

Infrastructure requirements for horticultural exports from Tonga

TECHNICAL REPORT

#116



Infrastructure requirements for horticultural exports from Tonga
TR#116

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Acronym List

Acronym	Description
AFAS	Australian Fumigation Accreditation Scheme
ASGC	Agricultural Sector Growth Committee
BQA	Bilateral Quarantine Agreement
DFAT	Department of Foreign Affairs and Trade (Australia)
EDPF	Eastern District Packhouse Facility
EOI	Expression of Interest
FOB	Free on Board
FFS	Farmer Field School
GAP	Gender Action Plan
GAPs	Good Agricultural Practices
GroCom	Growers Commodities Marketing Group Ltd (Tonga)
GroFed	Growers Federation of Tonga (Inc)
GXN	Grower's Export Network
HACCP	Hazard and Critical Control Point
HTFA	High Temperature Forced Air
ILO	International Labour Organisation
MAFFF	Ministry of Agriculture, Food, Forestry and Fisheries
MCTL	Ministry of Commerce, Tourism and Labour
MOF	Ministry of Finance
MORDI TT	MORDI Tonga Trust
NMAC	National Market Access Coordinator
NRBT	National Reserve Bank of Tonga
NWC	Nature's Way Cooperative (Fiji) Ltd
NZ MPI	New Zealand Ministry and Primary Industries
PHAMA	Pacific Horticultural & Agricultural Market Access Program
PICs	Pacific Island Countries
PPP	Public-Private Partnership
RFP	Request for Proposal
SPC	The Pacific Community
TASP	Tonga Agricultural Sector Plan
TEQM	Tonga Export Quality Management Ltd
TMAWG	Tonga Market Access Working Group (PHAMA)
TRIP	Tonga Rural Innovation Project

EXCHANGE RATES (March 2017)

Tonga Pa'anga (TOP) 1.00 = Australian Dollars (AUD) 0.58

Tonga Pa'anga (TOP) 1.00 = New Zealand Dollars (NZD) 0.61

Tonga Pa'anga (TOP) 1.00 = US Dollars (USD) 0.44

Part 1:

Infrastructure Requirements for Processing and Packaging Horticultural Products for Export

Executive Summary

Background

PHAMA Technical Report 45 was completed in April 2013 and included a range of recommendations on priority export marketing infrastructure. The three priority infrastructure needs identified were: (i) improvements to the MAFFF export processing facility to increase its capacity and enable it to operate more efficiently; (ii) overhaul and improvement of the airport HTFA treatment facility; and (iii) establishment of two decentralised general-purpose processing facilities on Tongatapu.

Over the last three years recommendations relating to (i) and (ii) have been substantially completed. The proposed decentralised processing facilities are still under consideration. However the establishment of a modern HACCP-certified export packhouse by Nishi Trading Ltd. provides a facility that is readily accessible to growers and exporters in the Central and Western parts of Tongatapu. Nishi has plans to upgrade the facility to process root crops in addition to its current use for processing cucurbits for export. Therefore the focus has now turned to the proposed Eastern District Packing Facility (EDPF). However, the specific needs and viability of the proposed new processing facility needed to be reconsidered in light of new information that was available since TR 45 was completed.

In the past, most export processing was undertaken in small, decentralised and makeshift premises, with consolidation taking place into reefer containers prior to export. More recently establishment of the MAFFF post-harvest facility at Nuku'alofa and the Nishi packhouse have led to greater centralisation and improved quality control. However, Tonga's capacity to process and package fresh produce to export standards is limiting the expansion of export-based agriculture.

Existing Marketing Infrastructure

The MAFFF facility in Nuku'alofa is well located with paved roads on two sides and is only about 500m from the international wharf. There is abundant land available to expand the facilities if needed. About a third of the complex is used for MAFFF offices, for work not necessarily related to export marketing. All other parts of the facility are available for use by exporters without charge other than payment for electricity used. Five exporters are using the facility on a regular basis to process root crops for export, both frozen and chilled. The MAFFF facility is functioning reasonably well and is regularly processing 2-3 container loads of mainly root crops per week.

The airport facility is equipped to perform HTFA treatment of fresh produce for fruit fly host species. The facility is well located and has all of the necessary equipment for HTFA treatment and cold storage chambers in an insect-proof area. It is also suitable for packing and cold storage of non-fruit fly host products prior to export. Ownership of the facility was transferred to a parastatal company, Tonga Export Quality Management (TEQM) in 2013 and the equipment has been extensively overhauled. However, the facility is struggling to operate viably due to technical problems and the low/variable level of throughput.

The established exporters handling squash, pumpkins, coconuts and watermelons have packhouse and storage facilities which are adequate to handle the current volumes exported, but with little scope for expansion. The most notable development has been the establishment of a large modern packhouse facility by Nishi Trading Ltd. During 2013-14 the company built Tonga's first international standard export packhouse and food processing plant. The design of the packhouse is adaptable and enables it to potentially process a wide range of root crops and other fresh produce for export in a variety of forms including both chilled and frozen. Nishi Trading uses the packhouse to process its own produce for export, but also makes the facility available on a fee-for-service (toll) basis for other growers and exporters. Currently the Nishi packhouse is only used for dry processing of cucurbits, but the company is planning to upgrade it to also process fresh and frozen root crops for export.

Priority Infrastructure and Equipment Needs

Complete implementation of the TR 45 recommendations for the MAFFF Nuku'alofa facility would enable capacity to increase from 2-3 20-foot containers per week to 3-4 per week; and if volumes are sufficient, to increase the capacity of the fumigation facility from 60 tonnes per shipment to 120 tonnes.

The airport HTFA facility is now in good working condition and is ready to process and pack the complete range of fruit and vegetables for export. The problem now is not the infrastructure or equipment, but the operational challenges of managing a facility on a fee-for-service basis in the face of low and highly variable throughput and the need to sustain high operating standards in order to maintain access to the New Zealand market.

Decentralised General-Purpose Processing Facilities

TR 45 concluded that if root crop exports are to expand, additional processing facilities would be needed. Increasing food safety concerns among root crop importers and retailers means that such facilities must have high operating standards and be designed so that HACCP accreditation is possible. TR 45 recommended that the decentralised facilities would be available to exporters on a fee-for-service basis. It is likely that the facilities would be mainly used for processing frozen root crops, but could also be used for coconuts, watermelons or other produce.

A number of steps have been taken towards the establishment of the EDPF. An Establishment Board has been created and agreement on the ownership structure and operating model has been reached. A preliminary architectural design and costing has been completed, and the Australian Department of Foreign Affairs and Trade (DFAT) has indicated that it would be prepared to contribute to the financing of the construction costs subject to the completion of a comprehensive feasibility study and business plan and consultations with relevant stakeholders on the arrangements for its construction and operations. A draft feasibility study/business plan is therefore presented in Annex 2 of this document.

The preferred option for ownership and operation of the EDPF is for it to be owned by a PPP with Government holding less than 50%, and managed by a private sector partner. The role of MAFFF would be confined to technical support and inspection/certification. Some form of grower and/or exporter organisation would most appropriate to be the majority owner of the facility. Charges for use of the facilities should be sufficient to cover all operating costs as well as contributions to a sinking fund to accumulate money to finance replacement of the buildings and equipment as necessary. Details of the proposed operating model are given in the Business Plan which demonstrates that if the facility is appropriately designed and managed it would make a sustainable contribution to the development of Tonga's export agriculture.

It is therefore recommended that the EDPF be established according to the design features and operating model described in the business plan, recognising however that there are several risks associated with the operating model including: (i) the possibility that it may provide difficult to engage a commercial partner; and (ii) that exporters may be reluctant to pay a full commercial toll fee if the market will continue to accept produce processed in basic non-certified facilities. The first of these risks can be managed by calling for EOIs from commercial partners at an early stage. It is within the mandate of MAFFF biosecurity to manage the second risk.

1. Introduction

1.1 Background

PHAMA is an Australian Department of Foreign Affairs and Trade (DFAT)-funded initiative launched in 2011 and funded through to June 2017. It is designed to provide practical and targeted assistance to help Pacific Island Countries (PICs) manage regulatory aspects associated with exporting primary products including fresh and processed plant and animal products as well as marine and forestry products. This includes gaining access for novel products into new markets, and helping to maintain and improve existing trade. Australian and New Zealand are the markets of major interest, along with export markets outside the Pacific region. The core countries assisted through PHAMA include Fiji, PNG, Samoa, Solomon Islands Tonga, and Vanuatu. PHAMA also provides assistance to other PICs through the Secretariat of the Pacific Community's (SPC) Land Resources Division. The PHAMA regional office is located at SPC in Suva, Fiji. Smaller country offices are operated in all PHAMA countries and staffed by dedicated National Market Access Coordinators.

PHAMA Technical Report 45 (TR 45): ***Feasibility Study to Determine Infrastructure Requirements for Processing and Packaging Horticultural Products for Export*** (from Tonga) was completed in April 2013 and included a range of recommendations on priority infrastructure issues to be addressed. The three priority infrastructure needs identified in TR 45 were:

1. Improvements to the MAFFF Nuku'alofa export processing facility to increase its capacity and enable it to operate more efficiently.
2. Overhaul and improvement of the Fua'amotu airport HTFA treatment facility.
3. Establishment of two decentralised general-purpose processing facilities on Tongatapu.

The recommendations of TR 45 have been used to guide PHAMA operations in Tonga over the last three years, and recommendations 1 and 2 have been substantially completed. The third recommendation currently being considered is for the proposed decentralised horticultural processing facilities, one in the Eastern District of Tongatapu, and one in the Western District. However the establishment of a modern HACCP-certified export packhouse by Nishi Trading Ltd. provides a facility that is readily accessible to growers and exporters in the Central and Western parts of Tongatapu, and could be upgraded to process root crops. Therefore the focus has now turned to the proposed Eastern District Packing Facility (EDPF).

Exporters have expressed a preference for facilities close to the main root crop production areas where produce could be processed and packed in shipping containers. It was agreed by the Tonga Market Access Working Group (TMAWG) to focus on the proposed facility for the Eastern District. PHAMA supported a series of activities from early 2014 towards considering the ownership and management arrangements, business plan, specific location and design, and funding sources.

By early 2016 progress had been made towards the establishment of the EDPF including the creation of an Establishment Board comprising representatives of Government and the private sector, and agreement on the ownership structure and operating model. It was also recognised that the specific needs and viability of the proposed new processing facilities needed to be reconsidered in light of new information that was available since TR 45 was completed. Key pieces of new information were: (i) the completion of the Nishi Trading export packhouse; (ii) a new Agricultural Census; (iii) completion of Tonga's first Agriculture Sector Plan (TASP¹); and (iv) completion of a draft business plan for the EDPF.

Consequently, it was decided that PHAMA would undertake a review of TR 45 to reconsider the needs for new processing facilities and provide updated recommendations in light of developments since early 2013, and to finalise the business plan for the EDPF.

¹ *Kingdom of Tonga (October 2015) Tonga Agricultural Sector Plan*

1.2 Rationale

Despite having a very small land area, Tonga has very good agricultural production capacity with good soils and favourable climatic conditions for a wide range of tropical and sub-tropical crops as well as temperate horticultural products in the winter months. There are long-standing trade linkages with New Zealand, and Tonga has historically been a source of many fruit and vegetable crops for New Zealand including pineapples, bananas, coconuts, root crops and winter vegetables. Tongan exporters also have long-standing trade linkages with Australia (coconuts and root crops), Japan (squash), North America and other PICs.

However, exports have waned over a number of years due to increasingly stringent phytosanitary regulations, more demanding quality requirements and increasing competition from other suppliers including Australia, South America and North America. In addition, some of the export protocols under various bilateral quarantine agreements (BQAs) have lapsed (e.g. beans to New Zealand).

Due to its proximity and transport linkages, New Zealand has always been Tonga's main target market for exports. Although small in absolute terms, the New Zealand market is large relative to Tonga's capacity to produce and export. Effectively, the size of the market does not represent a constraint from Tonga's perspective. New Zealand is heavily dependent on imports of temperate horticultural products during the cooler winter months (May to October), and for tropical products all year round.

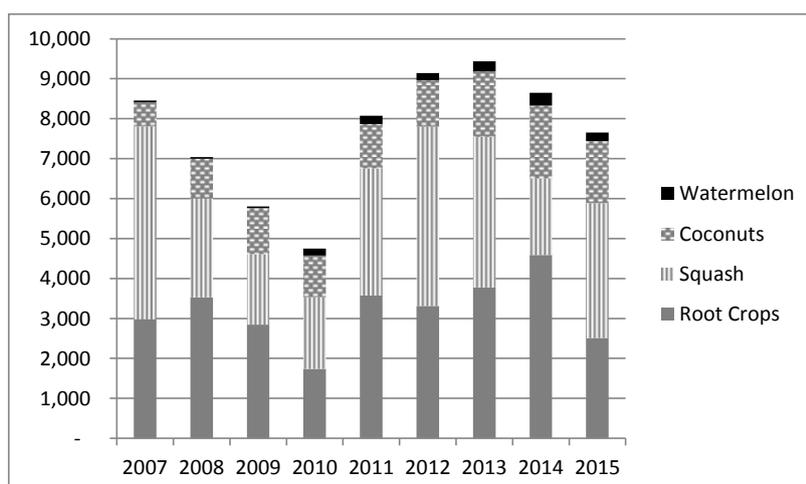
The large population of Pacific Islanders, Indo-Fijians and Asians in the Auckland area also provides market opportunities for specialised food products, which target the culinary needs of these communities. New Zealand has five or six large fresh produce wholesalers, which handle the full range of products and routinely import temperate products for the mainstream market through the winter months, and specialised tropical products for the ethnic communities all year round. This differs markedly from the Australian market, which is mostly supplied from domestic production and does not have a strong import culture.

Seasonality strongly favours Tonga in accessing the New Zealand market. Tongan production of horticultural products tends to be higher, and prices lower, between June and October. This coincides with the period when supplies of many items in New Zealand are scarce or non-existent, and when prices in Australia (a competing exporter) are the highest. There are good air and sea freight linkages between Tonga and Auckland, although costs, particularly for air freight, tend to be high due to low volumes. However, current exports are almost entirely confined to low value products transported by sea, such as root crops, pumpkins, squash, watermelons and coconuts. Exports of fresh fruit and vegetables are negligible, and there are no export protocols in place for a number of potentially profitable export commodities.

There are a number of well-established exporters handling squash, coconuts, watermelons and root crops (fresh and frozen) who are interested expanding their businesses and diversifying fresh produce exports once the export protocols and infrastructure are put in place. Such expansion cannot take place unless there is adequate infrastructure for processing, packaging and transporting these items to market.

As shown in Figure 1 below exports of the major commodities (root crops, squash, coconuts and watermelon) declined between 2007 and 2010 but rebounded in 2011 reaching over 9,000 tonnes by 2013. Severe drought conditions dented production and exports in 2014 and 2015, but shipments are expected to resume their uptrend from 2016 onwards. Most goes to New Zealand except for the squash which goes mainly to Japan, and the coconuts which go to Australia. Root crop and coconut exports are increasing, but squash and melon export volumes are erratic. Most of the root crops (cassava, taro, giant taro, tarua and yams) are bulk shipments in 20kg bags with about 70% in frozen form. Significant increases in both volumes and value are considered possible with improvements to the exporting infrastructure and moving from bulk format to retail packaging. Further development of the export pathways and marketing infrastructure are regarded as a necessary means of increasing exports.

Figure 1: Exports of Principal Commodities 2007 to 2015 (tonnes)



In the past, most export processing was undertaken in small, decentralised and makeshift premises, with consolidation taking place into reefer containers (chilled and frozen) prior to export. However in the last few years establishment of the MAFFF post-harvest facility at Nuku'alofa and the Nishi packhouse have led to greater centralisation and improved quality control. The Nishi facility is a modern HACCP accredited packhouse designed to process cucurbits for export, but could be adapted for other uses such as fresh and frozen root crops. The MAFFF facility was established with EU STABEX funding in 2010 and is equipped for washing, peeling, cutting, bagging, chilling and freezing produce with a capacity of around 4-5 tonnes per day. It also includes a methyl bromide fumigation chamber with a capacity of around 20 tonnes per day. Following improvements to the MAFFF facility as recommended in TR 45 it is now regularly used by about five exporters.

Apart from infrastructure, it is also necessary to be mindful of a number of other constraints. MAFFF has limited capacity to support the expansion of the export sector in terms of export inspection and certification. This is exacerbated by the demands on MAFFF to inspect and certify large numbers of small consignments of handicraft products (mats, wood carvings, tapa etc.) MAFFF also has limited capacity to provide the necessary research and extension support including grower registration and quality assurance schemes, maintain required biosecurity standards such as pest and disease surveillance, and to progress market access issues and negotiate export/import protocols. Other factors which need to be considered include the high cost of agricultural inputs (seeds, fertilisers, agro-chemicals etc.), the high cost of fuels and energy, and limited access to finance.

1.3 Strategic Framework

In the long run, Tonga's agricultural and horticultural export performance has been generally disappointing, although the rebound in exports beginning in 2011 gives cause for optimism. In contrast, developing countries globally have benefited from increased trade in high-value agricultural and horticultural products over the past 20–30 years. The relatively poor performance of Tonga and other PICs in this area is particularly disappointing considering: (i) these are agriculture-based economies, often with very limited alternative development opportunities; (ii) the comparative advantage often cited for the region in the production and export of a wide range of agricultural and horticultural products; (iii) the proximity of some large and affluent markets; and (iv) the commonly acknowledged role of economic growth and trade as a mechanism for promoting regional stability.

Difficulties in dealing with the regulatory processes associated with accessing markets are a major reason behind this poor performance. Progress in negotiating new or improved access has been slow, resulting in a high level of frustration and missed export opportunities. New market access agreements have been few and hard won, and trade in some products has stagnated or declined due to the imposition of more onerous protocols for products that were historically traded with relative ease. These conditions apply to some extent to most agricultural and horticultural commodities, with approved market access pathways for some items (albeit with strict compliance protocols), but total import prohibition for others.

1.4 Study Methodology

The study was undertaken by:

David Young Agribusiness Specialist

Logistical support and guidance was provided by Paula Mosa'ati (PHAMA National Coordinator, Tonga). The study includes an update of TR 45 as part of a process of developing Tonga's capacity to export horticultural products, including the traditional export commodities such squash, coconuts and root crops as well as higher value perishable fruit and vegetables, by air or sea. It is intended to identify remaining infrastructure bottlenecks and constraints, which PHAMA and other industry stakeholders can then address. The scope of work included:

- Assessing processing infrastructure in relation to installed capacity, throughput, condition, ability to comply with import standards, major product lines, ownership, and ability to meet projected medium-term industry needs.
- Reviewing the latest information on exports of fresh and processed crops to assess likely future exports (product type, volumes and markets).
- Identifying major constraints and issues associated with processing infrastructure, in particular the capacity to meet processing needs and standards.
- Reviewing and refining the draft business plan for the proposed EDPF, identifying capital costs; operating costs; projected throughput; ownership/governance arrangements; management arrangements and a financing plan.

As with the 2013 study which produced TR 45, a three-stage process was employed:

- Analysis of supply issues including the current volume and seasonality of supply, grading, packing and transport requirements, experience in exporting, and other factors influencing Tonga's capacity to supply the principal markets.
- Re-assessment of the design and capacity of the existing processing and packaging infrastructure relative to current and projected future export volumes in order to identify critical bottlenecks which may constrain export growth.
- Preparation of recommendations on the infrastructure required and the operational procedures to be employed, with particular reference to the proposed EDPF, in order to realise Tonga's export potential over the next five years.

2. Agricultural Sector Background

2.1 Overview

The major policy development since 2013 has been completion of the Tonga Agricultural Sector Plan (TASP). This is Tonga's first agricultural sector plan which identifies a vision and priorities for maximising contributions from the agriculture sector both to its economic growth and to sustained food security in the face of a changing world economy, climate change and natural disasters. The Plan also: (i) articulates specific programmes and activities to achieve sector priorities; (ii) clarifies the roles and responsibilities of the different stakeholders; (iii) estimates investment needs; and (iv) provides a framework for measuring progress over the short- and medium-terms. There has also been a major improvement in the information-base for strategic planning in the sector through completion of the 2015 National Agricultural Census.

2.2 Tonga Agricultural Sector Plan

2.2.1 Background

The TASP defines the key characteristics of Tonga's agricultural sector and reports on the findings of an extensive community consultation process which identified the following priority issues:

- The need for markets and the fact that everyone grows the same products and floods the local market at the same time. There is a lack of understanding that markets cannot simply be created by Government.
- Infrastructure including basic community infrastructure, access roads to farms, access to social services, and evacuation access.
- The unreliability and poor quality of public water supply, and lack of alternative water sources.
- Food security including the lack of appropriate farm implements and tractors, poor access to planting materials, and generally low technological advancement.
- Climate change: traditional farming systems cannot cope with the changes in weather patterns that are being experienced. Drought-tolerant varieties are not available, and current farming practices are not considered to be sustainable.
- Capacity building: there is a widespread lack of knowledge on climate change, agribusiness, farming techniques, food preservation, adding value through processing, and on how to improve crop and livestock productivity.

TASP notes that work to promote exports is currently underpinned by a range of strategies and has been the focus of numerous development initiatives over the past five years. The area is now led by the Agricultural Sector Growth Committee (ASGC – which also coordinated preparation of the TASP), with MAFFF playing an important quarantine and regulatory role. In terms of a strategy for exports, TASP recognises the need for a range of strategies to focus on overcoming constraints, identifying and opening export opportunities, and setting priorities. An important aspect will be the development of a programme to brand Tongan agriculture as “low carbon and climate resilient”. The expected outcomes are a reflection of the core strategies required to drive exports and import replacement over the life of the TASP. They are as follows:

- Identification of constraints to growth in the agricultural supply chain at all levels, including provision of inputs, production, processing, marketing and transport.
- Timely identification of prioritised policies, strategies and initiatives to improve sectoral growth, followed by implementation of these agreed interventions with better monitoring and reporting on progress.
- Consultation, communication and coordination between agricultural sector stakeholders and relevant Government agencies.

2.2.2 Focal Areas

The TASP will focus on four areas which form the basis of the four development Programmes:

- Climate-resilient production systems, which are determined by healthy soils, secure and sustainable water supplies, diverse farming systems, and adaptive communities.
- The enabling environment in terms of country systems and international relationships, human resource availability and capacity, regulations and compliance, quarantine, etc.
- Subsistence-level staple food, cash crop and livestock production, associated with rural livelihoods, and including income from local domestic sales.
- Export-orientated agriculture, with a strong focus on vegetables, plus import replacement.

Each focal area has its own strategic objectives, so that that different targeting and engagement mechanisms are required. Engagement with isolated and relatively poor rural households on the outer islands will require an intensive community development process, whereas the approach to successfully support emerging exporters and import replacers needs to be much more commercially oriented. Tonga's geographic characteristics also determine how the implementation of different development initiatives is approached. Farmers on 'Eua, and Tongatapu, have reasonable access to domestic and export markets, whereas farmers on some of the outer islands are very isolated and therefore are more likely to remain as subsistence farmers.

2.2.3 Structure of the Plan

The TASP is organised into four programmes, each corresponding to one of the four focal areas. Programme 4 is of greatest relevance to export marketing infrastructure.

Programme 1: Climate Resilient Environment can be considered as a “protective outer reef, or shell” which acts to ensure that Tonga's key natural resources (healthy soils, secure and sustainable water supply, diverse farming systems, and adaptive communities) are preserved, with a focus on building knowledge of the underlying environmental conditions that are required to support the development of climate-resilient agriculture. The objective is to establish the foundation for climate-resilient agriculture systems. The three specific objectives are to: (i) develop baseline knowledge for sustainable management of soil and water (for agriculture); (ii) develop climate-resilient guidelines and indicators for diverse farming systems; and (iii) build capacity for climate-resilient agriculture (diverse farming systems and adaptive communities) to impact on Programme 3.

Programme 2: Enabling Environment focuses on improving the environment in which Tonga's agriculture sector operates (governance, regulations and compliance, service delivery, quarantine, finance, etc.) The objective is to improve Tonga's enabling environment for agriculture. This influences and controls sector efficiency and growth. There are ten specific objectives that relate directly to the ten Sub-Programmes which include: (i) Sector Institutional Policy; (ii) Bio-physical Policies; (iii) Export and Import Policies; (iv) Land and Rural Finance Policies; (v) International Relationships; (vi) Compliance and Regulations; (vii) Quarantine; (viii) Industry Organisations; (ix) Market Information; and (x) Agro-Meteorology.

Programme 3: Sustainable Livelihoods and Healthy Foods focuses on improved farmers' knowledge and technologies for climate-resilient and diversified crop and livestock production, and the marketing of these products. The strategic objective for Programme 3 is to develop diverse, climate-resilient farming systems for Tonga's geographical zones (island groups). There are three specific objectives, to: (i) improve farmers' knowledge and practices of natural resource management, and diversified crop, livestock and handicraft production systems; (ii) revitalise Tonga's farming future and encourage young farmers to return to the land; and (iii) support farmers and handicraft producers to produce products that are marketable in local markets, can have valued added to them, and which contribute to food and nutritional security.

Programme 4: Sustainable Growth and Foreign Exchange Earnings focuses on increased exports, as well as greater import replacement, each of which has a separate sub-programme. The export sub-programme includes items related to export shipping, farm to pack-house access constraints, value chain and business training, training in post-harvest practices, technical and financing support for value chain development, and investment promotion. Programme 4 also addresses export-marketing infrastructure. In general, infrastructure

for value chains and markets should be developed through private sector investment. Clearly, transport infrastructure should be provided as a public good but equipment such as packhouses and cold stores is often better-provided by the private sector. In Tonga, however, the small-scale of many economic activities in the agricultural sector means that it is not always cost-efficient for exporters and other businesses to construct their own facilities. Only a few exporters have their own packhouses and it is not realistic to expect a business which exports, say, one container of frozen cassava a month, to make the necessary investment. If private investment does not offer this service on a commercial basis to numerous small exporters, it has to be provided by Government or the smaller exporters will be unable to operate.

The TASP notes that the MAFFF export processing facility plays an important role for small-scale exporters of frozen produce as they have space to peel, wash and pack roots and tubers, and to then either blast-freeze at the facility or to load directly into containers for freezing. A requirement is for the facilities to become HACCP compliant. TASP also makes reference to the need for a new pack-house in the Eastern District of Tongatapu. This is the main horticultural production area of the island but all production is presently consolidated in Nuku'alofa. As with the MAFFF wharf facility, it is proposed that this new facility would be available to all interested exporters, on a rotational basis. In addition to container packing, it would also be suitable for air freight packing as it would be close to the airport.

The TASP also identifies scope for greater collaboration among the private sector. Tonga is too small, with too many diseconomies of scale, for the various actors not to work together to aim for maximisation of both their profits, and benefits to farmers and the broader economy. The Growers Federation (GroFed) aims to engage in policy dialogue to promote the agriculture sector, and stresses that its role is to strengthen private sector representation. GroFed is currently working on its Strategic Plan for the next five years, aiming to be a strong industry organisation representing growers, exporters and any affiliated agricultural organisation in the private sector. The ASGC is expanding representation from both the public and private sectors. ASGC representatives from the Public Sector include MAFFF, MCL, Tonga Met., MFNP and NRBT, while ASGC representatives from the Private Sector include GroFed (farmers), Growers Export Network (GXN), kava processors and exporters, Tonga Handicraft Association, Tonga Chamber of Commerce and Industry, and domestic market suppliers.

2.3 Agricultural Census

The national agricultural census (the first for 14 years) conducted in 2015, with assistance from FAO, identifies some of the potential and key challenges faced by the sector that can be used to develop an appropriate policy framework. Key challenges include: (i) a lack of up-to-date and accurate agricultural statistics; (ii) a land tenure system which contributes to a high proportion of agricultural land lying idle; (iii) the need for supportive government policy; (iv) a bank lending policy which limits access to finance by many small farmers; (v) a low rate of adoption of improved production and marketing infrastructure and technology; and (vi) the risks introduced by variable weather patterns and increased natural disasters associated with climate change. However the census also demonstrates that there is great potential for further developing the sector. Greater import substitution offers improved domestic market opportunities. With improved capacity to supply the domestic market at the expense of imports, increased domestic demand associated with population growth also offers the potential to create additional employment opportunities in rural areas. Key findings of the census include:

- The total area of agricultural allotments was 66,202 acres, but over 50% of this land is not used for agriculture due to emigration of landholders, or lack of resources such as finance and transportation to engage in agriculture.
- Almost two thirds (64%) of agricultural land is on Tongatapu, 17% on Vava'u, 8% on 'Eua, 7% on Ha'apai and 4% on the Niuaus.
- Of the 16,122 rural households enumerated by the census about 13,944 or 86% were "agriculturally active" households (defined as being engaged in one or more of the following: cropping, livestock, fishing, forestry or handicraft activities).
- Only 5% of agriculturally active households engaged in commercial agriculture while 95% engaged in subsistence or semi-subsistence farming. The number of "commercial" farmers declined from 242 in 2001 to 89 in 2015.

- Annual and perennial crop cultivation occupied 27,206 acres of agricultural land. The areas of the main annual crops were estimated to be:

Cassava/Manioke	10,207 acres
Yam/'ufi	5,315 acres
Yautia/talo futuna	2,565 acres
Sweet potato/Kumala	1,901 acres
Swamp taro/talo Tonga	1,627 acres

- The main perennial crops are kava (1,257 acres), mulberry (757 acres) and vanilla (632 acres).

The census provides information on the main root crop producing areas of Tonga and Tongatapu by district. Table 1 shows that Vaini, Lapaha and Tatakamotonga produce almost 50% of the root crops in Tongatapu and are in close proximity to the proposed EDPF to be located at Alaki.

Table 1: Area of Principal Root Crops, National, Tongatapu and Tongatapu Districts

		Cassava Manioke	Yam Ufi	Yautia T/Futuna	S/Potato Kumala	S/Taro Taro Tonga	Total Roots
Tonga	Acres	10,207	5,315	2,565	1,901	1,627	21,615
Tongatapu	Acres	8,160	4,248	1,956	1,408	1,216	16,988
Tongatapu	Percent	80	80	76	74	75	79
Vaini	Acres	1,809	726	356	301	301	3,493
Nukunuku	Acres	1,727	673	545	264	280	3,489
Lapaha	Acres	917	1,023	267	235	48	2,490
Tatakamotonga	Acres	945	699	233	222	78	2,177
Kolovai	Acres	1,028	348	153	203	111	1,843
Kolomotu'a	Acres	844	426	222	99	215	1,806
Kolofo'ou	Acres	890	353	181	84	183	1,691

2.4 Agricultural Exports

Tonga's agricultural exports have been very unstable over time. Traditional exports such as copra have declined over time, although coconut exports have increased steadily during the last decade. Exports of tropical fruits (bananas, pineapples etc.) to New Zealand were important in the 1960s and 1970s but came under increasing competitive pressure from Central America and the Philippines, accentuated by increasingly stringent phytosanitary regimes and the demise of marketing parastatals in both Tonga and New Zealand. Fresh fruit and vegetable exports to New Zealand are currently negligible, although there is a small amount of trade to other Pacific Islands. Cucurbits and root crops are currently the two most important sectors, although performance has been patchy. Exports of cucurbits (mainly squash) collapsed during the last decade but have since staged a modest recovery. Exports of root crops have been fairly consistent over time, subject to seasonal fluctuations, and have been relatively strong over the last five years. There has been some recent success (supported by PHAMA) in developing watermelon exports to New Zealand. Current exports to New Zealand are confined to items that can be treated by fumigation either prior to shipment (e.g. watermelons) or, if required due to pest interceptions, after arrival in New Zealand (e.g. taro, tarua and yams), or can be exported in frozen form.

The biggest success story, and also the biggest disappointment, has been the squash export industry. Squash exports commenced in the late 1980s and grew to some 20,000 tonnes per annum, mainly to Japan during a narrow seasonal window (October-November). During the period 1994 -2004, squash exports accounted for about 45% of Tonga's total export earnings and more than 60% of agricultural exports. However squash exports subsequently declined to a low point of 1,800 tonnes in 2010, but have subsequently rebounded into the 2,000-4,000 tonne range. Japan remains the major market for squash although some has also been sent to Korea and New Zealand. The market window is narrow, with almost all exports taking place in October and November. In 2014-15 cucurbit exporters have also begun to diversify into butternut and butterkin exports, mainly to New Zealand.

Annex 1 summarises Tonga's agricultural export statistics over the last nine-and-a-half years, January 2007 to May 2016 (second half 2016 figures are not yet available).

- Amongst the root crops, cassava is the leading export with New Zealand being the main destination. Cassava exports show a gradual uptrend from around 50 tonnes per month in 2007 to over 100 tonnes per month today, occasionally 150-200 tonnes. All cassava is exported in peeled and frozen form. Whilst cassava can be produced year round, demand in New Zealand is somewhat seasonal and exports average about 70 tonnes per month during the first half of the year, increasing to over 100 tonnes during the second half.
- Exports of giant taro (*kape/ta'amu*) fluctuate markedly from month to month. Volumes fell to almost zero in 2010 but rebounded to 30-80 tonnes per month on average but with a large spike in the October to December period.
- Exports of swamp taro are also highly unstable but have shown a strong uptrend since 2010 and now average about 40 tonnes per month with seasonal peaks in July-August and November-December. Shipments fell to a very low level during the 2015 drought.
- Tarua exports declined between 2007 and 2010 but have recovered to around 40 tonnes per month, somewhat higher in October-December. Again, the drought of 2015 severely curtailed exports. Export of yams is highly seasonal reaching over 200 tonnes per month during the April-June peak season in 2007. Excluding the drought period, the seasonal peak is now around 200-350 tonnes per month.
- Taking all root crops together, exports in 2007-2009 were 250-350 tonnes/month, or about 2,800-3,500 tonnes per annum. During 2010 exports slumped to 1,700 tonnes, but subsequently rebounded and are now running at 250-300 tonnes per month. Because different root crops have different seasonal patterns the tonnage exported is fairly consistent over the year with a tendency to be a bit lower in January-February.
- Watermelons have become a significant export since the opening of the MAFFF fumigation facility has enabled access to the New Zealand market. The main watermelon export season is October to December during which exports are running at up to 80 tonnes per month, with annual volumes of around 200-300 tonnes. Growers and exporters plan to increase this to at least 500 tonnes per annum.
- Exports of fresh mature (brown) coconuts have shown a steady uptrend from around 60 tonnes per month in 2007 to about 150 tonnes per month today. Exports of green nuts are increasing from a low base and now average around 20 tonnes per month.
- The only other significant exports are kava to other Pacific islands (110-170 tonnes per annum) and taro leaves mainly to New Zealand (40-80 tonnes per annum). There are occasional shipments of breadfruit (fresh and frozen). Vanilla exports declined from 13.6 tonnes in 2009 to less than two tonnes in 2011. Fresh fruit and vegetable exports are negligible due to the lack of market access protocols. However, with the re-opening of the heat treatment (HTFA) facility there has been an increase in breadfruit exports, reaching 76 tonnes during the first five months of 2016.

2.5 Institutional and Regulatory Framework

MAFFF is the lead institution responsible for agricultural production and marketing. MAFFF is organised into the following divisions: (i) Office of the Director/Corporate Services Division; (ii) Research Division; (iii) Quarantine and Quality Management Division; (iv) Livestock Division; (v) Extension and Women's Development Division; (vi) Forestry Division; (vii) Fisheries Division; and (viii) Outer Islands Operations Division. MAFFF's vision is "an Island Kingdom where agriculture, fisheries and forestry contribute significantly to better living standards of all, in an economically, socially and environmentally sustainable manner". The mission of MAFFF is "to help build a better economy from agriculture, forestry and fisheries for present and future generations". MAFFF's authority to perform its functions is derived from a number of laws and regulations (see Box 1 below). The divisions responsible for research, extension and quarantine and quality management are key to the future success of agricultural production and export marketing.

Box 1: Legislative and Regulatory Framework

- Animal Disease Act and Regulations 2004
 - Agricultural Commodities Export Act 2002
 - Pesticides Act and Regulation 2002
 - Plant Quarantine (Fees) Regulation 1997
 - Plant Quarantine Regulations 1995
 - Plant Quarantine (Amendment) Act 1995
 - Fruit Export (Buttercup Squash) (Amendment) Regulations 1994
 - Fruit Export (Buttercup Squash) Regulations 1993
 - Fruit Export (Vanilla) Regulations 1993
 - Plant Quarantine (Squash and Vanilla) (Fees) Regulations 1992
 - Rhinoceros Beetle Act 1988
 - Plant Quarantine Act 1988
 - Noxious Weeds Act 1988
 - Copra Act 1988
 - Diseases of Plants Regulations (Cap.127A)
 - Infested Areas Declarations (Cap. 127B)
 - Prescribed Treatment for Bunchy-Top (Cap. 127C)
 - National Forests Policy 2009
- My worst fear now is, if someone starts to export, there may be problems of over fishing and people from outside our community coming to harvest sea urchin in our traditional fishing grounds”.

The Ministry of Commerce, Tourism and Labour (MCTL) includes five divisions: (i) Leadership and Labour Division; (ii) Corporate Services and External Information; (iii) Intellectual Property Office; (iv) Consumer Protection Division; and (v) the Trade, Investment and Business Development Division. MCTL is responsible for licensing agricultural exporters and is actively involved with PHAMA in export promotion and export market development.

The Ministry of Finance (MOF) administers the Agricultural Marketing Fund which is a TOP 1.0 million revolving loan facility intended to facilitate export marketing by Tongan business enterprises.

The Tonga Chamber of Commerce and Industry promotes economic growth in Tonga, makes representations to Government, creates training opportunities and provides information on the business environment. Other associations operating in Tonga include the Tonga New Zealand Business Association, which has a membership of over 70 businesses throughout Tonga and New Zealand. It focuses on creating a strong business relationship between the countries. There is also a Small Business Association which concentrates mainly on small enterprises.

In 2012-13 the Government is the establishment of the National Growth Committee and a number of Sector Growth Committees, one of which is the Agricultural Sector Growth Committee (ASGC). The ASGC includes representatives from both Government and the private sector and is intended to inform the National Growth Committee on policies and priorities for the agricultural sector (including food, fisheries and forestry). The ASGC was responsible for overseeing preparation of the TASP in 2015.

The Growers Federation of Tonga (GroFed) was established in 2008 as an umbrella organisation for the agricultural sector. It is registered as a not-for-profit incorporated association to engage in policy dialogue to obtain a favourable economic policy environment and political support for the agriculture sector in the long term. Its objectives are to strengthen private sector representation and to work closely with Government ministries and communities and assist to stimulate economic growth. GroFed's constitution requires that registered growers elect their representatives to the 34-member Council, and for the Council to elect the seven members of the Board of Directors. The vision and strategic objectives of GroFed are shown in Box 2.

The organisational structure of GroFed is shown in Figure 2. GroFed represents a high level public-private partnership between the growers and the Government to assess sector performance and identify key policy issues. Current policy issues raised by GroFed include the need for increased investment in technology for agricultural production, exporting, marketing, research and development, and human capital in the form of professional, managerial and technical skills. GroFed is calling for: reduced tariffs on agricultural inputs; reduced hire rates for agricultural machinery; increased regional trade with Fiji, Samoa, American Samoa and other Pacific Islands; and better access to finance for growers. In relation to export marketing GroFed is advocating improved packaging and labelling facilities for frozen root crops; opening of market opportunities including Australia and USA; and improved agricultural roads.

Box 2: GroFed Vision and Strategic Objectives

Vision: *“To be the leading private sector organisation enhancing prosperity and maximising benefits for the growers of Tonga.”*

Strategic Objectives:

Marketing:

- To create and enhance opportunities and market access for our agricultural produce including New Zealand, Fiji, American Samoa, Australia, US and also other countries.
- To double the existing market demands (volumes and gross income earnings).
- Production:
- To increase our agricultural production to achieve 1,000 acres or more every year.
- To search and promote additional fresh export market crops such as tomatoes, courgettes, cucurbits, pineapples, maize, sweet potato, sweet yam, organic crops etc, for export markets.
- To train growers to increase production of marketable yields as well as sustainable and consistent supplies.
- Infrastructure:
- To ensure that all quarantine and biosecurity facilities and post-harvest facilities and other new technological export facilities are established and operating to underpin Growers Federation’s export produce.

Export Financing:

- To ensure that growers and exporters are getting easy access to the Export Finance Facility and for Government and Banks to set up the Export Finance Facility to support the export sector.
- Maximise Economic Returns to Growers:
- To promote and train growers on production professionalism, agriculture as a business, and to understand the financial benefits of production based on financially viable crops (gross margin analysis of production).

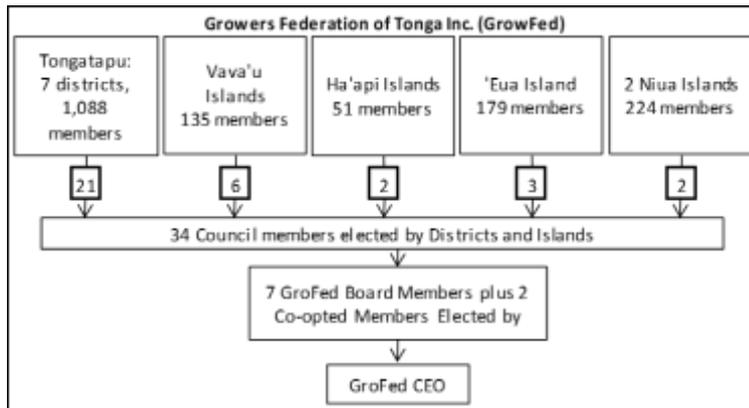
Outer Islands Transport:

- To ensure that more frequent and regular shipping services to the Niuas and Ha’apai for shipment of their produce.
- Research and Development:
- To work together with Government (MAFFF) on funded research and development works at the Research Division.

Risk Management:

- Operational risks on financial performance and conditions to ensure there is enough resources for GroFed’s operations.
- Effective management and leadership of the Federation’s businesses.
- To minimise technical risks that may cause doubts and uncertainties for growers to participate in production, eg:
 - Non-biosecurity and quarantine compliance for agri-exports;
 - Shipping and aircraft schedules for export of both fresh and frozen produce to markets;
 - Inconsistent supplies to market’s demands, etc.

Figure 2: GroFed Organisational Structure



GroFed is a not-for-profit organisation and cannot therefore engage in commercial activities. To overcome this constraint GroFed has established its own marketing subsidiary known as Growers Commodities Marketing Group Ltd (GroCom). GroCom is 76% owned by GroFed and 24% owned by four exporters. The GroCom board includes several members from the GroFed Board, exporters, and representatives from the GroFed Council. GroCom’s role is to search for more market opportunities for export produce with better prices to growers, with a requirement for the exporter to pay the growers before the shipment leaves Tonga. GroCom acts as an export broker under an exclusive arrangement with Fresh Direct Ltd, one of the major New Zealand-based importers and wholesalers. The system works as follows:

- Fresh Direct provides indicative CIF prices and specifications for produce it wishes to import.
- The four exporter shareholders of GroCom are invited to submit bids to fill the Fresh Direct order.
- The bids are evaluated by a bid panel appointed by the exporters and GroFed on the basis of the prices to be paid to the growers, with the stipulation that the growers are paid when the produce leaves Tonga.
- Fresh Direct pays GroCom on the basis of 30% on the provision of documents for the consignment, 30% seven days after clearance, and 40% 21 days after clearance.
- GroCom pays the growers the agreed contract price and forwards the remaining amount to the exporter after deducting a 2% levy to finance its own operations.

This system is popular with growers, because it provides prompt payment at the time of export, and has been successful in improving prices – in the case of coconuts grower returns have doubled. Two of the exporter GroCom members are active in bidding for contracts, the other two less so.

PHAMA is working together with GroFed and other stakeholders in identifying and facilitating export support services to increase market access opportunities. PHAMA has also provided export market development grants to facilitate the development of two new export products – sweet yam and Guinea yam. The grant funds have been used to help establish a small yam packing facility in the Eastern District which avoids the need for growers in the area to transport their produce all the way to the Nuku’alofa export facility.

The Government initially supported GroFed with a grant of TOP 60,000/year for two years, after which the Federation was expected to be self-sustaining from levy income from produce exports brokered by GroCom. However the levy income is not yet sufficient to finance the operating costs, despite some donor support, and the organisation is currently struggling to fulfil its mandate.

The TMAWG acts as the steering committee for PHAMA activities in Tonga (there are equivalent MAWGs in the other PHAMA countries). For each MAWG, four major meetings are scheduled each year, with interim meetings held as required. The TMAWG fulfils key coordination and communication roles; screening and prioritisation; monitoring; consideration of longer-term sustainability issues; and improving general understanding of international market access systems and processes. The TMAWG is responsible for identifying and endorsing all PHAMA-supported activities in Tonga. Recognising that market access priorities need to be developed by the MAWGs on an ongoing basis in response to evolving needs and information, an approval process has been agreed with DFAT that permits further refinement (and possibly extension) of

activities already defined, within the planning year. The TMAWG contains two exporter representatives, three grower (GroFed) representatives, two representatives from MAFFF and two from MCTL Trade and Investment Division.

The Tonga Development Bank (TDB) is the leading institutional provider of development finance with the mandate to promote Tonga's economic and social advancement by providing banking and a broad range of other financial services. TDB was established in 1977 and has six branches, in addition to its headquarters in Nuku'alofa. It has a long history of providing financial services to farmers, agricultural marketing ventures and exporters. It provides credit to assist growers and exporters make investments, and also finances working capital needs. TDB is also a business development service provider assisting its clients to prepare business and marketing plans, improve bookkeeping and accounting skills etc. The Bank gives priority to supporting enterprises with positive developmental impacts.

The BQA and related agreements between Tonga and New Zealand govern exports of food and agricultural products from Tonga to New Zealand. The responsible ministries are MAFFF in Tonga and the New Zealand Ministry of Primary Industries (NZ MPI). Under the BQA some 40 plant species shown in Table 2 are approved for export from Tonga to New Zealand, subject to various conditions and forms of treatment, including fumigation and HTFA.

Table 2: Plant Species Approved for Export from Tonga to New Zealand	
Botanical Name	Total households
<i>Abelmoschus manihot</i>	Island cabbage/pele
<i>Artocarpus atilis</i>	Breadfruit
<i>Carica papaya</i>	Papaya
<i>Citrullus lanatus</i>	Watermelon
<i>Colocasia esculenta</i>	Taro, taro leaves
<i>Alocasia macrorrhiza</i>	Giant Taro/Kape
<i>Capsicum frutescens</i>	Chilli
<i>Centella asiatica</i>	Indian pennywort
<i>Cocos nucifera</i>	Coconut
<i>Cucurbita maxima</i>	Squash
<i>Colubrina asiatica</i>	Soap bush
<i>Cucurbita moschata</i>	Butternut
<i>Evodia hortensis</i>	
<i>Glochidion ramiflorum</i>	
<i>Lycopersicon esculentum</i>	Tomato
<i>Manihot esculentus</i>	Cassava
<i>Morinda citrifolia</i>	Indian mulberry
<i>Musa paradisiaca</i>	Plantain
<i>Piper graeffei</i>	Pepper
<i>Psychotria insularum</i>	Wild coffee
<i>Solanum melongena</i>	Eggplant
<i>Syzygium inophylloides</i>	Lillypilly
<i>Ticus obliqua</i>	
<i>Wedelia biflora</i>	
<i>Xanthosoma sagittifolium</i>	Tarua
<i>Dioscorea spp</i>	Yam
<i>Gardenia taitensis</i>	
<i>Hoya australis</i>	
<i>Mangifera indica</i>	Mango
<i>Microsorium scolopendria</i>	Wart fern
<i>Musa spp</i>	Banana
<i>Persea americana</i>	Avocado
<i>Piper methysticum</i>	Kava

<i>Saccharum officinarum</i>	Sugarcane
<i>Syzygium cornocarpus</i>	Lillypilly
<i>Syzygium malaccense</i>	Malay apple
<i>Vigna marina</i>	Beach bean
<i>Xanthosoma sagittifolium</i>	Tarua
<i>Zingiber zerumbet</i>	Ginger

3. Marketing Infrastructure and Transport Services

The four main export facilities are at Nuku'alofa port, the Nishi Packhouse at 'Utulau on Tongatapu, Vava'u port and Fua'amotu international airport.

3.1 MAFF Export Marketing Facility, Nuku'alofa

- Location: Nuku'alofa port area, adjacent to main roads on two sides, 500m from the main wharf and 2.5 km from the town centre.
 - Land area: 100m x 65m (6,500 m²)
 - Offices: 400m² x 2 levels = 800m² of office space, used by MAFFF
 - Food processing area: 130m²
 - Export processing and inspection area: 270m²
 - Fumigation facility: 300m²
 - Forecourt, container stands, and un-used areas: 5,400m²
- Food processing/preservation area (130m²): includes equipment for pilot scale food processing, cooking, preserving, refrigeration etc. Operated by the Food Department of MAFFF.
- Export processing and inspection area (270m²): includes tables and benches for inspection, scales, forklift, cool room (50m³) and blast freezer (50m³). Operated by MAFFF Quarantine.
- Fumigation facility (300m²): includes 40-foot container used for methyl bromide fumigation, and separate doors for incoming and outloading into sea containers. Operated by MAFFF Quarantine.
- Paved area between the export processing and inspection area and the fumigation facility (approx. 120m²): includes water supply, and washing vats – used for washing and packing root crops for export. Roof covering recently installed as recommended in TR 45.
- Electricity: three-phase power with a back-up generator installed by PHAMA.
- Water supply: not connected to municipal water supply – rainwater from roof catchment stored in six 20,000 litre tanks.
- Waste disposal/treatment facilities: effluent is discharged via a concrete drain to the sea.

The Nuku'alofa export marketing facility was constructed in 2010 using EU STABEX funding. The facility is well located with paved roads on two sides and is only about 500m from the international shipping wharf. There is abundant land available to expand the facilities if needed. About a third of the complex is used for MAFFF offices, for work not necessarily related to export marketing. All other parts of the facility are available for use by exporters without charge other than payment for electricity used. Five exporters are using the facility on a regular basis to process root crops for export in sea containers, both frozen and chilled.

The food processing facility is available to anyone wishing to undertake pilot food processing activities, but is rarely used. The export processing and inspection area was mostly used for inspecting handicrafts for export and was not generally available for processing, packing and inspecting fresh produce for export. This area includes a cool room and blast freezer, the latter of which is used for freezing root crops for export. Following the recommendations of TR 45 a new building for inspecting handicrafts prior to export has been constructed at the site (with PHAMA funding) freeing up space for processing fresh produce.

The paved outside area between the two buildings is used for washing and packing root crops for export. A roof was recently installed as recommended by TR 45 but it still does not have packing tables, or adequate lighting and power supply, and the floor sloping makes it difficult to clean adequately. Wastewater is discharged directly to the sea without treatment. Water supplies come from rainwater tanks with a total capacity of 120,000 litres. The fumigation facility is currently able to treat all the watermelons exported and there is space to add an additional 40-foot fumigation chamber if needed.

Despite its shortcomings the MAFFF facility is functioning reasonably well and is regularly used by about five exporters processing a total of 2-3 container loads of mainly root crops per week. However, on-going

maintenance and future improvement of the facility (including the fumigation chamber) is a recognised issue with the absence of real charges for using the facility meaning there is no established source of funding for these costs (refer section 5.9).

3.2 MAFFF Export Marketing Facility, Vava'u

- Location: Vavau'u port area in town centre approximately 100m from main wharf with main roads on two sides.
 - Land area: 65m x 35m (2,275 m²)
 - Offices: 250m² on upper/mezzanine level
 - Produce receival area 25m²
 - Washing and packing area 100m²
 - Food processing and quarantine/inspection area 150m²
 - Packing and storage area: 175m²
 - Fumigation facility: 50m²
 - Open general purpose storage, packing and loading area: 1,000m²
- Forecourt, car park, and un-used areas: 775m²
- Produce receival area (25m²): adjoins road but below road level. Vehicles must park on road for un-loading
- Washing and packing area (100m²): long narrow room with no windows or ventilation. Tiled floor, equipped with washing vats and crates but no tables.
- Food processing/preservation and quarantine/inspection area (150m²): includes equipment for pilot scale food processing, cooking, preserving, refrigeration etc., as well as quarantine inspection equipment, microscope etc.
- Packing and storage area (175m²): adjoins fumigation facility. Used for storing packaging materials.
- Fumigation facility (50m²): includes 20-foot container for methyl bromide fumigation, and separate doors for incoming and outloading into sea containers.
- Open general purpose storage, packing and loading area (1,000m²): large area open on two sides suitable for packing, storage and loading. Includes a small blast freezer of 15m³.
- Electricity: three phase power.
- Water supply: connected to municipal water supply supplemented by rainwater from roof catchment stored in one 20,000 litre tank.
- Waste disposal/treatment facilities: effluent is discharged to the town sewerage system.

The Vava'u export processing facility was upgraded in 2010-11 using EU STABEX funding. It contains most of the equipment needed to process, pack and store fresh produce for export. It is well located in the port area with good access to road and sea transport. The facility is available to anyone wishing to process fresh produce for export but has never been used for this purpose. This may be partly attributable to the very low level of export activity in Vava'u with only one cassava exporter active on a semi-regular basis. However there are also a number of design features which detract from the usefulness of the facility. The produce receival area would be very inconvenient to use, being below road level and with no vehicle parking space. The washing and packing area is a very narrow un-ventilated room with no windows which would be extremely hot and humid to work in. The large open general work and storage area is potentially useful as a packing area, but contains no packing equipment (tables, scales etc.). The blast freezer is only about half the size needed to prepare a full container load of produce for export. There are no certified fumigation operators (the Vava'u delegate was unable to obtain his Australian Fumigation Accreditation Scheme certificate at the training held in Fiji).

3.3 Fua'amotu Airport HTFA Facility

- Location: Fua'amotu airport, Tongatapu, adjoining the domestic passenger terminal, 700m from the international cargo area and about 25km from Nuku'alofa town centre
- Building size: 32m x 36m = 1,150m²
 - Open area for produce receival, washing, grading and preparation (460m²)
 - Insect-proof (screened) area for packing and chilling produce (690m²).
 - Office and toilet facilities.

- Separate MAFF office area of 200m² near the man building (used intermittently as a packhouse)
- Equipment:
 - Boiler, hydrocooler, forklift, washing tank, standby generators, bins and crates
 - Stainless steel HTFA unit, twin chamber, connecting the receival area and insect proof areas. Includes computers for monitoring temperatures of both chambers and hydro cooler for lowering fruit temperatures after treatment.
 - Screened area contains a forced air cooler of 60m³ capacity and a quarantine cool room of similar size for storing packed air containers and opening onto the tarmac.
 - Rainwater tank.

The airport HTFA facility was constructed in 1996 with funding from New Zealand and USAID. Its main purpose is to perform HTFA treatment of fresh produce in line with the Tonga-New Zealand BQA requirements for fruit fly host species (papaya, chilli, eggplant, breadfruit, mangoes, avocados, tomatoes etc.) The facility is well located with direct access to the airport cargo area and has all of the necessary equipment for HTFA treatment and cold storage chambers in an insect-proof area. It is also suitable for packing and cold storage of non-fruit fly host products such as beans and okra prior to export. The facility was initially operated by a state-owned company, Export Produce Treatment Services Ltd, but throughput was insufficient to cover operating costs and the company was wound up in 2000. The facility was then handed over to MAFFF. However, there was very little use of the facility under MAFFF management and maintenance was limited. Some repairs were undertaken during 2012-13 with the help of a New Zealand volunteer and PHAMA funding, but these were only partial due to lack of funding.

In June 2010 the New Zealand Aid Programme and the Government agreed to provide TOP 184,000² in funding to support the overhaul of the airport facility and its operations for several years until throughput was sufficient to be self-financing. It was a condition of the agreement the facility would be transferred to a public enterprise (parastatal company), Tonga Exports Quality Management (TEQM) and re-commissioned. The asset transfer agreement between MAFFF and TEQM was executed in March 2013. Subsequently the facility has been extensively overhauled and is now in good working condition, under the management of an experienced HTFA technician, formerly lead technician of Nature's Way Cooperative in Fiji.

However, the facility has struggled to operate viably under TEQM management due to the low and variable level of throughput. TEQM estimates that the facility needs around TOP 180,000 per annum of revenue to cover its costs, equivalent to around 300 treatments at the standard flat rate charge of TOP 600 per treatment. Throughput is currently well below this level. In addition in 2015 New Zealand MPI suspended the pathway and imposed stricter standards of operation following detection of a quarantine pest in a consignment of breadfruit processed by the facility. Development and implementation of the new standards and associated procedures for use by MAFFF and the private sector is on-going including with oversight from NZ MPI while confidence in Tonga's capacity to comply is established. Support is also being provided through the PHAMA program towards the private sectors' capacity to comply with their increased roles and responsibilities.

Management of an HTFA facility as a stand-alone business will always be a challenge because of the high level of overhead costs and the likelihood that there will be long periods of time when there is little or no produce to process. This has been the experience with other HTFA facilities in the Pacific Islands, most notably Nature's Way Cooperative in Fiji which is still struggling to achieve financial sustainability after more than 20 years³.

MFAT has agreed to finance a study on the viability of TEQM which is expected to be undertaken before the end of 2016. The goal of this assignment is to provide recommendations on the necessary changes and strategies required by TEQM to become a sustainable, self-sufficient, commercially viable business. The objective is to assess TEQM's financial management, governance structures and operational performance and recommend a preferred option to the Ministry of Public Enterprises on how TEQM can become a viable and sustainable business.

² TOP 141,000 was to be provided by NZAP and TOP 43,000 by Government

³ PHAMA (2016) Feasibility Study for the Establishment of a HTFA (Heat Treatment) Facility in the Central Division of Fiji

3.4 Private Packhouses

The established exporters handling squash, pumpkins, coconuts and watermelons have packhouse and storage facilities which are adequate to handle the current volumes exported. During the narrow squash exporting season, these facilities need to pack up to 1,000 tonnes per week. However, they have handled much more than this in the past when Tonga was exporting up to 20,000 tonnes in a two-month season.

The most notable development has been the establishment of a large modern packhouse facility by Nishi Trading Ltd. During 2013-14 the company built Tonga's first international standard export packhouse and food processing plant. The facility was partly financed by a grant from the EU-funded Increasing Agricultural Commodity Trade (IACT). The facility is being used to process and pack a number of fresh produce commodities for export to New Zealand, Japan and Korea including squash, watermelons, butternut pumpkins and butterkins. The design of the packhouse is adaptable and enables it to process a wide range of root crops and other fresh produce for export in a variety of forms including both chilled and frozen. Nishi Trading uses the packhouse to process its own produce for export, but also makes the facility available to process cucurbits on a fee-for-service (toll) basis for other growers and exporters. It is not currently equipped to process root crops but could be adapted for this purpose.

The packhouse covers 1,200m², is well-designed and built, HACCP⁴ accredited and has the capacity to be adapted for a range of food processing and packaging applications. HACCP accreditation enables the company to export to a wide range of markets, doing business with wholesalers and supermarkets that require their suppliers to be HACCP compliant. The facility is also registered under the Sea Container Hygiene System (SCHS) administered by NZ MPI to ensure that containers arriving in New Zealand are free of pests and biosecurity contamination. This facilitates exports to New Zealand and reduces the risk that shipping containers will be delayed on arrival and avoids extra costs due to fumigation or cleaning.

The packhouse has the capacity to receive and process produce from large numbers of growers, and is introducing an identity preservation (traceability) system so that quality issues at any point in the marketing pathway can be traced back to the original supplier and remedial action taken. This is increasingly a requirement of wholesalers and retailers in New Zealand, Japan and other export markets. The facility has stands for six 40-foot refrigerated containers enabling up to 20 containers to be included in a single shipment.

Nishi adopts a whole value chain approach to its operations, seeking to maintain tight controls at every step from farm to delivery to the importer. Consequently the farmers who supply fresh produce under contract growing arrangements are trained in the use of good agricultural practices (GAPs) to produce safe and high quality produce of the required specifications. Farmer training is undertaken through the company's farmer training centre, which has been accredited by the Tonga National Qualifications Accreditation Board. The company is also seeking to extend farmer training on a larger scale through the Nishi Foundation, to improve the level of skills among Tongan farmers generally.

The packhouse is located on an 8 acre site at 'Utulau which is a 20-minute drive on sealed roads from Nuku'alofa. The location of the facility makes it suitable to source produce in the central and Western parts of Tongatapu. The company also has 300 acres of high quality agricultural land comprising 50 acres about 4km from the headquarters and 250 acres near the village of Vaini, about 15km away. Most of the land is used for growing cucurbits (squash, pumpkins, melons etc.) with smaller areas used for onions, potatoes, sweet corn and vegetables.

In addition to its own farming operations Nishi also operates an outgrower scheme to supplement its own production. About 70 outgrowers supply some 25 percent of the volume of squash and pumpkins and all of the watermelons processed through the packhouse. The more technically demanding crops such as onions and potatoes are grown by Nishi itself. Outgrowers are offered fixed price contracts at the beginning of each season and are provided with crop inputs and technical support.

⁴ Hazard Analysis and Critical Control Point

3.5 Air and Sea Freight

Air New Zealand operates the following flight schedule from Nuku’alofa to Auckland:

Table 3: Airline Schedule and Cargo Capacity, Nuku’alofa to Auckland				
Day	Depart	Arrive	Aircraft	Cargo Capacity
Monday	13.00	15.00	A320	Up to 3,000 kg depending on passenger loading
Tuesday	21.55	23.59		
Wednesday	14.40	16.40		
Thursday	21.55	23.59		
Friday	12.00	14.00	B777 a/	15-20,000 kg regardless of passenger loading
Saturday	21.55	23.59	A320	Up to 3,000 kg
Sunday	----- No service -----			

a/ During the winter tourism season B777s often replace some of the A320 services

For fresh produce exports the most convenient consignment days are Wednesday and Friday/Saturday. Produce shipped on Wednesday will be cleared and ready for sale on Friday. Produce shipped on Friday or Saturday will be cleared over the weekend and ready for sale on Monday. Most of the produce is expected to be exported during the winter months when ambient temperatures in Auckland are quite cool (minimum 8-12°C, maximum 15-18°C) so that if there are delays in inspection and clearance, product deterioration will be limited. Flights with evening or early morning arrivals are preferred (Tuesday, Thursday Saturday).

There are about three ship departures per month from Nuku’alofa to Auckland and one departure every three weeks from Vava’u. These are used for exporting root crops (chilled and frozen), watermelons and coconuts.

3.6 Internal Transport

Tonga has two international sea ports (Nuku’alofa and Vava’u) and one international airport (Fua’amotu). Due to the limited and expensive inter-island transport services, the bulk of agricultural exports originate in Tongatapu where they are transported by road to packing facilities and the seaport. There are also some root crop exports direct from Vava’u. Internal air freight services are too unreliable and too expensive to consider air transport of produce from the outer islands to Tongatapu for export via Nuku’alofa international airport.

3.7 Export Opportunities and Constraints

Whilst the Tonga’s track record as an agricultural exporter is patchy, there have been some notable success stories in the past, and there is considerable potential to develop the sector in the coming years. The strengths of Tonga’s agricultural export sector lie in:

- A core group of established and experienced fresh produce exporters, currently exporting root crops, coconuts and cucurbits, who are eager to expand and diversify their export activities.
- A well-defined strategy (TASP) that specifies the role of export market development in the development of the agricultural sector.
- Well-established commercial linkages between these exporters and several of the major New Zealand importer/wholesalers.
- The existence of GroFed and its commercial affiliate GroCom; and the marketing arrangements between GroFed/GroCom and Fresh Direct in New Zealand.
- Satisfactory (but expensive) transport linkages (sea and air) with Auckland.
- Climate and soils favourable to production of a wide range of tropical crops year round and winter season temperate crops during the months when supplies are lowest and prices are highest in New Zealand.
- A clean/green image with capacity to be turned into a powerful marketing/promotion tool.

It is also necessary to be mindful of a number of constraints which have prevented the full realisation of these opportunities until now. Foremost amongst these are:

- The lack of workable market access protocols for most agricultural commodities other than those which can be treated by fumigation.
- Institutional weaknesses particularly in research and extension support and quarantine and quality control functions.
- Infrastructure constraints especially for export inspection and certification, pre-export treatment (fumigation and HTFA), and decentralised packing and chilling/freezing facilities.

4. Export Pathways and Infrastructure Needs

In order to assess the resources needed for exporting various items, the following section details the steps in the export pathways for the major product categories, the actual and projected volumes exported, and the estimated equipment and infrastructure needs. This serves to highlight the critical infrastructure bottlenecks in Tonga’s export marketing pathways for agricultural and horticultural produce.

4.1 Coconuts

Export of fresh mature coconuts by refrigerated sea container to New Zealand and Australia

Steps in Export Pathway	Equipment and Infrastructure Requirements
<ul style="list-style-type: none"> Collect nuts from plantation 	<ul style="list-style-type: none"> Tractor and trailer Potential to use mechanised husking equipment
<ul style="list-style-type: none"> Transport to husking station 	
<ul style="list-style-type: none"> Remove husks and discard defective nuts 	
<ul style="list-style-type: none"> Transport to packhouse 	<ul style="list-style-type: none"> Tractor and trailer or truck MAFFF registered packhouse, preferably HACCP certified
<ul style="list-style-type: none"> Final inspection – discard defective nuts 	
<ul style="list-style-type: none"> Size grading and bagging 	
<ul style="list-style-type: none"> Pack bags in container 	
<ul style="list-style-type: none"> Chill container 	<ul style="list-style-type: none"> Container stand with reliable power supply
<ul style="list-style-type: none"> Move container to port 	<ul style="list-style-type: none"> Truck to lift 20 foot container
<ul style="list-style-type: none"> Wash container 	<ul style="list-style-type: none"> Container washing facility
<ul style="list-style-type: none"> Load container onto ship 	<ul style="list-style-type: none"> Container loading hoist at wharf

Current exports of coconuts are around 1,700 tonnes/year, equal to about 95 twenty-foot containers (20,000 nuts/18 tonnes per container). Exports of coconuts have increased from about 50 tonnes/month to almost 150 tonnes/month during the last nine years, occasionally reaching 200 tonnes per month. Coconut exporters do not face any equipment or infrastructure constraints in handling these volumes. However mechanised de-husking equipment has the potential to improve profitability of the value chain by reducing the amount of labour used in husking nuts.

4.2 Watermelons

Export of watermelons in refrigerated sea containers to New Zealand

Steps in Export Pathway	Equipment and Infrastructure Requirements
<ul style="list-style-type: none"> Harvest into field bins 	<ul style="list-style-type: none"> Tractor, trailer and harvesting boom
<ul style="list-style-type: none"> Transport field bins to packhouse 	<ul style="list-style-type: none"> Tractor and trailer or truck
<ul style="list-style-type: none"> Wash, sort and grade 	<ul style="list-style-type: none"> MAFFF registered packhouse, preferably HACCP certified, with mechanised washing facility, and grading/packing conveyer belt
<ul style="list-style-type: none"> Discard defective fruit and pack in export bins 	
<ul style="list-style-type: none"> Transport export bins to MAFFF fumigation facility 	<ul style="list-style-type: none"> Forklift and truck
<ul style="list-style-type: none"> Unload truck and place bins in fumigation chamber 	<ul style="list-style-type: none"> Forklift Insect proof fumigation area Fumigation chamber with minimum 12 tonne capacity
<ul style="list-style-type: none"> Fumigate with methyl bromide for 4 hours 	
<ul style="list-style-type: none"> Stow export bins in 20 foot reefer container 	<ul style="list-style-type: none"> Forklift and insect proof outloading area
<ul style="list-style-type: none"> Chill container 	<ul style="list-style-type: none"> Container stand with reliable power supply
<ul style="list-style-type: none"> Move container to port 	<ul style="list-style-type: none"> Truck to lift 20 foot container
<ul style="list-style-type: none"> Wash container 	<ul style="list-style-type: none"> Container washing facility

Steps in Export Pathway	Equipment and Infrastructure Requirements
<ul style="list-style-type: none"> • Load container onto ship 	<ul style="list-style-type: none"> • Container loading hoist at wharf

Current watermelon exports are around 200-300 tonnes per annum, mostly during October, November and December when monthly volumes can reach 80-100 tonnes or 8-10 twenty-foot containers (assuming 10 tonnes of melons per container). The watermelon exporters have the capacity to harvest, grade and pack this volume, using the same facilities as those used for squash. The MAFF fumigation facility can handle two 10 tonne container loads per day, so with about three ships per month it is generally possible to fumigate the current level of exports during one or two days before sailing. However, the capacity of the fumigation facility could become limiting if the watermelon industry expands significantly. The capacity of the facility is estimated as follows:

- Two 10 tonne container loads per day for three days prior to shipment = 60 tonnes/shipment
- Three shipments per month = 180 tonnes per month
- Three months x 180 tonnes = 540 tonnes per annum

The New Zealand market for watermelons in October-December is around 135 tonnes/week (580 tonnes/month), supplied mainly by imports from Australia. If the fumigation facility works at full capacity it could process 180 tonnes per month, which is only about 30% of the market requirements during Tonga's export season. The watermelon exporters have plans to expand volumes towards 1,000 tonnes over the next few years, which would be a market share of around 60% during the season. On this basis the capacity of the fumigation facility would become limiting in the near future. One way to overcome this capacity constraint would be to extend the watermelon export season, but to take advantage of the strong demand in the spring and early summer, there would still be a need to install a second fumigation chamber. The fumigation facility is only used for watermelons at present. If exporters wish to use it for other commodities, or expand beyond 180 tonnes per month of watermelons, it would be necessary to install a second fumigation chamber. A second chamber would certainly be needed if the industry target of 1,000 tonnes is to be realised over say five months. There is sufficient space in the building to install a second chamber beside or above the existing chamber. It is also important to be mindful of the risks to the exporter of any malfunctioning of the fumigation facility, for example through equipment breakdowns, shortages of fumigant, or non-availability of trained operators. This would have disastrous consequences for the exporters, since an entire shipment could be lost.

4.3 Squash, Pumpkins etc.

Export of squash or pumpkins to Japan, Korea or New Zealand

Steps in Export Pathway	Equipment and Infrastructure Requirements
<ul style="list-style-type: none"> • Harvest into field bins 	<ul style="list-style-type: none"> • Tractor, trailer and harvesting boom
<ul style="list-style-type: none"> • Transport field bins to packhouse 	<ul style="list-style-type: none"> • Tractor and trailer or truck
<ul style="list-style-type: none"> • Brush, sort and grade 	<ul style="list-style-type: none"> • MAFFF registered packhouse, preferably HACCP certified, with mechanised brushing facility, and grading/packing conveyer belt
<ul style="list-style-type: none"> • Discard defective fruit and pack in export bins 	
<ul style="list-style-type: none"> • Stow export bins in 40 foot reefer container 	<ul style="list-style-type: none"> • Forklift
<ul style="list-style-type: none"> • Chill container 	<ul style="list-style-type: none"> • Container stand with reliable power supply
<ul style="list-style-type: none"> • Move container to port 	<ul style="list-style-type: none"> • Truck to lift 40 foot container
<ul style="list-style-type: none"> • Wash container 	<ul style="list-style-type: none"> • Container washing facility
<ul style="list-style-type: none"> • Load container onto ship 	<ul style="list-style-type: none"> • Container loading hoist at wharf

Current exports of squash are around 2,000 – 4,000 tonnes per annum over a period of about six weeks. This requires an average harvesting and packing capacity of 50-100 tonnes per day (6 weeks x 6 days per week). The largest exporter, Nishi Trading, has the capacity to harvest and pack this amount, more if necessary by working extended or double shifts. There are also several smaller squash packing facilities. Together these have handled much larger volumes of squash in the past. Since squash exports to Japan and Korea are unlikely to expand

very much, and any exports to New Zealand will be over a longer seasonal window, the squash/pumpkin marketing pathway does not have any significant capacity constraints.

4.4 Root Crops

Cassava and other root crops exported frozen

Steps in Export Pathway	Equipment and Infrastructure Requirements
<ul style="list-style-type: none"> Harvest into field bins, baskets or sacks 	<ul style="list-style-type: none"> Tractor and trailer or truck
<ul style="list-style-type: none"> Transport to packhouse 	
<ul style="list-style-type: none"> Peel, sort and discard defective material 	<ul style="list-style-type: none"> MAFFF registered packhouse with facilities to peel, sort, wash and pack root crops, preferably HACCP certified Access to clean water and electricity Facilities for solid and liquid waste disposal
<ul style="list-style-type: none"> Wash in water 	
<ul style="list-style-type: none"> Rinse in sodium metabisulphite solution 	
<ul style="list-style-type: none"> Drain and pack in wholesale (20-25 kg) or retail (3-5kg) plastic bags 	<ul style="list-style-type: none"> Blast freezer with capacity reduce the temperature of produce to -15^oC in 4 hours
<ul style="list-style-type: none"> Freeze 	
<ul style="list-style-type: none"> Stow in freezer container 	<ul style="list-style-type: none"> Container stand with reliable power supply
<ul style="list-style-type: none"> Move container to port 	<ul style="list-style-type: none"> Truck to lift 20 foot container
<ul style="list-style-type: none"> Wash container 	<ul style="list-style-type: none"> Container washing facility
<ul style="list-style-type: none"> Load container onto ship 	<ul style="list-style-type: none"> Container loading hoist at wharf

Taro, giant taro, tarua, yams and other root crops exported chilled

Steps in Export Pathway	Equipment and Infrastructure Requirements
<ul style="list-style-type: none"> Harvest into field bins, baskets or sacks 	<ul style="list-style-type: none"> Tractor and trailer or truck
<ul style="list-style-type: none"> Transport to packhouse 	
<ul style="list-style-type: none"> Wash, peel, trim and discard defective material 	<ul style="list-style-type: none"> MAFFF registered packhouse with facilities to peel, trim, sort, wash and pack root crops, preferably HACCP certified Access to clean water and electricity Facilities for solid and liquid waste disposal
<ul style="list-style-type: none"> Drain and pack in red-net bags and export bins 	
<ul style="list-style-type: none"> Chill 	
<ul style="list-style-type: none"> Stow in reefer container 	<ul style="list-style-type: none"> Chiller and/or reefer container
<ul style="list-style-type: none"> Move container to port 	<ul style="list-style-type: none"> Container stand with reliable power supply
<ul style="list-style-type: none"> Wash container 	<ul style="list-style-type: none"> Truck to lift 20 foot container
<ul style="list-style-type: none"> Load container onto ship 	<ul style="list-style-type: none"> Container washing facility
	<ul style="list-style-type: none"> Container loading hoist at wharf

Tonga does not have the required infrastructure for hygienic and efficient processing of root crops in the required quantities. Discounting the 2015 drought year, exports are about 1,650 tonnes of frozen cassava, 1,000 tonnes of other frozen root crops, and about 2,200 tonnes of chilled fresh root crops. This represents about 240 twenty-foot containers per year or 5-6 containers per week (14-15 tonnes per container). The New Zealand market has the capacity to absorb increased exports of root crops, and there are also markets further afield with considerable potential, especially for frozen product, including Australia and North America. Processing infrastructure limitations could constrain access to these markets if production is expanded to meet the demand.

Since it was upgraded according the recommendations of TR 45 the MAFFF export processing facility at Nuku'alofa has the capacity to process 2-3 containers of root crops per week, which is less than half the current level of exports. Because the MAFFF facility lacks the capacity, most of the root crops are processed in very basic facilities, which do not meet acceptable hygiene standards or levels of operational efficiency. Also the MAFFF facility itself is not HACCP compliant. The root crop exporters have expressed a preference for access to decentralised processing facilities with the equipment needed to process root crops hygienically and

efficiently in the rural areas. It was initially suggested that two decentralised units would be appropriate, one each in the Eastern and Western Districts of Tongatapu. However the subsequent establishment of the Nishi packhouse and the company’s plans to upgrade this to process root crops with a capacity of about one container per week, means that only the Eastern District packhouse is needed. Some further investments and operational modifications would also improve the capacity of the MAFFF facility and prepare it for HACCP accreditation.

4.5 Fresh Fruit and Vegetables

Steps in Export Pathway	Equipment and Infrastructure Requirements
<ul style="list-style-type: none"> Harvest into field bins, baskets or sacks 	<ul style="list-style-type: none"> Tractor and trailer or truck
<ul style="list-style-type: none"> Transport to packhouse a/ 	
<ul style="list-style-type: none"> Wash (if necessary) and sort – discard defective material Pack into re-usable plastic crates/lugs 	<ul style="list-style-type: none"> MAFFF registered packhouse with facilities to sort, wash and pack fruit and vegetables, preferably HACCP certified Access to clean water and electricity Facilities for solid and liquid waste disposal
<ul style="list-style-type: none"> Transport to MAFFF airport facility 	<ul style="list-style-type: none"> Covered truck
<ul style="list-style-type: none"> Transfer to HTFA bins b/ 	<ul style="list-style-type: none"> Functional HTFA facility
<ul style="list-style-type: none"> HTFA treatment b/ 	
<ul style="list-style-type: none"> Final sort/grade and pack into cardboard cartons in insect proof area 	<ul style="list-style-type: none"> Work benches, scales, supply of cartons in insect-proof area etc
<ul style="list-style-type: none"> Cool produce in cartons in forced air cooling chamber 	<ul style="list-style-type: none"> Forced air cooling chamber in insect-proof area
<ul style="list-style-type: none"> Transfer cartons to air container 	<ul style="list-style-type: none"> Air containers and cool room with outloading onto airport tarmac
<ul style="list-style-type: none"> Store air container in quarantine cool room 	
<ul style="list-style-type: none"> Transfer container to international airport 	
<ul style="list-style-type: none"> Load onto aeroplane 	<ul style="list-style-type: none"> Covered holding area for cargo prior to loading Airport cargo handling equipment

a/ May be exporter’s packhouse or Fua’amotu airport facility

b/ These steps not required for non-fruit fly hosts (e.g. beans and okra)

Exports of fresh fruit and vegetables have been running at a very low level, mainly confined to taro leaves (non-fruit fly host) and breadfruit (cooked and frozen). There are several MAFFF registered packhouses currently used for watermelons which could be used to process fruit and vegetables, although none of these are HACCP certified⁵. However there has been a small revival of fresh fruit exports (mainly papaya and breadfruit) following the overhaul and re-commissioning of the HTFA facility under TEQM management. The capacity of this facility (about three tonnes per shift) is far greater than the actual volumes processed, so that HTFA capacity does not present a constraint in the foreseeable future. Of greater concern however, is the financial viability of the facility which is struggling due to low throughput volumes.

⁵ PHAMA is currently considering providing assistance to obtain HACCP certification for some of these facilities.

5. Conclusions and Recommendations

5.1 Priority Infrastructure and Equipment Needs

TR 45 identified the infrastructure needs for processing and packing horticultural commodities, in order of priority as:

Priority	Current Status
1. Improvements to the Nuku'alofa export processing facility to increase its capacity and enable it to operate more efficiently.	<ul style="list-style-type: none"> Many of these improvements have been implemented, but further work is needed to enhance efficiency and facilitate HACCP accreditation Working at near full capacity
2. Overhaul and improvement of the Fua'amotu airport facility	<ul style="list-style-type: none"> Overhaul and improvements completed and operation transferred to TEQM Financial sustainability is doubtful unless throughput is substantially increased
3. Establishment of two decentralised general-purpose processing facilities on Tongatapu	<ul style="list-style-type: none"> One new multi-purpose packhouse established by Nishi Trading Ltd. to service growers and exporters in central and Western Tongatapu Steps have been taken to initiate a new Eastern district packhouse facility including preliminary design and feasibility assessment

5.2 Nuku'alofa Export Processing Facility

TR 45 identified the main requirements to improve the Nuku'alofa facility in order to free-up the existing floor space so that it can be used as initially intended, and to install additional equipment in the outdoor washing and packing area to improve operational efficiency. The TR 45 recommendations and their current status are as follows:

TR 45 Recommendation	Current Status
1. Construct and equip a new building of around 40m ² for inspection and certification of handicrafts for export. This will free-up much of the export processing and inspection area in the existing building for processing of horticultural exports.	<ul style="list-style-type: none"> New building for handicrafts constructed but may be too small to handle the volume of exports
2. Equip the existing export processing and inspection area with stainless steel benches to facilitate sorting, grading, packing and inspection of produce for export.	<ul style="list-style-type: none"> Some washing vats installed but no stainless steel benches. Produce is still being washed peeled and sliced on the concrete floor
3. Install shelving in the blast freezer to allow for faster freezing of produce in individual pieces, with bagging after freezing prior to transfer to the shipping container. This is more energy efficient than bagging the produce before freezing, provides for quicker and more uniform freezing, and improves product quality by allowing individual pieces to be easily separated for placement in retail packs either at the packing facility or by the importer/distributor. Packing ready frozen produce is standard procedure for most frozen food	<ul style="list-style-type: none"> Shelving has not yet been installed and produce is still being frozen in bags

TR 45 Recommendation	Current Status
products.	
4. Engage a qualified refrigeration engineer to check the operation of the blast freezer to ensure that it is working satisfactorily. The long periods required to freeze cassava suggest that the freezer may not be functioning properly, although freezing bagged product also contributes to the problem.	<ul style="list-style-type: none"> • Blast freezer is now performing satisfactorily, although freezing bagged product impedes efficiency
5. Construct a roof over the 120m ² paved area between the export processing and inspection area and the fumigation facility. This area is used for washing and packing root crops for export. The area also needs to be equipped with stainless steel benches, lighting, three-phase electricity, weigh-scales and a washing machine for root crops. These machines greatly accelerate the washing and packing of cassava and other root crops, use much less water, and enable a full twenty-foot container load to be processed in 4-6 hours.	<ul style="list-style-type: none"> • Roof constructed but none of the other facilities or equipment have been sourced or installed
6. Install additional rainwater tanks or connect to the town water supply to allow for increased volumes of root crops to be processed.	<ul style="list-style-type: none"> • Tanks not yet installed
7. Assess compliance of wastewater disposal with environmental regulations, and if necessary install a wastewater treatment facility. Install removable bins for solid waste disposal.	<ul style="list-style-type: none"> • Untreated wastewater still being discharged to the sea • Operators are responsible for removing their own solid waste
8. Monitor utilisation of the fumigation facility. If exporters plan to export more than about 60 tonnes of fumigated produce per shipment, the capacity of this facility would become limiting and an additional fumigation chamber will need to be installed. Accreditation of additional MAFFF staff also appears to be a wise precaution to guard against possible disruptions to exports.	<ul style="list-style-type: none"> • Drought conditions in 2014-15 means that the volume of fumigated produce has not increased as expected • Continued monitoring the utilisation rate is needed • Maintenance of fumigation chamber and associated equipment and training in its operations to be funded by PHAMA during October 2016.

Complete implementation of the TR 45 recommendations for the Nuku’alofa facility would enable capacity to increase from 2-3 20-foot containers per week to 3-4 per week; and if volumes are sufficient, to increase the capacity of the fumigation facility from 60 tonnes per shipment to 120 tonnes.

5.3 Fua'amotu Airport HTFA Facility

TR 45 reported that the facility had recently been signed over from MAFFF to TEQM, which proposes to operate it on a commercial basis that it needed a fairly extensive overhaul before it can become reliably operational. The TR 45 recommendations and their current status are as follows:

TR 45 Recommendation	Current Status
1. Structural repairs to the building including replacement of guttering, repairs to the insect screens, and repair of the main entrance gates.	Most of these recommendations have been implemented (with PHAMA support) and the facility can easily handle the volume of produce available for processing
2. Installation of shutters on the Western side of the building to keep the working areas dry during heavy rainstorms.	
3. Installation of a lockable storage area.	
4. Overhaul of the electrical system including standby generator.	
5. Installation of a larger boiler and a new boiler room.	
6. Installation of work benches for grading and packing produce.	
7. Overhaul of the toilet and washroom facilities.	
8. Ancillary equipment including a new forklift, platform scales, office equipment and computer.	

The airport HTFA facility is now in good working condition and is ready to process and pack the complete range of fruit and vegetables for export by air including products for which market access is being pursued (courgettes/zucchini and possibly green beans), and including those commodities requiring HTFA treatment. In addition the old office building adjacent to the HTFA building is being used occasionally to grade and pack produce prior to HTFA treatment.

The problem now is not the infrastructure or equipment, but the operational challenges of managing a facility on a fee-for-service basis in the face of low and highly variable throughput and the need to sustain high operating standards in order to maintain access to the New Zealand market. Operation of the facility is dependent on the continuing presence of the HTFA Technician recruited from Fiji.

5.4 Decentralised General-Purpose Processing Facilities

TR 45 reported that the current level of root crop exports would fully utilise the Nuku'alofa facility, even after the recommended enhancements some of which have already been implemented. During 2015 root crop exports reached a record 4,600 tonnes (about 310 containers) and in busy months reached 400-500 tonnes, equivalent to 27-33 containers or 6-8 containers per week. Recovery from the drought, and strong demand for root crops in the main export markets, makes it likely that the 2015 levels will be equalled or exceeded in due course.

TR 45 concluded that if root crop exports are to expand, additional processing facilities would be needed. Increasing food safety concerns among root crop importers and retailers means that such facilities must have high operating standards and be designed so that HACCP accreditation is possible, as is the case with the new Nishi packhouse.

During the preparation of TR 45 exporters expressed a preference for decentralised facilities close to the main root crop production areas where produce can be processed and packed in shipping containers. It was suggested that growers and exporters in the central part of Tongatapu would use the Nuku'alofa facility, and that two new facilities would be constructed in the rural areas, one in the Eastern District and one in the Western District. However establishment of the Nishi packhouse which can easily access produce from central and Western Tongatapu, and could be upgraded to handle a modest volume of root crops, means that only the

Eastern facility is now needed. The need for the Eastern district facility is based on the following capacity assessment:

- Current volume of root crop exports: 5-6 containers/week, increasing to 6-8 during busy periods
- Capacity of MAFFF facility: 2-3 containers/week, able to be increased to 3-4 with further improvements as recommended in TR 45
- Nishi Packhouse capacity: Currently used only for cucurbits but could be upgraded to process one container of root crops per week
- Volume of root crops currently processed in informal/makeshift facilities: 2-6 containers per week

TR 45 recommended that the decentralised packhouse facilities would be general purpose processing and packing facilities able to handle the full range of root crops (chilled and frozen) and cucurbits. The facilities would have the capacity to process one twenty-foot container load of produce per day. They would include:

- An open-sided shed of around 200m² to allow for ventilation and easy cleaning with a concrete slab floor, together with small office and lunch area, toilets and wash room.
- Equipped with stainless steel benches, washing vats, washing machines and weigh-scales to facilitate sorting, grading, packing and inspection of produce for export.
- Connection to three-phase power with a backup generator and lighting to enable night operation.
- Borehole and tank for clean water supply, with high pressure pump to allow the work area to be cleaned.
- Blast freezer of about 50m³, sufficient to freeze one twenty-foot container load of root crops per shift.
- Parking space (concrete slab) and power for two twenty-foot reefer containers.
- Lockable areas to enable users to store packing materials and equipment.
- Composting bins for solid waste disposal (leaves, peel, reject produce etc.)
- A wastewater treatment facility to allow clean wastewater to be discharged or re-used.
- Access to an all-weather road suitable for heavy vehicles.
- Forklift for loading/unloading produce, bins etc.
- Perimeter fence, approximately 3m high.

TR 45 recommended that the decentralised facilities would be available to exporters on a fee-for-service basis. The operators would hire the facilities by the day and be responsible for engaging their own labourers and provision of all movable tools, consumables, packaging material and other equipment. It is likely that the facilities would be mainly used for processing frozen root crops, but could also be used for coconuts, cucurbits or other produce. The facilities would enable much more efficient and hygienic operations than the current makeshift facilities used by many of the exporters, as well as ensuring better quality product by blast freezing rather than the current practice of freezing bagged product in containers. Chilled product would be chilled in the container, avoiding the need for a separate cool room. The facilities would also be potentially HACCP certifiable.

A number of steps have been taken towards the establishment of the Eastern District Packing Facility (EDPF). An Establishment Board has been created comprising representatives of Government and the private sector, and agreement on the ownership structure and operating model has been reached. A preliminary architectural design and costing has been completed, and the basic outline of a business plan has been prepared. Importantly, the Australian Department of Foreign Affairs and Trade (DFAT) has indicated that it would be prepared to contribute to the financing of the construction costs of the project subject to the completion of a comprehensive feasibility study and business plan and consultations with relevant stakeholders on the arrangements for its construction and operations. A draft feasibility study/business plan (prepared independently from this report) is therefore presented in Annex 2 of this document.

The justification for locating the facility in the Eastern District is supported by the 2015 agricultural census which provides information on the main root crop producing areas of Tonga and Tongatapu by district. Vaini, Lapaha and Tatakamotonga produce almost 50% of the root crops in Tongatapu and are in close proximity to the proposed EDPF to be located at Alaki. A number of other sites were considered but found to be less suitable. The MAFFF office site in Alaki was discarded on the grounds that it would be expensive to develop due to the uneven terrain. Land adjacent to Fua'amotu airport was also set aside by the Establishment Board as the 4,000 m² site (approximately one acre) would have cost TOP 24,000 per annum to lease. The preferred site (see Annex 2, Attachment 1) is land adjacent to the MAFFF site in Aliki. This one acre block, a former rugby

field, was considered the preferred site for the facility and is available for 50 years for a once-only payment of TOP 50,000. The location is also very suitable with good road connections to growers in North-Eastern, South-Eastern and Central Tongatapu.

It is therefore recommended that the EDPF be established according to the design features given above and the operating model described in the business plan in Annex 2.

5.5 Vava'u Export Processing Facility

TR 45 noted that whilst the Vava'u facility has some design problems that partly explain why it is not being used, there is only one root crop exporter in Vava'u who operates on an intermittent basis and prefers to use his own facilities. This assessment has not changed. Consequently improvements to the Vava'u facility are considered low priority at this stage.

5.6 Ownership and Operational Issues

The ownership and operation of the export processing facilities detailed above is just as important as the structures and equipment therein. One option is for the exporters to own and operate all processing and packaging facilities, similar to the Fiji model with Nature's Way Cooperative (NWC). NWC is a cooperative of growers and exporters, which owns and operates the HTFA facility and export packhouse at Nadi Airport. It has been in operation for 21 years, during which the number of shareholders has grown and throughput has steadily increased. NWC has a full-time professional management team, and operates on a user-pays basis, but has always struggled to be profitable due to fluctuations in the supply of raw material for processing. It is important to note that NWC received substantial amounts of donor support to finance investments during its early years, and continues to be dependent on donor funding for its ongoing operations.

The two MAFFF export facilities at Nuku'alofa and Vava'u are available for use by exporters for the cost of electricity only. This arrangement is not sustainable as it makes no provision for other operating costs, repairs, maintenance or replacement of the facilities at the end of their working life. Given the constrained budgetary position of MAFFF it is inevitable that the condition of the facilities will deteriorate over time unless a system of full cost recovery is established. Ideally, the facilities should be leased to a private sector operator, possibly a NWC-type entity, which would charge commercial rates for use of the facility.

The airport HTFA facility has been transferred from MAFFF to TEQM, which is a state-owned company. TEQM has no other assets and no sources of revenue other than fees paid by users of the facility. It is essential therefore that these fees are adequate to cover the full operating costs. As a parastatal TEQM is able to retain the fee income it generates, unlike a ministry where fee income goes back to the treasury. TR 45 recognised that over the next few years revenue collected by TEQM from users of the airport facility would almost certainly be insufficient to cover the full operating costs or to finance the necessary repairs, maintenance and improvements. This has proven to be correct. TEQM will therefore need continuing external funding. As with the MAFFF facilities, once throughput is sufficient, the facility should be leased to a private sector operator. This was in fact the intention under the NZAP-Government agreement, which envisaged that TEQM would hand over to the private sector once the facility had sufficient throughput to cover its costs. Now that the facility has been transferred to TEQM the transition to private sector operation can again be considered. However throughput in 2015 and 2016 is far below break-even levels and it is unlikely that there would be any interest from the private sector.

The preferred option for ownership and operation of the proposed decentralised processing facility (i.e. the EDPF) is for it to be owned by a PPP with Government holding less than 50%, and managed by a private sector partner. Under such an arrangement the role of MAFFF would be confined to technical support and inspection/certification. In the absence of a NWC-type entity, some form of grower and/or exporter organisation would most appropriate to be the majority owner of the facility. Charges for use of the facilities should be sufficient to cover all operating costs as well as contributions to a sinking fund to accumulate money to finance replacement of the buildings and equipment as necessary. Details of the proposed operating model are given in the Business Plan in Annex 2. The business plan also identifies several risks associated with this

operating model including (i) the possibility that it may provide difficult to engage a commercial partner; and (ii) that exporters may be reluctant to pay a full commercial toll fee if the market will continue to accept produce processed in basic non-certified facilities. The first of these risks can be managed by calling for EOIs from commercial partners at an early stage. It is within the mandate of MAFFF biosecurity to manage the second risk.

Annex 1: Tonga’s Agricultural Exports 2007-2016

Figure 1: Monthly Exports of Cassava 2007-May 2016 (tonnes)

Cassava exports show a gradual uptrend from around 50 tonnes per month in 2007 to more than 100 tonnes per month today.

All cassava is exported in frozen form

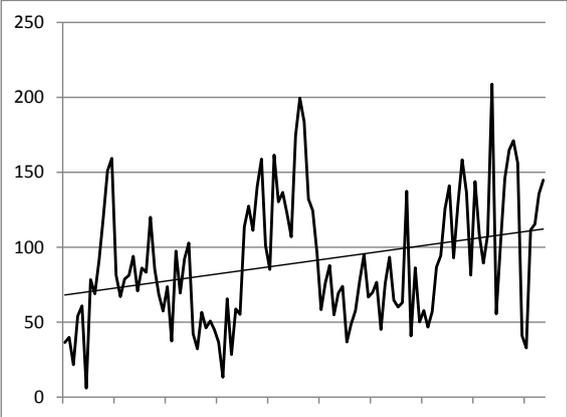


Figure 2: Average Monthly Exports of Cassava 2007-2015 (tonnes)

Cassava exports average about 70 tonnes per month during the first half of the year, increasing to over 100 tonnes per month during the second half.

This is mainly related to the seasonality of demand in New Zealand

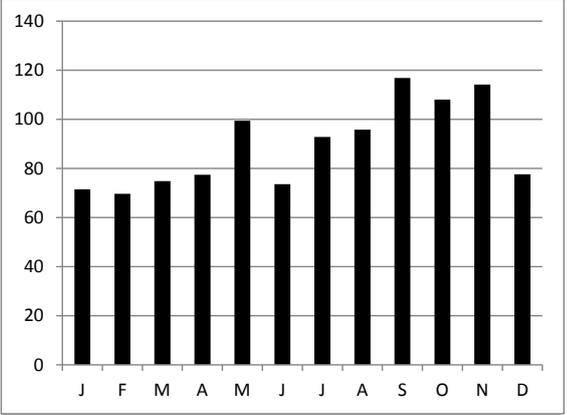


Figure 3: Monthly Exports of Giant Taro (Kape) 2007-May 2016 (tonnes)

Exports of giant taro fluctuate markedly within and between years. Volumes fell to almost zero in 2010 and again in 2015 due to the drought

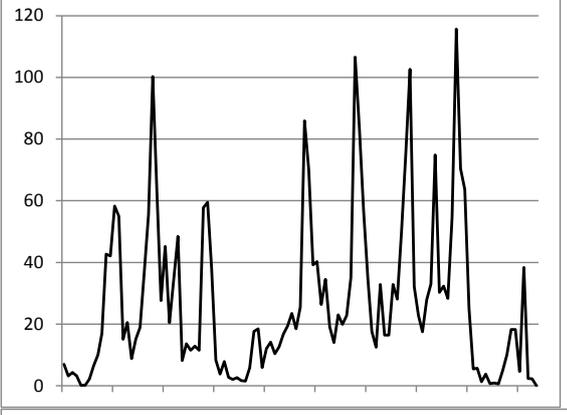


Figure 4: Average Monthly Exports of Giant Taro (Kape) 2007-2015 (tonnes)

There is usually a significant spike in giant taro exports during the October to December period

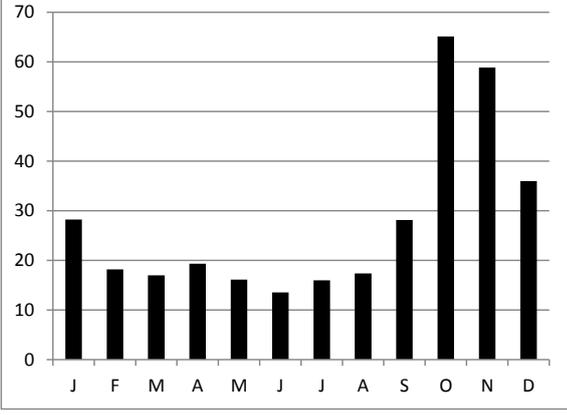


Figure 5: Monthly Exports of Swamp Taro (Taro Tonga) 2007-May 2016 (tonnes)

The long term uptrend in Swamp Taro exports has been severely dented by the 2015 drought

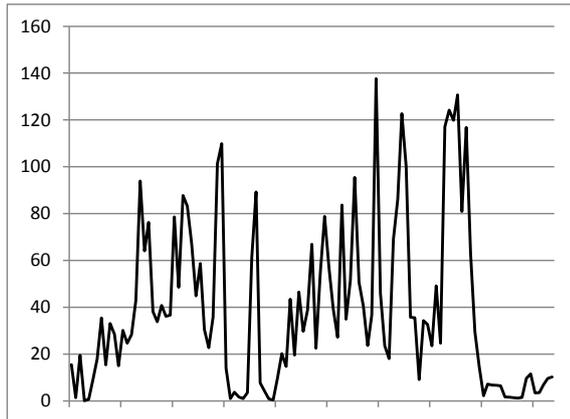


Figure 6: Average Monthly Exports of Swamp Taro (Taro Tonga) 2007-2015 (tonnes)

Exports of Swamp Taro are highest in June-July and December

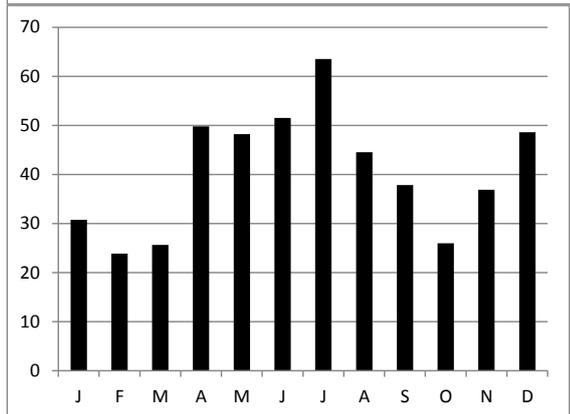


Figure 7: Monthly Exports of Taro Tarua (Taro Futuna-tea) 2007-May 2016 (tonnes)

Taro Tarua exports show an overall decline, exacerbated by the 2015 drought

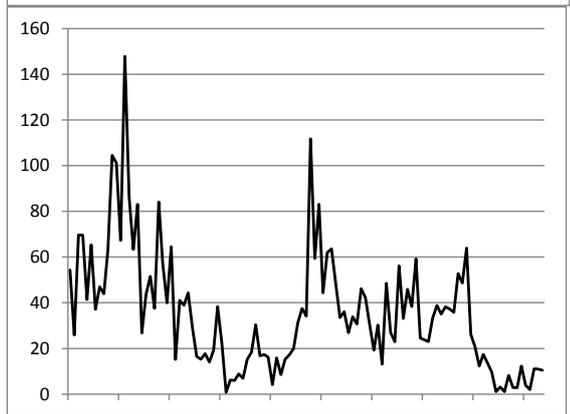


Figure 8: Average Monthly Exports of Taro Tarua (Taro Futuna-tea) 2007-2015 (tonnes)

Taro Tarua exports tend to be stronger in October-December and weakest in June-July-August

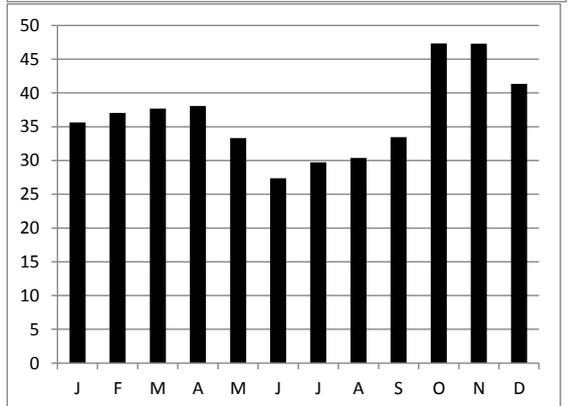


Figure 9: Monthly Exports of Yams 2007-May 2016 (tonnes)

Peak season exports of yams are generally between 100 and 200 tonnes per month, but exceeded 350 tonnes recently

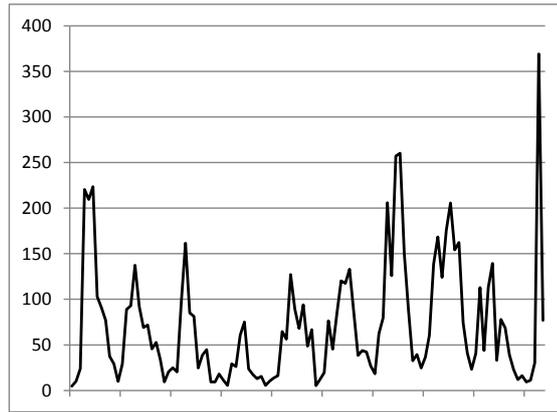


Figure 10: Average Monthly Exports of Yams 2007-2015 (tonnes)

Yam exports are strongly seasonal with the peak period being April-May-June

Exports fall to a trickle in November-December-January

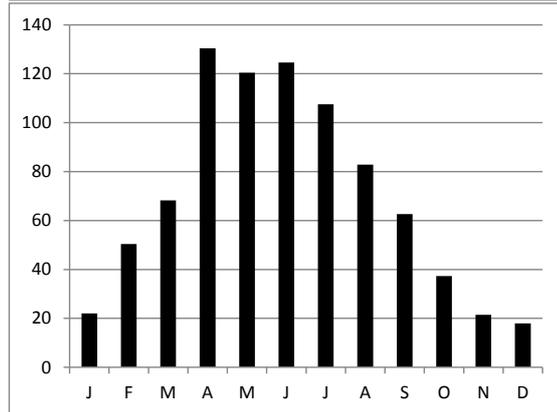


Figure 11: Monthly Exports of Japanese Taro 2007-May 2016 (tonnes)

There are occasional small shipments of Japanese Taro, but volumes are low compared to the other root crops

There have been no exports during the last two years

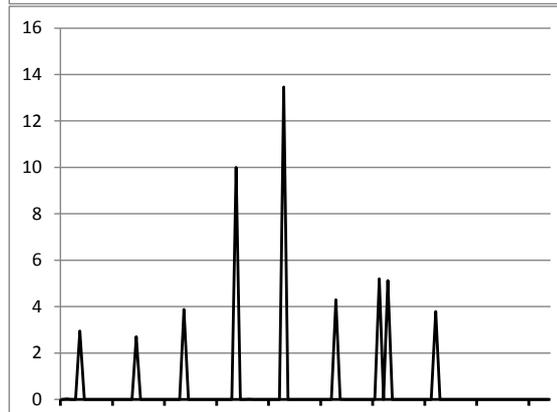


Figure 12: Average Monthly Exports of Japanese Taro 2007-2015 (tonnes)

Exports of Japanese Taro peak in April and May

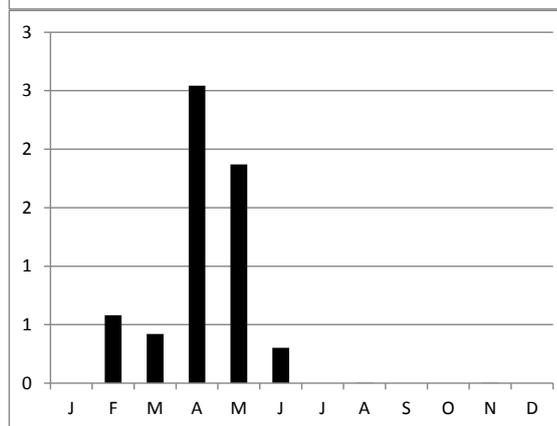


Figure 13: Monthly Exports of Sweet Potato (Kumala) 2007-May 2016 (tonnes)

Sweet potato exports commenced in 2011-12 but were badly affected by the drought in 2015

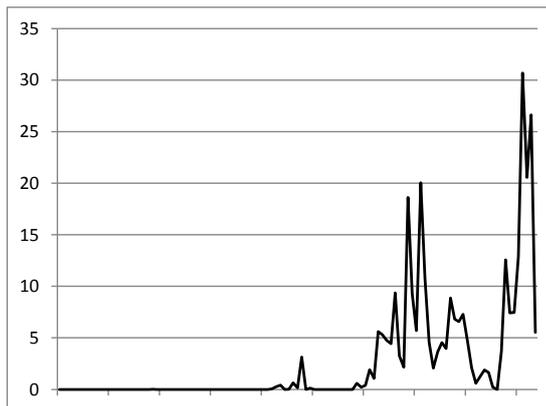


Figure 14: Average Monthly Exports of Sweet Potato (Kumala) 2007-2015 (tonnes)

Sweet potato exports are moderately seasonal with a peak in October-November-December and another one in February

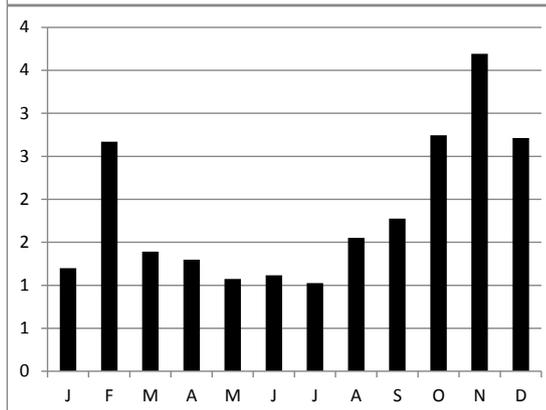


Figure 15: Monthly Exports of all Root Crops 2007-May 2016 (tonnes)

Total root crop exports are mostly in the 100-300 tonnes per month range, occasionally reaching around 500 tonnes

There is a gradual uptrend of 3.2% per annum with wide fluctuations within and between years

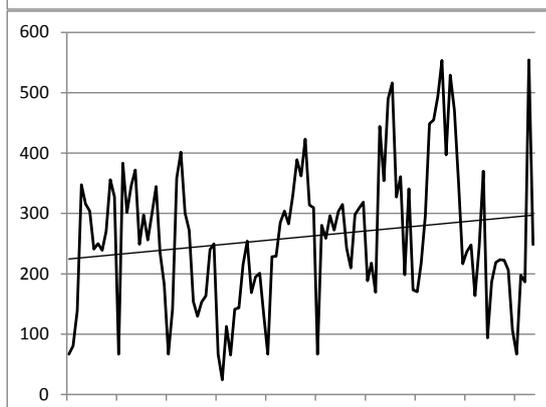


Figure 16: Average Monthly Exports of all Root Crops 2007-2015 (tonnes)

January-February-March is generally the low point for root crop exports but volumes are fairly stable over the remainder of the year

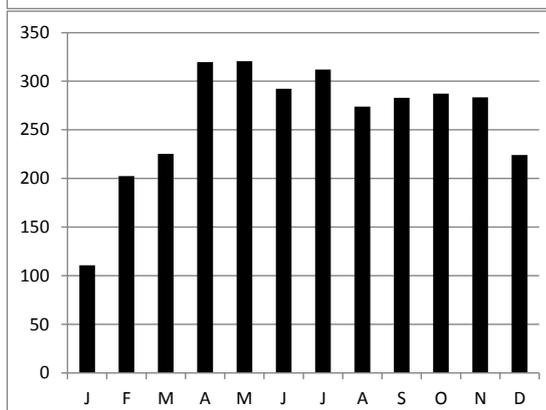


Figure 17: Monthly Exports of Squash 2007-May 2016 (tonnes)

Monthly exports of squash reached 2,500 tonnes in 2007, fell to less than 1,000 tonnes per month in 2009 and 2010 but have since recovered

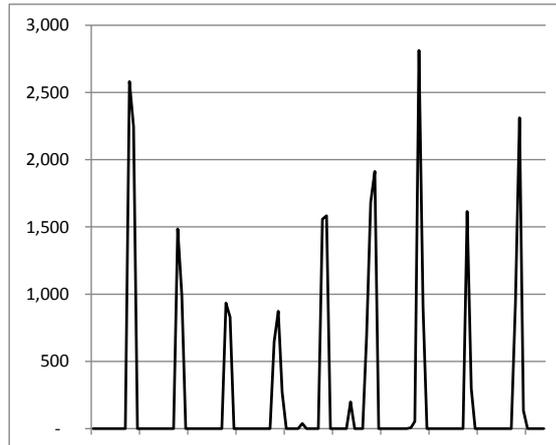


Figure 18: Average Monthly Exports of Squash 2007-2015 (tonnes)

The squash export season is concentrated in October and November

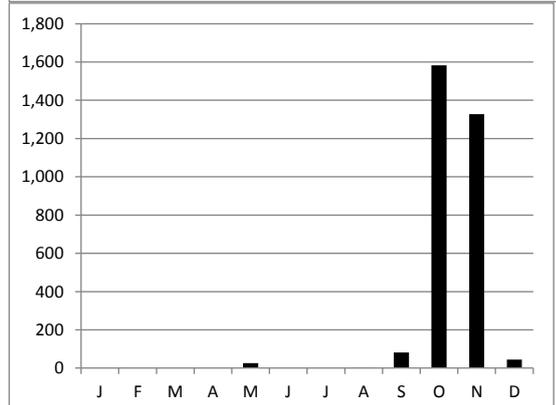


Figure 19: Monthly Exports of Watermelon 2007-May 2016 (tonnes)

Watermelons have become a significant export since the opening of the MAFFF fumigation facility has enabled access to the New Zealand market

Production was badly affected by drought in 2015

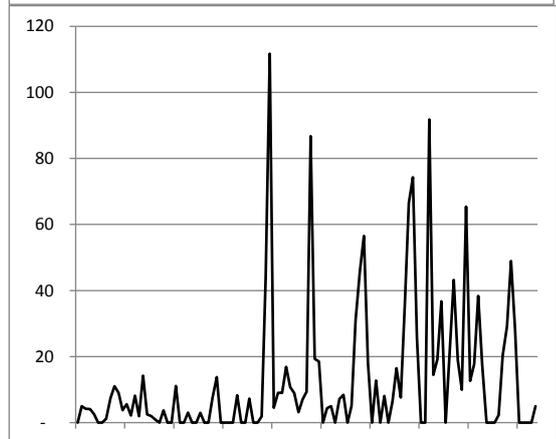


Figure 20: Average Monthly Exports of Watermelon 2007-2015 (tonnes)

The main watermelon export seasons is October to December

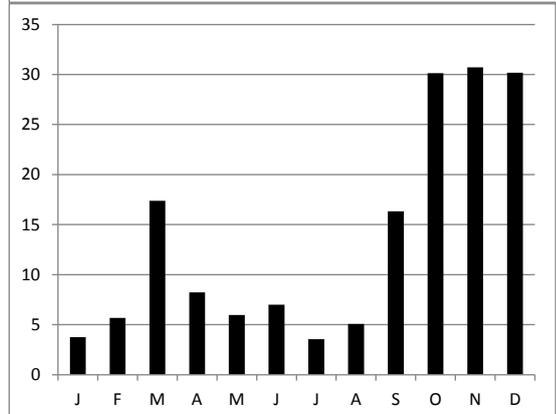


Figure 21: Monthly Exports of Coconuts 2007-May 2016 (tonnes)

Coconut exports have shown a steady uptrend from around 60 tonnes per month in 2007 to about 150 tonnes per month today

Most of these are fresh mature (brown) nuts

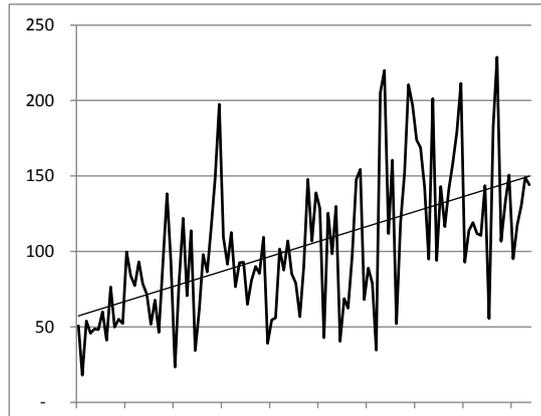
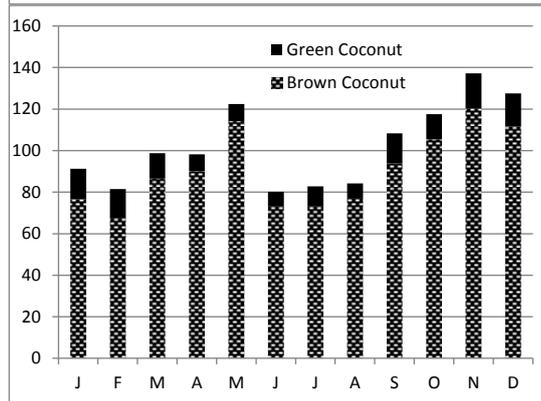
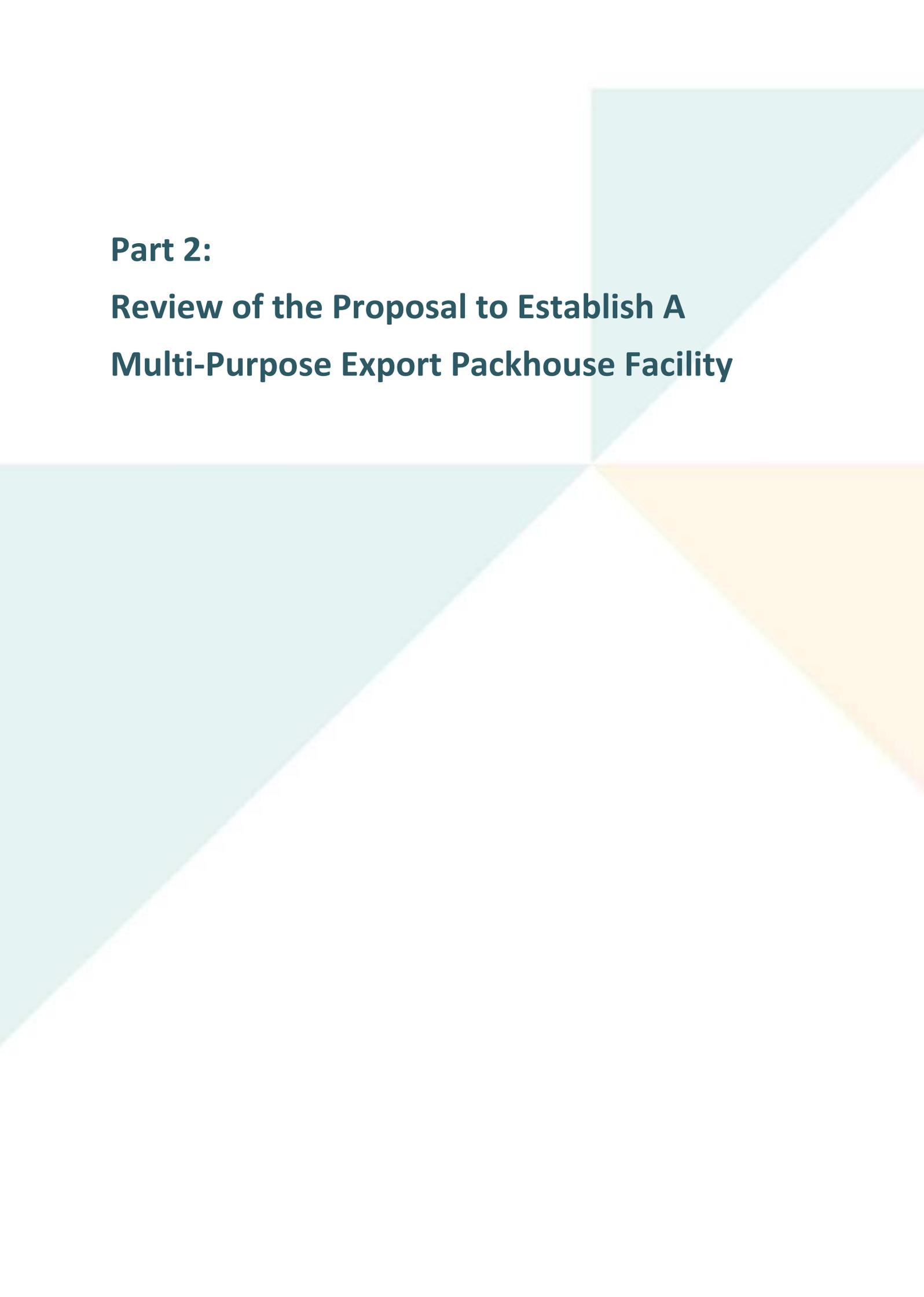


Figure 22: Average Monthly Exports of Coconuts 2007-2015 (tonnes)

Coconut exports are strongest during the last quarter of the year. Most green (drinking) nuts are exported during the new Zealand/Australia summer months



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Part 2:

**Review of the Proposal to Establish A
Multi-Purpose Export Packhouse Facility**

Executive Summary

Background

The proposal to establish a new export packhouse facility in Tonga has been under consideration for at least four years. The need for such a facility was identified in a PHAMA study of export marketing infrastructure in 2013. A further study undertaken by PHAMA in 2016 found that a number of steps had been taken towards the establishment of a decentralised packhouse facility, to be known as the Eastern District Packhouse Facility (EDPF). An Establishment Board had been created and agreement on the ownership structure and operating model had been reached. A preliminary architectural design and costing had been completed, and the Australian Department of Foreign Affairs and Trade (DFAT) had indicated that it would be prepared to contribute to the financing of the construction costs subject to a feasibility study and business plan and consultations with relevant stakeholders on the arrangements for its construction and operation. A draft feasibility study/business plan was presented in the 2016 study report.

Issues to be Addressed

Following review of the 2016 study report and business plan DFAT raised a number of issues and questions to be resolved before it could make decisions on whether and how to support the packhouse project. These include:

- Is the packhouse needed? Is there sufficient capacity in the existing packhouses on Tongatapu to process current and expected export volumes? What would be the impact on existing packhouse facilities? Is there a risk of crowding out private investment in packhouses?
- What alternative options exist for expanding root crop export processing capacity, what are their likely costs and how do these options compare to constructing a new EDPF?
- What lessons can be learned from other investments in export processing facilities in Tonga? How have these lessons been considered in the project design?
- How can the supply of raw materials be stimulated to ensure that throughput is sufficient for commercial viability? How should fluctuations in the supply of raw materials be managed?
- Are stakeholders prepared to invest in the construction and operation of the facility?
- Are exporters willing to pay full commercial rates for export packhouse services? Would they prefer to use the MAFFF facility at subsidised rates or continue to use informal/low-cost packing facilities?
- Is there potential to use the packhouse to supply the domestic market? Would this help to reduce volatility in the supply of perishable produce to the local market?
- How important is HACCP certification? Are exporters prepared to pay more to use a HACCP certified facility?
- How should gender issues be addressed in the governance, design and operation of the packhouse and in the upstream and downstream supply and marketing channels?
- Are there commercial operators willing to take responsibility for operation of the packhouse? If not, what are the alternative operating arrangements?
- What are the likely development impacts in terms of poverty alleviation, nutrition, and the prevalence of non-communicable diseases?
- What are the prospects for adopting a phased or modular approach involving a smaller and fairly basic facility initially, scaling up once viability has been demonstrated?
- How should the design and management of the packhouse incorporate the principles of resilience to climate variability and climate change?
- What are the risks (commercial, environmental, social) and how should these be mitigated?

Major Findings

- **Need for the Packhouse:** There is a strong underlying uptrend in root crop exports of 6.5% per annum. The bulk of this is exported through the informal system. If this uptrend persists average exports are expected to reach 400-450 tonnes per month by 2020, with an increasing number of months in the 500-700 tonnes

range. It is concluded that a new packhouse is needed to handle the increasing volume and to assist exporters to shift from the informal to the formal sector and eventually to Hazard Analysis Critical Control Point (HACCP) certified exports. The impact on the existing (Nuku'alofa Wharf and Nishi) packhouses is likely to be minimal.

- **Lessons Learned:** Excess capacity in agro-processing facilities is a global problem, and idle or under-utilised facilities are particularly common where public investment is involved. There are three examples of this in Tonga so it is reasonable to be cautious about the proposal for a fourth. The key lesson is that export processing facilities need to be very carefully and conservatively designed both from an architectural and engineering perspective and in relation to the operating model. This calls for a comprehensive business and financing plan to inform decision making and define the governance and operational arrangements.
- **Supply of Raw Materials:** Ensuring a consistent supply of raw materials is a key success factor for any agro-processing business. Measures to stimulate and coordinate production of root crops would help to underpin the commercial viability of the packhouse. The strong growth in exports of root crops indicates that Tongan farmers are responsive to market opportunities. Farmers are familiar with the main root crops produced for export and maintain that if there is an assured market at a fair price they will grow more. The best way of increasing the availability of produce is for exporters to engage groups of contract farmers/outgrowers to grow crops specifically for export, and to use farmer field schools (FFSs) to provide the necessary training.
- **Preparedness to Invest:** Stakeholder contribution to the cost of the packhouse investment would demonstrate ownership and commitment to the project and greatly improve the prospects of donor support. However, no offers of co-financing were forthcoming from any of the parties consulted, other than the Government which could consider a contribution through a waiver on import duties and VAT on construction materials. This is in contrast to other projects in rural areas of Tonga where project beneficiaries have proven willing to co-invest.
- **Willingness to pay for Services:** To generate a reasonable return on investment and provide for maintenance and eventual replacement of the facility the packhouse will have to charge more than the two existing service providers (MAFFF and Nishi Trading). Faced with differing toll rates, exporters will have four choices: (i) queue up to pay subsidised rates for a poor service at Nuku'alofa wharf; (ii) pay significantly more for a much better service at Nishi; (iii) pay a bit more again for using the proposed packhouse; or (iv) continue to process and market through informal channels. Nobody can be sure how the exporters will respond. Consequently there can be no definitive conclusion about the willingness to pay question, except that it does represent a material risk to the viability of the project.
- **Domestic Market:** It has been suggested that the packhouse facilities could be used to supply the domestic market by providing cold storage for perishable produce during times of over-supply. This could be done if the cold storage is not required for export crops, but the opportunities are fairly limited and would increase operational complexities. However there are significant domestic market opportunities in the supply of packaged root crops in the restaurant and fast food sectors.
- **Importance of HACCP Certification:** Every one of the exporters consulted was strongly in favour of having access to a HACCP certified packhouse. Those currently in the formal marketing system report that their importers/distributors are seeking additional volumes, provided that these are HACCP certified and can be distributed through the major supermarket networks. In view of the price premiums available in the formal market, the likelihood that HACCP certification will become increasingly necessary to stay in that market, and the legal/regulatory requirements, it would be unwise to construct a packhouse that could be difficult or impossible to certify at some time.
- **Gender:** The project needs to incorporate a number of gender-related initiatives to ensure that the benefits are equitably shared, and that any potentially adverse social impacts are mitigated. Five measures are proposed: (i) gender balance in governance and decision-making bodies including the Board of Management; (ii) gender and child protection considerations to be incorporated in the tendering processes for construction and operation of the packhouse; (iii) contractors and sub-contractors will be required to provide equal employment opportunities; (iv) employment conditions are expected to be compliant with Tongan law and international best practice; and (v) training activities should include minimum levels of female participation.
- **Operational Model:** There is a risk that it may prove difficult to engage a suitably qualified management company that is prepared to offer services to exporters at an affordable price. The Establishment Board has considered calling for expression of interest (EOI) to get a better idea of the level of interest from potential operating partners. Other operating models may need to be considered in the event of failure to attract satisfactory EOIs, or at a later stage proposals, for the management contract.

- **Phased/Modular Approach:** The risk of the project could be mitigated through a phased or modular construction of a single-purpose (root crop) processing facility with the first phase costing perhaps half of the earlier cost estimate, and with the remaining investments spread over a further one to two phases. Implementation of the second and subsequent phases would depend on reaching agreed levels of utilisation and profitability.
- **Climate Resilience:** The design and construction of the packhouse and its ancillary facilities should be based on best-practice standards for minimising adverse environmental impacts and maximising resilience to climate variability and climate change. Farmer training should incorporate adaptation measures including: (i) use of drought tolerant crops; (ii) training on how to access and interpret weather forecasting data; (iii) use of conservation agriculture techniques; (iv) water-efficient micro-irrigation during dry spells; and (v) integrated pest and disease management.
- **Development Impacts:** Most of the raw material will be grown by small-scale and semi-commercial farmers who are heavily reliant on income from these crops. Growing export crops also provides scope for increased engagement of women and youth in rural areas who otherwise have limited employment opportunities. Exporters using the packhouse would require about 110 contracted outgrowers, plus a number of semi-subsistence/semi-commercial growers supplying on an intermittent basis. The facility will also provide employment opportunities for up to 30 process workers, possibly more during busy periods. The great majority of these workers are expected to be women

Conclusions

As it currently stands, the proposal for a new packhouse facility has a number of strengths, but also some weaknesses and risks which need to be addressed before it goes ahead. The strengths of the proposal include:

- The demonstrable need for additional packhouse capacity to handle the growing volume of root crop exports and to transfer more of this from informal to formal channels which comply with Tongan laws/regulations and importer requirements.
- Lessons learned from other agro-processing investments which inform the design of the project and reduce the risk of repeating mistakes.
- The potential to invest some of the available resources in measures to increase raw material production, coordinate supply and demand, and improve climate resilience.
- The eagerness of the larger/well established exporters to utilise HACCP certified processing facilities to improve market penetration and prices.
- The potential to design the project in a way that ensures balanced and equitable participation of men and women.
- The potential to adopt a phased/modular approach to construction of the facility and to downsize and simplify the design – enabling some resources to be re-allocated to production stimulating and supply management measures.
- The expectation that the packhouse and its ancillary facilities will be designed and constructed according to best-practice standards for minimising adverse environmental impacts and maximising resilience to climate variability and climate change.
- The expectation of positive social and economic impacts through increased rural employment opportunities and increased export revenue.

The **weaknesses** of the proposal are:

- Apparent reluctance of project stakeholders/beneficiaries to contribute to the cost of the investment, other than Government's offer to waive import duties and taxes. This raises serious doubts about ownership and commitment to the project.
- Uncertainties about exporters' willingness to pay full commercial rates for use of the packhouse including depreciation and sinking fund contributions.
- Continuing uncertainty about the availability and interest of a commercial partner to operate the facility on a contract basis.

The following **recommendations** need to be adopted before DFAT or other potential financiers are able to make a decision about whether to support the project:

Recommendation No 1: The design of the packhouse should be downsized and simplified to reduce its cost, and also constructed in a modular or phased manner, subject to achieving defined throughput levels at each stage.

Recommendation No 2: Following completion of a revised packhouse design and costing based on a downsized/simplified facility at the Vaini site, the business plan should be adjusted as required. The Establishment Board should then officially endorse and adopt the business plan, or some variation thereof.

Recommendation No 3: Broaden the scope of the project beyond the packhouse construction to incorporate measures to stimulate production of root crops, and coordinate supply and quality control through the establishment of outgrower schemes and farmer training using the FFS approach. Minimum participation levels for women in FFSs should be mandated.

Recommendation No 4: The overarching purpose of building the packhouse is to boost Tonga's economy and international evidence demonstrates that better results will be achieved by taking a gender equality approach⁶. Doing so also supports the Government to meet its regional and international signed commitments, including to the ILO. Gender sensitisation and gender training should be provided for all communities and individuals engaged in the project. Training should be provided for men and women farmers, the exporters and their staff, management and workers in the packhouse itself, the governance bodies (Board and Committees), and the various packhouse shareholders. The combined equality approach will position the Board of Management well for compliance with future policy and legislative changes and will mitigate risks, especially reputational risk.

Recommendation No 5: The Establishment Board needs to explore ways of financing at least 10% of the cost of the investment.

Recommendation No 6: The exporters, through their industry association (GXN) should provide an assurance that they are prepared to pay full commercial rates for use of the packhouse. If such an assurance is not forthcoming MAFFF should indicate that it is prepared to subsidise the cost of operating the facility.

Recommendation No 7: The Establishment Board should call for EOIs in the management contract at an early stage, before further work on design or construction. In the event of an unsatisfactory outcome, the Board would need to formulate alternative operating arrangements among the options identified.

Recommendation No 8: The Establishment Board should confirm that the facility will service exporters sourcing raw material from any part of Tongatapu and that it is not just to service the Eastern District growers and exporters. Accordingly, it should no longer be known as the EDPF.

⁶ <http://www.worldbank.org/mdgs/gender.html>

1. Introduction

1.1 Overview

PHAMA is an Australian Department of Foreign Affairs and Trade (DFAT)-funded initiative launched in 2011 and funded through to June 2018. It is designed to provide practical and targeted assistance to help Pacific Island Countries (PICs) manage regulatory aspects associated with exporting primary products including fresh and processed plant and animal products as well as marine and forestry products. This includes gaining access for novel products into new markets, and helping to maintain and improve existing trade. Australia and New Zealand are the markets of major interest, along with export markets in East Asia and North America. The core countries assisted through PHAMA include Fiji, PNG, Samoa, Solomon Islands, Tonga, and Vanuatu. PHAMA also provides assistance to other PICs through the Secretariat of the Pacific Community's (SPC) Land Resources Division. The PHAMA regional office is located at SPC in Suva, Fiji. Smaller country offices are operated in all PHAMA countries and staffed by dedicated National Market Access Coordinators.

1.2 Previous Recommendations on Marketing Infrastructure

In 2013 PHAMA undertook a study⁷ (TR 45) of Tonga's export marketing infrastructure requirements which identified the infrastructure needs for processing and packing horticultural commodities, in order of priority:

- Improvements to the Nuku'alofa export processing facility operated by MAFFF to increase its capacity and enable it to operate more efficiently.
- Overhaul and improvement of the Fua'amotu airport heat treatment (HTFA) facility.
- Establishment of two decentralised general-purpose processing facilities on Tongatapu.

In relation to root crop processing TR 45 concluded that if root crop exports are to expand, additional decentralised processing facilities would be needed. Increasing food safety concerns among root crop importers and retailers means that such facilities must have high operating standards and be designed so that HACCP accreditation is possible. TR 45 recommended that the decentralised facilities would be available to exporters on a fee-for-service basis; and suggested that the facilities would be mainly used for processing frozen root crops, but could also be used for coconuts, cucurbits or other produce.

In 2016 PHAMA undertook a reassessment of the 2013 (TR 45) recommendations⁸ in light of the growing volumes of horticultural exports, and the work that had been completed in implementing the TR 45 recommendations. The 2016 study (TR 109) found that much of the work recommended for the Nuku'alofa export processing facility had been implemented but that its capacity was still less than demanded by the root crop exporters, and that HACCP accreditation had not been achieved. It also noted that the airport High Temperature Forced Air (HTFA) facility had been overhauled but was facing operational challenges in managing the facility on a fee-for-service in the face of low and highly variable throughput and the need to sustain high operating standards in order to maintain access to New Zealand. One major change that took place between the 2013 and 2016 studies was the establishment of the Nishi Trading packhouse.

TR 109 found that by late 2016 a number of steps had been taken towards the establishment of a decentralised general purpose packhouse facility, to be known as the Eastern District Packhouse Facility (EDPF). An Establishment Board had been created and agreement on the ownership structure and operating model had been reached. A preliminary architectural design and costing had been completed, and the Australian Department of Foreign Affairs and Trade (DFAT) had indicated that it would be prepared to contribute to the financing of the construction costs subject to the completion of a comprehensive feasibility

⁷ PHAMA (April 2013) *Technical Report 45 (TR 45): Feasibility Study to Determine Infrastructure Requirements for Processing and Packaging Horticultural Products for Export*

⁸ PHAMA (December 2016) *Technical Report No 109 (TR 109): Kingdom of Tonga: Infrastructure Requirements for Processing and Packaging Horticultural Products for Export*

study and business plan and consultations with relevant stakeholders on the arrangements for its construction and operation. A draft feasibility study/business plan was presented in Annex 2 of TR 109.

TR 109 stated that the preferred option for ownership and operation of the EDPF was for it to be owned by a public-private partnership (PPP) with Government holding less than 50%, and managed by a private sector partner. This was the model that had been decided upon by the Establishment Board. The role of MAFFF would be confined to technical support and inspection/certification. Some form of grower and/or exporter organisation would be most appropriate to be the majority owner of the facility. Charges for use of the facilities should be sufficient to cover all operating costs as well as contributions to a sinking fund to finance replacement of the buildings and equipment as necessary. Details of the proposed operating model were given in the Business Plan.

TR 109 recommended that the EDPF be established according to the design features and operating model described in the business plan, recognising however that there are several risks associated with the operating model including: (i) the possibility that it may prove difficult to engage a commercial partner; and (ii) that exporters may be reluctant to pay a full commercial toll fee if the market will continue to accept produce processed in basic non-certified facilities. DFAT also reviewed TR 109 and raised a number of issues to be addressed before it could make a final decision about financing of the project.

1.3 Issues to be Addressed

The terms of reference for the review highlight the key issues and questions raised by DFAT that need to be resolved before DFAT can make decisions on whether and how to support the packhouse project. These include:

- Is the packhouse needed? Is there sufficient capacity in the existing packhouses on Tongatapu to process current and expected export volumes? What would be the impact on existing packhouse facilities? Is there a risk of crowding out private investment in packhouses?
- What alternative options exist for expanding root crop export processing capacity, what are their likely costs and how do these options compare to constructing a new EDPF?
- What lessons can be learned from other investments in export processing facilities in Tonga, in particular the airport HTFA unit, the packhouses on Vava'u and 'Eua, and the Nuku'alofa wharf facility? How have these lessons been considered in the project design?
- How can the supply of raw materials be stimulated to ensure that throughput is sufficient for commercial viability? How should fluctuations in the supply of raw materials be managed?
- Are stakeholders prepared to invest in the construction and operation of the facility?
- Are exporters willing to pay full commercial rates for export packhouse services? Would they prefer to use the MAFFF facility at subsidised rates or continue to use informal/low-cost packing facilities?
- Is there potential to use the packhouse and its cold storage facilities to supply the domestic market? Would this help to reduce volatility in the supply of perishable produce to the local market?
- How important is HACCP certification? Are exporters prepared to pay more to use a HACCP certified facility?
- How should gender issues be addressed in the governance, design and operation of the packhouse and in the upstream and downstream supply and marketing channels?
- Are there commercial operators willing to take responsibility for operation of the packhouse? If not, what are the alternative operating arrangements?
- What are the likely development impacts in terms of poverty alleviation, nutrition, and the prevalence of non-communicable diseases?
- What are the prospects for adopting a phased or modular approach involving a smaller and fairly basic facility initially, scaling up once viability has been demonstrated?
- How should the design and management of the packhouse incorporate the principles of resilience to climate variability and climate change?
- What are the risks (commercial, environmental, social) and how should these be mitigated?

1.4 Study Methodology

The study was undertaken by two international consultants:

David Young **Agribusiness Specialist**
Carol Nelson **Gender Specialist**

Logistical support and guidance was provided by Paula Mosa'ati (PHAMA National Coordinator, Tonga). According to the terms of reference, the scope of work included:

1. Testing the current assumptions on throughput and charges for the proposed facility by collation and review of available data and surveying all exporters and commercial growers expected to use the packhouse.
2. Obtaining an update on plans by Nishi Trading Company to process root crops, including expected tonnage and processing charge per tonne.
3. Investigating likely impacts of the existing model for the proposed packhouse on existing packing/processing/storage facilities and women's opportunity to benefit from these facilities, and develop recommendations to mitigate negative impacts and maximise positive impacts.
4. Update the documented export statistics to include the 2016 export season.
5. Elaborate the lessons learned from previous investments in packhouses in Vava'u and 'Eua; the MAFFF export facility (Nuku'alofa Wharf) and the HTFA facility.
6. Investigate the steps and support necessary (including from a gender perspective) to stimulate supply of horticultural produce necessary to make investment in the proposed packhouse worthwhile.
7. Consider what alternative options exist for expanding root crop export processing capacity, their likely cost and how these options compare to constructing a new packhouse facility.
8. Factoring in the results and data from 1-7 above review: (a) the need for the proposed facility; (b) the commercial viability; (c) the development impact including (if necessary) updating the financial analysis and underlying assumptions on throughput and processing charges.

The work was undertaken during a mission to Tonga by the two international consultants during the week beginning 13th February 2017. This involved extensive consultations with stakeholders (a full list is provided in Annex 1) including community groups, growers and exporters, packhouse operators, grower and exporter associations, the Establishment Board, and government authorities. The team received a briefing from DFAT at the beginning of the mission and DFAT also convened a wrap-up meeting to discuss initial findings on the final day.

2. Background

2.1 General

Despite having a very small land area, Tonga has very good agricultural production capacity with good soils and favourable climatic conditions for a wide range of tropical and sub-tropical crops as well as temperate horticultural products in the winter months. There are long-standing trade linkages with New Zealand, and Tonga has historically been a source of many fruit and vegetable crops for New Zealand including pineapples, bananas, coconuts, root crops and winter vegetables. Tongan exporters also have long-standing trade linkages with Australia (coconuts and root crops), Japan and Korea (squash), North America and other PICs.

2.2 The Agricultural Export Sub-Sector

Exports of several commodity groups have waned over a number of years due to increasingly stringent phytosanitary regulations, more demanding quality requirements and increasing competition from other suppliers including Australia, South America and North America. In addition, some of the export protocols under various bilateral quarantine agreements (BQAs) have lapsed (e.g. beans to New Zealand). Over the last decade export performance has entered a recovery phase for some commodities (e.g. root crops and coconuts), and new export commodities have been launched (e.g. watermelons), whilst some of the traditional export commodities (e.g. squash) have fluctuated.

Due to its proximity and transport linkages, New Zealand has always been Tonga's main target market for exports. Although small in absolute terms, the New Zealand market is large relative to Tonga's capacity to produce and export. Effectively, the size of the market does not represent a constraint from Tonga's perspective. New Zealand is heavily dependent on imports of temperate horticultural products during the cooler winter months (May to October), and for tropical products all year round.

The large population of Pacific Islanders, Indo-Fijians and Asians in the Auckland area also provides market opportunities for specialised food products which target the culinary needs of these communities. New Zealand has five or six large fresh produce wholesalers which handle the full range of products and routinely import temperate products for the mainstream market through the winter months, and specialised tropical products for the ethnic communities all year round. This differs markedly from the Australian market which is mostly supplied from domestic production and does not have a strong import culture.

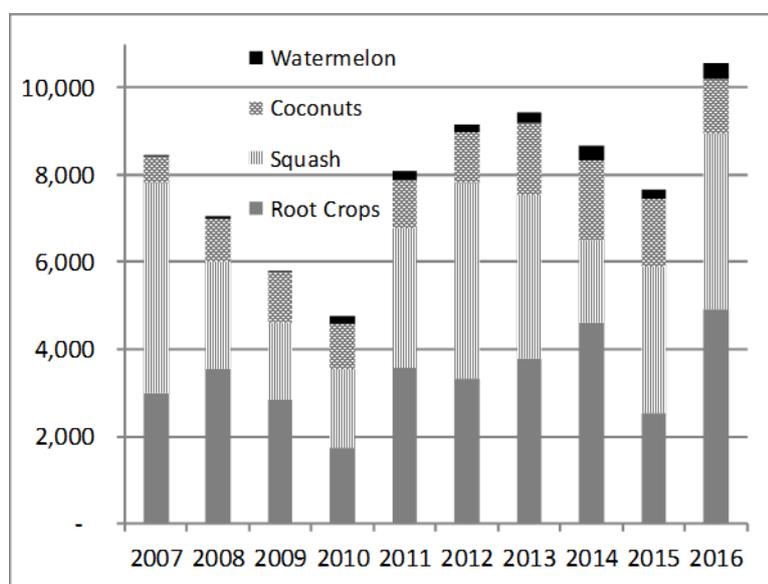
Seasonality strongly favours Tonga in accessing the New Zealand market. Tongan production of horticultural products tends to be higher, and prices lower, between June and October. This coincides with the period when supplies of many items in New Zealand are scarce or non-existent, and when prices in Australia (a competing exporter) are the highest. There are good air and sea freight linkages between Tonga and Auckland, although costs, particularly for air freight, tend to be high due to low volumes. However, current exports are almost entirely confined to low value products transported by sea, such as root crops, pumpkins, squash, watermelons and coconuts. Exports of fresh fruit and vegetables are negligible, and there are no export protocols in place for a number of potentially profitable export commodities.

There are a number of well-established exporters handling squash, coconuts, watermelons and root crops (fresh and frozen) who are interested in expanding their businesses and diversifying fresh produce exports once the export protocols and infrastructure are put in place. Such expansion cannot take place unless there is adequate infrastructure for processing, packaging and transporting these items to market.

2.3 Export Volumes

As shown in Figure 1 below exports of the major commodities (root crops, squash, coconuts and watermelon) declined between 2007 and 2010 but rebounded in 2011 reaching over 9,000 tonnes by 2013. Severe drought conditions dented production and exports in 2014 and 2015, but export shipments resumed their uptrend during 2016 onward driven largely by a major rebound in root crops. Most exports go to New Zealand except for the squash which goes mainly to Japan, and the coconuts which go to Australia. Root crop, watermelon and coconut exports are increasing, but squash export volumes are erratic. Most of the root crops (cassava, taro, giant taro, tarua and yams) are bulk shipments in 20kg bags with about 70% in frozen form. Significant increases in both volumes and value are considered possible with improvements to the exporting infrastructure and moving from bulk format to retail packaging. Further development of the export pathways and marketing infrastructure are regarded as a necessary means of increasing exports.

Figure 1: Exports of Principal Commodities 2007 to 2016 (tonnes)



2.4 Export Infrastructure

Most export processing is undertaken in small, decentralised and makeshift premises, with consolidation taking place into reefer containers (chilled and frozen) prior to export. In the last few years establishment of the MAFFF post-harvest facility at Nuku'alofa and the Nishi packhouse have led to greater centralisation and improved quality control. However, the MAFFF facility is not HACCP accredited. The Nishi facility is a modern HACCP certified packhouse designed to process cucurbits for export, and is currently being adapted for other uses such as fresh and frozen root crops. The MAFFF facility was established with EU STABEX funding in 2010 and is equipped for washing, peeling, cutting, bagging, chilling and freezing produce with a capacity of around 4-5 tonnes per day. It also includes a methyl bromide fumigation chamber with a capacity of around 20 tonnes per day. Following improvements to the MAFFF facility as recommended in PHAMA Technical Report 45 (TR 45) of 2013, it is now regularly used by about five exporters, processing up to two container loads per week.

Apart from infrastructure, it is also necessary to be mindful of a number of other export constraints. MAFFF has limited capacity to support the expansion of the export sector in terms of export inspection and certification. This is exacerbated by the demands on MAFFF to inspect and certify large numbers of small consignments of handicraft products (mats, wood carvings, tapa etc.). MAFFF also has limited capacity to provide the necessary research and extension support including grower registration and quality assurance schemes, maintain required biosecurity standards such as pest and disease surveillance, and to progress market access issues and negotiate export/import protocols. Other factors which need to be considered

include the high cost of agricultural inputs (seeds, fertilisers, agro-chemicals etc.), the high cost of fuels and energy, and limited access to finance.

3. Agricultural Exports

3.1 Agricultural Sector Background

Section 2 of TR 109 (2016) describes the principal features of Tonga's agricultural sector including a review of the new Tonga Agricultural Sector Plan (TASP), the key findings from the agricultural census which was conducted in 2015, and a description of the institutional and regulatory framework governing agricultural exports. Section 3 of TR 109 provides an update of Tonga's marketing infrastructure and transport services and an assessment of export opportunities and constraints. Section 4 describes the export marketing pathways and infrastructure needs for coconuts, cucurbits, root crops and fresh fruit and vegetables. Since there have been no significant changes to any of these aspects in the six months since TR 109 was completed, this information is not repeated here. It is however useful to assess the latest export marketing statistics which include the main July-December 2016 export season.

3.2 Agricultural Exports

Tonga's agricultural exports have been very unstable over time. Traditional exports such as copra have declined, although coconut exports have increased steadily during the last decade. Exports of tropical fruits (bananas, pineapples etc.) to New Zealand were important in the 1960s and 1970s but came under increasing competitive pressure from Central America and the Philippines, accentuated by increasingly stringent phytosanitary regimes and the demise of marketing parastatals in both Tonga and New Zealand. Fresh fruit and vegetable exports to New Zealand are currently negligible, although there is a small amount of trade to other Pacific Islands. Cucurbits and root crops are currently the two most important sectors. Exports of cucurbits (mainly squash) collapsed during 1990s but have since staged a modest recovery. Exports of root crops have grown quite strongly over the last decade, subject to seasonal fluctuations, and have recently staged a strong recovery following the 2015 drought. There has been some recent success (supported by PHAMA) in developing watermelon exports to New Zealand. Current exports to New Zealand are confined to items that can be treated by fumigation either prior to shipment (e.g. watermelons) or, if required due to pest interceptions, after arrival in New Zealand (e.g. taro, tarua and yams), or can be exported in frozen form.

Annex 2 summarises Tonga's agricultural export statistics over the last ten years, January 2007 to December 2016:

Root Crops

- Amongst the root crops, **cassava** is the leading export with New Zealand being the main destination. Cassava exports show a gradual uptrend from around 50 tonnes per month in 2007 to over 100 tonnes per month in 2015, occasionally 150-200 tonnes. All cassava is exported in peeled and frozen form. Whilst cassava can be produced year-round, production is somewhat seasonal and exports average about 70 tonnes per month during the first half of the year, increasing to over 100 tonnes during the second half. Following the end of the drought, exports in 2016 have soared to over 250 tonnes per month.
- Exports of **giant taro** (*kape/ta'amu*) fluctuate markedly from month to month. Volumes fell to almost zero in 2010 but rebounded to 30-80 tonnes per month on average but with a large spike in the October to December period.
- Exports of **swamp taro** are also highly unstable but have shown a strong uptrend since 2010 and now average about 40 tonnes per month with seasonal peaks in July-August and November-December. Shipments fell to a very low level during the 2015 drought and have not yet recovered.
- Taro **Tarua** exports declined between 2007 and 2010 but have recovered to around 40 tonnes per month, somewhat higher in October-December. Again, the drought of 2015 severely curtailed exports.
- Export of **yams** is highly seasonal reaching over 200 tonnes per month during the April-June peak season in 2007. Excluding the drought period, the seasonal peak is now around 200-350 tonnes per month.

- Taking **all root crops** together, exports in 2007-2009 were 250-350 tonnes/month, or about 2,800-3,500 tonnes per annum. During 2010 exports slumped to 1,700 tonnes, but subsequently rebounded 250-300 tonnes per month. Because different root crops have different seasonal patterns the tonnage exported is fairly consistent over the year with a tendency to be a bit lower in January-February due to wet weather. There was a major slump in 2015 followed by a rebound in 2016. Exports reached a record of 717 tonnes per month in July 2016. Over the ten-year period ending in December 2016 total **root crop exports grew at an average rate of 6.5% per annum.**

Cucurbits

- **Squash and Pumpkins:** During the 1980s Tonga exported as much as 20,000 tonnes of squash per annum. Exports subsequently declined to a low point of 1,800 tonnes in 2010, but have subsequently rebounded into the 2,000-4,000 tonne range. Japan remains the major market for squash although some has also been sent to Korea, China and New Zealand. The market window is narrow, with almost all exports taking place in October and November. In 2014-15 cucurbit exporters also began to diversify into butternut and butterkin exports, mainly to New Zealand.
- **Watermelons** have become a significant export since the opening of the MAFFF fumigation facility has enabled access to the New Zealand market. The main watermelon export season is October to December during which exports are running at up to 80 tonnes per month, with annual volumes of around 200-300 tonnes. Production was badly affected by the drought in 2015 but exports recovered to 364 tonnes in 2016. There are strong export orders for the 2017 season which could see the 2016 record easily eclipsed.

Coconuts

- Exports of fresh mature (brown) **coconuts** have shown a steady uptrend from around 60 tonnes per month in 2007 to about 150 tonnes per month today. Exports of green nuts are increasing from a low base and now average around 20 tonnes per month. Exports were lower in 2015 due to the drought and have not yet recovered.

Other Items

- The only other significant exports are **kava** to other pacific islands (110-170 tonnes per annum) and **taro leaves** mainly to New Zealand (40-80 tonnes per annum). There are occasional shipments of breadfruit (fresh and frozen). Vanilla exports declined from 13.6 tonnes in 2009 to less than two tonnes in 2011. Fresh fruit and vegetable exports are negligible due to the lack of market access protocols. However, with the re-opening of the heat treatment (HTFA) facility there has been an increase in **breadfruit** exports, reaching 94 tonnes during 2016.

3.3 Export Marketing Pathways

The various commodity groups have very different export marketing pathways, and consequently different infrastructure and packhouse requirements.

Root Crops

All cassava exports and some of the other root crop exports are in frozen form. Other root crops are a combination of chilled and frozen. These require wet processing to remove soil, and if frozen, to peel, slice and pack in plastic bags before freezing. Exports take place in chiller or freezer sea containers. Even though root crop exports have grown at an average of 6.5% per annum over the last decade, Tonga has very limited processing capacity for root crops, so that most of the processing is done in makeshift facilities in rural areas and marketed through informal channels. Only the MAFFF Nuku'alofa packing facility and the proposed Nishi Trading root crop processing line are able to process root crops to the standard required in formal marketing channels, and only Nishi is HACCP certified. Consequently the majority of root crops are exported through informal networks at relatively low prices.

Cucurbits

Squash/pumpkins and watermelons are processed for export by dry cleaning (brushing), grading, fumigation and packing in refrigerated containers. The volumes of squash and pumpkins exported are increasing but still well below historical levels, whilst watermelon exports are increasing rapidly but still less than 10% of total cucurbit exports. Squash/pumpkin exports are highly seasonal, watermelons less so, but both peak during the fourth quarter. Nishi Trading is HACCP certified to pack all these items for export. Other cucurbit packhouses are somewhat dilapidated remnants of the 1980s export boom, but have adequate capacity to handle current volumes.

Coconuts

Most coconut exports are mature (brown) nuts which are de-husked and packed in sacks before storing in refrigerated sea containers. A small number of nuts exported are fresh/green drinking nuts. The facilities required are quite basic although the largest exporter is HACCP certified. Packing facilities are adequate to handle current and likely future volumes.

Fresh Fruit and Vegetables

Fresh produce presents considerable challenges to exporters because of perishability, and in many cases, susceptibility to fruit fly infestation which requires treatment in a High Temperature Forced Air (HTFA) unit before export by air freight. These pathways are technically demanding and Tonga has struggled to establish a viable export pathway for these commodities, mainly due to problems in operating the HTFA facility at Fua'amotu airport. The facility itself has more than enough capacity.

4. Major Design Issues

4.1 Overview

The need for decentralised export processing facilities was identified in TR 45 (2013) and re-considered in TR 109 (2016). Initially it was planned to construct two facilities, one in the East of Tongatapu and one in the West. However, following the establishment of the Nishi Packhouse it was decided that a single decentralised facility would suffice and a site was identified in the Eastern District. Subsequently the proposed packhouse facility became known as the EDPF. A business plan for the EDPF was prepared in October 2016 and included as Annex 2 of TR 109. The following sections 4.2 to 4.13 respond to the issues that have been raised (see Section 1.3) about the merits of the proposed packhouse investment, and are intended to inform decision-making by DFAT and other stakeholders on whether to proceed.

4.2 Need for the Packhouse

As shown in Section 3.3 the marketing pathways for cucurbits, coconuts and fresh produce are not constrained by the availability of packhouse facilities. The situation is different for root crops, where existing and planned capacity is insufficient to handle the growing volume of exports. This means that the majority of root crop exports continue to pass through informal marketing channels.

Annex 2 Figures 1-14 show that over the last decade total root crop exports have been mostly in the 100-300 tonnes per month range, occasionally reaching around 500 tonnes. There is a strong underlying uptrend of 6.5% per annum, but with wide fluctuations within and between years, mainly due to seasonal factors. Dry spells and droughts depress production and wet periods impede harvesting operations. This creates challenges for export processing. If there is sufficient capacity to handle peak periods there will be idle capacity during the downswings (a fairly normal pattern for agro-industries). During July 2016 exports of root crops reached a record 717 tonnes. If the decade long up-trend in root crop exports persists average exports are expected to reach 400-450 tonnes per month by 2020, with an increasing number of months in the 500-700 tonnes range, possibly more.

Assuming 12-14 tonnes of product per 20-foot container⁹ this translates to 33-38 containers in an average month and 42-58 in peak months. Allowing for holidays, bad weather and other disruptions packhouses in Tonga generally operate for about 17 days per month (204 days per annum). This means that the required capacity is 1.9-2.2 containers per day in an average month and 2.5-3.4 per day in peak months. The Nuku’alofa wharf facility can currently process one container per three days at best. The proposed Nishi packhouse root crop processing line is likely to perform somewhat better but no more than one container per two days initially, possibly more if extra capacity is added later. As shown in Table 1 below this suggests a capacity deficit of 1.1 to 2.6 containers per day by 2020 if Nuku’alofa and Nishi work single shifts, falling to 0.3-1.8 containers per day with double shifts.

Table 1: Root Crop Processing Capacity Requirements (Containers per Day)

Containers per working day	Average	Peak
Capacity required by 2020	1.9-2.2	2.5-3.4
Nuku’alofa facility, single shift	0.3	0.3
Proposed Nishi root crop line, single shift	0.5	0.5
Capacity deficit with single shift	1.1-1.4	1.7-2.6
Capacity deficit with double shift	0.3-0.6	0.9-1.8

The fact that Tonga exported over 700 tonnes of root crops in July 2016¹⁰ indicates that it is possible to process the volumes shown in the right-hand column of Table 1. But over 70% of this would have to be processed in makeshift/un-licensed packhouses, and destined for the informal market. So the justification for the proposed packhouse is not about capacity per se, but the need for diverting an increasing volume of root crop exports from the informal to the formal market, where prices are significantly better. In any case the proposed facility (under a revised and scaled down design) would only have about the same capacity as the Nishi root crop line and would only represent a step in the right direction. Informal marketing is likely to remain in place for some time to come.

The impact on the Nuku’alofa and Nishi packhouses is likely to be negligible, except during very lean periods, when exports are well under 200 tonnes per month. This occurred four times during the 2015 drought, but is likely to be an increasingly rare event given the underlying uptrend in export volumes. Informal exporters would have the option to continue using their makeshift/un-licensed facilities or move into the formal sector by using the proposed new packhouse or one of the two existing ones.

Justification for the proposed investment needs to consider the alternative options. The “do nothing” option would constrain the ongoing expansion of Tonga’s root crop exports by reducing the rate at which exporters can shift from the informal to the formal sector, and from the lower end of the formal market to the premium level where HACCP certification is required. Upgrading the Nishi facility to handle frozen root crops is already underway but will only enable a small percentage of the informal trade to graduate into the formal sector. MAFFF is planning further upgrades to the Nuku’alofa facility but this will do little to increase its capacity, and the operational problems are unlikely to go away unless MAFFF imposes full cost recovery. The ideal scenario is for a private investor to install additional root crop processing capacity and make it available to exporters on a fee-for-service basis. Under this scenario some form of matching grant to the investor could be considered in view of the positive developmental impacts. Several exporters are understood to be contemplating such an investment but it is questionable whether they have the capacity to finance it. The cost of any additional capacity is likely to be roughly the same regardless of who builds it.

Nevertheless, there is a risk that the new packhouse would reduce the incentive for root crop exporters to invest in improved facilities of their own, thereby “crowding out” private investment. Consultations with the exporters revealed that most of them are enthusiastic about the prospect of gaining access to an efficient, hygienic and preferably HACCP certified packhouse, but only as an interim measure until they can afford to build their own facilities. However, none of them appear to have the capacity to invest at this stage.

⁹ Maximum is about 15 tonnes per container but not all containers are shipped fully loaded
¹⁰ It is unclear whether all of this was actually processed in the month of shipment.

It is concluded that a new packhouse is needed to handle the increasing volume of root crop exports and to assist exporters to shift from the informal to the formal sector and eventually to HACCP certified exports. The impact on the existing (Nuku'alofa and Nishi) packhouses is likely to be minimal.

4.3 Lessons Learned

Excess capacity in agro-processing facilities is a global problem, and idle or under-utilised facilities are particularly common where public investment is involved. There are three examples of this in Tonga so it is reasonable to be cautious about the proposal for a fourth. Therefore, the lessons learned from previous mistakes need to be carefully considered when assessing the merits of the packhouse proposal.

The Vava'u export processing facility has never been used for its intended purpose. There are several reasons for this. Apart from vanilla, Vava'u has a very low level of agricultural export activity with only one informal cassava exporter operating on an intermittent basis. There are also a number of design features which detract from the usefulness of the facility. The produce receival area would be very inconvenient to use being below road level and with no truck parking space. The washing and packing area is a very narrow un-ventilated room with no windows which would be extremely hot and humid to work in. There is no equipment provided such as packing tables, scales, forklifts etc. The blast freezer is only about half the size needed, and there are no certified fumigation operators in Vava'u.

The recently completed packhouse on 'Eua, opened in August 2016, has not yet been utilised and the rationale for its design is un-clear. 'Eua is not part of any export marketing pathway so there are no exporters, or export-oriented growers. The building consists of an empty shell with no equipment that could be used by potential exporters or domestic market operators. There is no side-loading truck on the island that can transport shipping containers and no way of loading containers onto inter-island ships. The Island Council is responsible for operation of the packhouse but a business plan has never been developed.

The Fua'amotu Airport HTFA unit has its own set of problems. Export of fruit fly host commodities to Australia and New Zealand is very technically demanding and has a mixed history in the Pacific Islands. The Fua'amotu facility is very well located, designed and equipped and is in good working order. But there have been long periods with little or no utilisation and it has proven impossible to operate on a commercially sustainable basis. Operation has been undertaken by MAFFF, then transferred to a parastatal, Tonga Export Quality Management (TEQM), then back to MAFFF. During 2015 the New Zealand quarantine authorities suspended the pathway and imposed stricter standards of operation following detection of a quarantine pest in a consignment of breadfruit.

Management of a HTFA facility as a stand-alone business will always be a challenge because of the high level of overhead costs and the likelihood that there will be long periods of time when there is little or no produce to process. This has been the experience with other HTFA facilities in the Pacific Islands, most notably Nature's Way Cooperative in Fiji which is still struggling to achieve financial sustainability after more than 20 years.

The story with the Nuku'alofa wharf facility is quite different. It is a problem of under-capacity and inappropriate design rather than lack of utilisation. The facility is fully utilised by root crop exporters and there is a long waiting list to gain access. Around two-thirds of the floor area is occupied by MAFFF offices and a food processing facility which is rarely used. Most of the remainder is used for export inspection of handicrafts leaving little space available for root crop processing. Some improvements (e.g. the construction of a roof between the main building and the shed containing the fumigation chamber) have been made following the recommendations of TR 45 but the facility can only be used by one exporter at a time and because of limited space it takes a minimum of three days to process one container load of root crops. As recommended in TR 45, a separate small facility has been constructed for the inspection of handicrafts and should be available for use by mid-2017. The water supply and drainage facilities are inadequate. There is a reefer container stand with power supply for 20 containers, but the backup generator can only support eight containers. Some export shipments have been lost due to power interruptions. Hygiene standards are not enforced and the facility has not been able to achieve HACCP certification.

There are also lessons to be learned about operational aspects of the Nuku'alofa facility. Whilst exporters are keen to use the facility, this is partly because it is provided almost free of charge. Users are only required to pay for the cost of the electricity used by the blast freezer and for reefer container operation while awaiting shipping. However, several exporters have complained about power outages and have lost some batches as a result. The low level of cost recovery means that MAFFF is unable to finance proper operation and maintenance of the facility, and it is likely that its condition will deteriorate over time. The users/exporters provide their own teams to do the processing, and the use of untrained staff means that hygiene is poor, occupational health and safety standards are ignored, and there is little chance of obtaining HACCP certification for the facility. The justification for these arrangements is that they are intended to help exporters make a start in the business, and that in time they will develop their own packhouse facilities. However, this has not yet happened.

There are a number of lessons that can be learned from these experiences. The design of 'Eua, Vava'u and Nuku'alofa facilities all had serious flaws that compromised their operations or rendered them useless. None of them have any private sector involvement in their operations other than Nuku'alofa which provides a heavily subsidised and unsustainable service to exporters. The Fua'amotu HTFA unit is far too large and has never operated satisfactorily in its 21-year history. The key lesson is that export processing facilities need to be very carefully and conservatively designed both from an architectural and engineering perspective and in relation to the operating model. This calls for a comprehensive business and financing plan to inform decision making and define the governance and operational arrangements.

4.4 Supply of Raw Materials

Ensuring an adequate and consistent supply of raw materials is a key success factor for any agro-processing business. Measures to stimulate production of root crops will therefore help to underpin the commercial viability of the proposed packhouse. The strong growth in exports of root crops, cassava in particular, over the last decade indicates that Tongan farmers are responsive to market opportunities. Farmers on Tongatapu are familiar with the main root crops produced for export and maintain that if there is an assured market at a fair price they will grow more. The surge in watermelon production and exports is evidence of this. The reverse is also true as seen by the contraction of the squash industry when markets were lost.

The catchment area for the packhouse is seen as the whole of Tongatapu, not just the Eastern District. This greatly improves the capacity to source raw materials. The proposed packhouse location near Vaini¹¹ is nearer to central Tongatapu and about equidistant by road from both the Eastern and Western ends of the island. The best way of increasing the availability of produce for processing and export is for exporters to engage groups of farmers to grow crops specifically for export. This involves coordinated scheduling of planting and harvesting of the required species and varieties to meet exporters' orders. The more successful exporters are already doing this, particularly with watermelons and squash, by organising and training groups of outgrowers under various contractual arrangements. Contractual arrangements with outgrowers accompanied by training and supervision are even more important when making the transition from informal to formal marketing channels under HACCP protocols.

The MAFFF extension services do not have the resources needed to organise and supervise outgrower schemes. This must be done by the exporters themselves, preferably with technical assistance for the conduct of farmer field schools (FFSs). FFSs have proved an effective agricultural extension method in many countries. In Tonga the Nishi Foundation in association with an NGO (the MORDI Tonga Trust) has successfully piloted FFSs on Tongatapu and 'Eua over the last year. FFSs will be a major component of the second phase of the IFAD-funded Tonga Rural Innovation Project (TRIP), also implemented by MORDI beginning in mid-2017.

The FFS approach would involve working with farmer groups of 20-30 members to go through a facilitated learning process to help them make the transition from semi-subsistence farmers to specialised commercial export growers of one or two crops. In most cases this would also include financial literacy and basic business management training. Since Tongan farmers are familiar with growing cassava and other root crops, the FFSs

¹¹ *The business plan presented in TR 109 was based on the facility being located at Alaki which is towards the Eastern end of Tongatapu. Since then a better site has been identified near Vaini.*

would cover the broader issues of improving supply management, coordination of appropriate crops, market advice, and utilisation of good agricultural practices required for HACCP certified marketing pathways. FFS groups can be male, female or mixed. The FFSs would assist the farmers to obtain the required planting materials and other inputs, adopt climate-resilient agricultural practices and to schedule production and harvesting as a group to supply the exporters' requirements.

The two main export root crops are cassava and yams. Yams are seasonal with peak production in April-June. Cassava can be planted and harvested year-round and is very drought resilient. FFS groups should schedule their planting of these and other root crops to provide a relatively stable year-round supply of exportable material, generating a steady cash flow and a degree of insurance against extreme weather events.

The number of farmers and FFS groups required to supply the proposed packhouse is not large, as shown by the following estimates:

Annual packhouse throughput: 2 containers per week x 50 weeks/year x 12-14 tonnes/container with packout of 70% = 1,700 tonnes of root crops supplied

Average yield of 15 tonnes/hectare (6 tonnes/acre) = 113 hectares (280 acres)

One hectare (2.5 acres) per grower = 110 growers

20 growers per FFS = 5-6 FFS groups

Exporters also buy produce from growers who produce occasional surpluses for sale which would reduce the number of FFS groups required. On the other hand, there is no reason why the FFS approach should be confined to exporters who utilise the proposed packhouse.

FFS groups would be facilitated by contracted service providers and are estimated to cost around TOP 12,000 per FFS per annum. Allowing for six groups the total cost would be around TOP 70,000 per annum. Minimum participation rates by women in FFSs should be mandated, including scope for womens' FFS groups if these are requested.

4.5 Stakeholder Preparedness to Invest

The issue of stakeholder contribution to the investment was raised in the discussions with Government, growers and grower organisation (GroFed), and the exporters. It was explained that stakeholder contributions would demonstrate ownership and commitment to the project and greatly improve the prospects of receiving donor support. However, no offers of co-financing were forthcoming from any of the parties consulted, other than the Government which said that it could consider making a contribution through a waiver on import duties and VAT on the construction materials.

This position is in sharp contrast to other programmes of this nature in Tonga. Under TRIP Phase I community-based projects were required and found willing to make significant contributions to investment projects. In TRIP II the beneficiaries of economic infrastructure such as wharves and access roads will be required to make a 25% contribution (50% in cash, 50% in kind). For activities under the "sustainable economic livelihoods" component, mainly involving farming and handicrafts, the required beneficiary contribution is 40% (15% in cash and 25% in kind).

4.6 Willingness to Pay

Some exporters have become accustomed to paying heavily subsidised rates for use of the Nuku'alofa wharf facilities, even though they complain about the lack of access, the suitability of the facilities and the quality of the service provided. MAFFF only charges users for the electricity used for the blast freezer and refer containers whilst awaiting shipping. This amounts to around TOP 1,200 – 1,500 per container depending on the

waiting time. Labour to process and pack a container load costs a further TOP 1,500 – 2,000 per container depending on the crop being processed. This amounts to a total of around TOP 0.22-0.29 per kg packed.

Nishi Trading is proposing to charge users TOP 0.18 per kg processed when it installs its new root crop processing line. This is equivalent to around TOP 0.25 per kg packed allowing for a 70% packout. However the Nishi toll fee does not include electricity for pre-shipping container storage. This would add a further TOP 0.04-0.08 per kg bringing the total to TOP 0.29-0.33 per kg packed, significantly more than the Nuku'alofa fee but for a much better service and with potential for full HACCP accreditation, provided that the growers and the exporter follow the required protocols.

The revised business plan for the proposed packhouse (see Annex 4) is based on a toll fee of TOP 0.42 per kg allowing for a 10% return on investment for the operator, and payment of TOP 0.06 per kg to the owner for depreciation and a sinking fund to provide for replacement of the facility after 20 years. This is considerably higher than the Nishi toll rate which only covers marginal cash costs and does not have to pay for overheads or depreciation and replacement of structures. The proposed packhouse tolls will therefore be more expensive than Nishi and considerably more than Nuku'alofa.

Faced with these widely differing toll rates, exporters will have four choices: (i) queue up to pay subsidised rates for a poor service at Nuku'alofa wharf; (ii) pay significantly more for a much better service at Nishi; (iii) pay a bit more again for using the proposed packhouse; or (iv) continue to process and market through informal channels. Nobody can be sure how the exporters will respond. Those who are currently exporting informally and are seeking to upgrade and potentially achieve higher returns as a result, will probably be prepared to pay the higher rates - see Section 4.8 below for a discussion on the likely benefits of upgrading from informal to formal marketing. Those who are happy to continue in the informal trade will probably balk at the cost. Nuku'alofa, Nishi and the new packhouse will have a combined capacity of around 1.3 containers per day (single shift) so even if the new facility works at full capacity there will still be 1-2 containers per day going through the informal system.

There can be no definitive conclusion about the willingness to pay question, except that it does represent a material risk to the viability of the project.

4.7 Domestic Market

It has been suggested that the packhouse facilities could be used to supply the domestic market by providing cold storage for perishable produce during times of over-supply and low prices, to be sold when prices recover. This could be done if the cold storage is not required for export crops, but the opportunities are fairly limited and would increase operational complexities. Any fresh produce trader wishing to use cold storage for supply management could easily import a second-hand reefer container from New Zealand for around NZD 14,000 (TOP 23,000) and have full control over its utilisation.

Some exporters of frozen products would very likely offer their products to local food wholesalers and retailers. This is currently occurring to some extent. PHAMA undertook a survey of local markets and take-aways in December 2016 and found that about ten tonnes per week of packaged cassava was being sold locally. This represents a significant and growing market opportunity for the packhouse facility as Tongan consumers seek greater food convenience and higher food safety standards.

There is a significant domestic market opportunity for locally produced onions and potatoes. Tonga imports around 380 tonnes of onions and 170 tonnes of potatoes from New Zealand annually. Potatoes and onions can only be grown in Tonga for 4-5 months of the year. Since there is insufficient cold-storage to hold stock for the remaining 7-8 months, the market has to be supplied by imports. Attempts to store onions and potatoes without proper drying/curing and cold storage have incurred heavy losses due to shrinkage and spoilage. However, the proposed packhouse would not be equipped with an onion/potato drying/curing unit and would have insufficient capacity for long-term cold storage of these bulky items for the domestic market.

4.8 HACCP Certification

Every one of the exporters consulted was strongly in favour of having access to a HACCP certified packhouse. Those currently in the formal marketing system report that their importers/distributors are seeking additional volumes, provided that these are HACCP certified and can be distributed through the major supermarket networks. They are fearful of losing market share over time if they are unable to access a certified facility. Some of the larger root crop exporters in Fiji have already obtained HACCP certification (with support from PHAMA) and two of Tonga's most successful exporters Nishi Trading (cucurbits) and Tinopai Farms (coconuts) are already certified. Certification is mandatory for suppliers of the major supermarket chains in Australia, New Zealand and North America, and over the next few years those who are not certified may be forced back into the informal market.

Moreover, the Tongan Food Act requires that all commercial food exports must be HACCP certified. Although this is not yet being enforced it is clear that over the next few years MAFFF and the Ministry of Health will place increasing pressure on exporters to be HACCP compliant. The combination of regulatory push and market pull underscores the vital importance of HACCP certification.

HACCP certification does not necessarily require elaborate or expensive facilities, particularly for low food safety risk products like root crops which are always cooked before consumption. So the plan to construct a HACCP certifiable facility does not mean that it has to be much more expensive. Certification is mainly about formalising procedures at critical points in all parts of the marketing pathway and installing the necessary monitoring and verification protocols.

Experience in Fiji also highlights the need for effective management to be in-place including having suitably skilled staff and dedication to implementing the various procedures and additional documentation. Annual audits are also necessary but expensive in Tonga as accredited auditors are not available locally. These are requirements that incur significant up-front costs that multiple small exporters will find hard to satisfy. In this light access to a single HACCP certified facility has obvious benefits.

Exporters currently in the formal sector are well aware of the costs involved with HACCP and seem willing to pay in order to maintain and expand their market access. But how much they are prepared to pay is an open question. The difference in prices between the informal and formal markets gives some indication of the benefits. Informal exporters are currently receiving the equivalent of AUD 1.00-1.60/kg (TOP 1.70-2.70/kg) for frozen cassava in 10 or 20 kg packs, somewhat more for yams and taro. Moreover, the informal trade is quite erratic, since there is generally no scheduled ordering system, and exporters report serious difficulties in getting paid. Some informal exporters have had to travel to Australia or New Zealand to collect payments. In the formal sector prices for frozen cassava in 1 kg retail packs supplied to wholesale distributors are around AUD 2.00/kg (TOP 3.45/kg). This represents a significant price premium, even after allowing for packaging costs. Wholesale prices for frozen cassava in the USA are currently around USD 2.00/kg (TOP 4.55/kg) but shipping costs are also higher.

In view of the price premiums available in the formal market, the likelihood that HACCP certification will become increasingly necessary to stay in that market, and the Tongan legal/regulatory requirements, it would be unwise to construct a packhouse that could be difficult or impossible to certify at some time. Certification need not be immediate. It can wait until throughput volumes are sufficient to justify the cost.

4.9 Gender Issues

Empowering women to participate fully in economic life across all sectors and throughout all levels of economic activity is essential to build strong economies and propel business operations and goals. According to the World Bank, expanding opportunities for women accelerates economic growth, helping to mitigate the effects on current and future financial crises¹². Additionally, it will assist the Government of Tonga to achieve

¹² <http://www.worldbank.org/mdgs/gender.html>

the Tonga Strategic Development Framework II¹³, the Tonga Agricultural Sector Plan¹⁴, the Revised National Policy on Gender and Development¹⁵ and internationally agreed goals for development, sustainability and human rights.

Tonga has made good progress on some gender indicators, including education equality and improved maternal and child mortality. There are increasing numbers of women in senior positions in the public service and the private sector, though the average income of the female population lags behind the male population in both the formal and informal economy. Women with limited access to land, livelihoods, support networks or formal employment experience additional hardship. Female-headed households are 22% of all households and are amongst the most vulnerable¹⁶.

The overarching purpose of building the packhouse is to boost Tonga's economy and, according to the World Bank, empowering women and girls makes economic sense¹⁷. Accordingly, the gender dimensions of the project were explored so that the best possible outcomes might be achieved.

In fulfilment of the Tongan Government's commitment to the Pacific Leaders Gender Equality Declaration¹⁸, gender mainstreaming is gradually being rolled out across the public service so taking an equality approach now will position the Board of Management well, as a proposed public-private partnership. Additionally, Tonga is now a member of the ILO and is expected to update labour laws in line with ILO Conventions, many of which mandate equality.

Gender issues have been addressed by the Gender Specialist in the context of DFAT's gender policies and guidelines, and a full report is provided in Annex 3. The gender analysis builds on a 2015 study¹⁹ undertaken by PHAMA and was undertaken by the same consultant. The analysis involved consultations with four women key informants three of whom are exporters, community consultations in two rural villages, and meetings with the Eastern District Working Council (EDWC), the Tonga Skills Programme and members of the Establishment Board. The recommendations arising from the gender analysis fall into five main areas.

- Gender balance in governance and decision-making including the composition of the Board of Management (likely to evolve out of the current Establishment Board). At least half of the members of all governance and management bodies should be women to ensure that Board decisions neither actively nor passively impact negatively on women. The same applies to the governing bodies of the various shareholder groups and to the firms engaged to construct and operate the packhouse. Women have a stake in the construction and operation of the packhouse because of women's multiple roles in the value chain, including exporting, growing and paid employment at the packhouse.
- Gender and child protection considerations in the tendering processes for the construction and operation of the packhouse. Tendering processes must be non-discriminatory and take into account gender equality and child rights, in keeping with the Government's commitment to the Convention on the Rights of the Child. Evaluation panels should have gender-balanced composition. Expressions of interest and proposals must include a gender action plan and gender disaggregated performance indicators in the monitoring and evaluation framework. This will reduce risk for the Board of Management.
- Bidders for construction contract(s) and sub-contracts should express willingness to provide equal employment opportunities, ensure that there are adequate toilet and locker room facilities, adequate lighting on the site, and suitable accommodation for construction workers from other areas, which further reduces risk for the Board of Management especially reputational risk.
- The majority of the process workers in the packhouse are expected to be women. Employment conditions for both women and men are expected to be compliant with Tongan law and international best practice as

¹³ *National Outcome C: a more inclusive, sustainable and empowering human development with gender equality.*

¹⁴ *Underlying Guideline ix: Cater for the specific needs of women, children, youth and disadvantaged groups.*

¹⁵ *Outcome 2: Equitable access to economic assets and employment; Outcome 5: Increased focus on addressing the additional vulnerability experienced by female-headed households; women with disabilities; and women in rural areas.*

¹⁶ *PHAMA Technical Report—Gender Analysis, Tonga*

¹⁷ <http://www.worldbank.org/mdgs/gender.html>

¹⁸ *www.forumsec.org Forty-Third Pacific Islands Forum, Rarotonga, Cook Islands 28 – 30 August 2012, Forum Communiqué.*

¹⁹ *PHAMA (November 2015) Gender Analysis - Tongatapu, Kingdom of Tonga*

defined in ILO conventions²⁰. The packhouse operator will be required to prepare a gender action plan, a gender risk management plan, and a gender disaggregated monitoring and evaluation framework.

- The proposed FFS approach to farmer training (see Section 4.4) should include minimum levels of female participation, or where considered appropriate, separate groups for men and women. Basic gender training should be incorporated in the FFS curricula for all groups. Regional research has found that gender training must go hand-in-hand with economic empowerment programming to enable change that advances women's security and wellbeing rather than aggravating family violence or adding to women's existing workload²¹. The new Tonga Skills TVET program is able to provide technical support in these areas.

Based on these recommendations Annex 3 identifies gender-related risks and risk management measures in three main areas: (i) tendering processes; (ii) construction management; and (iii) operational management.

4.10 Operational Issues

A number of ownership and operational models have been considered and debated in the four years since the decentralised packhouse concept emerged, finally settling on ownership by a PPP (49% government, 51% private) with operation undertaken by a commercial packhouse operator selected through a competitive bidding process. However, it has never been clear who the potential operators are or whether they would be interested in managing the facility. The business plan recognises the risk that it may prove difficult to engage a suitably qualified management company that is prepared to offer services to exporters at an affordable price. The Establishment Board has considered calling for expression of interest to get a better idea of the level of interest from potential operating partners and to address any concerns that they may have. This was also recommended in TR 109 but has not yet been implemented.

There are several options in the event of failure to attract satisfactory EOIs, or at a later stage proposals, for the management contract: (i) the project could be shelved or abandoned; (ii) the owner (the PPP company) could take responsibility for the operations; or (iii) MAFFF could take over management of the facility on a fee-for-service basis similar to the way it operates the Nuku'alofa wharf facility. The worst possible outcome would be to construct the packhouse and then find that the preferred operational model was unworkable, necessitating a fall-back to one of the three alternatives mentioned above.

4.11 Phased or Modular Approach

The business plan presented in Annex 2 of TR 109 envisaged the construction of a multi-purpose packhouse costing around TOP 1.6 million comprising TOP 1.2 million for the site and buildings and TOP 0.4 million for the equipment. It is expected that it would take 3-4 years to reach full single-shift capacity utilisation. A much less risky approach would be to undertake phased/modular construction of a single-purpose (root crop) processing facility with the first phase costing perhaps half of the earlier cost estimate, and with the remaining investments spread over a further one to two phases. Implementation of the second and subsequent phases would depend on reaching agreed levels of utilisation and profitability. The Architects have confirmed that the current design could also be down-scaled and simplified to achieve overall cost savings, which could be re-allocated to production stimulating measures discussed in Section 4.4. In addition, the newly identified site at Vaini has been donated by the owner, creating a further saving of TOP 50,000.

²⁰ *Equal Remuneration Convention (No 100), Discrimination (Employment and Occupation) Convention (No 111), Workers With Family Responsibilities Convention (No 156) and Maternity Protection Convention (No 183)*

²¹ *The Double Burden: The Impact of Economic Empowerment Initiatives on Women's Workload, December 2016, International Women's Development Agency and State, Society & Governance in Melanesia.*

4.12 Environment and Climate Resilience

The most recent report from Pacific-Australia Climate Change Science and Adaptation Planning Programme (PACCSAP) provides the following relevant future projections for Tonga (to 2100):

- Continuing increase in average temperatures and increasing frequency of very hot days.
- El Niño and La Niña events will continue to occur in the future (very high confidence), but there is little consensus on whether these events will change in intensity or frequency.
- It is not clear whether mean annual rainfall will increase or decrease and the model average indicates little change (low confidence in this model average), with more extreme rain events (high confidence).
- Drought frequency is projected to decrease slightly (low confidence).
- Sea level will continue to rise (very high confidence).

The design and construction of the packhouse and its ancillary facilities should be based on best-practice standards for minimising adverse environmental impacts and maximising resilience to climate variability and climate change. The major risks to be considered include damage to facilities, buildings, equipment and products; financial impacts from asset damage and degradation; reduced productivity; increased safety risk management; and supply chain interruptions. Disaster risks to consider include earthquakes, cyclones, hurricanes, tsunamis or storm surges and bushfires resulting from drought.

The design of the packhouse should address resilience in relation to architectural, structural, safety, mechanical, electrical, plumbing, security, communication and IT systems. Specifications should be provided on electrical systems, water and wastewater and fuel storage. Provision should be made in the design for fire extinguishers on the outside of the building, connected to a water supply, either underground or from water tanks.

The design should include a report by a technical expert/engineer on all known external threats and how mitigation measures will be incorporated in the design. The seismic hazard assessment should consider the lifetime of the infrastructure rather than being based on historical records. Standards should comply with international best practice even if that exceeds current regulations. External surfaces, such as roads and car parks should also be resilient to environmental and climatic challenges and minimise the use of tarmac surfaces, which are not well suited to tropical climates and have negative environmental impacts. There should also be provision for adequate drainage of these surfaces and the building exterior. The design should also consider the consequences of adding or removing shade. While tree shade can contribute to cooling of structures, birds may contaminate the operational areas.

Other considerations for climate change adaptation include insulation, air circulation, window areas, roof reinforcement, and protection from wind and floods. Consideration should also be given to the use of renewable energy, such as solar panels, to supplement power requirements. Procedures should be designed to ensure the efficient use of water for washing produce, harvesting rain water, and environmentally safe disposal of wastewater through appropriate treatment facilities. The design should also specify the use of energy efficient fittings and appliances.

Climate change is also creating increasing challenges for agricultural production mainly as a result of rising temperatures and increasing frequency of extreme climatic events. Consequently the farmer training should incorporate specific adaptation measures including: (i) the use of drought tolerant crop species and varieties; (ii) training on how to access and interpret short and long-term weather forecasting data; (iii) use of conservation agriculture techniques to reduce the vulnerability of crops to dry spells; (iv) water-efficient micro-irrigation during dry spells; and (v) integrated pest and disease management.

4.13 Development Impacts

Establishment of the packhouse would form part of Programme 4 of the TASP (Sustainable Growth and Foreign Exchange Earnings) which focuses on increased exports as well as import replacement, and recognises the fundamental importance of export marketing infrastructure in increasing income-generating and employment opportunities in rural areas.

Most of Tonga's export crops are grown by small-scale and semi-commercial farmers who are heavily reliant on income from these crops for their food security and livelihood. These also provide scope for increased engagement of women and youth in rural areas who otherwise have limited employment and self-employment opportunities. It is estimated that exporters using the packhouse would require about 110 contracted outgrowers each growing about one hectare of root crops, plus a number of semi-subsistence/semi-commercial growers supplying on an intermittent basis. The facility will also provide employment opportunities for up to 30 process workers, possibly more during busy periods when multiple shifts may be employed. The great majority of these workers are expected to be women.

The project will also contribute to the climate resilience of Tonga's rural livelihoods. The TASP incorporates a strong focus on sustainability and building resilience against climate change and natural disasters through two of its four strategic objectives (SOs): SO1 to develop a climate-resilient environment; and SO3 to develop diverse, climate-resilient farming systems. The TASP promotes the concept of branding Tongan produce as "low carbon and climate resilient". It also emphasises the importance of including climate change adaptation and disaster risk reduction into programmes and projects in the agricultural sector. The project is consistent with the climate resilience thrust of the TASP. Several of the major crops to be processed (cassava and yams) are inherently resilient to both drought and severe storm events. There is potential to further improve the resilience of these crops by wider adoption of improved varieties, irrigation and conservation farming systems.

Exporters who use the packhouse are likely to require over a hundred outgrowers, who would receive technical and management training through the FFS approach and a steady flow of income from sale of produce to the exporters. An unknown but possibly significant number of semi-commercial/semi-subsistence growers could also benefit from occasional sales to the exporters. Most growers also engage farm labourers on a casual basis during busy times such as planting and harvest. Crops are produced by the family business unit involving both male and female family members.

5. Conclusions and Recommendations

5.1 Strengths and Weaknesses

Tonga's root crop export industry is performing well in volume terms, but the majority of exports are in the informal sector or at the lower end of the formal sector where HACCP certification is required by law but not yet enforced. Tonga has HACCP certified facilities for export processing coconuts and cucurbits, and will soon have a HACCP certified root crop processing line in the Nishi packhouse. However even then, the total packhouse capacity (certified and un-certified) will only be adequate to process 30-40% of expected root crop exports by 2020. The remaining 60-70% will continue to be processed in unhygienic makeshift facilities which contravene Tonga's food safety laws

The proposal to establish a new decentralised packhouse facility has been under consideration for at least four years. The proposal as it currently stands has a number of strengths, but also some weaknesses and risks which need to be addressed before the project financier(s) can make a decision to proceed. The **strengths** of the proposal include:

- The demonstrable need for additional packhouse capacity to handle the growing volume of root crop exports and to transfer more of this from informal to formal channels which comply with Tongan law and importer requirements
- Lessons learned from other agro-processing investments which inform the design of the project and reduce the risk of repeating mistakes.
- The potential to invest some of the available resources in measures to increase raw material production, coordinate supply and demand, and improve climate resilience.
- The eagerness of the larger/well established exporters to utilise HACCP certified processing facilities to improve market penetration and prices.
- The potential to design the project in a way that ensures balanced and equitable participation of men and women.
- The potential to adopt a phased/modular approach to construction of the facility and to downsize and simplify the design – enabling some resources to be re-allocated to production stimulating and supply management measures.
- The expectation that the packhouse and its ancillary facilities will be designed and constructed according to best-practice standards for minimising adverse environmental impacts and maximising resilience to climate variability and climate change.
- The expectation of positive social and economic impacts through increased rural employment opportunities and increased export revenue.

The **weaknesses** of the proposal are as follows:

- Apparent reluctance of project stakeholders/beneficiaries to contribute to the cost of the investment, other than Government's offer to waive import duties and taxes. This raises serious doubts about ownership and commitment to the project.
- Uncertainties about exporters' willingness to pay full commercial rates for use of the packhouse including depreciation and sinking fund contributions.
- Continuing uncertainty about the availability and interest of a commercial partner to operate the facility on a contract basis.

5.2 Recommendations

The following recommendations need to be adopted before DFAT or other potential financiers are able to make a decision about whether to support the project:

Recommendation No 1: The design of the packhouse should be downsized and simplified to reduce its cost, and also constructed in a modular or phased manner, subject to achieving defined throughput levels at each stage. The recommended capacity is one 20-foot container equivalent of frozen root crops per two days (lower initially) or about 100 containers per annum. Further cost savings can be obtained by using the site at Vaini, which has been offered free of charge, rather than the originally proposed site at Alaki. The architects and quantity surveyors should be re-engaged to prepare a revised design and costing for the facility, working in close consultation with a group of 3-4 experienced root crop exporters to ensure that the design meets their requirements. A HACCP specialist should also contribute to the revised design.

Recommendation No 2: Following completion of a revised packhouse design and costing based on a downsized/simplified facility at the Vaini site, the business plan presented in Annex 4 of this report should be adjusted as required. The Establishment Board should then officially endorse and adopt the business plan, or some variation thereof.

Recommendation No 3: Broaden the scope of the project beyond the packhouse construction to incorporate measures to stimulate production of root crops through the establishment of outgrower schemes and farmer training using the FFS approach. This should go beyond simple agronomic training since Tongan farmers are already familiar with root crop production, and focus on supply coordination, marketing, quality assurance, good agricultural practices etc. FFS training for six farmer groups is expected to cost around TOP 70,000 per annum, with potential to expand the coverage beyond the direct suppliers of the packhouse. Minimum participation levels for women in FFSs should be mandated, including women's FFS groups if these are requested.

Recommendation No 4: The overarching purpose of building the packhouse is to boost Tonga's economy and international evidence demonstrates that better results will be achieved by taking a gender equality approach²². Doing so also supports the Government to meet its regional and international signed commitments, including to the ILO. Gender sensitisation and gender training should be provided for all communities and individuals engaged in the project. This may also be extended to incorporate training on nutrition. Training should be provided for men and women farmers working as outgrowers or suppliers to exporters (including those in FFSs), the exporters and their staff, management and workers in the packhouse itself, the governance bodies (Board and Committees), and the various packhouse shareholders. The combined equality approach will position the Board of Management well for compliance with future policy and legislative changes and will mitigate risks, especially reputational risk.

Recommendation No 5: The Establishment Board needs to explore ways of financing at least 10% of the cost of the investment (around TOP 80,000). This could include the value of the land provided by the landowner, any other contributions in kind, the value of taxes and duties waived by the Government, and direct financial contributions by Government and the three private sector shareholders.

Recommendation No 6: The exporters, through their industry association (GXN) should provide an assurance that they are prepared to pay full commercial rates for use of the packhouse, including provision for repairs, maintenance and replacement, currently estimated to be TOP 0.42/kg packed for frozen root crops. If such an assurance is not forthcoming MAFFF should indicate that it is prepared to subsidise the cost of operating the facility so that lower rates can be charged to the users.

Recommendation No 7: As recommended in TR 109, the Establishment Board should call for EOIs in the management contract at an early stage, before further work on design or construction. In the event of an unsatisfactory outcome, the Board would need to formulate alternative operating arrangements among the options identified here.

²² <http://www.worldbank.org/mdgs/gender.html>

Recommendation No 8: The Establishment Board should confirm that the facility will service exporters sourcing raw material from any part of Tongatapu and that it is not just to service the Eastern District growers and exporters. Accordingly, it should no longer be known as the EDPF. In addition, the Establishment Board should confirm that use of the facility will be subject to commercial arrangements between the operator and the exporters, and that the shareholders in the owning entity (GroFed, EDWC and GXN) will not receive any special priority in this regard.

Annex 1: List of Persons and Organisations Contacted

Person		Organisation	Position
Hon. Pohiva	Tu'i'onetoa	MCTL	Minister
		EDWC	Chair
Francis	Howes	Tonga Skills	Skills Supply Support Adviser
Soane	Tupou	Hihifo Food (exporter)	Managing Director
Pate	Tupou	Hihifo Food (exporter)	Advisor
Tiueti	Tupou	Hihifo Food (exporter)	Operations Manager
Walter	Holakeitua	Quality Design Ltd.	Architect
Pousima	Afeaki	Tinopai Farms (exporter)	Managing Director
		PHAMA	Chair of MAWG
Ana	Baker	DFAT	Senior Program Manager
Kathleen	Bombell	DFAT	Acting Deputy High Commissioner
Ma'ake	Faka'osifolau	Mark Shipping Line (exporter)	Managing Director
Joe	Fuavaou	PT&I, Auckland	Research Manager
Viliani	Kami (Dr)	MAFFF	Head of Quarantine
Saia	Lasike	SUL Farm (exporter)	Manager
Melesisi	Finefeuiaki	Lotopoha Export Trading	Manager
Maikolo	Manu	JM Export (exporter)	Manager
Viliani	Manu (Dr)	MAFFF	CEO
Tom	Nakao	TEQM	Chair
		Ha'amo Fresh (exporter)	Managing Director
Lesieli	Namoa	New Millennium Export (exporter)	Manager
Minoru	Nishi	Nish Trading (exporter)	Managing Director
Souane	Potolo	MORDI Tonga Trust	Manager
Meria	Russell	DFAT	Program Manager
To'imoana	Takataka	GroFed	President
		Lita Trading (exporter)	Managing Director
'Ofa	Tu'ikolovatu	GIO	Managing Director
Sinai	Tu'itahi	GroFed	CEO

Community Groups Consulted

Eastern District Workers Council
 Nukuleka Community (Eastern District)
 Fua'amotu Community (Eastern District)

Annex 2: Tonga’s Agricultural Exports 2007-2016

Figure 1: Monthly Exports of Cassava 2007-2016 (tonnes)

Cassava exports show a gradual uptrend from around 50 tonnes per month in 2007 to more than 100 tonnes per month in 2015. Exports in 2016 have soared to over 350 tonnes per month

All cassava is exported in frozen form

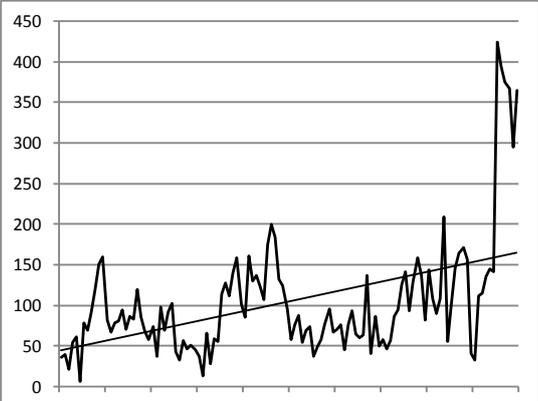


Figure 2: Annual Exports of Cassava 2007-2016 (tonnes)

Annual exports of cassava have increased threefold over the last decade, with a very large increase in 2016

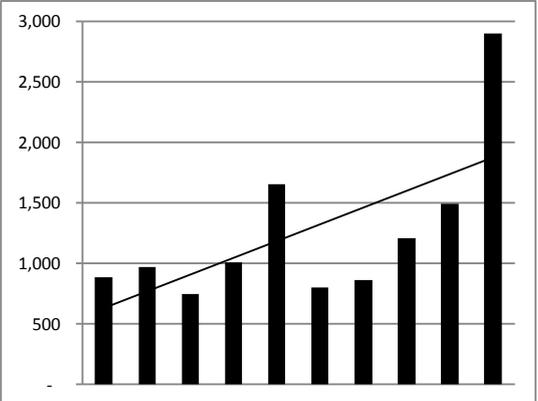


Figure 3: Average Monthly Exports of Cassava 2007-2016 (tonnes)

Cassava exports average about 70 tonnes per month during the first half of the year, increasing to over 100 tonnes per month during the second half, much more in 2016

This is mainly related to the seasonality of demand in New Zealand

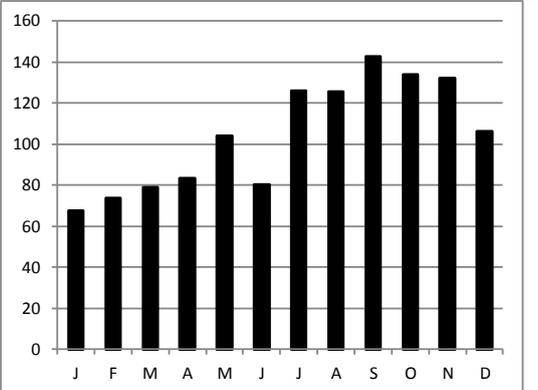


Figure 4: Monthly Exports of Giant Taro (Kape) 2007-2016 (tonnes)

Exports of giant taro fluctuate markedly within and between years. Volumes fell to almost zero in 2010 and again in 2015 due to the drought, but recovered in 2016

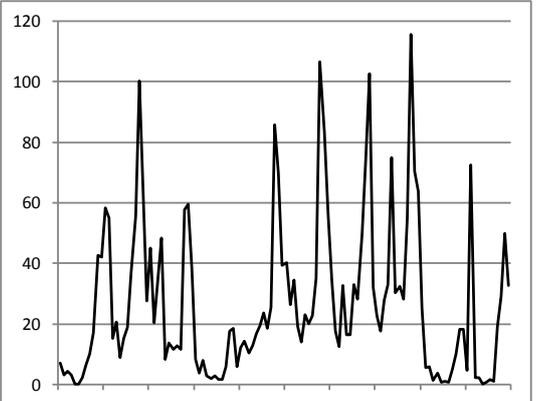


Figure 5: Average Monthly Exports of Giant Taro (Kape) 2007-2016 (tonnes)

There is usually a significant spike in giant taro exports during the October to December period

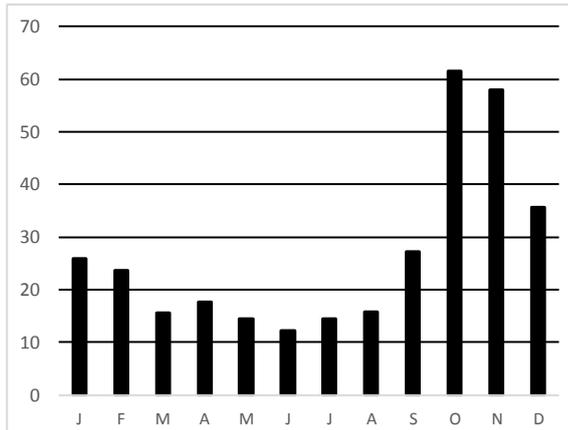


Figure 6: Monthly Exports of Swamp Taro (Taro Tonga) 2007-2016 (tonnes)

The long-term uptrend in Swamp Taro exports has been severely dented by the 2015 drought, and is yet to recover

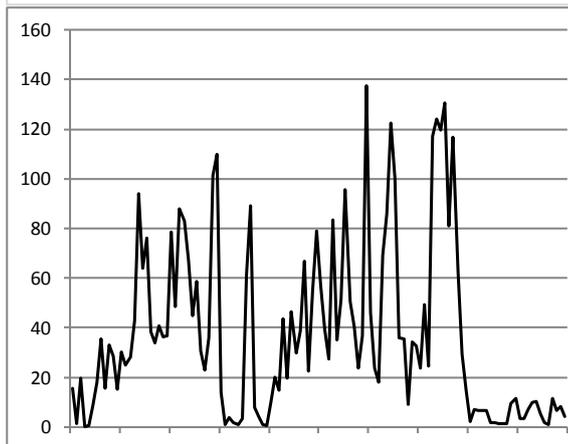


Figure 7: Average Monthly Exports of Swamp Taro (Taro Tonga) 2007-2016 (tonnes)

Exports of Swamp Taro are highest in June-July and December

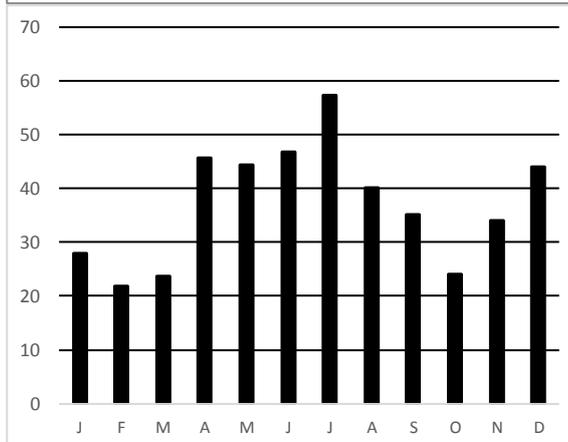


Figure 8: Monthly Exports of Taro Tarua (Taro Futuna-tea) 2007-2016 (tonnes)

Taro Tarua exports show an overall decline, exacerbated by the 2015 drought

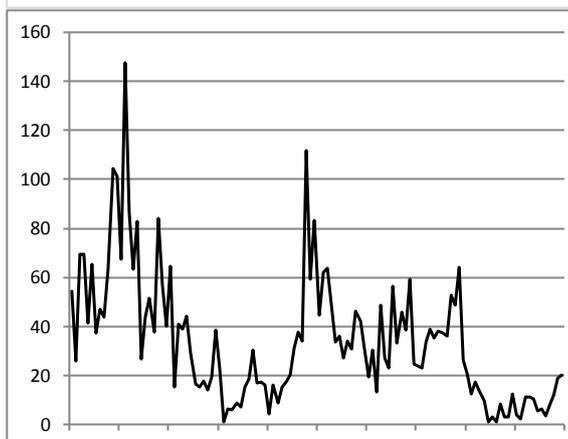


Figure 9: Average Monthly Exports of Taro Tarua (Taro Futuna-tea) 2007-2016 (tonnes)

Taro Tarua exports tend to be stronger in October-December and weakest in June-July-August

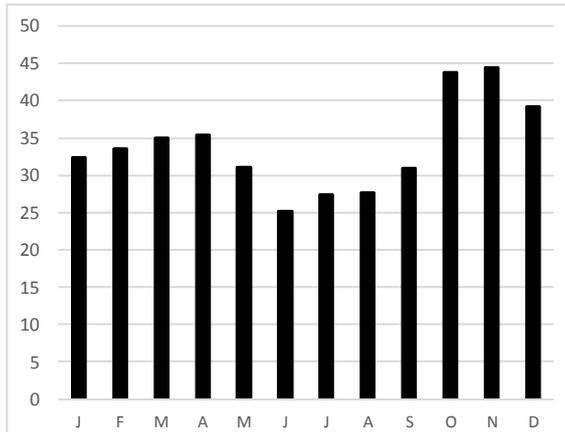


Figure 10: Monthly Exports of Yams 2007-2016 (tonnes)

Peak season exports of yams are generally between 100 and 200 tonnes per month, but exceeded 300 tonnes recently

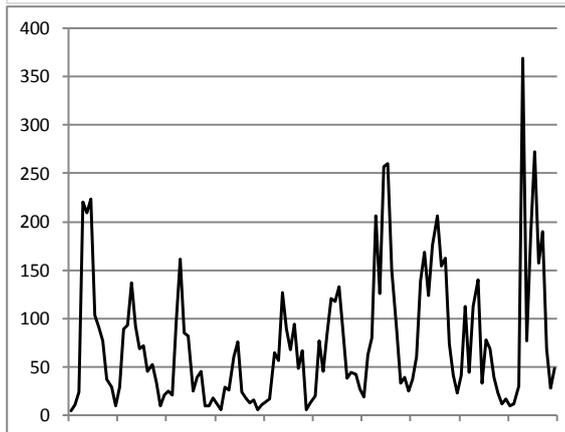


Figure 11: Average Monthly Exports of Yams 2007-2016 (tonnes)

Yam exports are strongly seasonal with the peak period being April-May-June

Exports fall to a trickle in November-December-January

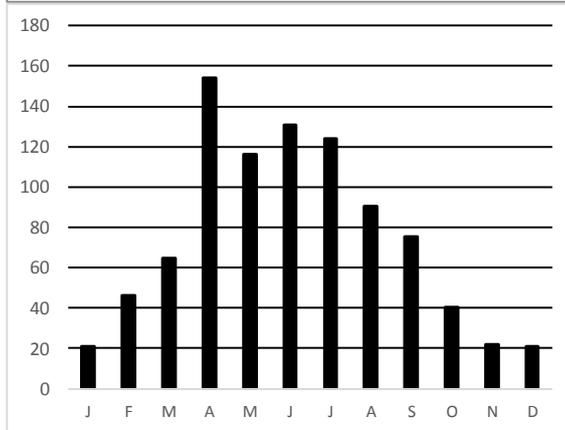


Figure 12: Monthly Exports of Japanese Taro 2007-2016 (tonnes)

There are occasional small shipments of Japanese Taro, but volumes are low compared to the other root crops

There have been no exports during the last three years

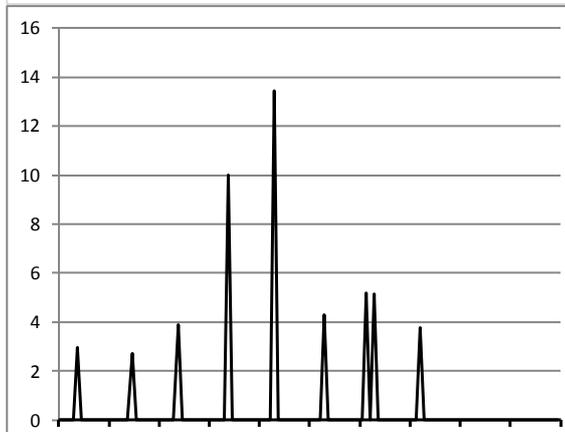


Figure 13: Monthly Exports of Sweet Potato (Kumala) 2007-2016 (tonnes)

Sweet potato exports commenced in 2011-12 but were badly affected by the drought in 2015

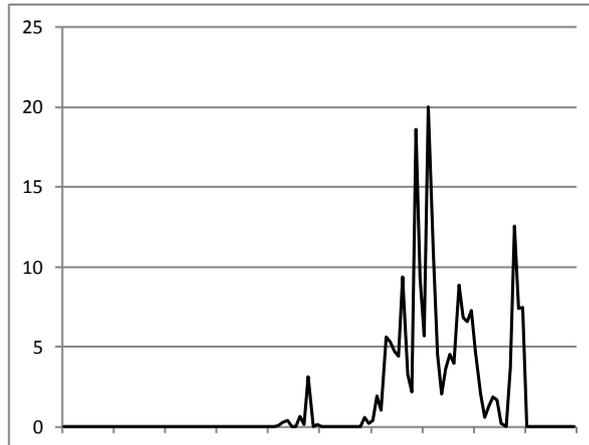


Figure 14: Monthly Exports of all Root Crops 2007-2016 (tonnes)

Total root crop exports are mostly in the 100-300 tonnes per month range, occasionally reaching around 500 tonnes

Exports reached a record 717 tonnes/month in July 2016

There is a strong uptrend of 6.5% per annum with wide fluctuations within and between years

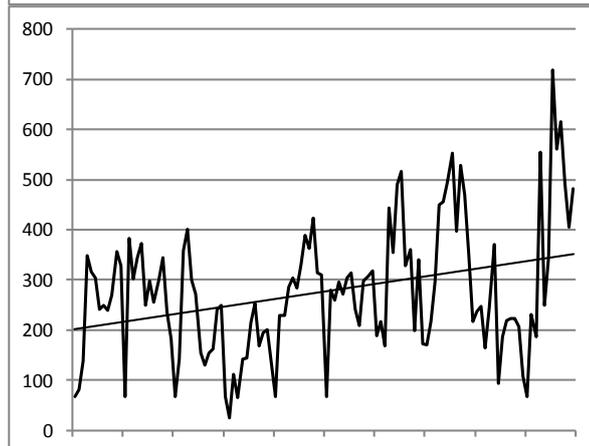


Figure 15: Annual Exports of all Root Crops 2007-2016 (tonnes)

Root crop exports have shown a steady decade-long uptrend with dry periods or droughts affecting volumes on two occasions, most recently in 2015

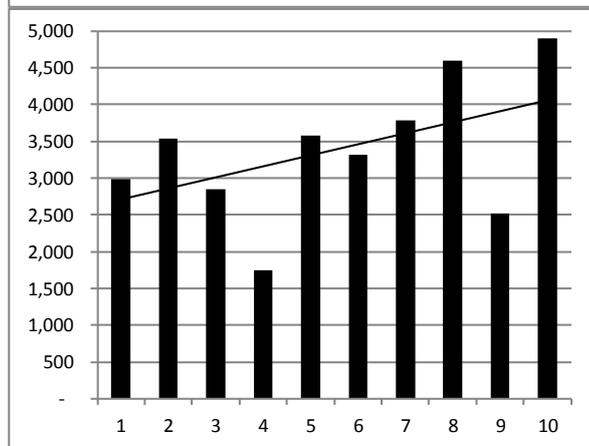


Figure 16: Average Monthly Exports of all Root Crops 2007-2016 (tonnes)

January-February-March is generally the low point for root crop exports, largely due to wet weather, but volumes are fairly stable over the remainder of the year

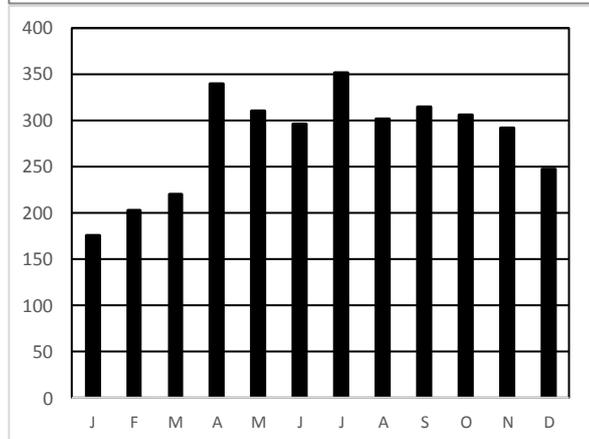


Figure 17: Monthly Exports of Squash 2007-2016 (tonnes)

Monthly exports of squash reached 2,500 tonnes in 2007, fell to less than 1,000 tonnes per month in 2009 and 2010 but have since recovered

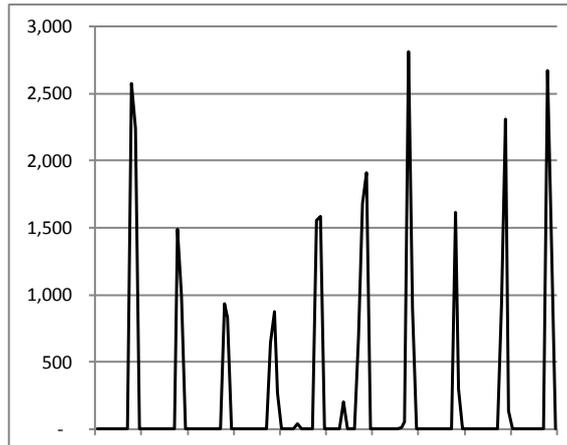


Figure 18: Annual Exports of Squash 2007-2016 (tonnes)

Squash exports over the last decade have fluctuated between around 1,700 and 4,800 tonnes with no discernible trend

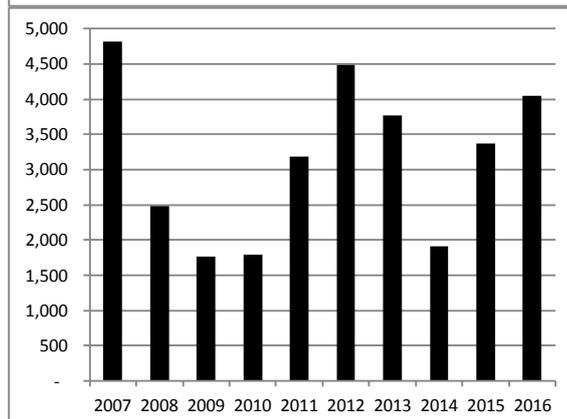


Figure 19: Average Monthly Exports of Squash 2007-2016 (tonnes)

The squash export season is concentrated in October and November

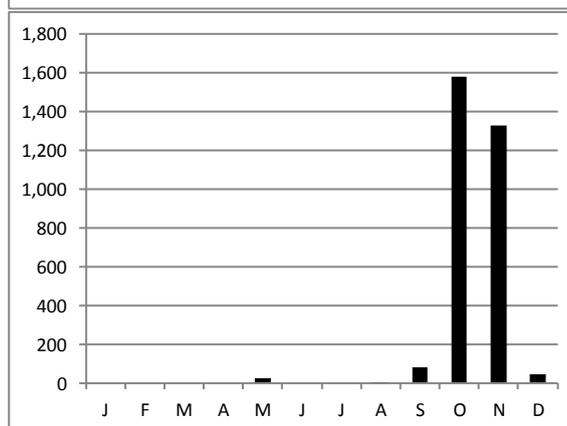


Figure 20: Monthly Exports of Watermelon 2007-2016 (tonnes)

Watermelons have become a significant export since the opening of the MAFFF fumigation facility has enabled access to the New Zealand market

Production was badly affected by drought in 2015 but recovered in 2016

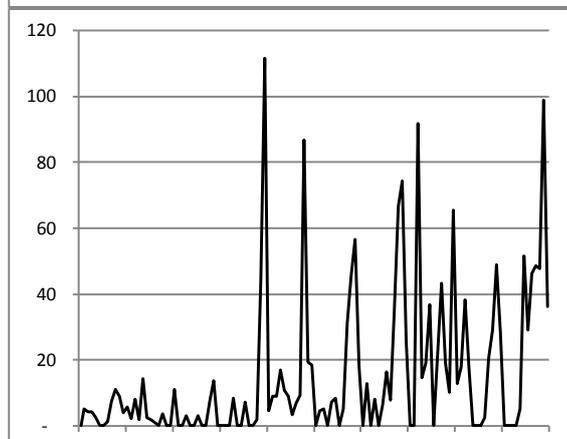


Figure 21: Annual Exports of Watermelon 2007-2016 (tonnes)

Watermelon exports have grown strongly from a low base over the last decade to reach a record 364 tonnes in 2016

There are strong export orders for the 2017 season which could see the 2016 record easily eclipsed

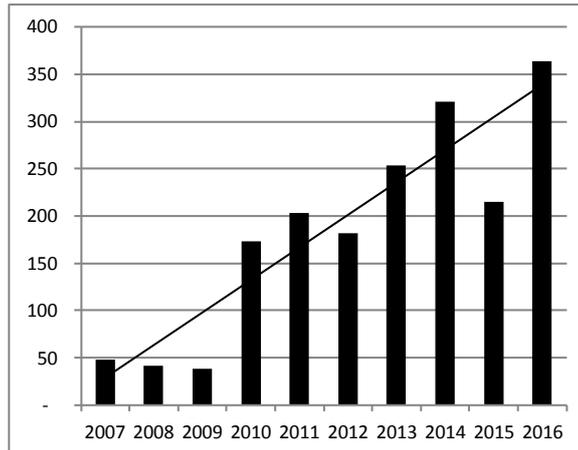


Figure 22: Average Monthly Exports of Watermelon 2007-2016 (tonnes)

The main watermelon export seasons is October to December during the New Zealand spring and early summer

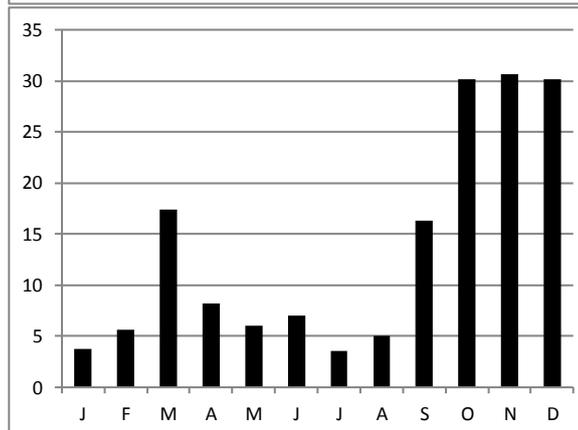


Figure 23: Monthly Exports of Coconuts 2007-2016 (tonnes)

Coconut exports have shown a steady uptrend from around 60 tonnes per month in 2007 to about 150 tonnes per month today

Most of these are fresh mature (brown) nuts

However, dry conditions have affected production in 2015 and 2016

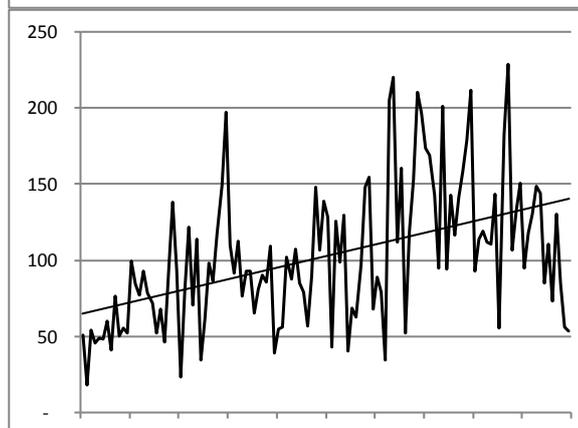
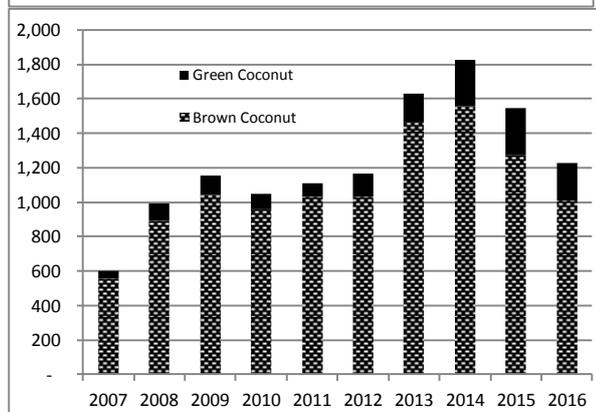


Figure 24: Average Monthly Exports of Coconuts 2007-2016 (tonnes)

Coconut exports are strongest during the last quarter of the year. Most green (drinking) nuts are exported during the New Zealand/Australia summer months



Annex 3: Gender Analysis

1. Overview

Empowering women to participate fully in economic life across all sectors and throughout all levels of economic activity is essential to build strong economies and propel business operations and goals. According to the World Bank, expanding opportunities for women accelerates economic growth, helping to mitigate the effects on current and future financial crises²³. Additionally, it will assist the Government of Tonga to achieve the Tonga Strategic Development Framework II²⁴, the Tonga Agricultural Sector Plan²⁵, the Revised National Policy on Gender and Development²⁶ and internationally agreed goals for development, sustainability and human rights.

In fulfilment of the Tongan Government's commitment to the Pacific Leaders Gender Equality Declaration²⁷, gender mainstreaming is gradually being rolled out across the public service so taking an equality approach now will position the Board of Management well, as a proposed public-private partnership. Additionally, Tonga is now a member of the ILO and is expected to update labour laws in line with ILO Conventions, many of which mandate equality.

Tonga has made good progress on some gender indicators, including education equality and improved maternal and child mortality. There are increasing numbers of women in senior positions in the public service and the private sector, though the average income of the female population lags behind the male population in both the formal and informal economy. Women with limited access to land, livelihoods, support networks or formal employment experience additional hardship. Female-headed households are 22% of all households and are amongst the most vulnerable²⁸.

Men and women influence each other's behaviour through gender roles assigned in childhood. In the Tongan context, the expected duties of males and females differ, with males being responsible for work that requires physical labour such as farming and females expected to do lighter work like household cleaning, washing and weaving. These gender stereotypes impact on what work women do in the economy. In relation to agriculture and horticulture, men do the dirty work of planting and harvesting while women clean and grade crops ready for crating. Choice is key, being able to make an informed decision based on the full range of options rather than having those options limited by stereotypical roles. For instance, squash growing is very lucrative but working in the packing shed only earns an hourly wage. Women are generally directed to packing shed work when, as squash growers, they could earn considerably more. Restrictions on choice due to gendered stereotypes impacts both political (decision-making) and economic empowerment. This lack of equality is undermining Tonga's economy²⁹.

The overarching purpose of building the packhouse is to boost Tonga's economy and, according to the World Bank, empowering women and girls makes economic sense³⁰.

Women's practical needs and women's strategic needs should be addressed by the project to ensure improved incomes, equality in decision-making and to achieve the best outcomes for all in the target communities.

Practical gender needs are the needs women identify in their socially accepted roles in society. They do not challenge the gender divisions of household labour or women's subordinate position in society. Practical

²³ <http://www.worldbank.org/mdgs/gender.html>

²⁴ *National Outcome C: a more inclusive, sustainable and empowering human development with gender equality.*

²⁵ *Underlying Guideline ix: Cater for the specific needs of women, children, youth and disadvantaged groups.*

²⁶ *Outcome 2: Equitable access to economic assets and employment; Outcome 5: Increased focus on addressing the additional vulnerability experienced by female-headed households; women with disabilities; and women in rural areas.*

²⁷ www.forumsec.org *Forty-Third Pacific Islands Forum, Rarotonga, Cook Islands 28 – 30 August 2012, Forum Communiqué.*

²⁸ *PHAMA Technical Report—Gender Analysis, Tonga*

²⁹ *Ibid*

³⁰ <http://www.worldbank.org/mdgs/gender.html>

gender needs are a response to immediate perceived necessity, identified within a specific context. They are practical in nature and often are concerned with inadequacies in living conditions such as water provision, health care, and employment³¹. These are needs of the whole family, not just women. Care is needed in any income-generating project to ensure that women's workloads remain manageable.

Strategic gender needs are the needs women identify because of their subordinate position to men in their society. They relate to gender divisions of labour, power and control, and may include such issues as legal rights, domestic violence, equal wages and women's control over their bodies. Meeting strategic gender needs helps women to achieve greater equality³².

Steps to mitigate family violence will also be required. Recent research has shown that increasing women's incomes can have both positive and negative impacts on levels of family violence, depending on a range of factors within the household³³. Four out of five Tongan women and girls have experienced some form of physical or sexual violence. The 2012 study that produced this finding stated that family violence is commonly linked to a web of attitudinal, structural and systemic inequalities that are gender-based because they are associated with women's subordinate position in society in relation to men's position³⁴. Victims of family violence could be women in public service positions, business women, and women working in packing sheds or selling goods at the market. Suggestions will be made for both the policy context and for training. More information on the situation for women in Tonga can be found in the PHAMA Technical Report—Gender Analysis, Tonga³⁵.

2. Consultations

Meetings were held individually with four women key informants: three exporters and the CEO of the Growers Federation (GroFed). Two other women exporters were unavailable during the timeframe.

Woman Exporters

One woman squash exporter currently hires a disused packing shed in Nuku'alofa on a property owned by MAFFF but is gearing up to build her own packing shed on leased land before the end of 2017. Another woman exporter who is in the early stages of building her business exports cassava and is planning to build her own packhouse on land in the centre of town. The third woman, an exporter of cassava and yams, has no immediate plans to build a packhouse. She currently uses the MAFFF wharf facility but is not happy with the booking system or with management of the facility. On two occasions, frozen crops ready for export have been ruined due to staff at the facility turning off the power supply to the freezer container. This exporter buys crops from growers in the eastern district, and other areas, and would be keen to use the proposed facility if the cost was reasonable. Further, she would prefer to use her own processing staff for quality control. Her preference would be to train her staff to HACCP certification standards, for which she would require assistance. HACCP certification is considered to be very important by all the women exporters as it would facilitate access to supermarkets in target countries and allow them to expand their businesses. None of these women are involved with GroFed and only one has recently joined the Grower Export Network (GXN). Both organisations could do more to engage women exporters in their networks; however, women exporters are achieving varying levels of success without the male-dominated grower and exporter networks.

Grower's Federation (GroFed)

The woman CEO of GroFed advised that the organisation has around 1,200 members of which roughly 200 are actively growing for exporters. Most of these are on Tongatapu and are therefore potential suppliers of exporters who may be interested in using the proposed packhouse. There are nine women members but none

³¹ Moser, Caroline O N, 1993. *Gender Planning and Development: Theory, Practice and Training*. London: Routledge.

³² Moser, Caroline O N, 1993. *Gender Planning and Development: Theory, Practice and Training*. London: Routledge.

³³ *The Relationship between Violence against Women and Women's Economic Empowerment in Bougainville, State, Society and Governance in Melanesia, ANU, In Brief 2016/17.*

³⁴ *National Study on Domestic Violence against Women in Tonga 2009, Ma'a Fafine Moe Famili, 2012.*

³⁵ <http://phama.com.au/resources/technical-reports/tonga-gender-analysis/>

are on the governance board or sub-committees. However, the CEO attends governance meetings in an ex-officio capacity. Project funding from MFAT has resulted in the nine women members growing papaya for export. Five women are growing on an acre of land each and a cooperative of four women is growing on another acre. GroFed provides field support and training.

Since GroFed will be a 17% shareholder in the packhouse it is expected that it would encourage its members to supply exporters who use the proposed facility. HACCP certification is considered by GroFed to be crucial to expanding export volumes to meet demand from importers and for opening up new markets in Asia. GroFed has one staff member trained in HACCP certification and in food safety.

Community Consultations

Community consultations were held in two eastern district villages: Nukuleka and Fua'amotu. The first was at the very eastern tip of Tongatapu and the second near the international airport. Eleven women attended the first consultation (12 men) but only one attended the second (11 men). Both consultations were held in the evening and were pre-arranged through the District Officer. The community consultations were moderately successful and some lessons were learned to guide future community consultation exercises – see Box 1.

Box 1: Community Consultations: Lessons Learned

Lessons were learnt for holding additional community consultations at a future time. As much notice as possible needs to be provided to the communities and days and times for meeting with women need to be arranged through women leaders to make sure they don't clash with other demands such as evening church services, mourning activities or child care responsibilities. Saturday afternoon meetings could be proposed as an alternative to weeknight evening meetings. The offer of simple refreshments may be an incentive to attend, such as biscuits and bottled water - items that do not require much preparation or clearing away.

While the result of the most successful consultation is just a small snapshot of women's potential as growers, it is none-the-less insightful. Most women were of mature age, estimated to be over 30 years with at least half over 50 years of age. All women were economically active but they advised they could barely meet the financial needs of the family. Two women had salaried work outside the house (public servants) and all women earned money from the sale of fish, animals (chickens, pigs) and handicrafts. As a coastal village, the sale of fish was a main income earner. All women earned money from the sale of fruit and vegetables and one woman was part of a family enterprise that grows yams under contract for export. All women grow fruit and vegetables for household consumption and all women accessed the bush garden to grow fruit and vegetables. All women earned money from the sale of handicrafts and one participant was the leader of a cooperative of eight women that mainly focused on handicraft production and sales. Handicraft sales were seen as quick money where cropping took a lot longer to see a return. One woman was the main income earner for the family. All women reported that household financial decisions were made by the wife and husband jointly.

Crops included cassava, yams, taro, kape, kumala, pumpkin, carrots, tomatoes, watermelon, papaya, chillies, cucumber, capsicum and banana. Only MAFFF extension officers had provided agricultural training in the village but there had not been any since 2013.

All women would like to increase the quantity of fruit and vegetables being grown for sale and all said that a lot of unproductive land was available. Constraints to increasing production were a lack of seeds, fertilisers, tools, machinery and training. The recent drought had been a constraint as women did not have access to a vehicle to take water to the bush land and plants died as a result. The unreliability of the HTFA unit had also been problematic. One example was a batch of 100kg of chillies prepared for export, which had to be sold on the local market because the HTFA broke down.

The poor condition of the road from the village to the bush land was another constraint. All women said they would make use of a packhouse if one was built to: prepare produce for export; get a job; and attend training if it was offered. There was little interest in using a packhouse to prepare produce specifically for the local market but that could change if a local formal market, e.g., supermarkets, was to be developed for frozen

crops such as cassava. Some women asked if the packhouse could be used to prepare handicrafts to send overseas or to process seafood. Processing seafood in an agricultural packhouse is likely to create food hygiene issues but preparing handicrafts for overseas customers may be possible if MAFFF is willing and able to have an inspection officer at the site on an appointed day per week or fortnight. The main constraint to using a packhouse was transportation. The women suggested providing the District Council with a truck to go around bush land, pick up crops harvested by women and take them to the packhouse for processing and export.

Commonly, exporters provide growers with planting materials, fertilisers and other inputs, then deduct the cost of these from payment to the grower when the crop is sold. Growers tend not to reserve some of the earnings to invest in the next crop so if planting materials and fertiliser are not forthcoming no planting is done. At a previous meeting with the Eastern District Working Council³⁶ (18 men), comments were made that no money is left once the exporter deducts costs and a loan repayment is made to the bank. In the case of this particular village, some of the women relied on MAFFF to provide free planting materials and inputs and when MAFFF stopped visiting the village some of the planting stopped, leaving land unproductive. The practice of relying on a benefactor for the basics needs to be turned around.

This is one of a number of training needs that became apparent from the discussion. A training programme should precede establishment of a packhouse. The program should include financial management, small business training or similar, as a prerequisite and then focus on farming skills, techniques for export crop production, nutrition, food security and marketing skills - the latter especially requested by male growers.

Another prerequisite is basic gender training for all villages engaging in growing for processing at the proposed packhouse, including training on eliminating family violence. Research in Solomon Islands found that training in examining gender roles, responsibilities, norms and expectations resulted in a noticeably different attitude towards gender roles in the community. A similar result was found in Timor Lestè. The research concluded that this kind of training must go hand-in-hand with economic empowerment programming to enable change that advances women's security and wellbeing rather than adding to women's existing workload³⁷.

This type of training approach is being taken by a TVET programme underway in Vanuatu, which is serving as a model for the new Tonga Skills program. The programme also provides practical supports to facilitate the participation of people with disabilities. Tonga Skills is an independent program and its principal counterpart agency is Tonga National Qualifications and Accreditation Board (TNQAB), under the Ministry of Education and Training (MET).

There is potential for target communities to have improved livelihoods through additional income, and improved health through training on food nutrition and the substitution of imported food with local staples. The proposed packhouse is likely to have positive impacts on the incomes of smallholders, including women growers, as long as preliminary training is provided, and probably planting material and equipment in the first year. These inputs will need to be budgeted based on the number of target communities. A range of supports could be brokered through MAFFF, the Tonga Skills program, MORDI (farmer field schools) or other civil society organisations running grower projects. Also, there may be a significant number of processing jobs available to women and men at the premises, though working for wages would not be as lucrative as growing crops for export.

If a decision is made to proceed with a facility, it is recommended that a suitable training establishment be contracted to design a training package for communities to be engaged in the supply of crops to exporters. These are potentially in any part of Tongatapu, since the packhouse is readily accessible from all parts of the island. However, they are most likely to be in the districts of Vaini (where the packhouse will be located), Tatakamotonga and Lapaha. There are a total of 4,594 households and 27,562 people in these three districts³⁸. However, given the relatively small scale of the proposed packhouse only a few hundred of these households are likely to become regular export growers.

³⁶ Formerly known as the Eastern District Growers Council (EDGC) or the Hahake Growers Council (HGC)

³⁷ *The Double Burden: The Impact of Economic Empowerment Initiatives on Women's Workload*, December 2016, International Women's Development Agency and State, Society & Governance in Melanesia.

³⁸ *Tonga 2011 Census of Population and Housing: Volume 1, Table G2*

The Establishment Board, with support from PHAMA, should play a role in coordinating the training work. The training should commence well before construction of the facility. It would have particular benefits for increasing the role of women as growers because the limited community consultations revealed that women have a strong desire to grow for export, and have time and access to land, but do not have a clear understanding of how to sustain a grower enterprise.

Beyond Production

Looking to the longer-term future, research³⁹ shows that women's economic empowerment in agriculture and horticulture can be progressed through training in value-added enterprises, such as the approach modelled by the Foundation for Rural Integrated Enterprises & Development (FRIEND) in Fiji and other similar organisations. These groups, often cooperatives, produce pickled fruit and vegetables for sale in supermarkets and to the tourist market. During the consultations, ideas and requests for similar uses of the facility came forward, such as jam making. Having options for preserving produce could also reduce the flooding of markets that takes place when large quantities of fruit or vegetables are not able to be exported for one reason or another, for example, the 100kg of chillies mentioned above.

Known sometimes as beyond-production, the approach can also result in higher status jobs for women, such as wholesalers or traders, and more decision-making power than women in production roles. Research is required to identify the best approach for women in the Tongan context.

3. Gender Strategy

3.1 Balanced Decision-Making

Practical gender needs can easily be met by a packing facility. Both women and men, including young women and men, will benefit from job opportunities, training, improved nutrition and access to equipment, ease of transportation and other related activities. However, gender equality and women's empowerment requires meeting strategic gender needs, such as equality of decision-making and opportunities. This is possible for the facility and is likely to result in better outcomes.

3.2 Ownership and Management

The ownership model under discussion is for the Government of Tonga to have a 49% share in the packhouse and for private sector stakeholders to have a 51% share. Private sector shareholders will be Growers Federation of Tonga (GroFed); Eastern District Working Council (EDWC) and the Grower Export Network (GXN), which will each acquire 17% of the facility. An Establishment Board exists and is made up of three representatives from the private sector (males) and two from government (females), all members of the PHAMA Market Access Working Group (MAWG). The Establishment Board will develop into a more formal governance body (Board of Management of one sort or another: company, incorporated association, etc.) if the project proceeds. This is a key entry point for gender equality but there are others.

The intention is to contract out management and operation of the facility. Further, the new building is required to be climate resilient so that existing climatic conditions and natural disasters do not pose a threat to the integrity of the building and so that future potential impacts are minimised.

3.3 Governance of the Packhouse

The role of the Establishment Board has been to oversee planning of the facility including the ownership arrangements, operating model, preliminary architectural design and business plan. When the owning body becomes a legal entity (company, registered association etc.) the Establishment Board will become the Management Board and will be responsible for selection and contracting a suitably qualified operator to

³⁹ For example, *Promoting Women's Economic Empowerment: Beyond-Production in Market Systems Programs, Leveraging Economic Opportunities (LEO) Brief* https://www.microlinks.org/sites/default/files/resource/files/LEO_SEEP_Brief_3_-_Beyond_Production_FINAL.logos-1_new_0.pdf

efficiently run the facility in a viable manner that will see replacement of infrastructure as needed in the future.

Once the Board takes a formal identity it should be written into the articles of association or constitution that representation will be a minimum of half women from both government and the private sector stakeholders to ensure that Board decisions neither actively nor passively impact negatively on women. To be truly representative the new Board should have 10 members so that each of the four shareholders can have both a male and female representative, and two of each from government. Otherwise, females involved in the stakeholder groups may not have a voice in decision-making. If that number is believed to be too large, other combinations are possible but if it stays at five members, as it is now, at least one of the private sector representatives and at least one of the government representatives should be a woman.

Government has senior men and women in relevant positions to fulfil the requirement. GXN will need to boost the membership of women exporters. GroFed has a membership of around 1,200 of whom only nine are women. A commitment is required to increase the membership of women farmers and deliver GroFed's mandate to these farmers. GroFed will also need to boost the number of women on its Council. The GroFed woman representative must have voting rights within the organisation and not be in an ex-officio position (unless GroFed's constitution allows for voting delegation to staff).

EDWC considers that every man, woman and child in the eastern district is a member of the organisation, but this is not evident in the Council's governance or decision-making, which is entirely male. The Council needs to be open to women and young people having a say in decision-making. EDWC will need to encourage the formation of a women's group from within its constituency (this doesn't have to be a registered group, e.g., church women's groups). The women's group should then nominate its representative to the Board and the representative should report back to the women's group, just as all the other Board members should be nominated by their constituencies and report back and take instruction from their constituencies. Support to facilitate this approach can be factored into the project, e.g., governance training.

3.4 Governing the Contractual Process

There will be at least one contract for the construction of the packhouse, and one for its operation. In both cases a two-step tendering process is to be undertaken: an invitation for Expressions of Interest (EOI) to pre-qualify bidders, and a Request for Proposal (RFP) from those who have the necessary capacity and qualifications. One bidder will then be contracted for building the facility, and one bidder contracted to manage the operation. To ensure transparency, the Management Board should advertise the call for EOIs widely and through women's networks.

As part of the due diligence, the Board should ensure that the tendering process, the construction and the management are non-discriminatory and take into account, gender equality, child rights and climate resilience in construction. This will require the Board to work closely with the contractors and to take necessary actions if contractual obligations are not being met. The contracts will need to have consequences clearly articulated. These could be fines, withholding of funds until obligations have been met or cancellation of the contract for repeat or serious breaches.

3.5 Tendering Processes

All tender documents should use inclusive and gender-neutral language that implies that there are no barriers to women-owned or managed businesses applying. It is not necessary to have a target for submissions from females and males, just an assurance that tenders will be judged by evidence of meeting the criteria and not based on male or female ownership or management, that is, that there will not be any discrimination. This is not a situation where affirmative action would be appropriate. The winning tenders must be the bidders that are the best fit to the criteria. It would be acceptable to include a statement in the call for EOIs encouraging women-owned or managed businesses to apply.

Tender evaluation panels should be balanced between suitable males and females to convey non-discrimination in the decision-making process. The MAWG has female representation, some of whom might be suitable. Also, there are women CEOs of relevant Ministries who could be suitable, or representatives of the

Women in Sustainable Enterprises (WISE) network or women exporters. When selecting the panel, conflicts of interest, whether real or perceived, should be avoided.

All tender documents should include a Gender Action Plan (GAP) and gender indicators and outcomes in the M&E framework. The construction and management contracts should also specify the penalties for non-compliance with gender equality requirements or contractual obligations in any area, which could range from fines to cancellation of the contract for repeated offences.

Proposals for construction should identify the specific requirements for female use of the building, separate to general use. These are discussed below and include adequate facilities and safety, especially after hours. The RFP should also outline information on employment practices within the organisation and only those bidders with exemplary practices in place should be considered. Bidders should express willingness to provide equal employment opportunities in recruitment for the construction, such as, site managers and construction workers or other labour.

Proposals for construction should also require an engineer’s report on addressing best practice in climate resilient construction, and consideration of land use planning, legislation and regulations, building codes, hazard management, disaster response and recovery if an event occurs during the construction process, business continuity strategy and compliance enforcement.

Proposals for operational management should outline information on how gender equality will be addressed. These matters are also discussed below and include a supportive policy environment and willingness to employ females and males in non-stereotypical roles. There should also be a plan for disaster response and recovery and a business continuity strategy.

Sample Risk Management of Gender in Tender Processes

Risks that are high impact need to be managed closely and even more so if the likelihood is high.

Risk	Likelihood	Impact	Management
Women do not submit EOIs	High	High	Use gender-neutral language; include a statement encouraging women to apply; advertise the EOI processes publicly and through women’s networks; seek out women-owned or managed organisations
EOIs from women are not assessed equally	Medium	High	Gender balance on the selection panel; agreement with panellists to judge EOIs fairly; conflicts of interest avoided (favouritism)
Successful bidders will not comply with gender equality requirements	Medium	High	Proposals to include a GAP and sex-disaggregated M&E framework; penalties in the contract for failure to perform

Sample Gender Indicators for Tender Processes

- Evidence of the type of actions taken to encourage women to express interest or submit proposals
- Number of female-owned and male-owned businesses expressing interest
- Number of female-owned and male-owned businesses submitting proposals
- Evidence that tender documents and contracts require the recruitment of women
- Evidence that the tender document and contract for construction requires that climate resilience and gender issues in building use and access are met
- Evidence of consequences for contractors failing to meet contractual obligations

Qualitative information should also be collected through individual or focus group discussions with construction staff.

3.6 Building Design and Construction

Gender in Building Design and Access

Females will be accessing the building for a range of reasons. Some may be office staff or processing staff and some may be exporters or growers. Commonly, it is mostly females who are employed as washers and graders in packhouses. This is partially due to societal stereotypes but mostly because females generally perform better than males with these types of tasks. During harvest time there could be 20 or more females working in the packhouse. Safety and adequate facilities are two main construction concerns.

Toilet facilities for females need to be adequate for the number of females that may be in the facility at any one time. This includes cubicles and handwashing areas. A standard used by some packhouses is one for every 15 staff. A HACCP certification requirement is for toilets to not open directly into processing areas, which may mean entrances on the outside of the building. The path from the packhouse to the amenities will need to be covered for protection from the elements. Female toilets should be positioned so that they are safe and accessible without fear of harassment or embarrassment. Lighting needs to be adequate to ensure that females feel comfortable using the toilets in poor daylight or in the evening when working late or on night shift, or accessing the building after hours during the busy harvest seasons. If the building is multi-story, there should be multiple toilet facilities.

If lockers are provided for personal effects, female lockers should be separate from male lockers so that females do not feel compromised when using a locker or do not risk being gossiped about. If staff uniforms are provided, the female changing area must be separate to the male changing area and be well lit.

Adequate lighting on the exterior of the building is crucial for access after dark so that females feel safe arriving or departing. Lighting should be shatter-proof or enclosed in wire. Suitable and well-lit parking areas and waiting areas will also be required if the facility is to function for extended hours. Night time waiting areas should be near the entrance to the building and not near the road so that if a safety issue arises staff have quick access to help.

Consideration should also be given to employees, growers or exporters with disabilities. Since the facility is a new build, accessibility could be designed in at minimum cost. This should extend to toilet facilities.

Construction Workers

Every attempt should be made to employ females across the construction workforce, to promote females and to train females in non-stereotypical roles. The new Tonga Skills TVET program may be able to assist here as there is an intention to broker training for females and males in non-traditional occupations. As with the final construction, safe accessible amenities will need to be available on the construction site for both females and males. Portable toilets appear to be widely available in Nuku'alofa so having female toilets separate to male toilets should be manageable.

The policy environment needs to be supportive too and meet International Labour Organisations (ILO) standards discussed in the next section. In particular, there should be policies to prevent discrimination of any kind including workplace violence. Policies need to be enforced, with consequences for breaches, such as warnings or dismissal for serious offences.

Often construction workers in-migrate from remote villages for the length of the construction. This dislocation is known to contribute to sexual and gender-based violence (SGBV) in the host communities. The construction company must have a procedure for preventing SGBV and must strictly enforce it. Addressing SGBV should also form part of the proposals risk management.

The successful construction organisation should articulate an intention to meet regularly with communities closest to the construction site and to deal with any grievances that may arise.

Sample Risk Management for Construction

Risks that are high impact need to managed closely.

Risk	Likelihood	Impact	Management
The building will not be climate resilient	Low	High	Proposals must include information on how climate resilience will be addressed; climate resilience is a contractual obligation and there will be serious penalties or withholding of payments for failure to meet contractual obligations
The building will not be energy or resource efficient	Low	High	Proposals must include information on how the building will use energy and other resources efficiently
Gender-related design considerations will not be implemented	Low	High	Gender-related design considerations will be a contractual obligation and there will be penalties for failure to meet these obligations
Females in the construction workforce will be discriminated against	Medium	High	The construction organisation will be obliged to meet ILO gender standards and have an appropriate policy environment in place; construction staff will be trained appropriately
People with disabilities will not be able to make use of the facility	Low	Medium	Accessibility will be a feature of building design
Increase in SGBV as a result of construction	Medium	High	The contracted company will have a procedure for preventing SGBV, including serious consequences, which will be explained to all staff and monitored for compliance; construction company will meet regularly with local communities to monitor for grievances

Sample Gender Indicators for Construction

- Evidence of separate, private, and safe toilets and washing areas for women at construction and other work sites
- Evidence of safe external areas for access after dark
- Evidence of separate lockers and changing rooms if appropriate
- Evidence of compliance with ILO gender standards
- Number and types of gender equality policies
- Number and types of gender training provided to staff disaggregated by sex
- Evidence that contracts and tender documents for subcontractors provide for recruitment of women as unskilled labour
- Number and percentage of jobs (person-days) generated by the project for women and men
- Number and percentage of women and men employed, by type of job and pay rates; and proportion of women employed in unskilled, technical, management, and supervisory roles
- Percentage change in women's employment in professional, technical, supervisory, and management positions
- Number of women employed in non-stereotypical work
- Evidence of the type of incentives designed to recruit women, increase their capacity, and provide career development
- Changes in opportunities for employment and income generation for women and men (long-term)
- Number and types of SGBV reports in surrounding communities against a pre-construction baseline
- Number of community meetings to discuss progress with construction and hear any grievances, community members disaggregated by location, sex and age grouping

Qualitative information should also be collected through individual or focus group discussions with construction staff and surrounding communities.

3.7 Operational Management

In February 2016, Tonga became the 187th member State of the International Labour Organisation (ILO) and has accepted its obligation to the Constitution of the ILO. This obligation will gradually be enshrined in local law so management of the new facility would benefit by having appropriate employment conditions in place from the beginning.

The four key ILO gender equality Conventions are the Equal Remuneration Convention (No. 100), Discrimination (Employment and Occupation) Convention (No. 111), Workers with Family Responsibilities Convention (No. 156) and Maternity Protection Convention (No. 183). The Government of Tonga is in the process of revising the Employment Relations Bill and one outcome will be the extension of paid maternity leave to the private sector. Proposals for facility management should demonstrate how they will take these obligations into account.

The successful managing organisation should demonstrate willingness to apply best practices in gender equality, beyond existing legislation. Issues to consider are policies on violence against women and children, workplace sexual harassment policy, workplace health and safety policy and child protection policy.

If children are to be employed as part-time labour - which can be common in agriculture-producing families - there should also be a policy on the employment of children under the minimum school leaving age. The policy should state the minimum age of eligibility, how age is to be proven, the maximum number of hours per week a child can work, the earliest starting time and latest finishing time for a child, prohibiting employment during school hours, and provisions for school holiday work that allows the child to have a break from work as well as from school. There should also be restrictions on the types of work children do.

Policies should include enforcement mechanisms and consequences for breaching a policy, such as a well-articulated disciplinary procedure. Such a procedure can form part of an operations manual and should be wider than just for breaches of policies. The Establishment Board should include obligations for policies to be adhered to in the contract, should monitor adherence and should have mechanisms in place for failure to adhere to contractual obligations, such as fines or cancellation of the contract for serious or repeat breaches.

An intention to employ females in positions of responsibility should be evident in proposal information, e.g., supervisors or managers, and to promote females into positions of responsibility. There should also be an intention to make non-stereotypical roles available to females and to provide training, e.g., forklift driving. Family-friendly workplaces, security of employment contracting and the right to join a union should also be outlined. A safe mechanism for women to bring grievances to the attention of management is also required, along with a process for how grievances will be resolved.

Any decision-making bodies, e.g., senior management team, should be made up of equal numbers of females and males who have an equal voice in decision-making.

Evidence is required that a procedure will be in place to ensure that women growers and exporters have equal priority of access to the facility, regardless of smaller volumes of crops.

In relation to management of the facility, it will be the responsibility of the contracted organisation to prepare a Gender Action Plan (GAP), gender risk management and a monitoring and evaluation framework, including baseline indicators for gender equality, gaps and opportunities, disaggregation of data and gender equality outcomes. Disaggregated information should be collected on employees, growers and exporters. The Establishment Board, as the contracting body, will be responsible for ensuring that these are implemented on an ongoing basis.

Sample Risk Management for Operational Management

Risks that are high impact need to be managed closely.

Risk	Likelihood	Impact	Management
Gender equality employment measures will not be implemented	Medium	High	Implementation of gender equality measures is a contractual obligation and the managing organisation will be penalised for breaches of the contract
Child rights measures will not be implemented	Low	High	Child rights measures are a contractual obligation and the managing organisation will be penalised for breaches of the contract
Decision-making bodies will not be gender balanced	Medium	High	Gender equality measures are a contractual obligation and the managing organisation will be penalised for breaches of the contract
Women growers and exporters stop using the facility due to discrimination	Medium	High	Complaints from women exporters and growers will be dealt with by the Establishment Board, which will caution the managing organisation or take stronger measures if required

Sample Gender Indicators for Operational Management

- Evidence of compliance with ILO gender standards
- Evidence of gender equality policies and procedures, including consequences
- Evidence of child protection policies and procedures, including consequences
- Number and percentage of jobs (person-days) generated by the packhouse for women and men
- Number and percentage of women and men employed, by type of job and pay rates
- Proportion of women employed in unskilled, technical, management, and supervisory roles
- Evidence of the type of incentives designed to recruit women, increase their capacity and provide career development
- Number of women and men in non-stereotypical work by type of work
- Number and types of gender equality training, attendance disaggregated by sex
- Number and types of child rights training, attendance disaggregated by sex
- Number of growers and exporters accessing the facility by type of produce, volume and disaggregated by sex
- Changes in incomes of women and men employed by the packhouse
- Changes in women's status in agricultural communities (long-term)
- Changes in numbers of women growing for export and numbers of women exporters (long-term)

Qualitative information should also be collected through individual or focus group discussions with packhouse staff, exporters and growers.