps</td>
<td>Tonga Cable Ltd</td>
<td>Tonga (Tongatapu); Fiji (Suva)</td>
</tr>
<tr>
<td>Interchange Cable Network 1 (ICN1)</td>
<td>2014</td>
<td>1,238</td>
<td>Gbps</td>
<td>Vanuatu National Provident Fund, Interchange Ltd., Vanuatu Post Ltd.</td>
<td>Vanuatu; Fiji (Suva)</td>
</tr>
<tr>
<td>Solomons Oceanic Cable Network</td>
<td>2016</td>
<td>900</td>
<td>planned</td>
<td>Solomon Islands National Provident Fund, Solomon Telekom Company Limited</td>
<td>Solomon Islands; Sydney</td>
</tr>
<tr>
<td>Samoa-Fiji</td>
<td>2017</td>
<td>1,300</td>
<td>planned</td>
<td>Samoa Submarine Cable Company</td>
<td>Samoa, Fiji (possibly Wallis &amp; Futuna, Fr.)</td>
</tr>
</tbody>
</table>

Though still far from resolved, as Table 1 illustrates, the Internet access constraint is being addressed as telecom service providers are starting to roll out mobile broadband services more aggressively, particularly in the South Pacific. Mobile broadband penetration is accelerating due to network expansion/upgrade and more attractive pricing offers (such as daily/weekly prepaid service bundles, based on data volume). In addition, user devices, in particular smartphones, are becoming increasingly widely available and affordable (at <US$100) in many countries in the region. These trends are reflected, inter alia, in increased uptake of social media in the region.

**Figure 2. Projected Bandwidth Demand: Papua New Guinea, 2015-2040**

Demand projections for the Pacific indicate sustained, rapid increase in Internet utilization all across the region. For example, demand for Internet bandwidth in PNG (pop. 7
million) is projected to increase from the current level of about 3 Gigabits per second (Gbps) to over 650 Gbps within the next 25 years. This is driven by projected growth in demand for services ranging from streaming video, ICT in education and online government services. These trends call for significantly increased investments, primarily by the private sector, in the required infrastructure.

Improved access to ICT infrastructure, particularly Internet services, is a recognized contributing factor to economic growth. There is extensive literature on this in the global context. In the case of the Pacific region, the data required to undertake detailed analysis are scarce. However, initial assessments of the impact of ICT (initial impacts of telecommunications investments and related employment-generation) on economies in the South Pacific highlight its growing significance in the region (source-PRIF 201531).

**Figure 3. ICT Contributions to GDP in Selected Pacific Economies**

![Graph showing ICT Contributions to GDP in Fiji and Samoa]

In addition to investments, regulatory reforms will continue to play an essential role in stimulating service rollout and improvements in quality of service. An important component of the telecom sector reforms over the past few years has been the establishment of independent regulatory functions/institutions particularly across the South Pacific and PNG. Table 3 summarizes the current institutional and market arrangements in the region.

**Table 3. Pacific Islands Telecoms Markets and Oversight Institutions**

<table>
<thead>
<tr>
<th>Country</th>
<th>Mkt</th>
<th>Legislation</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiji</td>
<td>C</td>
<td>Telecommunications Promulgation (2008)</td>
<td>Division of Communications</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Telecommunications Authority of Fiji</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fiji Commerce Commission</td>
</tr>
</tbody>
</table>

31 PRIF Economic and Social Impact of ICT in the Pacific, 2015
A key role for these new and emerging regulatory institutions (which may evolve as country/sector specific, or multi-sector, or multi-country models going forward) is to ensure competitive behaviour by the telecommunications service providers, equitable and affordable access, and quality of service to consumers.

**Recommendations.** Key remaining connectivity issues address to realize a “smart Pacific” include the following:

- Completing market liberalization, enabling additional investment in infrastructure and services in the northern Pacific, particularly in FSM and Marshall Islands;
- Increased and more affordable international bandwidth for PNG, Kiribati and Tuvalu (cable/satellite connectivity, as appropriate), requiring mobilization of public and private investment;
- Targeted approaches, including PPP-investments and, where feasible, mobilization of new technologies, to connect remote/outer islands, particularly in Kiribati, Tuvalu and the northern Pacific;
- Commencement, or continuation of regulatory reforms that focus on expanding broadband Internet access, including, for example, those relating to radio spectrum management; infrastructure-sharing and technological convergence (e.g. of broadcasting and telecoms)
Anticipating a gradual shift towards more regional or subregional telecommunications markets, cross regional (or sub-regional) harmonization of legal/regulatory instruments and institutions to stimulate increased investments, provide stable market environments and serve the interests of consumers.

3. Digital Economy

Small island countries, including in the Pacific, are increasingly connected to the global economy. The region’s improving Internet connectivity and increasing access to mobile phones presents an opportunity for Pacific Island countries to overcome their inherent limitations, and help address the long-standing issues of employment and income generation, which is vital to accelerate progress towards ending poverty and creating an inclusive society. The improving connections provides the foundation for these islands to become and benefit as digital economies.

There are various definitions of digital economies since the term’s first use in the 1990s. One common definition is “an economy based on digital technologies”, and the term is used interchangeably with others such as the Internet Economy, New Economy, and Web Economy. The Australian government, which has made a commitment to become a leading digital economy, defines digital economy as “the global network of economic and social activities that are enabled by ICT; such as the Internet, mobile and sensor networks”.

The digital economy is part of the shift from the past industrial period to the new digital or information period. It is where the factors of production rely on the deployment or use of ICT. Access to the Internet is the driving force behind the digital economy. It increases the speed with which information is produced (instantaneously), transmitted (immediately), shared (collaboratively) and acted upon (spontaneously). Mobility is another key driving factor – which are in the form of intangibles (e.g. software); consumers’ increased access to mobile Internet through widespread adoption of smart mobile devices; and businesses’ significantly increased ability to provide global services, due to decreased the cost of organizing and coordinating complex activities over long distances. The increase in computing power and storage capacity and a decrease in data storage cost has also resulted in massive reliance on data and content, and further driving the rise of the digital economy.

The digital economy has given rise to a variety of new business models. ICT advances have made it possible to conduct many types of business at substantially greater scale and over longer distances than was previously possible. Electronic commerce (e-Commerce) models,
broadly defined as the sale or purchase of goods or services, conducted over computer networks, has evolved and growth significantly; and these include models for business-to-business (B2B) and business-to-consumers (B2C), and consumer-to-consumer (C2C). A number of alternative online payment options are also in use; such as international online payment mechanisms like PayPal and Skrill, digital or e-Wallets, and use of virtual currencies such as Bitcoin. App stores, which are digital platforms for software typically provided as a component of a mobile operating system, allows consumers to browse, purchase and automatically download and install applications on their devices; while online advertising uses the Internet as a medium to target and deliver marketing messages to customers. Cloud computing business models now allows the provision of standardized, configurable, on-demand, online computer services, using shared physical and virtual resources.

Leading digital economies, such as South Korea, Denmark and Sweden, exhibit three key elements for their digital economy as shown in Figure 4—readiness to use digital technologies, a supportive environment, and the adoption of emerging digital opportunities.

Digitization has had a major transformative effect, and has impacted upon every sector of the economy. These trends show no signs of decreasing. Digital technologies will also increase competitiveness in the economy; this is likely to be global in scale, given that geographical barriers are becoming increasingly irrelevant. According to IDC, the size of total worldwide e-commerce, combining business-to-business (B2B) and business-to-consumer (B2C) transactions, is US$16 trillion in 2013. IDate, the French technology research firm, estimates the global market for digital products and services at US$4.4 trillion in 2013. Adding these figures together gives us an estimate of the total size of the digital economy at US$20.4 trillion, equivalent to approximately 13.8% of all sales flowing through the world economy.

Figure 4. Digital Economy Readiness Assessment Framework

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37 Extracted from article by Infocomm Development Authority of Singapore; as referred above.
The Pacific islands have traditionally been hindered in economic development by their inherent constraints; including geographical remoteness from major global markets, small country size, limited natural and human resources, cultural and ethnic diversity, aid dependency, and vulnerability to climate change and natural disasters. They also facing a particularly pressing development challenge in the form of high youth population and growing youth unemployment. An estimated 23 percent of the potential youth labor force is unemployed, reflecting only the formal sector and omitting those in casual, low-paid, or subsistence occupations. A digital economy development approach for the Pacific in the coming decades could help these islands to transcend, overcome and address these constraints and challenges.

**Key Issues and Challenges.** The Pacific islands are still building the foundational connectivity for Internet and mobile access that could be used to develop their digital economies. Digital economy issues that have been addressed by more developed economies will also need to be addressed by the PICs. The Pacific island economies, like other developed economies, also face the same structural issues and challenges with regards to digital economy, given the rapid pace of ICT developments and uncertainty regarding its future impact. Discussions about digital economies inevitably and necessarily lead back to the role of governments\(^\text{38}\); and some of the pertinent issues are discussed below.

The governments’ levels of involvement and focus in building a digital economy is a foremost consideration. The international experiences suggest that governments have generally been involved; but have differing levels of focus. For example the Australian government has a specific digital economy strategy developed in 2011\(^\text{39}\); while the New Zealand government has established 4 focus areas and 8 integral areas to ensure the country benefits from the digital economy\(^\text{40}\). Other countries, like India, integrate their digital economy agenda into their wider Digital India program\(^\text{41}\). There is also a need for countries to identify their specific digital economy enablers; based on their country context and the 3 elements of readiness, environment and usage discussed above. The typical enablers include infrastructure, mobility, basic laws and regulations, digital or e-Skills, and leveraging ICT for jobs. These are discussed in more detail below.

The availability of a basic legal and regulatory environment for digital economies, is a key challenge that developing countries face. The international experience shows that there are

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41 Department of Electronics and IT; Government of India. *Digital India – About the Program*. Available at: http://www.digitalindia.gov.in/content/about-programme
various basic laws and regulations needed; such as e-transactions, e-payments, e-signature, intellectual property rights, privacy and confidentiality, etc. However this still do not exist in many developing countries, and in the majority of the PICs e.g. only Vanuatu has an electronic transaction act.

There are also challenging legal and regulatory issues particular to the digital economy. Taxation is an example, as it would not be feasible to ring-fence the digital economy from the rest of the economy for tax purposes. However, certain business models and key features of the digital economy may exacerbate base erosion and profit shifting (BEPS) risks. Traditional tax laws are not adequate in a world where people, intangible property, data and business functions don’t need to be located in the same country as the customer or business owner\textsuperscript{42}. The OCED has been examining this issue over the years\textsuperscript{43}, but numerous areas of uncertainty remains\textsuperscript{44}. New Zealand is also working closely with the OECD and G-20 on their entire BEPS action plan\textsuperscript{45}.

Countries also need to consider key ICT-related investments for their future digital economies. The pertinent investments includes first and foremost the digital infrastructure, given that the Internet is the foundation for digital economies as discussed above. While the Pacific island are already in the midst of improving their connectivity, it remains an on-going priority to ensure that such infrastructure continues to address and improve issues related to reach, penetration, speed, reliability, cost, etc. These issues have been discussed in the section above.

e-Skills are also a key investment for building digital economies. As ICT increases its importance in strategic and operational aspects of the economy and society, it is now a key component of the new skills requirements for new jobs. E-skills for entrepreneurs, managers, ICT practitioners and users are crucial for fostering innovation and competitiveness\textsuperscript{46}. An example of the type of e-Skills is provided in the figure below.

\textsuperscript{43} OECD. 2014. (refer above)
\textsuperscript{46} European Commission. 2009. e-Skills are crucial for the EU. Available at: http://www.ecdl.org/files/cepis/20091126111011_e-Skills%202009%20Conference%20Concl.pdf
There have been limited national initiatives on building e-Skills in the Pacific, although numerous countries have already adapted national or regional initiative on this issue. For example, the European Commission have developed regional e-Skills strategies, competence frameworks, curriculum guidelines, etc.; and major action lines for e-Skills development at the European level.

Many developing countries has also not benefited from the current availability of digital jobs; in spite of their significant importance for socio-economic development and long term digital economy goals. The global ICT sector accounts for a significant share of total employment, employing almost 15 million people in OECD countries in 2009, and millions more around the world. These include ICT jobs for specialists who produce ICT, and ICT-intensive users who consume ICT (World Bank 2013). In particular the international experience suggests that the global outsourcing services (GOS) industry offers significantly greater potential for job creation for PICs; as compared to the telecommunications or the IT hardware and software subsectors. For GOS, the typical services outsourced are IT, business processes, and knowledge process; and the industry consists of diverse types of services and skills requirements, as show in the table below.

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Table 4. Definition and Classification of ITO/BPO/KPO\textsuperscript{49}

<table>
<thead>
<tr>
<th>Classification</th>
<th>Definition and service areas</th>
<th>Required skills level</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Outsourcing (ITO)</td>
<td>Outsourcing of IT services; such as software development, remote infrastructure management (RIM), custom application development, systems integration, package software implementation and support, IT consulting, embedded systems, project design, plant engineering, and products.</td>
<td>The range of services can require low to high skilled personnel.</td>
</tr>
<tr>
<td>Business Process Outsourcing (BPO)</td>
<td>Service functions that are information intensive and that are transferred outside a company to a third party. It includes services such as customer relationship management, human resource management, and enterprise resources management supporting the varied business processes in different verticals such as banking, finance, health, or tourism. The types of services provided are broad, and include: • Voice based services, such as call centers/helpdesks, telemarketing, etc. • Non-voice based services; such as data entry, digitization, graphics rendering, accounting, etc.</td>
<td>Mostly falls into the low to middle skills range (e.g. call centers to complex financial services).</td>
</tr>
<tr>
<td>Knowledge Process Outsourcing (KPO)</td>
<td>Encompasses specialist activities that are knowledge intensive, such as research and development (R&amp;D), market intelligence, and legal services, and comprises core information-related business activities that are competitively important or form an integral part of a company's value chain.</td>
<td>Requires advanced analytical and technical skills as well as a high degree of specialist expertise.</td>
</tr>
</tbody>
</table>

The GOS industry's consistent growth has led to increasing demand for skilled workers globally; and the growth is expected to continue in the decades ahead. The GOS industry in India alone has created 3.1 direct million jobs.\textsuperscript{50} Further, every direct job created in this industry is estimated to create indirect employment for about 2.5 people in other sectors. While large players, such as India and Philippines, have traditionally dominated the global market; some small island economies are also competitive and benefitting from this global industry. Mauritius and Jamaica are recognized among the offshoring leaders in their respective regions.

New GOS industry approaches have also emerged in recent years, owing to continual advances in technology and connectivity (A.T. Kearney 2014). The online outsourcing (OO) approach refers to the performance of tasks conducted over the Internet by workers from anywhere in the world, using online marketplaces or exchanges\textsuperscript{51}; and is a particularly


\textsuperscript{50} NASSCOM employment numbers available at [http://www.nasscom.in/impact-indias-growth](http://www.nasscom.in/impact-indias-growth)

promising channel for job creation in the Pacific islands. The global OO industry already has over 48 million registered workers, with an estimated 10 percent (4.8 million) being active.

To date Fiji appears to be the only country in the Pacific Islands benefitting from jobs in GOS\(^52\), as the country already hosts major offshoring operations. There is also virtually no participation of Pacific island youth and women in the new OO industry.

**Recommendations.** The development of digital economies is still an on-going agenda for numerous developed and developing countries. These countries’ approaches and plans have to take into account the technical environment’s uncertainty, given the rapid rate of ICT developments and “disruptive technologies” on the horizon – such as artificial intelligence, robotics and the Internet of Things\(^53\). The Pacific island governments will need to conduct analytics and planning for develop their digital economies in the long term. They could also take concrete steps to start addressing some of the key digital economy issues; based on the experiences of countries that had embarked much earlier on this effort. The recommendations for both the long and short term efforts are discussed below.

Pacific island governments will need to define what is encompassed within their definition of digital economy, in order to gain the maximum leverage of this economic development approach. They could also define the digital economy in terms of the influence of digital technologies on their main socio-economic issues they seek to address. For example, the European Commission emphasized it in terms of its influence on jobs and growth\(^54\). The Pacific Islands should also establish a vision that will transform their economies for long term competitiveness and value using ICT. The vision should be able to motivate, nurture and enhance both their ICT sector, and the use of ICT across the economy (e.g. use of e-business/e-commerce for their traditional industries; such as tourism, fisheries and niche commodity exports). They could take a regional approach for the definition and visioning process. Such regional approach would be similar to Europe’s, and is expected to be more realistic and relevant to the Pacific given each country’s limited size and population.

The region, and each PIC would also need to develop and effectively implement policies, strategies and roadmaps to build their digital economies. These policies, strategies and roadmaps will have to be broad enough to cover their vision for both the ICT and non-ICT sector, and be flexible enough to cater for rapid and disruptive technological changes. The effort could be conducted at the national level; or developed at the regional level with other PICs to benefit from cross-country synergies and economies of scale, especially given the inherently small population and geographies of these countries. The strategies and roadmaps would necessarily cover pertinent digital economy issues on digital infrastructure, e-Skills and


\(^{54}\) Digital Agenda for Europe; European Commission. 2014. (Refer above).
ICT-enabled jobs. They could also be developed based on neighboring countries’ advanced experiences, such as those of Australia55 and New Zealand (refer to digital economy work program in Annex 1). Box 1 highlights Okinawa’s experience in ICT development56.

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**Box 1. ICT Development in Okinawa and Possible Lessons for the Pacific**

Japan’s Okinawa Prefecture faces many similar economic development issues similar to the Pacific Islands. It is made up of 160 islands that are spread geographically, industries can only expand so far there because its market is small, and it is far removed from the large markets (Tokyo and other major cities in this case). Creating employment opportunities is also an especially challenging issue.

Over a period longer than a decade, Okinawa Prefecture has deliberately planned and implemented various approaches around their ICT industry to improve infrastructure, support policy, attract businesses from outside and develop human resources. Okinawa came up with the “Okinawa Multimedia Island Concept” in September 1998 and began discussing specific policy for the development of an ICT industry to stand behind tourism as the number-two industry. Besides building submarine cables for basic digital connectivity; the Prefecture and developed and implemented two 10-year plans that began in 2002, the “Okinawa Promotion Plan” and the “Okinawa Information and Communications Industry Development Promotion Plan,” which led into the “Okinawa 21st Century Vision” unveiled in March 2010. The “21st Century Vision” is a 10-year plan that began in 2012 and, in tandem with the “Okinawa Smart Hub Concept,” names and promotes the ICT industry as a new, leading industry for creating jobs and reinvigorating local business.

These initiatives have already resulted in the set up over 200 ICT companies, which have created new jobs for over 20,000 people in the decade leading up to 2011. They are an example of deliberate planning and implementation to develop a new ICT industry, and has helped the island to overcome its geographical limitations.

While such planning activities for Pacific digital economies are taking place; governments in the Pacific could start immediately to implement the basic laws and regulations to provide an enabling environment for digital economies. There are already sufficient international experience that shows the basic laws and regulations required (e.g. e-Transaction law), and the Pacific Islands are relatively far behind time in their enactment. In additional the Pacific governments should understand and be ready to manage the legal and regulatory issues that are particular to digital economies, such as those related to taxation as discussed above.

Pacific governments should consider investing in foundational areas to build their digital economies. As discussed above continual investments in digital infrastructure and e-Skills are already necessary at this initial stage; in addition to other area that could be identified and assessed for feasibility for investment (e.g. e-Payments and online trusted identities). The Pacific island governments could also examine issues and implement actions needed to increase the use of ICT in businesses, such as e-commerce for their traditional industries.

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55 As referenced above - Department of Broadband, Communications and the Digital Economy; Australian Government.
The governments may need to consider some forms of support for industry development to build digital jobs. Such jobs are already bringing significant socio-economic benefits to comparable countries, and its workers can become the pioneers and enabling workforce to build digital economies in the country and region. For example, Fiji could pilot industry development programs for GOS industry growth and jobs, given that the country already hosts a limited number of such outsourcing operations. Other countries could follow Fiji subsequently to develop their GOS industry; based on the “flying geese” approach for regional economic development; and as ICT readiness, environment and usage improves in these other PICs.

4. Digital Government

An important potential benefit of improving connectivity in the Pacific region is to enable citizens to conduct not only social and commercial but also government-related transactions online. This helps to lower transaction costs for users, and also strengthens the service-orientation of governments. Digital government may thus be considered a key component of a “smarter” Pacific region, though it will take some time to implement. A variety of enabling technologies can help to improve the efficiency, transparency and accountability of governments, and to make services more accessible to businesses and households.

**Figure 6. E-Government Components**

At the earliest stages of digital government or “e-government”, the Internet offers a basic platform for dissemination of information about government policies, programs, contacts, news and events. At more advanced stages of e-government deployment, an extensive range of services may be delivered via the Internet, including tax payments, licensing, civil registration etc, and accessibly from a variety of user devices.
The principal components of “digital government” typically include the following:

(a) Front end (citizen-facing): government websites (in some cases, interactive portals and other forms of citizen engagement/feedback services, including those delivered via social media)

(b) Back end (supporting government offices):

- Government networks (may be leased from telecom service providers or directly operated)
- Data centres, plus business continuity/disaster recovery centres
- Information systems (e.g. government financial management, tax, business registration etc), backed by core databases (e.g. unique identification, land registration, business registration); processes essentially “digitized”
- Cybersecurity (protecting information systems and data)
- Standard government enterprise architecture. Globally, many government are moving to “cloud-based” services, in which ICT infrastructure and applications are provided through a shared platform, and accessed by users via the Internet (in the same way as social media, for example)
- Chief Information Officer and technical staff (may be in-house, fully or partially outsourced)

These components can provide a platform for the collection and management of data (for example on citizens, businesses, land utilization, meteorology, natural resources) and for delivery of services.

*Table 5. Available online services—selected countries*

<table>
<thead>
<tr>
<th>Service</th>
<th>Fiji</th>
<th>Samoa</th>
<th>Solomon Islands</th>
<th>Tonga</th>
<th>Vanuatu</th>
</tr>
</thead>
<tbody>
<tr>
<td>government elections</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>return, least complex situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtain a copy of a birth certificate</td>
<td>Level 3 <a href="#">www.bdm.gov.fj</a></td>
<td><a href="#">www.mjca.gov.ws</a></td>
<td>NA</td>
<td>Level 1</td>
<td>Level 1</td>
</tr>
</tbody>
</table>
Current status. As summarized in Tables 5 and 6 governments in the Pacific and PNG have mostly established some form of online presence, but, with few exceptions, are not yet delivering services via the Internet. Very few have developed any form of e-government policy and associated strategies or implementation plans. At the “front end” governments have established informational websites, for whole of government and/or selected agencies. Quality and availability of up to date data/information varies widely across countries and individual ministries/agencies. The Government of Fiji is working on an online Investment Fiji application (single window) and also on systems for land registration and civil registration. Tonga has established an online business registration system. In some cases, Government/ministry websites offer forms or information for download, but transactions have to be conducted manually. In some cases governments have started to work on digitization of documents and processes. Table 6 shows the current status of Pacific e-government, in particularly “back-office” status.

<table>
<thead>
<tr>
<th>Country</th>
<th>Government network</th>
<th>E-Government Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSM</td>
<td>“Campus” network connection in progress for Ministries in Pohnpei; other states have individual govt office connections</td>
<td>Government information website, mostly news <a href="http://www.fsmgov.org/">http://www.fsmgov.org/</a> Individual ministry websites No formal CIO function</td>
</tr>
<tr>
<td>Kiribati</td>
<td>Individual Internet connections</td>
<td>Individual ministry websites. No E-govt strategy/policy Ministry of Transport, Communications and Tourism Development setting up CIO function</td>
</tr>
<tr>
<td>Country</td>
<td>Government network</td>
<td>E-Government Status</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Palau       | Individual Internet connections                                                     | Government of Palau main website/portal [http://palaugov.org/](http://palaugov.org/) Mostly informational; some forms available for download  
No formal CIO function |
| PNG         | Integrated Government Information System (China Eximbank loan)                      | No E-Government strategy/policy  
No government CIO  
Government communications network installed and partially functional (IGIS)  
Government/ministry websites (informational) |
| Samoa       | Samoa National Broadband Highway (China Eximbank loan)                               | No E-government strategy/policy  
No government CIO  
Government/ministry websites (informational)  
www.samoagovt.ws |
| Solomon Islands | Solomon Islands Government (SIG) Connect Network (DFAT Grant)                      | National ICT policy  
No E-government strategy/policy  
Some government websites (informational)  
IT Support Unit (ITSU) under the Ministry of Finance |
| Tonga       | Ministries have individual arrangements for Internet connections                   | Broad strategic vision  
E-govt unit established under Ministry responsible for Information & Communication—to take on CIO function  
Tonga government portal and ministry websites (informational)  
| Vanuatu     | Government Network (China Eximbank loan)                                            | E-Government strategy  
Data centre to be established  
Enterprise architecture, IT policy, cybersecurity policy  
Government website and individual websites  
[https://governmentofvanuatu.gov.vu/](https://governmentofvanuatu.gov.vu/)  
CIO under the PM’s office [https://ogcio.gov.vu/](https://ogcio.gov.vu/) |

**Key issues and challenges** include the following:

- Limited awareness within governments of the benefits of online services, not only in terms of improved services to constituents, but for greater internal efficiencies
- Need for investment in enabling technologies and establishment of standards: data centers, cloud, interoperability
- Mobilization of skills and technical support, if not in-house, then through outsourcing or shared services arrangements
- Cybersecurity: implementation and continuous maintenance

**Recommendations.** Pacific governments will need to develop—individually, or where feasible collectively—the appropriate policy frameworks for e-government, including the supporting infrastructure and services. Extensive resources and prior experience is available to provide guidance in these areas, but this will require significant effort over the next 3-5 years to build solid foundations. A key priority is to establish strong and explicit leadership of this agenda, either through specialized agencies and/or driven by strong central agencies such as Ministries of Finance or Offices of the Prime Minister.
Pacific governments may also wish to consider options for sharing certain critical resources regionally, for example:

- A regional Government cloud/data center (for example, reducing the need for individual software licenses, extensive government hardware investments etc)
- A regional cybersecurity agency, and a regional computer emergency response team (CERT) allowing scare specialized technical skills to be shared regionally
- Shared regional data sets/repositories, for example on climate change/disaster risk monitoring, road safety, aviation, fisheries

5. Making the Smarter Pacific Possible

A smarter, better-connected Pacific region is an achievable vision within the next 10-15 years. A framework for a “smart region” can be further elaborated based on the building blocks described above.

**CONNECTIVITY**
- ICT Policy & Legislation
- Market Liberalization
- Investment in Broadband: funding (including PPPs) and supportive regulations

**Digital Governments**
- Government Chief Information Officer
- Standard approaches to whole-of-government communications, enterprise architecture, use of data centers, portals, standards/interoperability
- Government cloud
- Cybersecurity
- Resource-sharing: regional, sub-regional?

**Skills**
- Public and Private Sectors-skills matching
- Curriculum relevance

**Digital Economy**
- ICT-Enabled Jobs: content, GoS
- E-Commerce
- Legal & regulatory framework
ANNEX 1: New Zealand’s Digital Economy Work Program

DIGITAL ECONOMY PROGRAMME

"ICT is catalyzing social and economic change on a scale comparable to those resulting from previous breakthrough technologies such as steam power, the internal combustion engine, and electricity. In conducive economic environments, these technologies were largely responsible for the high rises in real income that transformed the world's population from the late 19th century. Such breakthrough technologies occur rarely – perhaps less often in a generation."

- The New Zealand Productivity Commission

<table>
<thead>
<tr>
<th>$1.8 billion</th>
<th>$34 billion</th>
</tr>
</thead>
<tbody>
<tr>
<td>the value of ICT goods and services exports (in 2012)</td>
<td>the estimated total impact in productivity and efficiency gains for firms if all New Zealand businesses were using the Internet to its full potential</td>
</tr>
</tbody>
</table>

MBIE has identified eight areas integral to ensuring New Zealanders benefit from the significant opportunities created by ICT:

<table>
<thead>
<tr>
<th>FOCUS AREAS</th>
<th>PRIORITIES</th>
<th>CURRENT INITIATIVES</th>
<th>POSSIBLE WORK PROGRAMME PRIORITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing New Zealand’s ICT Sector</td>
<td>Ensuring our firms have access to the ICT skills they need to grow and innovate</td>
<td>ICT Skills</td>
<td>Identify the gaps and opportunities across the three focus areas</td>
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<td></td>
<td>Encouraging better use of ICT by New Zealand businesses</td>
<td>Telecommunications Infrastructure</td>
<td>Enhance ICT engagement</td>
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<td>Enhancing domestic and international connectivity</td>
<td>Cybersecurity</td>
<td>Run further talent engagement campaigns</td>
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<td>Ensuring the right balance between innovation, and security and privacy protection</td>
<td>Cybercrime</td>
<td>Promote the Skills Framework for the Information Age</td>
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<td>Ensuring New Zealanders can fully participate in a digital world</td>
<td>Cyber Resilience</td>
<td>Establish ICT forums to promote industry leadership and greater coordination between government, industry and other stakeholders</td>
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<td>Ensuring policies and regulations allow for digital innovation and respond to technological change</td>
<td>Cyber Capabilities</td>
<td>Explore options for business technology standards development</td>
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<td>Ensuring Government supports the digital economy through the way it operates</td>
<td>Infrastructure</td>
<td>Establish the UFB and RDI</td>
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<td>Result Area 6</td>
<td>Affordability</td>
<td>Develop initiatives to accelerate uptake and address barriers, including land access arrangements</td>
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<td>Result Area 10</td>
<td>Digital literacy</td>
<td>Refresh the Five Point Plan (could include priority users, key sectors, regions or R&amp;D streams)</td>
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<td>Procurement</td>
<td>Communications regulations and convergence</td>
<td>Coordinate research on broadband uptake and affordability to support delivery of education, Result Area 10, and connectivity programmes</td>
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<td>Open Data initiatives</td>
<td>Data and information regulation</td>
<td>Assess digital inclusion in New Zealand, including possible implications for the Government's economic, education, employment, and government services objectives</td>
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<td>Copyright and creative sector</td>
<td>Link to work being proposed on copyright and designs in the Commerce portfolio</td>
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<td></td>
<td>Continue the Government ICT Strategy and Action Plan workstreams</td>
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</tbody>
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