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INNOVATION IN THE PACIFIC: AN ASSESSMENT

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1. Executive summary

This Report is the main outcome of *Task 4.1 Assessing innovative competencies in the Pacific region and the role of EU support in enhancing them*, from *Work Package 4: Enhancing the cooperation on innovation issues to tackle the societal challenges*. Work Package 4 is one of the 7 Work Packages included in the EU funded PACE-Net Plus Project.

The PACE-Net Plus Project aims to support the EU-Pacific policy dialogue on innovation issues and plans to reinforce the EU-Pacific Science, Technology and Innovation (ST&I) cooperation, focusing on three major societal challenges, which are: 1) health, demographic change and well-being; 2) food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the bio-economy; and 3) climate action, environment, resource efficiency and raw materials.

The object of this Report is to provide an assessment of innovation capabilities, activities and results in the Pacific countries in these domains and in other sectors. To this end, the Report describes the current innovation activity in the Pacific region, and especially in Fiji, Samoa, New Caledonia, Papua New Guinea, and Cook Islands. The purpose of the Report is to identify the characteristics of the innovation activity in each country, discuss the obstacles and opportunities for innovation, the role of different actors and of public policy in advancing innovation as well as the contribution made by EU cooperation and European private sector.

The Report is based on the results of several activities conducted as part of the PACE-Net Plus Project. These activities were conducted with the objective of collecting, summarizing, analysing and synthesizing relevant primary and secondary sources of information and data concerning innovation activities in the Pacific region. To inform this assessment, UNIDO - supported by the Consortium partners - has coordinated, led and performed four different activities. These include a literature review on innovation in the Pacific region, the implementation of a multi-country firm-innovation survey, the conduction of stakeholders' interviews in different countries, and the preparation of case studies.¹

The Report summarizes the information collected through more than 120 interviews, more than 150 firm innovation survey questionnaires from five countries (Fiji, Samoa, Cook Islands, Papua New Guinea and New Caledonia), and from four detailed cases studies of innovative firms in the region. In our comparative approach to interpret this rich set of information and

¹ For details on the methodology for the different activities, including the Firm Innovation Survey, the Stakeholder Interviews, and the Case Studies, see the Appendix.

data, we look at success stories but also at failures, emphasizing the difficulties and obstacles faced by the actors in the innovation process.

The Pacific region has a very heterogeneous economic landscape: there is a lot of variety between and within countries, especially in relation to innovation. Innovation is now increasingly seen as a key instrument to achieve diversification, the latter being one of the strategies governments are adopting to ensure long-run economic growth. There is also an increasing interest in innovation from the private sector that is exploring new products and new processes to take advantage of the world markets. In fact, according to our research innovation is very important for the vast majority of companies in the region. Moreover, there is evidence of a slight increase in product and process innovation expenditure and more than 50% of firms has done some innovation-related activity in the last five years. Yet, innovation is still limited in the region and formal R&D is even smaller. Our results also show that, while innovation has brought positive results for the large majority of firms, there is also a significant share of firms for which innovation has been a failure.

The Report also discusses the obstacles to innovation faced by Pacific region companies. Our research shows that these obstacles range from cost of loans to local demand conditions and shortage of skilled workers. While obstacles vary by country and sector, several of them are common to most countries. The most important ones are: remoteness and small size of the economy causing high cost of operations; an economic structure characterised by high concentration of market power and product specialization in resource-based goods; large government inefficiencies; a not well developed banking system; lack of business capabilities and lack of knowledge about innovation opportunities in the private sector; weak links between private sector, Government, and University; government support biased toward basic rather than applied research; low human capital and significant brain drain.

The Report also explores in detail the role of the Government. Until very recently, supporting innovation was not among the priorities of governments in the Pacific region. The situation has now started to change. Governments (at different levels) are increasingly interested in promoting innovation because the latter is now understood as key to diversify the economic structure and to generate long-run growth. While traditional industrial policy instruments (subsidies, tax breaks, etc.) are being dismissed, governments are implementing various strategies to favour innovation. Among these, the most important are the design of an innovation policy (which does still not exist in most of the countries), the creation and funding of government agencies dedicated to stimulate innovation, and the attraction of foreign investments. Yet there are several obstacles to Government's action. Our research has identified

as the most important, government inefficiencies, and the weak dialogue between the business community and the Government. The Report also discusses a long list of requests and suggestions coming from the private sector to improve Government intervention that we have collected during our research. While these differ across countries, there are some common elements. The Government is expected: to create a more business-friendly economic environment; to reduce the cost of innovation (credit lines dedicated to innovation projects, innovation grants, etc.); to provide training to entrepreneurs on how to manage innovation, and to assist them in preparing grant proposals for innovation projects; to favour the cooperation between domestic and foreign companies; and to use public procurement as source of high quality demand for the domestic private sector.

Next, the Report offers a details description of the opportunities for innovation in the Pacific region. First, these are found in the agricultural, marine, and raw material sectors. Examples of very promising products in these domains are breadfruit flour, avocado margarine, sea cucumber (*bêche-de-mer*), fruit wines, kava, taro chips, noni juice, and cassava beer. Moreover, the Report devotes much attention to the discussion of the possibilities offered by the incredibly rich biodiversity that characterizes all Pacific countries. In particular, the Report discusses the attempt to develop new drugs using endemic plants. This idea is critically explored to conclude that its economic potential is still very uncertain. Finally, the Report addresses the possibility for innovation in the ICT sector arguing that it could provide large opportunities for growth in the region.

Finally, the Report focuses on the role of the European Union to note that - given the context of the Pacific region, the role it could play in favouring innovation is very important. The EU's interest in the development of cooperation projects in the domain of innovation is due to the acknowledgement that there are several unexplored opportunities in the Pacific region. In fact, the EU – which has a long standing relationship with the Pacific, aims for enhancing its profile and reinforcing cooperation in ST&I with the region, in the perspective of the forthcoming Horizon 2020 programme, and promote the development of mutually beneficial partnerships. Yet, the analysis of the current strategy of the EU in the Pacific suggests that – for these opportunities to be exploited – some changes are needed. In fact, in most of the Pacific countries the EU presence is not very strong. Moreover, until now the EU's strategy has privileged the cooperation in domains related to environment conservation rather than the development of economic activity *per se*. At the same time, large part of the local business community does not consider the EU as a potential market for export, and sees as very unlikely to cooperate with a European company or an EU institution. This limited interaction between

Pacific countries and EU is also found between research institutions. This can be an obstacle to cooperation on innovation since the latter has a strong basic research component in the Pacific countries. In any case, our analysis suggests that while EU has an important gap to fill in terms of cooperation in the innovation domain, the potential reward for this effort is very large. This Report is intended to be a first step in providing useful information to develop new strategies to achieve this result.

2. Introduction

This Report is the main outcome of *Task 4.1 Assessing innovative competencies in the Pacific region and the role of EU support in enhancing them* of Work Package 4: *Enhancing the cooperation on innovation issues to tackle the societal challenges*,

The object of this Report is to provide an assessment of innovation capabilities, activities and results in the Pacific countries. This is one of the main tasks included in the WP4 of the PaceNet-Plus Project as described in the project documents.

This Report discusses the current innovation activity in the Pacific region, and especially in Fiji, Samoa, New Caledonia, Papua New Guinea, and Cook Islands. The purpose of the Report is to identify the characteristics of the innovation activity in each country, discuss the obstacles and opportunities for innovation, the role of different actors and of public policy in advancing innovation as well as the contribution made by EU cooperation and European private sector.

The Report is based on the results of several different activities conducted as part of the PaceNet-Plus Project. These activities were conducted with the objective of collecting, summarizing, analysing and synthesizing relevant primary and secondary sources of information and data concerning innovation activities in the Pacific region. To inform this assessment, UNIDO - supported by the Consortium partners - has performed four different activities.² The first one has been the preparation of a detailed review the economic literature on innovation in the Pacific region (see review of the literature paper). This background document has served as a reference point for all the following research. Providing a detailed description of the state-of-the-art about innovation literature in the region, it has provided a clear indication that more research on the topic of innovation was in needed. Next, the research has focused on collecting useful information and primary data on the innovation process in the Pacific to fill these knowledge gaps. To this end, UNIDO has conducted three activities to generate primary data information. The first activity is a firm innovation survey designed to collect data on innovation activities by firms in each of the five countries (Fiji, Samoa, New Caledonia, Papua New Guinea, and Cook Islands). The second activity is the conduction of a series of detailed interviews of stakeholders in the innovation domain in the same countries. The main objective of these interviews has been to learn from key actors (entrepreneurs, politicians, researchers, NGOs, etc.) which are the opportunities and challenges for innovation activity in the Pacific region. The third activity has been the preparation by SPI of four case studies, including both

² For details on the methodology for the different activities, including the Firm Innovation Survey, the Stakeholder Interviews, and the Case Studies, see the Appendix.

successful and failed industrial innovations in the fields of food security, sustainable agriculture, climate action, resource efficiency and raw material. These cases focus on specific scientific and technological domains and competencies developed by the Pacific region, distinguishing the generic and specific knowledge and skill requirements of each case, the role of different actors and of public policy in advancing innovation as well as the contribution made by EU technology transfer. The case studies accounts for the local context and are developed using a combination of primary data collected through interviews and secondary information gathered through literature review.

The Report summarizes the information collected through more than 120 interviews, more than 150 firm innovation survey questionnaires from five countries (Fiji, Samoa, Cook Islands, Papua New Guinea and New Caledonia), and from four detailed cases studies. In our comparative approach to interpret this rich set of information and data, we look at success stories but also at failures, emphasizing the difficulties and obstacles faced by the actors in the innovation process. Moreover, the Report discusses the current role of EU and which are its limitations in relation to the enhancement of innovation in the Pacific region. Based on these results, the Report suggests possible ways of enhancing cooperation between the EU and the Pacific region.

Before proceeding, it is necessary to define the object of analysis, namely innovation. In this Report, we adopt a very ample definition of innovation. According to OECD, an innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or (even) external relations (OECD, 2005). Moreover, innovation also includes social innovation, that is, innovations that seek new answers to social problems. This definition clearly suggests that there are several economic actors engaged in innovation. Among these, the most important are private and public firms, universities, public research institutes, and the government. While universities and public research institutes play a crucial role by providing education, training, creation and diffusion of knowledge, the primary role of government is to support private initiatives through measures designed to favor innovation.

The Report proceeds as follows. In Section 2, the Report provides an overview of the current situation concerning innovation in the Pacific region. Section 3 explores the obstacles to innovation in the different countries and in relation to different aspects of innovation process. Section 4 presents the opportunities for innovation in the region according to different types of products and sectors. Section 5 explores in detail the role of Governments as both supplier and consumer of innovation. Among other aspects, it explores the specific attitude of the different

governments towards innovation. Section 6 discusses the role of the European Union. In particular, it explores how and which results the EU is present in the different countries, especially in domains related to innovation. The discussion here develops mainly around the current activity of international cooperation and discusses some possible policy options for the future. Section 7 summaries the findings of the Report and suggests some topics for future research.

3. Overview of innovation in the Pacific region

The Pacific region has a very heterogeneous economic landscape: there is a lot of variety between and within countries, especially in relation to innovation.

In general, our research indicates that there is a great vitality in terms of new enterprises. Yet, innovation is low and this reflects in the limited number of examples of product and process innovation that we have found in our research.

This is hardly surprising considering that until very recently there has been very low interest in changing the economic structure in these countries. One of the reason is that the domestic industry was satisfied with the local demand and domestic producers enjoyed protection from international competition. In other words, the need for innovation was low. Now the situations is changing. Innovation is now increasingly seen as a key instrument to achieve diversification, the latter being the strategy governments want to adopt to ensure long-run economic growth. Yet, there are several difficulties. To begin with, in most of the countries, the private sector seems to be still too weak to be the leader in the identification of the niche of opportunities for innovation. Moreover, several countries are characterized by a very high concentration of economic activity. In some countries, few large families own up to 80% of the economy. Moreover, in almost any country, the raw material sector is very central to the economy. This situation can be a very strong obstacle to any government attempt to favour innovation and economic change. Another peculiar feature of the region concerns the very important role played by remittances. In several countries, more than 20% of GDP is remittance; this can be a constraint to innovation. The opportunity cost of time you time increases. This is likely not to encourage the start of new activities.

The situation has now started to change: the innovation idea is now spreading around. The current situation is one of a very rapid change in the attitude towards innovation. There is an increasing interest in innovation from both the private sector and the government. The Government (in different ways) are increasingly interested in promoting innovation: proof is the number of events, conferences, on the topic of innovation. In fact, our research has found that

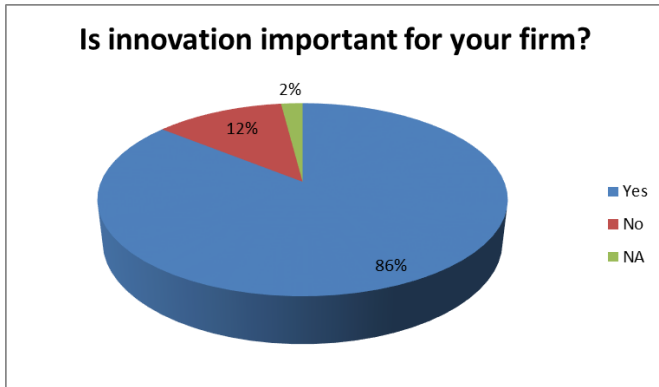
innovation is very important for the vast majority of firms. There is evidence of a slight increase in product and process innovation expenditure and in the last 5 years, more 50% of firms has done some innovation-related activity. Yet, innovation is still limited in the region, with only a very small percentage of domestic firms doing innovation. Formal R&D is even smaller, even this is hardly surprising considering that most of domestic firms are SMEs. Our results also show that – while innovation has brought positive results for the large majority of firms - there is also a significant share of firms for which innovation has been a failure and thus ended up with a reduction in profitability, employment etc. Interestingly, in some cases firms reported not to be able to evaluate the effect of their innovation activities on firm outcomes. This suggest that entrepreneurs probably need some training related to innovation and management. Finally, while there some examples of new products (see Section 5), it is very small the number of firms exploring the possibility to do process innovation, which is a more uncertain but also more potentially rewarding activity.

3.1 Innovation in the Pacific: results from a firm innovation survey

We conducted our research during the period 2014-2015 in four countries: Fiji, New Caledonia, Cook Islands and Samoa. Our final sample includes 148 companies. As for the distribution of the ownership structure of the company, 63% is private, 5% public, 5% joint venture (local/foreign), 1% foreign individuals (remaining 26% is not available). The largest sectors of activities are: retail (20 %); manufacturing (17%); social and personal services (14%); real estate (12 %); storage and communication (11%). agriculture (5%). The sample of firms is very heterogeneous, with the year of establishment ranging from the 1920s to 2014 and employment level from one to thousands.

Figure 1 reports the answers to the question concerning the importance of innovation for firms in the Pacific. The results show that innovation is important for the vast majority of firms (86%) in our sample. Yet, 12% of respondents indicates that innovation is not important for their own activity. Among the reasons for that, respondents have mentioned that: 1) the market for their products does not require innovation; 2) innovation would not change their market share because they already enjoy a dominant position; 3) innovation will not help them because their competitors are already dominating the market.

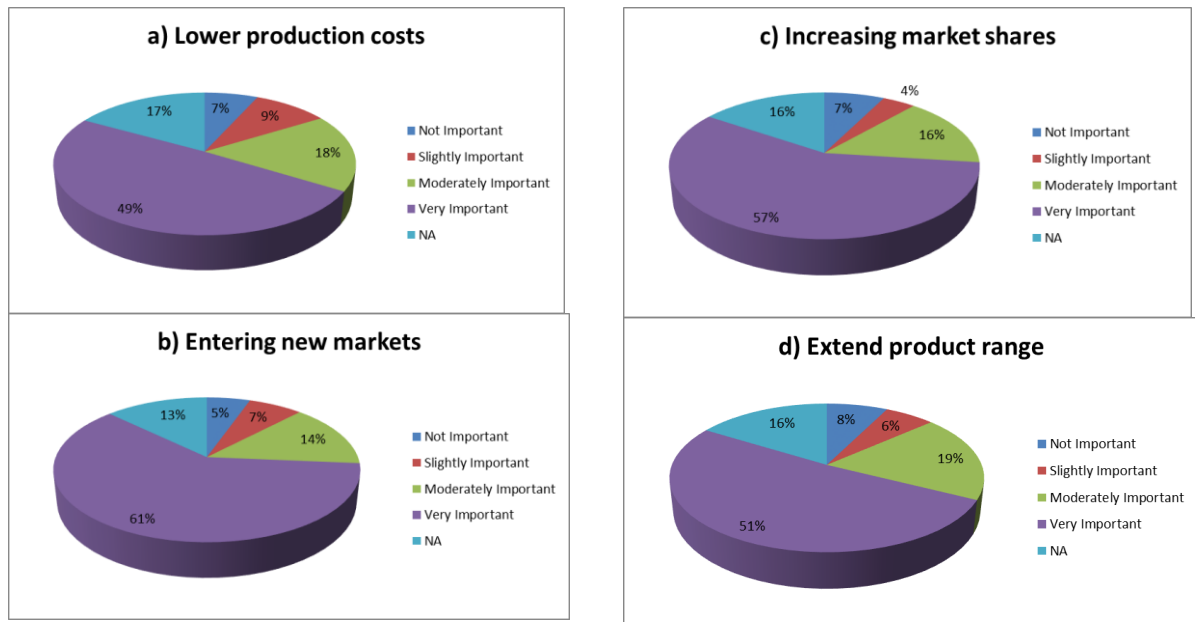
Figure 1: Is innovation important for your firm?

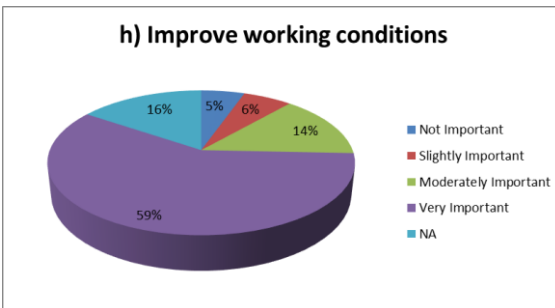
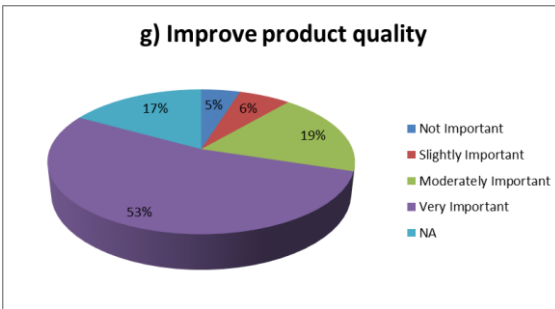
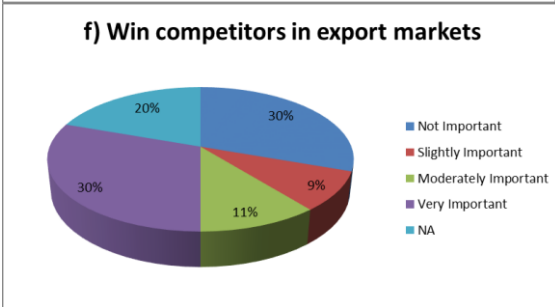
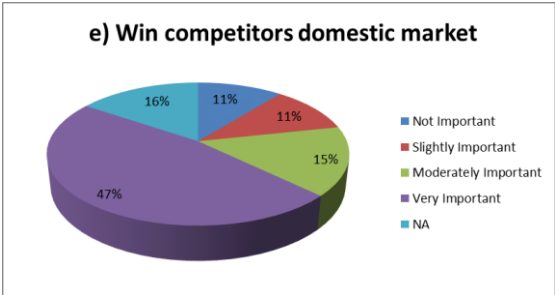


Source: Author’s elaboration based on PACE-NET Plus Firm Innovation Survey data collected in New Caledonia, Samoa, Cook Islands, Fiji (2014-2015). Sample: 148 enterprises. For details on the survey and on sample characteristics, see Appendix A.

To explore why innovation is important, we look at the impact of innovation on different firm’s strategies and activities (see Figure 2). Innovation is considered important for entering new markets (75% of firms) and increasing market share (73%) and Improve product quality (72%). On the contrary, innovation is considered not important for winning competitors in export markets (39% of firms), winning competitors in the domestic market (22%), and lowering production costs (16 %).

Figure 2: How important is innovation for the different firm activities



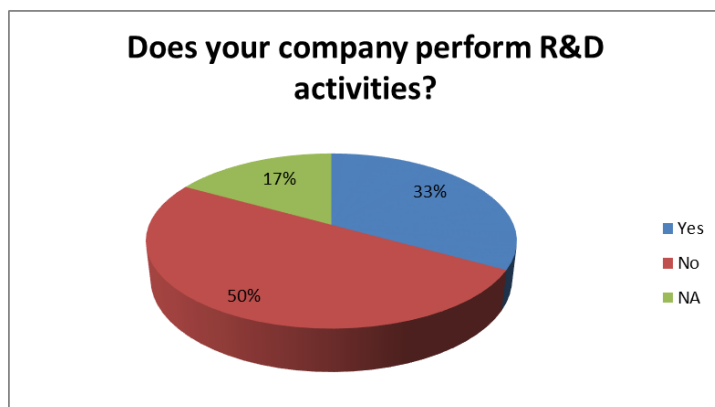


Source: Author's elaboration based on PACENET-Plus Firm innovation Survey data collected in New Caledonia, Samoa, Cook Islands, Fiji (2014-2015). Sample: 148 enterprises. For details on the survey and on sample characteristics, see Appendix A.

Table 1 reports the analysis by type of innovation activity performed by firms in the Pacific in the last five years. In the last 5 years, more than half of the firms: 1) improved an existing product / service (with respect to the domestic market); 2) introduced a new product / service (with respect to the domestic market); 3) introduced quality controls; 4) introduced changes in management; 5) improved an existing process (domestic market) 6) introduced a new process (domestic market). At the same time, less than 40% of firms had any external training for innovation activities. Even smaller (between 24% and 16%) is the percentage of firms that had: 1) Improved an existing product / service (world market); 2) Entered a new market abroad; 3) Introduced a new product / service (world market); 4) Improved an existing process (world market); 5) Introduced a new process (world market); 6) Reverse engineered any product or process.

While firms perform a number of activities related to innovation, only 33% does any R&D activity (see Figure 3). This is indeed not very surprising considering the average size of the firms and the sectors of activity. Still, it suggests that investments to generate innovation are still low in the region.

Figure 3: Does your company perform R&D activities?



Source: Author's elaboration based on PACENET-Plus Firm innovation Survey data collected in New Caledonia, Samoa, Cook Islands, Fiji (2014-2015). Sample: 148 enterprises. For details on the survey and on sample characteristics, see Appendix A.

Table 1: Innovation activities performed by the firms in the last five years

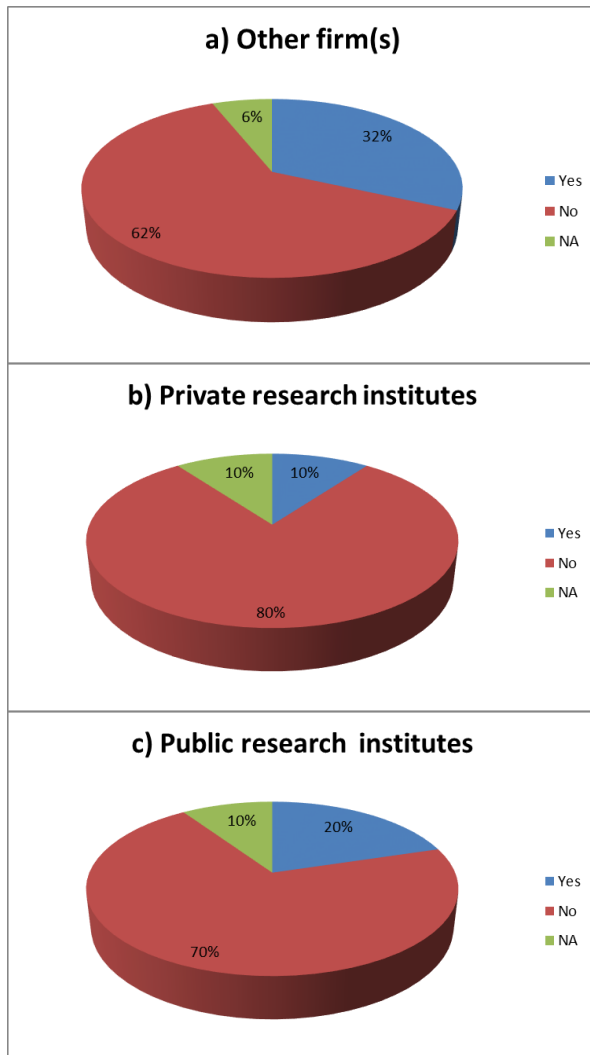
Activities	YES (%)	NO (%)	Abandoned the activity (%)	NA (%)
Improved an existing product / service (your country)	75	17	1	7
Introduced a new product / service (your country)	68	25	2	5
Introduced quality controls	56	32	2	9
Introduced changes in management	54	28	1	17
Improved an existing process (your country)	53	36	0	11
Introduced a new process (your country)	50	39	1	10
Changed the plant layout	49	38	1	11
Introduced an in-house training program	47	42	0	11
Introduced a new marketing technique	46	41	2	11
Introduced waste management procedures	45	43	0	11
Entered a new market in the home country	41	47	1	11
Had external training for innovation activities	37	50	0	13
Improved an existing product / service (world)	24	62	1	14
Entered a new market abroad	24	66	1	9
Introduced a new product / service (world)	22	63	3	12
Improved an existing process (world)	22	65	0	14
Introduced a new process (world)	19	66	1	15
Reverse engineered any product or process	16	67	1	17

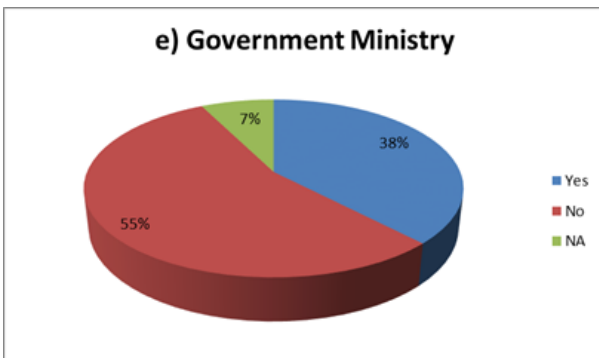
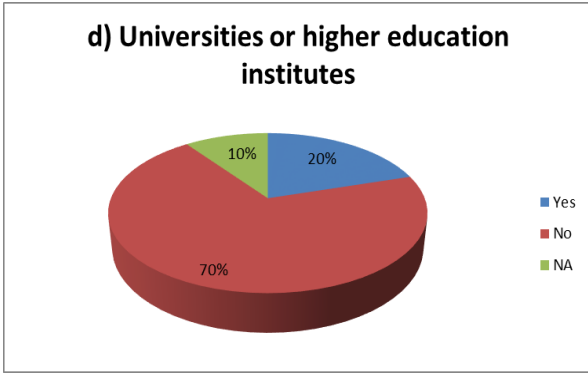
Source: Author's elaboration based on PACENET-Plus Firm innovation Survey data collected in New Caledonia, Samoa, Cook Islands, Fiji (2014-2015). Sample: 148 enterprises. For details on the survey and on sample characteristics, see Appendix A.

As shown in Figure 4, firms do not perform these activities alone. The most important partners for innovation are (in order of importance): Government ministry (38% of firms); 2) other firms (32%); 3) public research institutes and Universities (20%). Only 10% of firms have developed innovation through the collaboration with private research institutes.

We have also collected data concerning expenditures in innovation activities. Unfortunately, for these questions the number of respondents have been significantly lower. For this reason, here we report the data for New Caledonia, which is the only country where data are enough for elaborating the dynamics of expenditure across time. The evidence reported in Figure 5 shows a slight increase in the expenditure in both product and process innovation comparing the last two years of available data.

Figure 4: Cooperation and joint innovative activities

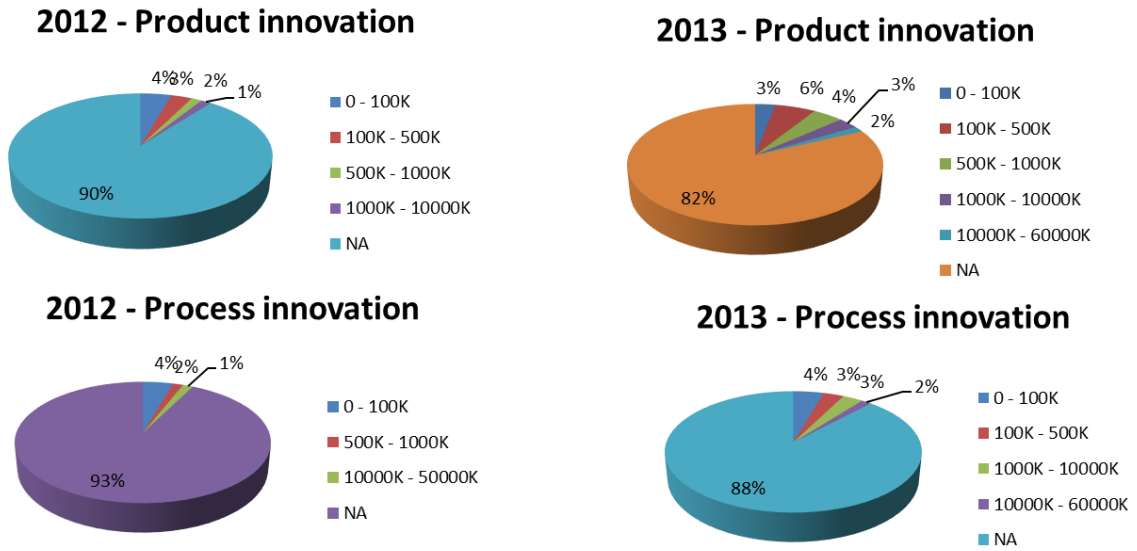




Source: Author's elaboration based on PACENET-Plus Firm innovation Survey data collected in New Caledonia, Samoa, Cook Islands, Fiji (2014-2015). Sample: 148 enterprises. For details on the survey and on sample characteristics, see Appendix A.

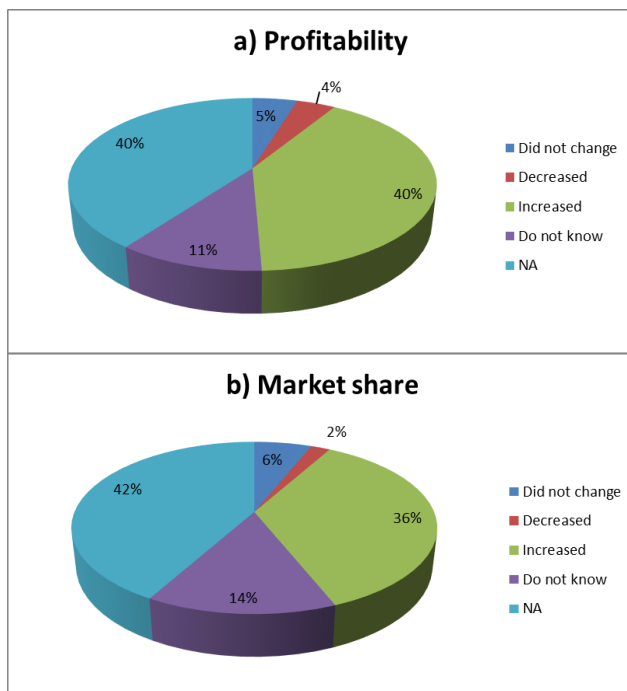
Finally, we look at the data on the effects of innovation efforts by firms. Figure 6 shows the results for our sample of Pacific firms. Firms that have done innovation efforts in the last year report improvement in: 1) profitability, market shares, and diversification of products and markets (around 40% of firms); 2) employment (24% of firms). Interestingly, between 1% and 9% of firms report reduction in profitability, employment and market shares because of innovation efforts. This clearly shows that innovation can be a failure and that *failure can be costly*. This is an important point because emphasizes that innovation is a risky choice: firms needs to be supported in taking this risk, otherwise they will probably refrain from doing it. Finally, we find that between 40% and 44% of firms are not able to evaluate the impact of innovation on performance. This clearly indicates that a large share of firms is not able to assess the impact of their innovation activities firm's outcomes. This suggests that entrepreneurs probably need some training concerning firm management and innovation development.

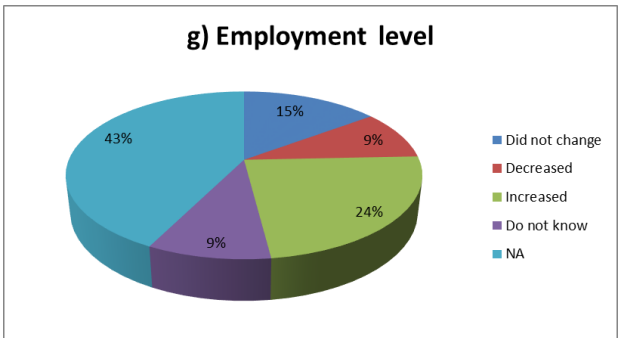
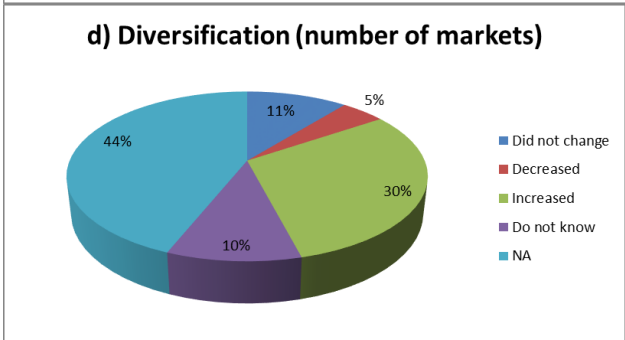
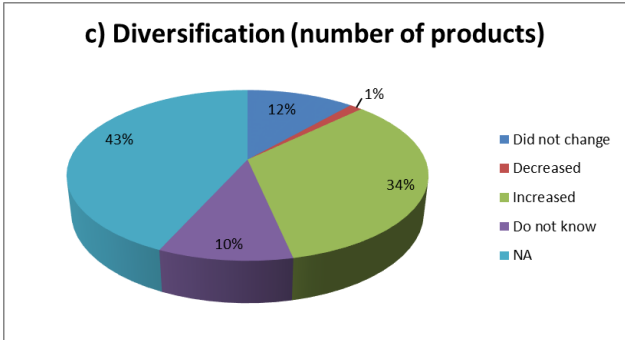
Figure 5: Firms' expenditure in product and process innovation in New Caledonia (2012-2013)



Source: Author's elaboration based on PACENET-Plus Firm innovation Survey data collected in New Caledonia. Sample: 68 enterprises. For details on the survey and on sample characteristics, see Appendix A.

Figure 6: Firms' expenditure in product and process innovation





Source: Author's elaboration based on PACENET-Plus Firm innovation Survey data collected in New Caledonia, Samoa, Cook Islands, Fiji (2014-2015). Sample: 148 enterprises. For details on the survey and on sample characteristics, see Appendix A.

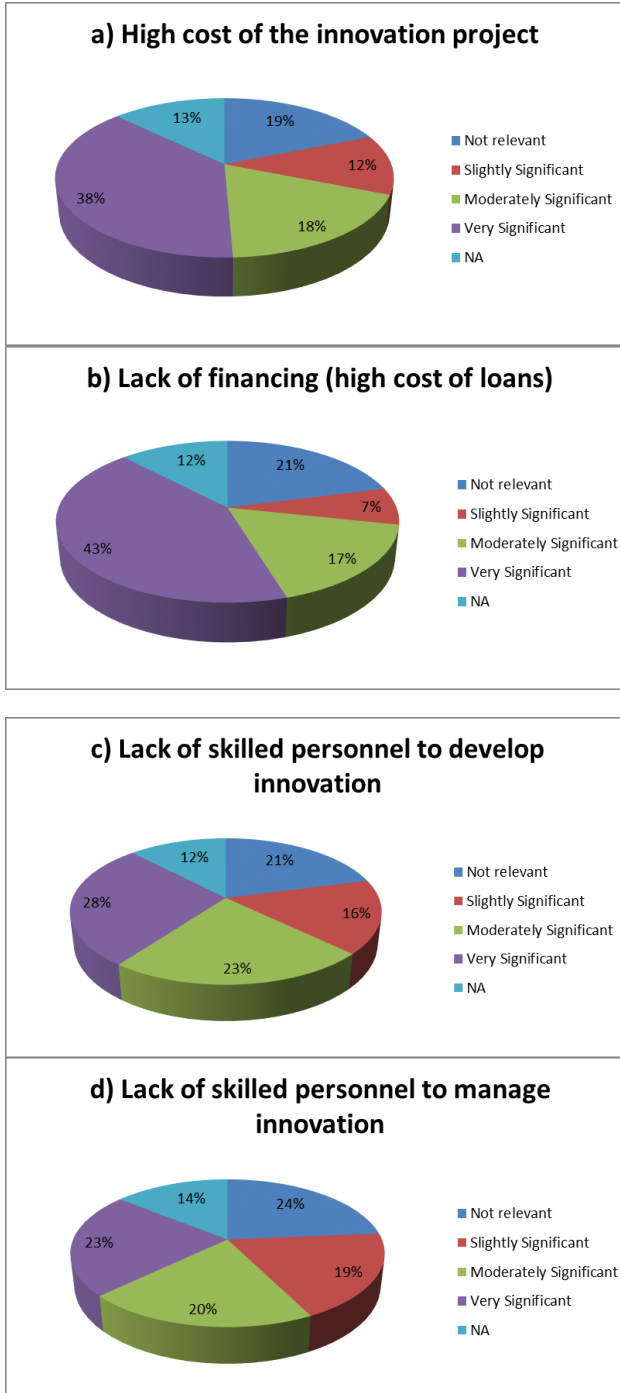
In the next sections, we will explore more in detail both the causes for this situation (by discussing the main obstacles to innovation in the region), and the opportunities that now and in the future could be exploited.

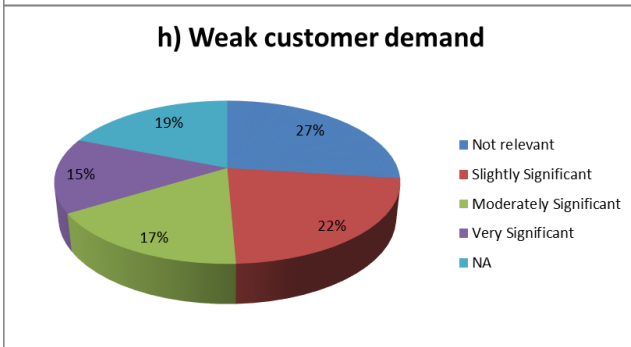
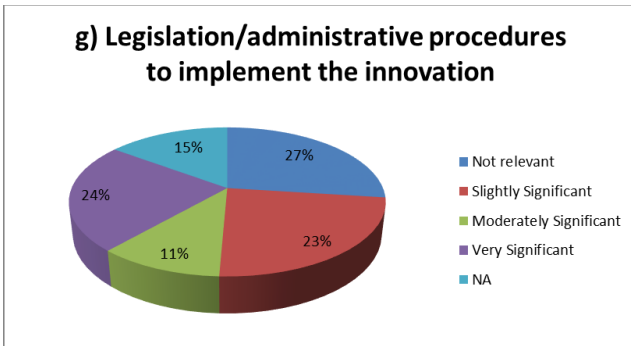
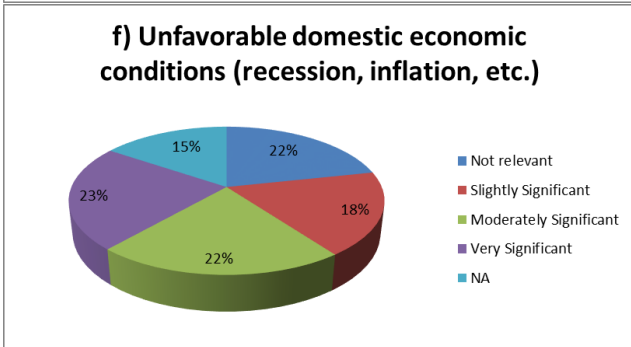
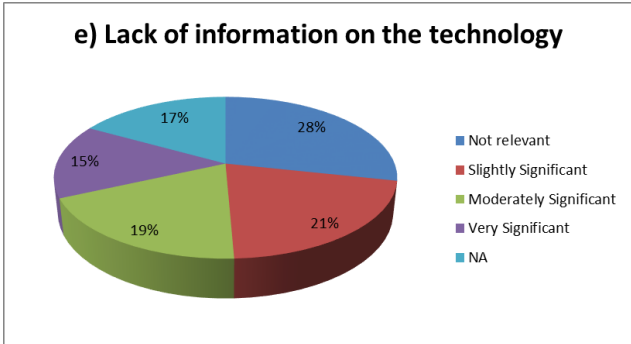
4. Obstacles

Innovation is low in the Pacific region. This is due to existence of several obstacles. The results from the firm innovation survey indicate that – ordered from the most binding to the less binding – the obstacles in implementing innovation are (see Figure 7): 1) Lack of financing; 2) High cost of innovation project; 3) Lack of skilled personnel; 4) Unfavourable domestic economic conditions; 5) Lack of personnel to manage innovation; 6) Weak consumer demand;

7) Legislative/administrative procedure to implement innovation; 8) Lack of information on the technology.

Figure 7: Obstacles to firm's innovation activities





Source: Author's elaboration based on PACENET-Plus Firm innovation Survey data collected in New Caledonia, Samoa, Cook Islands, Fiji (2014-2015). Sample: 148 enterprises. For details on the survey and on sample characteristics, see Appendix A.

As it emerges from these data, firms face several obstacles ranging from cost of loans to local demand conditions and shortage of skilled workers. While obstacles vary by country and sector, most of them are common to most countries. In the following, we will discuss the most important ones as they emerged from our stakeholders interviews.

Remoteness and small size of the economy. One limiting factor common to all countries is the distance from the main world markets and from the main innovation centers. The problem with the distance from the main markets is not only a geographical issue, but more in general concerns the difficulties in entering global value chains and dynamic markets. For instance, being far from large markets implies that it is more difficult to be exposed to new products and new production processes. While it is in general very difficult to create an environment conducive to innovation, it is even more difficult to create that in isolation. At the same time, being farther from the large markets implies that the incentives to innovate are lower since the possibility to enter those markets appear more difficult given the additional cost associated with transport. While these are all important elements, it should also be noted that things are rapidly changing in world trade. In particular, trade and transportation costs are constantly decreasing making them increasingly less relevant. This could increase the window of opportunity for producers also in more remote islands to attempt innovation. Thus, while important, the distance from large markets seems – among all the obstacles to innovation – the less binding in the long-run. Moreover, while this is a common obstacle, the situation of the Pacific countries is somehow heterogeneous. In fact, some of the Pacific countries are close to the most dynamics and large markets of the worlds, namely those of the South Asia.

In the case of the Pacific countries, the remoteness is also associated with the small economic size. This is clearly an obstacle when we consider the importance of the agglomeration effects for innovation and the possibility of spillovers effects. In fact, while innovation activities are heterogeneous across sectors, the proximity between innovators would benefit everybody. This is one of the theoretical argument supporting the use of measures such as the creation of incubators for innovative firms.

A related problem is that of the small population size. This fact has several implications. Two are the most important concerning innovation. First, the potential pool of innovators is small and that the rate of innovation will be low. Second, to maximize the potential for successful innovations there is the need to focus on some specific activities: the identification of these niches becomes thus crucial and it is not obvious that the private sector is able to identify them. This implies that in the Pacific countries, the cooperation between it and the Government thus become crucial (more on this below in Section 5). Finally, the remoteness and the small

population size affect the attractiveness of foreign workers, especially researchers, creating a shortage of needed experts and potential innovators.

Current economic structure and product specialization. In several Pacific countries, economic wealth is quite concentrated and the local business community tends to maintain the status quo. Some sectors – especially food processing - are highly protected. This implies that incumbent domestic firms do not need to innovate. In fact, there is a serious problem of demand for innovation. Moreover, processing activities (that are likely to generate more innovation) are not very attractive because they are less profitable than alternative such as land ownership – that thanks to tourism creates the largest wealth - and commerce. In fact, banks prefer lending money to no-risk activities such as construction, import and resales rather than to new innovative companies. Moreover, most of these countries are highly dependent on natural resources (especially mining). The raw material sectors often drag most of the technicians and creates a very strong demand for the service markets. These facts both reduce innovation incentives.

Another obstacle to innovation is related to the type of products the Pacific countries are specialized into. For most of these countries, the very high salary limits the dimension of the manufacturing sector and thus most of the potential for innovation. At the same time, the agricultural products in which Pacific countries have a comparative advantage are facing a very strong price competition from Asian countries. Moreover, access to land and the regulation of land ownership are problematic because there are no clear titles. This is an impediment to large investments in agriculture. Finally, competition is very strong also in the few processing products Pacific countries are producing. For instance, cocoa producers are trying to processing the raw material domestically - because selling the raw material is not very rewarding. Yet, production costs are too much higher because of the much smaller scales of production. Moreover, most of the attempts to develop some innovation face a potential problem on the supply side. In general, the challenge is to transform the currently subsistence agriculture into large production and new processed products. In particular, there is the need for a reform of land management since access to land can be quite expensive - particularly in small islands (such as Cook Islands and Samoa). While e-commerce offers a great opportunity for business entrepreneurs to get their products out to the world market, still there are issues with the production levels.

Government policies. Governments' attitudes towards innovation is very heterogeneous. While in some cases, governments are trying to support innovation, in others they are part of the problem. In fact, in most of the cases, politicians are not paying attention to innovation, often

because they are not aware of the economic potential of innovation. In fact, rather than promoting new industries and firms, governments often prefer to protect the existing ones. The lack of interest of governments in supporting innovation is exemplified by the lack of legislations to protect innovation: this situation significantly reduces the incentives to explore new ideas. The lack of a proper regulation to protect innovation can turn out to be a significant obstacle especially in the case of research related to the natural environment. For instance, in the case of PNG, there is no protection of any discoveries of new plants but there is also no clear rules as to how explore the new plants: this uncertainty is likely to negatively impact on the incentives to do research in this domain. Moreover, in most countries the tax and trade regime is far from being favorable to innovation. For instance, no country has the recognition of R&D expenditure as tax deductible, making all costs for innovation investment directly and immediately beard by the individual companies. This is clearly not an incentive to develop innovations. At the same time, it should be acknowledged that, when governments intervene, things are not necessarily better. Sometime, Government actions can even hinder innovation. In other cases, government interventions are simply out of target and not useful. These issues will be discussed in more detail in Section 6.

Banking system. The difficulty to access to credit is one very important obstacle to innovation activity in any country in the Pacific. In Samoa, it is a known fact that the banking system is quite reluctant to lend money to new economic activities, even if the liquidity of the system is considered to be high. The effect is that several potentially innovative and profitable projects are not developed because there is no financial support. This attitude can be the result of different elements, not last cultural ones. Yet, the same difficulties are found in other countries with very different cultural traditions. For instance, the process of accessing to funds in New Caledonia is long and difficult. Moreover, banks tend to be very risk adverse, and to be very conservative as for the project funded. One explanation is that this is a defensive strategy adopted by the banks because they have serious difficulties in evaluating the investment projects due to their low capabilities. Yet, even when bank provide credit, loans are very expensive. This is a serious obstacle to innovation and entrepreneurship especially for new economic activities. Unfortunately, the banking system is also an obstacle to the development of commerce and e-commerce. While these represent great opportunities for Pacific islands as for increasing export and innovation, the bank system is not ready for that. For instance, transfer of money is still very difficult, even among the same bank offices located in different countries. Moreover, these difficulties are even more significant as for the e-banking: for instance, the Paypal electronic paying system cannot be used in the Pacific. It is obvious that this is a serious obstacle to the

enlargement of export markets and creating the condition for innovation. In this sense, it is not unfair to argue that the banking system is far from facilitating innovation in the region.

Cultural attitude. There are very different cultural perspective on innovation across Pacific countries. In some countries, the traditional economic life is built around the idea of collective goods: it follows that there are no many incentives for taking risk or innovate. Briefly, the basic idea is that if you are successful, you have to benefit all the community. It follows that if you have something, this is of your extended family as well. Admittedly, this is not what it is expected to be an environment favouring entrepreneurship and innovation. It is interesting to note that this cultural background coexists with a very open attitude towards novelties. For instance, people from PNG are from a cultural perspective very open to changes. In fact, there is a lot of new economic activity continuously emerging, even if not (always) efficient. The population is in general very open to novelties: for instance, it is very easy to make growers accept new crops. Yet, this does not imply that these products will be taken to the market: maximizing profit is not part of local tradition culture. In other cases, the cultural obstacle to innovation takes the form of a lack of understanding – especially by the business community - of the importance of innovation for economic development. This is the case of New Caledonia, where the idea that innovation is important has been accepted only very recently. Until few years ago, the economic community was not interested since there was the idea that things could have continued without major changes, with large domestic groups enjoying strong protection and government subsidies. The importance of the cultural obstacle to innovation can be appreciated even more comparing countries with similar characteristics. For instance, while New Caledonia and Reunion have similar external constraints, their population attitude towards innovation is very different with the second being the home of a very lively and innovative entrepreneurs' community. The cultural obstacles is also important in the case of Samoa and Cook Islands, where taking risk is not part of the traditional local mentality. Often, this cultural obstacle also affects the political elite, which contributes to explain its lack of attention towards innovation.

Lack of business capabilities and lack of knowledge about opportunities. While there is no shortage of innovative ideas in the Pacific region, the private sector is not always able to understand if these are economically feasible and their potential economic impact. In fact, one of the most relevant blocking factor for innovation is that entrepreneurs often do not really know about market opportunities. This may be due to different factors (remoteness, low human capital, lack of information, etc.). Yet, this ignorance reduces economic incentives and is a very strong limiting factor for innovation activities. For this, it would be very important to have some

specific support both in terms of how to evaluate the economic feasibility of economic projects, and on how to develop the idea and bring it to the market (being those competencies hardly in possess of the average entrepreneur). In fact, one issue that has been mentioned several times during our interviews, it is the difficulty to move from being a researcher to become an entrepreneur and in particular an innovative entrepreneur. In fact, this passage is extremely difficult because the abilities and the skills need in the two roles are very different. Without external support, few attempt this transition, even in countries like New Caledonia where there are several successful researchers.

Basic vs applied research. In almost any country in the Pacific, there is some Government funded basic research activity, there are research institutes, and Universities. The problem is that in most of the cases, Government believes that funding basic research is enough to generate innovation. In general, there is a lack of attention to applied research. This obstacle is becoming increasingly more evident to Governments in the region. For instance, to partially overcome this problem, the Government in PNG has recently established the Secretariat for Science and Technology (see below in section 5) that is expected to fill this gap. A related problem is that of the way in which research is prioritized. In fact, to generate innovation, researchers should be given the possibility to explore without constraints, and to collaborate with the private sector to identify the objectives, rather than having them decided by some Ministry or Government agency.

Weak links between private sector, Government, and University. As emphasized by several actors, one very important obstacle to innovation is the lack of formal and informal links between the private sectors, the Government, and the University and research centers. There is a very weak link between the private sector, and the high education institutions and research centers in the Pacific countries. Often, government funded basic research programs are completely disconnected with the local demand, which is often just interested in the results from applied research that may have some market potential. There are several reasons for the weak link between research and the business community. In some cases, it is the very business community is not asking for more innovation. Paradoxically, it seems that there is more supply than demand for research and innovation. For instance, the University of Port Moresby (PNG) has developed an innovative way re-generate oil form used one (collecting cooking oil from restaurant and converting in usable fuel) but no one is interested in economically exploit this innovation. Recently, there have been attempts to close this gap also in other countries. New Caledonia offers several examples of these attempts, with the activities of CNRT in the mining sector and in the marine sector being particular effective.

Low human capital and brain drain. In poorer countries in the Pacific, such as PNG, another important obstacle to innovation is the fact that average education level is quite low. The education level is especially low for farmers. While farmer know well what was useful and effective in the past, they lack the new knowledge need to be able to deal with the rapidly evolving economic environment. The problem of low human capital shows up also in the form of shortage of researchers. Often, this situation is coupled with lack of research infrastructures, and of basic instruments for research. As a result, for most of the projects in PNG, the most important the stages of the research need to be carried abroad (University Utah, US) while UPNG only takes care of the collection of the raw materials (plants, flyovers, etc.). This implies that all opportunities for discovery and innovation are created and developed very far away from the Pacific. A related problem, especially relevant for small islands (e.g. Fiji, Cook Islands, and Samoa), is that of brain drain and the associated problem of shortage of skills. While the causes of this phenomenon are several, one of the most important is the fact that overseas companies are able to offer a higher salary, so skilled engineers tend to leave the country. In this sense, the problem is not the production of engineers or skilled people *per se* (there are good Universities in most of these countries) but the ability by the economic system to keep them in the country. Similarly, most of educated people tend to migrate: this implies that those who are more likely to start more innovative enterprises are those leaving the country. This exit cannot be compensated by the influx of foreign workers (technicians and engineers) because - in most of the cases - regulations are very tight and these operations are very expensive for the employers. The case of PNG is very emblematic where – in addition - attracting foreign workers is also extremely expensive due to the high cost of living and the supposedly difficult security situation. These are all elements that reduce the creation of an environment conducive to innovation and the development of fruitful international collaborations. The problems becomes even harder because the new technologies are increasingly complex and so are the capabilities need to manage them – but people able to deal with innovations will be increasingly more difficult to find.

High cost of operations. Another important obstacle to innovation in the Pacific region is the very high cost of operations. This is a common problem, especially relevant in countries like PNG, New Caledonia and Cook Islands. Transport costs, basic services, accommodation are incredibly expensive in these countries. Obviously, due to the lack of funds, high operation costs seriously undermine capacity for many firms to invest in innovation. On top of that, cost of internet is incredibly high in most of these countries (e.g. there is no cable reaching Cook Islands). This curtails several innovation possibilities related to e-commerce and web development. Yet, somehow paradoxically, the high costs of production have been the very

motive for innovation. There are several examples of the fact that these difficult conditions have forced the manufactures to be innovative. For instance, the Coca Cola plant in Papua New Guinea turns out to be among the most efficient in the world because it has been designed to deal with power shortage and continuous blackouts. A food processing company in Papua New Guinea has designed a processing factory operating while navigating the rivers as a reaction to the incredibly high transportation costs. The same company, to cope with a plant malaise that destroyed a large part of its production, has developed a new variety of cocoa: while cocoa production usually takes five years, the new one needs only eighteen months.

Small firm size. It is a very well-known fact that innovation is related to firm size due to the fixed costs associated with exploration of new products and processes. This implies that, *ceteris paribus*, the larger the firm the more likely is that it performs any innovation activity and that it is successful. The large majority of companies in Pacific countries are small, and they do not have the competencies that would allow them to develop innovation autonomously (without public support). Also, possibly related to the small size of firms, most of firms are family owned and thus traditionally managed. This is another obstacle to innovation.

County-specific problems. In addition to the obstacles to innovation we have discussed so far, there are several that are country-specific. For instance, in the case of New Caledonia, an additional complication is the fact that France still holds the competencies in the domain of innovation. This makes more difficult to decide to introduce some support measures. Also, there is the complex role of mining companies in the economy. For instance, mining companies pay most of the research in the restoration activity. In fact, mining companies are the only ones that can afford that. One important obstacles to innovation in the case of Cook Islands is the depopulation process and consequent age structure: old people are already the majority and their number will increase, making less likely the possibility to have innovation. Finally, one issue is common to Cook Islands and New Caledonia: the competition between the private and the public sector. In particular, in both countries salaries and benefits are better in the public sector: this reduces the incentives to be entrepreneurs. This adds to the fact that many people are followers and not leader, making the pool of potential innovators very small.

5. Opportunities

While there are serious difficulties in pursuing innovation, the Pacific countries also offer great opportunities. In this section, we discuss examples of opportunities for innovation in the different countries.

5.1 WP2: food security, sustainable agriculture, marine and maritime

One of the comparative advantage of Pacific countries is the variety of vegetable and fruits that can be cultivated. There are several products abundant in Pacific countries and having a large world market. Among these, the most important are taro, cocoa, sea cucumber, passion fruit, papaya, lime, and mango. Important opportunities for innovation are found in the creation of new varieties of these products. In fact, to compete in the international markets, the quality needs to improve and this requires innovation in terms of techniques adopted and varieties cultivated. These improvements would also be very much appreciated by tourists, who are ready to pay for local products of high quality. At the same time, having high quality agricultural products also allow the possibility for innovation in terms of processed food. For instance, the new varieties of cocoa recently introduced in PNG are producing very good yields and can be harvested more regularly than the standard variety. This has made possible exploring possible innovation related to processing of cocoa, i.e. producing 100% locally made chocolate. To satisfy these needs, biological agriculture is becoming the new standard: it is not conventional agriculture but it is not organic either. This type of cultivation needs a lot of biological research and thus it offers possibility for innovation itself. This is new for most of the Pacific countries, where there is no tradition for the use of fertilizers.

There are many new processed food products being developed in the Pacific countries. These include:

- 1) Breadfruit flour. This is a unique type of flour because it is gluten free. While this is not an entirely new product (breadfruit flour already exist in the Caribbean), the one that could be produced in Samoa is apparently of premium quality. In fact, the comparative advantage of Samoa breadfruit is that is the only type that survive transport, so it is perfect for processing. Now that experimentation phase is finished, the next step is now to bring it to the market. The local beer company (owned by an Australian multinational) has started to use that to produce a special beer – it is has a different taste from the standard one and it is very appreciated by consumers. There is a large market for this type of beer in Australia.
- 2) Chocolate. Cocoa is produced in different Pacific countries. That of PNG is considered among the best in the world. Now local companies are trying to produce chocolate using local cocoa and trying to innovate by adding local flavours and spices. The idea is to combine premium quality raw material with a something that is related to the local dimension.

- 3) Avocado margarine. Probably this is the first example in the world. Its production has been tried before in New Zealand but it was interrupted because costs were too high. In Samoa, there is a lot of avocado that is not used – the price is much lower which would make the production of the margarine profitable.
- 4) Sea cucumber (*bêche-de-mer*, the way in which it is called when processed and exported): this is a potential important product for export. It happens to be that Cook Islands has the high value species. Apart from having a market in Asia as food, sea cucumbers clean the sand so there is a positive relation with tourism.
- 5) Fruit wines. There have been attempts to produce wine and alcoholic drinks using different fruits like banana, taro, star fruit, and mango. There are two large beer companies and three spirit companies which are already producing these beverages in Samoa. They are about to enter the local market.
- 6) Kava. Another potential innovation is related to the commercial exploitation of kava. The African, Caribbean, and Pacific Group of States (ACP) regional office is very interested in developing the kava market. It was a very florid market and a local industry until 15 years ago, when export stopped because of the German ban. After 15 years, it is now again growing big. It seems that the Samoan kava is grown and harvested in a way that eliminates all the negative effect of kava. This makes the Samoan kava the only that will be able to enter the EU market.
- 7) Taro chips. After 20 years of halt, the market for taro is finally booming again. The growers have recently discovered that a new variety is much appreciated by consumers, its selling price is higher, and has higher yield by hectare. Samoan taro is already exported to New Zealand and US. It can be exported because it is a tuber, so it does not undergo the strict sanitation control for fresh fruit and vegetables. Processing taro as chips would open another important market and would allow for different processing of the raw material.
- 8) Noni juice. Noni juice is at the same time a beverage and a health product. In fact, it has different effects, also healing ones. It is produced in Fiji, Samoa, and Cook Islands. Interestingly, it seems that the quality of the raw product and of the process used in Cook Islands makes it of better quality than that of the competitors and the consumers value it.
- 9) Papaya tea. Academic research suggests that papaya leaves are particularly successful to cure cancer. A company from Cook Islands has experimented with the production of the tea and, as for the taste, the result is encouraging. It would be the first example of this type of tea.

10) Cassava beer. This is another example of using processed local food in an innovative way.

Several agricultural products from the Pacific region are enjoying a demand increase after a period of difficulties, i.e. cocoa, taro and banana. This is creating a new interest in improving and innovating agricultural production and in finding ways of selling these products adding value (either processing them – banana and taro chips), or branding it. For instance, Samoa cocoa is now sold as premium quality, as a niche product, and has become the input for a few chocolate producers in New Zealand. Similarly, the market for taro is regaining momentum, and taro chips are becoming much appreciated. Both these activities have some innovation aspect that is quite new to the Samoa economy. Finally, a massive disease affecting banana production in Asia will probably open that market for banana from Samoa. This suggests that it is a good period to try innovations in these markets because demand is very high. Finally, it should be noted that some of these countries have special conditions that allow them to access important markets. For instance, Samoan producers can exploit a very special opportunity to access the US market. Shipping from American Samoa to any city in the US is very cheap because the US Postal Service considers American Samoa as any other city in the mainland. Thus, it is very cheap to export any product once it arrives in American Samoa. This implies that producers of goods that can be easily transported (as cosmetics and small items) have a very large potential to access the large market of Samoans in the US that are said to be very loyal to the products coming from the home country.

In some countries, the marine environment is considered one of the most promising sectors to trigger innovation. This is because in these countries (for instance New Caledonia), agriculture has been abandoned in the past for mining. One interesting example is that of the micro-algae project in New Caledonia: the local development agency has first developed the new product, i.e. micro-algae, and then looked for some entrepreneur willing to economically exploit it. This is their preferred strategy to solve the problem of the distance between research and business (see also Section 4). Another project involves seaweeds: the objective is to use seaweeds for producing biofuel, biomass cosmetic et al. These projects are instead still at the exploration stage.

Other examples show that innovation should build on the local comparative advantages but also requires government support. One example is the Government-supported attempt to develop fish breeding in New Caledonia. A pilot firm has been created and experts from Australia and Thailand have been hired. The next step is to conduct market studies to verify the economic

feasibility of the project. After all these steps will be completed, they are planning to look for an entrepreneur willing to take up this activity.

Finally, there are some innovations that instead seem quite more risky and uncertain. One example is the idea of growth oysters in land. In this case, the idea is the result of the collaboration between an American marine biologist (they did the research and looked at the facilities) and a local. They are starting the implementation thanks to the funds provided by some US investors who seem to be interested in this innovative idea.

5.3 WP3: climate action, resource efficiency and raw material

In the Pacific region, there are also several examples of local firms exploiting natural resources and raw material to produce new products. Coconut is one of these raw materials. There are now numerous companies in both Samoa and Cook Islands that are producing coconut-oil-based natural body care, hand-made soaps, etc. The expectation is that coconut-oil-processed products will be able to produce a reasonable income stream because the market is not yet saturated. Some of these companies are producing them by hand. Other, have more mechanised production. Each looks for a niche in the world market, trying to be different as for the processes used. Also, other products that have been started to be explored as possible product of processing coconut: coconut water, coconut cream and mosquito repellent. The increase in the demand for these simply processed products is due to a new trend in international markets: with the product, you sell the story behind it. Natural production is now thus a quickly expanding market. Somehow organic has lost credibility and green consumers are pushing it a step further: they want to be sure about the origin of the product. Coconut oil-derived products are a very good example of this trend. Most of these companies are trying to keep production local (even if some ingredients are imported, like the essential oil) and artisanal. Some of these companies are also exporting, now selling to an important multinational. This multinational company was interested in having a community fair program to produce a line of its products. Now, they use the local coconut oil in all the products for the fair trade line. The rise of the fair trade market explain why there also numerous initiatives to process raw materials directly with local communities, such as producing soap from honey (which is produced in abundance in PNG) or the production of bird's eye chilies and ginger. The basic idea is to develop eco-business and a sustainable use of natural resources because this is highly valued in the market

The coconut is also basic product for another type of innovation that seems very promising: biodiesel. SROS in Samoa is experimenting how to obtain biodiesel using coconut oil. They have developed this project in collaboration with the EPC (Electric Power Company): the

objective is to provide the private sector with the technical information needed to set up bio-diesel production facilities. One of the motivations to pursue this project is a climate change-related activity, part of the commitments made by the Government as signatory of the convention on climate change. Yet, given the drop in the international prices on fuel, at present the project seems to be economically not feasible. There is also an issue with the price of coconut: since it is constantly increase, the growers maybe will be reluctant to sell it to the bio-fuel producers.

The mining sector is very important in several Pacific countries. Its role is very complex: it can be both an obstacle and a stimulus for innovation. Where the mining sector is large, it attracts most of the technicians of the country and provides strong incentives for entrepreneurs to enter the service market for the mining companies. In these cases, governments find difficult to provide enough incentives to induce entrepreneurs to invest in activities not related to the supply of mining companies (so this creates additional difficulty in terms of supporting diversification and innovation in other sectors). At the same time, mining companies favour the creation of new enterprises. In this sense, there is also a positive impact of the mining sector on the local economy. Moreover, these large mining companies often train locals in various skills. In particular, they improve the managerial ability of locals – dealing with a large firm makes local entrepreneurs and firms to become more efficient. At the same time, state-of-the-art plants characterize these large mining companies. Mining companies sometimes are also directly sources of innovation. In some context, these companies may even be the only or largely the main source of innovation (as in New Caledonia). For instance, one large mining company has recently introduced an important process innovation by building a beneficiation plant (which is a plant that works like a washing machine for the diamond processing). The same company has also started to have the first step of the processing of nickel done in New Caledonia. Interestingly, some of the activities the mining companies implement as part of their social corporate responsibility program are very innovative for the region, especially in relation to environment protection. For instance, in New Caledonia mining companies are collaborating with public bodies in different projects to the reduction CO₂. These are a micro-algae project and mangrove project. Mining companies participate in these projects because they will produce a lot CO₂ (as by-product of their activity). The project objective is to identify the type of algae and mangrove that are more able to capture CO₂, how these can be grown, and where. The next step is to understand what to do with these algae and mangrove. These could be used for different products: biomass, biofuel, biogas etc. Another possible use of these results it is to use microalgae to provide protein (that are very costly) to shrimp producers. Finally, some mining companies are also working on developing a project on biodiversity with a French ONG. In this

case, they provide finance to create a nursery for very rare land species or those species that are used for re-vegetation of mines.³

Another very important sector for Pacific countries' economies is tourism. The possibility to exploit the touristic resources in some cases is strictly linked to the way in which natural resources are managed. Some of the Pacific countries in fact face serious environmental challenges. It is now clear that investing in tourism development also requires increasing the care to the environment. Governments are working on a paradigm shift since the idea that the environment is something that needs to be preserved is still a quite new concept for the local population. One way to make this happen is to create transparent ways to transfer the benefit of environment preservation to the people. Government are designing mechanisms to compensate villages that are located to areas that are reserved, and to provide incentives to villages to encourage them to manage the land in a more environmentally friendly way. Interestingly, the peculiar geographical conditions of these territories and the relevance of environmental conservation for the survival of these countries, makes the latter as perfect cases studies for experimenting ecological and environmental services management. While environment protection is one of the main challenge for these countries, it also offers good opportunities for developing innovative solutions and approaches to sanitation and waste management projects, which may be next applied in other countries. For instance, New Caledonia's main environmental problem related to mining is erosion: sediments go into the water because there are no more plants. Recently, there have been some interesting innovation in the way the re-plantation process is done. Re-plantation requires to use the same plants that were on the massive before the opening of the mine. Since more than 80% of the plants which grow on the mines sites are endemic, there has been a large study to identify these plants. Interestingly, this has created several research and opportunities for future innovation: in this sense, the rehabilitation obligation by mining company is creating opportunities for future innovation in the replantation activity. Another promising innovative project is the one related to forest is that currently conducted by CNRT: they are studying plants that accumulate heavy metals and these metals are used as catalyst of chemical reaction. They plan to use these two plants from New Caledonia to accelerate chemical reaction. They are currently studying how to growth these plants. They can use these plants for use for re-vegetation of mining sites.

Finally, it has emerged some discussion on the possibility to transform these countries in places for medical tourism. This illustrates in a very clear way the huge potential to develop new

³ For a detail discussion of the experience of VALE mining company in New Caledonia, see the Appendix Case Studies.

products or services exploiting the agricultural comparative advantage and the geographical characteristics of the Pacific countries. Some has started thinking about combining cultivation of new drugs (for instance marijuana-related) with medical tourism: offering a nice destination where to be cured (and where part of the drug can be prepared locally). In particular, in Samoa there is some initial exploration of the possibility to produce non-psychoactive marijuana. There still a lot of uncertainty about which will be the protocol for producing it but the discussion has started and the Government is open to this possibility.

5.3 Biodiversity and eco-diversity

All Pacific countries are characterized by a rich biodiversity. In fact, this can be considered another comparative advantage of the region. The potentials for new discoveries is enormous. In New Caledonia alone, the research on pictorial plants has shown that almost 350.000 plants have not been yet studied. There is an increased interest in the possibility to exploit the biodiversity in the country, even if mostly by foreign companies. Yet, much research is needed to transform the rich biodiversity into something that is innovative and that has economic value.

There are some very successful cases of the attempt to exploit the bio-diversity of these countries. Sometimes it is the private sector that provides the demand for a specific type of product. In other cases, it is the researcher that come up with something that ex-post turns out to have some economic potential. For instance, in New Caledonia, a local researcher discovered that an aromatic. Fragrance could be extracted from an endemic plant and used to produce a cosmetic. Next, he developed an innovative process to extract it. One of the most important multinational in the cosmetic sector has now bought the patent.⁴

Another promising source for innovation is that related to the production of drugs based on traditional medical plants. The development of pharmaceutical products has already started and some of these products are already in the clinical trials phase. Not surprisingly, many of these studies are trying to explore the rich biodiversity of Papua New Guinea. UPNG has a project whose main objective is to identify plants that could lead to the creation of new drugs. This is part of an international project on forest research involving also University of Utah, University of Minnesota and the Smithsonian Institute. The project has now been going on for 15 years. The project started to study plants in the last 5 years has moved to study sea mushrooms (sponge fungi). The peculiarity of this research is that they are looking at endemic plants, which nobody has ever studied before. A similar project in New Caledonia made researchers to

⁴ For a detailed discussion of this story, see the case study on the New Caledonian company Serei No Nengone reported in the Appendix Case Studies.

identify medical plants that have now been included in the EU official list. Another successful example is that of the antivenin project in PNG. The creation of the antivenin has been the result of the collaboration between the UPNG medical school and the University of Melbourne. A multinational pharmaceutical company will produce it in Costa Rica.

While there is still a huge potential for this type of research, some important aspects of it are changing. In most of the countries, regulation for the exploration of plants is becoming stricter. In New Caledonia, it is under discussion a new law to require the authorization to collect plants and study them. These changes in the regulation are very important for the perspective of research and its potential economic applications. This is in part a response to a recent evolution in the attitude of local chiefs, who are becoming more reluctant in sharing traditional knowledge and more worried about the exploitation of the natural environment. Everyone is aware of the fact that the situation is changing: new laws will regulate not only plants collection but also the procedures to collect information. There is also a proposal to regulate the market-use of customary knowledge. This will probably also induce researchers and foreign companies to involve more the local population in their activities of research. Maybe it will also help to go beyond the current difficult situation in which most of the research projects are blocked or facing serious obstacles from the locals.

While the impression is that there is still a lot to be discovered, the discussion about the economic value of these discoveries and the opportunity for innovation is still open. The fact that traditional medicine has worked for centuries does not mean that is valuable also today. There are two main reasons why this may be the case. First, the way in which indigenous populations do medicine is very different from that of developed countries. In their approach, the context is very important for the effectiveness of these actions and external conditions have changed a lot with respect to the past. Second, these populations are reluctant to share this knowledge, because it has a very strong symbolic and magic relation to their history, but this does not mean that it can have it in relation to the western one. This implies that the economic value of traditional knowledge is probably overestimated. Finally, while it is true that biodiversity in these countries is incredibly varied and still unknown, there are not many things that can have an economic application and discover them could be very expensive.

5.4 ICT

Pacific countries have also some potential for innovation in the ICT sector. In particular, New Caledonia seems to have a sort of comparative advantages in ICT, software and cellular application development. In Samoa, one of the Government priority is develop the

communication and information technology in the country. The Government has invested a lot to develop the infrastructure generating opportunities in the sector for both foreign and the local investors. The real question then is if the private sector will take advantage of this more favourable economic environment.

At the same time, the Pacific countries are important market for new services and product, being among the countries that are likely to gain more from innovation in this sector. For instance, the development of e-commerce provides great opportunity for local business entrepreneurs to get their products out to international markets. This is particularly true for people in the remote and small islands (and most importantly for countries with numerous small islands like Cook Islands). Finally, consumers from Pacific countries are in general very open to novelties and in particular to new technologies. Particular promising opportunities in this sense seems to be mobile app development and creation of platforms for electronic banking.

Some domestic companies are already developing innovations, using technologies developed abroad and re-use that for elaborating info that is useful to the local demand. For instance, in Cook Islands a company has developed a software that elaborates geographical information useful for mining companies. Another interesting case from Cook Islands is that of a company which has develop a software that checks the solar panels and reports by e-mail and on the website the results. It is universal so it can be applied to any brand, and it works with slow internet too. This is an important feature since a lot of commercial software, when linked with internet through satellites, as it is common for small and isolated islands, work very poorly. This software solves the problem of having different pieces/components from different brands and – very importantly – it works with old hardware too. The innovation in this case thus is to make working something that already exists but that would not work properly due to the special local conditions. Another interesting example of innovation related to software development is that offered by a New Caledonian company which applies geophysical methods to volcanology, providing a new method to search for new nickel mines. The basic technique is well known and the hardware is bought from abroad. Still, nobody has ever used that for nickel exploration, which is something very important in the country. Another example of this adaptation to local conditions of known technologies is the company producing custom-made underwater video system to identify fishes in the lagoon. This is a standard technique in academic research: the idea is to apply it to a commercial demand. Finally, again from New Caledonia, there is the case of a domestic software company producing satellite imaging at an affordable cost. This allows even small businesses to access otherwise very expensive information for their business (see Section Appendix Case Studies for a detailed discussion).

Interestingly, these innovation opportunities in the ICT sector would also benefit other sectors as well. The starting point is the observation that most of the agricultural products can now go to markets directly. Through internet, world consumers can directly access local producers, which thus now directly face world demand. This implies that local products can be sent anywhere in the world: this is an interesting opportunity to expand production, and provides incentive to innovate products and processes.

Most of the Governments in the Pacific countries are experiencing a digital transition: there is a general understanding that ICT is an important driver for innovation. Digitalize government's bureaucracy and provide e-education could prove to be very effective in a geographical context such as that of Pacific countries. In fact, the transition towards the e-government is an opportunity for leapfrogging in terms of government efficiency. The programs of the Ministry of Education in Cook Islands give an example of how ICT development could also improve public service provision. The conditions in which the education system operates there are very difficult: remoteness, small number of students, low number of teachers, etc. To solve these problems, the Government has adopted an innovative approach. Given the difficulties and costs associated with reaching the outer islands, it has developed a service that provides an on-line teacher available every day. It has abandoned the old approach of recorded classes then broadcasted. The new system is completely different: it is like having a real teacher in front of each student. This is a real innovation in the long-distance teaching provision, something that could be copied and/or sold to other countries that may have similar problems of which may just want to access the same service. There are also interesting examples of web application related to e-learning. One is the case of a platform that provides the possibility to access parts of different textbooks without needing to buy the entire book. This would significantly reduce the cost and the difficulties of transport the physical books. Moreover, this will allow the access only to the part of the book one maybe interested into and combine that with other books for a reasonable price.

6. The role of Government

Governments play a crucial role in supporting innovation in any country in the world. This is not different in the Pacific region. What it is different is that Governments have started playing this role only very recently. For a long time supporting innovation was not among governments' priorities. In most countries, local business owners were satisfied with domestic demand and domestic producers enjoyed strong protection from international competition. This implies that the need for innovation was low and Governments could avoid having an innovation policy. The situation has now started to change: interest in innovation is now spreading around and the

private sector is (albeit slowly) understating the importance of innovation given the new economic context. Governments (at different levels) are increasingly interested in promoting innovation: proof is the number of events, conferences, including international and regional meetings, on the topic of innovation.

It is now being increasingly recognized that long-term growth requires diversification of the economic structure. Governments have identified innovation as a key instrument to achieve it. Yet, the private sector seems to be still too weak to be the leader in the identification of the niche of opportunities. Therefore, while traditional industrial policy instruments (subsidies, tax breaks, etc.) are being dismissed, governments are increasingly acting as entrepreneurs and carrying the exploration costs to discover new investment opportunities.

In this section, we will discuss the different actions undertaken by governments in the region to provide incentives and support to the private sector to increase innovation.

6.1 What Governments are doing to support innovation

Innovation policy. As for now, there is no specific innovation policy in any Pacific country. Even in New Caledonia, which under this perspective is among the most advanced countries, there is a lack of laws/programs/policies specifically designed to support innovation. This situation has important practical implications. Since there is no innovation policy, there is no recognition of R&D in the tax regime and thus any exploration and development expenses are financed from operating revenues, making it even more difficult for companies to perform innovation. At the same time, there is no support from the Government to the various projects aiming at developing non-traditional food and agro-processing activities. Recently, the Government of New Caledonia has prepared a document titled NC 2025, to present its strategy for economic development for the next decade. The document is a diagnostic of the actual situation, and a forecast for agriculture, mineral, and manufacturing sectors. For the first time, the document contains a chapter dedicated to innovation with different niches identified. It is still a proposal but it will inform the future discussion on these issues in the country. In other cases, the attention to innovation policy is even lower. The National Sustainable Development Plan for Cook Islands is supposed to promote sustainable development during the period 2015-2020 but there is no reference to innovation policy at all. While the document discusses research priorities, these are not clearly linked to any innovation project.

Apart from the specific-countries difficulties, two main obstacles to the proper functioning of innovation policy are common to all countries in the Pacific region. These are: 1) administrative and political inertia, which make innovation policy likely to be very low effective; 2) the

difficult condition of public finance, which poses serious threat to the possibly to implement any innovation policy in the future.

While no country has a full-fledged innovation policy, in some countries there are policies that could – albeit indirectly – could favour innovation and entrepreneurship. In Samoa, local firms are receiving some support from the Government to cover expenses related to participation in exhibitions, marketing, and advertising. Also, the Ministry of Women Government is developing an incubator project (UN funded) for young entrepreneurs. Finally, there is the so-called Private Sector Support Facility. It is a program managed by the Ministry of Commerce, Investment and Label and funded by UNDP, NZ government and Samoan government. Its objective is to allow the privates sector to develop new ideas. Unfortunately, its effectiveness is limited because the size of the grants is small since the project is designed to support only small new businesses. In the Cook Islands, there is another example of an interesting new program that could lead to innovation: the Young Enterprise Scheme in the Cook Islands. Originally, it is a New Zealand program, which has been running for several years and has been very successful there. In the Cook Islands, it has been running for two years. During the last two years of the secondary school, a business teacher guides the students in the creation of a company (all the steps, from choosing the name to the actual production of the production). The competition awards the best project a small fund to develop it further. Last year the winner was a project to develop a recycled bag with the logo of Cook Islands to be used in all supermarkets and shops in the country. This year, the winner is a belt to keep babies attached to the mothers when they are on the motorbike (in Cook Islands babies are usually transported on motorbikes and nobody wears a helmet).

Government agencies to stimulate innovation. While no country has a specific innovation policy, in several countries, there are government agencies which contribute (directly or indirectly) to support innovation. In fact, the situation is very heterogeneous. In some cases, there is a dedicated agency. In New Caledonia, this agency is ADECAL (Agence de développement économique de la Nouvelle-Calédonie/New Caledonia Economic Development Agency). ADECAL (and in general the public sector) is playing a very important role in the local economy, being very interventionist and taking the lead in several project. Most of the ADECAL initiatives are motivated by the objective to favour the diversification of the economy. One such project is to develop fish breeding in New Caledonia. ADECAL has created a pilot firm, has hired experts from Australia and Thailand, has done market studies to verify the economic feasibility of the project and has checked if the cost could covered by the selling price. Now that all these steps are completed, they are planning to look for an entrepreneur

willing to take up this activity. This is the usual strategy by ADECAL: prepare the project and then offer it to the private sector. The relation between ADECAL and the business community is very good, also because some of the members of the board of the agency are from the private sector and the business associations (chamber of commerce, chamber of agriculture, etc.). In general, it should be acknowledged that in New Caledonia the degree private sector trusts towards the different public counterparts (central government, provinces etc.) is very high. Also, this is a very different situation with respect to that in other countries in the Pacific. In NC, the private sectors has a direct and strict link to the public sector. There are several cases of strict collaboration between public research centers and the private sectors. In fact, the experience of the IDR can be considered as best practice in terms of providing research inputs to business. Another important agency in New Caledonia is IAC (Institut Agronomique Néo-Calédonien) which does a lot of research focusing on the study of new plants, new horticulture methodologies, and new vegetables. They study the feasibility of planting new varieties to then pass the information to the private sector. IAC also supports the creation/spin-off of new companies from the commercial exploitation of the research

Samoa has a very interesting example of a government agency promoting innovation. SROS (Scientific Research Organization of Samoa) was established in 2006 to complement the activity of the Ministry of Agriculture. Its mandate is to explore ways of adding value to agriculture products and to produce renewable energy by exploring the different technological options, taking into account what is locally available. SROS employs 55 people: around thirty people are scientists with a degree. Most of them are Samoans but some are from Tonga, Fiji and Solomon Islands. SROS activities are also supported by the collaboration of foreign academics (sometimes on a voluntary basis): they provide useful expertise that increase the ability of the agency to deal with technical issues. SROS has initiated several projects to add value to local products, including breadfruit flour, and avocado oil (see Section 4). Each of these products face different challenges. SROS is actively involved in business development: the strategy (not much differently from that of ADECAL) is to develop products and then propose them to the private sector to be commercialized. SROS has also a role as business partnership facilitator: in this case, its objective is to attract local and foreign investors. It can be said that main innovation policy in Samoa is the presence of SROS, which is largely agreed to do a very good work. In some sense, SROS can be thought as an instrument available to the producers to explore new products, new things without needing to initially invest those activities. In Samoa, SBEC (Small Business Enterprise Centre) is also providing support to entrepreneurs to start new activities and introduce innovations. It is a semi-governmental agency operating in the private sector. It works in collaboration with the Ministry of Commerce, Trade and Label. Since its

inception, SBEC has supported more than 2000 businesses in every sectors, some of which thanks to their support have grown from small to medium. It is now mostly working in the food processing industry. The main challenge it is facing is to transform the currently subsistence agriculture production into large production and to develop new processed products. SBEC strategy is to discover which products have been successful overseas and verify them can be produced locally.

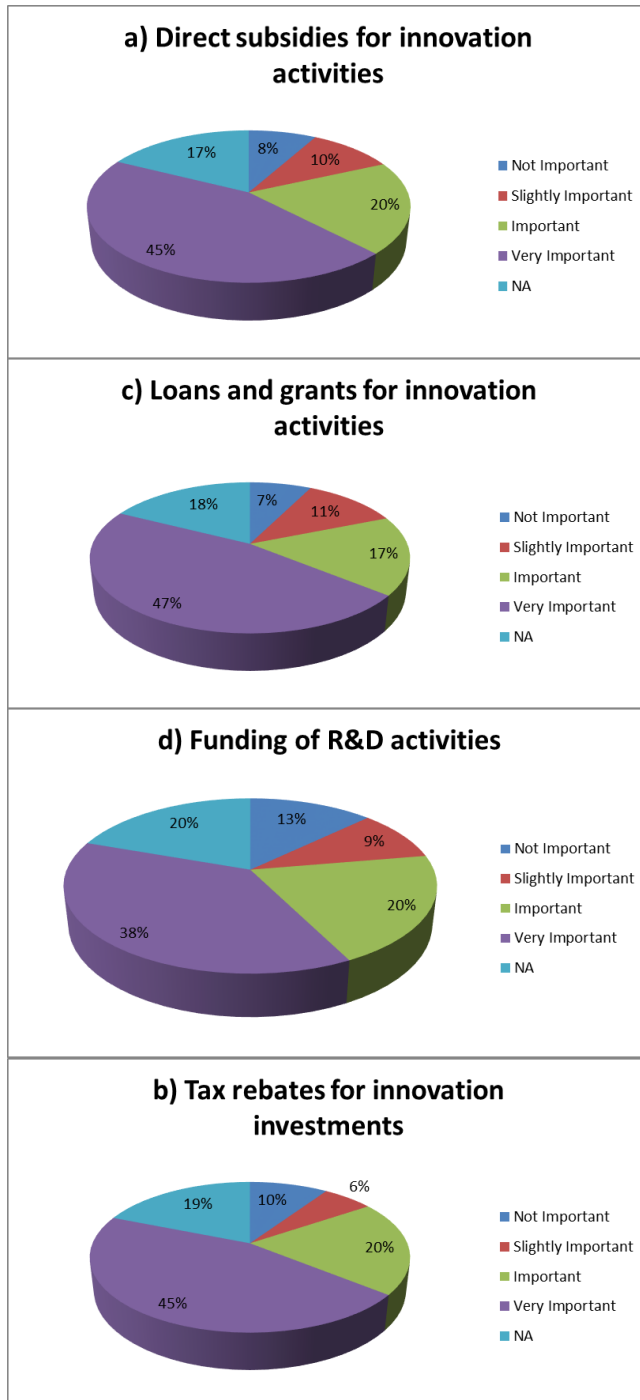
Not in all countries, there are dedicated Governmental agencies for innovation. For instance, in PNG the Government has only recently established the Science and Technology Secretariat. While this is expected to support innovation, it should be noticed that the name suggest a focus on research. In Cook Islands the Central Policy and Planning Office has the broad mandate to supervise the decision making process in the Cook Islands and improving it. Only recently, there has been a decision to consider the possibility to have some activities directed to support innovation.

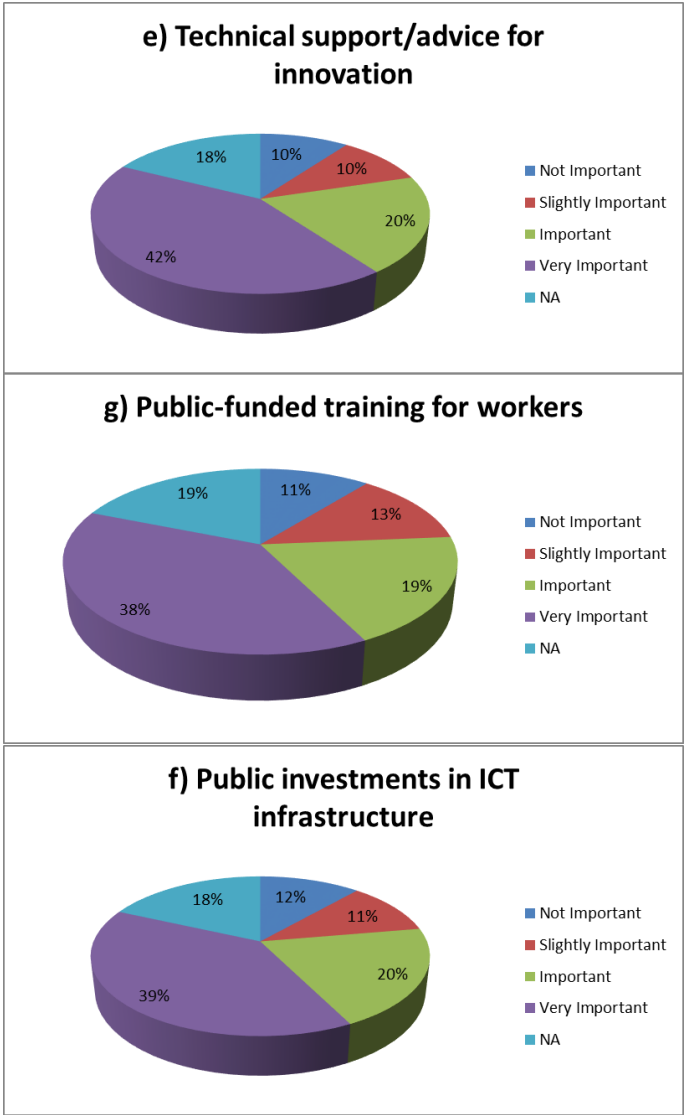
Attraction of foreign investments. Another common strategy to favour innovation is to attract foreign investors: this is a potentially very effective way to access the technological frontier. In turn, this would increase the possibility for introduce innovations and generate new varieties and products. This strategy is also motivated by the fact that local investors are usually reluctant to take risks. Unfortunately, this strategy has been pursued with very different results in the different countries. The situation has become even more complicated because the world economy and the rules of international trade have changed. For instance, in the past the Samoan government had several polices in place to attract foreign producers. In this way, the Government successfully made a Japanese automotive production factory to locate in the country. The company decided to establish in Samoa because the country was very stable, workforce was educated but also because the Government offered a large package of incentives (tax holiday, free rental of the plant building, etc.). Nowadays, that would not be possible anymore: the WTO rules in fact forbid this type of incentives. This new condition significantly reduces the potential for Pacific countries to attract foreign producers. This implies that governments needs to find other strategies to attract foreign investors focusing: these could be to improve the quality of the labour force and of the business environment.

While governments are implementing different policies and strategies, it is also important to better understand which are those that are considered more important by the private sector. The results of the firm surveys in the Pacific indicate that the most important policies to support innovation are (see Figure 8): 1) Tax rebates for innovation activities / Direct subsidies; 2) Loan and grants for innovation activities; 3) Technical support and advice for innovation; 4) Public

investment in ICT; 5) Funding of R&D activities; 6) Public –funded training for workers. Results show that firms in the Pacific prefer to receive direct support while public investment and training are only second-order of importance.

Figure 8: Importance of the various government programs to support innovation





Source: Author’s elaboration based on PACENET-Plus Firm innovation Survey data collected in New Caledonia, Samoa, Cook Islands, Fiji (2014-2015). Sample: 148 enterprises. For details on the survey and on sample characteristics, see Appendix A.

6.2 Obstacles facing Governments in supporting innovation

Governments’ attempts to support innovation faces several difficulties. To begin, the rules regulating international trade if anything do not favor or encourage domestic innovation in Pacific countries. The prohibition to use any protectionist measure has eliminated the possibility to adopt any industrialization strategy based on temporary import protection. Moreover, Government intervention is constrained by the macroeconomic environment of isolate economies, far from large markets, and highly dependent on raw materials. Moreover, the presence of a large mining sector in these countries often creates obstacle to innovation. The mining sector attracts most of the technicians of the country and provides strong incentives for

entrepreneurs to enter the service market for the mining companies. This implies that it is very difficult to provide enough incentives to induce entrepreneurs to invest in activities not related to the supply of mining companies. At the same time, it cannot be denied that one of the reasons why governments are not supporting innovation is that there is low demand for such intervention. The private sector does not seem to be very interested in innovation. In addition, a common element across Pacific countries is that salaries and benefits are higher in the public sector than in private one: this reduces the incentives to be entrepreneurs. Finally, not everybody is very open to innovation. This is particularly true for farmers: there have been several attempts to introduce innovations in agricultural production aborted because farmers were not adopting them or even openly opposing them.

Government as an obstacle. In other cases, the Government itself is an obstacle for innovation. There are serious political economy considerations related to innovation. The political and the economic cycle can be very different. Innovation is long-term in nature while the political cycle is much shorter. This makes innovation hardly to be a priority for any government.

At the same time, examples of Government inefficiencies are also numerous. In general, governments have difficulties to efficiently allocate funds because there is a lack of capabilities and experience in the bureaucratic apparatus concerning the management of activities related to innovation. This shortage of capabilities sometimes contributes to increase uncertainty concerning the program development and duration. Often, once the person in charge leaves, the whole project may disappear. The lack of government capabilities in supporting innovation is also reflected in the inability to use public procurement to stimulate the local economy.

In other cases, the problem are instead the government agencies. For instance, in the Cook Islands the BITB (Business Trade & Investment Board) is severely criticized for its lack of understanding of the problems of the private sector and ineffectiveness in supporting new businesses and innovation. In this case, the main problem is that BITB has a protectionist attitude and its focus is on organizing small trade fairs for local products.

Moreover, there are serious issues related to the availability of resources to be devoted to support innovation. The lack of resources implies that governments are forced to look at the short-run and do not consider the long-run. The influx of donor funds – that is considerable in several of the Pacific countries - often does not solve this problem. In fact, the general impression is that only in few cases the government takes the lead and autonomously decide how to use donor money. More often, governments do what the donor requests.

Sometimes, the problem is that the government projects and initiatives are not well-tuned to the local conditions. For instance, most of the activity of the National Agricultural research Institute (NARI) in Papua New Guinea is directed to support subsistence-level farmers in small villages. In general, the education level of these farmers is low, but the government program seems not to take into proper account this situation. It is important that the innovation programs are designed as to reach out also the most emarginated and to allow for the diffusion of new techniques that may bring also innovation in agricultural production.

Weak dialogue between business community and the Government. In most of the Pacific countries, there is a lack of dialogue between the private sector and the government. While this is true for any domain of government intervention, it is particularly severe in the case of innovation. In some cases, the different ministries engage the private sector informally. Yet, there are no official nor recurring events in which issues related to innovation are discussed. It is also true that, since Chambers are not always representative of the private sector, it is difficult for the Government to identify a reliable counterpart. The distance between the Government and the private sector is somehow larger when involves parts of population with lower human capital. In Samoa, there is a sort of disconnection between the Government and the growers. Due to this lack of reciprocal understanding, programs that aims at developing innovations in agriculture do not produce the expected results. This distance often creates a situation of mismatch of objectives. For instance, in the Cook Islands this is very clear on the issue of ITC development. While this is considered a crucial pre-requisite for development and innovation by the private sector, the Government sees any investment in the improvement of the internet connection (and in general digitalization) only as a costly activity without any development impact.

Somehow, this lack of dialogue is also reflected in governments' strategies concerning research funding. The problem is that governments seem not to take into proper consideration the fact that research and innovation are two very different things. In New Caledonia, there is a Ministry delegated for research and post-studies, but not for technology and innovation. The situation there is further complicated by an overlapping of competencies between New Caledonia and France, which creates some confusion and generates lack of coordination.⁵In general, applied research is not funded and basic research programs (that are the only ones to receive funds) are not related to local entrepreneurs need and demand. There are some attempts to fill this gap (a good example of this is the activity by ADECAL and CNRT in the mining and marine sectors).

⁵ For instance, France is formally still in change of some competencies including University, postgraduate studies and research.

On a more positive note, there is the example of SROS in Samoa, which seems to be well connected with the private sector, having continuous interchange of ideas and developing projects together.

6.3 What Government are expected to do

The results of the firm innovation survey indicated that firms attributes a very important role to the Government in supporting innovation. This clearly emerges when looking at the expectations of firms in terms of policies that the Government should implement. For the case of New Caledonia, these are reported in Table 2. The table shows a very long list of proposals (almost any respondent has indicated at least one policy). At the same time, it is interesting to note the high variability among the proposals, suggesting that while the Government is expected to play a role there are very different opinions on what it should do.

Table 2: List of policies that the Government should implement to support innovation according to New Caledonian firms

- | | |
|---|---|
| 1. Tax exemption on purchases the first year of business launch | 25. Do not suffer the French regulatory constraints and administrative heaviness |
| 2. Grants and relief expenses during test period | 26. Improvement of wireless flow capacity and reduce cost |
| 3. Establishment of financial aid for renewable energy development solar | 27. Innovation Law (financing R & D and investors). |
| 4. Training for companies and workers. | 28. Do not post in the public service positions that are relevant to the private sector. |
| 5. Direct aid to specific investments or research programs. | 29. Obligation to appeal to local innovative companies vs foreign companies |
| 6. Collaboration facilitated between Univ. NC and businesses on projects. | 30. More links between research organizations and innovative companies |
| 7. Abandon the logic of subsidies | 31. Supporting export |
| 8. Reduce the scope of government projects! Several projects do not advance. | 32. Aid for the intellectual protection. |
| 9. Developing quality controls to promote companies working well | 33. Aid for the hiring of young PhD. |
| 10. Exemption from taxes | 34. Establish effective customs clearance procedures for innovative products. |
| 11. Offering a dedicated service to companies "support for innovation " | 35. Tax incentives to innovating works |
| 12. Encouraging, through tax breaks for business innovation | 36. Reduce constraints for export (delete of export license, reduce cost of harbor taxes) |
| 13. Offering more visibility on possible external partnerships | 37. Direct financial assistance to companies developing innovations for export |
| 14. Financial support for equipment purchase (software) and training | 38. Abolition of proportional right to the patent importation for investment! |
| 15. Clarifying taxes and customs duties | 39. Stop funding many "development agencies" to assist in direct investment. |
| 16. Subsidize partial or total payment of personnel costs dedicated to innovation | 40. Through fiscal aid to reduce the impact of development of innovation cost |
| 17. Action to create a real culture of innovation. | 41. Through a communication campaign. |
| 18. Promote the use of local expertise in public procurement. | 42. Having competent staff and consult professionals before any decisions |
| 19. Stop the monopoly ! | 43. Aid for transport and storage of wood on all the three provinces. |
| 20. Allowing fairly access to tenders | 44. Training assistance and respect for well-done work. |
| 21. Taking into account that innovation in NC is mainly adaptive innovation. | 45. Monitoring of innovative firms and support the timber industry by taking stakes. |
| 22. Logistic, marketing and financial aid | 46. Establish a development policy in the long term. |
| 23. Stop doing "copy and paste" with the French laws not adapted to NC. | 47. Communication on existing innovative techniques in our field of activities. |
| 24. Support (legislative) to protect local innovation | 48. Public commission on innovative topics |

Source: Author's elaboration based on PACENET-Plus Firm innovation Survey data collected in New Caledonia (2014-2015). Sample: 68 enterprises. For details on the survey and on sample characteristics, see Appendix A.

The importance of Government also emerges from the stakeholders' interviews. Innovation requires that entrepreneurs try new things. The first condition for this to happen is that the general economic environment is business friendly. One important elements to create this context is that the Government becomes efficient and timely in delivering services. This would make the economic environment more conducive to innovation, creating the conditions for experimentation and taking risk.

Innovation is an expensive activity that brings fruits only in the mid-long term. Exploration work can be very time consuming and uncertain. This is why a common request is to reduce the cost of innovation. This is why entrepreneurs expect governments to cover at least part of these expenses, reducing innovation costs through the provision of soft loans, grants, tax deductions schemes or other measures. The reduction of the high cost of financing innovation is expected to allow for a much larger number of ideas to be explored.

In almost every country, there is an increasing demand to have formal (or informal) meetings with the Government to have exchange of ideas, especially in the innovation domain. In particular, there is unanimous agreement that Governments should focus more on the development of the PPP – Private Public Partnership. At the same time, there is the request of adopting a coordinated strategy to identify the priority sectors. This should be done starting from the review of the available evidence to discuss with the private sector how to prioritize the interventions and to learn which sectors are very unlikely to have innovation potential not to waste resources.

Interesting, it is also emerging a strong consensus around the idea that traditional industrial policy instruments (subsidies, tax breaks, etc.) are not useful. One of the reasons is that most of these policies cannot be used for a long period. On the contrary, useful policies are those that could have long-lasting effects. For instance, policies directed to increase skills and expertise of entrepreneurs. Therefore, governments are asked to provide trainings on management, marketing and production techniques to entrepreneurs; but also assistance to prepare grant proposals for innovation projects, etc.

Governments are also expected to deal with the issues of human capital and brain drain. Innovation requires high skilled workers. Unfortunately, in most of the Pacific countries, education level is low and brain drain is massive. Moreover, bringing in expatriates is very complicated and costly. This lack of educated people is a serious problem for entrepreneurship development in general and in particular for innovation dynamics. There are different possible interventions. For instance, Government sponsorship of tour studies abroad could be very effective: to see in person how firms on the frontier work can be very inspiring to young students and technicians. Moreover, simplifying immigration requirements could increase the inflow of foreign technicians, and contribute to knowledge diffusion in the region. Finally, to mitigate the existing cultural resistance to innovation, governments should find ways of showing the benefits of innovation to induce people to try new things. While the improving level of education will probably contribute to change the attitude, specific programs and interventions are also needed.

Another action governments are expected to implement is to create the conditions to make local and foreign companies to cooperate. Obviously, governments should not go too much into the details of collaborations: it may suggest investing in marine sector, not in which type of fish. In addition, governments could contribute by providing market information and specific support, but interventions should be focused and only short term. This type of interventions would also help in closing the existing gap between local and foreign companies, favoring a more equal and fruitful partnership.

As for the specific policies and measures to be implemented, there is a very large consensus on the potential benefit of creating an incubator set-up. This is expected to facilitate the exchange ideas and to create an environment conducive to the creation of new things, where innovation can more easily happen. The creation of something like a techno-pole is considered important because it would provide a physical place where to meet and develop cooperation and projects. Physical closeness also helps business because entrepreneurs meet with each other and learn what others are doing. Moreover, this setting allows the possibility to share some resources (e.g. meeting areas, cars, etc.). This also facilitates meetings between scientists and companies, which turn out to be extremely useful since allow the exchange information (about the market, the public administration, etc.), create continuous motivation, and allow to stay in touch with the knowledge frontier of current research. This measure has proved to be very effective in the past in New Caledonia and promises to be the same in the future.

There are also macro-policies that governments could implement to favour innovation in the region. Since to make innovation profitable it is required to have a large scale of production (and thus the possibility to do large investments), ensuring access to land and an efficient regulation of land ownership are crucial conditions to be met. In fact, in most countries, there are serious issues related to the management of customary land since there are no (clear) titles and this hinders large investments in agriculture.

Governments could also favour innovation by using public procurement. High quality Government demand can be very effective in stimulating innovation, as it is shown by the case of the anti-snake venom project in PNG. The other area where the Government can make a difference is improving the management of donor money. Often governments use donor money to contract foreign companies because the donor - who set criteria and design the project - has a preference for companies from its own country. On the contrary, donor money could be used also to stimulate local innovation.

Moreover, governments could contribute trying to solve the numerous coordination problems (coordinating demand of the different small manufacturers in the country) that affect Pacific countries: this would reduce production costs and allow producers to invest in innovation and exploration of new ideas. It is also needed a better coordination among research institutes, and between research institutes and the private sector. This is where Government intervention would be more useful: to facilitate the exchange and circulation of ideas and the creation of new projects.

At the same time, government intervention should try - as much as possible - to avoid creating problematic situations. One such situation is the one that follows from the differential access to Government support among (domestic) companies. This asymmetry can have serious unintended negative effects in terms of competition in the domestic market. The second one is more general and concerns the issue of international competition. Government intervention may affect international competition when domestic and foreign firms receive different amount of government support: as it often the case in the Pacific countries, this implies that domestic firms have to compete with firms (often from advanced countries) that have access to stronger instruments to develop innovation. At the same time, firms may end up competing with public entities. For instance, there are cases in which public research laboratories in France have become competitors of New Caledonian companies: competition turned out to be somehow unfair since laboratories – being public entities - do not have to generate profits and can make lower prices. This situation could end up with a reduction of innovation effort and success in the Pacific countries.

7. The role of the European Union: current situation and future opportunities

The European Union's interest in the development of innovation in the Pacific region is due to the acknowledgement that there are several unexplored opportunities. Yet, it is also clear that to make it happen some form of more articulated cooperation is needed.

While in some countries the existence of an European delegation is very old, the EU presence in the Pacific is in general not very strong. Moreover, until now the EU the strategy has privileged the cooperation in domains related with the environment conservation rather than economic activity *per se*. In fact, whenever this is feasible – the EU strategy is to leave governments to develop their own priorities. For instance, in Samoa EU intervention is focusing on supporting civil society and water management. All EU-funded projects are to support the development of different sources of renewable energy. The 85% of the EU funds goes directly to the government for the development and maintenance of the water and sanitation sector. In fact, EU

stopped to do its own projects in 2010 and moved to only provide budget support. One of the reasons for this choice is that the Government is considered reasonably capable. In fact, EU does not have projects related to economic development. In countries with lower income (such as PNG) EU's programs focus especially on agricultural development, rural development, education, and health. An important EU project was that supporting the development of the tuna industry, with the provision of programs to favour the creation of industrial employment around the industry. Enterprises in the tuna sector are all foreign owned but the EU agreement (zero import duties for tuna from PNG entering EU) allowed the creation of local employment. As to support innovation and economic diversification, the EU has recently launched a study to identify potential cluster for development. The EU - PISPO project identified ICT as a possible cluster for Papua New Guinea.

It is interesting to note that this is a very different strategy from that adopted by China. For instance, China is very present in Samoa. The China embassy has a very large staff and there is a unit explicitly dealing with economic development. As a comparison, consider that the EU delegation is one person. Moreover, while China has adopted a strategy based on increasing its political visibility and its role as provider of business support, EU has no projects nor provide direct support to stimulate innovation for local entrepreneurs. Moreover, China accepted to build the hospital and the new Government's houses for the Samoan Government while EU declined the request. Chinese companies are also building the airport and the wharf. Both projects are financed by the Chinese Government and will further increase the economic bounds between China and Samoa.

In most of Pacific countries, the business community does not consider the EU as a potential market for export. This primarily depends on the geographical position but political and historical reasons also are important. Moreover, entrepreneurs are not considering as likely to have a cooperation with a European company nor with EU institutions (of which - by the way - they know very little). In fact, the closeness of Australia and New Zealand makes them the natural and - in most of the case - the only commercial partners for Pacific countries. This is hardly surprising considering that these are large and very rich markets and that the Pacific countries are (with the exception of PNG) small in economic and population terms. Also the US market is closer than the EU one, especially for Samoa. Again, it is not only a matter of geographical distance but of the fact that between these countries there are more links (also related to the diaspora) that create important commercial and production channels. Moreover, the fact that EU is losing importance to China in terms of assistance and development support contributes to weaken the presence of EU in the economic landscape of Pacific countries

The only (obvious) exception to this pattern is New Caledonia, which has a very peculiar relationship with France. Yet, somehow paradoxically, this special status does not reduce the distance between New Caledonia and other European countries, since all foreign partners of domestic firms are in fact French. Yet, the peculiar status of New Caledonia gives it some advantages in terms of the possibility to access to EU innovation support instruments. For instance, the EU Parliament has recently approved the possibility for individual and research institutions located in the French Overseas Territories French Overseas territories to submit projects from Horizon 2020, Life and other European projects. At the same time, Erasmus has been also extended to students in New Caledonia and now the FED (Fond Europe of Development) has a special fund for OCTs, for regional cooperation regional.

Another important difference is that related to role of the universities as creator of international links. While Australian, New Zealand, and North American universities have been developing research projects with different Universities in the Pacific countries since long time, this is not the case for European universities. Even if there are important exceptions (as for those that are member of the PACE-NET Consortium), it is without doubt that this is the outcome of a number of limiting factors that make the European universities less oriented to this type of cooperation. This can be a serious problem since the type of innovation that could originate in most of the Pacific countries has a strong basic research component. Being involved in academic research cooperation projects is thus an important asset for entering these new developments. The current situation is one in which European universities are still in the learning phase as for the creation of such research agreements and they lack the expertise to feed them. On the contrary, Australian, New Zealand, and North American universities have been developing these abilities for decades. This implies that EU has an important gap to fill. This does not mean that the race cannot be won but only that there are serious obstacle on the way.

8. Concluding remarks

This Report has provided novel evidence to understand the factors, mechanisms and obstacles that underlie the innovation process in the Pacific region. While the Pacific is one of the most heterogeneous regions of the world in terms of size, geography, specialization, and economic activity, some of the difficulties in relation to innovation are common to almost all countries. To begin with, our research has documented that (excluding Australia and New Zealand) no country in the region has a national innovation policy and that it does not exist a regional innovation strategy. Moreover, there is a lack of dialogue between the private and the public sector on innovation and examples of collaboration between public research centers and private sector are very few. Yet, the region offers several opportunities for innovation in different

domains (from agriculture to raw materials) and governments are increasingly trying to provide more support to the private sector. Our research has also highlighted that as for now the role of EU in supporting innovation domain in the Pacific region is only marginal. In part, this situation is the result of the cooperation strategy adopted by the EU in the last decade, which focused mostly on providing support to government projects directed to improve environmental sustainability. Yet, as shown in this Report, there are reasons and opportunities to modify this approach. The EU, which maintains a long-standing relationship with the Pacific, should aim for enhancing its profile and reinforcing cooperation in ST&I with the region, in the perspective of the forthcoming Horizon 2020 programme and promote the development of mutually beneficial partnerships.

As for the sectors more likely to generate innovations – and where EU involvement could be more effective, our research has identified agriculture and agro-business. All the countries analyzed in this Report are trying to develop semi-processing activities of local products and improve their market positioning. The idea is to add value to raw material through agro-processing and combine that with the use of the Pacific brand to differentiate the product in world markets. Our research suggests a potential important role for the EU ST&I cooperation to generate new products and processes, and to introduce novel forms of production organization. In fact, strengthening EU-Pacific science and technology cooperation through the joint identification, promotion and monitoring of areas of environmentally sustainable innovative activity is expected to have a high economic impact.

Our analysis has also made clear that more data and research is needed to better identify the country-specific characteristics of the different national innovation systems, to map the innovation capabilities, the opportunities, and ‘niches’ for innovation in the Pacific region, and to define which could be the role of EU in supporting innovation in the region.

We believe that the results presented in this Report provide useful evidence to design policy recommendations that will stimulate academic, private and public sector, non-governmental organizations and other relevant stakeholders from both the EU and the Pacific to engage and cooperate in innovation projects. Identifying which are the best government policies and support measures for promoting innovation in selected activities is the next step of the PACE-NET Plus project.

9. Appendix

9.1 Firm Innovation Survey

As discussed in the Introduction, the firm innovation survey was proposed by UNIDO as an activity with the objective to generate primary data information on innovation in the Pacific. The main objective of the survey was to identify some general stylized facts concerning the innovation activities, the difficulties related to the production process and the experiences of collaboration with European firms and institutions. To the best of our knowledge, this is the first attempt to conduct such a survey in the region. In relation to the other tasks included in the PACE-Net Project, the survey was also meant to offer also a benchmark for the evaluation of the effect of the whole project on the firms in the region (a follow-up survey at the end of the project would then allow to compare the before-and after situation).

UNIDO has designed, organized and supported in each country the implementation of the firm innovation survey. The survey has been designed to be directed to all firms in the region, especially the ones active in products sectors related to WP1, WP2 AND WP3. It was directed to all firms both domestic and foreign ones. The survey has been designed to be a good balance between being comprehensive - as for the collection of general firm-level data - and being accurate - as for innovation data.

While the design of the firm questionnaire survey has been conducted principally by UNIDO, other aspects of the activities related to the survey have instead seen a direct involvement of the different Consortium partners in the countries where the survey was planned to be implemented. In fact, there are several aspects concerning this activity that have been discussed with the members of the project. Among these: How to identify firms? How to make contact with them? How to organize the questionnaire dissemination? How to ensure that questionnaire will be returned?

The questionnaire

As a first step, UNIDO has designed an ad-hoc questionnaire. The questionnaire has then circulated among Consortium partner to receive comments and suggestions. The final version of the questionnaire is reported in Appendix B.

The questionnaire has been designed with the objective to provide a comprehensive perspective on the activity of firms in relation to innovation. The questionnaire has nine main parts:

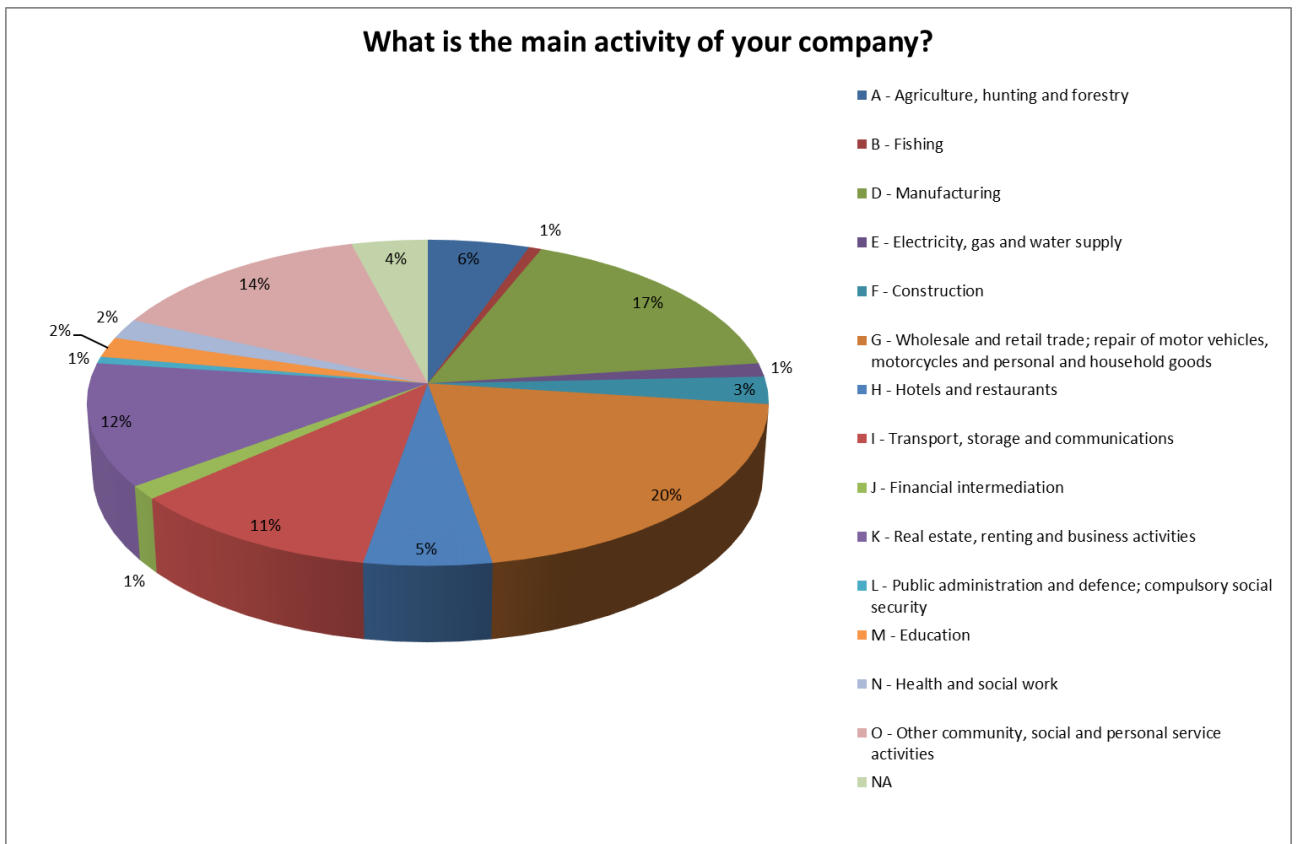
- GENERAL INFORMATION ABOUT THE RESPONDENT
- GENERAL INFORMATION ABOUT THE FIRM/COMPANY
- OWNER, MANAGER AND EMPLOYEES
- INNOVATION
- MOTIVATIONS FOR INNOVATION
- INNOVATION ACTIVITIES
- RESULTS OF INNOVATION ACTIVITIES
- OBSTACLES TO INNOVATION
- GOVERNMENT POLICY

Among other things, in the questionnaire respondents were asked to identify the main obstacles to innovation and business and offer their assessment of what the role of government could be for the economy.

The sample of firms

One key step in the implementation any survey is the creation of a database of potential respondents. The identification of firms has proved to be a very difficult task. The task of identifying the firms has been left to the local partners. The objective was to collect the list of a large as possible list of firms (self-employed entrepreneurs, small-medium and large firms) operating in each country. The list had to include the name, the location and a contact number (of the owner or of the manager). The basic strategy was to collect a large list of potential respondents, i.e. firms that would agree to respond to the questionnaire, and based on the number of actual positive responses to then decide which firms to visit. In this regard, it may be useful to clarify a crucial methodological point. The objective of any survey is not to get information on the population of firms. That would be a census and it would be far beyond the possibilities of the project. In general, a survey tries to get information from a representative sample of the population to then infer information on the whole population. But to have a representative sample you first need to know the characteristics of the population (something that in our case is not possible). In our case, the best that can be done is to collect information on the largest possible number of firms. This implies that our results are not statistically representative but still informative of the situation.

Figure A1: Sample distribution by sector of activity.



Source: Author's elaboration based on PACENET-Plus Firm innovation Survey data collected in New Caledonia, Samoa, Cook Islands, Fiji (2014-2015). Sample: 148 enterprises. For details on the survey and on sample characteristics, see Appendix A.

The training of students and dissemination of the questionnaire

The original plan was to train enumerators to disseminate the survey. Unfortunately, in some of the countries the number of students that have accepted to take part in the project has been too low to allow for an individual-based distribution. The only country where the number of students (around 30) was sufficient to conduct the survey as planned is Fiji. In other countries, a local partner has disseminated the questionnaire. In the Cook Islands, the partner was the Cook Islands National Council of Women (CINCW). To make easier the collection of data, we have also developed a web version of the questionnaire for the different countries. The questionnaires for each country can be found at the following links:

- Fiji survey - http://web.spi.pt/pacenet/surveys/sv_final/
- New Caledonia survey - http://web.spi.pt/pacenet/surveys/sv_final_fr/

- Papua New Guinea survey - http://web.spi.pt/pacenet/surveys/sv_final_png/
- Cook Islands http://web.spi.pt/pacenet/surveys/sv_final_cook
- Samoa http://web.spi.pt/pacenet/surveys/sv_final_samoa

9.2 Stakeholders Interviews

To collect primary data, UNIDO has also conducted a set of stakeholders interviews. The objective of this activity was to generate valuable and novel information concerning different aspects of the innovation process that cannot be captured by secondary data or by the firm innovation survey. The interview covered topics such as general stylized facts concerning innovation activities, which are the main difficulties related to innovation, which is and should be the role of the Government and the experiences of collaboration with European firms and institutions in the innovation domain.

Methodology

UNIDO has conducted the interviews in Papua New Guinea, New Caledonia, Fiji, Cook Islands and Samoa. The interviews were of the open ended type. There was a basic set of questions that have been asked in order to have a (minimum) comparable set of questions and answers. The list of the basic set of questions has been enriched as needed depending on the characteristics of the specific respondent. The duration of the interview varied between 20 minutes and one hour.

UNIDO has asked Consortium members to organize meetings and interviews with:

- individual entrepreneurs
- representatives of business associations
- academics
- scientists
- representatives of research centers
- high-level government officials in charge of innovation policies and of projects to support in innovation activities

Interviews have been organized by USP for Fiji CNRT for New Caledonia, UPNG for Papua New Guinea, CINCW in Cook Islands, and NUS in Samoa.

List of respondents by country

1) New Caledonia

The interviews have been arranged by CNRT. All interviews took place in the week 19-25 August 2014. Most of the interviews have been in person and took place in Noumea. Two interviews were on the telephone because the person was not in Noumea.

The list of interviews is the following:

1. Laurent Lebrun, Province Nord
2. Michael Ramassamy, CEO Numeric NC
3. Cedric Karvadec, CEO Synergie
4. Delphine Mallet, CEO Vision
5. Cecile Savin, CEO Geophysical
6. Christophe Lapous, CEO Alisezo
7. Dorina Sanchez-Lebris, ADECAL
8. Didier Lile, CEO Bluecham
9. Jean-Michel Fernandez, Ael Environment
10. Edouard Hnawa, University of New Caledonia
11. André Carpentier, IFREMER
12. Oliviere Monge, Government New Caledonia - Fonds Nickel
13. Christin Habault, Le Nickel-SLN
14. Frederic Guillard - Government New Caledonia
15. Bruno Fogliani, IAC
16. Maurice Ponga, Institution: European Parliament
17. Didier Ventura, KNS
18. Jean-Briec Herrenschmidt, Gie Oceanide

19. Catherine Wehbe, MEDEF
20. Letitia Francois, CESE
21. Claire Bastian and Clotilde Boutrolle, AFC
22. Philippe Donuyer, PROMOSUD
23. Herve Chauvin, Isotechnic/Free Energie
24. Sylvain Capo, Glencore
25. Laurent Chatenay, SOFINOR

2) Papua New Guinea

All interviews were arranged by UPNG, took place in November 2014 in Port Moresby and were conducted in person

The list of the interviews is the following:

1. Alan Quartermain, Professor of Agriculture, University of Goroka, PNG
2. Sergie Bang, Research Director General National Agriculture Research Institute (NARI)
3. Dr. Topul Rali, Lecturer in Chemistry, University of PNG
4. Osea Gideon, Head of Department of Physical Science at UPNG
5. Chey Scovell, CEO Manufactures Council of PNG
6. Paul Barker, CEO Institute of National Affairs
7. David Peate, CEO Paradise Food
8. Chiara Tardivo, Economics and Trade Coordinator EU Delegation to Papua New Guinea
9. David Conn, Port Moresby Chamber of Commerce and Industry
10. Marco Venditti, Editor of the Papua New Guinea Report 2014, Oxford Business Group

3) Cook Islands

All the interviews have been arranged by CINCW (Cook Islands National Council of Women, CINCW). All interviews took place between July 13 - 18, 2015 in Raro, and were conducted in person.

The list of the interviews is the following:

1. Petero Okotai, Prime Minister Office, Director Central Policy and Planning
2. Teareki Taoiaun Rongo, Ministry of Marine Resources, Project manager for EU – funded project “Global Climate Change Alliance for Pacific Small Islands states”
3. Taputu Mariri, Cook Islands National Council of Women (CINCW), administrator /coordinator
4. Ano Tisam, self-employed (no formal activity), web-designer/software developer
5. Frances Taoro (shop owner + no formal activity), self/employed
6. Poroa Arokapiti, Mangaia Fishing Association, secretary
7. Mike Pynenburg, Chamber of Commerce (president) and Computerman (owner)
8. Steve Anderson, Andersons, owner and director
9. Robert Skews, Turama (Pacific Travel Group), Managing Director
10. Ewan Smith, Cook Islands Touristic Association (chairman) and AIR RARO (CEO)
11. June Baudinet, self-employed (shop owner)
12. William Wigmore, Ministry of Agriculture, Director Research and Extension Division
13. Maureen Hilyard, self-employed
14. Bob Kimiangatau, Roaiangan Mens Support Centre, president
15. Teava Iro, Noni Juice, Director and Growers Association (president)
16. Daphne Ringi, Public Service Commission (Prime Minister Office), officer
17. Nga Teinangaro, Punanga Tnutu (NGO), director
18. Ian Ibbetson, PTS Plumbing. owner
19. Gerrard Kaczmarek, Restaurant Association (president) and Salsa Restaurant (owner)
20. Robert Wyllie, Rito CI, owner
21. Rob Riley, Solar Bob, owner
22. Erina Korohina, Ministry of Finance, DCD, Development program manager,
23. Gail Townsend, Ministry of Education, director
24. Bob Taylor, Edgewater Resort, general manager
25. Piltz Napa, BTIB, Trading and marketing manager
26. Nick Reeves, Te Vakaroa Villas, director
27. Danny Mataroa, Te Mou Enuu Growers Association, president

28. Tatiana Cips, Cook Islands Printers (and several other businesses), owner
29. Kelvin Passfield, Te Ipukare Society, director

4) Samoa

All the interviews have been arranged by NUS (National University of Samoa). All interviews took place between July 20 - 23, 2015 in Apia, and were conducted in person.

The list of the interviews is the following:

1. Edwin Tamase, Soil Health Pacific, owner and CEO
2. Fonoti Perelini, Electrical Power Company (EPC), Project manager for the project management unit
3. Oliva Vaai, Yazaki Samoa, general manager
4. Lisa Vaai, Eveni (garments), operation manager
5. June and Chris Langton, Air Samoa, owener
6. Kitiona and Sylvie Salanoa, Mailelani, owner
7. Teleiai Sapa Saifaleupolu and Fiu Mataese Elisara, Siosiomaga Society (NGO), directors
8. Benjamin Pereira, Central Bank of Samoa, Assistant Governor Monetary Stability Group
9. Tuatagaloa Joe Annandale, Siumu village (matai) and Sinalei Reef Resort & Spa, owner
10. Suluimanlo Amataga Penaia, Ministry of Natural Resources, Chief Executive Officer (Director)
11. Walter Vermeulen, Matuaileoo Environment Trust Inc (METI), director
12. Papalii Grant Percival, Natural Foods Samoa, owner
13. Adimaimalaga Tafunai, Women in Business, executive director
14. Jackie Tamasese, Mena (garments), owner
15. Peseta Margaret Malua, SBEC (Small Business Enterprise Center), chief executive officer

16. Ane Moananu, Chamber of Commerce, CEO
17. Vanya Taulealo, Art Café, owner
18. Tilafono Hunter, SROS, director
19. Jaime de Aguinaga, UNDP, vice-representative
20. Henrietta McNeill, SAME (Samoan Association of Manufacturers and Exporters), consultant
21. John Stanley, European Union, EU representative for Samoa

9.3 Case studies

Objective

The four cases studies have been prepared by SPI (Sara Medina, Nishant Shandilya and Pascal Sam-Soon). The main objective of this research is to showcase innovation potential exhibited by the researched organizations during the course of the PACENET Plus project. These case studies present the diversity of the Pacific Regions in terms of organizational diversity, innovation as well as the impact created by each of the studied organizations.

The purpose of the case studies are to identify the specific scientific and technological domains and competencies developed by the Pacific region, distinguishing the generic and specific knowledge and skill requirements of each case, the role of different actors and of public policy in advancing innovation as well as the contribution made by EU technology transfer.

The case studies accounts for the local context – and are developed using a combination of primary data collected through interviews and secondary information gathered through extensive literature review.

Selected Organizations

To identify organizations to be studied, some selection criteria were formulated including for instance: Has the company filed any patent; Is the company launching new product/service within the next 6-12 months; Does the company have its own R&D team; Has the company experienced continuous growth over the past 3 years; Has the company's innovation been successful; etc. To reflect the diversity and innovation capacity, the following organizations have been carefully chosen to mirror their unique attributes:

- 1) Bluecham SAS (New Caledonia), a software company;

- 2) Nature's Way Cooperative (Fiji Islands), a food storage cooperative;
- 3) Serei No Nengone (New Caledonia), a distillery;
- 4) Vale (New Caledonia), a mining multinational from Brazil with a big operation base in New Caledonia.

Bluecham

Bluecham (<http://www.bluecham.net>) is a software company from New Caledonia whose products are satellite imaging for its clients from a broad range of industries. It is an award winning company which recently received "AWARD 2015 for Technical Excellence" delivered by the Spatial Industries Business Association (SIBA) among many others. The rewarded product has been Qëhnelö™ which provides geospatial cloud computing system. Through satellite imaging at lower cost, satellite data is now available to a broader audience, which otherwise, would have cost a fortune to acquire. Bluecham's software products enable its clients to create value for their respective businesses, whether it is a private mining company or a public sector institution. Bluecham's innovation lies in its image rendering capability which is 20x faster than other available software solutions, with precision of less than 50 cm. These 2 factors represent a cut throat difference in data analysis processing speed.

Nature's Way Cooperative

Nature's Way Cooperative is a thriving Fiji-based agribusiness, which provides packaging, marketing and technical services to farmers. The company started its operations by handling only 30 tonnes of papaya annually and have grown now to treat and pack about 1,200 tonnes of papaya, mango, breadfruit and eggplant per year. NWC has had a positive impact in its local community, helping farmers to increase their sales and expand their sources of income, even in times of steep decline in the sugar industry. Similarly, NWC's activities in the expanding fruit and vegetable industry are helping new exporters to develop their businesses. Established exporters have also been helped, and new plantations planned. It has invested heavily in its quarantine treatment capacity for fresh produce over a five year period. The support from the Fiji government has been essential for driving this investment, in addition to financial assistance from private organisations. It has successfully implemented and maintained treatments based on high temperature forced air (HTFA) techniques. This provides a significant advantage compared to traditional methods and has been successful where others in the region have not. At its core, Nature's Way Cooperative specialises in quarantine treatment.

Serei No Nengone

Serei No Nengone (SNN) is a distillery company based in Maré, New Caledonia. The company started out as a collaboration between Mr. Jean Waikedre and Robertet Group to capitalize on the opportunity in the market to develop essence for resale in the international market. The perfume industry being a large global market has contributed to the fast-growth of SNN and has also facilitated its ease to market access through the collaboration with Robertet group. SNN spearheads local community development by being an inspiration through its innovative process to produce essence at a faster rate while maintaining high quality of the end product. In addition, it contributes to the protection of the environment on two fold – reforestation to ensure sustainability and by being an energy/water saving company.

Vale

Vale (<http://www.vale.nc/>) is a multinational company originating from Brazil with locations all over the world. It has a strong presence in New Caledonia, whereby one of the largest nickel deposit can be found. Although it has multiple businesses, Vale remains a major global mining company and New Caledonia is one of its important markets. Through its presence in New Caledonia, Vale had the opportunity to conduct business as well as improve its societal & environmental footprints. The company provides jobs to about 3000 people in the country, contributing indirectly to the economic development. From an environmental point of view, Vale needs to respect and ensure sustainable mining. Furthermore, the company maintains nurseries to ensure reforestation, and aligns school trips to such endeavors in order to educate the younger generation in New Caledonia. Globally, it appears that Vale is trying to ensure that it is contributing positively on both environmental and societal aspects. Given the size of the company, the innovation chosen has been around the transportation of ores from one place to another by the Valemax ship. Valemax ship offers higher cargo capacity and considerably better port maneuvering capability, thus providing a competitive edge over its competitors.



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