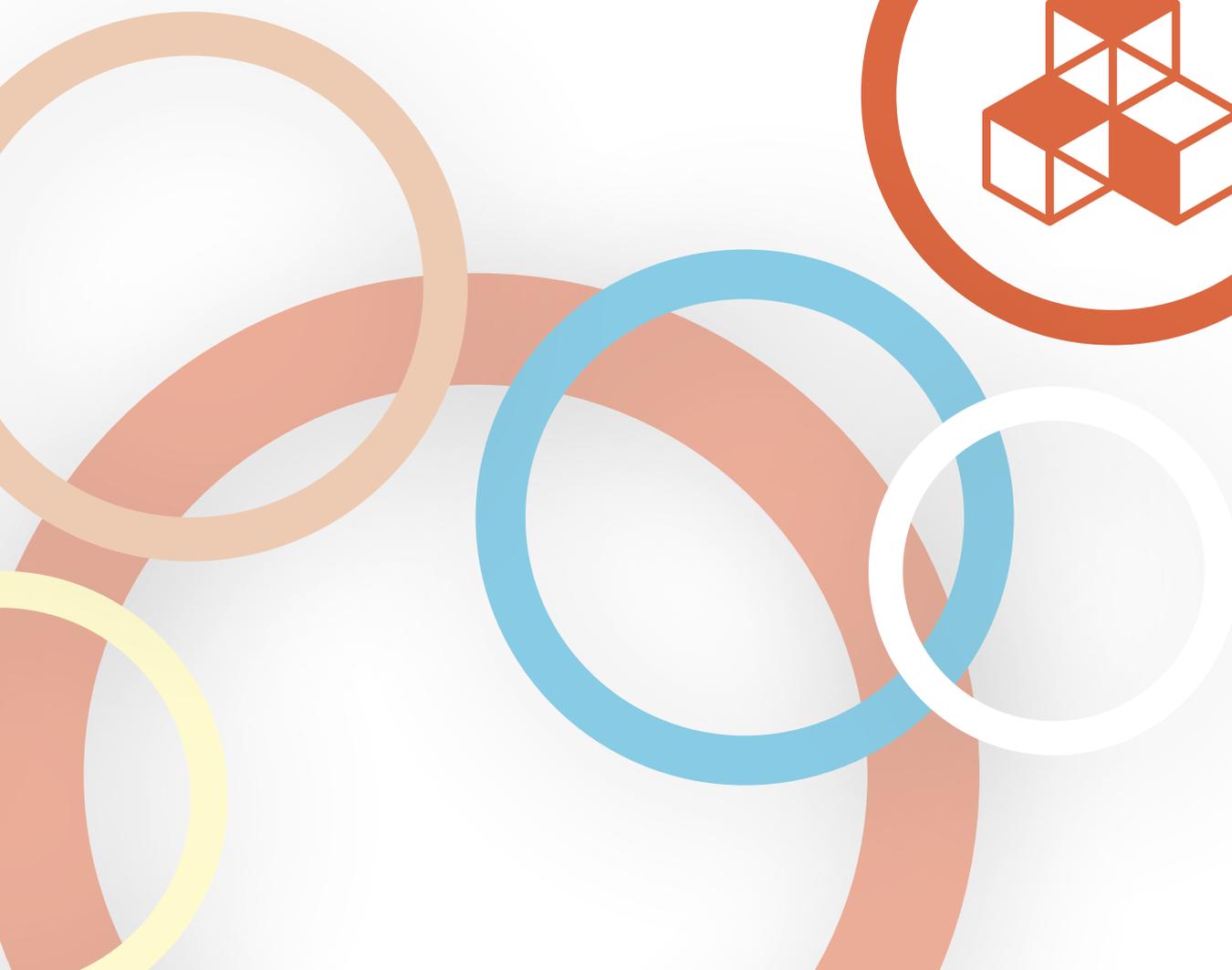




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China's South-South Cooperation with Pacific Island Countries in the Context of the 2030 Agenda for Sustainable Development

*Series Report:
Infrastructure*





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China's South-South Cooperation with Pacific Island Countries in the Context of the 2030 Agenda for Sustainable Development

Series Report: Infrastructure

United Nations Development Programme in China

2017

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Acknowledgement

UNDP would like to thank Ms. Ellen Kulumbu for writing this report as part of the policy series titled “China’s South-South Cooperation with Pacific Island Countries in the Context of the 2030 Agenda for Sustainable Development”. This report also received invaluable inputs and strong support from Mr. Denghua Zhang as team leader and Mr. George Cater as member of the research team for this policy series. Acknowledgement also goes to all the interviewees for this report, all the reviewers from UNDP Pacific countries offices, as well as experts and officials that actively participated in the international workshop on “China-Pacific Island Countries Cooperation for the Sustainable Development Goals”, hosted by UNDP China on 17-18 November, 2016 in Beijing. This report also benefited from the management support, substantive inputs and quality assurance provided by Ms. Christine Han, Mr. Niels Knudsen and other officials from the UNDP China Office. It is hoped that this report, along with the larger policy series, can stimulate further discussion and debate on the topic of China-Pacific development cooperation.

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List of Acronyms

ADB	Asian Development Bank
BASI	Australian Bureau of Air Safety Investigations
DoW	Department of Works (PNG)
EU	European Union
FSM	Federated States of Micronesia
GCF	Green Climate Fund
GDP	Gross Domestic Product
ICAO	International Civil Aviation Organization
ICT	Information and communication technology
IFC	International Financial Corporation
IWRM	Integrated Water Resources Management
MDG	Millennium Development Goal
PASO	Pacific Aviation Safety Office
PICs	Pacific Island Countries
PNG	Papua New Guinea
PRIF	Pacific Regional Infrastructure Facility
SDG	Sustainable Development Goal
SOPAC	The Secretariat of the Pacific Community Pacific Islands Applied Geoscience Commission
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Program
UNCTAD	United Nations Conference on Trade and Development
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNICEF	United Nations Children's Fund

Executive Summary

Infrastructure development is crucial for economic development and human well-being but remains a major challenge for many countries around the world today. Goal 9 of the Sustainable Development Goals (SDGs) focuses on infrastructure, aiming to “develop quality, reliable, sustainable and resilient infrastructure to support economic development and human well-being”. This report is part of a policy series that identifies challenges and opportunities for China's South-South cooperation with Pacific island countries (PICs) in the context of the SDGs. It focuses on Samoa, Fiji and Papua New Guinea (PNG), and examines two infrastructure sectors: Transport and communications, while taking a brief look at the water and sanitation sub-sector. PICs face unique challenges in infrastructure due to their geographic characteristics, as the table below shows. They relate to three main factors: Financing, asset management and human and technical resources.

Infrastructure (sub-) sector	Challenges
Land (transport sub-sector)	Lack of paved road networks; unmet financing needs for roads and maintenance of roads
Air (transport sub-sector)	Lack of directly flights between major PIC cities; limited resources to develop air transport systems
Maritime (transport sub-sector)	Financing constraints; trade imbalances; limited institutional and human capacity; natural factors
Water and sanitation	Lack of access to safe drinking water; disparity between urban and rural areas or outer islands; vulnerability to climate variations and natural disasters; lack of equipment, infrastructure and technical capacities
Communications	High costs; low internet and mobile phone coverage and penetration; lack of connectivity; limited institutional capacities and human resources

Source: Made by author

A number of development partners are providing support to the infrastructure sectors and sub-sectors in the Pacific region, including China. There is space for China to strengthen its infrastructure support while complementing other development partners' efforts. Based on the analysis of the infrastructure needs and existing development cooperation in infrastructure in the Pacific, this report draws specific recommendations under each of the sectors and sub-sectors studied, with a view to enhancing China-PICs infrastructure development cooperation towards the SDGs.

Infrastructure (sub-) sectors	Recommendations
Transport (land, air and maritime)	<ul style="list-style-type: none"> » Assist PICs in addressing the challenge of limited human and technical resources through capacity building programmes on infrastructure management, supervision, and maintenance. » Strengthen support to the maritime transport sector to PICs. » Engage with regional organizations such as the PASO.
Water and sanitation	<ul style="list-style-type: none"> » Establish a trilateral partnership with UNDP in the water and sanitation sector. » Address the challenges related to lack of equipment and technologies for sustainable fresh water supply and waste management. » Work through existing partnerships with regional bodies, such as the SPC or PIFS.
Communications	<ul style="list-style-type: none"> » Expand its current support to PICs that face similar challenges in their mobile and internet coverage and connectivity. » Support the use of applications for health, commerce and disaster risk management.

Introduction

Goal 9 of the Sustainable Development Goals (SDGs) focuses on infrastructure, aiming to “develop quality, reliable, sustainable and resilient infrastructure to support economic development and human well-being”. Infrastructure development facilitates social development and sets the pace for economic growth, as good roads, bridges, ports, wharves, terminals, airports and communications infrastructure make it possible for the movement of goods and people to engage in economic exchanges and contribute to livelihood improvement. However, the infrastructure system of any country or region reflects its geography. For instance, the key infrastructure systems of land-locked countries differ from those of countries surrounded by sea. The level of infrastructure development of a country is one important indicator of the level and strength of its economy: Developed countries with stronger economies generally have more sophisticated and efficient transport and communications infrastructure systems than developing countries with weaker economies.

Pacific island countries (PICs) face unique development challenges due to their geographic characteristics. This report focuses on the development and challenges in the infrastructure sector of three PICs, namely, Fiji, PNG and Samoa. The discussion of this report is limited to key economic infrastructure sectors and sub-sectors, which have been examined in reports of several key organizations, such as the Asian Development Bank (ADB) and the Pacific Regional Infrastructure Facility (PRIF). The report covers two major infrastructure sectors: transport and communications, while water and sanitation will be briefly looked at as a sub-sector. Under transport, the land, air, and maritime sub-sectors will be examined. This report is not a detailed assessment of the infrastructure systems in PICs. Rather, it aims to 1) provide a broad picture of the status of selected infrastructure systems in PICs; 2) highlight issues and challenges that are common across PICs which may impede the achievement of the SDGs and targets related to infrastructure; 3) provide an overview of China's current engagement in infrastructure development in PICs; 4) identify gaps requiring interventions by development partners; and finally 5) provide recommendations for China to strengthen its support to PICs in meeting the SDG infrastructure sub-goal and relevant targets. This report is based on interviews with partner governments and development partners,¹ review of reports and documents of organizations and projects in the infrastructure sector in the Pacific, and feedback from the China-Pacific Workshop organized by UNDP China in November 2016 in Beijing.

Infrastructure Challenges in the Pacific

Various development challenges posed by geography, size of the economies, limited capacity, small dispersed populations, and environmental issues lead PICs to following a different pattern of development expected for most low-middle income countries.² The needs and challenges of the infrastructure systems in the Pacific region are unique. Most PICs are sea-locked and naturally rely on ports to facilitate the movement of people and goods, but many of the main ports were built in the 1960s and 70s and the conditions of port facilities need urgent upgrades (UNESCAP, 2013).³ In addition, most PICs do not have well-functioning and reliable maritime transport systems (ADB, 2011). As a result, airports and road sub-sectors play a vital role in facilitating social and economic development in many countries, such as PNG which relies heavily on air and road transport (ADB, 2011). However, while land, air, and maritime sub-sectors are crucial, the current status of infrastructure systems in the region is generally in a poor-to-fair condition.⁴ Several countries, including Fiji, PNG, Samoa, Solomon Islands, Tonga and Vanuatu ranked in the lower half of the infrastructure development index for the Asia-Pacific region

1. Based on author's interviews with: (i) Navy Mulou, Health Economist, PNG National Department of Health, 17 July 2016; (ii) Koney Samuel, First Assistant Secretary (Foreign Aid) and staff, Department of National Planning & Monitoring, 25 July 2016; (iii) Kia-Henry Nema, Governance Associate, UNDP PNG, 21 July 2016.

2. Additional details on PICs in general including economies and development aid are in (i) Pacific Island Nations – How Viable are their Economies? http://www.eastwestcenter.org/sites/default/files/private/pip007_0.pdf and (ii) What We've Learned about development in Pacific island countries. Vol 1: <http://devpolicy.org/publications/reports/What-we've-learned-about-development-in-Pacific-island-countries.pdf>, Vol 2: <http://devpolicy.org/publications/reports/What-we've-learned-about-development-in-Pacific-island-countries-volume-2.pdf>.

3. This is according to an evaluation made by the Permanent International Association of Navigation Congress in the study of Port Located in Small Islands (2008), cited in Strengthening Inter-Island Shipping in the Pacific by UNESCAP (2013).

4. Assessments by the ADB (ADB, 2011) and the PRIF (PRIF, 2013).

in the United Nations Economic and Social Commission for Asia and the Pacific's (UNESCAP) 2007 measurement (UNESCAP, 2015).⁵ Some of these infrastructure-related issues exacerbated the challenges that hindered PICs' achievement of the Millennium Development Goals (MDGs). If not addressed, these challenges will also pose the same risks for PICs in implementing the SDGs. While some challenges are sector- or country-specific, others are common across countries and across infrastructure sectors and sub-sectors. These common challenges relate to three main factors: Financing, asset management and human and technical resources.

» **Financing**

Most PICs are categorized as lower-income countries with gross domestic product (GDP) per capita ranging from US\$1,026 to US\$4,035, while PICs at upper-middle-income category have GDP per capita of US\$4,036 to US\$12,475 (World Bank, 2017). The small size of the economies of most PICs poses a huge challenge to those that borrow from the ADB and the World Bank mainly for infrastructure projects. In addition, it is difficult for PICs to find willing partners for special sector funds and there is need for simplified processes and better access to these funds.

» **Asset management**

This is one of the biggest challenges in the Pacific region (PRIF, 2013:6, 17; SPC 2012). Apart from Fiji, PNG and Samoa (PRIF, 2013:9), most PICs do not have sufficient funding for the maintenance of completed infrastructure projects, which results in fast deterioration (World Bank, 2006). This is partly due to limited technical, human and financial capacity, and limited attention and low priority given to the maintenance of existing infrastructure by PIC governments. Most PICs have developed national infrastructure strategies which consider issues of prioritization, sustainability, asset management and financing options for not only new infrastructure but also ongoing maintenance of existing infrastructure. However, many governments in the region are observed to be prioritizing new infrastructure over ongoing maintenance, and do not give sufficient considerations when allocating funding for the maintenance of the infrastructure over the years (PRIF, 2013; World Bank, 1994:6). They rely on development partners for maintenance of existing infrastructure and view the assistance as a "free good" (PRIF, 2013:13).

» **Human and technical resources**

Many PICs have limited human and technical resources, including technical capacity and knowledge to manage, supervise and maintain infrastructure. Fiji, PNG and Samoa experience common challenges of limited human skills, and weak institutional capacity at required level of quality and standards (ADB, 2011:4-5).

Current status and development challenges in transport

The three major modes of movement of people and goods in the Pacific region are by sea, by air and by land. As PICs are sea-locked, air and maritime transport are the main means of transport for many PICs, with seaports and airports becoming the lifelines for these countries. Land transport is only utilized to a greater degree by a few countries in the region, such as PNG, Fiji, Samoa and Cook Islands.

Land transport and roads

The land transport status varies across PICs. While smaller countries have limited or no properly developed road transport systems, larger countries have relatively well developed ones. Rails are almost non-existent in PICs as a means of transport but only used for industrial purposes in transporting sugarcane in Fiji (ADB, 2007:34). With limited statistics in general and the absence of recent data, the 2009 data in Table 1 is used here to highlight the varying road conditions, and illustrate their good-fair-poor in PICs.

5. ESCAP (2010) computed a composite measure to get a sense of the infrastructural development levels in Asia and the Pacific for 2007. The composite measure captured aspects of transport infrastructure (roads, railways and air transport density), ICT infrastructure (telephone and internet density), energy availability (intensity of energy use) and banking infrastructure (bank branches density).

Table 1. Selected transport statistics of the Pacific region (2009)

Country	Paved road network (km)	Unpaved road network (km)	Airports with paved runways	Liner Shipping Connectivity Index (UNCTAD)
Cook Islands	320	33	2	-
Fiji	1,692	1,748	4	85
Federated States of Micronesia (FSM)	42	1298	4	150
Kiribati	36	670	6	146
Marshall Islands	75	1,953	5	152
Nauru	29	40	1	-
Palau	36	47	1	-
Papua New Guinea	3,600	17,600	21	106
Samoa	332	2,005	1	120
Solomon Islands	71	1,875	2	114
Tonga	184	496	1	139
Tuvalu	8	0	0	-
Vanuatu	256	814	3	138
Total	6,681	27,479	51	1,150

Source: Adapted from ADB, 2011:6-7

The Pacific region has a road network of about 40,200 km with about 23 per cent sealed roads,⁶ and the status varies across countries. Many PICs have relatively good road networks although paved road density and coverage depend on the size of the country. For instance, there are more paved road networks in the larger Melanesian countries such as PNG, than in smaller atoll countries such as Nauru, Palau, and Tuvalu. The road networks in the atoll countries comprise few sealed roads in main towns, and consist of compacted coral sand. Of the eight PICs that China has diplomatic relations with,⁷ only Fiji and PNG have large paved road networks of more than a thousand kilometres, while roads in Fiji are in better conditions than those of PNG. The conditions and connectivity of road networks in PNG are affected by heavy rainfalls (ADB, 2011:69-70).

Financing needs to support road infrastructure developments are greater for low-per capita-income PICs (UNESCAP, 2015). In terms of country financing needs, Fiji requires additional funding for more road construction even though the Fiji government has been investing heavily in transport since 2012 (ADB, 2014:9). Similarly, Samoa is in need of funding for road maintenance activities (AusAID, 2013:39).

Air transport and airports

Air transport services are vital to PICs despite a relatively small and limited air transport market in the region. A relatively good air and flight network exists between larger cities, such as Port Moresby, Nadi, Apia, Honiara and Rarotonga. A few countries have their own national airlines, such as Fiji and PNG, with a network covering many of the PICs as well as Australia, New Zealand, the US and some Asian cities (ADB, 2007:xiv). PNG's Air Niugini is limited to a few international connections and few regional connections, while Fiji has air connectivity with many

6. The terms "sealed roads" and "paved roads" are used interchangeably. Sealed road has a surface that has been permanently sealed by one of several pavement treatments, such as asphalt concrete, chip seal, tarmac or bitumen. Paved road is a road with a hard smooth surface of bitumen or tar.

7. Five Components: (a) number of container companies serving country; (b) container-carrying capacity of largest ship serving country; (c) number of different services serving country; (d) total number of ships; (e) total container capacity of all ships serving country ((UNCTAD, 2014).

other PICs. However, there is no direct flight between Fiji and Palau, the FSM, Marshall Islands, Niue and Cook Islands, and several of the French, American, British and New Zealand territories.

There are a total of 53 airports in the Pacific region with surfaced runways. 40 per cent of these are in PNG, since air transport is the main mode of travel due to geographical conditions of the country, poor road conditions and security issues. The capacity of airports determines the accommodation, movement and volume of passengers and cargo. Larger airports such as the ones in Fiji, PNG and Samoa can accommodate long-haul flights on wide-bodied aircraft, while smaller airports can only accommodate smaller aircrafts. Terminal facilities of many smaller airports lack required services. The challenges faced by individual PICs in the aviation sub-sector relate to limited resources to develop air transport systems, including safety, accident investigation and other related functions, all of which would not allow them to establish safe, effective and efficient air transport systems (ADB, 2011).

Maritime transport and ports

Access to well-functioning and reliable maritime transport systems is vital for sea-locked PICs. Each country in the region has a range of ports, for both international liner trades and domestic services. Port conditions in the Pacific region vary from relatively modern, well-equipped container and bulk facilities, such as those in PNG and Fiji, to very basic wharves such as the ones in Nauru. Sophisticated facilities with major cargo-handling capability are rare, such as in Suva and Lautoka, Fiji (ADB, 2007:26, 29). Many ports in the region, such as the ones in the FSM and Solomon Islands, are well below international standards in terms of infrastructure and operations, and their facilities pose operational problems for efficient movement and storage of containers as they were built in the 1950s and 1960s, prior to containerization (ADB, 2007; AusAID, 2004:37 cited in ADB, 2011:25).

Domestic shipping services vary from sophisticated passenger and cargo services to services by various smaller vessels for serving small ports and beach landings. Many PICs do not have commercially viable domestic shipping services due to low volumes of goods transported between urban and remote areas, aging domestic fleet in some countries, and locally developed racks and containers which do not conform to standards of the International Organization for Standardization (ISO). Even with countries that have domestic shipping services, the services are not regular or frequent, thus impacting on service delivery and livelihood activities. The lack of adequate domestic shipping services limits the ability of people to participate in economic activities and access to adequate health, education and other essential services. In addition, many of the vessels do not meet the acceptable safety and security requirements (ADB, 2007:23). International shipping services, on the other hand, mainly support import trade in the region, which is transported in containers. There are scheduled international shipping services from around the world. The geographical isolation of the Pacific is reflected in the low rankings on the Liner Shipping Connectivity Index by the United Nations Conference on Trade and Development (UNCTAD) as shown in Table 1, where a lower value is better than a higher value. The ranking captures how well countries are connected to global container liner shipping networks on five components of the maritime transport sub-sector⁸ (ADB, 2011:11; UNCTAD, 2014). There are many challenges affecting the maritime transport sub-sector as reflected in Table 2 below.

Table 2. PICs' challenges in the maritime transport sub-sector

Issues and challenges	Description
Financial and economic factors	
Financial constraints	Limited funding from government budgets for developing, rehabilitating and maintaining port infrastructure and facilities. PICs classified as low-middle-income countries have limited access to financial resources.
Trade imbalances; low and imbalanced cargo volumes	Pacific island economies are small. The volume of imports out-weighs exports. Trade imbalances create operational challenges and higher costs. Investors tend not to be attracted to areas with trade imbalances.

8. Lowy Institute: <http://www.lowyinstitute.org/publications/digital-islands-how-pacifics-ict-revolution-transforming-region>. Accessed 11 July 2016.

Facilities	
Seaport facilities, infrastructure and equipment	As many port facilities were built before containerization, the layout of ports, terminal designs and space for warehousing and storage do not meet requirements for handling containers. Facilities lack maintenance.
Institutional factors	
Limited capacities	Limited qualified human resources with capacity in management, supervision and technical skills.
Geographical factors	
Long distance between ports	For domestic shipping services, countries are scattered over vast distances. Long and indirect routes impact on transport costs.
Lack of access to global shipping networks	PICs are remote and far from global markets, and not in the path of the main shipping networks connecting the markets in international trade and shipping.
Exogenous factors	
Natural hazards	Many PICs are located in areas that expose them to natural hazards (earthquakes, tsunamis and hurricanes) and extreme meteorological effects (storms, floods, droughts).
Climate change	Rising sea level, extreme heat and heavy rainfalls in many PICs can damage the transport infrastructure, including port facilities.

Sources: ADB, 2007, 2011; SPC, 2014; UNCTAD, 2014

Current status and development challenges in water and sanitation

Many PICs do not have access to sustainable freshwater. According to the 2008 WHO/UNICEF Joint Monitoring Programme, only 54 per cent of the population in the Pacific region had access to improved drinking water sources, and 55 per cent improved sanitation facilities (SPC, 2013). Lack of access to safe drinking water and sanitation poses challenges for many PICs. While some areas of larger Melanesian countries, such as Fiji, PNG, Solomon Islands and Vanuatu have problems with poor water quality, the smaller Micronesian and Polynesian countries, in particular, face more problems with access to clean water and sanitation. Even within countries, the disparity is huge between urban and rural areas or outer islands. Groundwater and rainwater provide the only sources of water for both households and agricultural use in several countries. However, these sources are threatened by high vulnerability to climate variations; natural disasters, population growth and lack of solid waste management practices (WHO, 2008:37). Many PICs lack appropriate equipment, infrastructure and technologies of required standards, the capacity for water quality control, and monitoring and data management systems (Mirti and Davies, 2005).

Current status and development challenges in communications

Information and communications technology (ICT) is widely recognized as a powerful tool for development. Despite the Pacific region lagging behind other developing countries in Southeast Asia in terms of telecommunications sector reform, ICT has progressed faster than other aspects of the sector, such as radio and television, as a result of the deregulation and reform within the sector in the early 2000s. Prior to the reforms, governments of all PICs had monopoly over the telecommunications sector, which made access to mobile phones and internet usage costly and difficult for the majority of the populations. Today, about 60 per cent of Pacific islanders have access to mobile phones.⁹ The situation in all aspects is better now across all PICs compared

9. The three PICs are: Tonga, Nauru and Vanuatu. Refer to: <https://www.digicelgroup.com/en/where-we-are/asia-pacific.html> for details.

to before the reforms. ICT services are now handled and delivered by the private sector in many PICs. Digicel is now the leading and fastest-growing mobile operator since it began operations in the Pacific region in 2006. It now operates in Fiji, PNG, Samoa and three other countries in the region.¹⁰ Mobile penetration rates vary between countries in the region. Whereas Fiji and Samoa enjoy rates of over 80 per cent, PNG's penetration rate was 34 per cent in 2011.¹¹ However, this represents a huge increase for PNG, up from 2 per cent in 2006 and 16 per cent in 2008 (Cave, 2012:4).

Improving access to ICT services, however, remains a challenge despite efforts by PIC governments and development partners at country and regional level. Some of the issues and challenges faced by PICs with regard to ICT infrastructure are indicated in Table 3.

Table 3. Issues and challenges in the ICT infrastructure

Issues and challenges	Description
Costs	ICT infrastructure for connectivity is costly in PICs at the institutional level. ICT service providers spend more on purchasing equipment and facilities, and individual consumers pay more for usage of the ICT services.
Internet and mobile phone coverage and penetration	PICs have some of the lowest internet penetration rates compared to Southeast Asian and developed countries. Broadband internet penetration is between 1 to 4 per cent. Telephone density ¹² is around 10 per cent; mobile density in opened markets ¹³ is more than 50 per cent.
Connectivity	The Pacific region does not have roaming arrangements.
Institutional/legislation	Lack of relevant sector plans, legislation, updated policy, legislative framework and ICT strategy required for the development, implementation, management and use of ICT.
Human resources	Limited human resources with technical capacities to develop, maintain and sustain ICT.

Sources: SPC, 2014; Cave, 2012; Samoa MoF, 2015

Development Cooperation in the Infrastructure Sector in the Pacific

Many PICs rely heavily on development assistance from development partners and remittances from diaspora living abroad (SPC, 2014). Based on their capacity to achieve self-sustained growth,¹⁴ PICs are divided into 3 economic categories by the ADB as indicated in Table 4.¹⁵

Table 4. PICs' economies and achievement of self-sustained growth, categorized by the ADB

Category	Description	Countries
1	Capacity for self-sustained growth	Cook Islands; Fiji; Samoa; Tonga; Vanuatu

10. The three PICs are: Tonga, Nauru and Vanuatu. Refer to: <https://www.digicelgroup.com/en/where-we-are/asia-pacific.html> for details.

11. Due to absence of updated statistics on penetration rates of mobile phones in PICs and little written on the subject, 2011 is referred to in the discussion as the year of comparison from a reliable author.

12. Telephone/mobile density is the number of telephone/mobile phone connections for every 100 individuals living within an area. It varies across the nations and also between urban and rural areas within a country.

13. An opened market refers to an economic system without any barriers, such as regulations, taxes, licencing requirements, which prevent free market activity.

14. Capacity was based on average growth of GDP and per capita GDP, 1995-2010. The weighted average was based on 2008 GDP at current price (ADB (various issues) and ADB's statistical database system cited in ADB 2011:5).

15. Check Pacific Island Nations – How Viable are their Economies? http://www.eastwestcenter.org/sites/default/files/private/pip007_0.pdf.

2	Resource-based growth but struggling to diversify economy	PNG; Solomon Islands
3	Difficulty adopting policies and institutions to create and sustain domestically-sourced growth; show little or no growth relative to regional performance	FSM; Kiribati; Marshall Islands; Nauru; Palau; Tuvalu

Source: Extracted from ADB, 2011

One of the initiatives in the infrastructure sector is the establishment of PRIF by the ADB in 2008. PRIF is a multi-development partnership for improving infrastructure in PICs, and its membership comprises development partners that are involved in long-term transport infrastructure support in several PICs. The PRIF provides an opportunity for potential development partners, including China, to coordinate with each other and invest in the infrastructure sector in the region. PRIF also provides advisory services to PICs in areas where they lack expertise, serving as a knowledge hub for information-sharing, benchmarking and sharing of best practices (PRIF, 2013).

Development cooperation in transport

Land transport and roads

Currently, the challenges within the road sub-sector are partly addressed by PIC governments with support from six major development partners, namely, the ADB, Australia, the European Union (EU), Japan, New Zealand and the World Bank (ADB, 2011:4; PRIF, 2013:9; World Bank, 2010). Most of the assistance is in the form of loans, grants and technical assistance to support the construction of new roads, rehabilitation and maintenance, and institutional capacity building (PRIF, 2015). While Fiji has secured more than one loan from the ADB (ADB, 2011:4), Samoa is supported by bilateral and multilateral partners in road infrastructure, including Australia, China, the ADB and the World Bank (Samoa MoF, 2014:6-7). In PNG, the government has been increasing funding for road transport over the years in view of the funding shortfalls through domestic budget allocations. It has received more than three loans and technical assistance from several development partners including the ADB, the World Bank, Australia, Japan and China for road programmes (PNG CSP, 2015:2). In terms of asset management, Fiji is currently going through a substantial road rehabilitation programme with support from development partners (SPC, 2013 cited in UNESCAP, 2015). And Australia and the World Bank provide substantial support to PNG for infrastructure maintenance.

China has stepped in to provide funding for road projects in several PICs, including Fiji, PNG and Samoa (PIFS, 2015; Samoa MoF, 2014). For instance, in Fiji, China is providing not only roads, but also bridges, hydro dams, social housing and hospitals (Brant, 2009:1-2; ADB, 2013:8). In PNG, China is supporting road infrastructure (PNG DoW, 2015:19).

Air transport and airports

Four major development partners are assisting PICs in addressing some of the challenges in the air transport sub-sector, including the ADB, Australia, New Zealand and the World Bank, through loans, grants and technical assistance (ADB, 2011). The Australian Bureau of Air Safety Investigations (BASl) is also involved in investigating accidents in the Asia-Pacific region.¹⁶

The establishment of the Pacific Aviation Safety Office (PASO) in Vanuatu in 2005 provides an opportunity for addressing the challenges in the aviation sub-sector at the regional level. It was created as a result of the Pacific Islands Civil Aviation Safety and Security Treaty. The PASO's function is to assist small island states in meeting international aviation safety requirements relating to operational issues, such as air traffic control, airport inspection, aviation security, and airworthiness of aircrafts. It offers regulatory advice and assistance on aviation safety and security matters to the region, using guidelines provided by the International Civil Aviation

¹⁶ Refer to Australian Government. Department of Infrastructure and Regional Development. <https://infrastructure.gov.au> for details.

Organization (ICAO). Fiji, PNG, Samoa and eight other PICs are parties to the treaty.¹⁷ The PASO is, however, under-resourced, which makes it difficult to perform its functions (ADB, 2011:73).

China has supported Samoa with the building of an international airport (Samoa MoF, 2014:7). China's support in the airport infrastructure development programme in Samoa demonstrates a good example of trilateral cooperation between three entities: while China helped with the construction of the airport terminal buildings, the World Bank redeveloped a climate-proof runway and apron, and the Samoan government provided engineers to monitor and supervise the implementation of standards.

Maritime transport and ports

In the maritime transport sub-sector, challenges related to financing, institutions, human and technological capacities are partly addressed by the ADB and Japan. The ADB is the major development partner providing financial assistance to improve port facilities and governance capacity of relevant state authorities in the maritime sub-sector for safety of navigational aids (ADB, 2011). The ADB is also financing community water transport in selected parts of PNG. Japan is another development partner which has assisted Samoa with the rebuilding and refurbishing of its wharves and port facilities. Australia provides advisory services across the three transport sub-sectors, including the maritime sub-sector (Samoa MoF, 2014). The small number of development partners in this transport sub-sector shows that there is room for more development partners to engage.

Development cooperation in water and sanitation

There are several development partners assisting PICs in addressing the challenges in the water and sanitation sector at country and regional level. UNDP has been supporting infrastructure in the PICs, including building seawalls in Tuvalu recently and improving drinking water in Marshall Islands. It has directly and indirectly supported the water sector in a number of PICs, including Marshall Islands, Tonga, Nauru, Tokelau, Niue, among others.¹⁸ Fiji is upgrading its water treatment plant with support from the ADB (ADB, 2014). Similarly, Samoa is improving its water and sanitation with support from Japan, the ADB, the EU and Australia (Samoa MoF, 2014). At the regional level, the Secretariat of the Pacific Community Pacific Islands Applied Geoscience Commission (SOPAC) provides technical support, guidance and advice to member countries (WHO, 2008). Other regional agencies, including the Secretariat of the Pacific Regional Environment Program (SPREP), also provide similar assistance through the UNDP/Global Environment Fund (GEF) Integrated Water Resources Management (IWRM) project to many PICs. Key regional strategies guide countries in addressing constraints and challenges related to water management and sanitation, such as the Pacific Wastewater Policy Statement and Framework for Action (2001), Pacific Regional Action Plan on Sustainable Water Management (2002), and Drinking Water Quality and Health Framework for Action (2005). The IWRM is the latest planning framework, adopted in 2012, to increase efforts and address issues in the sector,¹⁹ combining disaster, climate change and water safety (SPC, 2013).

Development cooperation in communications

Several development partners are involved in the ICT sector. The International Financial Corporation (IFC) and Australia supported in the initial stages the establishment of some of the policy and legislative frameworks, regulatory processes and reforms, which contributed to the rapid growth of ICT in the Pacific region. The World Bank and ADB are assisting Samoa in improving connectivity and reducing costs for communications technologies. UNDP has provided support in this area through the Pacific Islands Internet Project and ICT for Development Project of the UNDP Multi-Country Office based in Samoa, which included e-governance projects in Niue, Cook Islands and Samoa, among others. The applications developed from these projects can be used for financial services, assisting with disaster preparedness and relief, and health services, among others. Fiji, PNG, Samoa, Tonga as well as Vanuatu are now using mobile phones for banking and financial services, including payment of bills and rural banking (Cave, 2012).

17. The eight PICs are: Cook Islands, Kiribati, Niue, Nauru, Solomon Islands, Tonga, Tuvalu and Vanuatu.

18. An overview of water initiatives supported alone by UNDP as part of the regional UNDP/SPTRP/GEF PACC project is provided in <http://www.sprep.org/pacc/country-projects>. An overview of projects supported by the SPC/UNDP/UNEP/GEF IWRM project can be seen in <http://www.pacific-iwrm.org/pacific-on-google-earth.html>.

19. Refer to <http://www.pacific-iwrm.org/> for details.

Currently, China is also supporting PICs with low-cost telecommunications and digital services, and low-cost internet and international calls through a new satellite deal with them. Fiji and PNG are beneficiaries of this deal along with five other PICs (Cave, 2012: 6).²⁰ Mobile applications, such as e-government, e-commerce and e-health were largely non-existent in many PICs while some are beginning to use them, such as e-government in Vanuatu, financed by a loan from China and serviced by Huawei, a Chinese telecommunications company. There is huge space for development partners to provide support to PICs in mitigating challenges related to costs, coverage and penetration, lack of sector plans, policies and legislations, and qualified and skilled human resources.

Perspectives from PICs and Development Partners on China-Pacific Development Cooperation in Infrastructure

PIC governments and traditional development partners²¹ hold mixed perspectives on China's infrastructure development cooperation in the Pacific.²² It is noted that while China brings a number of potential benefits, there are issues related to the new transactions on both the provider and partner sides.²³

Highlighted by PNG respondents during interviews, although China is one of the largest bilateral development partners in the Pacific,²⁴ it has a relatively short history as a development partner in the region. China's engagement in sectors such as infrastructure, where the bulk of the support comes from traditional development partners such as Australia, the ADB and the World Bank, becomes less salient. As the largest bilateral development partner in the region, Australia has not only scaled up its level of support in many sectors²⁵ but enjoys a very long history of relationship with many of the PICs, such as PNG. Australia's official development assistance (ODA) to the Pacific region increased from AU\$105.4 million in 2013-14 to AU\$129.1 million in 2014-15 and AU\$149.8 million for 2016-17 (Australia Department of Foreign Affairs and Trade, 2016). Engaging China as a relatively new development partner creates new transaction costs for PICs and will add more pressure on the limited human resources in key agencies of PIC governments. While many PICs are already partners of China's development cooperation and are becoming familiar with China's project delivery models, others are yet to become familiar with the processes.²⁶

According to interview respondents, the consultation and negotiation process is a difference observed in China's development cooperation. Although China's development cooperation follows similar processes using project cycles, it slightly differs from traditional development partners in the procurement of Chinese contractors and national sub-contractors. However, China is generally preferred by PICs over traditional development partners because China's conditionalities for loans differ from those of international financial institutions, and its procedures for funding are considered less complex and less time-consuming. Partner countries receive China's assistance in relatively less time than from traditional development partners (PIFS, 2015). However, it has been indicated that the quick disbursing nature of loans from China could add to the pressure of increasing debt stocks and inflexibility in staggering debt repayment periods over the years.²⁷ There is therefore need for PICs to consult their poverty reduction strategies and debt management strategies and conduct assessments of their debt situation, particularly when the cooperation modality is not grant aid.

There is also demand from PICs for China to have more coordination with PIC governments regarding projects, strategic dialogue, and effective monitoring and evaluation so as to better monitor disbursements. There have been experiences of reporting only coming back more than 6 months after disbursements, and requests for

20. The five PICs are: Vanuatu, Solomon Islands, Tuvalu, Tonga and New Caledonia.

21. Views of traditional development partners was obtained from government officials through one of the interview questions.

22. Based on author's interviews with: (i) Navy Mulou, Health Economist, PNG National Department of Health, 17 July 2016; (ii) Koney Samuel, First Assistant Secretary (Foreign Aid) and staff, Department of National Planning & Monitoring; (iii) Kia-Henry Nema, Governance Associate, UNDP PNG.

23. Check *The Geopolitics of Chinese aid: Mapping Beijing's Funding in the Pacific* <http://www.lowyinstitute.org/publications/geopolitics-chinese-aid>.

24. The views of partner governments are not related to results and impact of China's development cooperation in PICs. This is mainly due to China's relatively short history of involvement in key sectors, such as health and infrastructure in the region.

25. Refer to <http://dfat.gov.au/about-us/corporate/portfolio-budget-statements> and <http://www.budget.gov.au>.

26. Based on interviews referred to in Footnote 2.

27. Opinions from participants at the China-Pacific workshop in November, 2016 in Beijing.

reconciliation of figures and data are never responded to. This is partly due to the level of engagement that China has with partner governments. In addition, PNG and Fiji's project management experience has shown that there has been oversight of project implementation handled by key ministries whose functions are not related to national planning but who initially take charge of the Chinese development cooperation projects.

How Could China Enhance Development Cooperation in the Infrastructure Sector in the Pacific

The challenges of limited financing, inadequate asset management, and limited human and technical resources in the three infrastructure sectors and their sub-sectors directly or indirectly affect PICs' progress to achieve the SDGs. Based on the above analysis, there are several approaches that China may consider to address issues hindering PICs' SDG implementation that are non-mutually exclusive.

One approach is for China to carve out its niche in a specific sector where traditional development partners have not crowded out the development space, such as maritime and air transport sub-sectors or the communications infrastructure sector. Another approach is for China to work in partnership with other development partners already engaged in the sectors through trilateral development cooperation at the country or regional level. In addition, China could consider maintaining an ongoing programme that will produce longer-term benefits for the PICs, which goes beyond one-off projects. Last but not least, China may also consider assessing its existing bilateral and trilateral projects and consider options and areas to provide additional support and financing. For example, China is already supporting infrastructure development within the air and road sub-sectors in Samoa. One option to enhance its support could be to extend its assistance to include safety and security aspects of the existing projects or work on regional connectivity through public-private partnerships.

Related to each of the sectors and sub-sectors discussed in this report, specific recommendations are provided for China to enhance its infrastructure support with a view to contributing to PICs' SDG implementation processes.

Recommendations for China-PICs cooperation in transport

- » Most of the development partners within the road sub-sector focus on financing and asset management through technical assistance. However, the long-term challenge of limited human and technical resources has not been adequately addressed. China is already engaged in the road sub-sector and could complement development partners' efforts by enhancing cooperation in human and technical resources. Skills transfer through capacity building programmes to manage, supervise, and maintain infrastructure could be considered by China through partnerships with existing development partners at the country or regional level.
- » Given that the ADB and Japan are two of the few development partners providing financial assistance to mitigate major challenges in the maritime sub-sector, there is space for China to become more involved in the maritime sub-sector at the country or regional level.
- » At the regional level, there is opportunity for China to work with regional bodies, such as providing the PASO with financing to help it fulfil its functions. For China to work with Pacific regional bodies may be tricky because not all the Pacific countries have diplomatic relations with China. However, since China has already provided funding to key regional organizations, including the Pacific Islands Forum Secretariat (PIFS) (Brant, 2009:1), similar arrangements could be considered.

Recommendations for China-PICs cooperation in water and sanitation

The WHO, the EU and New Zealand are currently assisting PICs in this sector. UNDP has directly and indirectly supported the water sector in a number of PICs. With the Green Climate Fund (GCF) becoming operational, UNDP's support for infrastructure is likely to increase significantly in the coming years. China could enhance its support in the water and sanitation sub-sector by doing the following:

- » Establish a trilateral partnership with UNDP in the water and sanitation sector.
- » Address the challenges related to lack of equipment and technologies for sustainable fresh water supply and waste management.
- » Work through existing partnerships with regional bodies, such as the SPC or PIFS.

Recommendations for China-PICs cooperation in communications

While some of the challenges require financial resources, others require innovative approaches and the use of ICT applications. Given China's current engagement in the ICT sector of PICs, and its technological advancements and innovations, there are opportunities for China to become more involved in areas such as the use of mobile phone applications. This can be extended to link with other transport sub-sectors and other infrastructure sectors, such as health, water and sanitation, and disaster risk mitigation. Of the five challenges in ICT infrastructure shown in Table 3, the two which provide opportunities for China to engage in are related to "improvement of internet and mobile phone coverage and penetration", and "connectivity". Since China is already present in the sector together with the World Bank and ADB in Samoa, it is well placed to become more engaged in a larger number of PICs. It is recommended that China choose to do the following at the country or regional level, either through bilateral or trilateral development cooperation arrangements with other bilateral development partners, regional and multilateral agencies:

- » Expand its current support to PICs that face similar challenges in their mobile and internet coverage and connectivity.
- » Support the use of applications for health, commerce and disaster risk management.

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Annex 1: List of interviewees

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