STDF Standards and Trade Development Facility

"Strengthening the national food control system in Kiribati, with particular attention to the fish processing sector" (STDF/PPG/657)

PART I - FEASIBILITY STUDY

"Food safety and laboratory capacity, challenges and capacity building needs in Kiribati"

March 2019*
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*Note: This final version with revised figures and text is consistent with the Part II - Investment Proposal

ABBREVIATIONS

ABBR.	FULL WORDING
AAS	Atomic Absorption Photometer
ACP	Africa Caribe Pacific group of Nations
ADB	Asian Development Bank
AusAid	Australia Aid
CAC	CODEX Alimentarius Committee (FAO)
CPD	Consumer Protection Division (of MCIC)
ECD	Environmental Conservation Division (of MELAD)
EIF	Enhanced Integrated Framework (World Bank)
EPA	Economic Partnership Agreement
EU	European Union
FAO	Food and Agriculture Organization (United Nations)
FSMS	Food Safety Management System
GC	Gas Chromatograph
GDP PPP	Gross Domestic Product (Purchasing Power Parity)
GNI	Gross National Income
HACCP	Hazard Analysis and Critical Control Points
HPLC	High-Performance Liquid Chromatography
IEEE	Institute of Electrical and Electrotechnical Engineers
IPPC	International Plant Protection Convention
KCAE	Kiribati Customs Administration and Enforcement
KCDL	Kiribati Coconut Development Ltd
KDP	Kiribati Development Plan (5 years)
KFL	Kiribati Fish Limited
KPA	Kiribati Port Authority
KSVA	Kiribati Seafood Verification Authority (MFMRD)
KV20	Kiribati Vision 2016-2036
MCIC	
MCPW	Ministry of Construction and Public Works
MELAD	Ministry of Land, Environment and Agriculture Development
MFMRD	Ministry of Fisheries and Marine Resource Development
MHMS	Ministry of Health and Medical Services
MOU	Memorandum of Understanding
MRL	Maximum Residues Levels
NCD	Non-Communicable Diseases
NCP	National Control Plan (of KSVA)
NGO	Non-Government Organization
NPPO	National Plant Protection Office

ABBR.	FULL WORDING
NTAC	National Trade Advisory Committee (Kiribati)
NZAid	New Zealand Aid
OIE	International World Organisation for Animal Health
OIML	International Office for Legal Metrology
PACER Plus	Partnership Agreement for Closer Economic Relation
PHAMA	Pacific Horticultural and Agricultural Market Access
PIFS	Pacific Islands Forum Secretariat
POP, PCB	Persistent Organic Pollutants, PolyChloroBiphenyls
PPG	Project Preparation Grant
PPP	Private-Public Partnership
PUB	Public Utility Board
RPPO	Regional Plant Protection Office
SI	System of International Units (meter, kilogram, second, Ampere...)
SOE	State-Owned Enterprises
SPC	South Pacific Commission
SPS	Sanitary and Phyto-Sanitary
STDF	Standards and Trade Development Facility
UL	Underwriters' Laboratories (a certification body)
UNIDO	United Nations Industrial Development Organization
US EPA	United States Environment Protection Agency
VCO	Virgin Coconut Oil
WWF	World Wildlife Fund

Note: *Clicking on Hyperlinks allow readers to access immediately the reference. Reverse links in annexes will bring readers back to the initial text.*

EXECUTIVE SUMMARY

The Kiribati Vision 2016-2036 (KV20) is the long-term development blueprint for Kiribati, motivated by a collective aspiration for a better society by the year 2036. The vision is for Kiribati to become 'a wealthy, healthy and peaceful nation, with the people in the center of it all'. KV20 seeks to achieve this aspiration by maximizing the benefits from development of the fisheries and tourism sectors among others. The realization of the vision is done through the Kiribati mid-term Development Plan and through the Ministries' Strategic Programmes and Annual Operations Plans.

The quality of services and safety of products are crucial for developing the tourism and fisheries sectors, and achieving the "Healthy Youth" component of the KV20 vision. There are also strong dependencies between the environment, animal and plant health, food safety, and human health. These sanitary and phytosanitary issues cut across sectors and Ministries and call for integrated strategies, for example as promoted by the WHO's 'One Health' approach. However, a multi-stakeholder approach is not yet in place in Kiribati, where the SPS system remains scattered across ministries. Each ministry (agriculture, fisheries, health) has taken steps to improve enforcement of regulations in the environment, health and agri-food areas. Although information-sharing takes place at the National CODEX sub-committee, due to a combined lack of resources and insufficient synergies, enforcement has remained limited and the SPS situation is still challenging.

With an increasing population pressure, the quality of waters in aquifers and lagoons is threatened and challenges to provide continuously safe drinking water are rising. Maintaining or developing fishing and aquaculture resources is closely linked to maintaining the water quality in the lagoon and the ocean. While the level of environmental and health monitoring has increased, the lack of resources and the quality of data are recurrent issues that limit the effect of official controls. Besides, food consumption patterns are changing in Kiribati: a surge of food imports originating from Asia, and the development of locally processed food, are generating increased interest from regulators. Here also, the lack of resource and the absence of testing capability have prevented so far the competent authorities for food to enforce regulations (especially the new FS regulation 2014).

Such situation is not uncommon in the Pacific Island States: the project team has gathered information from Solomon Island, the Cook Islands, and Vanuatu indicating there are immediate drivers such as insufficient water sanitation monitoring, poor official controls of food, limitation to produce and export added-value products, for improved access to analytical services., the lack of testing capability may affect with varying degrees a majority of countries in the Pacific region. Against this background of under-developed testing capacity that impede the enforcement of regulations (food safety, environmental monitoring...), Kiribati would need increased access to tests for the chemical and bacteriological characteristics of water, soil, and food both locally used and exported.

The proposal for a central integrated laboratory for environmental and food analyses had been raised and discussed in the wake of the preparation of the national quality policy (2016). The STDF mission has continued the consultations and allowed updating the mapping of SPS capacities and needs (chapter 2) and especially for the fisheries sector (chapter 3). The mission has also benefitted from information derived from similar assessment or feasibility studies undertaken under the projects STDF PG521 in Solomon

(with FAO), and "Sanitation sector reform" (EU) in the Cook Islands[1]. These projects allow taking into account some crucial lessons learnt and caveats about the development of a central test facility.

The feasibility study team convened a focal discussion group gathering representatives from all the laboratories and a wider-reaching consultative workshop[2] with various Departments, the private sector, and local NGOs. These meetings reflected three main areas of concerns among stakeholders, namely: i) the lack of capacity, funds, and strategies in ministries to 'fast-forward' the development of their individual laboratories, ii) the prevalence of certain SPS issues remaining unaddressed to date, which could escalate and hinder achieving the KV20 goals, and iii) the need from food processors, regardless of their size, to have local access to analytical work. Further, it was accepted that maintaining the current very limited and fragmented analytical services spread across three ministries is not effective. The low budget footprint of the current testing solutions comes as a trade-off with effective regulation enforcement.

An integrated laboratory would undertake food and water analyses to support the export market (tuna, copra and organic food). Integration of testing services into a single facility would also bring together existing environmental health programmes, and provide capacity for expansion of the monitoring of water quality and better control of sewage regulations. It seems important to highlight that each Ministry needs to obtain reliable data/tests results, even if the tests are not carried out within their Departments.

The STDF mission has delineated options for improving technical capacity and organization, which would support Kiribati's development. These options were summarized during the consultations and discussed in particular during a meeting of the National Trade Advisory Committee (NTAC). The success conditions and institutional arrangements have been fully developed (see chapter 6 and 7). The consultant considers that given the limited volume of samples and tests involved, having a central testing facility is justified on the grounds of the reliability of results, the synergies in the use of resources (staffs, power, reagents), and the impossibility to expand services based on outsourced tests, which incur intractable logistics issues. Overall, developing a central laboratory represents a significant investment. Based on the Consultant's own calculations, Kiribati would invest about 34% less in a central unit as compared to upgrading or building separate labs. Once in full use, the costs to run a central laboratory would be 45% lower than four separate laboratories ensuring the same range of services.

It was therefore agreed to continue the preparation of a central laboratory on the base of a new two-storey building with a footprint of 310 square meters (approx. 26 m.*12 m.), with estimated costs for buildings at A$700,000) and for systems, fixtures, and finishing at A$223,000. The laboratory should be equipped with furniture and basic and intermediate analytical equipment amounting to a total of A$ 1,109,100; an option for non-priority equipment would up the total to A$ 1,556,500. The facility and equipment would thus represent about A$ 1,827,600 (or A$ 2,275,000 with option). In the first years of the project, the operational costs would be much higher than income and would generate an operating loss, which should be financed. After year 6, the laboratory becomes profitable and generate a profit of about A$ 250,000/year, with a turnover of about A$ 800,000, capacity development and amortization costs included. The laboratory would employ between 7 and

[1] The reports and other documents used for the PPG657 are listed in Annex 16 and can be accessed here: https://tinyurl.com/y8toptjl

[2] The mission work plan and list of meetings and attendance is in Annex 10.

12 persons. To note, the figures presented in the first feasibility study and the consultative workshop have been revised upwards, following the inclusion of calibration and biosecurity services in the project.

In terms of the institutional setup discussed in chapter 8, the most flexible and efficient option would be to mandate the realization and subsequent operation of the testing facility to an autonomous entity, which would then enter into service agreements with the individual Ministries and agencies using the services. If no suitable existing statutory body were identified, the Government should create a new statutory body or a joint-venture company (PPP[3] model) with a focused mandate, which could lead the project and manage the laboratory independently of any other public activity.

The proposed solution of managing through an autonomous entity, rather than a ministry department, is seen as the best way to guarantee an effective management, for which the following features are required: total independence from external pressures, operational autonomy, the ability to plan and adapt operations in response to changes, independent and agile purchasing, and cost tracking. It is strongly suggested that these features are embedded into the setup, since most of them will be instrumental to demonstrate compliance to the ISO/IEC17025 standard. However, because tests results will be used mostly for regulatory purposes, the central laboratory should remain under the overall Government supervision through adequate channels e.g. a Board of Directors or Steering Committee.

The realization of the central laboratory, from the initial decision to reaching full effectiveness for the whole range of tests, would be staged in three phases over the next ten years. It is recommended that the Government of Kiribati would seek a partnership with a private operator to run the laboratory and ensure knowledge transfer; as well as using regional specialists who will gradually be replaced by I-Kiribati[4] ones. The capacity development plan linked to the laboratory and other SPS functions is detailed in chapter 9. This plan involves 10.5 person.months of inputs from external trainers and would cost a total of A$ 225,000 over the next 5 years; it would require Aid support (e.g. through the EIF) to be fully implemented.

As is the case for the existing labs, the sustainability of the central laboratory will rely on public funds, since the market demand for tests would remain limited. The economic assessment presented in chapter 10 indicates the central laboratory should aim at cost recovery; however, while the facility may be able to sell a limited amount of tests, it is anticipated that most of the revenue will originate from the Government (central support and Ministries agreements). This investment project will thus require co-funding on a grant or loan base from the development partners, channelled through a specific line of the national budget. The support provided would also cover the costs of technical assistance and advisory services to lead and monitor the implementation, and to assist with preparing for accreditation. In the view to seek future support, the STDF mission has initiated contacts with Donors (NZAid, Taiwan, ADB) and registered positive feedback from some of them.

The above approaches represent a significant change from the current strategies in each Ministry. Such change will need to be explained again during the second mission, since accepting the concept and agreeing to rely on a third party to carry out the tests will require the collective commitment of the Government and ministries. On the long run though, Kiribati

[3] Public Private Partnership

[4] The local name of Kiribati people

will benefit from an increased pool of institutional and individual capacities and will enjoy a better SPS reputation, one that will be conducive to attract investors and boost exports. The Ministries (MELAD, MFMRD, MHMS...) and agencies (KCDL, PUB, KSVA...) will benefit from having access to the results of a competent laboratory at lower costs (indirect costs spent on time and logistics). The private sector companies or the SOE will benefit from easier and faster access to tests, even though the most complex tests for e.g. pesticides and veterinary medicines residues would still be outsourced.

These initial findings and proposed options have been shared at Secretary's level through a meeting of the National Trade Advisory Committee (NTAC), which expressed a positive feedback for an integrated testing facility. The recommended approach could seem unusual to senior officials; however, it should be recognized that the isolated efforts in each Ministry have so far yielded inadequate results to develop SPS capacities. The new approach will yet require the collective commitment of the Government of Kiribati and private sector, and the support of Aid agencies. Success will be measured by efficiency gains from the integrated laboratory, increased availability of test services, and better quality data used to support regulatory action and ultimately the monitoring of policy effectiveness.

The initial version of the study (Nov. 2018) has then been circulated to the main Ministries and concerned stakeholders. Comments expressed have been collected and shown in Annex 17 of the report, alongside with their treatment. Accordingly, the text of the report was amended as necessary. During the next part of the mission (Jan. 2019), the consultant held face-to-face discussions with the Ministries involved in SPS official controls. The representatives met confirmed their agreement for the option of a central laboratory supervised and operated by a new independent statutory body. In addition, the Ministry of Environment, Land and Agriculture Development required that fumigation and incineration equipment be included in the investment project. Similarly, Ministry of Commerce, Industry and Cooperatives indicated the needs for a calibration laboratory; based on the recommendation of an expert's mission. The same overall agreement was expressed during a validation workshop (29th January) and finally during a special meeting of the National Trade Advisory Committee (30th January).

In recognition of the wider role and the integrated nature of the facility, it is proposed that the new entity would be created as an institute dedicated to improving the official controls for food and the environment, and contributing to the 'One Health' policy of the WHO. Therefore, the proposed name for the Institute is KOHSI - 'Kiribati One Health Support Institute'.

The main conclusion of this mission is the identification of an urgent need to provide more and better analytical information to facilitate policy-making and regulatory enforcement, thus mitigating environmental pressure and reducing risks on human health. Based on the interaction with interested parties and with Development Partners, the Consultant's recommends that for bridging this gap over the years to come, the Kiribati Government should consider setting up a new statutory body that would manage the development and later operate an 'SPS support facility' delivering testing, fumigation, incineration, calibration and capacity building services. The new statutory body should consider entering in partnership with one or more laboratory in the region, with the view to facilitate transfer of skills.

Another important conclusion of the mission consists in the need for a task force to lead the next steps and managing the whole project until the new statutory body is created. This task force/ PIU could be organized under MCIC, with close liaison with the Quality

Coordination Committee that includes all interested stakeholders. Furthermore, the task force work must be supported by significant expert inputs availed through technical assistance and advisory missions, both for managing the project and for preparing the technical documents necessary for its implementation.

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Contents

1 ANALYSIS OF THE CURRENT SITUATION

Kiribati consists of a collection of thirty-three islands and atolls in the Pacific, laid in three sub-groups namely the Gilbert, Line, and Phoenix groups. The atolls are scattered across the equator over three and half million square kilometres of water.

1.1 Political and economic background

Kiribati has now reached the GDP of a lower middle-income nation, and would have graduated from the UN 'Least Developed Countries' (LDC) group a while ago. Notwithstanding the UN assessment that graduating would not have had negative consequences, Kiribati advocated successfully for remaining in the LDC group, on grounds of economic remoteness and vulnerability to internal factors and external shocks. Sustainable development has thus become a priority objective in recent years due to the increased risk of flooding – all islands but one rise no higher than a few meters above sea level. This objective requires delicate balancing of public investment between infrastructure (protection, water, etc.) and productive facilities.

The population of Kiribati was 110,540 in 2015 (Census 2015). In 2017, its GNI per capita estimates were US$[5] 2,780 (Atlas method) or US$ 3,850 (PPP method). GNI includes external revenues sources (see below), which substantially complement the GDP. Kiribati GDP was estimated at about US$ 181 million (PPP) or US$ 2,110 per capita in 2017. The GDP growth has been irregular over the last decade, averaging 1.4% per annum 2008-12 and 3% over last 3 years. The economic output is dominated by the services (62% of GDP), with agriculture and industry sectors contributing 26% and 11% of GDP respectively (2015). Kiribati's economy is thus based primarily on the sale of fishing licenses, tourism, copra, fishing, and subsistence agriculture (starchy crops, coastal fishing). This is complemented to a lesser part by remittances (about 850 seafarers abroad in 2015), and the income from the Revenue Equalization Reserve Fund. These two sources have been on a declining trend, due the global economic slowdown that has reduced shipping and decreased the fund's performance.

Economic development is constrained by a small and limited production capacity, weak infrastructure, insufficient skilled human resources, insufficient of energy sources and natural resources, and the country's spatial spread and remoteness from international markets. These are constraints of Small Island Developing States, which have been well identified and documented by several aid agencies. Mitigation solutions have remained scarce. In the case of Kiribati, the combined effect of population growth, change in life styles, and sluggish trade and economic growth result in a chronic trade and budget deficit. Drawdowns from the country's Revenue Equalization Reserve Fund (RERF), a sovereign offshore fund, helped finance the government's annual budget. Kiribati is dependent on foreign Aid, which contributed about 40% in 2016 to the government's finances. Kiribati thus receives around A$15 million annually for the government budget from an Australian trust fund; and the Aid funding from the United Kingdom, Germany, Japan, China, Australia and New Zealand equates to almost 10% of GDP.

Kiribati is ranked 158th overall for the ease of doing business in the World Bank's 'Doing Business 2018' survey. According to the World Bank indicators, Kiribati scores better than the average of East Asia-Pacific region time to import and export; however, the costs indicators for export and import documentary compliance and border process are much higher than regional averages[6].

[5] In chapter 1 dealing with international trade, the figures are in US Dollars. In other chapters, the figures are in Australian Dollars.

[6] See: http://www.doingbusiness.org/en/rankings, accessed 10th Nov. 2018

The political context relates to the globalization of trade in the Pacific region. Regional trade agreements with the European Union (EPA) and with Australia and New Zealand (PACER Plus), which have been 'in the making' for almost a decade. Kiribati has signed PACER Plus Trade agreement and is currently working towards accession to Interim EPA. PACER Plus has key components related to enhancing TBT, SPS-related capacities, and to Trade Development. The Government intends to use such linkages to get trade-related support from Australia and New Zealand. Similarly, Kiribati cannot benefit from Trade with EU under the IEPA if her SPS capacity is not enhanced: case in point the export to the EU of fisheries products. The proposed intervention is therefore significant in this context. It would allow delineating, for consideration under the trade assistance of said agreements, well-defined TA packages to support national SPS capacity building on the mid-term.

The social context reflects growing difficulties to cope with reduced opportunities and increasing costs of life. Under- and unemployment levels are high in Kiribati (about 43% for the latter), especially among the younger age groups. Youth unemployment is a severe problem with the youth unemployment rate at 43% in 2015. Unemployment at the 2015 census was 41%. Young people account for more than half of all unemployed people.

The labour force accounted for 47,635 people over the age of 15. Of these, 27,096 people were employed in either paid or unpaid work. In a country of individual enterprises, subsistence lifestyles and small co-operatives, the Government of Kiribati remains the largest employer: it employs around 4,700 staff, on top of the additional 2,000 staff working in public enterprises. Private sector can yet be engine of economic growth and development. While the private sector is small in relation to the public sector, its contribution to GDP has increased from 47.3% in 2005 to 54.5% in 2015 (with about 3,980 jobs).

The data from the Kiribati Provident Fund reveal that Kiribati has experienced growth in employment in the private sector over the past 5 years. Approximately 10% of the population is employed on salaries or wages, mainly in the public sector. Seafaring, fishing and the seasonal worker programs in Australia and New Zealand provide the bulk of offshore employment; whilst the rest is found in small local individual trades, subsistence fishing and farming, or working on fishing vessels.

Seasonal Worker Programs with Australia and New Zealand have consistently contributed to youth employment and recently recorded in 2017 a total of 378 recruitments from Kiribati compared to prior years recruitment numbers of less than 30 per year. Additionally, there will be a Pacific Labor Scheme for Kiribati, Tuvalu and Nauru of up to 2,000 workers in 2018.

The impact of the global economic and financial crisis has been affecting Kiribati in diverse ways through multiple transmission channels. The sharp rises, from 2008 onwards, in the prices of basic food items (rice flour and sugar) has especially affected the poorest and most vulnerable households in the urban centre of Tarawa, even as some food prices decreased and inflation is contained at about 1% (2015 estimates). On the income side, the decline in world trade and the lay-up of a number of merchant shipping vessels has reduced the number of Kiribati seafarers and has led to a decline in remittances (A$ 7 million- 2015). The reduction in employment linked to cruising sector (on-shore: termination of cruise vessel visits to Tabueran Island; offshore: staffs on cruise and foreign fishing vessels) has further reduced employment prospects for the labour force.

A poverty social impact assessment report was conducted, based in part on the data of the Household Expenditure and Income Survey (HIES 2006). The report indicated that around one-in-five households and almost one-in-four of the population of Kiribati live below the national minimum cost of living or basic needs poverty line; more than one-third of all children lived in households below the poverty line. Dwellers in South Tarawa were slightly more likely to experience poverty

than those living in the rural areas, where subsistence production underpins daily life. People living below the basic need poverty line struggle to pay bills and are thus frequently in debt. The drift of population from the outer-islands to the urban centre of South Tarawa, especially amongst young men and women, leads to higher levels of unemployment and growing numbers of people living in poor quality housing conditions. It is also leading to higher dependency ratios in the rural areas and a weakening in the traditional social structure, which has contributed to more demand for unhealthy imported products.

1.2 Economic policy and international cooperation programmes.

1.2.1 Economic development policies

The economic development policy is reflected in the Kiribati Vision 2016-2036 (KV20) that describes four Pillars as Wealth (incl. Nature and Human resources development), Peace and Security, Infrastructure, and Governance. The KV20 implementation is done in the frame of Kiribati Development Plan (KDP, 5 years) through the Ministries Development Plans with the assistance of development partners. The Government is eager to rationalize investment and to channel spending to those streams that point directly to the KV20 and KDP indicators. In addition to the KDP, Kiribati has a number of national policies such as Trade Policy Framework and National Quality Policy, Fisheries Policy, and other sectoral policies. The government has adopted a Private Sector Development Strategy that aims at fostering a more conducive business environment for enterprises. An example on action under this plan is the setup of a public-private partnership to operate a major hotel in Tarawa.

Kiribati has also an Agriculture Strategic Plan 2017-2021 (ASP), led by Ministry of Environment, Lands and Agricultural Development. The ASP feature the biosecurity objective, stated as 'increased compliance with international standards' with two outputs related to trade facilitation for agricultural products (training in import risk assessment and import specifications, access to markets, and support to quarantine system).

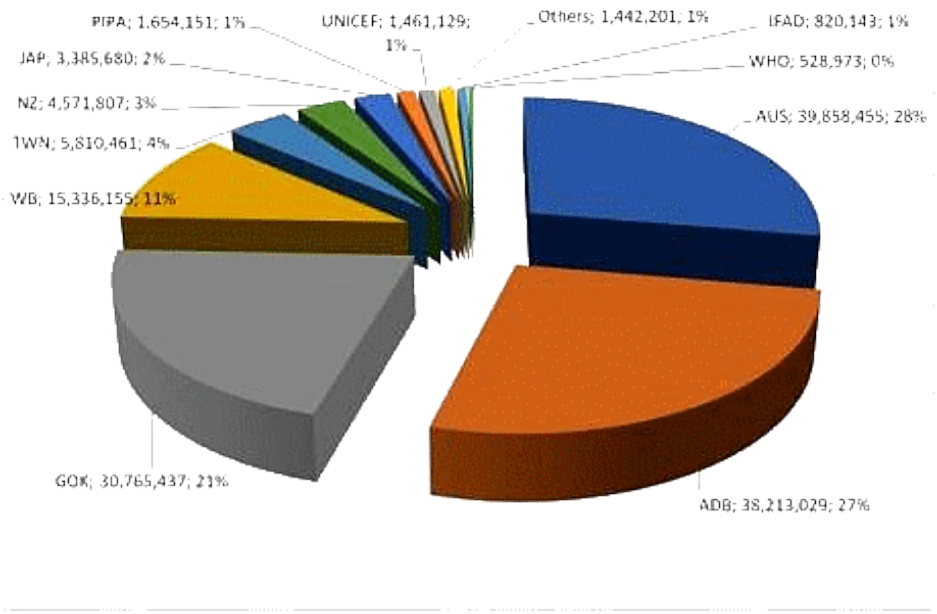
Improving economic opportunities for the population remains the central focus. The Government is viewing human resource development, infrastructure and good governance as critical enablers; employment abroad is still seen as important. In terms of the Government's alignment of budget behind development priorities, the public expenditure analysis of 2016 showed that Government and Donor spending is fairly well-aligned with development priorities and overall expenditure on key social services and infrastructure is high, with the notable exception of health sector, which received a significantly smaller amount of donor resources.

The Government is also focused on employment creation, in Kiribati and abroad. However, population growth still exceeds employment growth. The Kiribati Government faces difficulties in generating sufficient domestic revenues to provide all people with access to basic services. Kiribati's fiscal position had worsened over the period 2005-2012, as revenue has stagnated and expenditure has not been sufficiently adjusted to reflect the slowing economy. However, with the introduction of the VAT and increased revenue from taxation the situation has improved in the recent past. Kiribati has also gradually been tapping more of the potential of its tuna resources: the returns from tuna fishing licenses to catch value have passed the 10% mark in 2015 (catch that year was 641,500 tons valued at about USD149 million). Such progress in generating internal revenue is referred into the reference to Kiribati Voluntary Mid-term Review Report for the current fiscal position.

1.2.2 Cooperation programmes

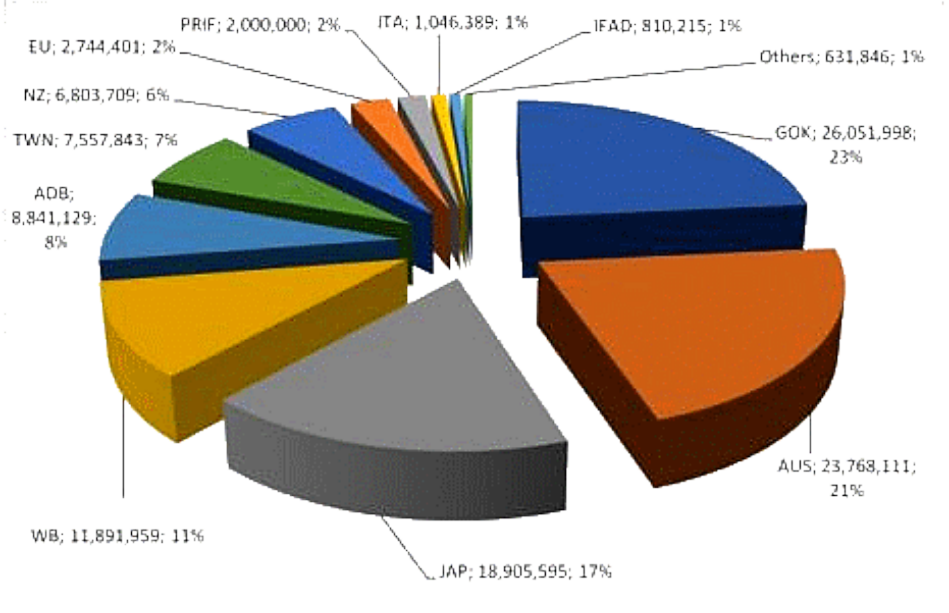
The Government of Kiribati benefits of Official Development Assistance from several nations.

The figures below depict the distribution of Development Budget for 2016 and 2017, with a total amounting to about AUD 150 million a year.



Kiribati development budget 2016

And 2017



The development budget listed about 650 projects in the period 2015-2017. The bulk of the Development budget[7] goes to Infrastructure: 49%, then to Economic Growth & Poverty Reduction: 25%, Human Resource Development: 15%, Environment: 5%, Health: 4%, and Governance: 2%. Relevant to the trade sector, the following projects have been identified:

- PACER Plus, now in the early stages of ratification to prepare implementation, would avail trade facilitation support to the agreement partners, in addition to or combined with bilateral

[7] In 2016, the budget with GOK and Aid amounted to AUD 145.8 million (% for 2016 figures)

channels (e.g. PHAMA). Being a Trade-related agreement PACER Plus would probably avail support for developing SPS capacities.

- Pacific Horticultural and Agricultural Market Access (PHAMA) is a regional program funded by Australia and New Zealand to help exporters in Pacific Island countries to meet the standards and requirements of importing countries. PHAMA is now seen as the main delivery of Aid for Trade support encapsulated in PACER Plus; however, PHAMA has not targeted Kiribati so far.
- The Enhanced Integrated Framework has signed an agreement with Kiribati in 2010. The EIF typically works with partners by defining a tier-1 project, consisting of an implementation structure and delivering various feasibility studies, and then tier-2 projects that are unrolled in a phased manner, to assist partners to remove identified trade obstacles. In Kiribati, the National Implementation Arrangements have been agreed, technical positions have been staffed for the NIA, and one tier-2 project is being implemented (development of a metrology function at MCIC).
- The FAO is providing support to Ministry of Health to develop capacities for food safety; the project is ongoing (2018) with one component on Strengthening the National Codex Committee, and one component on developing control of street food handlers.
- EU support for Regional Integration under the 11th Pacific Regional Indicative Programme, includes trade facilitation components; however, the National Indicative Program for Kiribati with EUR 20.5 million sets the priority for water and sanitation programme and for the socio-economic development of Kiritimati (Christmas Islands). The consultant would liaise with the EU regional office in Fiji during the second mission, to assess their interest to support the proposed central laboratory.

New Zealand, through the Ministry of Foreign Affairs and Trade is significantly involved in Kiribati. The New Zealand Aid Program (NZAP) amounted to AUD 4,571,807 in 2016 and to AUD 6,803,709 (estimate) in 2017. Recent projects under NZAP were in the following main areas:

- *Environment*; with the solid waste management program (phase 1 and 2) and solid waste management UDP phase 2, Line & Phoenix waste management project, Betio landfill protection wall...
- *Marine Resources* with the sustainable costal fisheries project, joint Kiribati sustainable fisheries development and management project, maritime safety project, fisheries training project.
- *Health,* with hospital upgrading, access to health and training projects
- *Human capacity development*, with support to the Marine Training Center, to Labour mobility
- *Institutional support;* with a housing project, and capacity building or assistance in various public offices (Min. of infrastructure, finances, etc.)

Apart the support from FAO to MHMS and the Agriculture and Livestock Division (quarantine) and various water and sanitation projects, there is no specific SPS project addressing the shortcomings in this area.

In summary to this policy and cooperation section, three salient conclusions can be drawn, which should be considered for developing the proposal.

Firstly, Kiribati is struggling to address the numerous constraints impeding economic development. Kiribati has low aid absorption and project implementation capacities, because of a limited number of government officers dealing with an increasing volume of development priorities and negotiations at regional level (fisheries sector, PACER Plus, EPA, SPC, PIFS…). Donors in Kiribati expressed their interests in supporting this PPG and the upcoming project; this orientation is subject to further discussion and will be confirmed during the second mission.

Secondly, Kiribati's GDP and budget are still unbalanced. Prudent macro-management has resulted in relatively stable financial situation; and it is important that any proposed investment for SPS capacity development will not jeopardize these efforts by introducing new recurring costs without direct returns.
Thirdly, the Government has a policy to facilitate and engage more with the private sector. Indeed, quality infrastructure and SPS management is one area where such policy should be actively pursued.

1.3 Kiribati's Trade Integration and SPS-related needs.

Kiribati trade remains heavily unbalanced, with a yearly deficit in the range of US$170 million. The variability of exports of goods and services is important, attaining at times 3 times the level of all other developing countries. Similarly, exports destinations vary year by year because of opportunistic behaviour by traders and the absence of high-volume supply. Export instability affects copra and seaweed, more for supply-related than for price-related reasons. Tourism has also undergone sharp fluctuations associated with the international demand.

1.3.1 Kiribati's global merchandise trade relationships

- ***Exports***

In 2017, Kiribati exported US$123 million and imported US$159 million, resulting in a negative trade balance of US$39 million. The Government however through the KV20, seeks to increase the value of exports. Kiribati exports 19 products with revealed comparative advantage[8] of which about ten agro-food products (see Table on next page). Some products are re-exported. The main export destinations in recent years have been Japan, Thailand, The Philippines, Australia, Bangladesh, the United States, and Mexico (other countries are included in the table on next page, yet they reflect one-off or discontinued deals). At present, no export duty is charged on exportable items; however, for marine products an export license from the Fisheries Division of the Ministry of Natural Resources Development is required.
The main exports over last decade have been non-fillet frozen fish ($110 million), frozen fillets ($5.67 million), copra ($1.17 million), coconut oils ($1.2 million), refined petroleum, fish preserved fresh or chilled fish and lobsters, seaweed, shark fins, clams, milkfish, sea cucumber, and live ornamental fish.
For the future, the government has plans to diversify products in the fisheries sector through investment in the higher value added products to increase the export basket and enhance structural transformation.
The table below allows assessing the prevalence of SPS issues, depending on product and destinations (see Annex 3). Fish frozen in whole with medium value represent over 80% of the export value. By contrast, frozen fish fillets (on-shore processing) with higher value can be exported to Australia, Japan or EU; however, since these countries have more demanding hygiene regulations, this sub-group of exports represent less than 5% of the export value.

EXPORTS	DESTINATION COUNTRIES (% of export value)				
Non-fillet frozen fish	Thailand 67%	El Salvador 9.9%	Columbia 6.8%	Japan 5.5%	S Korea 2.1%

[8] meaning that the share of global exports is larger than what would be expected from the size of the export economy and from the size of a product's global market

Fish fillets	USA 71%	Japan 28%	New Zealand		
Other fish products	Vietnam	Hong Kong	Japan	Samoa	USA
Copra	Philippines	Malaysia	Bangladesh	Korea	
Seaweed	China 69%	Vietnam 31%			
Refined petroleum	Marshal Island	Fiji	Australia		

Table: Indicative distribution of Kiribati exports (data over 2006-2016, author's calculation)

- Imports

Kiribati is a net importer of goods and services. From US$ 88.4 million in 2008, imports value rose to US$159 million in 2017, which represents about 87% of the GDP. There are no import duties now in Kiribati.

Kiribati imports include processed foodstuffs incl. sugar; tobacco; canned meat & vegetables ($30 million -19%); animal meats ($6 million - 3.8%); rice, flours and other vegetal products ($15.6 million - 9.8%); transportation goods e.g. boats ($26.4 million-17%); machines ($21.5 million - 13%) ; refined petroleum ($17.9 million - 11%); metals (4.5%); chemicals (3%); textiles (3%); plastics (2%); goods for housing & furnishing (2%); paper and wood (1.3% each). The main imports were sourced from: Fiji (29%), China (22%), Australia (15%), Japan 6.5%, New Zealand, South Korea, Singapore, EU, and USA. Of note, approximately 30% of food, animal and vegetal products are imported from China, the rest from USA, Fiji, and Australia.

In summary of the above analysis of trade flows, it should be noted that most Kiribati exports are subjected to both TBT and SPS requirements. Currently, exports consist mostly of raw or semi-processed goods, sold to regional countries where they are further processed. Diversification has started, albeit limited to a handful of local enterprises producing virgin coconut oil, dried seaweed, frozen lobster, and frozen fish fillets. Countries such as Australia, New Zealand and the European Union have higher SPS requirements; therefore, full compliance with these dispositions will be a requisite in order to export more high value-added fisheries products to such destinations.

On the import side, most products originate from countries where quality and safety is regulated, hence a limited concern on TBT and SPS issues. Nevertheless, the import of food items in provenance from China and Vietnam has sharply risen in recent years. Given the record of food safety/quality rejection cases in these countries, Kiribati should have capacity to demand (and control) compliance with basic TBT and SPS dispositions in order to better protect I-Kiribati against unsafe or adulterated food. Official services such as Agriculture and Livestock Department (ALD) are much alert on China's cases in food adulteration. The Food Act is the more appropriate instrument to address these concerns; however, ALD is strengthening its capacity to intervene also where it is appropriate.

1.3.2 Overall framework for complying with trade requirements

- ***Roles of the Kiribati Port Authority and the Kiribati Customs***

The Kiribati Port Authority (KPA) mandate is to manage and develop seaport infrastructure; this includes the physical handling of cargoes until clearance and release by the various inspection services. KPA thus interacts with customs, quarantine, and health services, which are availed access or basic facilities to carry out their inspections. KPA is also ensuring the collection of all handling and clearance related fees.

The Kiribati Customs Administration and Enforcement KCAE) ensures the functions of revenue collection, border control and the movement of goods across the border, mostly at Tarawa seaport

and to a limited extent at the Bonriki airport, as well as in the Kiritimati seaport. KCAE maintains a close cooperation with the Biosecurity Section of Ministry of Environment, Land, and Agriculture Development (MELAD), which has quarantine officers posted in the port buildings.
The reform of customs operations is ongoing. Customs services have recently aligned their procedures on international standards and best practices; for example, they use a risk-based management approach and follow the standards of the Oceanic Customs Organization. The development of ASYCUDA, and the possibility to outsource part of the verification function to authorized operators, is under consideration.

- ***Animal and Plant Quarantine***

Kiribati is not a member of the International World Organisation for Animal Health (OIE); and has no immediate plans to join. Usually, the country would submit a national report on live animals (aquatic and terrestrial) using OIE template, through the SPC Secretariat. The Director of Agriculture is the Kiribati focal point vis-à-vis SPC, for OIE. While Kiribati has thus a linkage to OIE, the absence of direct relationship is restricting the ability of exporters to send live fish to Australia. Kiribati is not a member of IPPC, but they have a correspondent status and similarly, engage through the SPC Secretariat. Therefore, for plants, products marketed for export have to meet the quality standards and quarantine requirements of the receiving countries: failure to comply with such requirements results in the product being rejected. For plant's exported products, ALD through its Biosecurity Section has been effective and vigilant in meeting health certificates required by importing countries concerned. Nevertheless, some countries like New Zealand and Australia have started requiring health certificates for articles/items of handicrafts, when these include parts of animal of plants in raw form. Treatments for plant products include fumigation or heating to kill possible pests/ parasites. For plant products such as timber, fumigation off shore prior importation is a requirement. Recently, ALD's Biosecurity division has allowed fumigation to be carried out in the country only when treatment will definitely eliminate the quarantine risk; approval is given by the Biosecurity Officer/Director coupled with the Environment and Conservation Division. Copra is treated at the Kiribati Coconut Development Limited premises with permethrin, piperonyl butoxide and methylin chloride. The Agriculture division verifies the process and issues a phytosanitary certificate. The Agriculture division is responsible for the treatment of all products prior to exportation. However, the Agriculture division lacks suitable premises for forced hot air exposure. On the import side, all plants and animal imports are regulated.
Kiribati updates its pest and disease list as frequently as possible. Despite the infrequent updating, ALD through its Biosecurity and Extension services are very alert to any outbreak or so of the pest or disease. Due to lack of human resources and capacities to investigate and identify pests, Kiribati faces biosecurity challenges to maintain its reputation as a relatively pest- and disease-free environment.

- ***Food Safety***

Food safety is important for health reasons as well as for the development of tourism. Imported food items present a concern to authorities, including issues such as composition, labelling, date marking and adulteration. National food standards are under the auspices of the Ministry of Health and Medical Services (MHMS), which has started in 2018 conducting border inspections (while previously ad hoc inspections were triggered by KCAE call). Officers from MHMS are based at KPA for food container inspection and clearance. Kiribati has been a member of FAO Codex since 1990 and has a National Food Safety and CODEX Committee, which serves as a multi-sectorial forum on matters related to food standards; to advise the government and recommend priorities on food issues and standards implementation.

1.4 Overview of Legislation for SPS issues

The following Laws and Regulations[9] have been considered in assessing the current Kiribati SPS legislative framework:

- Consumer protection Act 2001 and Consumer Protection Regulation 2004
- Food Safety Act (2006) and Food Regulation and Standards (2014)
- Fisheries Act 2010 with amendments (2014), Fish Export Regulation 2012 and Kiribati Industry Standard (2016)
- Quarantine and Importation of Animals Ordinances (1977 ed.) and the Biosecurity Act of 2011.

The collection of texts administering the SPS issues appears complete, especially considering the recent updates in regulations (local fisheries products, food...). The Laws are based on modern legal writing and account sufficiently for international practice. The regulations are also effective, even if some modern approaches to regulation (user pay policy, impact assessment...are not always mentioned or used)

These regulations now require the concerned Ministries to develop specific action plans to enforce the dispositions. Implementation has been unequal so far: the most advanced in term of practice and capacity would be the CA Fisheries, followed by MELAD, while the Ministry of Health and Medical Services (MHMS) has only recently started mobilizing resources for enforcing the Food Safety dispositions.

- ***Consumer Protection***

The Consumer Protection Act 2001 defines the tasks, competence and powers of inspectors. The Act also provides for the remedies and sanctions for which initiation the Minister of Commerce, Industry and Cooperatives is responsible.

The Act empowers the Minster to prescribe by regulation, product safety or quality standards for any specified kind of goods and prohibits the supply or trade in goods in relation to which there is an approved standard, unless the goods comply with the standard. The Act also includes provisions on fair-trading and statutory warranties.

The Consumer Protection Regulation 2004 importantly specifies two standards in Product Safety and Labelling. There are concerns about the adequacy and practicability of the current sanctions and the capacity to deal with highly technical issues.

- ***Biosecurity***

The Biosecurity regulation is provided by the rather outdated and trade restrictive Quarantine (ed. 1977) and Importation of Animals Act (ed. 1977) which are augmented and updated by the Biosecurity Act of 2011. Together this package of laws and attendant subordinate legislation provide modern detailed requirements for the import and export of plants animals and their products as well as domestic surveillance and control measures as well as the sanctions and mechanisms for enforcement. At the time of writing, the updating of regulations governing the quarantine sector is in progress.

- ***Agri-food processed products***

The Food Safety Act 2006 puts in place the basic requirements and prohibitions as well as the powers and functions for official control of food. It also prescribes the sanctions and mechanism for their enforcement, which is the responsibility of Ministry of Health and Medical Services.

[9] A separate summary of the legislative framework, derived from the final report form ACP-TBT project (2017) is presented in Annex 8...

The Food Regulations and Standards (2014), fully harmonized with Codex Guidelines and Standards, further details requirements for domestic food businesses as well as for imports and for so-called designated products whilst prescribing horizontal chemical and microbiological parameters. In addition, there are mandatory quality parameters for key food groups included in so-called standards attached as schedules.

- ***Fisheries***

The Fisheries Act of 2010 concerns protection, management and development of fish stocks as well as the licensing of foreign vessels. It was amended in 2015, amongst other things to create the Kiribati Seafood Verification Agency as the Competent Authority (CA) to verify the import and export of seafood. The Act requires the certification of exports with certain requirements, provides sanctions and the mechanism for enforcement, and provides for the Minister to set standards.
The Fish Export Regulations 2012 brings the Agency into being and specify procedural as well as provide for the appointment of inspectors, the mandatory certification requirements (establishment and product) and the powers to define standards.
Further to this regulation, in 2016 the Kiribati Industry Standard (KIS) was adopted pursuant to the Regulation, which specifies and details the requirements for the establishment, for personnel as well as for production processes.

- ***Copra***

The Copra (Marketing) Ordinance (ed. 1977) with its subordinate regulations provides for the requirements for marketable copra as well as the powers and mechanism for their enforcement.

The following chapter of the gaps assessment deals with the official controls (implementation of the laws), and follows the main economic sub-sectors.

2 OFFICIAL CONTROLS FOR SPS IN KIRIBATI

2.1 Controls in the Fisheries sector: the competent Authority

The fisheries sector includes local traditional fishing, aquaculture, and industrial fishing and fish processing. Kiribati has adopted the modern food safety approach whereby the operators are primary responsible for ensuring safe and hygienic food; the competent authority carrying out verifications and sectorial planning.

The Kiribati Seafood Verification Authority (KSVA) is the competent authority (CA) for ensuring seafood safety. It is a section under Ministry of Fisheries and Maritime Resources Development. Established with EU support, the CA has a staff of four officers. They carry out inspection of vessels and processing plants, sensory evaluation of catch, and sampling and testing of fish landed. The CA is now using a risk-based approach for their residue monitoring plans and for planning the inspection of FBO and vessels. These dispositions are fully detailed in the Fisheries National Control Plan, finalized in 2017. Recently, the KSVA received support from the Forum of Fisheries Authorities, which provided capacity building on Food Safety techniques & inspection methods. However, none of the KSVA officers has been trained as analyst.

The analyses of process water and fish meat are needed to ensure residue monitoring plans and the verification of establishment compliance. The detailed analyses requested for export (pp. 50-54 of the NCP) are provided in Annex 3. The CA is outsourcing all the tests for a total cost of about 15,000$ /year:

- Heavy metals and Histamine in fish meat (2 times/ year), as well as all water and ice tests by the IAS laboratory of the USP in Fiji
- PCB & dioxins (1 times/ year) at Asure Quality lab (Australia)
- Histamine by HPLC at Cawthron laboratory (NZ), (service agreement in preparation)

The competent authority is facing the following constraints:

- Equipment limited to basic controls (pH, sampling tools, temperature)
- Insufficient space to organize a proper laboratory
- Absence of testing capability: the tests are sub-contracted in laboratories in Fiji and in New Zealand.

The KSVA would thus need capacity development on fish inspection, on fish sampling methods, and on the development and verification of HACCP plans for fisheries operators; as well as developing testing capabilities. The CA director welcomed the idea of a central laboratory; one of their concerns is the independence of the CA from the testing facility. If the CA would develop their own testing laboratory, the Head of KSVA would be in the position to sign the test reports used to establish the product health certificates: this situation would be seen as a breach of impartiality for the laboratory and as a conflict for the official controls role. If this solution is selected, dispositions should be sought after, in order to avoid possible conflict of interest for the CA (see below § 5.2). On the other hand, KSVA cannot rely on any (private) industry labs to ensure their own test: this would also be a breach of impartiality.

2.2 Ministry of Environment, Land and Agriculture Development

Under MELAD, the Agriculture and Livestock Division includes the biosecurity and plant health section in charge with control of animal diseases and plant pests, while the environmental conservation division (ECD) is in charge of preserving Kiribati ecosystems. MELAD has also mandate to control hygiene and safety of raw agricultural products, either locally produced or imported.

2.2.1 Biosecurity and Plant Health Section

Agriculture activities in Kiribati are limited, and consist of small-scale fruit cultivation (banana) or picking (wild figs), and production of staple (taro) or vegetable in pits. Animal breeding remains a household activity in most cases, yet a few small-scale chicken- and pig-raising farms are noted. Apart from coconut cropping, widespread in all islands as income generation, other products are almost entirely for subsistence. Vegetable production has been promoted of late by community groups (AMAK, Church groups) & Aid agencies (Japan Cooperation, Taiwan Technical Mission). However, the current model of 'yard-based' gardening is not yet well developed. Local market places show only minute volumes; virtually all fruit and vegetable available in retail centres are imported from abroad.

The Biosecurity and Plant Health Section (BPHS) is responsible for enforcing the Biosecurity Act and regulation, which concern mainly the identification of pests in consignments and the related quarantine procedures (rejection, fumigation, heat treatment, etc.). The later function takes place at the main seaports (Betio in Tarawa, Kiribati Group; Kiritimati and Tabueran, Line Group; Kanton, Phoenix Group), where quarantine officers carry out a systematic, 100% inspection of shipments. They work closely with Customs officers at the seaport (Tarawa mostly) and airport (limited volumes of freight). In the two international airports of Bonriki (Kiribati) and Cassidy (Christmas Island), the controls are limited to passenger declarations. The BPHS ensures fumigation services and delivers

health certificates for agricultural export products. The BS officers are also responsible for food safety in primary food products (unprocessed). This activity is under development; the BS cooperates with MMHS in the National CODEX committee in that respect.

Some constraints have been noted respect with the delivery of biosecurity services:

- The Biosecurity Section could be understaffed to check and fight invasive species. As well, facilities and capacities towards the identification pests are limited to a set of very basic tools. At the Tarawa port, the quarantine officers work in a single small room with limited tools: this is inadequate to carry out efficiently pest analyses. The FAO had provided earlier in the region training on pest identification, but the BPHS officers who attended had no opportunity to practice due to lack of sufficient testing and identification equipment. MELAD has submitted a funding proposal through FAO to install a containerized minilab (biological testing) on the grounds of the Port Authority. Another area of interest for BS would be able to screen genetically modified organisms (GMO) and live modified organisms (LMO) that might be traded into Kiribati.
- MELAD recognizes SPS certificates from other countries, but there have been cases of infested consignments despite valid certificates. This situation would call for regulatory dialogue with the competent authorities of the countries of origin. The BS must continue accepting certificates, but could adopt additional SPS measure at the cost of importers, provided that cases of faulty certificates are duly documented and notified to the country of origin. In the meantime, all shipments of agricultural and food products are inspected (systematic inspection of imports), which creates a high workload on quarantine services and increases transit times.
- The needs for better fumigation facilities and tools were highlighted during the meetings. At present BSD has no shed/ building were to store products for treatment and move to exporters' factories to verify fumigation. They also lack equipment for hot treatment for the control of pests and larvae in fruits and tubers.
- Kiribati is not a member of the World Organisation for Animal Health (OIE), and is a non-contracting party of the International Plant Protection Convention (IPPC). Kiribati however, is a member of the Secretariat of the Pacific Community (SPC), which has a memorandum of understanding (MOU) with the OIE. This allows sharing data on animal health in Kiribati with the World Animal Health Information System (WAHIS), an online disease reporting system. However, the IPPC website does not reflect any of the reporting that may have been done though the SPC. Similar arrangement could be in place for plant quarantine: while a National Plant Protection Office has been established[10], it has no direct activity at IPPC or Regional Plant Protection Organization levels. Such limited connections with international or regional organizations (RPPO, OIE Regional Commission for Asia, the Far East and Pacific) prevent the country to be fully recognized as a partner and to receive assistance for biosecurity systems.

The BS would be in favour of developing a central laboratory, and would prefer a location nearby the seaport as this is where most import control activities take place. They also would welcome this unit to play a broad role in SPS conformity, not only analytical but as well that of a resource center for sampling, sample handling, and capacity building on SPS procedures and analytical work.

[10] See: https://www.ippc.int/en/countries/kiribati/

2.2.2 Coconut Sub-sector

Coconut and copra production are widespread across the country. A 2011 study reported production figures at 131,351 tons of coconut, and 6,825 tons of oil, with an increasing acreage (about 30,500 ha). The Government has a subsidy system that top up buying prices, to compensate the logistics costs linked to remoteness. The Kiribati Coconut Development Ltd (KCDL) is the main operator.

This public company ensures both processing (copra, oil, and soon virgin coconut oil), and development of primary production. KCDL operations are constrained by the low or irregular quality of local products. Currently KCDL is exporting copra and coconut oil regionally. KCDL ships around 20 containers/ month (up to 40), which means as many tests (one test report per shipment). The only tests performed by KCDL so far are moisture on copra, and basic acidity measurement on oil. The company has 30 moisture meters on different islands, to ensure the correct dryness level of collected copra.

Testing capacity is high in priority list for KCDL, as tests condition access to export markets (see Annex 2). The price of crude coconut oil is on declining trend. Kiribati has still a small advantage due to the pale colour of copra and oil (sun-dried vs smoke-dried in other Islands). The production equipment is working with low capacity (old Indian expellers) as some machines are out-of-order. KCDL will invest in one expeller from Malaysia; this model with recent technology would replace the three current machines. KCDL managers emphasised their plan to diversify export markets, which means international standard requirements.

KCDL's main customer for crude coconut oil is in Malaysia. KCDL is dependent on Malaysian clients for testing: because there is no transparency on the test results, KCDL is disadvantaged in price negotiation. KCDL could expand sales to customers in Japan and Korea, but clients in these countries require testing in accredited labs. KCDL currently send samples to laboratory in Australia; the lab send test report and conformity documents to importers, then Kiribati may ship the product. The delay in obtaining reports causes late shipping and late payment and/or penalties.

Virgin Coconut Oil (VCO) is the growing market, with stable export prices. KCDL is keen to scale up VCO production, but again need independent testing to ascertain quality. KCDL also produce soap in bars and would need some technical assistance to improve the process and quality Finally, KCDL produces animal feed based on copra cake. They have a formulation for pig and one for chicken; they need testing of fat, protein, etc.

Tests for coconut oil export
- Volatile matter at 105°C
- Acidity
- Peroxide value
- Unsaponifiable
- Fatty acid profile
- Metals (iron, copper, lead, arsenic)
- Pesticide residues

Besides KCDL, a few local organizations are involved in coconut products. Otta Services Co ltd has been developing high value products (VCO, coconut sap sugar, syrup) for sale on local & regional markets. The products are certified organic (Pasifika Organic), hence the need for purity tests.

Kiribati seems not having benefitted from recent projects specific to the coconut sub-sector (e.g. ACP: Pacific Coconut Project, SPC: FACT, PHAMA etc.). However, MCIC has recently commissioned a Coconut sector study for improving trade and competitiveness in this sub-sector.

KCDL management has welcomed the concept of a central lab that could address their testing needs.

2.2.3 Environment Conservation Division (ECD)

The ECD is responsible for environmental impact assessment (investment projects), for environmental monitoring, and for waste management. ECD is currently monitoring marine water for physical and chemical parameters and heavy metals (such samples being sent in Fiji for testing). For this monitoring program, the Environment Conservation Dept. has the following testing needs:

- Heavy metals in water and maternal milk (the later project based),
- Biological Oxygen Demand, pH, colour, turbidity and total dissolved solids in groundwater

There are plans to monitor and test new contaminants in the future, such as radionuclides, asbestos, and POP[11] in water and air samples.

ECD have no lab yet and send all their samples, when funds are available, to external labs in Fiji (metals in water), Australia (radioactivity), or in the EU (metals in breast milk). Therefore, the concept of a central lab that could carry out analyses locally was found to be a positive development.

Other Public Bodies could have needs for testing water: The Public Utility Board and the Ministry of Infrastructure and Sustainable Energy are implementing water sanitation projects that would require monitoring of the water quality.

2.3 Controls by the Ministry of Health: safety of water and processed food

2.3.1 Official control dispositions

The KV20, the Kiribati Development Plan and other national level documents have highlighted the significance of non-communicable diseases such as diabetes and diarrhoea, linked to safety and nutrition. While the quality and safety of water and food are often pointed at, especially for imported food, the situation results from interaction of several aspects such as lack of information, nutritional habits, and food safety.

Kiribati is a member of FAO's CODEX Alimentarius Committee; a sub-committee of the National CODEX Committee (NCC) has been set up with representatives from the main ministries. The sub-committee (s-c) meets regularly to exchange information and discuss on-going issues and needs. The NCC s-c plays increasingly the role of a cross-sector platform for food safety. During the STDF mission, the NCC s-c was working with a FAO team to enhance the food safety institutions and develop controls for street food handlers.

The MHMS current focus is on drinking water: the Environmental Health Division collects water samples (in wells, public system, rainwater tanks, and marine waters), which represent about thirty samples/ week. Food safety is gradually becoming a priority with the implementation on the Food Safety Regulation; this represents a growing part of the workload of the division. The official controls for food have remained at a minimal level, including some initial assessment of food businesses and investigation of imported shipments. However, the implementation of the food safety regulation now requires strengthening of the monitoring and testing capabilities.

2.3.2 Capacity to analyse water and food hygiene and safety

The MHMS has two labs, the medical laboratory and the public health laboratory. The medical lab ensures microbiological analysis of water aside from medical testing; while the public health laboratory analyses the chemical and physical parameter of water. Ten officers have been trained

[11] POP are the Persistent Organic Pollutants targeted by the Stockholm Convention

for analytical work; the microbiology section has a staff of four, and the chemistry section has two technicians.

- The laboratory for medical testing is used for the needs of the public hospital: biology, serology, and immunology tests are carried out; in addition, this lab carries out water microbiology tests.
- The chemistry section ensures testing to monitor the quality of water. The only tests carried out are the measurement of nitrates and nitrites in water samples, which are usual contaminants and indicate the level of water quality. The tests are carried out by colorimetry (benchtop colorimeter). This method is valid, but known to be relatively imprecise: to produce reliable results, it would require regular calibration and quality control (QC) procedures. The lab has also two hand-held water testers used to determine basic physical characteristics during on-site visits. Similarly, these could need re-calibration. The chemistry section operates with standard operating procedures; however, the quality assurance and quality control arrangements are still being prepared with the assistance of an external laboratory.
- The microbiology laboratory
    - It analyses both the samples of human health (medical tests) and environmental health (food-water). For the later samples, it identifies and measures the contamination for aerobic flora (TPC), Total Coliforms, E. coli, and Enterococci for shellfish (local consumption). The lab consists in two small rooms, one for sample reception and preparation and one for inoculation, incubation and determination. The tests are carried out on small petri dishes (mostly). The equipment is very limited (one incubator, one mixer, one water bath, autoclave...).
    - The setting of the lab (floor area and number of rooms) does not allow following the good laboratory practices. The instruments seemed poorly maintained and ongoing work, due to lack of space, seemed poorly organized. In addition, the laboratory seemed operating without set procedures and without any disposition to ensure the quality and reliability of results.
    - In addition, serious concerns are the proximity of patient consultation in the same lobby, the free access to the incubation rooms (no airlock), the overlap of activities and lack of space and fixtures to properly store, manage and dispose properly of instruments and reagents. These current settings create a significant risk for the health of workers and visitors, not to mention a risk of cross contamination.

2.3.3 Summary on official food controls

The official controls for food hygiene and safety, currently being updated with the support of the FAO, still show a few weaknesses and constraints:

- The organization of official controls is not based on modern risk-based approaches; and no control plans have been defined. In addition, the food safety certificates from other countries are not recognized. All this leads to a situation where MHMS spends resources to control products that, either present a very low risk or offer sufficient assurance of safety. There is a need to revise this approach and to shift from a 'rent-seeking' position (inspection fees levied) to a more pro-active and effective approach based on risk level of concerned food groups.
- The official controls include imported food imports and surveillance; however, food-processing establishments are not re-inspected or monitored. MHMS indicated that foreign 'Health certificates' need to be verified due to suspicious cases: such situations should be documented and integrated as a 'country risk' in a risk assessment plan. If Kiribati is

'refusing' the certificate without a tangible basis, this could be seen as a technical barrier to trade. A possible way to ease the situation is to document accurately each case and engage in a regulatory dialogue with the competent authorities from the countries that export faulty lots to Kiribati. A risk-based approach to controls has been developed and reportedly is being used by inspectors. With support from the FAO, MHMS has started work to regulate street food handlers. As of 2019, there were no contaminants residues monitoring plan in place.

- The enforcement part of official import controls is not yet fully effective. The responsibilities for handling non-compliant food are blurred; and it would seem that MHMS has insufficient power to seize and dispose of faulty shipments, and to impose fines or to collect the costs incurred by the destruction of food. This issue relates the lengthy legal proceedings to re-export or with the disposal of non-compliance food consignments, which hinder food inspectors to exercise their powers more efficiently and effectively.
- The capacities of testing laboratories for testing food and waters are utterly inadequate. The equipment is incomplete and does not allow testing the quality and safety parameters of raw and processed food products.
- The Ministry of Health has plans to renovate the Public Health Hospital, and reportedly to increase the testing capacity[12]. The STDF mission had the opportunity to exchange information with an FAO team (see Annex 6, proposed equipment). Reviewing the investment plans of MOMHS in the light of a comprehensive cross-sectors needs assessment would allow finding synergies or avoiding overlaps. MHMS needs on the short-term some instruments to characterise fraudulent or adulterated food imports; however, limitations in terms of space and staffing might prevent the Ministry to deploy a food-testing lab with adequate capacity to address the testing needs of the country.

2.4 Ministry of Commerce, Industry and Cooperatives

- ***Technical standards and conformance***

Kiribati has no formal standards organization, and is not a member of the ISO. At Ministry of Commerce, Industry and Cooperatives, the Trade Promotion Division oversees export development and the related Aid for Trade, the newly created Quality Promotion Division is responsible for facilitating the implementation of the National Quality Policy and ensuring access to relevant standards, and the Consumer Protection Division deals with issue related to fairness in trade and legal metrology (use of metric system).

- ***Consumer Protection Division***

The Ministry of Commerce has mandate for consumer protection and legal metrology; these functions are within the consumer protection division (CPD, 6 officers). The relevant legislation, updated recently, still does not provide for comprehensive protection:

- Prosecution powers are not defined; officers have only a right to enter premises;
- Controls are mostly post-market surveillance, without any import requirements;
- No disposition is in place to regulate dangerous goods (electrical appliances, gas cylinders, etc.)

[12] A proposed list of equipment was shared by the FAO mission TL, Dr Nana Annan

- The regulations do not refer to standards for prescribing minimum levels of quality and usability (electronics, cars, motorbikes…)

On the regulatory side, CPD powers and capabilities should be strengthened to provide better protection of consumers against unsafe or low quality goods (non-food products), and to ensure fairness in trade-related measurements. This may include:

- Revising the CP regulation to define powers of enforcement
- Developing dispositions for ensuring the safety of products imported and placed on the market, by mandating regional/ international standards or the use of certification (e.g. UL, IEEE, and CE marking...).
- Prescribing existing OIML standards for trade-related measuring devices.

➢ ***Metrology***

The legal metrology role has been so far limited to promoting the use of metric system units; the CPD ensures no control of measuring devices used in trade transactions (balances, pumps, and meters). However, even basic dispositions to regulate and inspect balances (for example) will require the development of a minimum metrology capacity. The CPD work is therefore more oriented towards raising public awareness, and providing information and warnings to businesses. The CPD ensures also regular outreach activities, such as drama presentation and school contests.

An industrial metrology function had been set up years ago at MCIC; however, it has not been sustained. The CPD still have trained staff and a few standards weights, although the latter may need recalibration by a national metrology institute and the former could benefit from re-training on metrology procedures. In Aug. 2018, MCIC commissioned a TA mission to start re-deploying their capability to deliver industrial calibration services. This will require the setup of a basic measurement laboratory for the most usual properties (mass, electricity, length, temperature...): consequently, MCIC needs to invest in an adequate building that must be vibration-proof and that must provide controlled operating environment. However, at the time of writing, the mission report had not been shared with the consultant. The possibility to accommodate a calibration activity under the central laboratory will be further assessed in the second part of the STDF project.

2.5 Financing and sustainability of the current systems

Most of the current SPS services are paid on public moneys. Only the fumigation and certification services from the Quarantine section of MELAD, and the tests linked to official controls for EU exports (CA at MFMRD) fall under a user-pay policy and billed to users. The other tests and inspections without cost-recovery mechanisms are those performed by the Environment Conservation Division of MELAD and by the Environmental Health section of MHMS: those are funded by the operation budgets of these Ministries.

In that context, the sustainability of the national SPS systems is problematic. The main consideration is that all these functions (apart those linked to exports) are considered as delivering public goods; in the poverty context of Kiribati (see §1.1), Government may have considered that budget allocations are more appropriate than 'user-pay' policies. In effect, consider cost-recovery for every tests and inspections would impart extra costs on operators and eventually would generate cost increases for the consumer. By subsidizing some of the SPS inspection and tests domestic market, the Government re-allocates the costs onto all consumers evenly

At present, the sustainability of the SPS systems lies mostly on public funding complemented by a few Aid projects (FAO for environmental health and CODEX committee, and Australia for biosecurity, WHO for water testing).

NOTE: During the consultation process, some stakeholders indicated the need to consider increasing the capacities of the oil-testing laboratory at the Kiribati Oil Company (KOL). However, KOL have already a lab fairly well equipped that is sufficient to ensure the quality control of imported diesel oil (see Annex 7). There would be no synergy between the tests for oil and the tests for SPS issues. Therefore, this activity has not been included into the range of tests for the proposed central laboratory.

3 POTENTIAL FOR DEVELOPING TRADE IN FISHERIES PRODUCTS

3.1 Positive trends for inland processing

The fish sector worldwide is under pressure from consumers, increasingly aware of environmental issues, and the scarcity of resource due to depletion of fish stocks in most of the fishing zones. These global changes mean the fishing industry is leading towards a reduction of fishing rights[13] and the development of fish farming, and increased focus on local processing. In Kiribati for example, the above trend has induced Kiribati Fish Limited (KFL) to plan opening two additional factories, one in Tarawa and one on Christmas Island. The presence of a forerunner, combined with favourable investment climate, could attract other investor in Tarawa; in that perspective, a local testing capacity would strengthen Kiribati's enabling environment for fish/food processing, and support further development of fisheries sector.

3.1.1 Local Traditional Fishing

This sub-sector is of limited size, but important to livelihoods. About 60 to 70% of coastal fisheries production in Kiribati is for subsistence purposes, with the remainder comprising artisanal and small-scale commercial fisheries. A 2008 survey recorded the artisanal catch at around 13,700 tons (60% skipjack and 30% yellow fin). MFMRD has set up small fish plants with gutting tables, freezers, ice production… on 22 islands (Gilbert group), and ensured training of operators on Good Hygienic Practices. The fish is sold fresh on local markets; small volumes are dried or marinated and sold locally. MFMRD has issued regulations extending the mandate of the competent authority for the local fisheries products; however, the hygiene and safety practices are evolving slowly. The official controls for hygiene and food safety are not yet in place: there is some action in terms of awareness rising rather than enforcement. HACCP training was recommended by CA in line with key Policy measures in the Quality policy.

3.1.2 Aquaculture

Initiatives such as aquarium clam production (Atoll Beauties Co Ltd), live ornamental fish, milkfish raising have been reported; at time of writing, another investment project (for milkfish production) is being assessed by MFMRD. While at early stages, aquaculture has a potential to relay local traditional fishing both for subsistence and for commercial purpose. However, as highlighted in the national fisheries policy, a specific regulatory framework is missing (Good Aquaculture Practices, zoning). As well, export of live fish (as food to Hong Kong, and ornamental fish to Australia) is regulated on the grounds of conservation (CITES), quarantine (parasites), and safety (contaminants). Because Kiribati is not a member of the CITES or OIE agreements, export initiatives have been limited by the lack of certificates for sanitary condition or for conservation status.

3.1.3 Industry

[13] Kiribati is located in a zone of the South Pacific Ocean rich in tuna and other migratory species. Recent assessment indicates that the resources in this zone, while under pressure, are not endangered.

The sector has a limited size as Kiribati operations entail one landing point, the Kiribati Fish Limited (KFL) plant and cold store, and about twenty fishing vessels (3 vessels for KFL). The total volume of catch landed amounts to about 1,000 tons/ month, which compares to the total yearly catch of about 140,000 tons caught by licensed international fishing vessels under the Vessel Days Scheme. Other processing factories are of smaller size e.g. PPL, catching and exporting fresh and frozen shellfish (lobster) and Pacific Fish, freezing local catch for sales in the villages of south Tarawa. Only the KFL plant holds a food safety management system (FSMS) certification; the factory laboratory is using rapid tests methods for analyses of bacteria and histamine.

KFL is facing a few trade constraints, as follows.

- USA, Australia and New-Zealand based importers (fresh and frozen fish) increasingly demand sustainable catch (MSC) and eco-friendly certification (WWF …)
- For EU markets (fresh/frozen fish), SPS requirements demand the recognition by the EU of the competent authority (CA). In addition to maintaining food safety certification, the factory must also carry out tests in accredited laboratories to verify their own routine checks. The overall budget for testing is in the tune of AUD 150,000 /year. To maintain their FS system, KFL currently carries out:
    - Microbiological tests (hygiene monitoring)in fish meat, water and ice: with daily in-house analysis of about 25 swab samples for Total Plate Count, Total Coliforms, Escherichia coli, Salmonella ssp, Staphylococcus aureus, Listeria monocytogenes.
    - Routine detection of histamine with rapid test kits (cost of about AUD20,000 /year)
    - Water quality tests with rapid reaction chlorine strips
    - External tests in accredited laboratories (verification of FSMS) include histamine by HPLC (4 times/yr.), polychloro-biphenyls (PCB[14]) once a year, heavy metals in water samples (4 times/ year)

The constraints for the above tests include:

- The high costs of subcontracted tests, of rapid kits, and of logistics;
- The unpredictability of freight, since even the courier operator face limitations and some flights are full or cancelled;
- Waste of working time to process paperwork and administration procedures to sort out cross-border issues when sending samples.

The KFL management welcomed the idea of having a local testing capacity within a central laboratory. In their view, it is imperative to seek good quality of services and reach accreditation as soon as possible. KFL would be open to consider contracting part of their tests or even to operate jointly certain tests in the laboratory (microbiology). This means the KFL could sub-contract analysis to the Central laboratory, or even carry out their analysis with their staff in the premises of the laboratory under a cost-sharing arrangement.

For the country as a whole, these constraints prevent creating an enabling environment for potential investors in the fisheries sectors. Easing this constraint would thus contribute to the Ease of Doing business and to the broader KV20 Objectives for investment and exports.

[14] PCBs are a family of compounds included in the Stockholm convention on the elimination of Persistent Organic Pollutants. See: http://chm.pops.int/Home/tabid/2121/mctl/ViewDetails/EventModID/871/EventID/407/xmid/6921/Default.aspx

3.2 Development of new markets

3.2.1 Aquaculture

Whilst the aquaculture sub-sector is still under-developed in Kiribati, there are a few enterprises already involved in seaweed collecting and farming; this sub-sector has benefitted from support projects funded by Australia and the Government. Other aquaculture entrepreneurs have developed hatchery and production of juveniles of sea cucumber (beche de mer). They use imported species; the live animals are sent for further growth in Abaiang and eventually exported to Hong Kong. A local company, Atoll Beauties, is also producing and exporting ornamental bivalves.

Milkfish collecting and farming takes place at artisanal scale for domestic markets, although milkfish is not the main fish meat consumed in Kiribati. KFL has plans to develop aquaculture for producing of milkfish for export to SE Asia countries, where it is in demand. This project has been submitted to MFMRD in 2018. In addition to the above, offshore cage fish farming is being experimented. Finally, one can find a few crab-raising sites in villages in Tarawa and Kiritimati. These are small-scale operations catering exclusively for the local market.

The development of aquaculture, whilst in its initial stage, could require additional testing capacity, since certain contaminants[15] e.g. antibiotics residues are specific to aquaculture.

3.2.2 Local processed fish products

Beside the industrial, large-scale operations described above, processing take place at household level with sun-dried, marinating, or smoking operations. Such local processed fish specialties are sold on local markets and to Australia and New Zealand for a small extent. In these countries, and to some extent in the USA, there is a niche market for dry or marinated fish or fish 'jerky'. The idea to export on a regular and official basis[16] has been looming in Kiribati for a while: both MFMRD (CA) and MCIC have received repeated requests to support and facilitate development and trade in these locally prepared fish products.

There is a CODEX standard for smoked fish (CAC-RCP 311-2013); the Australia and New Zealand food code reflects this standard and has additional specifications. Exporting fish products prepared locally by fishing communities will require compliance with destination regulations; and the CA fisheries will be in the front line to ensure that exports are properly regulated and controlled.

This new trade opportunity may not concern large volumes, but would certainly boost incomes for the families involved; therefore, it is significant for the national economy. In order to develop trade in local processed fish products, the concerned Government department should consider:

- Developing local food safety guidelines / regulations based on the CODEX standard for smoked fish;
- Organizing local small-size collect and/or processing centres where basic quality control and proper packaging could be ensured on a cost-recovery basis;
- Building capacities of producers groups[17] (or civil society networks) to market and export such products.
- Engage with the producers' groups to develop their knowledge on hygiene, process, and finally capacity to produce safe (exportable) prepared fish products.

[15] These include the detection of malachite green, nitrofurans metabolites , and chloramphenicol at sub-ppb levels (EU MRL)

[16] Current exports are rather based on the ANZ tolerance, allowing passenger to carry 'less than 10 kg' of food for personal consumption.

[17] A case study (WTO Aid for Trade - http://www.oecd.org/aidfortrade/casestoriesbyreferencenumber.htm, CS No 257) presents the experience of Samoa's Women in Business Development to develop export of organic produce to New Zealand.

In terms of analytical capacity, the CA mandate for export controls and for surveillance of fish products consumed locally, incur additional testing needs as follows:

- Benzo(a)pyrene at ppm level for smoked fish and fish meat,
- Benzoic acid in cured fish,
- Formaldehyde and benzoic acid for marinated products (0.1% MRL)
- Total Volatile Basic Nitrogen and Total Methyl Amines that indicate degradation of fish meat,
- Cigatoxin, a toxin cumulating in the meat of reef fish (local consumption)
- Salt and moisture contents,
- Microbial load[18],
- Heavy metals (50 ppm MRL in Australia).

4 SPECIFIC CONCERN ON MERCURY

Responding to public health and safe trade concerns related to fish and fish products, recent developments in the Minamata Convention aimed at decreasing exposure to methyl mercury. However, most of the dispositions of the Minamata convention, of which Kiribati is a member, are not directly applicable to this country. The Convention deals with extraction, processing, handling, and disposition of mercury; it describes the use and disposal of articles containing mercury as well and finally the tracking of mercury contaminants in the environment, the latter being relevant to Kiribati. Mercury contamination is already addressed through the monitoring activities of ECD at Ministry of Agriculture; yet with the limitation to access to tests, currently outsourced.

The preparation of the CODEX standard on methyl mercury in major predatory fish would not bring new requirements for the industry. The CODEX Commission simply adopts and harmonizes various maximum residues levels (MRL) into an international standard. The ongoing works aim at evolving the current Guideline[19] into an international standard. The MRL requirements in the guideline are similar to those found in regulations in the EU, Australia, or USA; Kiribati fisheries operators are already familiar and compliant with these. Nevertheless, the fact that such residue levels are stated in an international standard would in the future induce importers to increasingly referring these in trade deals; hence, a necessity for exporters as Kiribati to be able to demonstrate routinely conformance to such MRLs. This in turn would be much easier if a local laboratory had the capacity to analyse these heavy metals.

5 ENHANCING KIRIBATI SPS CAPABILITY

5.1 Legislative corpus for SPS matters

Based on the document review[20] and interviews with key informants, the legislative texts are deemed complete and adequate to organize a framework to ensure environment, animal and plant health, and food safety. A summary of such texts is presented in Annex 8.
Particular ministries may find necessary to develop application text or guidance for regulations, when more detailed dispositions are needed (e.g. enforcement and penalties). However, it is safe to consider the legislative corpus offers at present a sufficient basis for enforcement; therefore, legal assistance should not be considered a priority for Aid projects.

[18] The ANZ food code states the requirement depends on salt contents (<20% need testing) or on moisture (>40% need testing)
[19] CAC/GL 7-1991 : GUIDELINE LEVELS FOR METHYLMERCURY IN FISH
[20] A review of the legal text related to TBT and SPS matters was carried out in 2016 under the ACP-EU TBT programme. The report is available at MCIC.

5.2 Official Controls

5.2.1 Kiribati Seafood Verification Authority (MFMRD)

The official controls are well organized and staffed, but as described in § 2.1.4, the competent authority testing capacity is very limited. For the CA director, there is a need to access to the range of tests requested by export destinations regulators, in good conditions of timing and cost. However, the CA might prefer not to operate the laboratory directly; because when food safety agencies own and operate a laboratory, they are '*de facto*' in a situation allowing conflicts of interest. To avoid this situation, most food safety agencies in developed economies do not own and operate a laboratory; they either 'isolate' the public laboratory by adequate administrative set up (attachment to another hierarchy level: example in Annex 9), or completely outsource the testing services to suitable (read: accredited) private laboratories. In Kiribati, it is recommended that the KSVA do not invest in and operate a laboratory section, but delegate the tests to a suitable structure e.g. the proposed central laboratory.

> The ISO17025 standard (quality management systems for laboratories) has requirements for labs to demonstrate their impartiality and independence. Having a laboratory under the direct authority of a body that uses the results of this same unit creates a situation where conflicts of interest may arise. With a lab manager under the authority of the CA, the lab would have utmost difficulty to demonstrate it can deliver results independently of any external pressure. This would prevent accreditation and *invalidate recognition by the EU FVO.*

In addition, The CA has indicated their desire to assist outer islands that wish to export smoked fish, salted fish, and tuna jerky to the Pacific community living in Australia or New Zealand. As indicated in § 3.2.2 above, this will require the capacity to test salt, moisture and contaminants in the products.

Finally, the CA fisheries would need support to improve their fish sampling methods when inspecting fishing vessels, and would need the support of an external team (local service provider or consultancy) to develop capability of seafood operators to conceive and implement properly HACCP systems.

5.2.2 Plant and Animal Quarantine Services (MELAD)

The quarantine services are relatively effective despite limitations in staffing and equipment. In a context where public resources are scarce and budget constrained, MELAD should consider making large use of equivalence and recognition arrangements to minimize the border controls.

Using the proxy of the South Pacific Commission to report to international quarantine organizations, Kiribati is not a member of the OIE and of the IPPC[21], and does not accept Health certificates from other countries. The quarantine section ensures a 100% screening of consignments, which puts a heavy workload on the team. It may be much more effective to engage with international forums, accept Health certificates from origin countries, and use risk-based approaches to focus the controls on the actual risks areas. In that perspective, the mission recommends pursuing more actively membership in the OIE and IPPC at international and regional levels. There would be a positive trade-off between the costs of resources needed for such participation (travels, staffs time…) and the benefits Kiribati would derive on trade (easier trade with specific countries) and development (access to support programs from these organizations).

[21] See: https://www.ippc.int/en/countries/kiribati/

5.2.3 Food Controls (MHMS)

While the control of water used for human consumption is well organized, the official controls for food are not yet sufficiently developed. The environmental health division (EHD) is responsible for several other components of public health and therefore has no specific officers. Food safety issues are supposed to be dealt with by public health officers in each district, as part of the range of duties in public health. The EHD has not yet carried out a systematic analysis of the food risks prevalence and of their impact on public health, or developed a national contaminants monitoring plan. While the significance of non-communicable diseases (NCD) is recognized, it seems that an important cause of illness remains the food consumption habits[22]. Therefore, MHMS focus was set on the control of water quality, which is relevant to diarrheal diseases. Yet other risks, linked to the use of local or imported vegetables, fresh seafood sold locally, and food improperly stored (retail stores) could have a significant role on the health of I-Kiribati. The government regulatory bodies for food importation are numerous (MHMS, MFMRD, and MELAD). While the legislation for each area is relatively effective, there is a need to develop a common food safety policy and most importantly, a joint approach to food risk assessment.

The situation offers opportunities for enhancing effectiveness of official controls. The first priority is to conduct a thorough assessment of risks levels, in the light of epidemiology data and consummation patterns for each group of consumers. Then, the dispositions for implementing official controls (nature of risks, monitoring plans and border controls) would be clarified, and harmonized with those of the trading partners. It would be also advisable to extend the current information sharing and coordination efforts taking place in the NCC, especially to harmonize the contaminants monitoring plans and the efforts on waters quality monitoring. Finally, it would be useful to engage food business operators (processors, traders, retailers, and catering operations) and the consumers associations, with the purpose of developing partnerships to achieve the national food safety objectives.

The FAO is providing support for developing regulation for street vendors and strengthening the national CODEX committee. There is an opportunity to build on the existing effort and develop a broader and more holistic project that would address the issues listed above.

This is an area where Aid support could be needed in the future, in the aim to assist MELAD and MHMS upgrading the whole SPS system and adopting modern quarantine and food safety procedures. Improving SPS capacity would include extending inter-agency cooperation (NCC subcommittee or else), possibly defining joint inspection/ monitoring plans; or running PVS and PPCE. Improving SPS capacity could also benefit from the deployment of ASYCUDA by customs, which is now in its final phase. Although Customs and the ASYCUDA system use a different classification of risks, there would be room e.g. to integrate certain hygiene/quarantine/ health parameters/ keywords in the system so that shipments would be classified automatically as 'low risk' and directed to a green channel. The above activities would contribute to enhanced health protection and trade facilitation. A small specific TA project spreading on a couple of years and dealing with the above issues could be useful to evolving quarantine and food safety systems in Kiribati.

[22] Excess consumption of fats, salt and short sugars, relatively low fibre contents in diet combined with increasingly sedentary lifestyles, leading to cardiovascular incidents.

5.3 Analytical Capacity

Basically, there is no capacity to analyse the chemical characteristics and possible chemical contaminants of agricultural and food products in Kiribati. The only chemical tests available locally, with a limited accuracy, are the measurement of nitrates and nitrites[23] in waters. The capacity to determine and enumerate bacteria, yeasts and moulds in water and food could be sharply constrained by the lack of space, equipment, and proper work methods.

In KV20, Kiribati aims at '*becoming a wealthy, healthy, and peaceful nation*'. Ensuring health and wealth of I-Kiribati will require the use of a modern quality infrastructure, and more specifically those conformity assessment functions related to safety of goods and products placed on the market. Hence, there is an obvious need to develop the capacities for testing, in association to enhancing the enforcement mechanisms for agri-food safety and the coordination between Ministries (One Health perspective). The justification for a local testing capability vs. continuing outsourcing is provided in Chapter 6 below.

The fact that Kiribati is starting from a very low capacity level should be seen rather as an opportunity than as a challenge. Against the immediate perception that the lack of existing resources will challenge the realization of a competent local laboratory, one should recognize that starting from an almost blank page allows adopting from the onset, in an adequate facility, good laboratory practices and a management system, and allows shaping up the team and resources to the objectives set.

The needs for tests have been detailed in Chapter 2 above and in Annex1 (for MHMS), 2 (KCDL), 3 (EU MRL lists) and 4 (KSVA tests). In first approach, Kiribati would need to develop capacities to test characteristics of food (composition, additives, vitamins...), as well as a set of contaminants such as metal, toxins, and germs. As shown on the table on next page, a whole range of test can be carried out with instruments of basic or intermediate complexity.

- Proximate analysis[24]: dry matter by weight after drying at 105°C; ash by incineration at 550°C, crude protein by distillation and colorimetry (Kjeldahl), crude fibre (organic fraction remaining after acid and alkaline hydrolysis) and crude fat as the fraction extracted with petroleum ether.
- Incineration, extraction (Soxlhet or hot extraction), evaporation for the above analyses
- Phosphates determination by acid digestion and titrimetry
- Total volatile basic nitrogen (TVB-N) by distillation and titration
- Analyse of minerals in waters and food such as chloride, fluoride, ammonium, nitrites, nitrates, phosphates, sulphates, bromate, chlorate, chlorite; this determination can be done by a Flow Injection Analyzer + ion chromatography
- Water tests such as total nitrogen, phosphorus, hardness, alkalinity, cyanide (C-N), phenolics, ammonium, nitrate, nitrites can as well be carried out with a Flow Injection Analyzer and with a spectrophotometer.
- Benzoic acid, hydrosoluble vitamins, most mycotoxins, and certain additives can be determined by a liquid chromatograph with a range of columns and detectors
- Fatty Acid profile for oils and fats is determined by gas chromatography
- Microbiology analyses will require water baths, incubators, and laminar flow cabinets

[23] The Kiribati Oil Ltd has a quality control lab carrying out some analysis of diesel oil (Standard ASTM, see list in Annex 7)

[24] See definition and methods at: http://www.fao.org/docrep/008/y4705e/y4705e12.htm; proximate analysis is used to determine nutritional values by calculation.

TYPE of INSTRUMENT	TEST	NB/YEAR
Atomic Absorbtion Spectrometer & Cold Vapor injector	mercury in water and food	500
Atomic Absorbtion Spectrometer & Graphite furnace	other metals in water and food	1,300
Colorimeter	ammonium, sulfate, colour in water	610
	colour of oil	600
Distiller, Extractor, Weighing & Titration	Moisture in food Solids in water proximate, total volatile nitrogen	3,290
Gas Chromatograh & Various Detectors	Fatty acid profile	305
	Organic compounds in waters	410
Liquid Chromatograph & various Detectors	Mycotoxins, Histamine,Vitamins, Benzo(a)pyrene, Formaledehyde, Melamine	755
Spectrophotometer and/or Flow Injection Analyzer & ion Chromatograph	Nitrate-nitrites in water cyanide, fluoride phosphate in water Iodine, ascorbic acid in food	1,575
Titrimetry or Conductivity or Potentiometry	Sodium, chloride, pH, oil QC tests, BOD...	2,085
Specific instruments	Density, refraction index, melting point	2,500
	Insects	500
Organoleptic tests	Odour and taste of water/ oil	200
Microbiology	Bacteria, yeast and molds in water, and food	10,000
Mass Spectrometry or other advanced equipment	asbstos, hormones, dioxins and PCB, PAH, arochlor pesticides, acrylamide, Radionuclides	225

Only the tests on the last line of the table (red ink), which requires complex equipment, could not be carried out immediately in the local laboratory. In addition, the number of samples for such tests remains low: it would not allow an effective use of the equipment.

6 OPTIONS TO INCREASE ACCESS TO LABORATORY TESTS

At present, most of the tests required by regulators or the industry (exports) are outsourced: only a few microbiology tests are done locally (see 5.3 above). From the focus group discussions, the mission positively identified that MHMS, MFMRD, and MELAD have a common range of projects and responsibilities. These ministries' mandate and plans require similar analyses for water quality, soil and food. With limited resources in terms of funding, analytical expertise, equipment, and adequate laboratory space, the central question is whether it would be possible for Kiribati to develop the national testing capacities. The options are thus either to continue and increase outsourcing of tests, or to develop the local capacities to ensure testing locally; in the latter case the ways for the delivery of services should be appraised.
In this assessment, a time span of five years has been considered. Five years is a usual lifetime for laboratory equipment; hence, it is practical to consider a first phase for capacity development with the same duration.

6.1 Outsourcing of the tests to other laboratories in the region

Outsourcing is currently the default option for all tests (except microbiology analyses). Most of the samples for testing heavy metals in water and fish meat are sent to the chemistry laboratory of the University of South Pacific in Suva, Fiji. Other tests require sending samples to the Philippines (copra/oil), to Australia, New Zealand, or in Europe. Currently, the volume of 'complex' tests represents about 50 samples a year (fisheries, environment, and water tests).

6.1.1 Advantages of outsourcing

The main advantage consists of getting reliable results, since the laboratories involved are accredited for the outsourced tests. Specialized laboratories are able to use complex equipment with a large throughput, which allow providing a reasonable cost for the tests.

For Kiribati's economy, another advantage could be seen in the fact the Government needs not immobilizing funds for investment and for recurrent operational and overhead costs. The tests are purchased at market prices; and this requires only specific (and flexible) budget allocation. However, such flexibility and low budget footprint come as a trade-off with effective regulation enforcement.

6.1.2 Disadvantages of outsourcing

- *Limitations to the range of testing*

  Some samples cannot be sent abroad, since they must be analyzed within a set time after sampling. In general, any sample will evolve during handling and this determines changes in the presence or relative concentration of the molecules of interest. These requirements are particularly stringent in the case of microbiology sample and most of the samples including organic contaminants, which must be stored under low temperature and analyzed within 24 hours.

- *Heavy logistical constraints.*

  The use of courier services is not straightforward in Kiribati. Frequent changes in flights, and the limited space for cargo, lead sometimes the courier company to cancel or delay the shipment. In addition, forwarding samples abroad involve significant administrative procedures (customs, quarantine, etc.), abundant paperwork, and consumes time. As a whole, the handling of samples up to the laboratory abroad remains unpredictable. Following

proper procedures for handling and forwarding samples is yet a crucial part of successful analysis. Because the duration of transport and reception, and the temperature storage can vary considerably between series of samples sent to a same lab abroad, this would affect the quality of analytical data and cause difficulty to compare the test results. This situation was experienced in the Cook Island, were the results of water samples for environmental monitoring were found to be heterogeneous within similar series and prevented useful exploitation of data (see "*Scoping report for a central environmental and food laboratory for the Cook islands",* M. Leonard, 2006, Institute of Environmental Science and Research Limited).

- *Longer time to results.*

  Even once the samples are successfully forwarded, the time to result can be very long. Kiribati clients have little or no leverage to demand a quick processing, given the limited number of samples sent. Delays in producing test results generate additional freight costs (case of copra: shipment cannot be done without test report).

- *Overall costs of testing*

  The cost of courier service (A$150 / shipment), as well as the staff time linked to prepare documents, add to the quality control costs. This extra cost acts also as a limitation to increase the frequency of sampling and testing, since large shipments would not be cheaper[25]. Since volumes remain comparatively modest, there seems to be no possibility to enter into an agreement with the forwarders or airlines to accommodate regular shipping and/or lower rates; in this context, the costs of shipping would remain in proportion to the volume of samples sent.

- *Weak investment environment*

  The absence of a testing capacity in country acts as a disincentive for investors. Companies seeking to develop fish processing factories near the catch location, or food production for local or regional markets, have to accommodate the inconvenience and extra costs for getting their quality control analyses done.

- *Weak trading positions*

  The absence of tests in country obliges KCDL to rely on their customers' analyses. Lacking the capacity to produce test reports at origin places KCDL in the weak position of a deal-taker. Since they have no access to the test results, they cannot challenge the cost position of the client.

- *Absence of in-country capacity building*

  Finally, the most serious inconvenience of outsourcing is the hindrance to capacity development in Kiribati. Because there is no proximity between the laboratory and the clients, the latter receive neither information on the analytical techniques and their scope and limitations, nor advice on how to interpret the test results or on how possibly improve sampling or sample handing. This limits both the value of the results for users, and their capacity to understand the results, to enhance SPS controls, and to improve their SPS-related knowledge. In theory, any accredited laboratory should avail themselves to providing assistance to the customers to understand the results; nevertheless, such exchanges are greatly hampered by distance. Having the lab 'next door' allows more frequent formal or informal meetings, and greatly improves the interactions and learning process.

[25] The courier companies use a dual rule for costing, based on volume or based on weight: whichever the higher, applies.

In addition, analytical theory and practice is a keen intellectual exercise, one that produces smart technicians and professionals. The absence of laboratories in Kiribati means such opportunities for personal development are lacking. Lab work or apprenticeship would be valuable in many trades e.g. marine industries, catering, food industry..., and would even offer youth the possibility to work abroad as qualified professionals.

In summary, outsourcing of testing consists of the 'default' option. The costs of testing abroad are marginally higher than in-country testing. It has the convenience of avoiding significant investment in capital and human resources; but conversely brings in hidden costs and significant limitations that prevent regulatory agencies to discharge their mandate effectively. This could be seen as hampering both the growth of the economy and the knowledge base of the people. Alternatives to outsourcing would consist in developing a sufficient analytical platform locally; this may be achieved faster and more efficiently under a public-private partnership lab development model.

6.2 Developing analytical services in-country

6.2.1 Lessons learnt and critical success factors

- The project team was able to engage with another STDF project in the Solomon Islands. The project PPG523, implemented by the FAO, aims at strengthening the capacity of the national public health laboratory to provide services in support of market access for Solomon Islands fish exporters. The project has a CHF 500,000 budget over three years, and involves the support of Cawthron Institute[26] of New Zealand for developing capacities in microbiology tests and preparing a management system compliant with the requirements of ISO/IEC 17025. The analysis of the project reports enabled the consultant to consider the following caveats, which would likely apply to the Kiribati situation.
    - Procurement was an issue. This public service lab sought to reach low unit costs by purchasing large quantities; however, this generated overstock while the limited rates of consumption lead to obsolescence and waste of reagents.
    - The laboratory mandate and organization were inadequate to reach sustainability. The lab was insufficiently staffed and was running 'at minima' with a few samples per week. Steps were taken to recruit three more microbiologists and to collect more food samples (target of 100 samples each week)
    - The availability of staff has slowed progress. The project proposed to associate laboratory aids to analytical work, so that a regular flow of activities could be maintained.
    - It was highlighted that staff training and hands-on capacity building required lots of practice and hence additional reagent during the growth period.
- The project team also engaged with the Ministry of Marine Resource (MMR) of Cook Islands. The MMR has benefitted from the EU funding towards the 'Cook Island sanitation sector reform' project. MMR has commissioned *"Feasibility studies to scope options to establish a central laboratory"*. The report, shared with this PPG project, recommended investing in a centralized laboratory. There is no information regarding the subsequent decision by the Government and any possible funding by donors yet. This could be investigated in the second phase of the PPG work. The report highlighted the following issues:

[26] http://www.cawthron.org.nz/analytical-services/, accessed 02 Sept. 2018

- The need to embed ISO/IEC 17025 requirements in the institutional setup and in the physical design of the laboratory;
- Consideration of independency, or large autonomy from parent ministry, so that the laboratory head has sufficient authority on budget matters to sustain the activities;
- The organizational options considered range from a 'Ministry's unit' to a public-private partnership.

- Finally, the project team has identified the following key success criteria based on Kiribati situation and on experience supporting laboratories in the Pacific and in Asia.

(1) The accreditation of laboratories is neither an option, nor a remote objective they would achieve in some distant future. This objective must be embedded in the early stages of the laboratory roadmap. Accreditation means the lab management system is effective, and henceforth, that the lab provides reliable results and would remain sustainable.

In short:
Accreditation → Trust → more clients and business → Continuity
No Accreditation → Less trust: clients will seek better labs → no sustainability

(2) To seek accreditation, any laboratory must:
   a. Have a top management that is independent from external pressure and has access to the resources needed by the lab. The laboratory head must be committed to quality and have good planning and leadership abilities.
   b. Have personnel with the qualification and experience adequate to the range of tests. If personnel are not available in country, regional professional will be sought after and competence will be transferred gradually.
   c. Have equipment that is well maintained, calibrated, and traceable to SI[27]
   d. Have a facility that is secure, large enough to accommodate work, and can minimize the environment variations affecting the tests. The existing microbiology laboratory does not match such criteria.

(3) Kiribati-based laboratory/ies should aim at ensuring only tests of intermediate complexity that will be most in demand in the next 5 years. Some more specific tests (pesticides, POP, etc.) would need to be still outsourced. While a management system will cover all activities, accreditation could be sought after first for specific tests (export-related) and gradually extended to the whole range.

(4) Laboratories are business units that produce and sell services to clients. The fact that public laboratories do not always 'charge' for the tests, does not mean that these services have no costs. Rather, their costs are hidden and covered by the Government budget. However, good laboratory management suggests tracking the costs associated to inputs (staff, reagents, energy, etc.), and to use business planning with a costing structure that allow cost recovery when feasible. This is seen as a mean to measure the value-to-cost ratio of the services offered, and to ensure sustainability.

[27] System of International Units - an harmonized framework of measurement units

(5) Considering the broader SPS system, local laboratories can play an important role in assisting regulators to understand better the interactions between the environment and plant, animal, and human health. There is a need to facilitate interactions between laboratory and enforcement or monitoring sections, in particular to improve monitoring plans, sampling methods, or HACCP implementation. Therefore, it would be worth if the central lab facility would also include a meeting room and office setup allowing to host on a temporary or permanent base the activities from other SPS stakeholders (CA fisheries, CODEX, function, official food controls, monitoring plans, etc...)

6.2.2 Option 1: Developing independent laboratories in each Ministry

This option may immediately come to mind for most Government officers. The logical reasoning is that their Ministry needs to have a lab to carry out tests required to implement the Ministry mandate, action plans or regulatory functions.

However, what each Ministry would actually need is reliable data and test results that can be used to guide the regulatory activity and adjust policies. What matters is more being able to access testing services, rather than carrying out the tests. Reliable data is obtained when the laboratory implement a management system and can demonstrate its compliance[28] with ISO/IEC 17025. Secondly, each Ministry would need to get this data at an economical cost, in order to avoid inflating public expenditures.

Therefore, the option to develop individual laboratories in Kiribati must be proof tested against the two above criteria. The following table shows the assessment for this option. The cost calculation is based on a generic business model presented in Annex 14.

		KSVA MFMRD	MELAD ECD	MELAD BS	MHMS	MHMS
Tests		Heavy metals, histamine, microbiology	Metals, minerals in water A few samples agri-products & contaminants	Insects, plants determination	Metals, water minerals Food chemistry & contaminants	Microbiological tests water & food
Minimal size required (m^2)		60	100	60	140	120
Staff	current	1	0	2	1	2
	needed	2 +1/2 (manager)	2+1/2	2+1/2	5+1	3+1/2
Samples/ year		30	140	275 (to be confirmed)	Water: 1,000 Food: 1,500	
Number tests/ year		150-200	500-800	500-600	8,000- 10,000	
Cost* of tests $		700 each	214 each	203 each	84 each	28 each
Possibility of Accreditation		Difficult- will require institutional decisions	very difficult; may require long time	Very difficult due to low activity	Difficult , may require long time	Unlikely due to location

[28] Accreditation is the recognition of such compliance by an external body. It is the easiest way to demonstrate compliance, as opposed to explaining to any customers how the lab is satisfying the requirement of the standard.

The line "cost* of tests" is provided here to give a rough estimate of the level of costs: they allow comparing the effect of size and number of tests for the different labs. The costs have been calculated based on a theoretical model and assumptions presented in Annex 14. The consultant recognizes that some values would need revision, to increase the accuracy of calculations. There would be variations upwards and downwards; nevertheless, the changes will affect all the labs in the same manner. Hence, the model and assumptions are deemed solid enough to carry out the financial analysis and justification at this stage.

Based on the above table, the consultant's assessment of each laboratory is as follows:

- **A Fisheries CA lab** would require the construction of a specific building of about 60 sq. m. near the current office (the land plot includes a free area of about 150 sq. m.). The lab would yet receive very few samples and would still need outsourcing complex tests, as well as the microbiological tests, for which the team has no experience. There would be no possibility to attract private tests from the industry, since the lab would be in a conflict of interest (being resourced by a private client that is subject to export regulations). Accreditation might still be possible but will require re-arranging the hierarchy, with oversight ensured from outside the official controls section by an officer who must be technically competent. However, the lab investment and operating costs would be extremely high in proportion of the number of tests carried out.

- **An Agriculture & Environment Lab** would essentially deal with environmental samples (heavy metals in waters and air) but would still outsource tests for POP contaminants. As there is no facility and no staff yet, the set up and staffing of a testing facility (about 100 sq. m.) may take a significant amount of time. With a small activity base and staffing, the costs of tests would remain high and the management system may turn out difficult to sustain. Accreditation may thus be difficult to reach and maintain due to scarce qualified human resources and difficulties to participate in proficiency tests.

- **A Quarantine inspection and testing lab** would deal with a limited number of samples. It would require building a small facility (60 sq. m.), which could operate with reasonable costs. Accreditation would be difficult on the grounds of limited human resource and scarcity of quality assurance or proficiency testing schemes offered. However, the lab may benefit from support from Australia and New Zealand and from other International agencies (FAO, IPPC and OIE). While there may be no technical synergies with the ECD lab, staff-sharing, joint use of utilities and common management functions (training, internal audit, etc.) might be arranged in a view to reduce operating costs.

- **A Ministry of Health microbiology lab** could be developed. MHMS may either use the existing lab as a base, or build an entirely new structure, possible including a chemistry section. The former option would be uneasy as widening and renovating the current lab could disrupt operations in the whole wing. There is a limited (yet sufficient) space available at the back of the current lab. Nevertheless, the renovated lab would be in an environment carrying out heavy contamination: this may create difficulties in avoiding cross-contamination. Accreditation would be difficult if staffing remain scarce, and could prove impossible due to the environment.

- **A Ministry of Health food chemistry lab** complementing or combined with the microbiology lab, would rapidly deal with a significant number of samples. When the official food control

regulations will be totally enforced, the samples for food safety and environmental health would represent the largest part of the testing needs of Kiribati. This would yet require the building of an adequate facility (140 sq. m.) and subsequent proper staffing, since there is no such chemistry testing lab at MHMS at present. The food microbiology and chemistry laboratories at MHMS could be relatively cost-effective, if properly staffed and managed.

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In summary, the development of separate (different) Ministry-based laboratories remains a solution that would be unsustainable and financially not viable for the following reasons:

- No Ministry has on-going plans and budget to develop their laboratory section. MHMS will receive support to upgrade the Public Health Hospital, but the consultant was informed such support might not include laboratories. On-going support from WHO (water) and FAO (CODEX Committee) reportedly do not include infrastructure or equipment funding. The biosecurity division has contacts with FAO to set up a standalone containerized quarantine lab. Apart of this, no Ministry has contacts or proposal with Aid agencies to develop their laboratories.
- The development of laboratory infrastructure and the subsequent staffing in each Ministry would take a long time and remain uncertain, since this has to be approved separately by the Cabinet.
- The scarcity of candidates with suitable profiles to staff the key positions would lead to difficulties in managing the laboratories, especially to demonstrate their competence.
- Similarly, the laboratory development would remain slow and uncertain, since most of the labs would be unable to justify fund requests equipment, training or external services within their Ministry.
- Separate laboratories would have difficulties in identifying and mobilizing peer support for advice e.g. through networking or overseas contacts.
- Accreditation would be a difficult and protracted exercise in most case, and may prove impossible for some labs.
- Individual labs may still remain not familiar of the procedures for forwarding samples overseas for analytical tests; and the forwarding of samples could not be optimized (pooling, pre-processing, etc.).

6.2.3 Option 2: Justification for developing a central laboratory

Conversely, the justification for a central laboratory is grounded in the following considerations.

(1) The central lab investment represents an economy (saving) of about half a million dollars, as compared to the sum of investments in individual, ministry-based labs. The recurrent costs of the central lab would also be 45% less than the sum of running costs in all the separate units. For the nation's budget, generating the test results 'as one' would result in saving approximately 330,000$ a year.

NATURE of COSTS	% GAP	VALUE GAP*
Investment costs (one-off)	-34%	-$ 538,648
Cost of Operations/ year	-45%	- $ 331,404

** Investment in a central lab minus investment in individual labs*

(2) In a central lab, the support functions (administration and quality) will be distributed on several sections and will have lesser impact on operating costs. The quality management system can be more easily properly organized and maintained than it would be possible in separate laboratories.

(3) In a central lab, the cost of utilities, maintenance, generic systems, and services will be distributed in a much larger number of tests; therefore, their share in test costs will be lower as compared to their share in individual labs. The same is true for the costs of calibration, equipment maintenance, training and qualification of staffs, since these operations can be pooled and their cost reduced.

(4) There will be no duplication of tests between ECD, KSVA, and CA food (metals, water...). Redundancy of investment in same equipment across ministries will be avoided.

(5) The central lab will have comparatively less difficulties to gather a team; it would be easier to manage staff replacement and avoid loss of knowledge and skills in case of staffs moving away. Individual labs would have difficulties to properly train or supervise personnel, whereas this can be arranged more easily in the central lab.

(6) Because personnel in the central lab will carry out a large number of tests routinely, they will quickly become familiar at performing tests and will acquire skills for evaluating validity of results, fixing instruments problems, or ensuring internal calibrations.

(7) The production of services will be more efficient and effective, because of the combination of pooling of samples, specialization of instruments, polyvalence of technicians, planning of work, familiarity with methods, and better conditions for purchasing reagents and small tools.

(8) A central laboratory will allow all interested parties building up and understanding a comprehensive picture of environmental health issues, and of possible interaction between environment, animal and plant heath, food safety, and human health. The pooling and assessing of data sets from series of tests will allow producing more relevant and significant information to be shared by all concerned ministries.

(9) In a central laboratory, there will a single point of contact for receiving samples: this would allow improving sampling and the verification of sample status, as well as enhancing the capacities of customers to take samples (correct containers, preservation conditions, labelling, sampling methods...). Staff at a central laboratory, will have knowledge of the results and be able to interpret the data better from knowing the sampling environment.

(10) It will be easier for the central lab senior staff to set up network or links with peers in labs overseas. In turn, this will improve the conditions for forwarding samples to supplier labs, and more importantly, will create good information channels for support to interpret data. The senior staffs in the central lab will gradually become proficient in interpreting data (typical data vs. outliers) from both local and outsourced tests. They will thus become able to assist regulators for example on improving their monitoring plans, on sampling locations and methods, or on alternative tests to carry out.

There may be a few disadvantages and risks associated with a central laboratory; however, this would much depend on the decisions made for its setup, governance, and funding. The main disadvantages and risks are identified as follows:

- There might be changes in the level of funding or support from the different ministries and Aid Partners, or limitations in the public funding necessary to maintain building and equipment in subsequent years;
- Access to tests could be variable across ministries, or be untimely, or not matching their needs. This might result in ministries returning to outsourcing or developing again own laboratories;

- Poor cost tracking may lead to a deficient pricing structure (too high or too low prices) that would hinder the sustainability of the laboratory business;
- Unsatisfactory linkages could prevail between the laboratory and ministries, which would trigger disinterest and/or the development of individual labs in the future;
- There is little synergy and possible work sharing between biology, microbiology and chemistry analyses. The only rationale to couple these sections is the cost reduction for investment and utilities (energy, water, air conditioning).

These risks will be included in the logical framework of the project, with mitigation options.

7 INSTITUTIONAL FEASIBILITY

7.1 The range of options

As explained above in § 6.2.1, the institutional set up of the central laboratory must allow three conditions to be met:

- Be independent from undue influences potentially affecting test results
- Have a secure operational budget with funds regularly/timely allocated
- Receive a sufficient number of samples.

Both the ownership and management structure may either support or hinder the above requisites. These issues are critical success factors for the central laboratory. A range of options to set up the central lab can be considered by combining the choices for ownership and management (see the table on next page). Nevertheless, international practices increasingly favour private ownership and management of laboratories, on the rationale that in most cases, private ownership and management tend to optimize efficiency and sustainability in response to markets signals. In such an option, the public offices can select and approve those laboratories offering accredited services at competitive prices. Selected laboratories are then offered multi-year service contracts to carry out the tests necessary to achieve public regulations.
However, the model indicated above is mostly found in developed or emerging economies, where sizeable demand for testing services exists. Such is not the case in Kiribati where the limited demand for tests in the industry would not allow full profitability for a laboratory owned by a private company. Consequently, in order to sustain the production of reliable data used for regulatory decisions and policy-making (public goods) the Government should be prepared to secure recurrent operational funding over the first years of services; this would yet be on a decreasing basis as the central laboratory would gain progressively more private and external clients to generate revenue.

Table: Combination of ownership and operation options

Ownership / Management	Public only One ministry	Public only Other entity	Public-Private	Private only
Public only One ministry	Individual labs in each ministry managed by technical sections	Lab is owned by a public agency and managed by a Ministry's technical section	Lab ownership is shared (building/ equipment); lab is managed by Min.	Private company builds and owns lab, and rent to a Ministry
Public only Other entity (Statutory body)	MOU between ministries or with public operator ; Central facility where different ministries team perform their own tests	Labs owned and managed by another public agency; access to services through MOUs	Lab ownership is open to private parties (building/ equipment); lab is managed by another public agency	Private company builds and owns the lab, and rent it to another public agency for operations
Public-Private	Lab owned by a Ministry, operated in partnership under a joint Management agreement	Lab owned by a public agency, jointly managed with a private operator	Lab ownership is shared (building/ equipment); lab is operated via a joint management agreement	Lab is built and owned by a private company, and co- managed with a public entity
Private only	Lab owned by a Ministry, operations sub-contracted to a private operator	Lab owned by a public agency; management is sub-contracted to a private operator	Lab ownership is shared (building/ equipment);operated via a fully delegated management agreement	Lab is owned and operated by private companies, and approved to deliver regulated services under MOU with each ministries

Hereafter, a rapid assessment of the options possible in Kiribati is presented.

- **<u>Central laboratory as the technical arm of a ministry (e.g. MFMRD, or MHMS)</u>**

The selected ministry would be responsible to build and scale up their testing capacity and deliver testing services for all other ministries. The ministry's 'technical section' would thus have a work plan with several activities streams, some for the ministry and some for other regulators. Services to other ministries and public bodies would be availed under MOU with agreed service levels and sample number. Other arrangement could also be considered, for example renting facility space and/or equipment to other ministries, where technical teams would come to carry out testing.

This option will require particular arrangements allowing it to be managed in wide independence[29] from the rest of the ministry. This is crucial to guarantee independence of the testing, security of resources (avoiding possible intra-ministry budget re-allocation), and equal treatment for any sample received. The 'central lab' budget would need to cover all direct operational expenses (labour, consumables, chemicals, repairs and maintenance).

While this option has the advantage to build upon existing administrative and technical capacities, it brings significant risks as follows:

- Perception of bias/inadequacy towards the host ministry and unwillingness of other ministries to enter in MOUs.

[29] This may require the technical section to be attached directly at the top level of the Ministry, rather than down in the hierarchical lines

- Inappropriate hierarchical arrangements could lead to insufficient independence of the lab Manager.
- The allocated budget could be not separate enough, which would lead to re-allocation within the Ministry and compromise effectiveness of the laboratory.
- The ministry's administrative procedures used for selection, recruitment, management and training of personnel could be inadequate and limit the efficiency and capability of the laboratory.

➢ **Central laboratory as part of an existing statutory body**

The Government of Kiribati has developed a range of state-owned enterprises and statutory authorities for ensuring the production of goods and services. Under this option, the development, ownership and operations of the central laboratory would be entrusted to an adequate recipient, to be selected among the non-ministerial, Government-controlled entities. Examples of such entities include the Kiribati Chamber of Commerce and Industry, Kiribati Coconut Development Limited, Marine Training Center, Kiribati Institute of Technology, etc...

The host entity would become responsible for the investment and operational budgets of the laboratory, as well as for generating revenue to cover the costs of testing services provided. The central laboratory could be seen as an adjacent business unit working under the umbrella of the existing entity; for the sake of avoiding creating yet another independent state enterprise.

The advantages of this option consist in a fit with the commercial and operational orientation of the entity, and in the independence of the lab management with any other client. It may yet be uneasy to 'graft' a new, specific activity into an existing structure: the central lab activity would have to be 'hosted' within the structure while having a full operational and managerial autonomy.

The disadvantages of this option include the grafting of a completely new activity to the host body: KIT and MTC are training institutes, KCCI is an advocacy body, and KCDL is for production and processing. None of these would bring synergies with a testing activity. In addition, Statutory Bodies' boards were composed to fit their mandate; therefore introducing a new activity would require modifying the Board and keeping probably a dual management channel. As a whole, the introduction of a new activity may generate trouble and confusion, and finally lead to a less efficient configuration.

➢ **Central laboratory created as a new stand-alone public entity (Statutory Body)**

This option aims at creating a new stand-alone entity, tailored and fit for the purposes of the central laboratory. The new body would have its own strategy, budget and programs. Besides delivering specific microbiology and chemistry testing services to regulators, the new body may seek other private sector clients and/or become the recipient of projects or partnerships for building SPS capacities in the country, or for research activities.

A new independent statutory body may prove an ideal situation to allow participation of Kiribati private sector and/or external operators into the capital and operations. The main advantages of this option are the full independence of the central laboratory from any customer, the full control on the budgets, and a greater focus on service delivery.

It would also facilitate the development of new services as Kiribati needs evolve, as well as receiving any possible external support from Development partners.

There could be some disadvantages with this option, such as the time required to create such a new body and secure the budget arrangements, and the need for each ministry to prepare and enter in ad hoc MOU to have their tests carried out under the new body.

- **Central laboratory created as a private company**

This option would require the Government to attract one or more private operator to invest in Kiribati in the aim to develop and operate the central laboratory. The private operator may be sought after among existing accredited laboratory in the region, as well as with international companies specializing in conformity assessment. Taking into account the small size of the market for services in Kiribati, private players would require commitment from the Government to facilitate the investment for the laboratory, as well as securing a volume of tests for public purposes. Such support could be formalized through a public-private partnership and the creation of a local joint-venture company with a minority public share, for the single purpose of creating and operating the central laboratory.

Nevertheless, the requirements of each partner will need to be duly accounted for. In such situation, the private sector partners usually take on the responsibility for operating the laboratory; they expect to have a large freedom to run the operations. The Government may have requisites in terms of local capacity building and the priority given to samples for official controls.

For Kiribati government, the advantages of this option would be found in access to the private operator resources, knowledge, and experience such as available technical staff, established management system and methods, training infrastructure, etc. Overall, this option would be the faster way to reach the state of a fully functioning, accredited central laboratory. The benefits for the private partner, beyond the financial income stream, may consist of increased footprint in the region, enhanced reputation, and access to additional funding for research purposes.

The disadvantages of this option are chiefly the lesser government control on the central laboratory and the need to enter in substantive MOUs with each ministry to secure the full load of samples. Another inconvenience is that if the new local venture priorities do not match government ones, tension may arise for managing the operation. The risks include the somewhat higher costs of tests due to the profit margin applied by the private operator, the possibility to see monopolistic practices, and the difficulty for Government department to organize research. Finally, there is a risk that the private company could cease operations and disinvest after a few years, leaving the management of the central laboratory to the Government.

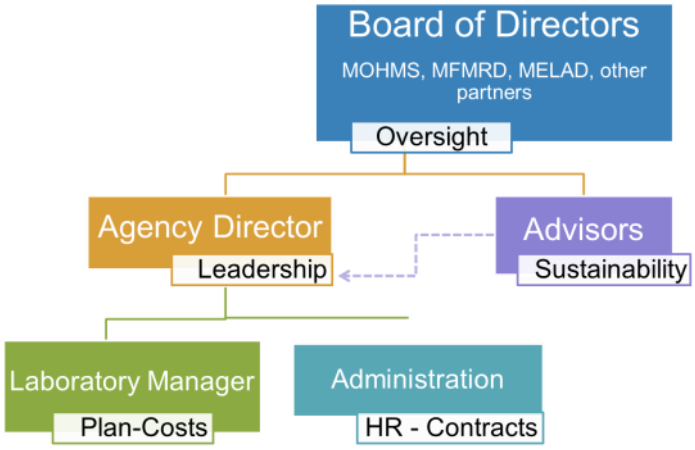
7.2 The optimal configuration

There is no 'best option' and each of the solutions mentioned above has its pros and cons. The reasoning would thus be to assess how the success factors can be met and the risks could be best mitigated.

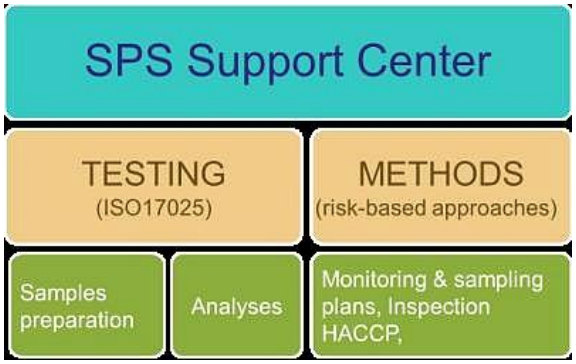
- The need for impartiality and risk assessment can be best fulfilled in the configuration of an independent entity (joint-venture or private company), or by dispositions included in the statutes of an autonomous public body.
- The presence of the public sector in the oversight structure of the central laboratory is deemed necessary to maintain alignment with the country objectives and to foster and facilitate linkages with the ministries. This can be achieved through either a share in the capital or the nomination of independent directors in the Board.
- The need for large operational independence can be reached through the position of Institute director, granted with full power to run the operation within the mandate and guidance of the Board.
- The requirements to secure recurring resources can be met through adopting a multi-year budget framework integrated to national budget, in addition to the capability to generate own resource (user-pay policy).

- To ensure the ongoing provision of services and other collaborative arrangements, the central laboratory will need to enter into MOU or agreements with each ministry.

In summary, the institutional set-up, which would best enable the successful operation of a central laboratory, is an autonomous enterprise or agency, supervised by a Board including both private operators and representatives from the ministries that will use the testing services. To comply with ISO/IEC 17025 requirements, the Board should also oversee, but not control, a group of independent advisors in charge of assessing the lab exposure to risks on impartiality and sustainability.



Considering the need to strengthen the SPS capacities across ministries and to embrace the "One health" policy fostered by WHO and FAO, the mandate of this new entity may include, besides testing, the provision of fumigation, incineration services and methodological support (methods, research) for assisting the ministries to achieve environmental health objectives.



In recognition of the need to adopt and implement the 'One Health' policy to contribute fully to KV20 'Health and Wealthy country' objective, it is proposed to create the Statutory Body as the

KIRIBATI ONE HEALTH SUPPORT INSTITUTE - KOHSI

7.3 Possible role of the private sector

7.3.1 Operators in the fisheries sector

As indicated in § 3.1.3 the fisheries industry in Kiribati consists of one large processing company and half a dozen of smaller ventures. The leader, Kiribati Fish Limited, carries out routine microbiology and basic chemistry tests on-site, and outsources the detection of histamine and heavy metals (regulatory requirements) to the USP laboratory in Fiji. The management recognized that developing local capacities is necessary; however, a local lab should rapidly secure accreditation.

KFL may be willing to consider using the services of a central laboratory for routine tests in complement or in substitution of their factory QC laboratory. The two factors into consideration here will be the cost of the tests and the time to results. If tests prices are higher than the costs of the internal lab, or if the results cannot be delivered in real time, the industry would not use the central lab services. Regarding the tests currently outsourced, shifting from USP to the local laboratory would be considered once accreditation is secured and provided the costs be at the same level.

The KFL management was open to continue the discussion and to consider possible collaboration with a central laboratory. Nevertheless, the prospects of a public-private partnership for the fisheries sector remain uncertain, because of the low number of enterprises involved and the significant risk[30] involved. Furthermore, the industry could not possibly control a laboratory that provides tests for the use of the competent authority for fisheries. The involvement of KFL would thus probably remain limited below the PPP level, for example through an observer position in the board and through service purchasing agreements.

7.3.2 Operators in conformity assessment sector

Due to the highly specialized testing services, seeking a partner laboratory that may co-invest in the central laboratory makes sense. Such partner could easily provide support services (training, assistance) as an external supplier. However, the Government's aim will be that the lab become fully operational and reliable and quickly get an accreditation without any delays. Securing one or more private laboratories as co-investors in Kiribati's central laboratory would greatly facilitate achieving this objective. In addition, the participation of private investors may generate opportunities for mobilizing support funding from the investors' countries.

Several laboratories could be approached for partnership, including

- In New Zealand: the Cawthron Institute (already involved in the discussion of a PPP in Cook Islands), ESR, RJ Hill, Asure, EnviroLab-MSL, Eurofins....
- In Australia: SGS (PPP developed in Cambodia and Indonesia), OMIC, ACS Lab, Symbio alliance, Eurofins, Envirolab;
- In Fiji: the laboratory of the University of the South Pacific.

The above is merely an indication of possible support. Most labs would rather be cautious to involve in a PPP for the small operation in Kiribati with limited market. Thus, Donor support would be necessary to 'incentivize' the investment and to provide operational support over the first years.... A New Zealand laboratory could be the favourite (with NZAid support). Alternatively, the USP lab could be convinced to step in, on the grounds of regionalism and given USP has campuses in almost all countries of the Pacific. That option could or 'may' be linked with the COE (Regional SPS project). The USP would probably request same level on incentives to step in.

8 OPERATIONAL AND TECHNICAL FEASIBILITY

8.1 Nature of the facility

The building hosting the laboratory and other offices either could be considered as a joint facility or integrated facility.

- *A joint facility* would be staffed by each of the ministries with allocated laboratory space and separate budgets. In this set-up, the role of the entity owning the facility includes the management and maintenance of the infrastructure, in addition to the organization of their tests. This option may be suitable if the central laboratory would be conceived as the technical unit of a lead ministry (e.g. Health). It would allow maintaining a strong relationship between the central lab and other Ministries. The disadvantages would be a significant degree of overlap and inefficiency, the possible competition for space and/or reagents, and crucially the high difficulty to develop a management system compliant with ISO/IEC 17025.

[30] For KFL investing in a new activity that is not in their core business brings the risks of additional costs and managerial time that might not be covered at the onset by accessing to cheaper/ faster tests.

- *An integrated facility* that actually manages operations for all parties would offer a single contact point for enquires about analyses and results. It would have an experienced laboratory director in charge of implementing the management system and quality assurance and control disciplines. The staff carrying out a higher number of tests would quickly gain proficiency, and reach a high standard of service. However, an independent facility would have no core support from any of the ministries, which induces the risk of funds shortage in case of disagreement over budgets or tests priority.

8.2 Location

The issue of the location of the central laboratory is significant for the timeframe for having the laboratory built. Other aspects relate to the proximity of the sampling operations, which is relevant for quarantine and food official controls.
Given the existing laboratories and their possible extension, there are two possibilities as follows

- *Two separate sites, one for microbiology tests, one for all other tests*

The microbiology laboratory would be re-deployed (extended and upgraded) at the public hospital of MHMS, and a new chemistry & biology laboratory would be built near the port. With this option, the set-up may be a bit faster since the upgrading of microbiology laboratory could be completed within a few months[31]. However, having a split location brings back most of the disadvantages identified in the 'individual labs' analysis (§ 6.2.2.). It would require the 'central facility' to handle two different arrangements to manage operations: one for the site owned by the MHMS and providing microbiology for KSVA, ECD (MELAD), and another one for the site under the new entity and providing chemistry analyses for all ministries. In addition, this will oblige additional samples to be taken and distributed at two different places, and duplicate the sample preparation work. Finally, a split location will also prevent any possible workload offsetting between the microbiology & chemistry sections.

- *One single facility hosts the biology, microbiology, and chemistry labs.*

The site would be located near the port, either near the KSVA or on the reclaimed land (landfill site) near Port Authority compound. If that location were not available, the Government would allocate another suitable vacant public land. A single integrated facility would be easier to manage, and will generate significant reduction in the costs of building, maintenance, and utilities. The environmental conditions for the microbiology laboratory will be much better than in the other scenario.
The preferred option is the second one, for the reasons exposed in 6.2.3.

8.3 Infrastructure

8.3.1 Building layout and realization

8.3.1.1 Considerations for layout

The preferred option for a laboratory building is a stand-alone facility. A laboratory environment includes or generates hazardous chemicals and waste, potential noise, vibration, smells and fumes...all presenting risks or inconveniences for the public. Integrating a laboratory in a general use building (hospital, offices...) would incur additional costs e.g. for better protection of environment and safety systems. Finally, a stand-alone facility allows expanding the laboratory building in the future.

The facility should include the following:

[31] This would depend entirely upon the management of the Ministry of Health.

- Central laboratory building;
- Offices, board & meeting rooms, canteen and break rooms, either a separate unit or integrated to the lab building, possibly as a second floor;
- Separate technical building (45-50m^2) to host the storage for chemicals and gases; the generator and fuel tanks, the air compressor, the power regulation, the water filtration unit;
- Hangar or shed (80 m^2) to accommodate the fumigation and incineration activities.

It is possible to design multi-storey labs, or to host laboratory section into a multi-storey building. Nevertheless, there is little economic gain as the reduction of structural costs is almost offset by the additional access (stairs), extra materials used to withstand weight, and the need to extend reticulation, power lines, ducts etc. Furthermore, single-floor labs provide better security (access for rescue teams, evacuation...). A dual-storey building would become necessary however, above a certain overall size, to reduce the ground footprint and costs of foundation infrastructure; this option should be assessed by contractors during the design phase.

Laboratories are usually designed and built so as to minimize potential impact of any external factors on the environment and operations of the laboratory. When variations are kept to a minimum, the laboratory is in good condition to work regularly and produce reliable results. The standard ISO/IEC17025 describes in details which factors should be controlled (or monitored), including:

- Security: access to most areas is restricted by keys or locks. This contributes both to security and to protection of confidentiality.
- Reducing the possibility of air-borne contamination (bacteria, solvents, fumes...) by maintaining a negative pressure in work areas; this is achieved by extraction of the air volume and replacement by external air[32].
- Absence of physical contamination in the incoming and circulating air. Contaminants include insects, dust, particulates, bacteria.... The lab building must be insect-, bird-, rodent- and vermin-proof. Preventing contamination also requires the use of air filtration systems, and determines dispositions to avoid cross-contamination.
- Control of temperature and humidity of the circulating air where these could affect the results of operations.
- Environmental protection with control of effluents (test solutions) and waste (sample, matrices...)
- Ease of cleaning and sanitation (especially for microbiology), which requires all surfaces to be smooth, easily washable, and acid- and solvent-resistant.
- Adequate lighting to ensure easy reading of colours and instruments indications.

In addition, it is also recommended to consider

- Reducing the area of windows and using fixed window panes with tinted glass
- Using an external, separate building for storing chemicals
- Restricting access to chemicals and laboratory equipment to trained personnel
- Stabilizing electrical power (voltage and wave when needed)
- Using a pre-filtration and reverse osmosis unit to filter the water supplied to labs.
- Keeping the gas cylinders and pressure equipment in external enclosures with concrete or cinder blocks walls.
- Using a fire protection system with smoke detectors and temperature alarms.

[32] The requirement for negative pressure and air replacement induce high capacity requirements on the conditioning system. These can be reduced if the whole building is perfectly insulated against thermic transfers.

The size of the proposed laboratory is determined by the scope of services, the number of samples and tests, the land space available, and finally by the target budget. There are a number of guidance documents on the design of laboratories, such as from UNIDO or US EPA. Some generic designs retrieved on the internet tend to indicate that a generic medium size chemistry lab would be around 250 m^2 and a 'generic SPS laboratory' combining chemistry and microbiology could cover 375 m^2. The proposed central water laboratory in the Cook Islands was conceived under two variants of 235 m^2 and 390 m^2, the later including extra rooms reserved for future extension.

Based on the designs and information gathered, it is proposed to consider a building with a footprint between 320 and 380 m^2, which will provide a room area of between 280 and 334 m^2, respectively. Additional discussion during the second mission introduced the need for extra calibration rooms: this may bring the overall size to around 400 m^2. The draft layout, shown in Annex 12, would include a veranda that will serve as a reception and waiting area[33]. The dimensions and building design should be finalized with support of specialist architect and civil engineering services, to be secured during the preparatory phase.

The laboratory would need the following work areas (see detail in Annex 11):

- Office & general purpose rooms
  - Offices for the director and administrative officer
  - Meeting room
  - Canteen and rest area
  - Toilets
  - Changing rooms for males and females
  - Cleaning and decontamination room with post-rooms for autoclave
  - Small reception area (info counter) to receive queries and samples
- Sample handling area with
  - reception slot (as above),
  - sample holding (refrigerators, freezer, shelves etc.)
  - bench for test items preparation
- Storage rooms
  - One ambient store for generic, dry reagents and miscellaneous supplies
  - One controlled store room for sensitive media
- Microbiology Laboratory
  - media preparation room (including adjacent media storage)
  - inoculation testing and reading room
  - room for incubators
  - reference culture storage and maintenance room (could be fitted at later stage)
- Chemical/physical laboratory
  - Digestion/ extraction area
  - A 'wet' chemistry area for the methods involving titration, spectrometry, conductivity…
  - Instrument rooms hosting the AAS, GC, and HPLC instruments

8.3.1.2 Construction

A few options may be considered for building the facility premises, depending on the nature and characteristics of the underlying soil. A traditional option consists of a cinder blocks structure

[33] This aims at preventing unplanned visits by outsiders. The more traffic in the lab, the higher will be the risk of contamination by dust and bacteria. Most laboratories receive visitors only on appointment, thus reducing entries and disturbance.

built on concrete foundations, pillars and slab; it must be entirely heat-insulated by proper lining. Alternatively, the laboratory could be built as a metallic structure with insulated sandwich panels walls and ceilings. This would require equipping the lab rooms with mobile benches and cabinets, since the walls would not be fit to bear masonry benches.

All floor surfaces must be covered with materials suitable for laboratory use: PVC tiles, high-grade ceramic tiles, epoxy-resins...and the angles with floor and ceilings must be rounded to allow easy cleaning.

All windows and doorframes should be high quality, durable PVC assembly; windows should be in small dimension with fixed tinted, dual- or triple insulated glass reducing heat and UV transfer.

The construction project for the building should be tendered under one of the two options below.

a. A Design-Build tender allowing selecting a consortium of firms offering the best cost-to-value project; or
b. - Preparation services commissioned to various experts, resulting in the production of the Building Plans, Schematic Design, Construction Documents and Specifications;
   - followed by Tendering of the works, building materials and project management services, based on the documents prepared.

8.3.2 Functional Systems

The definition and set-up of all the functional systems should be part of the construction project (either option a) or b)).

8.3.2.1 Ventilation and Air Conditioning

This represents a crucial system for the laboratory, since it determines the security and stability of the operational environment, as well as well-being of staff. The lab has three kinds of zones requiring different atmospheres:

- Areas/ rooms for generic work, dry stores, and office areas where simple air extraction and air conditioning is sufficient.
- Rooms where temperature and humidity must be maintained within set limits (25± 1.5^{o}C and 55±2%HR), AND a negative pressure must be maintained by extraction and replacement of air.
- Rooms with controlled ambiance, negative pressure, AND supply of filtered air with very low levels of particulates or bacteria.

The requirements to control humidity and temperature combined with the need to renew the air volumes can lead rapidly to significant power consumption. The VAC system should thus include a combination of individual air conditioners, and a unit for supplying de-humidified and filtered air in replacement of the extracted volumes in controlled rooms.

8.3.2.2 Power

The importance of high quality power cannot be emphasized enough. Most technical representatives and equipment suppliers fail to understand the extent of power issues in developing countries.

- Voltage typically can vary from 180 to 240 volts.
- Outages are frequent and unpredictable
- Spikes are frequent; they are caused by load variation, network imbalance, start of nearby generators, lightning...

- The structure of the alternative current wave may vary in shape and amplitude
- The start-up of certain instruments generate currents five time higher than the nominal (current usage load)

These conditions can generate variations in the instruments, and cause premature aging. Across brands, instruments have very different built-in protection and stabilization features. Certain brands are better than others, but in any case, there is a need for high-quality protection at two levels: a general unit and some units dedicated to the AAS, HPLC, and GC instruments. Cheaper or entry-level uninterruptible power systems (UPS) just turn on below a pre-set voltage, but do not stabilize or redress the power wave. Even the best UPS equipment does not have good surge protection. Hence, the lab's main power board must be fitted with a high-grade surge protector, capable of withstanding lightning and other network spikes. The AVR capability is essential in high precision work, since variable mains load can affect results especially in cheaper instruments with weak internal regulation. Furthermore, the central lab must have either:

- Top-range UPS that transforms incoming AC voltage/current to a battery and then generate a stabilized sinusoid AC voltage calibrated at 240 Volts 50 hertz; or
- Basic UPS combined with separate automatic voltage regulator (AVR) to lock in 240 Volts.

Another aspect to take into account is the quality of the realization of the laboratory power lines, which must be well balanced over 3 phases and prevent resonance effects. All electrical works should be professionally designed and validated beforehand, use certified materials, switches, relays...adequate to a lab power grid, and be carried out by certified technicians according to Australian safety and performance standards.

Finally, given the very high cost of electricity, there will be a need to realize an energy diagnostic study, to find the most economical way of powering the lab. It is proposed to equip the central laboratory with solar panels for supplying part of the power used in the lab during the day for lightning, hot water, small amperage plugs..., and the basic functions used during night time (security, low power ventilation, fridges and freezers). This would require also a set of batteries[34], an inverter and a controller unit. The investment comes at an extra cost: it should be evaluated as part of the detailed preparation of the investment project. There will be a need of professional advice and design services to define a stable and regular power supply and distribution grid, as well as balancing the use of fossil- and solar-based energy sources.

8.3.2.3 Water

The laboratory should have a single medium-size unit to filter, de-ionize and purify the water supplied by the Public Utility Board. In first estimation, the unit should process about 100 litres/ day, which means a nominal output capacity of 20 litres/ hour (water 'type 3[35]'). The lab should have input and output buffer tanks of half to one m^3 to store incoming water in a sufficient quantity for feeding the washing machine, sterilizers and water stills or ultra-purifiers for a couple of days.

8.3.2.4 Waste

The laboratory must have a system to process waste. One option is to store in separate bins biological waste (after decontamination) and physical waste (paper, plastic, glass etc.). The containers would be taken away by the public waste collection service. However, autoclave decontamination is for laboratory waste, but not adequate for quarantine samples. It is also worth noting that currently, the Public Health Laboratory has no capacity to incinerate properly medical

[34] One of the limitations of solar power systems is the need to replace the batteries every 5 years or so. Similarly, the efficiency of the photovoltaic decreasing with time, these panels must be replaced after 6 to 9 years (depending on initial quality).

[35] Resistivity 50 kOhm.cm, silica<1ppm, TOC<0.2 ppm..., equivalent to ISO3696 'grade 3' and ASTM D 1193-91 'type III'

waste, which might increase the risk of propagation of contaminants. Therefore, there is an opportunity for the new facility to accept waste from various sources and to burn it properly in a medium-sized incinerator. Modern incinerators have dual combustion and gas cleaning system that reduce their environmental impact.

The liquid waste (solvents and acids) should neither be burned nor released in the environment. Instead, it must be stored in ad hoc containers and shipped away to the nearest recycling center.

The waste resulting from fumigation (spent phosgene pellets and other solids) must be collected, stored securely, and sent away for recycling.

8.3.2.5 Internet access

Access to a broadband service provider is a necessity for the laboratory. Beyond mundane search and exchange of technical information, the cloud-based transmission and storage of data, access to online database of tests, distributed (cloud-based) Laboratory Information Management Systems (LIMS), and online hook-up for maintenance of equipment...are now of common use in laboratories.

8.3.3 Equipment

The necessary equipment is based on the main tests needed by the regulatory agencies. The table on next page provides detail of equipment set in main groups: lab furniture and general equipment including the laminar flow cabinet and the fume-cupboards (lot 1 and 4), instruments for chemistry (lot 2) and microbiology (lot 3), and instruments for optional tests that are not required by regulators (lot 5). The full list of equipment, with basic specifications is presented in Annex 13. A procurement plan for the central laboratory has been prepared: the laboratory would need to procure immediately after completion of the laboratory and recruitment of staffs, the equipment listed in the lot 1, 3 and 4, and parts of lot 2. The most complex instruments (AAS and LC) in lot 2 would be purchased in the year 2 of operations after launch. The lot 5 would be considered at a later phase, based on the demand for such tests.

The cost of equipment and consumables has been estimated based on lists previously gathered by other specialists, and on catalogue prices. There are large variations in costs of equipment and supplies, depending on their origin and quality levels. The central laboratory would need an equipment budget of about A$ 1,167,000. When additional equipment for biosecurity and calibration is considered, the total would amount to A$ 1,737,535; and with optional equipment, slightly above A$ 1,857,535. These figures yet require confirmation: costs of transportation are not included, but on another hand, the tendering of instruments' supply would allow some economy.

LOT	DESCRIPTION	COST (A$)
1a	Backup generator, main UPS, air compressor for instruments; External water filtration + pre-purification system, air conditioners...	266,400
1b	Chairs, desks, tables, filling cabinets, lab benches and stands, push-in cabinet/ drawers, trolleys, rack of shelves in store rooms, etc.	35,000
2	Autoclave for waste, precision balances (2), Blender or grinder, eye wash station+ emergency shower, fume canopy, fume hoods (ducted), heat sealer, glassware drying cabinet, large wash sinks, standard weights, stomacher + bags, trolleys, water de-ionization/still, lab coats, gloves, safety goggles...	99,600

LOT	DESCRIPTION	COST (A$)
3	Chemistry lab equipment - Atomic Absorption Spectrometer + Graphite furnace + Cold vapour unit; - GC+ ECD & FID detectors and columns + pre-columns, - HPLC+ ECD, UV, FID detectors and columns, guard columns, - Flow Injection Analyzer, thermoreactor with controller, Kjeldahl unit - UV-Vis spectrophotometer, pH + conductivity meter + DO probe, turbidity meter - reversing rotary vacuum evaporator, Soxlhet apparatus, - Reagent dispenser, auto-pipettes, analytical balance (0.1mg), mixer and homogenizer - Electronic desiccator/ dry cabinet , BOD Incubator, centrifuge (refrigerated), desiccator, manifold filtration unit, muffle furnace, orbital shaker, drying oven, fridge, vacuum pump, vortex mixer, water bath (shaking), misc. items & glassware....	408,135
4	Microbiology lab equipment - Balance (2 digits), Balance (precision) - Benchtop pH-meter with probes, connections - Binocular magnifier, microscope, bio-safety cabinet, colony counter, - Steam Sterilizer and accessories - Freezer, fridge, microwave oven, incubators (2), sterilization oven, water bath (regulated) - Electronic hot plate, manifold filter holder & set, media dispenser, membrane filters, multiposition heating stirrer, UV hand lamps, vacuum pump, vortex mixer - Pipette filler, pipette washer, pipettors - Portable Digital Reference Thermometer, working precision LIG Thermometers - Set of misc. lab tools & glassware - Set of reagents....	213,000
	Total 1- 4	**1,022,135**
5	Calibration Equipment	86,300
6	Fumigation equipment and Incinerator (200kg furnace)	182,000
7	Second Priority Instruments	447,000
	Total 1 - 7	**1,737,535**
8	Optional equipment Anaerobic jar for microbiology and bags, Brookfield digital viscometer, dry cabinet, fluorimeter, Infra-red moisture analyzer, lyophilized bacterial stock culture, ultrasonic bath, vacuum oven, washer-disinfector and accessories & detergent+ neutralizing agent, water activity meter, water ultra-purification system	120,250
	Total 1 - 8	**1,857,535**

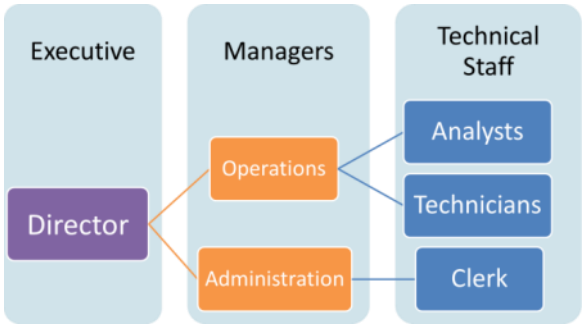
9 STAFFING AND CAPACITY DEVELOPMENT PLAN

9.1 Human Resources

9.1.1 Organization

The laboratory being part of the Institute, there is a need to nominate a director. The Director must have a chemistry background or a substantial experience at executive level in a competent authority. He will manage the laboratory and supervise the delivery of other services in the facility (fumigation, incineration, calibration).

The central laboratory should include sufficient staff for ensuring the managerial, administrative and operational tasks involved in the production of tests results. A typical laboratory organization includes three hierarchical levels executive, managerial and technical staffs.



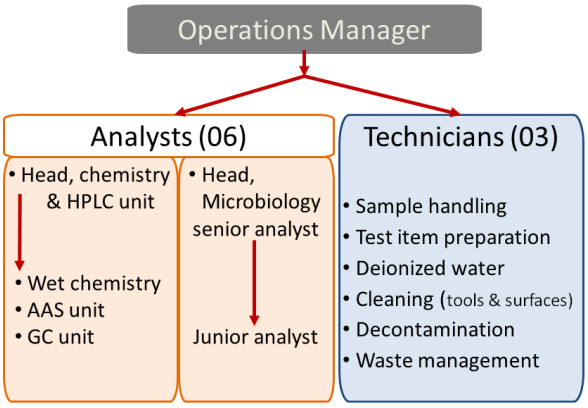
However, the number of staffs and the volume of operation might not require an administrative team: a single person should be able to handle the administration of the lab, since accounting could be out-sourced. Hence, the role of administrative manager could be replaced by a senior administrative officer.

9.1.2 Staffing required for the proposed central laboratory

The ability to recruit and retain qualified and experienced staff is a crucial success factor for a central laboratory with a large testing scope, aiming at accreditation. While the volume of tests may remain low in the first years, the central lab will need to fill up all positions at the onset, so that staffs may operate any instrument and on-the-job training and transmission of skills may take place. Once in full use when the analyst will be familiar with several instruments, the laboratory would have ten positions, which could be staffed by ten or more persons in case of part-time work.

In order to jump-start the laboratory and reach quickly accreditation, the use of foreign specialists should be considered at least for the executive and managerial positions. The table on next page provides an indication of the staffing requirements during the setup of the facility.

The staffing structure will ensure that senior staffs with skills and knowledge work closely with the technicians and analysts, until they are competent with all the instruments.



The laboratory will need a manager who will have the dual responsibility to develop technical competence and to ensure overall performance management. The manager should be assisted by an executive advisor senior lab expert) would will ensure his mentoring over the first years. The manager will be seconded by section heads, which will combine the responsibilities of handling the quality management system and ensuring the planning and management of resources (time,

reagents, staffs, machines etc.). At least one of them (preferably both) should have experience working with advanced automated laboratory equipment (flow analyzer, atomic absorption spectrometers, and chromatographs).

The rest of the team would include two or three staff knowledgeable in microbiology tests, and three or four in chemical tests, and two or three technicians. The laboratory should seek to maintain a degree of polyvalence among the staff, since specialization would not be always possible. For the analysts, polyvalence could consist of holding one core skill (e.g. one complex instrument) and being able to operate others instruments. For the technicians who will ensure support functions and ancillary tasks, they should be able to master all the tasks at hand, including some basic reaction steps (extraction, digestion). All the laboratory personnel should have a working proficiency in English language.

- Executive advisor
  - Employed on a consulting/ contractual base
  - Should have considerable lab management experience covering finance, operations, and quality; as well as ideally experience in official controls
  - Decreasing volume of inputs over the years
- Institute Director
  - I-Kiribati with adequate profile e.g. Chemistry or Engineering background, and management qualification
  - Ensure the supervision of the laboratory and other services, and the overall financial and operational leadership of the Institute
  - Signs the test & fumigation reports
- Operations Manager
  - Foreigner from year 1 to 5, replaced by a local from year 5 or 6
  - Local candidate recruited in year 4, work with foreign manager and director for 1 year
  - Ensure the day-to-day management of lab operations
- Section Heads (senior analysts)
  - Foreigners during year 1 to year 6,
  - Replaced in year 5 and 6 by the two first local analysts (A1 &A2)
- Analysts
  - In year 1: A1 Microbiologist + AAS and A2 Chemist (AAS) + GC
  - In year 2: A3 Microbiologist + HPLC
  - In year 3: A4 Chemist (GC) + AAS
  - In year 4: A5 Chemist (HPLC) +microbio
  - In year 8: A6 Microbiologist + AAS/GC
- Technicians
  - Local candidates to be recruited in year 1, year 3, and year 7

9.1.3 Description of the roles

(1) Institute Director

The Director is a I-Kiribati with adequate profile e.g. Chemistry or Engineering background, and management qualification. She or he is a member of the KOHSI Board, and ensure reporting and information exchange. She or he ensures the supervision of the laboratory and other services, and the overall financial and operational leadership of the Institute. She or he represents the Institute and the lab within Kiribati and abroad; this include establishing relationship and preparing

MOU and other collaborative arrangements. She or he signs the test & fumigation reports; hence, she or he must have sufficient technical competence.

This role should be fulfilled by a senior manager having a background in Chemistry or Engineering, and solid experience as a manager in SPS-related e.g. competent authority, testing laboratory, etc.

(2) Laboratory manager (Operations manager)

The manager shall be recruited to provide overall leadership to run the laboratory in a sustainable way, and to ensure provision of reliable data. The manager will be responsible for securing timely and managing resources (funds and team), and for reporting annually or twice annually to the Board on the status and performance of the laboratory and on proposed plans. She or he shall be the unique point of contact for institutional clients and external providers and partners. She or he is responsible to authorize the tests reports. One important responsibility of this role, especially in the first 3-4 years, is the management of laboratories' operations, which includes managing stocks, planning work, monitoring time and reagent consumption, tracking costs, and reviewing and signing tests reports.....

This role should be filled by a qualified chemist or microbiologist, a M.Sc. or possibly a Ph.D. with several years' experience in an accredited laboratory. Ideally, previous experience would include responsibilities in a laboratory providing services for SPS regulatory agencies. They need to have good business and people management skills, negotiation skills, and the ability to solve complex problems with limited information.

(3) Administration officer

This role assists the laboratory manager by handling the processes related to support functions such as purchasing, HR management, contracting, and liaison with Ministries etc. Accounting services, which would be externalized (sub-contracted), are not part of the responsibilities of the role. When justified by the level of activities, the role will be assisted by a junior officer who would ensure secretarial and office assistant duties.

The administration officer should be a person with similar experience in both private sector and public service.

(4) Senior laboratory analysts (section heads)

The senior analysts are responsible for maintaining equipment, monitoring stock levels, carrying out and/or supervising testing and quality assurance plans, keeping records, and contributing to the quality management system. Further, the senior analysts will assume role of quality management representatives (quality managers), which includes supervising quality assurance dispositions, as well as the yearly plans for calibration, maintenance, and management system measurement.

They should hold a degree in chemistry/biochemistry, microbiology, medical sciences, food technology and/or nutrition, veterinary sciences... and have a few years' experience in the analysis of food and environmental samples, including significant time on using the instrument related to their core capacity.

(5) Analysts

The analysts should have a degree in the abovementioned fields and/or previous practice in a testing laboratory. They shall undergo a trial period of no less than 6 months to assess their fitness to the job.

(6) Support staff

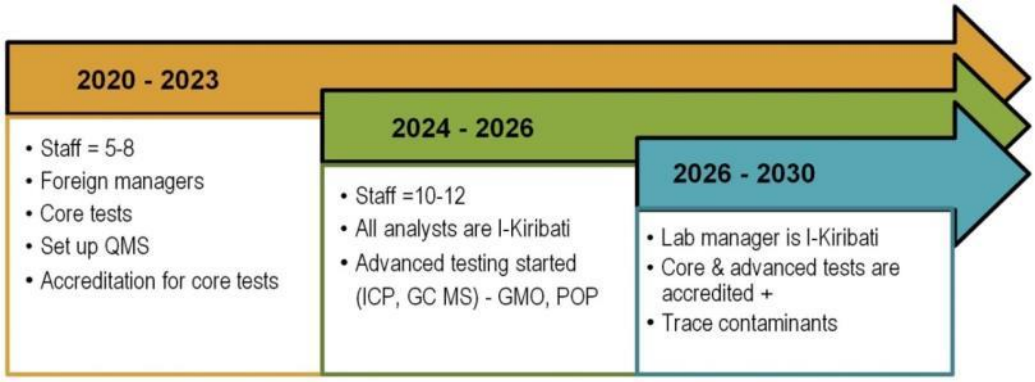
The laboratory technicians should have successfully completed the cycle of secondary education. Once recruited, they shall receive training for the tasks under their responsibility. They shall undergo a trial period of no less than 6 months to demonstrate their fitness to the job.

The laboratory must also employ one cleaner who will be responsible for maintaining overall order and cleanliness inside and around the building.

9.2 SPS-related Human Capacity Development Plan

As shown in the table on § 6.2.2, there is a lack of personnel capable to carry out tests and interpret the results for environmental and food microbiology and chemistry. To bridge this lack of qualification the central laboratory will have to hire foreign specialists who will train and transfer skills to local analysts. During the NTAC meeting, the PSO has also indicated the needs for adequate profiles should be reported and accounted for in the national curricula system; however, there may be a delay before the national training system could produce the desired profiles.

The development of capacities for the staffs of central laboratory will depend on the nature of equipment in use at the laboratory. The laboratory development plan is outlined in the figure below.



There would be two main channels for development of capacities, one internal through the foreign staff already qualified, and the other external, through visiting experts and attachment training in foreign laboratories.

The development of national capacities for the central laboratory would spread over several years. A detailed capacity development plan is presented in Annex 15. The capacity development would include the following areas and modules:

- Theory and basic technique (4-5 days each instrument):
  - Delivered on-site (Kiribati) by external expert on AAS, GC, HPLC...
  - Includes the fundamental principles of the instruments and variants, the principles of the analytical method, and the explanation of main systems of the instrument.
  - Includes basic operation of the instrument, calibration, basic troubleshooting, and coaching on the main situations that analysts will face
- Advanced training (2-3 days each instrument)
  - Delivered on-site (Kiribati) by external expert on AAS, GC, HPLC...
  - Includes specific manipulations and settings for non-current situations (e.g. interferences, matrix effects, etc.)
  - Could include assistance to extend range of tests or using different columns, detectors, etc.
- Attachment training (2-3 weeks)
  - Arranged for I-Kiribati analysts to go work in overseas, more advanced labs

- Allow practicing same tests with higher performance, or on more advanced instruments;
- Allow peer-to-peer exchange of knowledge and skills acquisition
- Could be used to prepare the investment in next generation of instruments (ICP, GC-MS, etc.)

The balance between internal and external capacity building will depend on the profiles of the manager and director, and on possible partnerships between the central lab and other operators. In first instance the training effort would be delivered in part (25%) as on-the-job training, in part by external trainer in-situ (35%), and in part (40%) as attachment training in partner laboratories overseas. Over the first five years, a total of six months of experts' inputs will be required to train the staff on the above modules and provide technical assistance for implementing the management system. Further, from year 3 to year 9, the staff would need to get exposure to work in advanced labs: this attachment training could amount to about 50 weeks in total.

The annual budget for capacity development would thus amount in average to A$31,500 during the first five years, and then to A$16,500 each of year 6 to year 9.

In addition, as the Institute mandate would also include supporting SPS functions, the capacity development plan may include training by foreign experts for the officers who implement the regulations for SPS matters and environmental health. These modules would be defined during the Institute's first year of operation; tentatively they may include the use of risk-based approaches, monitoring plan review, sample planning, sampling techniques, set up and enhancement of HACCP systems.

On-going donor funding would be required to ensure that staff become quickly proficient in the tests needed, as well as for re-training to overcome possible staff turnover. NZ Aid provides opportunities to support on-going training; other capacity building opportunities may be identified at later stage in the region by projects supporting SPS framework e.g. SPC Center of Excellence for SPS, or PACER Plus.

10 IMPACT AND ECONOMIC VIABILITY

In developing countries, many official controls or applied research laboratories are government units that receive investment and operation funds from the national budget. Most of the time, the public laboratories are not charging for the services they ensure. When public laboratories have a 100% user pay policy, they often do not collect the moneys from their tests, as payments are done to a separate administration/ finance department. Only semi-autonomous or statutory bodies may be entitled to keep the proceeding of the sales of their services.
In Kiribati, the small size of the economy and the limited demand for tests would probably prevent to pursue a 100% user-pay policy. The recovery of the costs of tests would therefore be shared by the Government and by users.

10.1 Economic Assessment

10.1.1 Benefits of the laboratory

In general, laboratory testing is used for the following purposes:

- to contribute to regulatory compliance, when goods placed on the markets have mandatory specifications ;

- to help ascertaining production processes and the level of desired characteristics in products;
- to produce information used as a basis for managing risks in a number of areas (food safety, tourism, waste management, environmental crises....

The economic impact of events that can be prevented with monitoring plans backed up by competent testing is significant. A significant outbreak of gastro-intestinal disease, through either contaminated water or food, has both economic consequences (lost of work days, cost of treatment...), and indirect impact such as decreased reputation as a tourism place or as an import origin. Other health issues such as diabetes and hypertension, which affect heavily the population, could be better addressed with an improved control of the rate of sugars and salt in foods.

Long-term environmental monitoring, which is enabled by water & soils sample testing, has a positive effect. The Government services can assess long-term trends and adverse events, make informed decisions, and take timely action to preserve and enhance Kiribati's environment.

10.1.2 Anticipated testing needs

The assumption is made that in a few years ahead, all testing required by regulatory agencies will be enforced, and samples are analyzed by the central laboratory. This concern chiefly the monitoring of drinking water quality, the regulations on used waters and environmental protection, and the official controls for food. The consequent assumption is that sufficient budgets will be allocated at MFMRD, MHMS, and MELAD to purchase the testing services.

The table below reflects the current and future test volumes. The list has been prepared through consultations with the main stakeholders. With the development of fisheries projects, and the increase of officials controls for the environment, drinking (and sewage) waters, and food, the number of tests would reach an estimate of 33,000 tests. The complex tests such as pesticide residues would have still to be outsourced. The anticipated testing needs are detailed in Annex 5.

Number of Tests done in a year	2018	2025
Environment	250	5,000
Drinking Water	1,000	8,500
Food	0	4,800
Fisheries (CA &industry.)	8,000	15,500
Total	10,000	33,000

The number of samples that the laboratory would receive is likely to be much higher than at present, because of the progressive implementation of the food safety regulation, the increase of samples from fisheries sector, and additional testing related to other sanitation projects. In addition, there may be opportunities to get additional test requests

- from local processors in agriculture (feed) and food sub-sectors,
- from other countries such as Nauru or Marshall islands that have fisheries products processing factories
- from Fiji USP lab, as part of inter-laboratory comparison (as an external reference)
- from various regional collaboration programmes…

10.2 Expenditures for the central laboratory

A general model of costs has been calculated. At this stage, the costs estimated based on available data may be too high; however, it is believed the model is sound and will allow continuing the preparation. The full costing model presented in Annex 14 covers a series of 10 years. To note, there are significant variations in the first years because of the change in relative proportion of the costs of staff and of other factors (reagent, power...). In the text below, the cost indicated are those for year 8.

all figures in AUD		Year1	Year2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
EXPENDITURES				313,712	457,296	544,175	563,865	619,697	569,705	569,102	576,755
Operating costs				151,742	263,711	333,258	353,177	397,202	355,107	346,705	360,472
Non-operating costs				38,551	66,811	81,934	80,993	91,507	82,862	89,907	82,931
Indirect costs				123,420	126,775	128,983	129,695	130,988	131,736	132,491	133,352
EARNINGS				24,750	109,050	184,300	336,615	492,854	610,041	694,014	826,541
Sales of tests				5,000	68,750	118,800	236,115	360,154	488,991	599,014	743,291
Sales of outsourced tests				17,250	25,300	46,000	74,750	103,500	86,250	57,500	40,250
Other sales (fumigation, training)				2,500	15,000	19,500	25,750	29,200	34,800	37,500	43,000
REVENUE				-288,962	-348,246	-359,875	-227,250	-126,843	40,336	124,912	249,786
Cumulated Revenue				-288,962	-637,208	-997,083	-1,224,334	-1,351,177	-1,310,841	-1,185,929	-936,143

DESCRIPTION	All Years	Year1	Year2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Investment (tangibles)	2,274,905	207,917	976,118	695,267	395,603	0	0	0	0	0	0
Investment (intangibles)	1,723,879	360,706	347,102	276,762	212,421	202,260	162,230	114,155	26,643	16,200	5,400
Revenue funding		0	0	288,962	348,246	359,875	227,250	126,843	-40,336	-124,912	-249,786
Total funding needs	5,301,718	568,622	1,323,221	1,260,992	956,270	562,135	389,480	240,998	*-13,693*	*-108,712*	*-244,386*

- Direct operating costs

The bulk of the operating costs will be labour. Based on the local pay scales, and accounting for pay packages for foreign staffs, the total labour cost is estimated at A$175,000 per year (see table 3 below, and refer to Section 5.1 Staffing). Combined with A$ 185,000 in other direct operation costs, the total operational cost is estimated at around A$ 360,000 per year.
The cost of labour is higher than in the model prepared for Cook Islands laboratory, because Kiribati will need to hire foreign specialists and consultants to build the foundation knowledge and skills, which will be gradually transferred to local staff.

- Non-operating costs

These costs are not directly linked to the production of test results, including e.g. the salaries of administrative and ancillary staff, the costs of utilities for office & canteen, communications, accreditation-related expenditures, and training. They amount to about A$ 83,000 in a year.

- Indirect Costs

In this group, are the costs linked to use of capital invested (amortization of infrastructure and equipment, financial charges), the costs aimed at covering risks (insurance, business consulting and advisory), and those related to corporate communication (accounting, publications, registrations). Indirect costs are estimated to about A$ 133,350 a year, with three quarters of this amount for amortization. To note, amortization costs are not cash expenditures; since they contribute to a provision that is cumulated into a line of the balance sheet. This practice allow factoring the use of physical capital into the costs of testing, and thus replacing equipment or renovating buildings when need arise.

10.3 Sustainability of the central laboratory

10.3.1 Funding needs

To sustain the central laboratory, the following funding needs must be covered

- Capital funding to build the laboratory covering the investment in land, building, functional systems, and training and assistance (human capital development);
- Operational funding on a yearly basis, which includes:
  - Operating expenditures (linked to delivering test services)
  - Non-operating expenditures, or costs linked to support services
  - Indirect costs such as building amortization, insurance, financial services, etc.
- Development funding, when the Government would carry out research projects or the development of a new service (analysis or sampling).

These types of funding may be provided independently of each other. While the initial investment may be sufficient to set-up a laboratory and get equipment, it can be difficult in successive years to get sufficient funds to ensure the maintenance and to replace equipment. Those expenditures are part of indirect costs that have to be included when determining the prices of tests. When the revenue from the sales of services is insufficient, ongoing financial contribution to sustain the laboratory operations would be required. Therefore, it is strongly recommended that the future budget estimates include a separate and well-identified provision towards the capital and operational costs of the central laboratory.

- *Capital funding*

The mechanisms for obtaining donor funding for a central laboratory have been discussed with the MCIC team. Developing laboratory facilities will contribute to several Donor-supported projects in Kiribati:

- Ministry of Health, which has a project to improve drinking water management with support from New Zealand and WHO.
- Public Utility Board
- Ministry of Fisheries for the Costal fisheries projects and for the KSVA
- Ministry of Environment and Land...

- *Operational funding*

Funding for operations will depend on the management structure adopted. However, the lab revenue is likely to consist for a large part in public moneys, and to come for a small part from sales to private clients. Meanwhile, purchasing timely the reagents and services implies the laboratory has sufficient working capital to pay such purchases upfront. Hence, for the laboratory to operate efficiently, it should receive guaranteed funding (budget allocation) to cover overheads, non-operating costs, and a part of the operating costs.

10.3.2 Funding Modalities

10.3.2.1 Through Ministries budget

In this option, each Ministry would allocate an agreed amount in their budget for purchasing testing services. Ministries might also contribute by detaching technical officers, with appropriate profiles, to staff the laboratory. The combined contribution from all Ministries will need to be sufficient to cover the annual operating cost of the laboratory. There need to be ex-ante funding (tests should paid at least 3 months in advance), as the lab would not be able to order reagents and plan work on a 'real time' basis. However, the laboratory would have some provision against 'last-minute cancellations'.

The funding relationship should be thus based on service agreements covering preferably several years; this would allow for planning of resources and operations. The agreement would result in 'standing orders' for samples to be received and tested at agreed prices, with conditions to vary or cancel the planned samples during the year.
This option would require lots of tracking and administrative time, and nevertheless could be prone to delays, blockages, and financial management issues between the Ministries and the central laboratory.

10.3.2.2 Directly by the central government

In this option, the budget for tests in each Ministry is re-allocated to the laboratory, which is thus guaranteed to receive the required operating budget directly from central government. This re-allocation would be based on the Ministries' planned needs (number of tests) and on service agreements or MOUs between the Ministries and the central laboratory, detailing the services to be delivered. The performance of the laboratory would be monitored by the Government through formal reporting from the Ministries and from the lab.

In the case of an independent statutory body managing the laboratory, funding through budget allocation may be best managed through the Ministry of Finance and Economic Planning, who may be able to make a separate provision for covering all or part of the operation costs of the central laboratory.

Long-term donor aid (5-10 years) is another option to run securely some functions and indirect costs. A coordinated approach to Aid support will be useful to accompany the Government effort on the mid-term.
This second option has the advantages that once the funding channels are setup, the budget for the laboratory is secured, and the Government can easily oversee the execution.

10.4 Mapping of Funding Sources

- Embassy of the Republic of China

  Taiwan has been providing support to Kiribati in the following main areas:
  - To Ministry of Defence for training of the police force
  - To MHMS support for developing the hospital
  - To MELAD for the development of horticulture and aquaponics

The modality of Taiwan Aid is budget support channelled through treasury; therefore, any support is mobilized after a specific request from Government. The Embassy representative agreed on the need to developing testing capacities to control imported food on safety and quality aspects. The concept of a central lab was received positively.

- Embassy of New Zealand

New Zealand, a significant partner for Kiribati, is involved in water sanitation and in fisheries. The concept of developing SPS capacities was seen as a positive development; the Embassy expressed interest to be kept informed of the progress.

- Embassy of Australia

Australia is a major contributor to Kiribati development budget. The mission team was unable to secure a meeting with the Commissioner in July; however, this will be pursued during the second mission. The possible linkages with PACER Plus will be explored.

- Enhanced Integrated Framework

MCIC is hosting the EIF PMU. It is proposed that one or more submissions for tier-2 projects would be proposed to EIF Secretariat, in particular in support for hiring regional staff, training and preparation to accreditation.

- Other Sources

Kiribati has become a member of UNIDO in 2015. While it may take some time before operational programs are set, support might be forthcoming on themes such as energy efficiency and quality management system. The request should be expressed through official channels by the regional forum or more directly at the regional office in Bangkok.

There is an opportunity to continue attracting the interest of donors, by presenting the synergies between programs and the economies of scale for the Government to invest in the central laboratory. Nevertheless, the Government should self-finance a part of the investment. The table below provides an indication on funding arrangements, which would be further discussed during the second mission.

STAKEHOLDER	PART	MODALITY
Central Government or Ministries	5-10%	Investment budget 2019
Central Government/ADB	15%	Concessional loan
ADB (variable part)	5-15%	Grant
New-Zealand	20-25%	Grant and TA (training)
Australia	10%	Grant and TA (training)
Embassy of Taiwan	12.5%	Upon GOK request
World Bank	12.5%	Grant
Other Aid partners	10%	TA

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11 ANNEXES

*Note: In the Annexes section, clicking on the **hyperlink** will bring the reader back to the main text*

11.1 ANNEX 1 - TESTS REQUIRED IN THE FOOD SAFETY REGULATION (MHMS)

Proximate analyses
Energy
Carbohydrate, protein, total fat, saturated fat, sodium
Moisture contents in flour maximum 15.5% bw
Minerals
Sodium in bread; limit: 400 mg/kg
Sodium in canned fish; limit: 430 mg/100g
Sodium in sausages; limit: 600 mg/100g
Sodium in instant noodles; limit: 1600mg/100g
Chloride in salt >97% bw dry matter
Iodine in salt 30ppm
Vitamins in fortified flours
Thiamine minimum: 6 ppm,
Riboflavin minimum: 2 ppm,
Niacin minimum: 55 ppm
Folic acid minimum: 2 ppm
Metals
Iron in flour; limit: 45ppm,
Zinc in flour; limit: 30ppm
Arsenic in edible fats and oils; limit: 0.1 mg/kg.
Arsenic in salt; limit: 0.5 mg/kg
Cadmium in salt; limit: 0.5 mg/kg
Cadmium in sardine; limit: tuna, bonito...0.1 mg/kg
Cadmium in other fish; limit: 0.05 mg/kg
Cadmium in crustaceans; limit: 0.5 mg/kg
Copper in milk-derived fat; limit: 0.05 ppm,
in other animal fat; limit: 0.4 ppm
Copper in salt; limit 2ppm
Iron in milk-derived fat; limit: 0.2ppm
Lead in infant formula; limit: 0.02 ppm
Lead in named fats; limit: 0.1 ppm
Lead in other fat; limit: 0.2 ppm
Lead in canned meat; limit: 0.5 ppm
Lead in cephalopods; limit: 1 ppm
Lead in meat of crustaceans; limit: 0.5 ppm
Lead in meat of sardine, tuna, bonito, seabass; limit: 0.4 ppm
Lead in meat of fish; limit: 0.2 ppm
Lead in salt; limit: 2 ppm
Mercury (total) in meat of scombridae; limit: fish 1 ppm
Mercury (total) in meat of other fish; limit: 0.5 ppm
Mercury in salt; limit: 0.1 ppm
3-chloro-1,2-propanediol 3-MCPD in hydrolysed foods; limit: 0.2 ppm
1,3-dichloro-2-propanol DCP in acid hydrolysed foods; limit: 5 ppb
Formaldehyde in smoked fish and meats; limit: 5 ppm
Histamine in fish and frozen fish; limit: 10 or 20 mg/100g
Melamine in infant food; limit: 1 ppm
Melamine in foods and feed; limit: 2.5 ppm
Mycotoxins...; limit: CODEX levels
MICROBIOLOGY

- Total coliforms & E. Coli
- Salmonella ssp
- B. Cereus
- Coagulase positive Staphylococci
- Vibrio parahaemolyticus
- Staphylococcal enterotoxins

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11.2 ANNEX 2 - COCONUT OIL TESTING PARAMETERS

METHOD	PARAMETER	APCC	Malaysia	Philippines	CODEX
IUPAC 2.101	Rel. density	0.915-0.92	-	-	0.908 - 0.921
ISO 6883: 2000 with the appropriate conversion factor or AOCS Cc 10c-95.	Specific gravity (30°C), g/cm3	0.915-0.92	0.908-0.926	-	
IUPAC 2.102 or ISO 6320: 2000 or AOCS Ce 7-25.	Refractive Index (40°C), -	1.4480-1.4492	1.447-1.45	-	1.448-1.45
IUPAC 2.601 or ISO 662: 1998	Moisture & volatile , % weight	0.1-0.5%	-	≤0.2%	
IUPAC 2.604 or ISO 663: 2000.	Insoluble impurities, % weight	≤0.05%	≤0.02%	-	≤0.05%
IUPAC 2.201 or ISO 660: 1996 or AOCS Cd 3d-63	Acid Value, %m/m oleic acid or mg KOH for 1g o	0.5		-	4 mg KOH/g oil
IUPAC 2.205/1, ISO 3961: 1996, AOAC 993.20, or AOCS Cd 1d-92 (97)	Iodine value, %weight absorbed Iodine	4.1-11.0	5.5-10.6	-	6.3-10.6
IUPAC 2.204.	Polenske value	>13	-	-	13-18
IUPAC 2.202 or ISO 3657: 1988.	Saponification value, mgKOH/g	250-260	248-265	-	248-265
IUPAC 2.401 (part 1-5) or ISO 3596: 2000 or ISO 18609: 2000.	Unsaponifiable, % weight (g/kg)	0.2-0.5%	≤0.2%	-	
	Soap Content % weight	-	-	-	0.005%
	TPC: CFU/ml	≤10	≤10	-	-
	Peroxide Value, meq/kg	≤3	≤3	≤3	≤15mEqO2/kg
ISO 6321: 1991 and Amendment 1: 1998	Slip Melting point, °C	-	24-26	-	
IUPAC 2.301, 2.302 and 2.304 or ISO 5508: 1990 and 5509: 2000 or AOCS Ce 2-66, Ce 1e-91 or Ce 1f-96	Fatty Acid Profile				
	Free Fatty Acid, % lauric acid	≤0.5%	≤0.5%	≤0.2%	
	Colour	water clear	0.1R≤0.5Y	colorless	
	Clarity (30oC)	-	water clear	sediment free	
	Odour & Taste	no foreign	no foreign	coconut scent,	no foreign
	Volatile matter 105oC, %	≤0.2%	≤0.2%	≤0.2%	≤0.2%
ISO 8294: 1994, IUPAC 2.631 or AOAC 990.05 or AOCS Ca 18b-91	**Iron, mg/kg**	5.0	5.0	5.0	5.0
same	**Copper, mg/kg**	0.4	0.4	0.4	0.4
IUPAC 2.632, AOAC 994.02 or ISO 12193: 1994 or AOCS Ca 18c-91.	**Lead, mg/kg**	0.1	0.1	0.1	0.1
AOAC 952.13, IUPAC 3.136, AOAC 942.17	**Arsenic, mg/kg**	0.1	0.1	0.1	0.1
	Food Additives BHT, BHA TBHQ tocopherols, palmitates, propyl gallate	none	-	none	none
	Pesticides residues	-	none	-	see copra

11.3 ANNEX 3 - SUMMARY OF LIMITS OF CONTAMINANTS IN FISHERIES PRODUCT FOR SOME EXPORT DESTINATIONS

COUNTRY	Antimony	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Tin: can/	Selenium	Zinc	Fluorine	Asc.acid	Phosphates	Histamine	TVA/TVBN	PCB/138	POP/OC	Mgreen	Hormones
India																			
HongKong	1	6	2	1		6	0.5	230/-											forbidden
EU			0.1			0.3	1	200/-						9,2,100,200					
Indonesia																			
Israel							1							200	2.5/300				
Japan																0.5			
Korea (ROK)																			
Malaysia																			
Mexico			0.5			1	1	100/-							-/300				
Australia	1.5	1	0.2		10	1.5	0.5	150/50	1	150		400 (frzn)	1,300			0.5			
China		0.1	0.1			0.5	1									2/0.5			
New Zealand		2				0.5	1		2	40	10					4^-12		0.001	
Philippines		3				0.5	0.5	200/-											
Russia							0.5												
Taiwan																			
Thailand		2			20	1	0.5	100/250									0.1-0.6		
Vietnam			0.05			0.3	0.5							9,2,200,400					
ALL	1ppm	0.1ppm	0.05ppm	1ppm	10ppm	0.3ppm	0.5ppm	50ppm	1ppm	40ppm	10ppm	400ppm	1300ppm	100ppm	2.5/300ppm	0.5ppm	0.1ppm		

11.4 ANNEX 4 - MAIN ANALYSES REQUIRED FOR THE OFFICIAL CONTROLS OF SEAFOOD (EU EXPORTS[36])

Test	No. of samples	Maximum levels	Performance criteria
Lead	1 sample per species per company biannually	0.3 ppm	LOD less than a tenth of the permissible limit LOQ less than one fifth of the permissible level
Cadmium	1 sample per species per company biannually	0.1 ppm tunas - 0.25 ppm swordfish 0.05 ppm other species	LOD less than a tenth of the permissible limit LOQ less than one fifth of the permissible level
Mercury	1 sample per species per company biannually	1.0 ppm tuna and swordfish - 0.5 ppm other species	LOD less than a tenth of the permissible limit LOQ less than one fifth of the permissible level
Inorganic Tin **(ONLY FOR CANNED PRODUCT)**	Canned tuna: 10 cans per lot per year	200 ppm canned tuna	LOD less than 5 mg/kg LOQ less than 10 mg/kg
Dioxins and PCBs	1 sample per species per year	3.5 pg./g dioxins (sum of dioxin) 6.5 pg./g wet weight dioxins and PCBs (sum of dioxins and dioxins alike PCBs) 75 ng/g wet weight (sum of PCB 28/52/101/138/153/180)	Not specified
Benzo(a) pyrene , **(ONLY FOR SMOKED FISH PRODUCTS)**	1 sample per species per year	50 µg/kg smoked fish benzo(a)pyrene and 12.0 µg/kg sum of benzo(a) pyrene/ benz(a)anthracene/ benzo(b)fluoranthene and chrysene	LOD less than 0.3 µg/kg LOQ less than 0.9 µg/kg
Histamine	9 samples every 6 months per establishment	No more than 2 samples with results between 100 and 200 ppm and no results over 200 ppm	HPLC
Microbiology	1 sample per year	TPC 22oC No abnormal change; E. coli nil per 100 ml; Enterococci Nil per 100 ml	ISO 9308-1; ISO 7899-2
Acrylamide	1 sample per year	0.1 µg/l	Control by product specification
Antimony	1 sample per year	5.0 µg/l	Trueness, limit of detection and precision all 25%
Arsenic	1 sample per year	10 µg/l	Trueness, limit of detection and precision all 10%
Benzene	1 sample per year	1.0 µg/l	Trueness, limit of detection and precision all 25%
Benzo(a)pyrene	1 sample per year	0.01 µg/l	Trueness, limit of detection and precision all 25%
Boron	1 sample per year	1.0 mg/l	Trueness, limit of detection and precision all 10%
Bromate	1 sample per year	10 µg/l	Trueness, limit of detection and precision all 25%
Cadmium	1 sample per year	5.0 µg/l	Trueness, limit of detection and precision all 10%
Chromium	1 sample per year	50 µg/l	Trueness, limit of detection and precision all 10%
Copper	1 sample per year	2.0 mg/l	Trueness, limit of detection and precision all 10%
Cyanide	1 sample per year	50 µg/l	Trueness, limit of detection and precision all 10%
1,2-dichloroethane	1 sample per year	3.0 µg/l	Trueness, limit of detection both 25% and precision 10%
Epichlorohydrin	1 sample per year	0.1 µg/l	Controlled by product specification
Fluoride	1 sample per year	1.5 mg/l	Trueness, limit of detection and precision all 10%
Lead	1 sample per year	10 µg/l	Trueness, limit of detection and precision all 10%

[36] Commission Regulation 333/2007 , 589/2014, & 1441/2007, Regulation 1881/2006, 1259/2011, Council Directive 98/83

Test	No. of samples	Maximum levels	Performance criteria
Mercury	1 sample per year	1.0 µg/l	Trueness 20%, limit of detection 20% and precision 10%
Nickel	1 sample per year	20 µg/l	Trueness, limit of detection and precision all 10%
Nitrate	1 sample per year	50 mg/l	Trueness, limit of detection and precision all 10%
Nitrite	1 sample per year	0.5 mg/l	Trueness, limit of detection and precision all 10%
Pesticides	1 sample per year	0.1 µg/l	Trueness, limit of detection and precision all 25%
Pesticides – total	1 sample per year	0.5 µg/l	Trueness, limit of detection and precision all 25%
Polycyclic aromatic hydrocarbons	1 sample per year	0.1 µg/l	Trueness, limit of detection and precision all 25%
Selenium	1 sample per year	10 µg/l	Trueness, limit of detection and precision all 10%
Tetrachloroethene and trichloroethene	1 sample per year	10 µg/l	Trueness 25%, limit of detection 10% and precision 25%
Trihalomethanes	1 sample per year	100 µg/l	Trueness 25%, limit of detection 10% and precision 25%
Vinyl chloride	1 sample per year	0.5 µg/l	Controlled by product specification
Chloride (as Cl)	1 sample per year	250 mg/l	Trueness, limit of detection and precision all 10%
Manganese	1 sample per year	50ug/l	Trueness, limit of detection and precision all 10%
Sulphate	1 sample per year	250 mg/l	Trueness, limit of detection and precision all 10%
Sodium	1 sample per year	200 mg/l	Trueness, limit of detection and precision all 10%
Ammonium	4 samples per year	<0.5 ppm	Trueness, limit of detection and precision all 10%
Colour	4 samples per year	Typical	Not specified
Conductivity	4 samples per year	2500 Us cm^{-1}	Trueness, limit of detection and precision all 10%
pH	4 samples per year	6.5 to 9.5	Capable of measuring concentrations equal to the parametric value with a trueness of 0.2 pH unit and a precision of 0.2 pH unit.
Odour	4 samples per year	Typical	Not specified
Taste	4 samples per year	Typical	Not specified
Turbidity	4 samples per year	<5 NTU	Not specified
Aluminium	4 samples per year	200 µg/l	Trueness, limit of detection and precision all 10%
Escherichia coli	4 samples per year	Nil	Not specified
Total Coliforms	4 samples per year	Nil	Not specified

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11.5 ANNEX 5 - SUMMARY OF TESTING NEEDS FOR ALL SECTORS

TYPE of INSTRUMENT	TYPE OF TEST	KSVA	FISH. IND	KCL	WATER S	CA FOOD	FOOD IND
Atomic Absorbtion Spectrometer & Cold Vapor injector	Hg + Methyl Hg 0.1ppm					200	50
	Hg	1	1				
	Hg	4	4				
Atomic Absorbtion Spectrometer & Graphite furnace	As Cd Cu Fe Pb 0.1-2 ppm					400	80
	Al	4	4				
	As, B, Br, Cr, Cu, Sb	6	6				
	Mn, Pb, Ni, Se,	4	4				
	Pb, Cd	4	4				
	Fe, Zn in flour 10ppm					200	50
Colorimeter	Ammonium	4	4				
	Sulphate	1	1				
	Colour	4	4				
	Turbidity	4	4				
	Clarity (30oC)			500			
	Colour			500			
Distiller, Extractor, Weighing & Titration	Moisture					500	200
	Moisture & volatile			1000			
	Total Dissolved Solids				150		
	Unsaponifiable			500		50	
	Insoluble impurities			500			
	TVBN	10	20	10			
	Carbohydrates, protein, fat, energy					250	100
Gas Chromatograh & Various Detectors	Vinyl chloride	1	1				
	Tetra- and trichloroethene	1					
	Trihalomethanes	1					
	Benzene	1	1	1			
	Fatty Acid Profile			200		200	
	Epichlorohydrin	1	1				
Liquid Chromatograph & various Detectors	Mycotoxins					200	50
	Histamine	10	18				
	Histamine	5		10			
	Formaldehyde 5 ppm					30	15
	Histamine 100ppm					100	50
	Melamine 1ppm					50	10
	Vit. Group B 2-60ppm					100	50
	Malachite green		30				
	Benzo(a) pyrene	25	1	1			
Spectrometer and/or Flow Injection Analyzer & ion Chromatograph	Cyanide	1	1				
	Fluoride	1	1				
	Fluorine	1		2			
	Nitrate-nitrite				1500		
	Nitrate-nitrite	1	1				
	Ascorbic acid	5		5			
	Phosphates	2	2				
	Iodine (30ppm)					50	
Titrimetry or Conductivity or Potentiometry	Conductivity	4	4				
	pH	4	4				
	pH				150		
	Acid, iodine, H2O2, Polenske Value			500		50	
	Saponification value			500		50	
	Sodium (100-1000ppm)					100	25
	Sodium	1	1				
	Chloride (as Cl)	1	1				
	Chloride					150	
	BOD				150		
Specific instrument	Density			1000			
	Refractive Index			1000			
	Slip Melting point °C			500			
	Determination of insects					?	
Organoleptic tests	Odour		25				
	Taste		25				
	Odour & Taste			150			
Microbiology	: TPC, T.C. E.Coli	1	7000				
	: TPC			100			
	: TC-EC-Salm-B.Cr-Staph- Vibrio-					1000	200
	: TPC, T.C., E.Coli				1500		
Mass Spectrometry orother advanced equipment	Asbestos				?		
	Dioxins and PCBs	4	4	4			
	1,2-dichloroethane	1	1				
	Hormones	5	10				
	3-MCPD 0.2ppm - DCP 5 ppb					30	
	Pesticides (OCP)	4					
	Polycyclic aromatic hydrocarbons	1	1				
	Pesticides – total	1					
	Acrylamide	1	1				
	POP/OCP				150		
	POP/OCP		5				
	Radionuclides					?	

11.6 ANNEX 6 - PROPOSED EQUIPMENT FOR FOOD LAB MOMHS (PROJECT FAO)

FOOD LABORATORY EQUIPMENT LIST and quota		
Equipment	**Company**	**Cost estimate**
Chemistry		
1. Kjeldahl digestion and distillation unit	FOSS	$26,000
2. Water purification system (Millipore)	VWR International	$5,000
3. Centrifuge (refrigerated)	Candawide Scientific	$8,000
4. Centrifuge (non-refrigerated	Candawide Scientific	$5,000
5. Soxhlet/Soxtec apparatus	FOSS	$15,000
6. Grinding mill (Wiley mini)	FOSS	$4,000
7. Analytical balance (0 – 500 g ± 0.001 g)	VWR International	$4,000
8. Analytical scale (0.0001 – 0.1g)	Acculab series	$1500
9. pH meter	VWR International	$800
10. Conductivity meter	VWR International	$1500
11. Brookfield Digital Viscometer	Cole Palmer	$3500
12. Rotary vacuum evaporator	Cole Palmer	$3000
13. Ultrasonic bath	Cole Palmer	$2000
14. Pipettors a. 100 – 1000 µl (4 x$400) b. 20 – 200 µl (4x $400) c. 2 - 20 µl (4x$400) d. 0.5-20 µl (multichannel, 2 x $1400) e. 25-1250 µl (multichannel, 2 x $1500)	Cole Palmer	 $1600 $1600 $1600 $2800 $3000
15. UV-Vis spectrophotometer	Varian	$8000
16. HPLC Column, guard columns and services	Waters	$15,000
17. Infra-red moisture analyzer	Cole Palmer	$3000
18. Magnetic stirrer with hot plate		
19. Digital Overhead Reversing Mixer	Cole Palmer	$2000
20. High speed homogenizer	Cole Palmer	$1500
21. Orbital Shaker	Cole Palmer	$2000
22. Gas Chromatography/Mass Spectrometer (GC-MS)	Agilent	**$70,000**
23. LC/MS/MS	Agilent	**$43,800**
24. Shaking Water bath	Thermo Scientific Haake	$5000
25. Digital Vacuum Oven	Cole Palmer	$5500
26. Electronic Desiccator	Cole Palmer	$2000
27. Benchtop Water Activity Meter	Cole Palmer	$6000
28. Equipment Accessories (General)		$20,000
29. Muffle furnace	Fisher Scientific	$10,000
30. Dish washer	Fisher Scientific	$7,500
Microbiology		
31. Vertical loading laboratory Autoclave (80 L)	Yamato	$17,000
32. Stomacher laboratory blender	Seward, Cole Palmer	$6500
33. General Purpose Digital Incubator	StableTemp/Cole Palmer	$3000
34. Ultra-Low Temperature Freezer (-86°C)	Thermo Scientific/Cole Palmer	$20,000
TOTAL		**$337,700**

11.7 ANNEX 7 - LIST OF TESTS NECESSARY FOR IMPORTED DIESEL (K-OIL)

The standard ASTMD975 describes 13 criteria, associated test methods, and sets the value of parameters for seven classes of oil.

- Flash Point D93
- Water and Sediment D2709 or D1796
- Distillation Temperature D86
- Kinematic Viscosity at 40°C D445
- Ash D482
- Sulphur D5453 or D2622
- Copper strip corrosion D130
- Cetane number D613
- Cetane index D976
- Aromaticity D1319
- Cloud point D2500
- Low-Temperature Flow Test D4539
- Cold Filter Plugging Point D6371
- Ramsbottom carbon residue on 10%
- Distillation residue D524
- Lubricity, HFRR @ 60°C D6079 or D7688
- Conductivity D2624 or D4308

11.8 ANNEX 8 - SUMMARY ON KEY LEGAL TEXTS ON SPS (and TBT) MATTERS

Current legislative framework

The following Laws and Regulations have been considered in assessing the current Kiribati Quality Infrastructure legislative framework:

- Consumer protection Act 2001 and Consumer Protection Regulation 2004
- Food Safety Act (2006) and Food Regulation and Standards (2014)
- Fisheries law Fisheries act 2010 with amendments (2014), Fish Export Regulation 2012 and Kiribati Industry Standard KIS (2016)
- Quarantine and Importation of Animals Ordinances (1977 ed.) and the Biosecurity Act of 2011
- Building Act (2006) and the National Building Code (2010)
- The Petroleum Act (1977 ed.), Public Utilities Ordinance (1977 ed.) and amendments of 2010

Consumer Protection

The Consumer Protection Act 2001 defines the tasks, competence and powers of inspectors. The Act also provides for the remedies and sanctions for which initiation the Minister is responsible.

The Act empowers the Minster to prescribe by regulation, product safety or quality standards for any specified kind of goods and prohibits the supply or trade in goods in relation to which there is an approved standard, unless the goods comply with the standard. The Act also includes provisions on fair-trading and statutory warranties.

The Consumer Protection Regulation 2004 importantly specifies two standards in Product Safety and Labelling. There are concerns about the adequacy and practicability of the current sanctions and the capacity to deal with highly technical issues.

Agri-food products

The Food Safety Act 2006 puts in place the basic requirements and prohibitions as well as the powers and functions for official control of food. It also prescribes the sanctions and mechanism for their enforcement.

The Food Regulations and Standards (2014) further details requirements for domestic food businesses as well as for imports and for so-called designated products whilst prescribing horizontal chemical and microbiological parameters.

In addition, there are mandatory quality parameters for key food groups included in so-called standards attached as schedules.

Product group-specific legislation

In respect of specific strategic products, there is separate product-specific regulation:

Fisheries

The Fisheries Act of 2010 concerns protection, management and development of fish stocks as well as the licensing of foreign vessels which was amended in 2014 to amongst other things create the Kiribati Seafood Verification Agency (also called Competent Authority CA) to verify the import and export of seafood and requires the certification of exports with certain requirements. The Act further provides sanctions and the mechanism for enforcement and provides for the Minister to set standards.

Further to the act, there are the Fish Export Regulations 2012, which bring the Agency into being and specify procedural as well as provide for the appointment of inspectors, the mandatory certification requirements (establishment and product) and the powers to define standards.

Further to this, in 2016 the Kiribati Industry Standard (KIS) was adopted pursuant to the Regulation that specifies and details the requirements for the establishment, for personnel as well as for production processes.

Copra

The Copra (Marketing) Ordinance (ed. 1977) with its subordinate regulations provides for the requirements for marketable copra as well as the powers and mechanism for their enforcement.

Biosecurity

Biosecurity regulation is provided by the rather outdated and trade restrictive Quarantine (ed. 1977) and Importation of Animals Act (ed. 1977) which are augmented and updated by the more recent Biosecurity Act of 2011. Together this package of laws and attendant subordinate legislation provide detailed requirements for the import and export of plants animals and their products as well as domestic surveillance and control measures as well as the sanctions and mechanisms for enforcement.

Non-food goods

There is currently inadequate framework legislation for the general safety and quality requirements in respect of non-food products. There is however sector-specific legislation relevant to the quality and safety of the provision of certain services

and goods including the general framework law on public utilities which regulates certain aspects of utility provision and provides for its enforcement.
The Petroleum Act regulates the importation storage and sale of petroleum and its products but does not provide quality parameters. For resource reasons the state oil company currently conducts its own quality checks and testing of imports.
In respect of the energy efficiency of products energy labelling standards for consumer goods (including Air-conditioning equipment refrigerators and lights) are currently being drafted which will be based on Secretariat of the Pacific Community (SPC) regional standards which will be under the Consumer Protection Act and will probably be enforced (possibly through delegation) by Consumer Protection inspectors under their general mandate.
In respect of building standards, the building act of 2006 requires building activity to be undertaken in accordance with the Building Code. The code, (which is closely based on the Australian and NZ model and indeed contains references to its origins) provides requirements as well as references standards with the Code overriding any referenced standards. There are mandatory performance requirements as well as so-called "The Deemed-to-Satisfy Provisions of the Code which are one means of satisfying the Performance Requirement".
Laboratories
There is a basic laboratory capable of testing for certain parameters of water but the laboratory testing capacity for the safety and quality of other food and all non-food goods is lacking. There are plans to upgrade the testing capacity that can best be met in systematic by a testing needs assessment and laboratory rationalization plan.

Conclusions and recommendations
The Food Regulation and Standards is now in place to enhance the framework for the protection of consumers in respect of imported and domestic food, which needs to be implemented with much awareness raising and training. There are also quality and safety assurance systems in place for key exports. The definitions of "food" covers all food including raw material and the "food business" which covers any stage of the chain including primary production, will require competence and cooperation clarification with Ministry of Agriculture (MELAD) and the Local Councils (e.g. licensing).
Whilst the Consumer Protection legislation provides some key elements of quality and safety assurance in respect of non-food goods, there are a number of elements of the quality infrastructure regulation in particularly in respect of non-food products, which are missing or underdeveloped. Country specific solutions will need to be considered and discussed in the preparation of the policy.
It is therefore recommended to consider the preparation of new or amended legislation:

- to address Liability for Defective Products to provide the basic framework for non-food goods which is already in place for food products (primary responsibility). There may be a need to further development the basic requirements on Product Safety currently to be found in the Standard on Product Safety annexed to the Consumer Protection Regulation 2004
- for market surveillance and the institutional arrangements for its implementation to match the official control provisions currently in place for food products. These measures will help to strengthen the system of protection of the Kiribati consumers from low quality and dangerous good, which are predominantly imported.
- to define and prescribe the development and use of voluntary standards and the requirements and systems for conformity assessment. The issue of accreditation and metrology will also need to be addressed. These measures will enable the Kiribati authorities to develop the use of voluntary standards to improve and add value to the products and services of Kiribati citizens as well as to raise the level of the quality of imports.

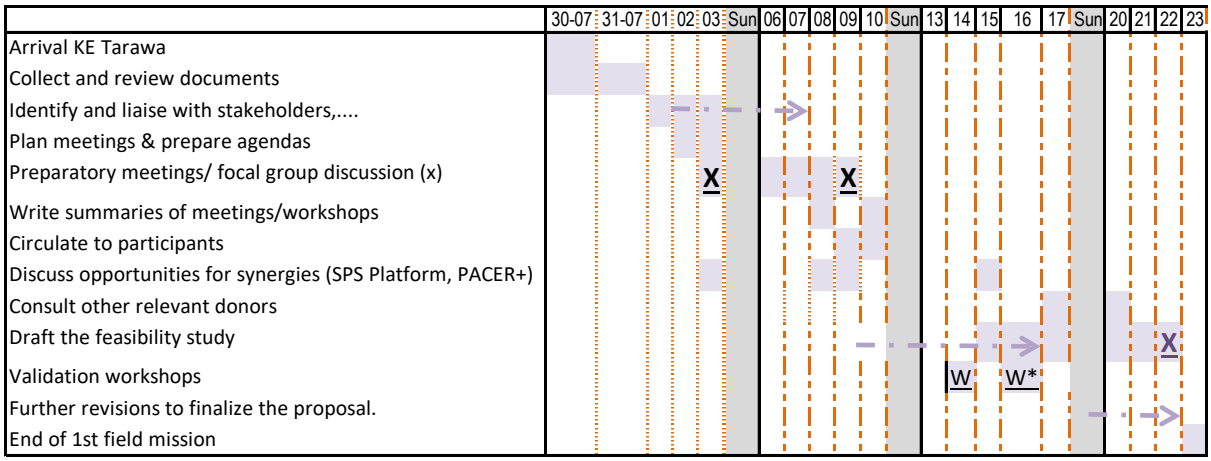
The Building Code reflects the modern regulatory approach to one use of voluntary provisions or standards to provide a presumption of compliance with mandatory performance requirements and could provide a model for the development of the use of standards in other areas considered relevant.
Resources (including inspectors and testing infrastructure) are in very short supply and their utilisation needs to be optimized. Consideration of and legal provision for delegation of specific tasks to and undertaking joint actions / sharing infrastructure (e.g. on basis of MoU) with other institutions will facilitate this process.

Back to Text

11.9 ANNEX 9 - SET-UP TO AVOID CONFLICT OF INTEREST IN PUBLIC LAB

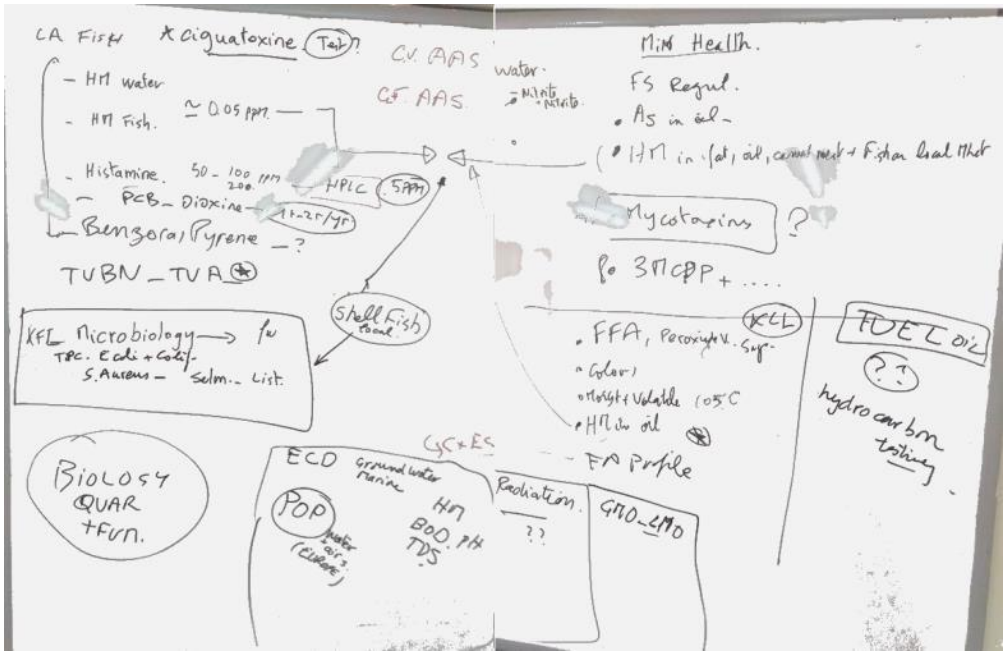
The CA for Food in Indonesia combines regulatory activities, enforcement activities, and testing. However, it can be noted that the laboratory is under the authority of the permanent Secretary; while the Official Controls division (red shape) is under the direct authority of the Head of NADFC (Director General). While the Permanent Secretary is also under the authority of the Head of NAFDC, the relative independence of the lab is vouched by the nature of the PS position (continuous in time and independent from political nomination), and by the fact that the PS role handles most administrative issues (Human resources, planning, financing...) which are key success factors for the laboratory.
Such arrangement allows the hierarchy to have a generic oversight on the lab, but not involving directly in its management. In addition, since the lab is independent from the official controls activity, it may sell services to private businesses in addition to performing tests at the request of the enforcement section.

11.10 ANNEX 10 - WORK PLAN OF THE PPG657 MISSION AND CONSULTATIONS



DATE & TIME	INSTITUTION	OFFICIAL/ATTENDEES
Thursday, 2nd August 2018		
0900-1230	MCIC	SCIC, DBPC and Quality Promotion Team
Tuesday, 7th August 2018		
0900-1230	MFMRD	Secretary, MFMRD
1330-1615	MFMRD	KCA
Wednesday, 8th August 2018		
0900-1230	MHMS	Secretary, MHMS Director, Environmental Health and team
1400-1600	MELAD	Secretary, MELAD, BS, ECD and ALD team
Thursday,9th August 2018		
0900-1330	Focal Group Discussion	Managers of the laboratories of MHMS, Fisheries, MELAD, KCDL, KFL,+ ECD officers
Tuesday,14th August 2018		
0900-1400	Validation Workshop	All key stakeholder groups
Thursday,16th August 2018		
0900-1230	Debriefing for National Trade Advisory Committee	NTAC members
Friday,20th August 2018		
1000-1100	MFAT	NZ High Commissioner
1150-1230	Taiwan Embassy	Taiwan Ambassador
Tueday,21st August 2018		
0900-1230	MISE	Secretary, Design & Costing Unit

Outcome of the Focal group Discussion



National Stakeholder Validation Workshop, KUC Antebuka - 14th August 2018

Programme

MC	**TBC**	
0830 – 0900	**Registration**	**MCIC Secretariat**
0900 – 0915	Welcome Remarks	**Honorable Minister** Ministry of Commerce, Industry and Cooperatives
0915-0930	**Session 1:** National Quality Policy: SPS and Testing Key Policy measures	**Mrs. Teira Taenang** Senior Quality Promotion Officer.
0930 -0945	**Session 2:** Overview of the Project: Scope and Expected Outputs	**Mr. Samson Odhiambo** National Trade Advisor
0945- 1000	**Floor Discussions**	**All Participants**
1000 -1020	**Tea Break**	**Participants**
1020 -1100	**Session 3**: Feasibility Study: Emerging Key Findings and Recommendations	**Mr. Alain Peyré** SPS Consultant
1200-1300	Floor Discussions and Feedback	All Participants
1300-1400	**Lunch and End of Workshop**	**Participants**

Attendance of the Validation workshop

Participants List

SR No.	Name	Institution	Title	Email Contact	Signature
1	Teboranga Tiofi	PSO	NCSSDI Coordinator	complaint@pso.gov.ki	
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5	Samson Awinoh	MCIC	ADVISOR		
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10	Koreti Eritai	MCIC	Director BPC	Eritai@commerce.gov.ki	
11					
12					
13					
14					
15					

Attendance to the NTAC Session

National Trade Advisory Committee (NTAC)

Date: 16th August 2018

MCIC Boardroom

Participant List

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20				

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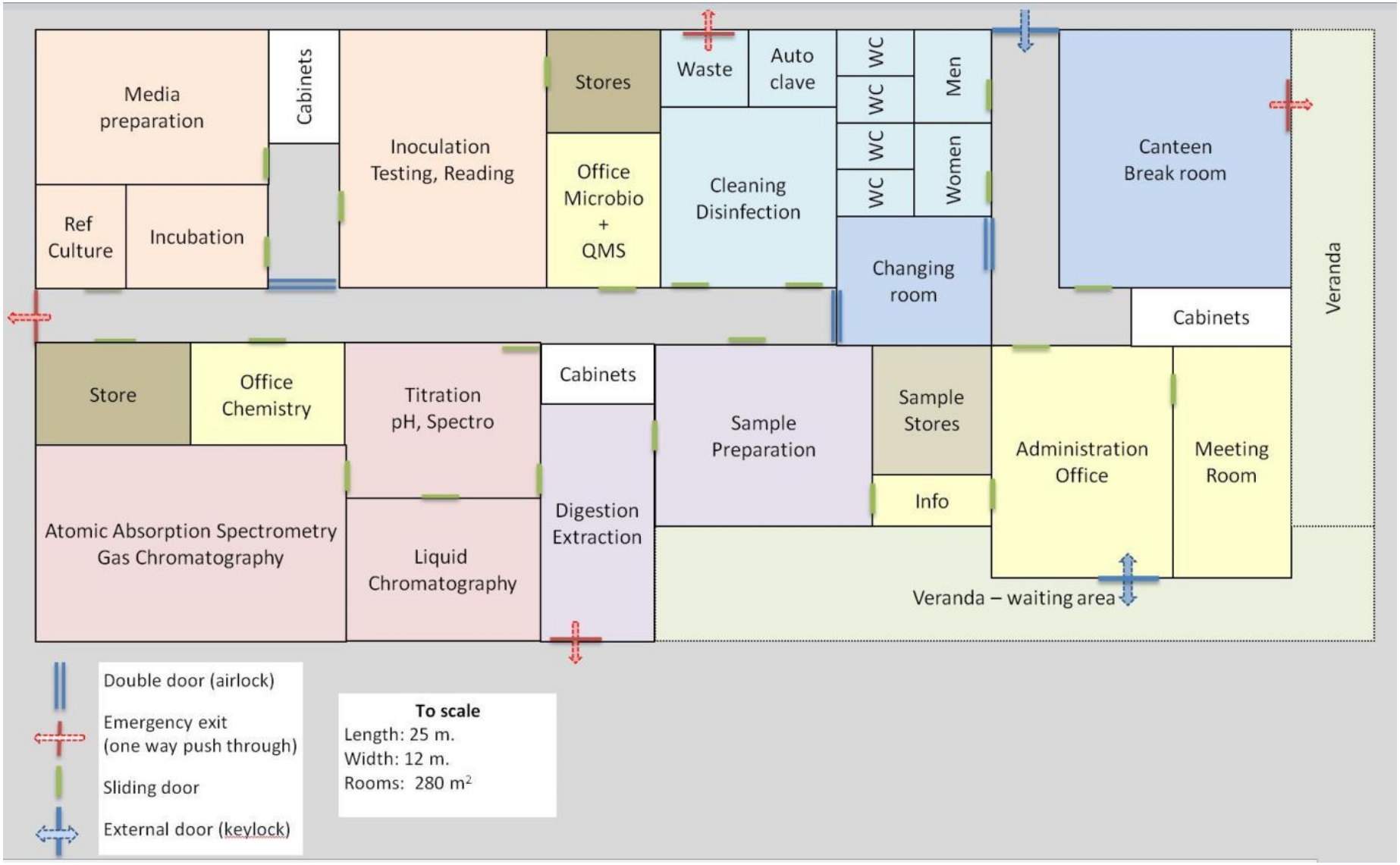
5	Teira Taenang	MCIC		
6				
7				

11.11 ANNEX 11 - DETAIL OF THE LABORATORY ROOMS

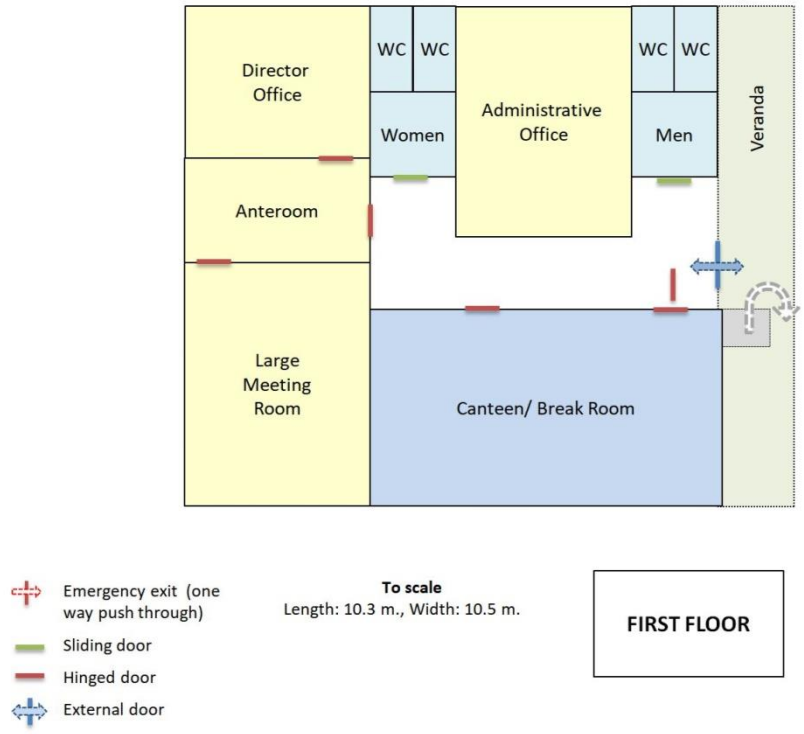
Length (m)	Width (m)	Size (m2)	Area	Function	Ambiance requirements	Details
3.7	4.84	30.4	Admin offices	rooms for director & admin officer	general VAC	two rooms + filing cabinets; internet connection, phone-fax & printing facilities; safety lockers
3.14	2.7	22.0	Lab office space	desks for managers, QMS docs	general VAC	semi enclosed space & cubicles, alu/glass pannels allow visibility in lab sections
3.9	5.13	28.6	Meeting room	staff & clients meetings, training	general VAC	screen +HD projector
2.1	5	10.5	Changing rooms	sas between outside & lab	general VAC	lockers and shoes rack (male/female)
1.8	3.7	6.7	Toilets	for offices & for labs	general VAC, air extraction	1 unit per 8 staff members, male/female
7.41	4.14	30.7	Canteen	Dining room, kitchen, rest space	general VAC, air extraction	food fridge, microwave, sink, handwash, first aid
2.2	1.37	3.0	Samples storage	Reception & storage of samples	general VAC	counter/ writing desk; benches, shelves, fridge,
6.4	2.7	17.3	Preparation room	Process samples into test items	General VAC, air extraction	benches, sinks, hotwater, blenders, stomacher,
3.72	3	11.2	Digestion and extraction room	all steps using of acid and solvent	Air extraction, no aircon	fumecupboards (2); surfaces impervious to acids, alkali, solvents
2.9	4	11.6	Conductimetry, spectro-, titrimetry	basic wet chemistry tests	Temp. control, air extraction	central bench
3.77	5.72	26.5	Instruments rooms AAS-GC-LC	clean, safe space for complex eqpt	T-H controlled, air extraction, E10 2-step filtration	extracting canopies/ ducts high amp. Plugs
1.8	9	16.2	Storage for generic stuff (ambient)	for small tools, dry chemicals...	General VAC	storage racks
			Storage for reagents, controlled	Keep solvents, acids & their waste	T-H controlled, air extraction	corrosion proof, solvents & acids separate
3	4.5	13.5	Media Preparation	Cooking, sterilization	General VAC, air extraction	water supply, high Amp. Plugs include storage facility for media at 15oC.
5	4	20.0	Inoculation & Testing	inoculation and reading of results	T-H control	floor and bench surfaces cleaned on a daily basis; house testing equipment only, handwash.
2	2.75	5.5	Incubation	House incubators	Temp control 24-27^{o}C	high amp. plugs,
2	1.75	3.5	Reference culture	Maintaining reference cultures, used only for such work	T-H control, air extraction, class E12 3-step filtration	surfaces cleaned before and after work each time; house single purpose laminar hood and a refrigerator.
3.7	5	18.5	Cleaning & Decontamination	washing of glass/tools, decontamination, drying	Air extraction	high amp. plugs, cleaned on daily basis; disposal of used test materials after decontamination on a daily basis.
			Cleaning & Decontamination room	host autoclave, waste, CS stuff	Air extraction	Space to keep cleaning equipment for the laboratories
3.7	3.77	13.9	Calibration 1			
5	3.77	18.9	Calibration2			
			Lobbies & empty spaces	int. circulation	Air extraction	include push-through emergency exits
			Verandas	ext. circulation, waiting area	Fans, lights	all weather fixtures, seatings

11.12 ANNEX 12 - LAYOUT OF THE PROPOSED CENTRAL LABORATORY

FIRST DRAFT Dec. 2018



FINAL DRAFT MARCH 2019


Director Office
WC
WC
Women
Administrative Office
WC
WC
Men
Veranda
Anteroom
Large Meeting Room
Canteen/ Break Room
Emergency exit (one way push through)
Sliding door
Hinged door
External door
To scale
Length: 10.3 m., Width: 10.5 m.
FIRST FLOOR

11.13 ANNEX 13 - DETAIL OF EQUIPMENT REQUIRED FOR A CENTRAL LAB

A13.1 General Equipment and Furniture

NB	COST	INSTRUMENT	DETAILS
1	15,000	50 KVA backup genset	
7	5,000	Airconditioners	1 and 1.5 HP, high quality brand
1	3,500	Autoclave 70l for waste decontamination	simple model
2	1,000	Balance (two decimal places)	
1	3,700	Blender, Grinder or Mill	bowl volume 0.7 to 1 l. max; blade rotation adjustable 2000-10000rpm
1	1,500	Compressor	with large receiver and moisture and oil vapour filters
16	2,000	Emergency exhaust fans in all lab rooms	
1	2,000	Eye wash station+ emergency shower	
12	2,000	Fire extinguishers for all rooms	
1	5,000	Fume canopy and blower	with ducts and activated carbon filter, resistant to solvents
3	8,000	Fume hoods, ducted and blowers	with scrubbers/filters, with blower, vapour proof light, resistant to acids
1	2,000	Glassware drying cabinet	vol. 300 l.; Temp. max: 120 °C, adjustable and regulated by processor
2	1,500	Heat sealer	
1	1,500	Lab coats, shoes, gloves, safety goggles...	
8	3,200	Large wash sinks	SUS316
1	2,000	Main surge protector	
1	10,000	Main UPS	100kVA
1	800	Standard Weight Box	F2 0.1-100mg
1	3,750	Stomacher + bags	
4	2,000	Trolleys	
1	3,520	Water filtration + pre-purification system	output 20l/hr, water type 3
1	3,000	Water tanks and pumps	1 cubic meter

(Figures in red have been included in the cost of 'lab infrastructure' and not as equipment.)

A13.2 Lower Priority Equipment

NB	COST	INSTRUMENT	DETAILS
1	1,000	Washer Detergent+ Neutralizing agent	
1	5,250	Washer-Disinfector, and Accessories	professional lab model
1	4,000	Water purification system	for producing type 1 water
1	3,500	Brookfield Digital Viscometer	
1	2,000	Fluorimeter	(phytoplancton)
1	3,000	Infra-red moisture analyzer	
1	3,000	Ultrasonic bath	chlorophyll
1	5,500	Vacuum Oven	digital regulation
1	10,000	Water Activity Meter	benchtop model
2	1,525	Anaerobic jar for microbiology and bags	
1	2,750	Dry cabinet	Capacity 175l.; Automatic 25~55%RH at ambient temperature
1	1,500	Lyophilized bacterial stock culture	Bacillus cereus (FDA strain PCI 213); Campylobacter jejuni subsp. jejuni ;et

A 13.3 Equipment for Chemistry

NB	COST	INSTRUMENT	DETAILS
1	30,000	Atomic Absorption Spectrometer + flame and cold vapor (specific for mercury tests)	AAS with autosampler and set of lamps, gas regulators and fittings, UPS +AVR 2.5KVA,
1	30,000	Atomic Absorption Spectrometer + Graphite furnace	AAS with autosampler and set of lamps, gas regulators and fittings, UPS +AVR 2.5KVA,
6	5,000	Auto-pipettes	
1	750	Balance (precision)	
1	1,200	Balance, analytical 4 digit	0.1kg to 0.2mg
1	2,200	BOD Incubator	digital, regulated, 2.5 cu.feet
1	4,000	Centrifuge (refrigerated)	
1	30,000	Clean room for Furnace AAS	air prefilters and filters, blower, controls
2	600	Desiccator	
1	1,400	DO probe	compatible with a multimeter e.g. WTW67484 or OAKLON700
1	2,000	Electronic Desiccator/ dry cabinet	
1	2,000	Filtered air cabinet, front-blowing	
1	30,000	Flow injection analyser	with 3-4 manifolds, auto-injector
1	9,000	Fridge, explosion proof for chemistry	
4	15,000	Gas Chrom. columns and pre-columns	also fittings, std reagents, spares, gas cylinders, regulators, special tools, e
1	35,000	Gas chromatograph TCD+ECD, FID detectors	with 2.5 KVA UPS
1	1,500	Homogenizer, overhead with stand	highspeed
1	35,000	HPLC + ECD, UV, FID detectors	with autoinjector. Plus dedicated 2.5KVA UPS+AVR
2	15,000	HPLC Column, guard columns and services	also fittings, std reagents, spares, gas cylinders, regulators, special tools, e
1	12,500	Kjeldahl digestion and distillation unit	
2	1,500	Manifold filtration unit, funnels, porcelans	
1	6,250	Misc. items	Bunsen burners, tripods, filter papers, tweezers, 100ml plastic sample cup
1	3,500	Muffle furnace	
1	2,000	Orbital Shaker	
1	2,000	Oven, drying	vacuum?
1	2,140	pH Meter +conductivity (benchtop)	
2	700	Reagent dispenser, digital	
1	2,000	Reversing Mixer, overhead with stand	digital regulation for speed & time
2	3,000	Rotary vacuum evaporator	
1	2,500	Soxhlet/Soxtec apparatus	6 positions
2	6,000	Thermoreactor (digestor)+temp control	
1	1,200	Turbidity meter	
1	5,000	UV-Vis spectrophotometer	
1	1,000	Vacuum pump	
1	1,500	Vortex mixer	
1	2,500	Water bath, shaking	
1	3,500	Water ultrafiltration and RO/ion exchange	producing Type I water for chromato, AAS

BACK TO TEXT

A13.4 Equipment for Microbiology

NB	COST	INSTRUMENT	DETAILS
1	450	Balance (2 digits)	0 - 200g, readibility= 1mg
1	650	Balance (precision)	Capacity max. approx. 210g, readibility= 0.1mg; Repeatability ~ 0.1 mg;
1	750	Benchtop pH-meter with probes, connections	Range pH –2.00 to 16.00; Temp: –20.0 ºC to 120.0 ºC; Resolution: 0.01 pH
1	750	Binocular magnifier	0 - 3X
1	5,000	Bio-safety cabinet (laminar flow hood)	Protection ISO Class 5; Separate flows blowers, ULPA filters; low velocity
1	1,500	Colony Counter	
2	500	Electronic hot plate	Ceramic top; Surface temp up to 350 oC
1	1,435	Freezer	Type Chest; CFC free; Climate Class N; Capacity: 100 liters; Cooling perf. -4
1	1,500	Fridge for microbio	professional model, climate class N, with regulator & external temp dial
2	4,200	Incubator	Stainless steel, Temp. up to +60°C, dual door, regulated, calibrated
2	800	Manifold filter holder & funnels+clamps	autoclavable
1	5,000	Media dispenser	
1	200	Membrane filters for water microb.	diam 47mm, pore 0.45micrometer, meets EPA and APHA standards for w
1	2,500	Microscope	10 - 100X
1	250	Microwave oven (basic)	power 1000W; High-performance vent system with standard output +hos
1	1,027	Multiposition heating stirrer	3 positions each adjustable temp and speed; 700W; plates 160x160 mm.
1	2,235	Oven sterilization - hot air	Capacity 105 l, Temp: min. 10°C above ambient up to +250°C, digital contr
3	2,000	Pipette filler	electric
2	1,500	Pipette washer	
7	7,500	Pipettors	4:100 – 1000 µl ; 4: 20 – 200 µl ; 4: 2 - 20 µl ; 2: 0.5-20 µl (multichannel); 2: 25-1250 µl (multichannel)
2	700	Portable Digital Reference Thermometer	With Pt100 probe (according to EN 60751); ~ 15 cm; Range : -30°C to +200
1	7,500	Set of misc lab tools & glassware	Autoclavable Disposable 'red' bags ; Pipette graduated (0.1, 1, 2.5, 5ml); e
1	3,833	Set of reagents	pH buffers (4,8,10); EC broth ; EMB Agar for coliform, E.coli testing; Indol
1	6,000	Steam Sterilizer ~80l + accessories	sterilization ISO 17665-1:2006, Safety: IEC/EN 61010-1, IEC 61010-2-040,
3	1,500	UV Hand lamps	254nm - 365nm
1	1,000	Vacuum pump	air displacement ~ 30l/min; depression ~720 mmHg
1	1,500	Vortex mixer	110mm
2	2,500	Water Bath, regulated	10-12 liters, Temp range: 10 °C to 95 °C plus boiling stage, regulated,
1	3,050	Water still (or UF+ion exchange)	for producing Type 1 laboratory water
3	500	Working Precision LIG Thermometers	Length ~305 mm, partial immersion (approx 75mm); Range : 0°C to 110°C
3	500	Working Precision LIG Thermometers	Range: approx. 10°C to 150°C with 1°C divisions; Length ~305 mm,

BACK TO TEXT

UPDATED QUOTATION MARCH 2019

1a	systems (infr.)	209,927
1b	furnitures	35,000
2	generic tools	99,569
3	chemistry	408,135
4	microbiology	212,921
5	calibration	86,297
6	Biosecurity	182,000
7	Priority 2	447,300
8	Optional	120,256

11.14 ANNEX 14 - DETAILS OF LABORATORY COSTS

A14.1 Investment Costs

Draft Dec 2018

all cost in AUD	2019 Year 0
INVESTMENT	**1,092,728**
Infrastructure general	**338,300**
Fencing, drains, PUB, carpark	12,000
Building mainframe + roofing	180,000
Buildings: insulation, doors, fittings, ducts...	108,000
Power stabilization/ inverters, control system	23,800
Security systems: CCTV+locks	14,500
Infrastructure laboratory	**165,428**
Fixtures & furniture	57,500
Electricity generator & fuel storage	21,000
Ventilation and Climatisation systems	75,000
Water treatment & purification unit	11,928
Equipment	**589,000**
Generic lab equipment	61,000
Chemistry Instruments	432,000
Microbiology instruments	96,000
Non-priority instrument	0

Revised Version March 2019

all costs in AUD *first quarter Q1 starts at Cabinet approval*	**All Years**
INVESTMENT: TANGIBLES	
Infrastructure general	**417,000**
Fencing, drains, utility connection, carpark	24,000
Building foundation, mainframe,walls, roofing	155,000
Buildings: insulation, doors, fittings, ducts...	188,000
Fumigation hangar	45,000
Registration, permits and publication costs	5,000
Infrastructure utilities	**301,427**
Fixtures & furniture	35,000
Electricity generator & fuel storage	49,000
Main UPS & protector, inverters, controls	138,037
Ventilation and Climatisation systems	52,000
Water treatment & purification unit	15,890
Security systems: CCTV, cardlocks, etc	11,500
Equipment	**1,556,478**
Generic lab equipment	99,569
Chemistry Instruments	408,135
Microbiology instruments	212,921
Calibration Instruments	86,297
Biosecurity equipment	182,000
Priority 2 instruments	447,300
Provision for overruns or options	120,256

Sub Total Investment: tangibles	***2,274,905***
Sub Total Investment: tangibles	**2,274,905**

A14.2 Operational Costs of the Laboratory Development Project

Back to Chapter 6 Back to Chapter 10

First Version Dec. 2018

all cost in AUD	2019	2020	2021	2022	2023		2027
	Year 0	Year 1	Year 2	Year 3	Year 4	----	Year 8
OPERATIONS	**101,299**	**439,349**	**569,759**	**604,123**	**598,279**		**545,467**
Operating costs	**21,749**	**177,554**	**275,711**	**320,379**	**323,252**		**308,768**
Reagents, chemicals, test kits	12,500	35,000	47,000	60,000	75,000		80,500
Calibration	0	5,000	7,500	7,500	7,500		7,500
QA services+ cert. standards	0	9,500	12,000	15,000	14,000		15,000
Salaries, technical staffs		112,680	190,368	215,568	200,472		175,020
Subcontracting of tests (not inputed)		*22,000*	*40,000*	*65,000*	*90,000*		*185,000*
Utilities : power, fuel, water	9,249	13,874	17,343	20,811	24,280		27,748
Waste disposal		1,500	1,500	1,500	2,000		3,000
Non-operating costs	**10,225**	**93,620**	**123,998**	**126,818**	**123,728**		**109,024**
Salaries, admin staff	0	27,730	42,418	45,668	60,356		63,374
Utilities : power, water	925	950	1,000	1,050	1,100		0
Communication fees (phone, Internet, mail)	1,000	1,500	2,000	2,060	2,122		2,500
Membership fees in organisations	500	1,500	1,600	1,700	1,800		1,900
Accreditation	0	10,780	21,560	9,500	10,000		10,500
Training of staff	0	43,200	47,300	58,560	39,900		21,600
Security costs	7,800	7,960	8,120	8,280	8,450		9,150
Indirect costs (overhead)	**69,325**	**168,175**	**170,050**	**156,926**	**151,300**		**127,675**
Amortization of building	30,075	30,075	30,075	30,075	30,075		30,075
Amortization of equipment	0	58,900	58,900	58,900	58,900		58,900
Consulting fees & advisory	33,750	67,500	67,500	54,000	47,250		20,250
Accounting & Auditing	1,000	4,500	4,750	5,000	5,250		6,500
Insurance	2,500	2,500	2,500	2,500	2,750		2,750
Travels in region	1,000	2,000	3,500	3,500	4,000		5,000
Financial costs	500	2,200	2,300	2,400	2,475		3,000
Other costs (meetings & publications)	500	500	525	551	600		1,200

all figures in AUD	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
EXPENDITURES	**313,712**	**457,296**	**544,175**	**563,865**	**619,697**	**569,705**	**569,102**	**576,755**
Operating costs	**151,742**	**263,711**	**333,258**	**353,177**	**397,202**	**355,107**	**346,705**	**360,472**
Reagents, chemicals, test kits	12,500	25,000	37,000	49,000	61,000	73,500	85,200	97,200
Calibration	0	5,000	7,500	7,875	8,000	9,000	9,500	10,000
QA services+ cert. standards	0	2,500	3,500	5,000	6,500	7,000	7,250	7,500
Salaries, technical staffs	112,680	190,368	222,035	200,472	203,688	160,359	160,788	173,337
Subcontracting of tests	15,000	22,000	40,000	65,000	90,000	75,000	50,000	35,000
Utilities (power, fuel, water) for tests	11,562	17,343	21,678	24,280	26,014	27,748	31,217	34,686
Waste disposal (BTC)		1,500	1,545	1,550	2,000	2,500	2,750	2,750
Non-operating costs	**38,551**	**66,811**	**81,934**	**80,993**	**91,507**	**82,862**	**89,907**	**82,931**
Salaries, admin staff	27,730	42,418	47,266	60,356	60,356	62,770	60,356	62,167
Utilities (power, water) for Offices	771	790	830	870	910	960	1,010	1,060
internet)	1,000	1,500	1,800	1,926	2,022	2,083	2,187	2,500
Membership fees in organisations	500	800	1,000	1,100	1,150	1,150	1,200	1,250
Accreditation	0	8,167	16,333	0	10,000	0	10,500	0
Training of staff (internal training)	750	1,904	2,220	3,007	3,055	1,604	1,500	1,500
Security costs	7,800	7,960	8,120	8,280	8,450	8,620	8,790	9,000
Maintenance		3,273	4,363	5,454	5,563	5,675	4,363	5,454
Indirect costs	**123,420**	**126,775**	**128,983**	**129,695**	**130,988**	**131,736**	**132,491**	**133,352**
Amortization of building	44,043	44,043	44,043	44,043	44,043	44,043	44,043	44,043
Amortization of equipment	73,377	73,377	73,377	73,377	73,377	73,377	73,377	73,377
Accounting & Auditing	1,000	2,500	2,550	2,601	2,679	2,759	2,842	2,927
Insurance	3,500	3,605	3,713	3,825	3,939	4,057	4,179	4,305
Travels in region	1,000	2,000	3,500	3,500	4,000	4,300	4,600	5,000
Financial costs (on OPEX)	0	500	750	1,200	1,800	2,000	2,200	2,350
Other costs (meetings, subscriptions...)	500	750	1,050	1,150	1,150	1,200	1,250	1,350

EARNINGS	**24,750**	**109,050**	**184,300**	**336,615**	**492,854**	**610,041**	**694,014**	**826,541**
Sales of tests	5,000	68,750	118,800	236,115	360,154	488,991	599,014	743,291
nb of tests	200	2,500	4,000	7,500	11,000	14,500	17,500	21,500
average unit price of test	25	28	30	31	33	34	34	35
Sales of outsourced tests	17,250	25,300	46,000	74,750	103,500	86,250	57,500	40,250
nb of ext. test	138	202	368	598	828	690	460	322
average unit price ext. test	125	125	125	125	125	125	125	125
Other sales (fumigation, training)	2,500	15,000	19,500	25,750	29,200	34,800	37,500	43,000

REVENUE	**-288,962**	**-348,246**	**-359,875**	**-227,250**	**-126,843**	**40,336**	**124,912**	**249,786**

11.15 ANNEX 15 - CAPACITY DEVELOPMENT PLAN

CB Modules Year	2019	2020	2021	2022	2023	2024	2025	2026	2027
AAS theory+basic tech.	A1, A2		A4						
AAS advanced		A1, A2		A4					
AAS attachment			A2	A1	A4	A2	A1		
GC theory + basic techniques	A2		A4						
GC advanced		A2		A4, A5					
GC attachment				A2			A4	A2	
HPLC theory+basic tech.		A3		A5					
HPLC advanced				A3, A5					
HPLC attachement					A5	A3	A5		A3
Water & food microbiology	A1	A1, A3		A5	A5				
Microbiology attachement			A1, A3			A1	A3	A5	A6
QA in microbiology		A1, A3	A3	A5					
Uncertainty in microbiology									
QMS and ISO17025	All			All					
QC-QA & Uncertainty	M, All A								
Internal Audit & CA	All		T	All					
Trainer p.month	1.5	1.5	9w	2/6w	0.5/6w	9w	10w	5w	5w
Executive Advisor	67,500	67,500	54,000	47,250	40,500	33,750	27,000	20,250	0
Technical Training & TA	43,200	47,300	58,560	39,900	35,400	32,400	37,800	21,600	16,200
In-house training & TA	43,200	47,300	26,160	18,300	13,800	0	0	0	0
(days)	40	45	21	15	15				
tickets	10,500	10,500	9,000	6,000	1,500				
fees	22,400	25,200	11,760	8,400	8,400				
pdiem	10,300	11,600	5,400	3,900	3,900				
Attachment training	0	0	32,400	21,600	21,600	32,400	37,800	21,600	16,200
			6	4	4	6	7	4	3
Tickets			3,000	2,000	2,000	3,000	3,500	2,000	1,500
DSA			8,400	5,600	5,600	8,400	9,800	5,600	4,200
Host lab fees			21,000	14,000	14,000	21,000	24,500	14,000	10,500

11.16 ANNEX 16 - LIST OF DOCUMENTS AND REFERENCES

DOCUMENTS also available here: https://tinyurl.com/y8toptjl

- ADB lessons SOE reform Kiribati 2012.pdf
- ADB plan 2017-2019.pdf
- asbestos.pdf
- ATSM D975 diesel tests-grades.pdf
- Biodiversity Report Kiribati.pdf
- Cook Islands Central Laboratory feasibility study - Final June 2017.pdf
- Cook islands sanitation sector reform - 20180703.pdf
- Cook Islands Scoping Report for a Central Laboratory 2006.pdf
- Cook Islands Water Lab Capacity Review Jan 2014.pdf
- CXG 007 mmercury in fish.pdf
- CXS 193 contaminants.pdf
- CXS 311 std for smoked fish 2013.pdf
- EDES Business Plan Laboratories.pdf
- EU import tuna requirement.pdf
- EU Official methods analysis HM food.pdf
- Food lab Equipment list MHMS.docx
- Food Regs and Standards Kiribati 08032016-2.pdf
- HACCP for fish processors KSVA.docx
- KIRIBATI 20-YEAR VISION 2016-2036 (3).pdf

- National Control Plan Sept 2017 KSVA.doc
- NZ animal-products FHS specifications.pdf
- NZ Code - Animal Pdt Contaminant.pdf
- NZ list approved labs.pdf
- R1881 2006.pdf
- SPS COE Pacific Regional Platform Report.pdf
- STDF COE SPS .pdf
- STDF PG521 Solomon report#2 2018 06 29.docx
- STDF PG521 Project Application.doc
- STDF PG521 Solomon Report #1 2017 11 30.doc
- STDF P-IMA sps.pdf
- STDF_PG_521_Project_Application_with_Annexes.pdf
- Taiwan import requirements (FDA) 2017.pdf
- VCO Standard APCC.pdf
- VCO standard Malaysia 2007.pdf
- VCO standard Philippines.pdf
- Vet med residues AO 3rd C import.pdf
- VN FHS MRL.pdf
- VN FHS systems.pdf

USEFUL WEBLINKS

- https://eeas.europa.eu/headquarters/headquarters-homepage/2074/cook-islands-and-eu_lv
- http://www.cookislandsnews.com/item/63753-consultant-to-look-into-lagoon-issue/63753-consultant-to-look-into-lagoon-issue
- https://www.theprif.org/
- http://www.mercuryconvention.org/Implementation/SpecificInternationalProgramme/tabid/6334/language/en-US/Default.aspx
- analyse of POPs
- http://www.chromatographyonline.com/analysis-persistent-organic-pollutants-using-pressurized-liquid-extraction-and-automated-column-chromatography
- https://www.fisheries.noaa.gov/export-requirements-country-and-jurisdiction-g-m-2
- https://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/Seafood/ucm176892.htm
- https://www.thermofisher.com/ki/en/home/industrial/environmental/environmental-learning-center/contaminant-analysis-information/metal-analysis/comparison-icp-oes-icp-ms-trace-element-analysis.html
- https://www.thermofisher.com/us/en/home/industrial/environmental/environmental-learning-center/contaminant-analysis-information/metal-analysis.html
- Trace Metals in Foodstuff - FDA: https://www.fda.gov/Food/FoodborneIllnessContaminants/Metals/default.htm
- https://www.fda.gov/Food/FoodScienceResearch/LaboratoryMethods/ucm2006954.htm
- Trace elements in Oils: ISO 10540-3 (2) and AOCS Ca 17-01 (8); AOCS Ca 18-79
- https://pubs.acs.org/doi/abs/10.1021/jf000649n?src=recsys&journalCode=jafcau

11.17 ANNEX 17 - COMMENTS AND INPUTS RECEIVED

[STDF] was wondering if you also identified other projects implemented in the fisheries sector, related to export.	There is a support project by New Zealand on costal fisheries, more geared to domestic production and marketing. MOFMRD has been developing infrastructure (fishing gear, cooled storages) in the outer Islands in the aim to allow fisherfolks shipping fish to Tarawa in good conditions.
[STDF] Besides New Zealand, do you think EU and Australia might be interested in supporting the resulting project? Both the EU and Australia are donor members to the STDF and they might be keen to support the project.	We had discussion with EU in 2016 at the occasion of a previous project (ACP-EU TBT facility). At this time it was clear they had no intention to support TBT/SPS issues. The NIP for Kiribati is mostly focused on water and sanitation, and on Kiritimati Island due to remoteness. We had requested meeting with the Australia High Commission, but the persons were not available at the planned dates. Appointment will be made in the second mission
[STDF] Are you intending to discuss this with them during the project formulation phase?	Yes obviously, we will meet other Donors, with a representative from MCIC
[STDF] It might be useful to share this report with Australia and EU in Brussels. ....When sharing your report with all those people, you might want them to provide feedback and comments, if any.	Agreed, but the relationship with Donors involve other Ministries (Foreign Affairs, Finances). It may be better using the Government channels, for the sake of keeping the communication traceable and official.
[STDF] As for New Zealand's interest, it would be useful to mention at least very generally in the report that donors in Kiribati expressed strong interests to support the resulting project, which is subject to be confirmed and discussed further in the project formulation stage.	Agreed and the text has been modified
[STDF] Have you mentioned in your report clearly that Kiribati is not a member of IPPC?	This is mentioned with full details in pages 16 and 20.
[STDF] The KFL lab idea is a very good idea and this is a PPP example in practice. It would be useful to mention this in the report clearly, if you haven't done so yet.	There is interest from KFL top management, but at this stage no commitment for a co-investment or PPP. This would need first to be discussed again during the second phase
[FSVA] I understand that Kiribati is not a member of OIE but Kiribati usually submitted a National Reporting on live animals (aquatic and terrestrial) through SPC using OIE reporting template. The Director of Agricultural is the focal point from Kiribati. I think it is important that our contribution in submitting these national reports is crucial to be reflected in this report even-though we are not member to OIE.	This information is noted and has been integrated in the text

[KSVA] Please kindly note that no staff from the CA has been trained as analysts.	Noted, the text has been modified.
[KSVA] The CA utilized IAS lab at USP for histamine and heavy metals for fish. For water and ice – microbiological, chemical and physical testing. We haven't utilized Cawthron lab yet but we have developed our service level agreement with them for HPLC method for histamine analyses. 2 times a year for histamine. Once a year for PCB and Dioxins and heavy metals (2 times a year).	This information has been inserted in the text
[ALD] (i)- New Zealand and the Republic of Marshalls are also Kiribati trading partners hence the paragraph hereunder must also include these two countries.	New Zealand is mentioned. FSM trade flows are very small and do not appear in figures of international trade (in the UN Comtrade or the FAO Database]
[ALD] (ii) ALD is much alert on China's cases in food adulteration. It should be well noted that the Food Act is the more appropriate instrument to address the concern. However, ALD is strengthening its capacity to intervene also to where it is appropriate.	This information is noted and has been added to the text
[ALD] (v) ALD together with Fisheries updates regularly the animal health status of Kiribati to OIE. ALD focuses its report on the animals' pests and diseases while Fisheries focuses their report on Fish diseases.	Information inserted in text
[ALD] (iv) (v) It is a pity to know that Kiribati cannot export its live fish to Australia as mentioned in the report. However if Fisheries chooses not to as they have their own reasons, the report should be amended to align its content with the concerned Division/Ministry. (vi) For information, a query has been sent to SPC who had been assisting Kiribati in submitting the Kiribati OIE report. Response is yet to be received from OIE personnel.	The information on hindrances to live exports came from the industry. There are probably several reasons to this situation, including quarantine and protection disposition in Australia. In that perspective, direct participation and dialogue in the OIE and CITES would place Kiribati in a better position.
[ALD] (vii) For plant's exported products, ALD through its Biosecurity Section has been effective and vigilant in meeting health certificates required by importing countries concerned. (viii) There has been no issue yet received due to the issuance of health	This information is noted and has been added to the text

certificates, however, there has been concern from our side especially on handicrafts that some countries like New Zealand and Australia had been requiring health certificates for these articles/items. 23 Jan. 2019 'the BSS recognize the phytosanitary certificates but there have been cases where consignments were infested, despite certificates indicating fumigation.	This situation calls for regulatory dialogue with the competent authority of the country of origin. BSS must continue accepting certificates, but could adopt additional SPS measure at the cost of importers, provided that case of faulty certificates are duly documented and notified to the country of origin.
[ALD] (ix) In the past, handicrafts had been classified as not regulated items in both these countries biosecurity. It seems that there is amendment been done recently. For information, there has been query made to New Zealand and we are yet to receive response.	Both Australia and New Zealand (and some SE Asia countries) have included handicraft in their quarantine regulation since handicraft often comprise parts of plants or animals that are in raw form (dry but untreated) and as such may contain parasites or diseases.
[ALD] (x) To ensure Kiribati's products are received well at their destination countries, Kiribati has to comply with standards/regulations etc., of the importing country. (xi) For treatment, ALD is not responsible at all for treatment to non-compliance regulated goods.	Information is noted
[ALD] (xi) For plant products such as timber, fumigation off shore is a requirement. (xii) Recently ALD (Biosecurity) has allowed fumigation to be carried out in the country only on the contrary that the treatment will definitely zero the risk. Such approval is given by the Biosecurity Officer/Director of ALD coupled with the Environment and Conservation Division.	This information is noted and has been inserted in the text
[ALD] (xiv) It must be noted well that all plants and plants' products fresh or chilled are regulated – NOT some as stated hereunder in the following paragraph.	Information is noted and has been added in the text
[ALD] (xv) It's quite a concern to see such a statement (the last sentence of this paragraph). It's important to know where the [] information are sourced. Kiribati updates its pest and disease list as frequent as possible. Despite the infrequent updating, ALD through its Biosecurity and Extension services are very alert to any outbreak or so of the pest or disease. PLEASE, PLEASE, PLEASE always	The last sentence reflects a discussion held at ALD offices in August 2018. It was indicated in general terms that BSD capacities were limited, concerning the work needed to 'identify and monitor' the possible threats to Kiribati fauna and flora. If pest and diseases list are updated regularly, they should be available publicly; however, they are not posted on ALD and IPPC websites. Furthermore, the IPPC website shows that Kiribati is not up-to-date with reporting requirements (https://www.ippc.int/en/countries/kiribati/). Therefore, while there is no doubt that the ALD is committed to ensure plant and animal health and is doing the best efforts towards this objective, it must be recognized that these efforts are not documented

check the validity of one's information with concerned organizations.	properly, not reported regularly, and that most IPPC codes are not complied with. Unfortunately when it comes to international trade, partner would look first at the IPPC and OIE websites and may not bother to query SPC or the national focal person, if they see a poor score card of compliance to reporting.
[ALD] (xvi) The last paragraph thus elaborates the excellency of the Biosecurity Act 2011 when it states that the Act provides modern detailed requirements. (xvii) While we do agree with the statement, its regulation has not been developed yet.	Information is noted, the text has been modified to indicate the regulatory updating was in progress.
[MOH] Information need to be corrected. We do have officers based at KPA for food containers inspection and clearance.	Information was corrected
[MOH] Non-compliance products are seized for further investigation. Adulterated and expired food articles were seized and disposed and non-compliance cases were prosecuted. For labelling issues, good either subject for relabelling, re-export or disposed if can't meet the FSA and Regulations requirements	There was no evidence or report of such actions disclosed during the meetings with the STDF team, nor reported in the media over the year 2018. Therefore, while the comment reflects what should be done, it can't be inserted in the report has 'having been done'
[MOH] The Environmental Health spend 87% of their work on food safety activities in particular imported food, and 60-70% on water safety works.	Comment lacks accuracy since the two figures combined would be 147 to 157% ....It should be recognized that the work of Environmental Health division as of end 2018 was still more orientated on water than on food safety; which was also reflected during the discussion with MOH in Aug 2018.
[MOH] Have two labs- Medical Laboratory and Public Health Laboratory. Medical lab did micro analysis of water aside from medical testing while the Public Health Laboratory does chemistry and physical analysis of water.	This information was inserted in the text
[MOH] Nitrate and Nitrite are two common pollutants that are of national concern for public health, however, there is a possible for other chemical to be analysed based on the country need and interest. The DR1900 HACH machine provides accurate results given that it operates at 340 - 800 nm wavelength.	This information has been inserted The HACH DR1900 may not provide accurate results since the instrument in the lab is old and has not been recalibrated. In addition, international good practice requires to carry out internal calibration with use of standard solution before each daily use.[see https://www.standardmethods.org/action/showTopic?taxonomyUri=part&topicCode=part4000&pageSize=20&startPage=1]
§2.3.2. [MOH] This is completely wrong. How can a lab operate without	During the visit of the lab in Aug. 2018, it was indicated that no SOP and no manual /procedure was used. However, during the second

set procedure? We do have manuals/ procedure that our technicians follow and have quality assurance and control in place.	mission in Jan'19 the consultant was shown the SOP for Nitrate-nitrites. It was indicated that QC and quality manual were in development with the support of an external laboratory. No evidence of QA-QC was shown.
p.23 [MOH] The risk-based approach is only used for Food establishment inspections, e.g. restaurant inspections	During the second mission, the consultant was shown the risk-based inspection manual that is currently used by MHMS inspectors. There may be a need for support to update or develop similar manual for import controls.
They need to be verified due to suspicious cases on certificate manipulation and tampering with labels	Certificate manipulation may happen; nevertheless such cases should be documented and integrated as a 'country risk' in a risk assessment plan. If Kiribati 'refuses' the certificate without tangible basis, this could be seen as a technical barrier to trade. Tampering with labelling could be easily verified at inspection; however testing would also be necessary to ascertain the fraud.
[MOH] This is something to do with the lengthy legal proceeding to re-export or disposal of non-compliance food consignment with hinder food inspectors to exercise their power more efficiently and effectively.	Information is noted and has been added in the text.
§5.2.3 [MOH] Is this referred to outer island district??	This would be in general
[MOH] The government regulatory bodies for food importation is fragmented so there is a need to harmonize all existing legislations and polices, and proper coordination among food safety stakeholders to ensure local and imported food are of good quality and safe.	While the legislation is relatively effective, there is indeed a need to develop a common food safety policy and most importantly, a joint approach to food risk assessment.
MCIC provided a set of comments on 30th January. None of these views were expressed during the validation workshop (29th January) or the NTAC meeting (30th January)	
[MCIC] 1. The Centralized Lab should be well equipped and qualified staff should be recruited and trained to execute and operate equipment for the Lab. There must be One Technical consultant who will work with them for transfer of knowledge and train them for 6 months.	This is already well detailed in the Feasibility report (ch.9); the need is much more than one TA over 6 months.
[MCIC] 2. Staff should be included the Establishment Register, PSO.	A central lab must have the ability to select and recruit staff that match its needs, and not necessarily under any Government framework. There are many examples (incl. the case in Solomon) where Ministry-operated labs are ineffective precisely due to staffing issues.
[MCIC] 3. The model of having a Board for the centralized lab is expensive as they will be paid sitting allowances. Another option is to put the Centralized Lab under the MCIC, as it is cheaper to operate.	The cost of a board represents merely a few hundreds of dollars a year: this is a very small expenditure in regard with the projected costs of the lab.

[MCIC] 4. We do not know what the Board will do as only technical staff who will do the work testing of products using equipment and provide a result, and nothing else.	The role of the board is to ensure overall supervision and enable liaison with whole of Government, as is the case in any other existing statutory bodies. This is necessary as the central lab will work for several public regulators, which must have an official entry point into the lab governance. This would not be the case with a central lab under MCIC.
[MCIC] 5. There will be no conflict of interest because the MCIC wants only quality and tested products to be consumed only without sickness and nothing else. Technical staff when doing their testing, they are professional and they will not alter or change the result. If they change the result of the testing, they will be prosecuted as it will make the population sick and vulnerable to such untested products.	The issue of conflict of interest is not relevant to either of the Ministry or Statutory body options. It would only appear if a lab were fully controlled by a competent authority - thus mixing testing results and the decisions made based on such test results.
[MCIC] 6. The centralised lab is very ideal and appropriate if it is under the MCIC as we oversee trade and the NQP is under the MCIC. Therefore, the operation of the centralized lab should be under the MCIC as there will be no conflict of interest and cheaper.	The central lab will be instrumental mostly to biosecurity, food safety and environment; not only trade. MCIC is responsible to facilitate and coordinate the implementation of the NQP; however, the NQP Action plan for developing a central lab indicates that the Lead Ministries should be MELAD and MOHMS and MLPI.