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Technical and Economic Feasibility of Selected Fresh Produce Export Pathways in Papua New Guinea

Technical Report # 098

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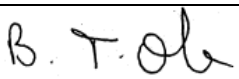
	18-Nov-2016	Editing and formatting	Trevor Ole / Project Director	
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Acronyms

Abbreviation	Description
ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
AUD	Australian Dollar
BICON	Biosecurity Import Conditions System
BQA	Bilateral Quarantine Agreement
DAL	Department of Agriculture and Livestock
DAWR	Department of Agriculture and Water Resources (Australia)
DFAT	Department of Foreign Affairs and Trade (Australia)
DOH	Department of Health
EPA	Economic Partnership Agreement
FER	Functional and Expenditure Review
FPDA	Fresh Produce Development Agency
HACCP	Hazard Analysis Critical Control Point
HTFA	High Temperature Forced Air
IEPA	Interim Economic Partnership Agreement (with the EU)
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IPA	Investment Promotion Authority
IPPC	International Plant Protection Convention
LLG	Local level Government
MAWG	Market Access Working Group
MB	methyl bromide
MCPNG	Manufacturers Council of PNG
MDP	Market Development Project
MFAT	Ministry of Foreign Affairs and Trade (New Zealand)
MPI	Ministry of Primary Industries (New Zealand)
MSG	Melanesian Spearhead Group
MSGTA2	Melanesian Spearhead Group Trade Agreement 2
NADP	National Agriculture Development Plan
NAQIA	Ministry of Primary Industries (New Zealand)
NARI	National Agricultural Research Institute
NCS	National Catering Services
NPPO	National Plant Protection Organisation
NSSL	Niugini Strategic Services Ltd
OIE	World Organisation for Animal Health

Abbreviation	Description
PACER	Pacific Agreement on Closer Economic Relations
PARDI	Pacific Agribusiness Research for Development Initiative
PGK	Papua New Guinea Kina
PHAMA	Pacific Horticultural and Agricultural Market Access
PICs	Pacific Island Countries
PICTA	Pacific Island Countries Trade Agreement
POM	Port Moresby
PMV	Public Motor Vehicle
PNGWIA	PNG Women in Agriculture
PNGWIB	PNG Women in Business
PPAP	Productive Partnerships in Agriculture Project
R&D	Research and Development
SME	Small and Medium-sized Enterprise
SMS	Short Message Service
SPC	Secretariat of the Pacific Community
SPS	Sanitary and Phytosanitary

EXCHANGE RATES:

(February 2016)

PNG Kina (PGK) 1.00 = Australian Dollars (AUD) 0.47

AUD 1.00 = PGK 2.12

Executive Summary

Background and Rationale: Papua New Guinea (PNG) has a large and highly diversified agricultural sector producing food for domestic consumption and cash crops (palm oil, coffee, cocoa, copra, coconut oil, tea and rubber) for export. Fresh fruit and vegetables are produced mainly for subsistence and the domestic market, with very limited exports. However, there is interest from government and the private sector to explore the potential for fresh produce exports.

Eastern Australia and New Zealand are large food markets with a high degree of culinary diversity and high domestic food prices. Several other Pacific Island Countries (PIC) have been successful in developing exports of fresh produce to these markets, generally for niche products which target seasonal supply windows and tropical products favoured by Pacific Island and Asian communities. However, these markets are difficult to penetrate and need to be very carefully assessed in selecting priority commodities. A further reason for caution is the current status of the fresh produce marketing systems in PNG. Marketing pathways are poorly developed and expensive, so that domestic fresh produce struggles to compete with imports. There are no established export pathways, and no exporters experienced in this business.

Noting the success of other PICs in developing fresh produce exports, the Pacific Horticultural and Agricultural Market Access (PHAMA) Program undertook a feasibility study to identify products that may have potential for export trade to Australia, New Zealand and the Melanesian Spearhead Group (MSG) countries. The study aims to provide clear direction on market access, examining the logistic, economic and technical viability of various export pathways.

Methodology: The first task was to compile a long list (almost 100) of potential export commodities. This was subsequently reduced to 26. A review of previous studies on fresh produce marketing was undertaken as well as field visits and consultations with relevant stakeholders and a review of the policy and institutional context. This was followed by analysis and report preparation consisting of:

- analysis of **supply** issues including current levels of production and marketing channels, to consider PNG's capacity to supply the target markets on a competitive basis;
- analysis of **demand** issues based on market information for selected products from Brisbane, the most easily accessible export market;
- analysis of **biosecurity** issues to identify market access constraints and opportunities; and
- **value chain analysis** to estimate the financial returns likely to be available to exporters.

Export Marketing Opportunities: The Australian market for horticultural products is by far the largest in the region with more than 23 million relatively affluent consumers. Australia has a high degree of ethnic and culinary diversity which creates niche markets for a number of speciality foods which may not be of particular interest to mainstream consumers. Moreover, Australian food prices have become very expensive in recent years relative to other developed countries. The most accessible market entry point is via the wholesale markets in each capital city. New Zealand is also a large potential market for which imports are important for some product categories such as tropical fruits and root crops and temperate products during the cooler months.

Export Marketing Constraints: Numerous studies have highlighted the constraints which affect domestic and export marketing pathways alike. These include: weak transport and storage infrastructure and high transport costs; lack of access to affordable finance; law and order issues in rural areas; the subsistence orientation of production; unrealistic price expectations by growers; overcrowded local markets; limited trust among value chain actors; and lack of timely market information. Specific limitations to fresh produce exports include: PNG's unfavourable fruit fly status; market access barriers in Australia and New Zealand; high cost levels generally; lack of export readiness among traders; high prices in Port Moresby which act as a magnet for fresh produce supplies from all over the country; and the uptrend in the value of the Kina. The institutional and regulatory framework also has limitations in its export facilitation capacity. Although Australia is a potentially large market it is difficult to access due to high levels of quarantine protection; a high degree of agro-ecological diversity; high quarantine inspection and clearance fees; increasing concerns about food safety and "ethical sourcing" and consumer aversion to imported food products.

Asian markets are more accessible but very competitive. Opportunities for intra-MSG trade are limited by market size, uncertain biosecurity arrangements and unfavourable transport linkages.

Conclusions: Analysis of domestic and international prices in potential export marketing pathways identified four medium/high priority commodities: asparagus, sweet potato, chillies and coconuts; and five of medium/low priority: ginger, Tahitian limes, French beans, snake beans and okra. These priorities need to be considered relative to domestic marketing opportunities which are easier and much more attractive in most cases, and include a number of import substitutes.

It is concluded that the opportunities for profitable fresh produce export in PNG are few and far between, and that investment in the development of domestic marketing systems should be given higher priority. Only one of the four medium/high priority commodities, coconuts, currently has access to the Australian market and is in abundant local supply. Asparagus also has access but is not produced in commercial quantities. Major investments would be required to develop export marketing pathways for all but coconuts.

Based on these conclusions it is questionable whether PNG should invest significant resources in the development of fresh produce export marketing pathways, given the likelihood that, in the immediate future, better returns would be forthcoming from the development of the domestic market. Once the current deficiencies and bottlenecks in the domestic value chains have been remedied there would be a much stronger platform from which to launch an export initiative.

Recommendations: The recommendations address two key questions:

- What is required to advance from the current status where the prospects are rather limited towards a situation where PNG is ready to launch a meaningful fresh produce export initiative?
- How can PHAMA support this transitional process during the short time remaining until completion of the current Phase in June 2017?

Recommendation No 1: Develop detailed strategies and timelines for the export of the medium to high priority commodities for export to Australia as follows:

- Coconuts and asparagus – provide assistance for trial shipments under existing Australian import conditions.
- Sweet potato and chillies – provide assistance to seek new market access to Australia.

Recommendation No 2: Support the development of the National Agricultural Quarantine Inspection Authority's (NAQIA) capacity through training in export facilitation and the development or streamlining of relevant procedures and protocols using recommended commodities.

Recommendation No 3: Partner with and provide technical support to existing and potential programs to develop PNG's domestic fresh produce marketing pathways on the grounds that streamlining these pathways will contribute greatly to PNG's export readiness, as well as its import substitution capacity.

Recommendation No 4: Identify appropriate research and development (R&D) to address supply issues for medium to high priority commodities under Recommendation 1. The R&D may include varietal screening and evaluation, development of grading and packaging formats, post-harvest management, food safety protocols and other measures to advance export readiness.

1.0 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 (PIC) 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 manage issues associated with maintaining and improving existing trade. Australia 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 funding provided to the Secretariat of the Pacific Community's (SPC) Land Resources Division. The PHAMA head 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 Rationale

PNG has a large and highly diversified agricultural sector producing food crops for domestic consumption and cash crops for export. Exports from the sector are dominated by internationally traded commodities such as palm oil, coffee, cocoa, copra, coconut oil, tea and rubber. Timber and marine products are also major exports but are not considered in the current study. Fresh fruit and vegetables are produced mainly for subsistence consumption and the domestic market. The diversity of agro-ecological conditions means that a wide range of tropical and temperate fruits and vegetables can be produced for the domestic market all year round. Historically and currently there are very limited exports of fresh produce, limited to tomato, lettuce, capsicum and root crops, principally to other Pacific countries. There is interest from government and private sector to explore the potential for further development of fresh produce exports. However, there is limited information available on, product specifications, pricing, sanitary and phytosanitary (SPS) constraints and potential market opportunities. This hinders decision-making by government and the private sector on potential investments to promote agricultural exports.

Eastern Australia and New Zealand are large food markets with a combined population of around 15 million, with substantial purchasing power, a high degree of culinary diversity and high domestic food prices. Several other PICs have been successful in developing export markets for horticultural products mainly in New Zealand but also to some extent in Australia, generally for niche products which target seasonal supply windows, generally in the winter when prices rise. New Zealand market access is generally easier and is facilitated by Bilateral Quarantine Agreements (BQA) for example between New Zealand and Fiji and Tonga. Most PICs also enjoy better sea freight linkages with New Zealand than with Australia, and benefit from a strong presence of Pacific Islander populations who have a preference for produce from their home countries.

Access to the Australian market is constrained by the absence of import regulations except for a few commodities (e.g. taro, pawpaw, coconuts), longer shipping times, more expensive and demanding inspection and quarantine regimes, competitive domestic production of tropical commodities, and the aversion of Australian consumers to imported food products generally. Australia is unique in its high levels of quarantine protection and consumer aversion to imported produce which means that imported items will only sell if the local equivalent is in short supply (e.g. asparagus, garlic, taro and pawpaw); or if the imported product is very much cheaper (e.g. garlic from China). All of these factors contribute to make the Australian market difficult to penetrate and highlight the need to be very careful in selecting commodities for development of marketing pathways.

A further reason for caution is the current status of the fresh produce marketing systems in PNG. Domestic marketing pathways are poorly developed and expensive, so that domestic fresh produce struggles to compete with imports, which come mainly from Australia. In addition, the very high prices in Port Moresby act as a magnet for fresh produce supplies from all over the country. There are no established export marketing pathways for horticultural products, and no exporters experienced in this

business. This compares with Fiji, for example, where there are at least ten experienced fresh produce exporters with well-established business linkages in New Zealand, Australia and in some cases North America.

Noting the success of other PICs in developing fresh produce export pathways, initial consultations with stakeholders during the launch of PHAMA in PNG gave priority to undertaking a feasibility study to identify specific fresh horticultural products that may have potential for developing export trade to Australia, New Zealand and the Melanesian Spearhead Group (MSG) countries and territories[1]. The study aims to provide clear direction on market access and production initiatives, examining the logistic, economic and technical viability of various export pathways.

1.3 PHAMA's Strategic Framework

PHAMA's mission is to strive for equitable and sustainable agricultural industries and value added ventures across the PICs. Agriculture is central to the livelihoods of many Pacific Island people. Historically the region has been economically disadvantaged with limited development opportunities due to extreme geographic and economic isolation. With increasing globalisation and challenges such as climate change, population growth and diminishing food security, it is imperative that development opportunities are improved and that the region is economically secure.

PHAMA's work focusses on maintaining and improving existing market access by developing the capacity of the public and private sectors in participating countries to meet the requirements of these markets, and on gaining access for novel agricultural-based products into new markets. PHAMA also provides assistance in meeting export regulations, such as compliance with international food safety standards. In terms of new export products PHAMA can assist with market research and market development activities.

Central to the PHAMA approach is the development of strong public-private partnerships between governments and private enterprise to help manage market access. Market Access Working Groups (MAWG) have been established by PHAMA within each of the six core countries. These include private sector representatives (e.g. exporters and producer groups) and relevant government agencies responsible for elements of market access (e.g. Departments responsible for Quarantine, Trade, Agriculture, Fisheries and Forestry). The MAWGs provide the link between farmers, industry and government. Some examples of PHAMA activities include:

- Opening up new markets for selected products;
- Accreditation for export facilities;
- Development of quality production and processing guidelines and manuals;
- Animal or plant health surveys to support market access applications;
- Feasibility studies for export of selected products to new destinations;
- Development of biosecurity plans for new products;
- Development of export pathway protocols for new products;
- Capacity building of public and private sector organisations to gain, maintain and improve international market access.

A key aim of PHAMA beyond its core activities is to develop longer-term country-specific sustainability of the MAWGs and to establish Industry Working Groups in countries where there is minimal industry representation. This long-term focus entails assisting with legal, political and structural tasks to ensure continuation of market access activities beyond PHAMA.

[1] Comprising Fiji, New Caledonia (Front de Liberation Nationale Kanak et Socialiste, FLNKS, Observer Status), PNG, Vanuatu and Solomon Islands.

1.4 PHAMA in PNG

PNG is a late entrant to the PHAMA program. A scoping mission was undertaken by the PHAMA team in February 2015 to determine if PNG would benefit from engagement in the program. The scoping mission determined that:

- There is strong support for the program to be implemented in PNG by both the private and public sectors.
- The capacity of both the private and public sectors to gain, maintain and improve international markets is low due to a focus on domestic supply and dependence on export of bulk commodities.
- The program should be implemented in PNG as soon as practicable.
- The current phase of PHAMA is due for completion in June 2017 and in consideration of this short time frame a targeted activity focus must be adopted. Suggested priority activities were:
  - Development of a private sector body with a primary focus on export development and promotion of agricultural products.
  - Work with the MSG Customs and Quarantine Subcommittee (and member countries) to progress current regional market access requests.
  - Work with the National Fisheries Authority on European Union tuna export issues and new market access in selected countries.
  - Provide market access and risk assessment capacity building to the National Agriculture Quarantine Inspection Authority (NAQIA).
  - Provide assistance to several businesses to further develop spice and chocolate products for export.
  - Assist commodity sectors develop sector plans related to development needs and export.
  - Assist with ongoing improvements to cocoa and coffee quality standards.
  - Commence work on artifacts/handicrafts quarantine compliance awareness.
  - Conduct brief scoping studies to determine if there might be more local export opportunities for Bougainville and Manus Island.

PHAMA in PNG was launched at an inception meeting in November 2015 which presented ten priority activities to be undertaken during the first year of the program of which the first two are the basis for the current study. These include:

1. Fresh Produce: Review feasibility of existing and potential new pathways to Australia, New Zealand and MSG countries. Findings to guide subsequent capacity building (e.g. NAQIA), export pathway development and trade facilitation activities.
2. Sectoral Plans: Collate existing sectoral/industry plans/strategies. Review to identify potential gaps or weaknesses regarding market access. Provide assistance for revision, and strengthen public/private coordination mechanisms.

The remaining eight priority activities include work on MSG collaboration; commodity specific work on spices, cocoa, coffee, handicrafts, fish and forest products; and market access scoping studies for Bougainville and Manus Island.

Key issues noted in the inception meeting relevant to fresh produce included:

- Some industries will require more support on market access than others. Further discussions will be needed to identify and prioritise key areas of intervention.

- Fresh produce pathways require **improvement in the domestic supply chain** which could then be a springboard for exports. However, **attractive domestic pricing may also be a disincentive to export**.
- PNG is **not a low cost producer**, and so **needs to compete on quality**. There is also a need to improve processing technology for value added production.
- Adequate laboratory facilities are important to service various industries and ensure their products meet standards for export.
- PHAMA activities should take account of women's participation in agriculture and the need for empowerment, particularly in value chains of fresh produce and handicrafts.
- Improved dialogue and coordination amongst the sectors and between projects or programs is required.
- PHAMA activities needed to embrace the various current innovation initiatives in public and private sector.

1.5 Study Methodology

The study was undertaken by the following team, closely supported by the Fresh Produce Development Agency (FPDA) and NAQIA:

Rob Duthie	PHAMA Technical Director/Biosecurity Specialist
David Young	Economist/Market Analyst
Sidney Suma	PHAMA Country Manager
Jane Ravusiro	PHAMA National Coordinator
Christine Petroff	PHAMA Administration and Finance Officer
Amanda Mararuai (Dr)	NAQIA, Senior Technical Officer (Plants)
Nime Kapo (Dr)	NAQIA, GM, Technical and Advisory Services
Noel Yori Kuman	FPDA, Program Manager – Value Chain Innovation

The first task was to compile a long list of potential export commodities and subject this to initial screening. The initial long list identified almost a hundred commodities for consideration (see Appendix A). This list was later reduced to about 20 to be considered in more detail. The short-listed commodities included the following:

1. Aibika (Slippery Cabbage)
2. Asparagus
3. Broccoli
4. Cabbage
5. Carrot
6. Choko
7. English Potato
8. Ginger
9. Leek
10. Lettuce
11. Lime (Tahitian)
12. Onions
13. Pineapple
14. Shallots
15. Snake gourd
16. Spring Onion
17. Sugar Fruit
18. Sweet Corn
19. Sweet Potato
20. Tomato

Subsequently a few others were suggested by the study team to be added to the short list. These included French beans, snake beans, chillies, coconuts, garlic and okra.

A review of previous studies on fresh produce marketing in PNG was also undertaken (see Appendix B) as well as a review of the policy and institutional context. The study team then undertook consultations with relevant stakeholders and field visits in PNG between 17 and 30 January 2016. The list of persons and organisations consulted is given in Appendix L. A brief introductory workshop was provided for NAQIA staff in Port Moresby (see Appendix C). Initial findings were presented to DFAT and NAQIA on 29 January 2016. This was followed by a period of analysis and report preparation consisting of:

- Analysis of **supply** issues including current levels of production and marketing channels, focusing mainly on domestic marketing pathways to consider PNG's capacity to supply the target markets on a competitive basis.
- Analysis of **demand** issues based on market information for selected products from Brisbane, the most easily accessible export market.
- Analysis of **biosecurity** issues for selected products to identify possible market access constraints and opportunities.
- **Value chain analysis** of marketing costs and margins to estimate the financial returns likely to be available to potential fresh produce exporters.

The interim report on the above was discussed with stakeholders at a meeting in Lae on 22 March 2016 prior to finalisation of the report.

2.0 Agricultural Production and Marketing in PNG

2.1 Agricultural Sector Overview

PNG's agricultural sector is highly diverse, reflecting the wide range of agro-ecological and socio-cultural conditions. It includes two main sub-sectors: subsistence/semi-subsistence farming and export oriented cash cropping.

Subsistence Sub-Sector: Around 80% of Papua New Guineans live in rural areas and are dependent on subsistence agriculture for the livelihoods, supplemented by occasional sales of crop and livestock commodities. The subsistence farming systems are dominated by root crops that provide staple foods. They generally provide an abundance of nutritious food on a year-round basis. The high productivity of the predominantly root-based agricultural systems, particularly in terms of their return to labour, enabled rural communities to meet their limited and basic subsistence needs with a relatively low utilisation of land and labour resources. As they have become exposed to the cash economy they were able to respond by incorporating export crops into their farming systems in order to generate income for the purchase of goods and services. Some subsistence crops are also sold for cash as a sideline when surpluses become available, and in few parts of the highlands food crops are grown mainly for sale.

Cash Crops: The pattern of cash cropping in PNG has been for export crops to be introduced through large-scale private enterprises and then for villagers in the surrounding area to plant the crop in small plots. The main export cash crops are oil palm, coffee, cocoa, coconuts/copra, tea and rubber. Generally smallholders have integrated new cash crops into their existing farming systems. The agribusiness firms that operate large-scale agricultural-related enterprises set the standards and commercial culture that drive the cash crop sub-sector, particularly through their role in introducing new technology, setting productivity standards, maintaining product quality and providing the essential processing and marketing infrastructure that allows PNG to compete on world markets.

2.2 Sector Development Strategy

PNG's agricultural sector development strategy is defined in the National Agriculture Development Plan 2007-2016 (NADP). The **vision** of NADP is sustainable transformation of the country's agriculture sector into a vibrant and productive economic sector that contributes to economic growth, social wellbeing, national food security and poverty alleviation. The **mission** of NADP is to enhance and improve the quality of life for over 87% of the rural population through increased productivity, sustainable and quality production coupled with integrated planning and environmentally sustainable management. The **goal** of NADP is to stimulate economic growth in the agriculture sector through the development of a well-coordinated plan and implementation that is interactive and effective, involving the full participation of the stakeholders, which promotes food security, income generation and poverty alleviation. The **objectives** of NADP are to:

- reduce costs of production and improve quality of agricultural produce for both domestic and international markets;
- increase income earning opportunities of those dependent on agriculture;
- allocate resources based on priority areas;
- ensure that development is socially, economically, and environmentally sustainable; and
- improve the recognition of women's contributions to rural industries and increase opportunities for women's decision making in agriculture.

The eight **priority areas** in NADP are:

1. Agriculture research, extension, information and training;
2. Food and horticultural crops development;
3. Tree and industrial crops development;
4. Livestock, apiculture and aquaculture development;
5. Spice and minor crops development;
6. Gender, social and HIV/AIDS related issues;
7. Regulatory and technical services;
8. NADP management and coordination.

The food and horticultural crops sub-component aims to promote economic production of food and horticultural crops, for domestic consumption and for exports in crops that PNG has a competitive advantage; and to promote downstream processing for value addition. Expected outcomes include: (i) increased production of local food crops and vegetables; (ii) establishment of efficient marketing systems, downstream processing and value adding facilities; (iii) reduction of imports; (iv) increased income and employment; and (v) improved nutritional status and livelihood of rural households.

2.3 National Trade Policy

Identification of potential export commodities needs to be undertaken within the context of PNG's recently launched National Trade Policy (see Box 1 below). The policy recognises that PNG's global competitiveness remains a major challenge due to low levels of productivity, un-conducive business regulatory environment and inadequate infrastructure leading to high costs of doing business. Relevant parts of the policy include: Chapter 9, Reducing Import and Export Costs; Chapter 10, Supporting Domestic Industries Export Potential; and Chapter 11, Gaining Market Access for PNG's Exports. The last of these addresses technical barriers to trade including SPS measures and other standards and recognises that non-compliance with international standards has been a barrier to exports in the past. Relevant policy measures include: (i) development of legislation and regulations on standards and quality based on World Trade Organisation principles; (ii) capacity building for enforcement agencies on standards and compliance measures; (iii) support to the private sector to improve its compliance capacity: (iv) creation of trade negotiating teams and active participation in trade negotiation processes; and (v) research and market access analysis for potential export goods and services.

Box 1: National Trade Policy 2016-2021

Vision: An internationally competitive export-driven economy that is built on and aided by an expanding and efficient domestic market.

Mission: To promulgate and advance PNG's vision and the policy intentions or goals of the Government on international and domestic trade; to provide clear directions to all parties involved in the pursuit of such goals; and to serve as a basis for unifying and coordinating actions across all stakeholders both domestically and internationally.

Guiding Principles: (i) protection of national interests; (ii) PNG is open for business; (iii) inclusiveness; (iv) role of government and the private sector; (v) respect for trade obligations and commitments; and (vi) commitment to free and open trade.

Goals: (i) maximising PNG's international trade competiveness; (ii) maximising PNG's comparative advantage in regional and global trade; (iii) establishing an efficient domestic trading system that powers the national economy; (iv) establishing a sound regulatory and policy framework for doing business; (v) creating an open and fair trading system that favours investment and business; and (vi) achieving a compliant-based trading regime.

2.4 Fresh Produce Marketing

The fresh produce sector has been intensively studied over the last 30 years, with fairly consistent findings about constraints and opportunities. A review of some of these studies is provided in Appendix B. The various studies have made occasional references to the potential for developing fresh produce exports, but almost all consider this a low priority compared to enhancement of domestic marketing systems and import substitution. All of the studies that have looked at fresh produce export marketing potential found that the prospects for developing profitable exports were very challenging.

Domestic food production is seen as one of PNG's most important industries, which underpins PNG's generally satisfactory food security status in rural areas. However, the great majority of production is used for subsistence consumption. Only a small portion finds its way into domestic marketing channels and a miniscule amount into exports. With growing urbanisation and demand from middle class consumers, demand from the towns and cities is expanding quite rapidly. Consequently there is substantial un-met demand for traditional food staples in the urban areas, which is being satisfied from low-cost imported rice and noodles. Meanwhile, low income urban households face widespread problems of access to food of adequate quality and affordable prices.

Asian Development Bank (ADB) study on Agricultural Marketing in PNG (2004)

ADB (2004) provides the most comprehensive analysis of agricultural marketing in PNG. It was undertaken as part of the formulation of an agricultural development project. The major findings of the ADB study in relation to fresh produce marketing are presented in Appendix B, and remain relevant today. The key points are summarised as follows.

Constraints

- Transport infrastructure, particularly the extent and condition of the road network. Inadequate maintenance of the highlands highway is a perennial problem, with periodic closures due to major road failures/landslides etc. Secondary and tertiary road networks are under-developed and much produce is transported in Public Motor Vehicles (PMV) for the first part of its journey. The use of refrigerated containers for storage and road transport is only just beginning.
- Domestic air freight capacity is limited and expensive. Unpredictable changes to flight schedules and aircraft types can leave produce stranded in cargo sheds without cold storage facilities. It is unlikely that PNG would have any competitive advantage in the export of any product that has to be transported internally by air.
- Lack of access to affordable finance for investment and working capital at all stages in the value chain. Farmers demand cash payment on delivery, which means that middlemen and traders require significant financial resources to assemble a consignment. In the highlands fresh produce marketing pathway, it can be several weeks before the produce is eventually sold to the consumer.
- Law and order in both rural and urban areas poses significant challenges to the fresh produce trade and the conduct of rural business generally.
- The subsistence orientation of most smallholder farmers means that the production of cash crops is generally opportunistic when there are surpluses to household needs. This means that supplies tend to be un-predictable.

- Urban fresh produce markets are generally overcrowded, poorly equipped and managed, un-hygienic and insecure, especially for women and children. Produce is often exposed to high temperatures and direct sunlight and deteriorates rapidly.
- There are only a small number of fresh produce wholesaling businesses, mainly concentrating on the trade between the highlands and Lae/Port Moresby. Most of these struggle to access the financial resources needed to expand their businesses.
- High price expectations of growers for the relatively small marketable surpluses and unwillingness of many farmers to sell to traders or middlemen. Many farmers are directly engaged in marketing their own produce due to the perception that they can obtain higher returns. The consequences are:
    - High marketing costs and decreased returns for growers;
    - Poor quality produce and inconsistent supply;
    - Labour is diverted from production to marketing activities;
    - Consumer prices are higher.
- Lack of confidence and trust between value chain actors.
- Poor telecommunications – rapidly becoming less of a problem.
- Lack of timely market information.
- Significant quality deterioration in the fresh produce marketing system in the many stages between farmer and consumer. Efforts to improve quality should be directed in five main areas:
    - Research to identify the best varieties, production systems and packaging formats for the PNG environment;
    - Application of grading standards to provide incentives for quality improvement;
    - Private investment in marketing infrastructure (cold storage, packing facilities, re-usable plastic crates, packaging materials, etc.);
    - Training and information dissemination on produce handling for farmers, marketers, transport agents and retailers;
    - Public investment in infrastructure (roads, storage facilities, etc.).

Specific Limitations to Fresh Produce Exports

- A most unfavourable fruit fly status, which means that almost all fleshy fruits and vegetables cannot be exported to most markets. There are no heat treatment (high temperature forced air – HTFA) facilities available to treat fruit fly host species.
- PNG's high cost levels which limit the competitiveness of PNG produce in export markets.
- A strong comparative advantage in the export of traditional tree crop commodities, which is much more attractive to exporters.

Fresh Produce Marketing Opportunities

- PNG's high degree of agro-ecological diversity has led to a high level of agro-biodiversity. The highlands provide excellent growing conditions for a wide range of temperate fruits and vegetables year round, whilst the lowlands are well suited for production of tropical products.
- The best market opportunities for fresh produce overwhelmingly lie with domestic markets. Over a million people now live in towns and cities, and this number is expected to grow at faster than the general rate of population growth. This provides a large and under-supplied market for traditional staples. Consequently the potential for developing exports of staple crops is seen as "largely illusionary".
- Whilst PNG's fruit fly status is a significant barrier to exports to Australia and New Zealand, it is less important in Asian markets such as Hong Kong and Singapore. However, because

these have minimal quarantine requirements everyone seeks to enter these markets, making them extremely competitive.

- Expansion of commercial horticulture requires greater specialisation by farmers in growing, not marketing. Means of facilitating this include:
  - Formation of farmer groups that can be linked to marketing businesses;
  - Training programs for wholesalers and marketers;
  - Provision of appropriate financial services for wholesalers and marketers;
  - Provision of timely information on product specifications and prices;
  - Raising the awareness of farmers about the importance of middlemen in produce marketing systems;
  - Improved telecommunication linkages between various value chain actors.
- Urban supermarkets are expanding their market share and provide a more conducive shopping environment for urban people.
- Public investment in infrastructure for consolidation/deconsolidation of fresh produce consignments has been proposed for donor funding. However public ownership and management of such facilities has a poor track record in PNG. It would be preferable to facilitate the establishment of such facilities by wholesalers, as is currently occurring under the Ministry of Foreign Affairs and Trade (MFAT) funded New Zealand Fresh Produce Initiative.
- FPDA collects weekly market information from all the major markets and provides this through a Short Message Service (SMS) market reporting service. However there is limited analysis of the raw market data to provide strategic guidance to value chain actors.

MFAT Study on the Domestic Fresh Produce Marketing System (2012)

The potential for developing export marketing pathways cannot be considered separately from the domestic marketing system. Domestic and potential export marketing channels have much in similar and share some of the same constraints. It is therefore useful to review some of the key features of the domestic fresh produce marketing system as presented in the MFAT study (see Appendix B) to gain a better understanding of what would be needed to develop fresh produce exports.

The Port Moresby fresh produce market was estimated to be around 167,000 tonnes in 2012, extrapolating from an earlier estimate by FPDA in the “Feeding Port Moresby” report (2008). This was estimated to be supplied by Central and Gulf Provinces (59%), peri-urban producers (36%) and other parts of PNG and imports (5%). The market has probably increased to around 190,000 tonnes in 2016. It was estimated that up to 80% of the fresh produce supply to resource construction projects was imported.

Highlands Fresh Produce Marketing

The mostly temperate types of fresh produce produced in the highlands follow two main marketing pathways: road/air freight and road/sea freight. The bulk of the produce is grown by **smallholder semi-subsistence farmers** who produce some fruit and vegetables for sale additional to their household needs. **Collectors** are middlemen who aggregate produce into marketable quantities. The more distant the market from the smallholders, the more important is the role of the middlemen. First level collectors aggregate produce from their village, neighbours or family group. Second level collectors aggregate from the first level collectors and/or from many family groups, tribes or regions. Most produce is handled in white polybags holding 50-80 kg. There is a general lack of knowledge of post-harvest handling and packing as well as formal business management skills amongst collectors.

Wholesalers consolidate produce from farmers and collectors for on-selling to supermarkets, resource companies, institutions, catering companies, hotels and restaurants.

There are various forms of **road transport** to Lae. The major trucking companies do not show great interest in hauling fresh produce and none of them currently offer refrigerated transport services from the highlands to Lae. Many smaller collectors and farmers transport their produce in dry containers returning to Lae or in pickups and PMVs. Road transport from farm to Lae requires 2-3 days and conditions are far from ideal.

Air transport takes place via non-refrigerated freight flights and passenger flights out of Mt Hagen and passenger flights as freight or luggage out of Goroka. Airlines PNG (PNG Air) has a refrigerated container for fresh produce storage at Mt Hagen but Air Niugini does not.

Containerised **shipping** services from Lae to Port Moresby and other domestic ports are run by the two major coastal shipping services, Consort and Bismarck. Reefer containers are used to move produce from Lae to Port Moresby which takes around five days. The total time from harvest to Port Moresby market is around 11-12 days, much of which is at ambient temperatures, which are generally very high.

Vendors in the **Port Moresby markets** are usually female entrepreneurs who buy produce as it arrives in PMVs outside the market perimeters. This may come through one of the highlands marketing pathways or from farmers or traders in Central Province. There are also six main supermarket groups handling fresh produce but their turnover is small relative to the markets.

Throughout the supply chain business relationships are mostly informal. Most transactions are treated as one-off with no promise of future deals, high levels of opportunism, limited information sharing and low levels of trust. Such relationships make it difficult to plan and present high risks for both parties. It results in high price variability, surpluses and shortages, and high wastage levels. Farmers often feel cheated and buyers are often unable to source the products their customers need. The near absence of formal business relationships also provides a weak foundation for the development of export marketing pathways.

Infrastructure and Facilities

Mt Hagen has a large, well-appointed retail market operated by the local government with up to 2,000 selling spaces. A large amount of wholesale trade takes place outside the market perimeter. However the New Zealand Aid-build wholesale market incorporating a cool store adjacent to the retail market is under-utilised by the two wholesaler tenants who have been resident since construction in 1986. In **Goroka** the existing market is poorly equipped, unhygienic and insecure. There are no coolstores for fresh produce available for public access and no cold storage at the airport. **Lae market** is old and access, particularly vehicle access is poor, but it appears more hygienic and somewhat more secure and better run than Goroka. The market has both farmers and collectors represented and women are the predominant vendors with many highlanders marketing produce through this facility. There are eight retail markets in **Port Moresby** with less formal markets at Koki and Eight Mile. These markets either have no infrastructure to accommodate vendors or have insufficient and inadequate structures resulting in overcrowding and the consequent disputes and violence is facilitated by the lack of independent security guards. Toilets and other facilities are inadequate, poorly designed, unsanitary and dangerous. The markets are often unsealed, not drained and rubbish accumulates and rots quickly.

There are six regional and 13 district **cool stores/storage** depots. Only one of the regional facilities is functioning, three are in service but are not effective and two are not in service. Of the 13 district facilities three have been constructed but are not effective and ten are not in service for a variety of reasons.

Other Fresh Produce Marketing Studies

There has been a large amount of research undertaken on PNG's fresh produce marketing, much of it focusing on the highlands to Port Moresby pathways, both road/air and road/sea. This includes studies by: Bourke et al (2009); Birch et al (2009, 2015); Chang et al (2009, 2011(2), 2012, 2013, 2014 and 2015); and Spriggs et al (2006, 2007 and 2012). The shorter marketing pathways from peri-urban and Central Province suppliers, which are far more important than the highlands in supplying Port Moresby, have been studied to a much lesser extent. The key findings from these studies are elaborated in Appendix B and summarised below.

- There is very little potential to export fresh food from PNG because of quarantine issues (including a serious fruit fly problem), poor presentation of food, expensive and unreliable air and sea transport and lack of price competitiveness. Limited possibilities for certain niche markets exist, but many obstacles remain. In contrast, there is significant unrealised potential for expanded sale of fresh food within PNG. Some indigenous nuts, such as galip, karuka and okari, have considerable export potential.

- It is difficult to supply the rapidly growing demand for fresh produce in Port Moresby from the highlands because of distance and poor transport infrastructure. Whilst the bulk of the market is supplied locally, production in the areas near Port Moresby is constrained by hot/dry weather conditions and poor soils.
- Nevertheless, around 90% of Port Moresby vegetable supplies in 2008 came from Central Province, and particularly from smallholders in peri-urban areas. This contradicts the widely held view that the highlands are the major sources of supply.
- The PNG Government has stated its desire to increase income and reduce poverty through export-driven economic growth, including fresh produce. Assessments have been conducted for exports of a number of fruits and vegetables to New Zealand. A review of the potential for exporting ginger to New Zealand concluded that this would be both technically and financially infeasible. In contrast, the domestic market has considerable potential for ginger sales as well as other fresh produce.
- A market survey in PNG's five main city centres found that the principal considerations for buyers in the formal sector are consistency of supply, price and quality. Quality is most important for supermarkets, airlines and hotels, but less important for institutional buyers. Consistency of supply is important to all buyers. For those who consider quality to be important the outcomes are not satisfactory, partly because they cannot communicate their quality requirements to suppliers. Quality requirements are perceived differently by different participants and there are no formal quality standards.
- Although the urban market for sweet potato is considered to be under-supplied, analysis of the sweet potato value chain identified a number of problems related to long travel distances, access to credit, transport infrastructure (high costs, poor roads and no specialised transport system), post-harvest management (no sorting or grading, poor packaging, rough and multiple handling and no proper storage facilities), chain coordination (no collaboration or communication between value chain operators) and support services (insufficient market information and no training and extension to build business skills).
- The national government is actively encouraging agricultural exports, and fresh produce is considered to have good export potential. However the PNG fresh produce sector is not export ready. It is unable to provide reliable supplies of consistent quality produce and there is no effective quality control system. In order for the PNG fresh produce industry to effectively compete in the export market it is essential to improve the functioning of the domestic supply chain. It is also apparent that fresh produce exporting is a specialised and different business to domestic trade. The major domestic fresh produce traders recognise that they do not currently have the capacity to engage in exporting.
- Mapping of the fresh produce marketing system suggested that there were very significant physical/technical and social constraints including lack of marketing infrastructure and poor post-harvest practices). The most significant social constraints were thought to be poor buyer-seller relationships, and social practices and attitudes that worked against the full participation of women and youth in the marketing system.
- Stakeholder workshops identified a number of actions aimed at relieving the physical/technical and social constraints. These included: (i) an infrastructure initiative to encourage consolidation of produce in the highlands; (ii) initiatives to improve post-harvest quality management (including development of a post-harvest resource manual); (iii) studies on identifying constraints and determining how to enhance the role of women and youth in the fresh produce marketing system; and (iv) studies aimed at improving understanding of customer and consumer preferences.
- The nature and extent of women's participation in the fresh-produce supply chains has not been adequately understood or appreciated and, in their attempts to participate, they face enormous difficulties. The physical/technical challenges in the fresh-produce marketing system were only one aspect of the problem, and the human/social challenges were at least as important, if not more so.

2.5 Institutional and Regulatory Framework

The roles and responsibilities of various government departments to develop and maintain international market access across the agricultural sector sit within the National Fisheries Authority for marine products, the PNG Forestry Authority for export of timber and timber products, the National Agriculture Quarantine and Inspection Authority (NAQIA) for plant and animal products, the Department of Agriculture and Livestock (DAL) and Department of Health for Codex food safety and food standards issues.

Under DAL there are several commodity boards and government authorities with linkages to industry sectors who also play a role in agricultural production, marketing and export. Research and development for product development and quality control, extension services and marketing of the main (bulk) commodities fall within the mandate of the commodity boards.

A Functional and Expenditure Review (FER) of agricultural commodity boards and agencies was completed in April 2014. The recommendations include sweeping changes to the structure and management of the commodity boards, DAL and the National Agricultural Research Institute (NARI) with the aim of improving the growth and profitability of the agricultural sector. If the FER proposals are implemented, the roles and responsibilities of key market access institutions may change. The institutions relevant to agricultural exports are described below.

National Agriculture Quarantine Inspection Authority (NAQIA)

NAQIA has the mandate to provide biosecurity and quarantine services in PNG. It has the duty to ensure the country is protected from introductions of new pests and diseases or from outbreaks of pests and diseases already within the country. It also serves as the competent authority for plant (International Plant Protection Convention - IPCC) and animal health (World Organisation for Animal Health - OIE) matters and provides sanitary and phytosanitary certification associated with animal and plant exports. NAQIA has physical presences in all provinces and at the international ports of entry. It is organised into three divisions namely, technical and advisory, operations and corporate services and deliveries it mandated services through regionally grouped provincial officers.

National Agriculture Research Institute (NARI)

NARI is a publicly funded research organisation mandated to undertake agriculture research and development on food crops, alternate crops and livestock breeding and management. It also provides services related to resource management, technical, analytical and diagnostic services and serves as the data and information services hub for the agriculture sector. NARI works primarily with smallholder and semi-subsistence primary producers and understands adaptive research including pest and disease management and post-harvest technology development and adoption for this sector.

Department of Agriculture and Livestock (DAL)

DAL is the primary Government Department that deals with the agricultural issues excluding Forestry and Fisheries. It is responsible for the development of policy and provides the overall guidance on the development of sustainable agriculture and livestock production in the country. The Science and Technology Branch of DAL is the contact point for Codex and together with the Department of Health are responsible for food safety issues in the country.

Department of Health (DOH)

The National DOH is the primary government department responsible for the delivery of better health services for the people of PNG. The department has the mandate for ensuring food is safe and nutritious to eat in the country. However given the enormity of the health issues in the country, food safety is given a low priority. The Food Sanitation Council Secretariat, within the Department of Health, is responsible for national food standards.

Investment Promotion Authority (IPA)

The IPA has a role of providing information on investment opportunities in PNG and on export opportunities to international markets, creating awareness on investment queries from the public and facilitating business introductions through its database of foreign and domestic investors and networking partners. The Investor Servicing and Promotion Division deals primarily with export

promotion and acts as a facilitator between government and potential exporters. It is a small group with limited resources but there is an opportunity to work closely with this group to facilitate exports.

Fresh Produce Development Agency (FPDA)

FPDA provides technical and market information to smallholder farmers and other key players in the horticulture value chain. FPDA also provides mentoring, agribusiness advisory and support services and post-harvest handling advice. The organisation has its headquarters in Goroka with regional offices located in Port Moresby, Lae, Kokopo and Mt. Hagen.

Commodity Boards and Institutes

PNG manages its bulk (unprocessed) agricultural exports through specific commodity boards and research and development institutes owned or linked to the commodity boards. These include:

- The Cocoa Board provides overall governance and is responsible for marketing, extension and quality control of cocoa.
- The Cocoa Coconut Institute Limited is jointly owned by the Cocoa Board and the Kokona Indastri Koporesen and provides research and development and technical advisory services for both commodities.
- The Coffee Industry Corporation provides overall governance and is responsible for marketing, extension and quality control of coffee. The Coffee Research Institute provides research and development services and technical advisory services.
- The Oil Palm Industry Corporation provides extension services and organises logistical services for smallholders. The Oil Palm Research Association provides the research and development for oil palm.
- The Spice Industry Corporation is responsible for the development of the spice industry in PNG and a unit within DAL manages rubber research and development.

2.6 Regional Trade Agreements

PNG is party to a number of regional trade agreements which influence export opportunities, including for fresh produce.

The **Melanesian Spearhead Group Trade Agreement 2** (MSGTA2), established in 2005 is a revised version of the original MSGTA which was signed in 1993 including Vanuatu, PNG and Solomon Islands. Fiji signed the Agreement in 1998. MSGTA2 established a Free Trade Agreement among members. Tariffs were to be eliminated on all products exported from other parties with the exception of individual members' exclusion lists. Currently the expansion of the agreement to include trade and services, investment and labour mobility is under negotiation.

The **Pacific Agreement on Closer Economic Relations** (PACER) provides a broad framework for regional integration among the Pacific Island Forum Countries, Australia and New Zealand. The Agreement contains no obligations on market access, but in certain circumstances requires the parties to commence negotiations on a Free Trade Agreement. Those negotiations have now commenced under PACER Plus and there are some prospects that there may be a conclusion some time in 2016.

The **Pacific Island Countries Trade Agreement** (PICTA) was signed in 2001, although not all Forum Island Countries have ratified it. It is not as comprehensive or precise as many modern preferential trade agreements, and interest in its implementation may reduce with the successful conclusion of the PACER Plus negotiations.

The **South Pacific Regional Trade and Economic Cooperation Agreement** (SPARTECA) entered into force in 1981 and requires Australia and New Zealand to provide non-reciprocal preferential access to the Forum Island Countries. It has restrictive Rules of Origin and challenges related to quarantine and productive capacities have made it difficult for Forum Island Countries to take advantage of the Agreement.

An **Economic Partnership Agreement** (EPA) is currently being negotiated between the PICs and the EU. These negotiations are a successor to the Cotonou Agreement, and currently the Pacific Island Countries are trading with the EU under the "Everything but Arms" arrangement which provides the

same level of market access as the Cotonou Agreement, but with more restrictive Rules of Origin. PNG and Fiji have initialled the Interim EPA (IEPA) to maintain their market access to the EU for tuna and sugar.

A recent study[2] of the regional trade agreements concluded that exporters in the Melanesian region regard MSGTA2 as the most important of these. In relation to PNG the study found that the PNG Government's objectives in the trade sector are to rebalance exports away from the extractive sector and encourage investment and employment in the non-extractive sector. The Manufacturers Council noted that the ability to increase exports is mitigated by severe competition in PNG from low cost imports, high internal transport costs and port charges, and lack of sanitary and phytosanitary (SPS) treatment facilities. Specific items considered to have potential for exports to MSG countries under MSGTA2 included:

- Corned beef (Ox and Palm brand), most of which is produced for the domestic market, with a small balance currently being exported to the Solomon Islands, Vanuatu, Samoa, Tonga and Australia. Exporters identified a number of barriers to increasing exports and although there are potentially lucrative markets in Fiji, the Philippines, Brazil and France, strong competition from other suppliers and regulatory barriers have made it difficult to penetrate these markets.
- Traditional *bilums* and related products such as ties, i-pad covers, pouches, scarves, hats, dresses etc., are cottage/subsistence industry operated by women living in remote villages. An attempt is being made to establish a genuine export industry by bringing a greater level of organisation to the manufacturing process so that there is consistency of supply and distribution. The intention is to market the products as high end fashion items which suggests that sales in MSG countries will be limited.
- One locally owned company producing biscuits and snacks currently exports to the Solomon Islands, with small volumes to the Marshall Islands. Barriers to increasing exports are seen as GST differential rates in the major export market, poor shipping routes and high freight costs.

2.7 Export Opportunities

Australia

The Australian market for horticultural products is by far the largest in the region with more than 23 million relatively affluent consumers. However domestic production supplies almost all of that market year round. This is unique amongst developed countries, most of which source fresh produce supplies from around the world, depending on prices and availability.

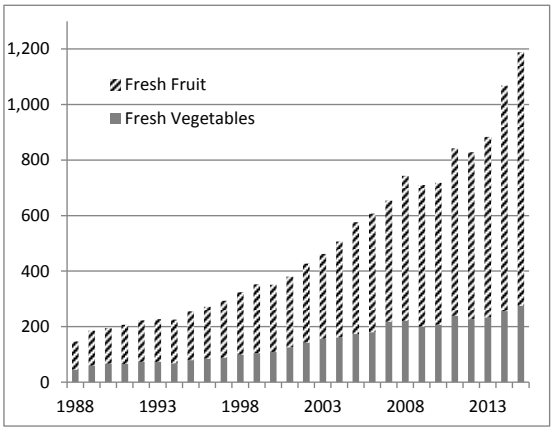
Figure 1.A shows that Australian imports of fresh produce have grown steadily in line with population and household incomes. Imports of vegetables now generally exceed AUD 200 million per annum and fruits almost AUD one billion. Whilst these quantities may sound large, they only represent 0.08% of GDP and around 0.11% of household expenditure. Figure 1.B shows that in per capita terms the value of imported fruit and vegetables has increased steadily over a long period but reached only AUD 50 per annum in 2015.

Fruit imports are markedly seasonal with higher levels prevailing in the second half of the calendar year when local temperate fruits are in limited supply. Vegetable imports tend to be less seasonal.

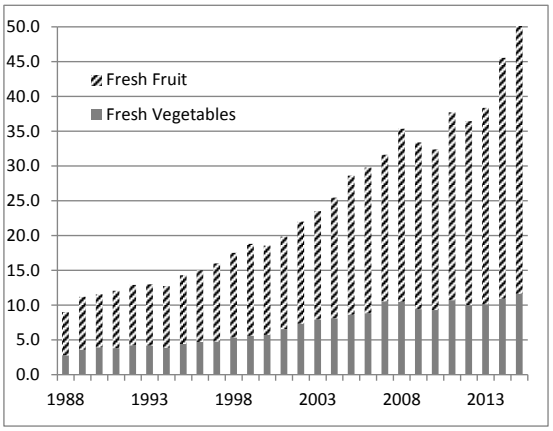
[2] Blackburn Croft & Co Ltd and Barry Hellberg Associates (December 2015) Final Report of the Study on the MSG Export Products for MSG Secretariat

Figure 1: Imports of Fresh Fruit and Vegetables to Australia, 1988-2015

A. AUD millions



B. AUD per capita



There are a number of reasons why Australia exhibits such a high degree of self-sufficiency in its horticultural produce markets, all of which need to be considered by PNG in assessing market access opportunities:

- Australia has a high degree of agro-ecological diversity ranging from tropical to cool temperate. Supplies of many products are maintained year round, from the tropical areas in winter and the temperate areas in summer.
- There are high levels of quarantine protection ranging from total import bans for some items (e.g. bananas) to strict procedures and protocols for others. No item can be imported unless there are established country specific and product specific protocols.
- Compliance with import protocols incurs significant inspection and clearance fees charged by the Department of Agriculture and Water Resources (DAWR) and the time taken to inspect consignments adds to transit times[3].
- Food retailers, particularly the large supermarket chains, are increasingly concerned about food safety and require their suppliers to employ formal food safety risk mitigation and traceability measures including HACCP certification. The supermarkets also employ "ethical sourcing" protocols which require all suppliers to be independently audited with regard to social and environmental standards.
- Australian consumers are accustomed to obtaining the bulk of their food supplies from Australian sources and are strongly averse to buying imported produce. The reasons for this are unclear, especially since so many Australians are recent immigrants. However retailers report that imported produce is very difficult to sell unless local supplies are limited or not available, or the imported alternative is significantly cheaper.
- Consumer aversion to imported food products may be amplified by the new country-of-origin labelling scheme following last year's furore over hepatitis-infected berries imported from China. From 1 July 2016 food that is made, produced or grown in Australia will show a kangaroo logo, while others will feature a bar chart to inform shoppers about the proportion of Australian ingredients in each product.

These five factors combine to make the Australian market difficult and expensive to access. However there are positive influences as well. First, Australia has a high degree of ethnic and culinary diversity which creates niche markets for a number of speciality foods which may not be of particular interest to mainstream consumers. Second, Australian food prices have become very expensive in recent years relative to other developed countries such as Europe and the US.

[3] Some major exporting countries (e.g. USA) have arranged pre-clearance procedures whereby DAWR inspects and clears consignments before they are shipped. This creates cost savings and reduces clearance times after arrival in Australia.

The structure of fresh produce markets in Australia is distinctly different from New Zealand (see below). The fresh produce trade in Australia is focussed on wholesale markets in the capital cities, which are large publicly owned facilities in which wholesalers and traders rent space. Growers consign produce to the wholesalers who on-sell to retailers and other end users. There are large numbers of relatively small wholesale businesses, but only a few of these deal in imported produce, because they can obtain almost all of their supplies domestically and because of the logistic and procedural complexities of fresh produce importation and the high risks associated with this, for example if a consignment is delayed or if it fails to pass quarantine inspection. Most of the wholesalers who do import, are speciality traders supplying Asian food retailers.

In terms of **geographic** target the three eastern seaboard cities (Brisbane, Sydney and Melbourne) present the most attractive and accessible sectors for PIC exporters. These have a combined population of around 12 million which is 50% of the national total, or perhaps 65% if nearby cities such as Gold Coast (Brisbane), Newcastle and Wollongong (Sydney) and Geelong (Melbourne) are also included.

The most accessible market entry point is via the **wholesale markets** in each capital city: Rocklea in Brisbane; Flemington in Sydney; and Footscray in Melbourne. These are all large well managed wholesale markets which supply the retail sector as well as food service and institutional customers. The operators in these markets include agents who sell on commission, as well as buyers and distributors for retail and other customers. Some of the supermarkets source supplies through the wholesale markets, whereas others have contracts with direct suppliers. Supply chains are often defined along ethnic lines with middle-eastern market operatives supplying middle-eastern green grocers, Chinese supplying Asian grocers etc. PIC exporters will generally find it easier to work with agents who are well connected to the ethnic supply chains rather than those who supply the supermarkets and up-market/boutique greengrocers, where food safety, traceability and “ethical sourcing” procedures can be onerous.

For PNG, the most accessible of the three major Eastern Australia wholesale markets is Brisbane’s Rocklea market which supplies the South-East Queensland (Brisbane-Gold Coast-Sunshine Coast) population of around 3.4 million people. During the winter months a large amount of the fresh produce produced in Queensland is also traded through Rocklea to Southern destinations.

New Zealand

The gross value of production from New Zealand’s horticulture sector (including wine) in 2014 was NZD 7.0 billion of which NZD 3.9 billion (56%) was destined for export. Fruit production was valued at NZD 2.65 billion (67% exported) and vegetables NZD 1.78 billion (34% exported). About 2% of fresh fruit and vegetable exports was classified as organic. Imports of fruit and vegetables were worth around NZD 740 million, less than 20% of exports, and mainly comprising tropical fruits such as bananas and pineapples and vegetables in availability gaps in New Zealand’s own seasonal production. The main sources of imports by value were:

- Australia (NZD 230 million): wine, macadamia and other nuts, frozen potatoes, fruit juice, mandarins, melons, oranges;
- USA (NZD 150 million): nuts, table grapes, dried fruits, oranges, dried beans, preserved tomatoes and fruit preparations;
- Philippines (NZD 60 million): bananas and pineapples;
- China (NZD 58 million): frozen vegetables and nuts;
- France (NZD 50 million): wine.

Other sources of imports include Italy (tomato products, olive oil and wine); Turkey (dried fruits); Ecuador (bananas); South Africa (wine and fruit preparations); Vietnam (cashews); Thailand (fruit preparations); Chile (table grapes); Fiji (taro); Brazil (orange juice); Canada (dried beans); and the Netherlands (flower bulbs).

Although imports are fairly minor compared to the size of the domestic and export markets, imports are important for some product categories such as the tropical fruits (bananas, pineapples, mangoes

and papaya), tropical root crops (taro, yams, etc.), and for temperate products during the cooler months (May to November).

The New Zealand fresh produce market is built around five or six key wholesale businesses, which operate in similar ways. These are much larger businesses than Australian wholesalers, and operate their own depots, and all deal in imported produce. They procure supplies of fresh fruit and vegetables from New Zealand growers, supplemented by imported supplies when necessary, or in the case of tropical products imports take place year round. The wholesalers all operate one or more storage and distribution centres where they receive, grade, pack, sell and distribute produce. They operate trading floors where retailers and other wholesale customers can purchase produce 24 hours per day, 6.5 days per week. Most also operate as exporters. All of these businesses are very experienced importers with global sourcing networks and facilities for receival, quarantine inspection and fumigation of imported produce. Most provide the full range of products required in the mainstream market as well as specialised products demanded by various ethnic groups including Pacific Islanders, Indo-Fijians and Asians.

MSG Countries

The total population of the MSG countries excluding PNG is 2.1 million with relatively large percentages of these engaged in subsistence agriculture. The number of people in the MSG countries who could be considered potential consumers of imported fresh produce is probably less than 250,000. There are also about 1.5 million tourist visits per year, mostly to Fiji and Vanuatu, but this is equivalent to only about 35,000 full time residents. Thus the total target market would be less than 300,000 people compared to about 3.4 million in South-East Queensland, 1.5 million in the greater Auckland area and around 1.0 million in PNG's own urban areas. In term of market size therefore MSG represents a very small market compared to Australia, New Zealand and the PNG domestic market. In addition, the MSG countries generally produce a similar range of fresh produce commodities as PNG, and one (Fiji) has a well-established fresh produce export sector. Air and sea transport linkages between PNG and the MSG countries are also inferior to those with Australia and New Zealand. Air Niugini flies from Port Moresby to Nadi via Honiara and return three times per week but uses B737 aircraft with limited freight capacity. Sea voyage times from Lae or Port Moresby are also longer and less reliable than voyages to Eastern Australian and New Zealand ports.

On the other hand access to the MSG market presents fewer technical obstacles than to New Zealand and especially Australia. This has enabled one PNG company to export small consignments of tomatoes to Fiji, where domestic prices are high during the wet season (November to March) when local production is difficult. However, intra-MSG trade in fresh produce has not developed to any significant extent, with the majority of fresh produce imports into Port Moresby coming from Australia, and very small volumes of exports from PNG to MSG countries.

Whilst high prices in Port Moresby suggest that there might be profitable opportunities for exports from MSG countries to PNG, there are a number of reasons why this has not happened. Air freight capacity is limited and costs are high. Shipping schedules are also unfavourable with most regional shipping movements in a clockwise direction, passing through MSG ports on the southbound voyage and via Australian ports on the northbound sectors.

PHAMA is investigating options to assist the MSG secretariat to foster intra-MSG trade. If intra-MSG trade in fresh produce is to be fostered over time there is a need for an increased trade facilitation dialogue at the quarantine and biosecurity level between MSG regulatory authorities and the private sector. Improved market information for potential exporters and importers, timely processing of technical market access requests using a science-based approach and the development of regional quarantine standards for commonly traded products are areas for investigation and discussion with the MSG Secretariat and member countries.

Asia

There are few technical barriers to access in the large urban markets of Asia such as Hong Kong and Singapore. However, precisely for this reason, these markets are fiercely competitive and abundantly supplied by low-cost/high quality Asian producers such as Vietnam, China and Taiwan. As a high cost producer PNG has little chance of penetrating these markets.

2.8 Export Constraints

Technical and Supply Chain Issues

Potential export marketing pathways for fresh produce overlap to a considerable extent with the current domestic marketing pathways. It is therefore useful to look at domestic market access constraints and opportunities and consider implications for possible future exports. Key technical and supply chain issues include the following:

- There is currently only one organisation exporting fresh fruit and vegetables from PNG (to Fiji). This organisation is a joint venture between an Israeli company and several PNG business interests and operates a modern greenhouse production unit near Port Moresby.
- Roads from production areas to consolidation points and or ports are poor and there are very few cool storage or processing options in production areas or at regional airports.
- Small fresh produce consolidation points with cool stores have been recently established in Kainantu, Simbu and Mount Hagen. These facilities have been established as joint business ventures through NZ MFAT private sector funding. Suppliers to these consolidation points are predominantly smallholder farmers.
- Consistent supply of quality product remains a key constraint to the establishment of formalised domestic market access pathways, which are a prerequisite for successful export marketing.
- FPDA has the mandate to promote the increased production of fresh fruit and vegetables. However it appears to be under-resourced with insufficient extension staff and training materials.
- There is a considerable lack of trust by farmers of other players along the supply chain. This results in reduced aggregation of product and farmers accompanying relatively small volumes of product from the farm gate to eventual markets contributing to existing inefficiencies.
- There is a small group of middlemen emerging who purchase produce from farmers and then sell to retailers in the main commercial centres. As farmers expect immediate payment, these middlemen face considerable financial challenges to finance sufficient volumes of product until they have sold the product to retailers and received payment.

Exchange Rates

Exchange rate movements over the last five years have not favoured PNG exporters to Australia. In March 2011 one AUD of exports yielded PGK 2.56. This has now fallen to around PGK 2.12. As shown in Figure 2 all of the MSG currencies have strengthened relative to the AUD over the last five years by about the same amount except for the SBD which has gained even more.

Figure 2: Index of Exchange Rates: AUD versus MSG Currencies

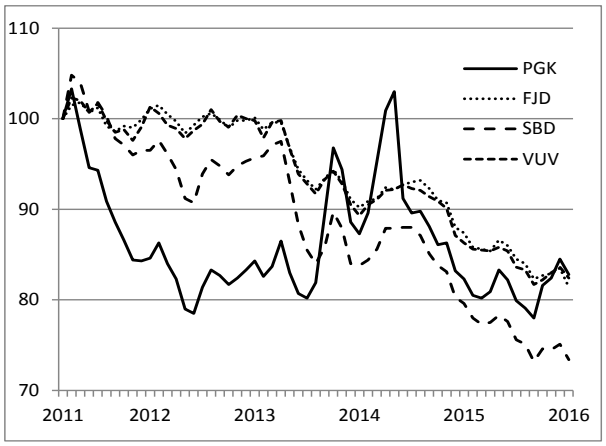
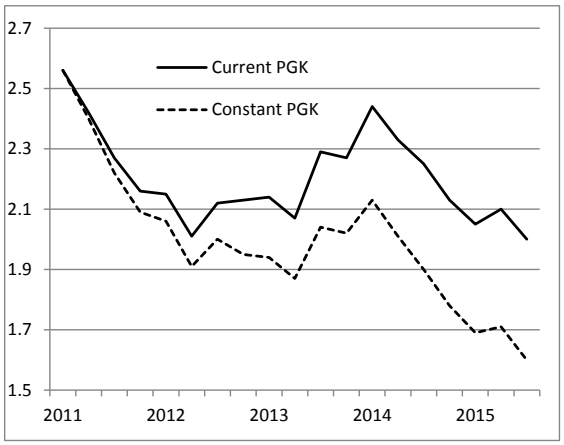


Figure 3: Purchasing Power of one AUD of Exports in PGK



The exchange rate trend is even more adverse for PNG exporters when domestic inflation is taken into consideration. As shown in Figure 3, the purchasing power of one AUD of exports fell in real terms from PGK 2.56 in the first quarter of 2011 to PGK 1.60 in the third quarter of 2015, adding to the headwinds already faced by exporters.

Institutional Capacity

To date the focus has been primarily on the export of bulk commodities and as a result there is limited capacity to implement and maintain more complex market access requirements associated with value added and higher value products. This limited capacity is reflected in the considerable frustration within the private sector relating to PNG Government's management of international market access issues. A brief assessment of the capacity of government departments with market access responsibilities is provided below.

Department of Health

The Food Sanitation Council Secretariat sits within DOH and reports directly to the office of the Health Minister. The Secretariat is responsible for the management, administration and enforcement of food standards within PNG. In reality the Secretariat is small and under-resourced with only one accredited officer to conduct audits of businesses processing and preparing food products. If exports of processed agricultural products are to be developed and promoted, clarification of roles and responsibilities and strengthening and capacity building of relevant staff to manage, administer and enforce standards would be required.

The PHAMA Inception Study (2015) identified areas where PHAMA could assist DOH with the development of appropriate food standards, provision of audit and verification training, provision of hazard analysis and critical control points (HACCP) for selected premises and accreditation of businesses to meet importing country requirements for export.

DAL – Science and Technology Branch

The Science and Technology branch of DAL is the national contact point for Codex and as such is responsible for the development of national food standards. In addition DAL has established the PNG National Codex Committee, but the effectiveness of this committee to implement changes to improve food standards remains unclear. Food standards and regulations are outlined within numerous pieces of legislation that are fragmented and do not provide the necessary mandate to regulate in many instances. The need for the review and refinement of regulations has been highlighted as an urgent requirement if food standards are to be effective and relevant for both domestic and export-oriented applications.

NAQIA

NAQIA is the responsible authority for the administration, implementation and certification of agricultural products for import and export. This work includes the conduct of risk assessments for

agricultural imports and the development of technical market access submissions (for new market access) and implementation and maintenance of existing export protocols. NAQIA also plays a central role in bilateral negotiations associated with imports and exports of agricultural products.

Due to a very recent round of recruitment NAQIA has a strong complement of capable veterinary and plant scientists who are well versed in the relevant international standards, protocols and procedures. However, practical experience in the interpretation and application of these standards and procedures to gain and maintain international market access is lacking. There is a need to build capacity and expertise of NAQIA officers to better administer and implement international market access principles and procedures at a national level. This work would include (but not be limited to):

- Training in the development of technical market access submissions and associated documents.
- Conduct of risk assessments and associated risk management strategies for pests and diseases.
- Assistance with the bilateral negotiations process to gain and maintain markets.
- Training in audit and review processes to verify the integrity of export pathways.
- Improvements in stakeholder consultations related to market access.
- Developments of templates and guidelines for the conduct and communication of risk assessments and technical market access submissions.
- Streamlining of the administrative processes (including development of electronic certification) associated with import and export.

Ensuring farmer and exporter compliance with specified export protocols does not appear be the responsibility of NAQIA. Responsibility for this area primarily sits with DAL and the commodity boards but roles and responsibilities are not clearly delineated and effectiveness is questionable. The verification of protocol compliance at the farmer and exporter level is another important area for focus for PHAMA.

Private Sector

Apart from bulk commodities there are very few private sector agricultural exports. This is largely due to strong domestic demand, supply chain logistical challenges and a lack of capacity and understanding of international markets by both the private sector and government.

During the course of the 2015 PHAMA Scoping Mission several private sector exporters (or potential exporters) were located. While they expressed a dissatisfaction with the Government's ability to facilitate exports, they were determined to maintain or develop new export markets. PHAMA actively engages with the private sector to build capacity to drive agricultural exports in association with relevant government departments. While the private sector is relatively fragmented in PNG a primary focus of the PHAMA program is to engage with the private sector to gain, maintain and improve export markets for agricultural products.

Capacity to Undertake R&D Related to Market Access

Feasibility Studies

There appear to have been very few market access related feasibility studies commissioned or completed by PNG Government in the area of agricultural investment or trade facilitation. These studies are considered essential to ensure that investment by public and private sectors are targeted at areas that are likely to provide returns on investment and increase economic prosperity.

Pest Surveys

Surveys for pests and diseases associated with agricultural commodities are conducted on a regular basis by NAQIA and to a lesser extent by NARI. Surveys are also conducted in association with the Northern Australian Quarantine Strategy on a less regular basis. As a result of past survey history and regular and ongoing surveys there are good pest and disease lists and scientific records for the

majority of PNG production areas. These lists and records are an essential component of international market access for agricultural commodities.

Application of Food Standards to Promote and Maintain Market Access

The area of food standards development, implementation and management is shared between DOH (audit and enforcement of standards), DAL – Science and Technology Branch (Codex secretariat) and NAQIA (certification of processed products). Roles and responsibilities are not clearly demarcated and communication between departments is limited.

There is currently discussion within government departments regarding the need for the development of a national food standards authority to better coordinate the development, implementation and enforcement of national food standards. However, support for the concept and possible budget and timelines for development remain unclear.

While PNG continues to work to address major human health issues, food standards and food safety must be addressed to both ensure national standards are set and implemented but also to ensure that any future processed food based exports have adequate standards applied.

2.9 Complementary Activities

The Australian Centre for international Agricultural Research (ACIAR) has been engaged in research to better manage pests and diseases and improve production within the PNG agricultural sector for many years. At the time of conducting the scoping mission, ACIAR is developing another package of agricultural interventions including phase 2 of the Pacific Agribusiness Research for Development Initiative (PARDI). It is understood that PNG will be included in this initiative and PHAMA will continue to engage with ACIAR on possible program synergies within the Pacific region including PNG.

The International Fund for Agricultural Development (IFAD) is an agency of the United Nations with a mandate to finance agricultural development projects within developing countries. IFAD's primary focus in PNG (in partnership with the World Bank) has been on coffee and cocoa through the Productive Partnerships in Agriculture Project (PPAP). The aim of PPAP has been to promote partnerships between coffee and cocoa growers and the private sector, with the objective of increasing smallholders' production and marketing. IFAD is now seeking to expand on PPAP through the Market for Smallholders Project. The project is still at preliminary design phase but will seek to help small farmers gain better access to markets, technologies and services to improve planning, production and profitability. PHAMA will engage with IFAD to seek potential synergies with the existing PPAP and the Smallholders Project as it develops.

The New Zealand MFAT is currently implementing a fresh produce initiative seeking to work with suitable agricultural producers and service providers to produce and supply fresh vegetables at the national level. Details of the project were not available at the time of the scoping mission but PHAMA will continue to monitor the development of this project.

2.10 Biosecurity Issues

Existing Market Access

PNG's primary focus has been on the export of bulk commodities and the production and associated supply chains for domestic fresh produce. Consequently there have been few efforts to develop export pathways and market access into Australia, MSG countries and New Zealand is very limited.

Access to Australia: Australian import conditions for fresh and processed agricultural products can be found at the Department of Agriculture and Water Resources (DAWR) - Biosecurity Import Conditions System (BICON) online database[4]. Based upon information provided by relevant databases and discussions as part of this study, Appendix D provides details of existing market access for fresh produce from PNG to Australia, MSG countries and New Zealand. PNG currently has access for six fresh commodities (or in the case of Brassica species a commodity group) to Australia

[4] http://www.agriculture.gov.au/import/online-services/bicon

and two of these commodities (Asparagus and Brassica spp.) were on the national priority list given in Appendix A.

Access to New Zealand: New Zealand Ministry of Primary Industries (MPI) import conditions for fresh fruit and vegetables can be found under the on-line Import Health Standards database[5]. The MPI Standard 159.02 – *Importation and Clearance of Fresh Fruit and Vegetables into NZ* provides relevant details for international access. PNG currently has access for seven fresh commodities to NZ and one of these commodities (ginger) was on the national list. It is important to note that none of the listed commodities are currently being exported in commercial volumes to any of the destination countries.

Access to MSG Countries: The MSG group of countries currently does not have a publically available database to provide import and export details for tradeable commodities, including fresh fruit and vegetables. This is a possible area for further development. PNG currently has access for three fresh commodities to Fiji and two of these commodities (lettuce and tomato) are on the national priority list. A new export pathway for hydroponic capsicum, lettuce and tomato into Fiji was established in 2015 with approximately 500 kg of product being shipped by one Port Moresby producer. There are no other know exports of fresh produce to other MSG countries.

3.0 Export Market Opportunities for Fresh Produce

3.1 Products Technically Feasible to Export

As a starting point for this activity PHAMA engaged with NAQIA, FPDA and other private and public stakeholders to develop a preliminary list of twenty fresh commodities as potential exports (Appendix A). This list served as the starting point for the market access study. This initial list was developed using information on ability to grow the commodity in PNG, domestic market prices, relevant quarantine considerations and any past or present fresh fruit and vegetable studies or research projects.

From the list of twenty commodities PNG currently has access for:

- **Asparagus, broccoli and cauliflower to Australia.** Quarantine conditions are not technically onerous (standard phytosanitary certification stating that the product has been inspected and found free of weeds, seeds and quarantine pests). However, wholesale market prices in Australia (see Appendix G) would suggest that Asparagus is the only one of these commodities that is likely to be a profitable export for PNG.
- **Lettuce and tomato to Fiji.** Quarantine conditions are yet to be clarified but it is suspected that standard phytosanitary certification (as above) is required. The lettuce and tomatoes that have been exported recently are produced under commercial hydroponic shade-house conditions by one supplier. The ability to supply in sufficient volumes appears to be the main constraint to this export market.
- **Ginger to New Zealand.** A trial shipment of ginger to New Zealand was conducted in 2010, but it appears that the wholesale price was not sufficient for this export pathway to be profitable.

After consideration of the national list of twenty commodities (Appendix A) and several others suggested by the PHAMA team; and existing market access for fresh commodities to Australia, MSG countries and NZ (Appendix D) the following commodities are technically feasible for export under existing market access arrangements.

- Garlic, asparagus and coconuts to Australia.
- Coconuts and ginger to New Zealand.

[5] https://www.mpi.govt.nz/law-and-policy/requirements/import-health-standards/

- Initial exports of hydroponic capsicum, lettuce and tomato to Fiji from a single supplier, have proven to be technically feasible, but further supply depends on domestic market prices.
- Initial considerations suggest that the other commodities for which PNG currently has market access are not likely to be profitable exports as market prices within the target markets are not sufficient to establish a profitable export pathway.

3.2 Potential to Expand Market Access

There are some products that may be potentially profitable exports from PNG to Australia and New Zealand that PNG currently does not have access for: sweet potato, chillies, beans, okra and Tahitian limes for example. To gain access for these products a detailed market access submission would need to be prepared and a detailed risk assessment conducted by the importing country. This is a lengthy (five to seven years) and technically demanding process that would require considerable technical input to achieve a successful outcome.

National Technical Capacity

The responsibility to implement and maintain international market access requirements primarily rests with NAQIA as the National Plant Protection Organisation (NPPO) of PNG. To date NAQIA's focus has been on the export certification of bulk commodities and as a result there is limited capacity to implement and maintain more complex market access requirements associated with fresh produce.

NAQIA does have a strong complement of capable veterinary and plant scientists who are well versed in the relevant international standards, protocols and procedures. However, practical experience in the interpretation and application of these standards and procedures to gain and maintain international market access is lacking. There is a need to build capacity and expertise of NAQIA officers to better administer and implement international market access principles and procedures at a national level. This work would include, but not be limited to:

- training in the development of technical market access submissions and associated documents;
- conduct of risk assessments and associated risk management strategies for pests and diseases;
- assistance with the bilateral negotiations process to gain and maintain markets;
- training in audit and review processes to verify the integrity of export pathways;
- improvements in stakeholder consultations related to market access;
- developments of templates and guidelines for the conduct and communication of risk assessments and technical market access submissions; and
- streamlining of the administrative processes associated with export.

Responsibility for farmer and exporter compliance with specified export protocols does not appear to be an area of responsibility that sits with NAQIA. Responsibility for this area primarily resides with FPDA and to some extent DAL. However roles and responsibilities will need to be further clarified if fresh produce export pathways are to be developed. It is evident that both of these organisations are under resourced, have considerable budget issues and would also require capacity building if they were to play a role to assist with farmer education and compliance to meet the requirements of export protocols.

4.0 Potential for Exports

4.1 Overview

The many obstacles to successful export of fresh produce from PNG create a need to be highly selective in identifying candidates for export pathway development. Initial screening reduced the list of potential products from almost 100 to around 20, with a further six added during the course of the current study. This section presents the findings of more detailed analysis based on multiple criteria to rank these 26 products as high, medium or low priority. The main factors considered were PNG and Australian market prices, looking for items with price differentials wide enough to cover the costs and risks incurred in the value chain, and to justify the level of investment needed to negotiate market access arrangements. Both air and sea freight pathways were considered depending on the perishability/storage life of the various items. The analysis is based on the data presented in the following Appendices:

Appendix E: Domestic Market Data for Fresh Produce

Appendix G: Brisbane Wholesale Market Data

Appendix H: Value Chain Analysis

Appendix I: Summary of Supply, Demand and Market Access Issues

Appendix J: Major Findings by Commodity

4.2 PNG Market Prices

Appendix E provides an analysis of market reporting data collected by FPDA over the six-year period 2009-2014. It shows annual average prices in eight urban markets for 24 commodities. Data for 2015 are not yet available, but prices in 2015 were generally higher than previous years due to the prolonged drought and import restrictions on some items. The price data are summarised in Table 1.

Table 1: Summary of PNG Market Prices for Fresh Produce 2009-2014, PGK/kg

	GOR	LAE	HAG	WEW	POM	POP	MAD	KOK
Avocado	1.40	1.97	1.49	2.17	3.47	0.87	3.54	2.55
Cooking Banana	1.72	1.19	2.73	1.08	2.29	1.07	1.46	1.02
Ripe Banana	1.24	1.56	1.40	1.19	2.70	0.92	2.33	2.20
French Beans	2.92	3.18	2.79	1.65	6.26	2.49	5.91	5.74
Snake Beans	3.64	2.47	2.82	1.61	6.37	2.53	4.65	2.56
Broccoli	4.77	4.31	2.71	4.12	7.83		4.59	4.24
Cabbage	1.10	2.07	0.98	2.17	4.69	2.04	1.70	4.13
Pakchoi	1.95	3.07	1.89	2.44	4.97	2.28	5.05	2.97
Capsicum	6.19	3.95	4.51	3.83	11.73	2.89	8.53	5.13
Carrot	1.81	2.15	2.51	3.14	6.32	1.12	2.31	5.23
Corn	1.66	1.43	1.04	1.23	3.22	0.76	1.40	1.73
Cucumber	1.81	1.41	1.24	1.52	3.16	0.90	1.45	1.94
Garlic	24.58	34.51	15.90	12.59	28.14	2.15	20.87	25.36
Ginger	4.49	4.78	3.92	3.57	8.21	3.16	7.25	9.28
Lettuce	3.30	3.42	3.37	2.80	9.33		9.18	13.51
Bulb Onion	5.40	3.51	5.70	3.60	5.39		6.62	14.00
Spring Onion	3.00	2.91	2.12	3.39	15.81	2.67	5.64	6.24
Orange	2.98	1.94	2.77	1.40	5.55	1.25	5.05	2.47
Peanut	6.95	2.71	7.50	2.81	9.85	2.61	5.88	5.49
Pineapple	2.23	2.00	2.11	1.49	4.94	0.95	3.11	3.60
Potato	2.01	1.69	2.01	2.31	4.04	0.98	1.89	2.00
Sweet potato	0.85	1.02	0.85	0.98	2.17	0.72	1.10	0.92
Taro	0.95	1.08	1.07	1.27	2.49	0.93	0.83	0.92
Tomato	2.96	4.93	3.93	2.79	5.77	2.18	7.25	3.79
Average of all items	**3.74**	**3.89**	**3.22**	**2.71**	**6.86**	**1.69**	**4.90**	**5.29**

GOR = Goroka; LAE = Lae; HAG = Mount Hagen; WEW = Wewak; POM = Port Moresby; POP =

Popondetta; MAD = Madang; KOK = Kokopo

Source: FPDA Market Reporting Service

Among the major PNG markets, Mount Hagen is the cheapest followed by Goroka, Lae and Port Moresby. Prices in Port Moresby were well above other markets for almost every product. Onions are an exception since they are imported directly to Port Moresby. This also applies to some extent with garlic. The implications are that any export via Port Moresby whether by sea or air freight, has to be considered relative to the very high prices available in the local market. Whilst Mount Hagen and Goroka are much cheaper sources of fresh produce, to be exported it first has to be sent by road to Lae from where it can be exported by sea; or by air to Port Moresby from where it can be exported by air or sea, depending on the commodity. All of these are multi-stage export marketing pathways which incur high freight and handling charges and provide many opportunities for damage and quality deterioration. The very high prices available for most products in Port Moresby, and the large volumes traded, are strong disincentives to export but provide attractive opportunities for import substitution. Madang and Kokopo are also relatively expensive markets and offer no meaningful export opportunities. Popondetta is quite cheap but is a small market and very isolated.

4.3 Australian Market Prices

Appendix G presents monthly Brisbane wholesale market data over the last two years for 23 of the 26 short-listed (original 20 plus six additional) commodities[6]. Average prices and price ranges for the various items are shown in Table 2 on the following page. In general commodities in the upper left part of Table 2 present few export opportunities unless they can be sourced very cheaply in PNG and transported by sea freight. Coconuts and sweet potato fall into this category. Items in the lower right hand part of Table 2 are high value products which are potential candidates for air freight. Chillies, okra and asparagus are possibilities. Garlic appears to be a very high priced item but the high prices are only available for local (Australian) garlic which is a small segment of the market. PNG product would have to compete with imported garlic which is much cheaper.

[6] Brisbane market data are not available for aibika, snake gourd and sugar fruit.

Table 2: Average Prices and Price Ranges for Brisbane Market 2014 and 2015 (AUD)

Item	Unit	$0-$1	$1-$2	$2-$3	$3-$4	$4-$5	$5-$6	$6-$7	$7-$8	$8-$9	$9-$10	$10-$11	$11-$12	$12-$13	$13-$14	$14-$15	$15-$16	$16-$17	$17-$18	$18-$19	$1
Onions	kg																				
Shallots	bunch																				
Pineapples	each																				
Carrots	kg																				
Cabbages	kg																				
Coconuts	nut																				
Potatoes	kg																				
Sweet Corn	kg																				
Chokos	kg																				
Sweet Potato	kg																				
Tomatoes	kg																				
Spring Onions	bunch																				
Beans, machine picked	kg																				
Broccoli	kg																				
Garlic, Imported	kg																				
Leeks	kg																				
Tahitian Limes	kg																				
Beans, hand picked	kg																				
Ginger	kg																				
Snake Beans	kg																				
Chillies, Hot Red Long	kg																				
Okra	kg																				
Chillies, Birdseye	kg																				
Asparagus	kg																				
Lettuce	carton																				
Garlic, Local	kg																				

4.4 Transport Linkages

Internal Transport

In all cases significant internal transport costs would be incurred in moving fresh produce from the producing areas to an international air or sea port. The main internal transport pathways are:

- Highlands to Lae by road and then Lae to Port Moresby or other domestic markets (Madang, Kokopo, etc.) by sea. This is a long and expensive marketing pathway which takes 8-12 days in total. The sea voyage (5-6 days) is in refrigerated containers but the road transport from farm to Lae is generally un-refrigerated and with poor packaging and multiple handling. Consequently losses and quality deterioration are high.
- Highlands (Goroka and Mount Hagen) to Port Moresby by air. More perishable and higher value items such as broccoli are air freighted to Port Moresby. PNG Air provides cold storage at Mount Hagen airport and is planning to install cold storage at Goroka. Air Niugini does not have cold storage at either of these airports. Air freight costs PGK 5-6 per kg.
- Central Province and peri-urban areas to Port Moresby by road. The bulk of produce sold in the Port Moresby markets is sourced from Central Province. It is mostly transported by market vendors or traders in small vehicles with poor packaging and handling, often on rough roads in hot conditions. However distances are quite short and most produce is transported and sold within a day or two.

International Transport

Sea freight export of fresh produce could pass through either Port Moresby or Lae. However, given the high prices in Port Moresby, the most viable route would be via Lae. There are regular sailings from Lae to Brisbane with voyage times of 6-8 days. Voyages are 14-16 days to Auckland, 17-19 days to Sydney and 20-21 days to Melbourne. Brisbane is clearly the most accessible destination for sea-borne exports. However, reefer container availability is limited on all south-bound routes due to the large volumes of fish exported.

Air Niugini provides daily B767 flights from Port Moresby to Brisbane with up to 16 tonnes of air freight capacity. Refrigerated cold storage is available at the airport and the airline regularly handles imported perishable products. South-bound flights generally have spare freight capacity and costs are in the range of PGK 5-6 per kg. Lower rates could be negotiated for regular shipments. There are a few flights from Mount Hagen to Cairns but these have limited freight capacity.

4.5 Value Chain Analysis

The value chain analysis in Appendix H is based on price differentials between Lae/Port Moresby and Brisbane less the various transport and other charges likely to be incurred. This identifies a small number of products where profitable export may be possible.

There are several commodities which could be potentially profitable for sea freight from Lae to Brisbane. These include **sweet potato** which as shown in Table 1 can be procured at very low cost (PGK 1.00/kg or less) in Lae and other PNG markets; and **ginger** which as shown in Table 2 is a relatively high priced item in the Brisbane market. Although not shown in the analysis, it is expected that **coconuts** could also be profitable as a sea freight export out of Lae. The results for sea freight export from Port Moresby to Brisbane are less attractive because of the much higher cost of transporting produce to the point of shipment or sourcing locally.

Appendix H also shows that the air freight export marketing pathway for the four commodities assessed appears unlikely to be profitable. **Snake beans** are a possibility if they could be sourced much more cheaply than at present. **Chillies** and **asparagus** are also potentially profitable air freight commodities due to the relatively high prices available in Brisbane, all year round for chillies, and during the winter months for asparagus.

4.6 Other Considerations

Appendix I introduces a number of qualitative criteria such as domestic supply levels, production systems, suitability for sea freight and proximity to a sea port, financing needs, seasonality, fruit fly host status, and current and potential market access. A number of demand issues are also considered including price seasonality in Australia, whether imported produce is currently available in the market, and whether any market opportunities are immediate or longer term.

4.7 Priorities for Export Pathway Development

Appendix J combines the findings presented in Appendices E, G, H and I to summarise the major conclusions for each of the 26 commodities considered in the study, and classifies them as low, medium or high priority as follows:

Medium/Low Priority	Medium/High Priority
• Ginger • Tahitian Limes • French Beans • Snake Beans • Okra	• Asparagus • Sweet Potato • Chillies • Coconuts
Low Priority	
• Aibika • Broccoli • Cabbages • Carrots • Chokos • English Potatoes • Leeks • Lettuces • Bulb Onions	• Pineapples • Shallots • Snake Gourd • Spring Onions • Sugar Fruit • Sweet Corn • Tomatoes • Garlic

These priorities for export pathway development need to be considered relative to domestic marketing opportunities which are easier and much more attractive in most cases, and include a number of import substitutes such as onions, garlic and potatoes for the mainstream market and a range of high quality fresh fruits and vegetables for the hospitality and catering service providers.

5.0 Conclusions and recommendations

5.1 Conclusions

The major conclusions arising from the study are that the opportunities for profitable fresh produce export in PNG are few and far between, and that investment in the development of domestic marketing systems should be given higher priority. This is consistent with the findings of previous studies.

Only one of the four medium/high priority commodities, coconuts, currently has access to the Australian market and is in abundant local supply. Asparagus also has access but is not produced in commercial quantities. Major investments would be required to develop export marketing pathways for all but coconuts. Asparagus is imported to Australia when local supplies are not available, but the small amount of asparagus grown in PNG is not of export quality. Chillies are a fruit fly host and strict control protocols would need to be developed to obtain access to the Australian market. Sweet potato is likely to present fewer challenges in terms of market access but production would have to be commercialised in order to produce the varieties and specifications required in the Australian market. The main sweet potato variety consumed in Australia has been trialled successfully by NARI but is not

produced commercially. These production and market access issues would require substantial investments over many years to resolve, and with no guarantee of success.

Among the medium/low priority commodities, ginger is a potentially profitable export but experience in processing Fiji's market access application suggest that this would be strongly resisted by the Australian ginger industry and likely to be a prolonged and expensive struggle. Beans are a possibility but only after careful varietal screening and selection and the development of rigorous pest control protocols as part of a market access application. Tahitian limes may be a fruit fly host in PNG so heat treatment (HTFA) could be necessary. Okra is growing in popularity in Australia and could be a viable air freight commodity with few biosecurity issues, but the market is still very small.

Based on these conclusions it is questionable whether PNG should invest significant resources in the development of fresh produce export marketing pathways, given the likelihood that, in the immediate future, better returns would be forthcoming from the development of the domestic market. Once the current deficiencies and bottlenecks in the domestic value chains have been remedied there would be a much stronger platform from which to launch an export initiative.

5.2 Recommendations

The recommendations address two key questions:

- What is required to advance from the current status where the prospects are rather limited towards a situation where PNG is ready to launch a meaningful fresh produce export initiative?
- How can PHAMA support this transitional process during the short time remaining until completion of the current Phase in June 2017?

The following recommendations are based on interim recommendations which were reviewed and endorsed at a stakeholder workshop (see proceedings in Appendix K) at Lae on 22 March 2016.

Recommendation No 1

Develop detailed strategies and timelines for the export of the medium to high priority commodities for export to Australia as follows:

1. Coconuts – provide assistance to facilitate trial sea freight shipments under existing Australian import conditions to an Eastern Australian port.
2. Asparagus - provide assistance to facilitate trial air freight shipments under existing Australian import conditions to Brisbane.
3. Sweet potato – provide assistance to NPPO and other stakeholders to seek new market access to Australia.
4. Chillies - provide assistance to NPPO and other stakeholders to seek new market access to Australia.

Recommendation No 2

Support the development of NAQIA's capacity through training in export facilitation and the development or streamlining of relevant procedures and protocols using recommended commodities.

Recommendation No 3

Partner with and provide technical support to existing and potential programs to develop PNG's domestic fresh produce marketing pathways on the grounds that streamlining these pathways will contribute greatly to PNG's export readiness, as well as its import substitution capacity. Potential partners include: the NZ Fresh Produce Initiative and the proposed IFAD-supported Markets for Village Farmers (*Maket Bilong Vilis Fama*) project.

Recommendation No 4

Identify appropriate R&D to address supply issues for medium to high priority commodities under Recommendation 1. The R&D may include varietal screening and evaluation, development of grading and packaging formats, post-harvest management (handling/storage), food safety protocols and other measures to advance export readiness. This work would need to be undertaken in partnership with NARI, FPDA and other appropriate service providers.

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Appendix A

List of Commodities Considered

Appendix A List of Commodities Considered

Initial List, Prior to Screening

No.	Product	Scientific Name
Traditional Leafy Vegetables		
1	Aibika	*Abelmoschus manihot*
2	Amaranths	*Amaranthus* spp.
3	Blackberried nightshade	*Solanum nigrum*
4	Choko	*Sechium edule*
5	Drumstick leaves	*Moringa oleifera*
6	Kalava	*Ormocarpum orientale*
7	Kangkong	*Ipomoea aquatica*
8	Kongkonga/Stripped Cucumber	*Diplocyclos palmatus*
9	Taro leaves	*Colocasia esculenta*
10	Two leaf/ Tulip/ Melinjo	*Gnetum gnemon*
Leafy Vegetables		
11	Broccoli	*Brassica oleraceae* Oleraceae group
12	Brussels sprout	*Brassica oleraceae* var *gemmifera*
13	Cabbage	*Brassica oleraceae* Capitata group
14	Cauliflower	*Brassica olearaceae* Botrytis cultivar *group*
15	Celery	*Apium graveolens* var. *dulce*
16	Chinese cabbage	*Brassica sinensis*
17	Coriander	*Coriandrum sativum*
18	Indian spinach	*Basella alba*
19	Leek	*Allium porrum*
20	Lettuce	*Lactuca sativa*
21	Okra	*Abelmoschus esculentus*
22	Spinach	*Spinacia olearaceae*
Other Vegetables		
23	Artichoke	*Cynara scolymus*
24	Asparagus	*Asparagus officinallis*
25	Capsicum	*Capsicum annum*
26	Carrot	*Daucus carota*
27	Marrow/ Zucchini/ Squash	*Cucurbita pepo*
28	Parsnip	*Pastinaca sativa*
29	Pumpkin	*Cucurbita pepo*
30	Radish	*Raphanus sativus*
31	Turnip	*Brassica rapa*

Initial List, Prior to Screening (Continued)

No.	Product	Scientific Name
	Fruit	
32	Avocado	*Persea americana*
33	Banana, cooking	*Musa* spp.
34	Banana, ripe	*Musa* spp.
35	Bitter melon/Bitter Gourd	*Momordia charantia*
36	Bottle gourd	*Lagenaria siceraria*
37	Breadfruit	*Artocarpus altilis*
38	Chilli	*Capsicum frutescence*
39	Cucumber	*Cucumis sativus*
40	Eggplant	*Solanum melongena*
41	Guava	*Psidium guajava*
42	Indian mulberry/Noni	*Morinda citrifolia*
43	Langsat	*Lansium parasiticum*
44	Lime, tahitian	*Citrus latifolia*
45	Mango	*Mangifera indica*
46	Melon	*Cucumis melo*
47	Naranjilla	*Solanum quitoense*
48	Orange	*Citrus sinensis*
49	Pawpaw	*Carica papaya*
50	Pineapple	*Ananas comosus*
51	Pomelo	*Citrus grandis*
52	Smooth loofah/Sponge gourd	*Luffa cylindrica*
53	Snake gourd	*Trichosanthes cucumerina*
54	Soursop	*Annona muricata*
55	Sugarfruit/ highlands passionfruit	*Passiflora spp.*
56	Tamarind	*Tamarindus indica*
57	Tomato	*Solanum lycopersicum*
58	Vanilla	*Vanilla fragrans*
59	Watermelon	*Citrullus lanatus*
60	Wax gourd	*Benincasa hispida*
	Herbs	
61	Basil	*Ocimum basilicum*
62	Chive	*Allium schoenoprasum*
63	Onion	*Allium cepa*
64	Parsley	*Petroslinum crispum*
65	Shallot	*Allium cepa* var. *aggregatum*
66	Spring onion	*Allium* spp.

Initial List, Prior to Screening (Continued)

No.	Product	Scientific Name
	Legumes	
67	Bean, broad	*Visia faba*
68	Bean, cluster	*Cyamopsis tetragonollobus*
69	Bean, hyacinth	*Lablab purpureus*
70	Bean, jack	*Canavalia ensiformis*
71	Bean, lima	*Phaseolus lunatus*
72	Bean, mung	*Vigna mungo*
73	Bean, scarlet runner	*Phaseolus coccineus*
74	Bean, winged	*Psophocarpus tetragonolobus*
75	Snake bean	*Vigna unguiculata*
	Nuts	
76	Canarium almond/ Galip Nut/pili nut	*Canarium indicum*
77	Cashew	*Anacardium occidentale*
78	Coconut	*Cocos nucifera*
79	Nutmeg	*Myristica fragrans*
80	Okari	*Terminalia* spp.
81	Pandanus	*Pandanus* spp.
82	Peanut	*Arachis hypogaea*
	Spices	
83	Cardamom	*Elettaria cardamom*
84	Cinnamon	*Cinnamomum* spp.
85	Garlic	*Allium sativum*
86	Ginger	*Zingiber officinale*
87	Pepper	*Piper nigrum*
88	Tumeric	*Cucuma domestica*
	Root Crops	
89	Cassava	*Manihot esculenta*
90	Chinese taro	*Xanthosoma sagittifolium*
91	Potato	*Solanum tuberosum*
92	Sweet potato	*Ipomoea batatas*
93	Taro corm	*Colocasia esculenta*
94	Yam	*Dioscorea* spp.
	Grains & Grass spp	
95	Corn	*Zea mays*
96	Pitpit, coastal	*Saccharum edule*
97	Pitpit, highlands	*Saccharum palmifolia*
98	Sugarcane	*Saccharum officinarum*

Prioritised List of 20 Commodities

Common Name	Scientific Name
Aibika (Slippery Cabbage)	*Abelmoschus manihot*
Asparagus	*Asparagus officinallis*
Broccoli	*Brassica oleraceae* Oleraceae group
Cabbage	*Brassica oleraceae* Capitata group
Carrot	*Daucus carota*
Choko	*Sechium edule*
English Potato	*Solanum tuberosum*
Ginger	*Zingiber officinale*
Leek	*Allium porrum*
Lettuce	*Lactuca sativa*
Lime (Tahitian)	*Citrus latifolia*
Onions	*Allium cepa*
Pineapple	*Ananas comosus*
Shallots	*Allium cepa var. aggregatum*
Snake gourd	*Trichosanthes cucumerina*
Spring Onion	*Allium spp.*
Sugar Fruit	*Passiflora liguaris*
Sweet Corn	*Zea mays*
Sweet Potato	*Ipomoea batatas*
Tomato	*Solanum lycopersicum*

Additional Commodities Suggested by the PHAMA Study Team

Common Name	Scientific Name
French Beans	*Phaseolus vulgaris*
Snake Beans	*Vigna unguiculata*
Chillies	*Capsicum annuam*
Coconuts	*Cocos nucifera*
Garlic	*Allium sativum*
Okra	*Abelmoschus esculentus*

Appendix B

Review of Previous Studies on Fresh Produce Marketing in PNG

Appendix B Review of Previous Studies on Fresh Produce Marketing in PNG

Overview of Agricultural Marketing in PNG (2004)

The most comprehensive analysis of agricultural marketing in PNG was undertaken by the ADB in 2004 as part of the formulation of the Agriculture and Rural Development Project[7]. The major findings of this analysis in relation to fresh produce marketing remain relevant today and are summarised below.

There are three major constraints to the profitable marketing of most of the commodities produced in PNG. These are poor transport conditions, lack of rural finance and serious law and order problems. The former poses a major barrier to the profitable movement of agricultural products to market. Lack of finance equates to inadequate investment in processing and marketing facilities. It also means insufficient working capital for wholesalers to operate efficiently. Law and order problems are directly manifested in the theft of crops before they can be marketed, the theft of cash earned from marketing the crops, and indirectly through threats to personal security.

There are numerous opportunities for expansion of the PNG private agriculture and agribusiness sector and for the inclusion of large numbers of smallholders in this expansion. The producers and exporters of palm oil, rubber, coffee, cocoa and other industrial tree crops have not yet achieved their full income earning potential. Indigenous nuts, cashews and floriculture offer similar opportunities. Profitable export markets are available for a number of spices and other minor products. There are very substantial opportunities for import substitution in the domestic market, particularly for fresh vegetables and fruit, livestock products and livestock feed.

Industrial Export Crops

The main PNG export commodities are coffee, palm oil, cocoa, copra and coconut oil, rubber and tea. Other export commodities include spices (vanilla, chillies) pyrethrum and sugar (under a small US quota). The depreciation of the Kina since the end of the “hard Kina” policy has helped spur growth in industrial crop exports, but the heavy export dependence on a limited number of commodities subjects PNG to cyclical fluctuations in world commodity prices.

Tea and sugar are the only entirely plantation crops. Oil palm production is based on plantations that have their own crop base, operate oil mills and depend on associated smallholders for their additional raw material needs. About one-third of total palm fresh fruit bunches are produced by these smallholders. Coffee, cocoa and coconuts all have remaining plantation sectors but 70 to 80 percent of production is by smallholders. The dwindling plantation sector, however, still plays a vital role in processing and maintaining quality.

Fresh Produce

Domestic Market: Domestic food production is PNG’s most important industry. The country’s relatively favourable food security status in terms of calories, results from the ability of the rural community to grow staples (particularly sweet potato) and to produce export commodities that provide the cash to purchase food (particularly rice). There is a considerable difference in per capita consumption of the various staples for the Highlands, Lowlands and Urban areas. This suggests a substantial unfilled demand for locally grown food staples in urban areas. Low income urban households face widespread problems of access to food of adequate quality at affordable prices. This in large measure reflects inadequacies in the produce marketing system and insufficient cash income.

Only a small proportion of traditional food produced is sold. However, the selling of food provides a major source of income for rural people. In recent years between 1,500 and 3,500 tonnes of sweet potato are shipped from the Highlands to Port Moresby annually. The annual income generated from

[7] Asian Development Bank (March 2004) Agricultural Markets, Marketing and Rural Enterprise Development. Agriculture And Rural Development Project Papua New Guinea ADB TA4055-PNG

this trade ranges from K2 to K5 million. Sweet potato sales to Port Moresby represent only a small portion of the volume of sweet potato sold. Bourke (2003) puts the total annual marketing of sweet potato at between 75,000 and 125,000 tonnes. Using his lower figure, this represents a commercial sweet potato industry valued at K60million. To put this in perspective, this is equivalent to about 20% of the value of coffee exports and exceeds the value of coconut product exports.

In total there are around 5,000 to 6,000 tonnes of fresh produce shipped from the Highlands to Port Moresby annually, generating income of around K10 million to K12 million. There has been a gradual increase in overall volume of shipments over the last decade. However, airfreight shipments have shown a marked decline in recent years. There has also been a proliferation of vegetable farmers in non-traditional areas outside the Highlands, which are not captured in available statistics.

The Highlands provide optimum conditions for growing brassica vegetables (cabbages, broccoli and cauliflower). Local cabbage is now more than competitive with imports due to a marked increase in production efficiency. More perishable broccoli and cauliflower find it more difficult to compete with imports – although there have been improvements in recent years. Significant domestic expansion of these products will depend on the development of more efficient road/sea freight marketing using cooler containers.

The Highlands offer near optimum conditions for the production of exotic high value vegetables such as asparagus and snow peas. Local production is constrained by demanding post-harvest handling requirements, high cost and the unreliability of airfreight.

There is a high degree of self-sufficiency in tomatoes, with production found throughout the country. A decade ago this market was almost entirely supplied by imports. Bulb onions are almost entirely imported (around 1,400 tonnes annually) and offer good import substitution potential.

Diverse agronomic conditions means that there is an astonishing range of fruit and nuts and prolonged seasonal availability. Surprisingly very few of these are grown commercially. A considerable quantity of fruit is imported. These imports include significant quantities of citrus and even pineapples.

Fresh Produce Exports: Trade statistics show that PNG has no fresh produce exports. This might be considered surprising given the superior agronomic conditions available for a range of fruit and vegetables. However, the absence of horticultural exports can be explained by three key factors:

- A most unfavourable fruit fly status. Virtually all fleshy fruits and vegetables cannot be exported to most markets. There are quarantine treatment technologies available to overcome this constraint.
- No apparent comparative advantage in the export of fresh fruit and vegetables.
- A strong comparative advantage in the export of traditional tree crop commodities.

Fresh Produce Imports: PNG imports substantial volumes of fresh products, which come almost entirely from Australia. The value of these imports is around K7 million. The largest single item was frozen potatoes (K3.8m), closely followed by apples (K3.6m) and onions (K2.4m). Other significant items were peas in various forms (K1.7m) and oranges (K1.1m). In the past, the main strategy to make local fruit and vegetables competitive with imports was through high import duties, import quotas and bans. In 1995, after PNG's accession to WTO, import quotas and bans on fruit and vegetables were replaced by a 75% across the board tariff. The applied tariff rates on fruit and vegetables now range from 40% to 50%, with PNG committed to the eventual removal of tariffs.

Fresh Produce Marketing Constraints

High Price Expectations of Growers: Traditional farming systems are labour intensive and often involve long commuting distances between the villages and food gardens. As a result labour productivity is relatively low and there tends to be a limited marketable surplus. This reduces the incentive to increase food crop production much above household needs. With relatively small marketable surpluses farmers expect high prices for what they do sell in order to make the effort worthwhile. However, there is considerable scope for increasing labour productivity and thus production. More commercially orientated farm households can be expected to accept lower prices if the total returns to effort can be raised.

Individual Farmer Involvement in Marketing: A characteristic of produce marketing in PNG is the high level of individual grower involvement. In the case of sweet potato virtually all marketing is undertaken by individual growers. Substantial grower involvement in the marketing can be explained by a combination of factors: (i) a perception that higher returns can be achieved by cutting out the middleman; (ii) poor telecommunications[8]; (iii) lack of confidence in the marketing chain; and (iv) farmers use produce to help subsidise trips to Port Moresby. The consequences of a high level of farmer involvement in produce marketing are:

- higher marketing costs
- decreased returns to growers
- poorer quality product
- labour resources are diverted from production to marketing activities
- inconsistency of supply flows
- limited market outlets
- increased consumer prices

Significant expansion of the commercial horticultural industry requires greater specialisation by farmers in growing, not marketing. Suggestions for facilitating this include:

- Formation of farmer groups that can be linked with marketing businesses.
- FPDC training programs and activities directed at developing wholesalers/marketers.
- Provision of appropriate financing arrangements for wholesalers and marketers.
- FPDC to provide ongoing information on marketing costs and timely information on product prices.
- FPDC to provide awareness to farmers of the role and importance of middlemen in the efficient marketing of farm produce.
- Improved telecommunication linkages between farmers and marketers.

Produce Wholesalers: There are only six fresh produce wholesalers operating in PNG and these are mainly concentrated in the Highlands. Clearly there are not enough marketing businesses and their coverage insufficient. However, the produce industry could not have developed to anywhere near the extent that it has without the tenacity of these few businesses. They have prevailed in a particularly difficult business environment – including poor transportation infrastructure, inadequate telecommunication services, lack of financial services support and a poor security environment. The three priority areas to address these constraints are: (i) the provision of affordable finance for both investment and working capital; (ii) upgrading the telecommunication network in production areas; and (iii) upgrading and maintaining the road network.

Urban Markets: Some of PNG's municipal markets are amongst the best in the Pacific Islands in terms of the array and quality of produce on offer. However, many of the open markets leave a lot to be desired in terms of stimulating produce trade. Produce is often directly exposed to the harsh tropical elements where it quickly deteriorates. As a consequence the income of farmers and traders falls, produce is wasted and consumers buy inferior quality produce. More affluent consumers will often turn to the more "congenial" environment of supermarkets increasing the likelihood that they will consume imported produce.

Formal Markets: Supermarkets and institutions now represent a major market for fresh produce. There is scope to significantly increase the volume of local produce sold to these markets. This will occur if the supermarkets see it in their business interest to increase the space devoted to local produce. The factors influencing the decision to purchase locally are: comparative price; quality; consistency; convenience; and, the perception of customer preferences.

Produce Quality: The inherent quality of much of PNG produce is superior to that imported. However, this quality is not seen by urban consumers. The problem lies in the supply chain from field to consumer. Efforts to improve produce quality should be directed in five main areas: (i) research (best varieties for PNG conditions, commercial handling of sweet potatoes and the best packaging and containers for the PNG environment); (ii) grading standards (reward improvements in quality); (iii)

[8] Much less of an issue today

private investment in marketing infrastructure (affordable finance for wholesalers to invest in cooler containers, adequate packing facilities, plastic crates and packaging materials; (iv) training and information dissemination on produce handling for farmers, marketers, transport agents and retailers; and (v) public investment in infrastructure (roads, communication and produce shelters).

Transportation Infrastructure: Adequate roads are a basic necessary condition for efficient produce marketing. In PNG this condition is often not met. The adequate maintenance of the Highlands Highway needs to be major ongoing component of the National Budget. For secondary roads too much emphasis seems to be on building tar sealed roads, without the supporting maintenance programs.

The continued formation of commercial farmer groups is expected to shift the balance of commercial power away from PMV drivers in the carrying of produce. The industry still needs to be able to invest in its own dedicated cooler containers if substantial growth is to occur. The availability of affordable finance is the constraint. Sea freight capacity is not seen as a constraint to fresh produce development.

Domestic airfreight capacity is limited, freight rates are high and the quality of service less than satisfactory. It is **unlikely that PNG would have any competitive advantage in the export of any product that had to be transported internally by air**. Short of subsidising internal air freight there is probably limited opportunity to significantly reduce these rates. However, there is scope for improving the quality of service on offer. Airline staff could benefit from training programs directed at providing skills in the handling of fresh produce.

Storage and Consolidation/Deconsolidation Infrastructure: A substantial public investment program to establish a network of market facilities has been proposed for donor funding. While endorsing the need for such infrastructure, the sustainability of projects based on state acquired marketing facilities is doubtful. The same funding should be used to facilitate the purchase by wholesalers of their own facilities. Some of this infrastructure is now being provided as part of Provincial Government initiatives. Marketing infrastructure in Lae and Port Moresby is seen to be less of a constraint to produce market development than is perceived.

Telecommunications: A key element in successful produce marketing is timely communication between growers, traders, buyers and transport providers. Benefits from the great strides that have been made in telecommunications are now starting to be felt in produce marketing in Pacific island countries like Fiji. Fresh produce growers and traders in the PNG Highlands have not been able to reap the telecommunications revolution. There is scope to utilise FPDC's Village Extension Worker (VEW) network as a communication hub. A feasibility study is required to determine the best technical and cost effective options to be adopted.

Market and Marketing Information: An efficient marketing system depends on the free flow of accurate and timely information between sellers and buyers. FPDC makes a very useful contribution to this process through weekly market surveys. Consumer buying prices are obtained for a wide range of fruit and vegetables at open markets (Gordons, Mt Hagen, Goroka, Lae, Madang, Kokopo and Popondetta) and retail stores in Port Moresby. The value of this information is reduced by a number of factors including: (i) the long lag between the collection and distribution; (ii) narrow distribution to potential end-uses – no use made of radio and newspapers for the dissemination of this information; (iii) until recently there was no marketing extension program to utilise and disseminate this information; and (iv) the presentation on consumer buying price information in isolation can give farmers an unrealistic view of the value of their produce. This can fuel the general impression that farmers are being exploited by middleman and prompt farmers to do their own marketing.

Marketing Finance: Credit and finance is a problem for the rural sector generally – but with fresh produce marketing having particular needs. There has been a dramatic decline in levels of financing for rural enterprises. The capacity of traditional sources of financing has seriously weakened over the last decade. The lack of affordable finance is perhaps the major constraint to fresh produce marketing. This applies to both finance for investment in marketing infrastructure and working capital for the purchase of produce. The largest fresh produce wholesaler indicated the company's capital investment needs to be in order of priority: (i) 10,000 plastic crates; (ii) 100 collapsible bulk bins; (iii) 30 cooler containers; and (iv) establishing improved receiving facilities in Port Moresby.

Lack of working capital is even a more serious constraint. Farmers demand cash payment on delivery – this is usually more important to them than the price they receive. Thus it is almost inconceivable that a commercial wholesaling business could operate without an overdraft facility. However, this is the predicament faced by small wholesaling businesses in PNG. A delay of more than a few days in receiving payment from buyers can put a smallholder under severe cash flow pressure. Any delay in payments erodes farmer confidence. The farmer may choose to supply somebody else or not supply at all. If the farmers don't deliver, buyers are not supplied and income is not received. It can be a vicious cycle - an overdraft facility provides the necessary cushion for a small business in the face of an irregular cash flow.

Fresh Produce Market Opportunities

Export led development does not mean that every economic sector should have export development as its priority. Decisions of which products to promote for export need to be guided by the principle of comparative advantage. For PNG **the best market opportunities for fresh produce overwhelming lie with domestic markets**. Markets for three categories of fresh produce are analysed: traditional root crops and staples; non-traditional root crops; and fruit and vegetables.

Traditional Root Crops and Staples: PNG has a large and fast growing urban population. Nearly a million people now live in towns and cities, and this is expected to double by 2030. This provides for a large and under-supplied market for traditional staples. An increase in urban sweet potato consumption of only 20kg/capita/year would represent an extra market of 20,000 tonnes. There would be an equivalent saving in foreign exchange with the substitution of sweet potato for imported rice and wheaten products. No root crop export industry could go close to matching these benefits. There has been much recent publicity regarding remunerative root crop export markets. However, these **export markets are seen as largely illusionary**.

Non Traditional Root Crops: The potato late blight crisis offered the prospect of new varieties suitable for processing being introduced. At that time PNG was importing around 1,200 tonnes of frozen chips annually valued at nearly K4 million. Around 1,400 tonnes of bulb onions are imported (value about K2.5 million). The actual market potential for onions is likely to be considerably more than the current imports, if they are readily available at a reasonable price. Huge differences between peanut prices at the Lae and Gordons Markets suggest the existence of significant market opportunity. An additional domestic market of several thousand tonnes is estimated.

Fruit and Vegetables: Most fleshly fruit vegetables are fruit fly hosts, which severely limit export market prospects. Quarantine treatment is unlikely to be economically viable for PNG for the foreseeable future. Hong Kong and Singapore have minimum plant quarantine requirements and thus PNG could probably export to those markets without quarantine treatment. The downside of easy quarantine is that everyone seeks to enter the market. Intense price competition can be expected. PNG exporters would also be severely constrained by limited airfreight capacity.

Pineapple is a fruit that is not a fruit fly host anywhere in the world. However, it is unlikely that PNG pineapples could generally compete on international markets. A niche market opportunity is identified in New Zealand for pineapples. However, there is far greater immediate potential to develop undersupplied domestic markets for fleshy fruit and vegetables. With the exception of apples virtually all these imports could be competitively replaced by PNG produced products. Even the consumption of apples could be significantly reduced through the availability of good quality and reasonably priced substitute local fruit. Perhaps the greatest scope for decreasing the price of locally grown produce lies in increasing marketing efficiency. The potential additional market is likely to be considerably more than the level of fruit imports. The experience with tomatoes and bananas shows that the availability of good quality fruit at a reasonable price will generate its own demand.

Requirements to Realise Market Potential

Very substantial potential for the expansion of trade in fresh produce has been identified. This would represent an industry equivalent to about a quarter of the size of the coffee industry. This will be an industry of considerable value added and multiplier because of the large number of households and rural small businesses involved. The 2004 Horticulture Industry Sector identified a number of measures required for the development of a major horticulture industry. Some of the key requirements (with responsible agency listed in parenthesis) are listed below:

- Formation of farmer groups that can be linked with marketing businesses (FPDC and other extension agencies).
- Encouraging the development of wholesale marketing of produce, particularly root crops (FPDC and other extension agencies).
- Programs directed at developing SMEs specialising in produce marketing (FPDC, Small Business Development Council).
- Reducing the unrealistically high price expectations of farmers (FPDC and other extension agencies).
- Providing realistic information to farmers on root crop marketing costs (FPDC).
- Provision of appropriate financing arrangements for wholesalers and marketers - for both investment in marketing infrastructure and working capital (The Banking System).
- Providing ongoing information on marketing costs and awareness to farmers on the importance of middlemen (FPDC and other extension agencies).
- Improved communication linkages between farmers and marketers (Telikom and other telecommunication service providers).
- Upgrading and maintaining the road network (National and Provincial Governments).
- Provision of shelters for market vendors, including the upgrading of municipal markets (Provincial and Local Governments).
- Encouraging the use of plastic crates/bins for produce (wholesalers, FPDC).
- Public investment in supporting infrastructure - roads and telecommunications networks.
- Research priority given to the post-harvest handling of sweet potato (NARI in collaboration with FPDC).
- Support for “Buy PNG Fresh Produce” promotional campaign (FPDC, Rural Industry Council).

II. MFAT Study on the Domestic Fresh Produce Marketing System (2012)

The potential for developing export marketing pathways for fresh produce cannot be considered separately from the existing domestic marketing system. Domestic and potential export marketing channels have much in similar and share some of the same constraints. It is therefore useful to review some of the key features of the domestic fresh produce marketing system to gain a better understanding of what would be needed to develop fresh produce exports. The following summarises the findings of a 2012 study[9] of the sector undertaken by MFAT.

Fresh Produce Demand

Port Moresby is the largest and fastest growing market in PNG. The population is in excess of 254,000 and the twenty year average growth rate has been 3.6%. The growth in population and associated increasing consumption demand is related to the growing level of government, commercial and resource development activity. Consequently, the standard of living of employed city residents is increasing and there is a growing middle class and a significant expatriate population.

In 2008, the only study of the POM fresh produce market estimated total demand at 140,500 tonnes per annum whilst the total formal supply to the POM market was estimated at 57,780 tonnes comprised of 50,350 tonnes supplied from peri-urban areas and 7,430 tonnes from other parts of PNG and imports. The shortfall in supply relative to demand was estimated to be around 82,720 tonnes per annum but this is believed to be met by home production and informal supply from Central Province

[9] Bonney L, Worinu M and Muscat P (August 2012) A Feasibility Study for a New Wholesale Fresh Produce Market in Port Moresby. Prepared for New Zealand MFAT.

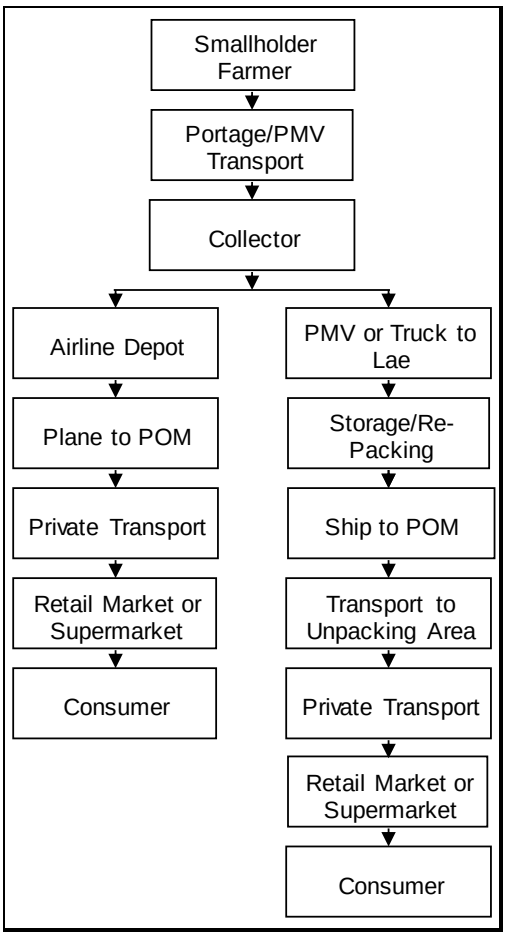
and the nearby Gulf Province. Since this study, there has been a significant increase in total demand which is now estimated to be around 167,000 tonnes.

There are significant resource construction projects planned and underway which are expected to affect fresh produce demand for at least the next ten years. However, it was estimated that up to 80% of this requirement is being imported from Australia due to concerns over the price, quality, consistency in supply and variety of local produce. This means that local communities are largely being excluded from supplying fresh produce to these projects.

Over the next 10-20 years, resource-led development will lead to increasing urbanisation and rising standards of living across the country, particularly in POM. Therefore, the fresh produce system is faced with two significant, related challenges: (i) capturing a greater share of the resources boom for local rural communities; and (ii) feeding POM from increasingly formalised and coordinated sources of domestic supply.

The Highlands Fresh Produce Marketing Pathway

Figure 1: Main Fresh Produce Marketing Channels



There are two main marketing pathways from the highlands road/air freight and road/sea freight. These are shown in Figure 1. The most distant chains start in the Mount Hagen region, although Goroka is also a prominent source. The bulk of the produce is grown by **smallholder farmers** who are semi-subsistence farmers producing some produce for sale additional to their household needs.

Collectors are middlemen who aggregate produce to gain the critical mass needed to supply particular markets. The more distant the market from the point of production, the more important was the role of the middlemen. There are two levels of collectors determined by their scale of operations: (i) first level collectors who aggregate produce from their village, neighbours or family group; and (ii) those who aggregate produce from several first level collectors and/or from many family groups, tribes, districts or even regions. Most produce is handled in white polybags holding 50-80 kg. There is a general lack of knowledge of post-harvest handling and packing as well as formal business management skills amongst collectors.

There are various forms of **road transport** to Lae. There are about eight main transport companies which rely on resource projects for their mainstream income. Most have a policy of not carrying smallholder consignments because premature harvesting and poor packaging and handling techniques mean that wastage of vegetables may be high and transporters will not accept liability. Those that are involved in transport do so on a "no liability" basis. There is a significant potential for back-loading fresh produce from the Highlands to Lae but because it is regarded as highly problematic and transporters want a quick turn-around for resource project work, companies are reluctant to become involved.

Trucking companies are reluctant to use reefer containers on the Highlands Highway because of the damage caused by the rough road and the high likelihood of theft. In Mt Hagen, one wholesaler has sufficient volume to arrange the use of reefers for its own produce. If transport companies were to use reefers it could not be on the basis of random loading and "less than container loads" (LCLs). The industry view is that it will require a dedicated fresh produce transport service with a company

establishing a base in Mt Hagen. It will need to use at least five drivers, specific trucks for reefers and giving priority to fresh produce from the Highlands to Lae.

Many smaller collectors and adventurous farmers transport their vegetables via unofficial backloads in dry containers returning to Lae or in the many varieties of PMVs. Costs from Mt Hagen to Lae vary but are around PGK 20-30 per seat and cargo is charged the same as it occupies a seat. Neither form is ideal as dry containers are not refrigerated or even ventilated and PMVs are often open to the weather or even mix freight with passengers with a high potential to damage the produce. The road transport of fresh produce to Lae requires 2-3 days depending on what form of transport is used.

Air transport takes place via dedicated, non-refrigerated freight flights out of Mt Hagen and as freight and baggage on passenger flights out of both Mt Hagen and Goroka. The standard freight charge is PGK 5.45/kg but volume discounting occurs down to under PGK 3.00/Kg with signed volume agreements. Air Niugini prefers consignments in stackable boxes. The airline has a small shed area for storage which is not designed for perishables so produce shippers have to synchronise their transport with aircraft arrivals. However, because planes are sometimes late or even cancelled, there is a need for a dedicated cool/refrigerated storage facility close to the Mt Hagen airport.

Goroka does not have a scheduled freight service but planes are available for charter on demand. Despite the lack of a dedicated freight service there are vegetables flown out of Goroka on passenger flights as luggage. However, the Goroka runway is too short for larger aircraft and, being sited within the town boundaries, extension of both the runway and other facilities such as a dedicated fresh produce staging facility are problematic.

Containerised **shipping services** from Lae to POM are run by the two largest coastal shipping companies: Consort Express Lines and Bismarck Maritime. Each run twice weekly services capable of carrying 220 containers including about 40 X 20 foot reefers. Whilst precise data on volumes of fresh produce shipped from Lae to POM is not available, it was estimated that total movements are approximately 13 reefer and 17 dry containers per week. There is an average cargo dwell time in Lae port of 3.67 days, but there is no indicator specifically for fresh produce although shipping interviewees claimed it was about 2-3 days. Growers claim there is considerable variation in this time due to ships being irregular or late. There is a further 48-52 hours steaming time to POM. Thus, the total sea shipment process appears to take around 5-8 days.

Both Lae and POM Ports do not allow fresh produce containers to be loaded within the port precincts. This means that whilst single source loads can be loaded under the conditions determined by the collector/wholesaler and delivered direct to the container loading area within the port, with mixed loads from several farmers/collectors, the loading process usually occurs on the roadside outside the shipping company gate under ambient conditions. At the POM end, unloading occurs within 1-2 hours directly from the ship to a company yard in Konedobu where farmers/collectors or their agents or *wantoks* usually collect it on the day of unloading. Therefore, at least a further day is consumed at both Lae and POM ports in loading under ambient conditions so the total sea transport time is at least eight days.

Wholesalers consolidate produce from farmers for on-selling to supermarkets, resource companies, institutions, hotels and restaurants. The term is loosely used but wholesalers are a broad service category constituted by registered businesses that buy produce from farmers or collectors, grade most of the produce and on-sell it to retailers, companies or institutions. It includes catering companies that service specific large clients such as shipping lines, resource projects, etc. There appear to be just three wholesalers operating in POM. The largest of these is Green Fresh Ltd, but Alele Ltd operates depots in Mt Hagen and Kainantu and Morobe Produce Marketing markets taro into POM. There are also two large **catering services** operating in POM.

Operatives in the **POM markets** are usually female entrepreneurs who buy produce from farmers as they arrive in PMVs at the back gate of POM retail markets and then offer for sale in the market. A survey conducted by FPDA found that in four main POM retail markets the majority of operatives were Highlanders.

PNG **fresh produce retailing** appears to be following a path of specialisation and increase in scale experienced in other developing countries. This involves a shift from petty traders and open-air markets toward segmentation into traditional wholesalers and small-scale retailers, and eventually

toward further segmentation and consolidation into specialised wholesalers and modern retailers including supermarkets and convenience store chains.

Retailers include supermarkets, urban markets, roadside sellers and small vendors. The six main supermarket groups are a mix of home grown retailers and international investors based elsewhere in Asia that have identified PNG as an emerging market opportunity in a highly competitive and increasingly concentrated global retailing environment. There is also a large number of smaller retailers with much less organisation and strategic influence on the fresh produce market.

The retail market is highly price sensitive which means that there is a limited demand for high priced quality food but income is a significant determinant of demand for quality food. In such an environment, to optimise profitability, supermarkets have adopted a pricing strategy in line with the more price-inelastic demand of the middle class interested in one-stop shopping and a clean shopping environment free from the threats of rain and heat.

The supermarkets employ a range of procurement strategies, many encouraging smallholders by purchasing at the back door. Some also have direct supply arrangements with large farms (e.g. Sogeri Hydroponics), large collectors or farmer cooperatives. Supermarkets also grade the produce purchased and merchandise the highest quality with imports in an expat/high income section with significantly higher prices in the fresh produce department and a local produce section which is of lower quality and price.

CPL is currently constructing a Distribution Centre in POM for its direct supply from Mt Hagen which appears to be the first such initiative for fresh produce. The rate at which PNG supermarkets adopt the modern retailing model with direct, targeted supply and the use of distribution centres will depend upon the development of competitive supply channels and an effective wholesale market, as well as the extent of demand for diverse, safe, differentiated products which can only be delivered through more coordinated supply chains.

PNG household consumers have a preference for local shopping and are currently well-served by small, independent supermarket chains, small self-service stores, and wet markets. Price, not quality is the main concern for most consumers using these outlets. The wet markets, whether formal LLG markets or informal roadside markets or hawkers are a major source of cheap, variable quality fresh produce, particularly for the unemployed, landless urban poor or working poor. Frequently, relatively short distances to the LLG markets in POM act as a disincentive for consumers because of the cost, insecurity and inconvenience of public transport.

Increasing standards of living, increasing urbanisation and specialisation of work will reduce household ability to grow their own produce and increase dependence on outside sources of food. This will drive future development of a more sophisticated retail sector to meet the increasing demand for greater diversity in food. As the level of ownership of refrigerators and personal forms of transport rises, less frequent shopping and home storage of food will replace the daily purchase of fresh produce. Consequently, the demand for product quality and integrity will increase which is only achievable by integrated management from farm to retail shelf.

Throughout the supply chain business relationships are mostly informal. Most operate as spot or cash market relationships with short term, once-only transactions and no promise of future supply performance, high levels of opportunism, limited information sharing and high levels of independence for each party. Such relationships are high risk for both parties because there is no foreknowledge of the ability to sell or buy. For the farmer, this results in high price variability and wastage of product, whilst for the buyer high variability in the volume, price and quality of supply. Neither party has much control over their situation, so the farmer often feels cheated and the buyer has “stockouts” (empty shelves) which lose potential sales and result in shoppers buying elsewhere. The advantage for the farmer is mainly in their low commitment and for the buyer in the ability to manipulate disorganised farmers into selling for the lowest price. Without such long-term, trusting, mutual interest, stable, open and interdependent relationships it will be difficult to improve the functioning of domestic marketing to make it more competitive with exports. The near absence of contractual relationships also provides a weak foundation for development of horticultural export pathways.

Marketing Infrastructure and Facilities

Mt Hagen has a large, well-appointed retail market operated by the Local Level Government with up to 2,000 selling spaces. The market appears to be clean, orderly and generally operating effectively although the market manager believes there is too much wholesale trading occurring immediately outside the market, some of which involves trading between resource company providers and larger farmers. In contrast, the New Zealand Aid-built wholesale store incorporating a cool store adjacent to the retail market is under-utilised by the two wholesaler tenants who have been resident since construction in 1986. It is also not big enough to accommodate the existing wholesaling function that occurs between farmers and collectors outside the retail market and the exclusive arrangements are attracting the criticism of other wholesalers.

In **Goroka**, the existing market is old, poorly designed, unhygienic and security cannot be controlled. The vendors are mainly the growers of the produce, and it is mostly sold by women. The few middlemen are for coconuts from Madang. The grading of produce is more extensive in this market than Mt Hagen or Lae and results in 4-6 levels of pricing. A new market facility was built on what was believed to be LLG-owned land but the boundaries became disputed and it has never been used. Land was surveyed near the airport for a market but after political intervention the planning was changed to an aircraft hangar. Therefore, there are no storage or coolstores suitable for fresh produce available for public access, and no cold storage at the airport.

Lae market is old and access, particularly vehicle access is poor, but it appears more hygienic and somewhat more secure and better run than Goroka. The market has both farmers and collectors represented and women are the predominant vendors with many Highlanders marketing produce through this facility. Shipments largely use the common white poly bags and are graded so produce is outstanding quality and has a wider range than the Highland markets. As with other markets, the Highlanders tend to predominate in the covered area but the Zenag tribe from the Huon Gulf area also feature.

Regional and district collection points are fundamental to the development of a fresh produce supply system. They form the first step in cooling produce (if refrigerated) or preventing temperature increase in the produce before transport to market (where convection cooling is used); and aggregating a critical mass of produce to justify commercial transport arrangements and accessing any volume discounts.

An FPDA review of the six regional and 13 district cool stores and storage depots indicates that among the regional facilities one is functioning, three are in service but are not effective and two are not in service. Of the 13 district facilities, three have been constructed but are not effective and ten are not in service for a variety of reasons. The two main reasons for those lacking in effectiveness are land tenure disputes and inadequate contract specifications and contract management. Of those not in service, the underlying reason appears to be the lack of funds to develop plans or concepts, repair damaged buildings or sites have been abandoned.

There are eight retail markets in **Port Moresby** (Tokarara, Gerehu, Gordons, Hohola, Lareva, Malaoro and Waigani) with less formal markets at Koki and Eight Mile. These markets either have no infrastructure to accommodate vendors or have insufficient and inadequate structures resulting in overcrowding. Many vendors sit in the open shaded only by their own umbrellas. These are mainly Central Province people who are apparently kept out of the covered areas by the strong cohesion and aggressiveness of Highland vendors. This and the consequent disputes and violence is facilitated by the lack of independent security guards. Toilets and other facilities are inadequate, poorly designed, unsanitary and dangerous. The markets are often unsealed, not drained and rubbish accumulates and rots quickly.

Lae Port Operations

Containerised fresh produce is accepted via the normal procedures and stacked with other containers awaiting loading within the secure confines of the shipping company yard. Non-containerised produce bound for POM which arrives by the diverse modes of transport arranged by farmers and collectors (private cars, PMVs and informal truck loads) is delivered in bags to the gates of the two shipping companies. Because of the need for a high level of port safety and security, fresh produce is often left during the night piled up outside the security gates. The shippers place dry containers at the gates for the smallholders to load their bags. Produce is open to ambient conditions which may be as high as

40^0C during the day and in the mid-20s at night and may not be packed into a container for up to two days. Containers are not ventilated and different types of vegetables are packed in the one container.

Shippers advise smallholders to leave spaces in the containers for air movement but farmers think this is a trick to charge them more for shipping their produce and so pack as many bags as possible into the containers. Bags are marked for identification purposes at POM but disputes often occur. Few smallholders or collectors pack their produce in cartons and those who do are associated with air freight (e.g. broccoli from Mt Hagen). Some vegetables such as sweet potatoes, potatoes and onions require harvesting at a specific maturity to ensure that their skins are sufficiently toughened to withstand damage however smallholders lack the skills to judge the optimal harvesting stage. If harvesting and post-harvest procedures were optimised, most vegetables could be stored for 14 days or more. Even perishable fresh produce such as lettuce and tomatoes, well treated, can potentially be stored for 21 days or more. However, with current practices losses are regularly as high as 20% and less frequently up to 40-50%.

During the 48 – 52 hour ship journey, reefer containers are powered from the ship's electrical system. Many smallholder farmers claim that through neglect or corruption, ship crew allow some reefers to be turned off which facilitates produce breakdown, but there is no evidence that this is anything other than speculation. Perhaps to counter such claims, Consort has recently installed a reefer temperature auditing system which monitors individual internal reefer temperatures twice per day and has a reporting capability.

Port Moresby

In the POM Port, smallholders are not allowed into the dock area to carry out the unloading of produce. Containers are unloaded from the ship within a couple of hours and taken directly to a marshalling yard less than a kilometre away in Konedobu where no reefer plugs are available to maintain the cool chain. In that yard, the consignment owners or their agents are then able to unload their own produce from the containers, usually within one day, and then the produce is transported via private vehicle or PMV to the outlet targeted by the consignor.

Port Moresby Fresh Produce Demand and Supply

On the basis of the "Feeding Port Moresby Study (FPDA, 2008) current (2012) demand is likely to be approximately 167,000 tonnes per annum, approximately 90% of which is supplied either through identifiable supply chains or by informal sources from Central Province/National Capital District. Chang (2009) identified the sources of various types of fresh produce as:

- Road and sea freight from the Highlands: hardier and lower value vegetables such as carrot, potato, sweet potato, cabbage and avocado.
- Air freight from the Highlands: more perishable and high value vegetables such as tomato, broccoli, cauliflower, capsicum, spring onion, French bean, sugar fruit, wombok and lettuce.
- Road freight (largely PMV) from National Capital District/Central Province: chilli, pawpaw, pumpkin, table banana (green), cooking banana, cucumber, eggplant, winter melon, watermelon (some also from Lae), sweet corn, pak choi, ginger, snake bean, lemon, pineapple, taro (also from Lae and Kimbe) and hydroponic tomatoes and lettuce from Sogeri.
- Imports of brown onions, garlic, English potato, apples, pears, oranges, grapes and stone fruits by sea.

The constraints to accessing the POM market as well as socio-cultural factors, include individual motivation, entrepreneurship, innovativeness, cultural attitudes and family economic needs. The main marketing constraints facing Highland exports to POM are:

- 20-25% wastage
- Lack of regional wholesale facilities
- Lack of cool chain maintenance
- Lack of local collection storage facilities
- Poor harvest and post-harvest practices of the growers and down-stream handlers

- Poor road system
- Lack of a professional, dedicated fresh produce freight service maintaining the cool chain
- Lack of port cool chain & loading facilities
- Port congestion and poor management
- Unsafe, unhygienic retail markets in POM.

The scale of highlands food supply to POM will always be constrained by sea transport until a road connection can be established. Central Province currently provides 92% of the fresh produce suppliers for POM and only 4% is sent from the highlands. According to the projected future demand model this figure is likely to drop to 84-87% when significant improvement to road transport occurs. Further, when highland road transport improves, the substitution of high value, low volume imports from Australia is also likely to expand the Highlands role in supplying POM.

While the area surrounding Port Moresby is referred to as the lowlands, the topography ranges from undulating land close to sea level to deeply dissected mountains exceeding 2,000m in the Owen Stanley Ranges. Most vegetables grown close to sea level are tolerant to heat such as tomatoes, capsicum, watermelon and beans. The higher altitude locations grow cool-temperate vegetables. However, Central Province's long dry season of 6-9 months means that producers without access to water resources have limited production options. Two growing regions can be identified in Central Province:

- The lowland areas (0-600 m) with hot, humid coastal conditions able to grow indigenous vegetables and fruits (e.g. sweet potato, coconuts, bananas), tomatoes, French beans, snake beans, capsicum, pak choi, celery.
- Intermediate areas (600-1,200 m) such as Sogeri and parts of Rigo-Koiari (600 m) are suited to tomato, French beans, sweet corn and pumpkins. Some slightly higher areas such as Goilala (800 m) are more suited to cool temperate vegetables such as English potato, cabbage, broccoli and cauliflower.

The main production areas that supply POM are the peri-urban area of the National Capital District, Laloki/Brown River, Sogeri, Bautama/Magi Highway area, Kwikila/Rigo and to a much smaller extent further afield to Cloudy Bay. Most of these areas have good arterial roads although the minor road system is very rough. Much of the supply is intermittent as subsistence farming families sell their surpluses to gain cash for trade goods, other materials and school fees. Hence, the nature of supply is very diverse and there is little understanding of the cost of business so farmers will individually travel to POM with only a few bags of produce and hawk them around the various outlets until sold.

There is considerable scope within Central Province for existing suppliers to significantly improve the quality and consistency of supply by coordinating supply processes. Most supply is from small to medium grower/vendors who use PMVs or their own vehicles to transport produce to market in small disparate lots. Packaging is white polyethylene bags and post-harvest handling is very poor, particularly for PMV transport where passengers are often standing or sitting on the produce. As yet, there are few cooperatives operating as consistent, large-scale suppliers of high quality produce either to larger outlets or direct to retailers.

Conclusions and Recommendations

Constraint	Recommended Solution	Provider
• Poor production and harvest practices as they affect produce quality at point of sale	• Training and extension • Appropriate technologies • Low input production systems	• FPDA and VEW system • NARI research
• Lack of collaboration between smallholders to gain economies of scale and bargaining power	• Training • Cultural change programs	• FPDA and VEW system • Donor assistance
• Lack of level 2 collectors graduating to formal regional wholesale businesses	• Marketing & business training for women	• Donor assistance

Constraint	Recommended Solution	Provider
	• Microfinance for women	
• Lack of protected, ambient aggregation points in local communities	• Community-based self-help program (co-investment)	• FPDA with budget increase
• Lack of properly managed regional collection points with adequate facilities	• Regional, LLG managed, wholesale markets adjacent or in close proximity to Regional Retail Markets(Model based on Mt Hagen Market)	• Donor assisted infrastructure
• Lack of cool storage facilities at Hagen and Goroka airports	• Construct LLG managed facilities (Mt Hagen Model)	• Donor assisted infrastructure
• Lack of professional dedicated fresh produce bulk road transport to Lae	• Commercial investment based on: (i) road improvement; (ii) scale, coordination and sustainability of demand; and (iii) reliable upstream partners	• Private interests
• Runway is too short for dedicated freighters at Goroka	• Air Niugini purchase STOL aircraft • Expedite runway extension	• PNG Government
• Inadequate contract management of most existing collection facilities	• Provide FPDA with legal and commercial expertise	• Budget increase • Donor assistance
• Lack of cool storage and smallholder loading facilities at Lae Port	• Construct cool storage, loading area and reefer farm at LAE Port	• Donor assisted infrastructure
• Inappropriate packaging	• Training • Regional packaging supplier interest requires scale, coordination and sustainable demand	• FPDA with budget increase • VEW system • Private interests
• Poor post-harvest handling practices along the chain	• Training	• FPDA with budget increase
• Lack of an unloading facility in POM port which enables cool chain maintenance	• Construction of facility, commercially managed	• Donor assisted infrastructure
• Insufficient functioning reefer points on the docks	• POM Port improvements	• PNG Ports
• Lack of a managed wholesale market function to aggregate produce and promote competition between suppliers and buyers	• Construction of appropriate facility • Controlled entry • Equitably apply rules/incentives • Give stakeholders a voice	• PPP or JV • Donor assisted infrastructure and implementation
• Lack of managed retail markets	• Retail market redevelopment • NCDC management restructuring • Training for managers and security • Equitably apply rules/incentives • Give stakeholders a voice	• Donor assisted infrastructure and implementation

Scott and Atkinson (1989)

Scot and Atkinson reported 27 years ago on the problem of marketing highlands produce and attempts to establish a cold chain to transport fresh produce to Port Moresby.

The national government is concerned at the cost of food imports and has considered reducing (or even banning) rice imports. It has imposed quotas on vegetable imports, through a system requiring importers of certain vegetables to purchase locally grown vegetables according to a quota set by the government. Despite this advantage, locally grown produce marketed in Port Moresby is of poor quality and highly priced.

It has been suggested that Port Moresby could produce its own food if extensive farming and irrigation were used. However, attempts to produce food on an intensive scale in this area have been unsuccessful. It has also been suggested that the fresh vegetable needs of the capital might be met by the Highland people growing a surplus for transport to Port Moresby and centres such as Kieta where imported food is consumed.

The substitution of imported vegetables with Highland-grown produce also conforms with the government's desire for Highland villagers to remain as subsistence farmers, rather than moving to the coastal towns where there are few employment opportunities and little chance of the newcomers being able to grow their own food.

Scott and Atkinson examined the problems associated with the transport of vegetables from the Highlands to major centres such as Port Moresby and Kieta. They found that although advisory staff believed that Highlanders were keen to produce vegetables for sale, they had been unable to recommend any substantial increase in production because of the lack of markets.

In the late 1970s the Food Marketing Corporation (FMC) was set up within a national government department to buy vegetables in the Highlands and airfreight them to Port Moresby. The project had many problems: among other things, the method of transport was inadequate and low quality produce was offered for sale at high prices. The project failed.

In 1983, when postharvest problems were first examined by ACIAR, fruit and vegetable buying in the Highlands was in the hands of small, privately owned companies or cooperatives operating out of centres such as Goroka. Also, three provincial government companies were trading in vegetables and competing with the private companies. All the groups involved had high overheads and used air freight and air charter to transport the produce. All were competing against each other in supplying the few major wholesalers in Port Moresby. All groups were facing financial problems due to high costs and low-quality produce and were struggling to survive. Two provincial government trading companies subsequently ceased trading.

The ACIAR team identified poor post-harvest handling as a critical problem. Poor handling often began in the field where the produce was harvested and excessive quantities of leafy vegetables were packed into poorly designed boxes and bags. The traditional *billum* used by women to transport produce to market was found to cause serious injury to soft produce, which was yet further damaged at each stage of the handling process, including loading and unloading of the aircraft.

It was considered that wastage would be reduced considerably if the produce were cooled and containerised at the point of production. This could be done by: (i) establishing precooling plants in the production area; transporting produce by refrigerated or insulated truck to the port; and then to a refrigerated container at the port and load onto a suitable ship; or (ii) establishing precooling plants in the production area; taking refrigerated containers to the production area and loading the precooled produce; and then transporting the container to the port and load onto a suitable ship.

Several transport trials were undertaken using refrigerated containers. Initially, vegetables were obtained from larger producers. However, they seemed unwilling to improve their handling and packing and were not reliable suppliers. The subsistence farmers became major suppliers. This was achieved by working with local groups who bought from subsistence farmers at the markets or sent a truck into different production areas each day. Many small producers, most of whom are women, seemed prepared to sell all their produce on a particular day to the buying group rather than spend all day at the markets.

The initiative was commercialised in 1985 with the assistance of New Zealand Aid which hired 10 containers for a year. These were used by small local organisations to send produce to Port Moresby, particularly from Wabag in Enga province. Subsequently a local transport company in the Highlands accepted responsibility for re-hiring the containers and has placed a charge on users to cover their costs. If use of the process is to continue, collaboration of all parties involved will be needed, particularly the shipping companies whose rates are one of the major costs of the exercise.

Bourke et al (2009)

It is believed that there is significant potential to export fresh food to New Zealand, Australia and South-East Asia. There is very little potential to export fresh food from PNG because of quarantine issues (including a serious fruit fly problem), poor presentation of food, expensive and unreliable air and sea transport and lack of price competitiveness. Limited possibilities for certain niche markets exist, but many obstacles remain. In contrast, there is significant unrealised potential for expanded sale of fresh food within PNG. Certain indigenous edible nuts, such as galip, karuka and okari, have considerable potential as export crops.

Birch et al (2009, 2015)

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Internal migration to peri-urban areas, in particular Port Moresby and increased demand from an expanding middle class and expatriate professionals are compounding food demands. Highland regions grow a range of temperate vegetables, but distance from Port Moresby, and poor transport infrastructure and services constrain consistency of supply and quality. Seasonally dry coastal lowlands and cooler highlands (Sogeri Plateau, Goilala District), in Central Province could increase production and improve supply. In 2008, about 50,000 tonnes of Port Moresby's 141,000 tonne/year fresh produce came from peri-urban gardens on rocky, erodible, drought prone and difficult to irrigate sites. Thus, sustainable production is unlikely. Vegetables are also produced in alluvial flood plains and on the Sogeri Plateau. Retail prices are unstable, and marketing is mostly through informal markets and direct supply to end users or supermarkets. Supply has not met Port Moresby demand.

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Ginger Exports

The PNG government has stated its desire to increase income and reduce poverty through export-driven economic growth, including fresh produce. Assessments have been conducted for a number of fruits and vegetables of the risks of PNG imports into New Zealand. A trial shipment of fresh ginger from PNG passed the Biosecurity New Zealand inspection with ease and was considered to be of exportable quality, but no further shipments have occurred. The technical and financial viability of exporting fresh ginger to New Zealand was assessed in terms of the following criteria: (i) technical capability of meeting market requirements for consistency in quality and volume: (ii) dealing with quarantine and other market access issues; (iii) market opportunities for growth and sustainability; (iv) investments required and how they will be financed; and (v) organisational/management capability of coordinating the ginger supply chain. The conclusion was that exports of Papua New Guinea fresh ginger into the New Zealand market would be both **technically and financially infeasible**. In contrast, the Papua New Guinea **domestic market has considerable potential** with the demand for ginger, as well as other fresh produce, set to increase substantially in the next few years. A broad-based agricultural development program for fresh produce for the domestic market would better meet the needs of Papua New Guinea farmers than would an export emphasis.

Buyers Requirements

A market survey was conducted in five main city centres in PNG to better understand buyers' requirements for fresh produce of major buyers in the formal market (wholesalers, the food services sector and supermarkets). The objectives were to provide farmers with this market information and to identify marketing opportunities which suit their circumstances. The principal considerations for the buyers at the formal market are consistency in supply, price and quality. Consistent supply is important for all these business buyers. The quality of fresh produce is very important to supermarkets, international airlines and international hotels, but it is less important for institutional buyers for whom price is more important than quality. For those buyers who consider quality to be important, their demand for quality is not satisfactorily met partly because they cannot communicate their quality requirements to suppliers. It seems communication problems occur because quality requirements are not well-defined and quality is perceived differently by different participants along the supply chain. Currently there is no quality standard for fresh produce at all marketing levels. The establishment of quality standards for key vegetables appears to be a reasonable starting point for improving communication on, and meeting, quality requirements from the formal market. Locally appropriate quality standards will help provide incentives to farmers to produce quality products and guidelines to improve postharvest handling.

Market Development Project

The Market Development Project (MDP) was initiated by FPDA in 2006. It involved FPDA acting as a wholesaler, buying fresh produce from farmers in the Highlands and delivering it to supermarkets in Port Moresby and to Tabubil, in the Western Province.

MDP was set up to link farmers to markets. It aimed to provide farmers with secure markets and stable prices; generate market information which FPDA could use to develop policies and strategies; provide a learning ground to educate farmers and the staff to become commercial and market-oriented; and encourage farmers to save money through the establishment of bank accounts. Some of the objectives have been achieved, for example, gaining practical experience in marketing, building capacities of famers and staff, establishing bank accounts and encouraging savings for some farmers. However, these achievements were not significant relative to the time and resources that were invested. More importantly, it failed to make significant inroads into addressing known supply chain issues of poor transport, poor post-harvest handling, and inconsistent supply. More effort should have been given to staff and farmer training, gathering information on costs of production and marketing and identifying and addressing supply chain issues. In addition, a workable M&E framework should

have been put in place so that problems could be promptly identified and rectified. The case of MDP demonstrates clearly that administered pricing is no substitute for the free play of market forces and farmers' interests can be better served by government acting as a facilitator, rather than as an interventionist.

LNG Project

A study was undertaken to estimate the requirements of the LNG project for fresh produce and to determine the potential for PNG farmers and supply chain operators to supply the Project. It was estimated that demand for fresh produce from the PNG LNG market to be in the order of 130 tonnes a week (or 20 tonnes a day) at the peak of the construction period from 2012-2013. However, during the construction phase, nearly 80% of this demand would most likely to be met by imports because of concerns over quality, variety and consistency in supply of local produce. In addition, after the initial construction phase and by 2014, demand for fresh produce from the PNG LNG market would be reduced to around two tonnes a week during the operational phase due to a significant reduction in labour force. This means the impact of the PNG LNG project on the local fresh produce industry is not only short-term but uncertain, depending on the ability of local suppliers to meet buyers' requirements for quality, variety and consistency in supply, which, in turn, will depend on whether long-standing supply chain issues can be addressed adequately and quickly by government and industry. Failing to do that, local suppliers will miss the opportunity to supply to the huge LNG market in the same way they have missed supplying to higher value formal markets.

Sweet Potato

In recent years, sweet potato has become a cash crop for smallholder farmers driven by the need to generate income in a market economy. Marketing opportunities exist for highlands sweet potato, especially in coastal markets, because of income growth and urbanisation. However, long distance sweet potato marketing has been problematic, as a result of high risk and high cost. There are also serious issues regarding access to credit, transport infrastructure (high costs, poor roads, and no specialised transport system), postharvest management (no sorting or grading, poor packaging, rough and multiple handling, and no proper storage facilities), chain coordination (no collaboration or communication between value chain operators), and support services (insufficient market information and no training and extension to build business skills). For female farmers, there were gender-specific issues related to personal safety, poor market facilities, and inequality in the division of labour and the distribution of income within the household. To meet growing demand for high quality products at competitive prices, smallholder farmers must be better organised into groups and be prepared to work collaboratively. Coupled with building their business skills, this approach should make it possible to improve their access to markets, and improve farmer income.

Port Moresby Fresh Produce Supply

It has been commonly assumed that most of the vegetable supply in Port Moresby comes from the highlands and from overseas, because Port Moresby and most parts of Central Province are too dry and infertile for vegetable production. However, contrary to that assumption, a market survey conducted in 2008 found that in fact nearly 90% of vegetable supplies come from Central Province, and particularly from smallholders in peri-urban areas around Port Moresby. Demand for fresh produce in Port Moresby has been growing due to population and economic growth and is expected to grow significantly in coming years. An assessment of the potential for increasing vegetable production in Central Province, was undertaken based on informant interviews, field observations and a literature review.

None of the four locations (6 Mile, Laloki, Bomana and Brown River), initially selected based on their proximity to Port Moresby, were good candidates for commercial vegetable production because of issues of land capability and land tenure. However, when the scope was extended beyond the initial 30 kilometre radius, we found that several areas warranted further consideration, including the Rigo District, Hiri West and Hiri East. Although they are more distant from Port Moresby, they appear to be potential candidates because: there is no land tenure issue; growing vegetables is their only source of income; and farmers are already working in groups to supply supermarkets. Other areas, such as the Sogeri Plateau, Kupiano, the Vanapa River and Goilala, may have very high agricultural potential and fertile soils, but poor transport infrastructure remains a serious challenge for agricultural development.

Given that increased production can be achieved through improving productivity of existing farmers and/or through opening up new production districts, different strategies will be required for the three different areas identified based on their comparative advantages and disadvantages. In the short term, it appears that production can be increased by improving productivity and access to water of farmers in the peri-urban areas and the Rigo/Hiri Districts. In the medium to longer term, more and more production could, with improved transport and marketing infrastructure, come from areas that are further afield such as Sogeri, Kupiano, the Vanapa River and Goilala.

Spriggs et al (2006, 2007, 2012)

The National Government of PNG is actively encouraging agricultural exports. In the long run agricultural exports are viewed as an important alternative source of export revenue as royalties from the mining sector begin to diminish. One category of agricultural production that is viewed as having good potential is **fresh produce**. Not only has this the potential to be an important generator of income from the national perspective, but also it can provide cash income for rural families in the PNG highlands, which have very few alternatives. However, the PNG **fresh produce sector is not export-ready**. The sector is unable to provide reliable supplies of consistent quality produce. Indeed, there is currently no effective quality control system in place. In order for the PNG fresh produce industry to effectively compete in the export market, it is essential to improve the functioning of the domestic supply chain.

Spriggs et al reported on an ACIAR-funded initiative that recognised the limitations of the highlands fresh produce marketing system. Improving the system, both informal and formal channels, was deemed to be a high priority. The project focussed on improving the formal marketing system which links the Highlands producing areas to coastal population centres. The rationale was that improving the formal domestic marketing system would provide a springboard for **eventually moving fresh produce into export markets**.

Mapping of the marketing system suggested that there were very significant physical/technical and social constraints. The most significant were thought to be: (i) lack of marketing infrastructure; and (ii) poor post-harvest management practices (handling, storage and transportation). The most significant social constraints were thought to be: (i) poor buyer-seller relationships; and (ii) social practices and attitudes that worked against the full participation of women and youth in the marketing system.

Stakeholder workshops to develop action plans led to a variety of actions aimed at relieving the constraints. These included: (i) an infrastructure initiative to encourage consolidation of produce in the highlands; (ii) initiatives to improve post-harvest quality management (including development of a post-harvest manual); (iii) studies on how to enhance the role of women and youth in the fresh produce marketing system; and (iv) studies aimed at improving our understanding of the preferences of customers (e.g. supermarket managers and institutional buyers) and consumers.

ACIAR and the PNG Government have had a common interest in improving the highlands marketing system for fresh produce stretching back over 30 years. The early studies focused on the physical/technical challenges and, while they recommended changes to improve the marketing system, they did not actually engage with the change process per se. By 2000, there was a strong desire for change and this led to the commissioning of an ACIAR-funded research project that would engage the change process in a way that responded to the perceived needs of poor rural households in the highlands of PNG. The project had three objectives: (i) map the existing marketing system, identifying constraints and capacities for change; (ii) facilitate a process of socioeconomic change using collaborative problem solving; and (iii) enhance the capacity of relevant people and institutions. The most important lessons were that: (i) the nature and extent of women's participation in the fresh-produce supply chains had not been adequately understood or appreciated and, in their attempts to participate, they faced enormous difficulties; and (ii) the physical/technical challenges in the fresh-produce marketing system were only one aspect of the problem, and the human/social challenges were at least as important, if not more so.

Appendix C

Training Materials

Appendix C Training Materials

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Pacific Horticultural & Agricultural Market Access Program

An Australian Government, AusAID initiative

Global trade under the SPS agreement

Australian Government Aid Program

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Agricultural Trade under the WTO

Structure of Presentation

- World Trade Organization (WTO)
- 2 Agreements (SPS Agreement & TBT Agreement)
- The SPS 'Principles'
- SPS measures
- 3 Standard Setting Bodies (IPPC, OIE, CODEX)

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The global trading environment

- Signatory countries to the World Trade Organisation (WTO) have the obligation to abide to international guidelines for trade.
- 2 fundamental WTO agreements
  - Agreement on the Application of Sanitary and Phytosanitary Measures (**SPS Agreement**)
  - Technical Barriers to Trade (**TBT Agreement**)
- 3 fundamental WTO Standards
  - Codex Alimentarius (**CODEX**) – for Food
  - International Animal Health Organisation (Office International des Epizooties (**OIE**) – for Animals
  - International Plant Protection Convention (**IPPC**) – for Plants

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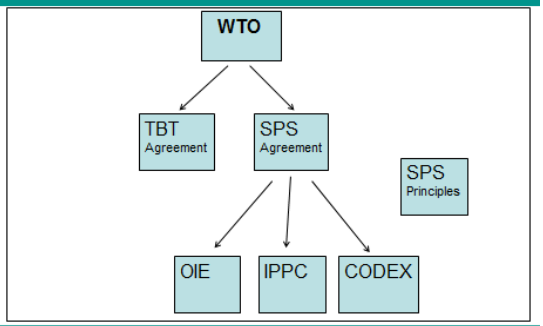
Relationship



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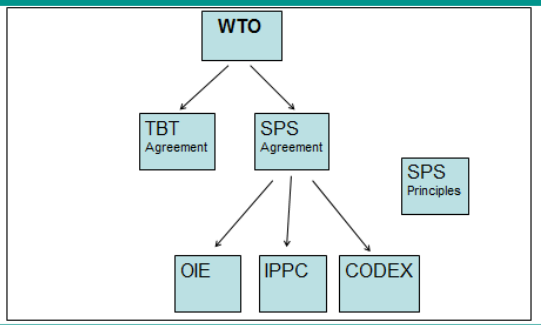
Relationship



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Agricultural Trade under the WTO

Purpose of WTO guidelines…

- To enable fair trade of products between countries **and** at the same time ensuring each country's sovereignty for the protection of their human, animal and plant health status.

–Problem faced by many developing countries is their difficulty in accessing the high-value markets in developed countries.

–Solution: Guidelines are in place as not to disadvantage any country from trade.

–Export: to prise open markets previously closed on quarantine grounds

–Import: to exclude commodities that are seen as posing a risk to the health of domestic animal and plant primary production industries anf to human health

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WTO

The World Trade Organisation

- Derived out of the General Agreement on Tariffs and Trade (GATT) dating from 1948
- Established in 1995
- 153 Member countries
- Rules based
- Dispute settlement mechanism
- May apply penalties to Members that do not abide by the rules
- http://www.wto.org/

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SPS Agreement

The Sanitary and Phytosanitary Agreement

- An international agreement – dating from 1995
- It's purpose is to ensure that Sanitary and Phytosanitary Measures are justified and do not constitute disguised restrictions on international trade.
- Allows countries to manage trade in order to protect human, animal and plant life *but*
- Countries seeking to impose barriers are required to base their SPS measures on international standards, or justify their actions
  - Requires a pest risk analysis

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SPS Agreement

Attributes of an 'Agreement':

flexible – it allows countries to use different standards and methods for inspecting product, as long as the regulations are based on analysis and assessment of objective and accurate scientific data

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TBT Agreement

The Agreement on Technical Barrier of Trade

- An international agreement – dating from 1995
- The TBT Agreement is a set of overarching rules in regards to the technical regulations of traded products to avoid unnecessary obstacles/disadvantages for products to be traded between countries.
- Its aim is the Prevention of deceptive practices.
- TBT refers to non-tariff barrier to trade in goods and services including product standards, labelling requirements, health certification, and intellectual property rights.

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TBT cntd.

The Agreement advocates:

- Conformity to product standards (e.g. symbols, packaging, labelling requirements) as approved by a recognised accredited body.
  - Requirements for testing, inspection and certification
- 'Transparency; i.e. notification obligation
  - e.g. change of conditions to members; provides commenting rights before finalising standards/regulations/procedures
  - TBT refers to non-tariff barrier to trade in goods and services including product standards, labelling requirements, health certification, and intellectual property rights.
- Reference to Article 2.6 of the TBT Agreement which states:
  "With a view to harmonizing technical regulations on as wide a basis as possible, Members shall play a full part, within the limits of their resources, in the preparation by appropriate international standardizing bodies of international standards for products for which they have either adopted, or expect to adopt, technical regulations."

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SPS and TBT commonalities

Both, SPS and TBT abide by:

- Obligation for non-discrimination
- Advance notification of proposed measures and creation of enquiry point
- The use of international standards

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SPS 'Principles'

- The right to take sanitary and phytosanitary measures
- Measures must be scientifically based
- Minimal impact
- Equivalence
- Regionalisation
- Consistency
- Non-discrimination

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SPS 'Principles'

i.e. the Right to Take Phytosanitary Measures

- *Members* (of the WTO) *have the right to take ….phytosanitary measures necessary for the protection of ….plant life, provided that such measures are not inconsistent with this Agreement*

(Paragraph 1, Article 2, SPS Agreement)

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SPS 'Principles'

Measures Must be Scientifically Based

- *Members shall ensure that any sanitary or phytosanitary measure is applied only to the extent necessary to …protect ….plant life or health, is based on* ***scientific principles*** *and is not maintained without sufficient scientific evidence……*

(Article 2, SPS Agreement)

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SPS 'Principles'

Minimal Impact

- *Phytosanitary measures shall be consistent with the risk involved and shall represent the* ***least trade restrictive measures*** *which result in the minimum impediment to the international movement of people, commodities and conveyances.*

(ISPM 1)

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SPS 'Principles'

Equivalence

- The concept of **equivalence** means that Member countries cannot discriminate between different risk management measures that achieve the same level of protection required by an importer.

(See Article 4, SPS Agreement)

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SPS 'Principles'

Regionalisation

- Pest distribution within countries is not uniform;
- Some areas may be free from particular pests, others may be areas of low pest prevalence;
  - WTO Members are required to recognise these facts when devising SPS measures.

(Article 6, SPS Agreement)

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SPS 'Principles'

Consistency

- The SPS Agreement requires members to be consistent in the application of risk management measures.
  - Countries should not apply a higher level of protection to commodities that compete with domestic industries than that applying to, say, germplasm imports, or to commodities that are not produced domestically.

(Article 5, SPS Agreement)

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SPS 'Principles'

Non-Discrimination

- Prospective importers must not discriminate between countries of the same phytosanitary status
- When targeting an endemic quarantine pest…..*measures shall be applied without discrimination between domestic and imported consignments.*

(See ISPM 1)

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SPS measures

The SPS Agreement covers all measures that protect:

- Human and Animal health from food-borne risks
- Human health from animal and plant carried diseases
- Animals and Plants from pests and diseases

SPS measures are:

A. the domestic food standards for

- Toxins
- Heavy metals
- Pesticide residues
- Microbial contaminants

and

B. measures applied to control the movement of pests, weeds and pathogens

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IPPC

The International Plant Protection Convention

- An international agreement – dating from 1951
- Relates to plant health
- 195 member countries
- Objectives of:
  - Protect sustainable agriculture and enhance global food security through prevention of pest spread
  - Protect the environment, forests and biodiversity against plant pests
  - Facilitate economic and trade development through promotion of harmonized, scientifically-based phytosanitary measures
  - Develop members' phytosanitary capacity to accomplish these objectives
- The 1997 revisions to the IPPC Agreement aligned the IPPC with the rules contained in the SPS Agreement of the WTO

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IPPC cntd.

The IPPC provides a framework to:

- Develop and apply harmonised phytosanitary measures through National Plant Protection Organisations
- Establish principles for phytosanitary measures
- Develop International Standards (ISPMs)
- Secretariat functions are provided by the FAO
- https://www.ippc.int/

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OIE

The OIE: World organisation for animal health

- Office International des Epizooties (**OIE**); office and agreement – dating from 1924
- Relates to animal health
- In 2003 becomes the World Organisation for Animal health, but keeps its former acronym of OIE
- In 1998 official agreement between the OIE and the WTO and adoption of SPS agreement
- 178 member countries
- http://www.oie.int/

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OIE cntd.

Objectives

- Transparency (WAHID: World Animal Health Information Database)
- Scientific information (incl. the sharing of technical data; ref. laboratories)
- International solidarity (sharing of expertise)
- Sanitary safety (development of Health Standards/Manuals/Codes)
- Promotion of veterinary services (investment into developing countries)
- Food and safety and animal welfare (through science-based approach)

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CODEX

Codex Alimentarius:

- An international agreement created by FAO and WTO – dating from 1963
- Relates to food
- 185 member countries
- Harmonisation with regards to food safety
- Methods for analysis & sampling, and codes & guidelines for hygienic practice
- Codex Standards considered scientifically justified and accepted as a benchmark against which national measures/regulations are evaluated
- www.codexalimentarius.org

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CODEX cntd.

Objectives

- To develop Food Standards/Guidelines/Codes of Practice for food and agriculture
- Main purpose is the protection of consumer health; it also incl. animal food regulations
- Ensuring fair trade practices in the food trade
- Promotion of Food Standards work of international and non governmental organisations
- Development of Standards, incl.:
  - Codex
  - Pesticide MRLs
  - Veterinary drugs MRLs
  - Food additives

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In summary

•The **WTO** deals with the global rules of trade between nations. Its main function is to ensure that trade flows as smoothly, predictably and freely as possible – without discrimination. Its mandate is *International Harmonisation*.

•The mandate of NPPOs is to ensure that robust National Phytosanitary Legislation and National Standards are in place as these are the key to effective risk management.

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TECHNICAL MARKET ACCESS – THE BASIC STUFF

Rob Duthie – PHAMA Short Term Advisor

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What we'll do today

- Hear about your experiences and needs
- Prioritisation and feasibility
- Talk about the rules of the game – SPS
- What technical stuff do we need to do to gain market access?
- Who does what and when to develop a submission
- Talk about key pests and possible risk management

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Market feasibility study

- Develop list of priority products based on national inputs
- Conduct market feasibility studies for key markets
  - Ability to supply market destination
  - Infrastructure requirements
  - Quarantine issues?
  - Investment to gain target market
  - Is it profitable short and longer term?

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What's the problem??

Let's just send some!!!

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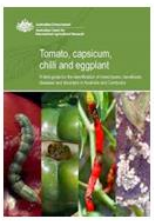
Different countries different pest status



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The rules of the game

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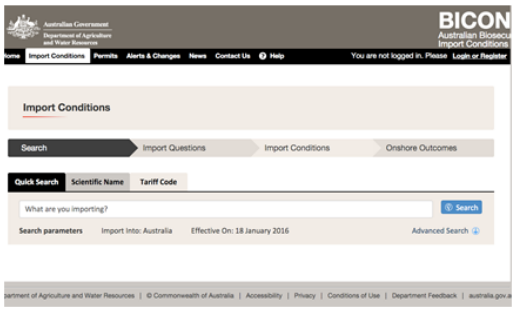
What does Australia allow?



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What does NZ allow?

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Australia - permitted

Current priority list

- Asparagus
- Brocoli
- Cabbage

Others not on list

- Coconuts
- Various cut flowers
- Some leaves
- Various processed

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New Zealand - permitted

Current priority list

- Ginger

Others not on list

- Betel nut
- Coconut
- Taro
- Yam
- Cassava
- Tarua

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Frozen – permitted all countries

- Must have commercial documentation stating that the product has been blanched and frozen for -18^0 C for 7 consecutive days.
- Must comply with Australian Food Standards packaging and processing.
- Hard Frozen Statement
- Country of origin
- Botanical Name
- Packaging Information
- Processing Information

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Let's play the game

Information is needed to:

1. Ensure clear and timely communications during assessment process
1. Assess the potential quarantine risk posed by imports
2. Determine how best to manage risks

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Market access submission

- Covering letter from PNG NPPO to destination NPPO requesting access
- Description of the commodity
  - Scientific name
  - Subspecies or varieties?
  - Taxonomy (order, suborder, family)
  - Common names

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Market access submission

- Origin of the commodity
  - Country
  - Province/state
  - Region
- Production details
  - Location/s and climatic conditions
  - Details of production season – all year round or specific supply period?
  - Cultivation methods
  - Pest and disease information
  - Pest management techniques

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Market access submission

- Harvesting methods
- Post harvest handling
  - Transport
  - Cooling
  - Washing/cleaning
  - Storage
  - Packaging
- Estimated production volumes
- Is the product to be exported imported into PNG and from where – under what conditions?

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Risk management – likely key pests

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How do we manage key pests?

Monitoring and surveillance for exotics

Host status testing

Pest free place of production

Disinfestation – cold, fumigation, heat

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Trials to prove risk management

- Need to decide what the best options are to manage key pests
- This may involve trials to prove that what we propose does work
- Will need to be in close communication with importing country before we conduct trials

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Just the start of the process
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Appendix D

PNG Fresh Produce Access to Australia, MSG Countries and New Zealand

Appendix D PNG Fresh Produce Access to Australia, MSG Countries and New Zealand

Common name a/	Scientific Name	Countries with approved access	Summary of access requirements
Asparagus	*Asparagus officianalis*	Australia	Phytosanitary certificate – free of pests, weed seeds and other contaminants.
Betel nut	*Areca cathecu*	New Zealand	Phytosanitary certificate – inspected and found free of quarantine pests.
		Australia	Phytosanitary certificate – free of pests, weed seeds and other contaminants.
Brassica spp b/	*Brassica spp.*	Australia	Phytosanitary certificate – free of pests, weed seeds and other contaminants.
Capsicum	*Capsicum annuum*	Fiji	Conditions still to be clarified.
Cassava	*Manihot esculentus*	New Zealand	Phytosanitary certificate – inspected and found free of quarantine pests.
Coconut	*Cocos nucifera*	Australia	Mature – mandatory MB fumigation and phytosanitary certificate. Immature – phytosanitary certificate c/
		New Zealand	Phytosanitary certificate – inspected and found free of quarantine pests.
Garlic	*Allium spp.*	Australia	Phytosanitary certificate – mandatory MB fumigation.
Giant taro corms	*Alocasia macrorrhiza*	Australia	Phytosanitary certificate – inspected and found free of quarantine pests. Corms must have tops removed to prevent sprouting.
Ginger	*Zingiber officinale*	New Zealand	Phytosanitary certificate – inspected and found free of quarantine pests.
Lettuce	*Lactuca sativa*	Fiji	Conditions still to be clarified.
Taro	*Colocasia esculenta*	New Zealand	Phytosanitary certificate – inspected and found free of quarantine pests.
Tomato	*Lycopersicon esculentum*	Fiji	Conditions still to be clarified.
Tarua	*Xanthosoma sagittifolium*	New Zealand	Phytosanitary certificate – inspected and found free of quarantine pests.
Yam	*Dioscorea sp.*	New Zealand	Phytosanitary certificate – inspected and found free of quarantine pests.

a/ Shaded rows are items on national priority list developed by PNG stakeholders (Appendix A)

b/ Incudes Broccoli, bok choy, cabbage, cauliflower, kale, kohlrabi, turnip.

c/ MB = methyl bromide

Appendix E

Domestic Market Data for Fresh Produce

Appendix E Domestic Market Data for Fresh Produce

This Appendix provides an analysis of market reporting data collected over the six-year period 2009-2014. Data for 2015 are not yet available. It shows annual average prices in eight urban markets for 24 commodities. The eight markets are:

Goroka	GOR	Port Moresby	POM
Lae	LAE	Popondetta	POP
Mount Hagen	HAG	Madang	MAD
Wewak	WEW	Kokopo	KOK

Table 1: Prices (K/kg) of Selected Items in Urban Markets by Year 2009-2014

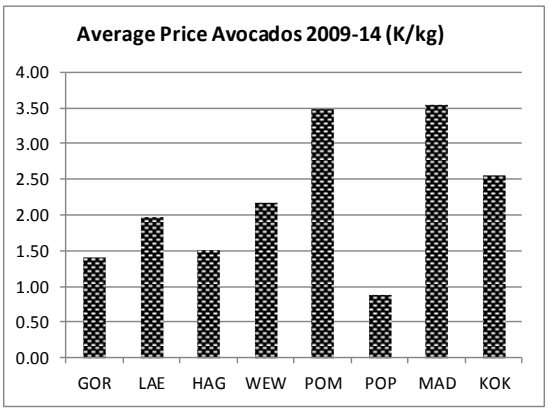
Year	GOR	LAE	HAG	WEW	POM	POP	MAD	KOK
Avocado								
2009	1.23	1.71	1.03	3.55			1.77	2.49
2010	1.26	1.40	0.99	2.39	3.31	0.87	3.65	2.77
2011	1.42	2.04	1.55	1.67	3.47		4.03	2.32
2012	1.53	2.19	2.32	1.34	3.00		2.55	2.40
2013	1.52	2.50	1.30	1.77	3.63		4.46	2.66
2014	1.44		1.75	2.31	3.94		4.76	2.68
Average	**1.40**	**1.97**	**1.49**	**2.17**	**3.47**	**0.87**	**3.54**	**2.55**
Cooking Banana								
2009	1.42	0.82	2.05	1.03	1.73	0.84	0.97	0.98
2010	1.49	1.09	2.23	0.85	1.68	0.83	1.08	1.01
2011	1.69	1.02	2.98	0.57	2.05	1.02	1.02	1.34
2012	1.53	1.36	3.36	0.57	3.23	1.25	2.00	1.25
2013	2.08	1.66	2.56	1.52	2.13	1.27	1.62	0.78
2014	2.08		3.18	1.96	2.92	1.22	2.06	0.77
Average	**1.72**	**1.19**	**2.73**	**1.08**	**2.29**	**1.07**	**1.46**	**1.02**
Ripe Banana								
2009	1.15	1.13	0.90	1.17	2.93	0.66	1.23	3.00
2010	1.22	1.26	1.54	0.85	1.89	0.56	1.83	2.01
2011	1.32	1.41	1.28	0.81	2.23	0.72	1.39	2.29
2012	1.21	2.08	1.38	1.14	3.14	1.12	2.79	2.39
2013	1.21	1.93	1.69	1.52	2.53	1.28	3.32	1.72
2014	1.31		1.63	1.65	3.47	1.16	3.41	1.80
Average	**1.24**	**1.56**	**1.40**	**1.19**	**2.70**	**0.92**	**2.33**	**2.20**
French Beans								
2009	2.22	2.25	1.77				7.65	4.75
2010	2.47	3.76	2.05		5.33	5.75	8.26	6.45
2011	2.91	3.27	3.3	1.13	6.09	1.78	4.75	4.34
2012	3.14	3.47	3.18	1.46	7.37	1.17	3.57	5.46
2013	3.72	3.17	3.78	2.35			6.36	6.62
2014	3.04		2.64			1.24	4.86	6.82
Average	**2.92**	**3.18**	**2.79**	**1.65**	**6.26**	**2.49**	**5.91**	**5.74**
Snake Beans								
2009	1.42	2.33	3.69	1.61	5.67	3.16	4.43	2.76
2010	2.77	1.92	2.78	1.61	4.81	3.87	7.22	2.86
2011	2.38	2.44	2.74	0.73	5.53	2.82	2.75	2.36
2012	4.18	2.85	3.81	1.21	5.74	2.17	1.88	2.30
2013	7.38	2.80	1.69	1.66	7.15	1.84	5.78	2.70
2014	3.72		2.22	2.84	9.34	1.33	5.83	2.38
Average	**3.64**	**2.47**	**2.82**	**1.61**	**6.37**	**2.53**	**4.65**	**2.56**
Broccoli								
2009	3.76	3.87	1.89		10.00		2.49	4.82
2010	3.85	5.43	2.40		6.18		4.67	
2011	5.22	4.75	2.60	3.28	5.78		4.48	3.65
2012	5.80	4.19	3.28	3.22	7.71		3.87	
2013	5.79	3.29	3.41	5.12	9.50		5.34	
2014	4.17		2.67	4.86			6.71	
Average	**4.77**	**4.31**	**2.71**	**4.12**	**7.83**		**4.59**	**4.24**

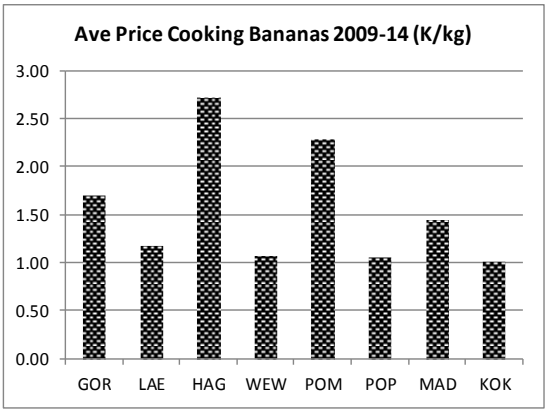
Year	GOR	LAE	HAG	WEW	POM	POP	MAD	KOK
Cabbage								
2009	0.83	1.76	0.70		3.75		0.88	3.72
2010	1.04	2.16	1.10	1.16	4.70		1.05	3.99
2011	1.08	1.58	0.85	1.77	4.83	2.23	2.42	3.68
2012	1.25	2.41	1.06	1.40	5.09		1.76	4.49
2013	1.34	2.46	1.26	2.75	4.92		2.50	4.80
2014	1.06		0.91	3.77	4.86	1.84	1.60	4.09
Average	**1.10**	**2.07**	**0.98**	**2.17**	**4.69**	**2.04**	**1.70**	**4.13**
Pakchoi								
2009	1.62	3.44	1.20	2.97	3.45		2.71	2.69
2010	2.31	3.19	1.58	2.92	4.82		9.23	2.48
2011	1.77	2.51	1.88	1.51	5.25	2.18	4.63	2.90
2012	1.71	3.15	2.32	1.44	5.82	2.75	3.62	3.10
2013	2.30	3.08	1.90	2.25	5.49	2.41		3.15
2014	1.96		2.46	3.55	4.96	1.77		3.48
Average	**1.95**	**3.07**	**1.89**	**2.44**	**4.97**	**2.28**	**5.05**	**2.97**
Capsicum								
2009	5.04	4.13	2.90	5.13	8.65	3.76	12.03	5.09
2010	6.34	4.43	4.13	4.65	8.78	3.72	12.02	4.92
2011	6.30	4.18	5.55	3.19	8.37	2.56	7.20	4.94
2012	6.97	3.17	5.50	3.09	7.03	3.41	4.41	5.32
2013	6.28	3.85	4.81	3.70	20.89	2.49	7.15	4.93
2014	6.19		4.15	3.19	16.66	1.40	8.38	5.58
Average	**6.19**	**3.95**	**4.51**	**3.83**	**11.73**	**2.89**	**8.53**	**5.13**
Carrot								
2009	1.05	2.49	2.01		8.50		1.08	
2010	1.81	1.90	2.62		6.08		1.53	3.55
2011	1.82	2.01	2.54	2.37	4.60		2.91	3.76
2012	1.88	2.49	2.68	2.88	5.69	0.74	1.96	0.00
2013	2.34	1.88	2.75	3.70	5.82	1.66	2.98	12.33
2014	1.93		2.48	3.62	7.21	0.97	3.38	6.50
Average	**1.81**	**2.15**	**2.51**	**3.14**	**6.32**	**1.12**	**2.31**	**5.23**
Corn								
2009	1.49	1.49	0.78	1.19	4.10	0.29	0.92	1.96
2010	1.59	1.31	0.76	1.21	1.90	0.33	0.52	1.72
2011	1.61	1.13	1.19	0.87	2.94	0.76	1.87	1.40
2012	1.78	1.69	1.35	0.90	3.44	0.95	1.50	1.98
2013	1.68	1.52	1.08	1.53	3.36	1.18	1.68	1.56
2014	1.79		1.08	1.70	3.60	1.05	1.91	1.73
Average	**1.66**	**1.43**	**1.04**	**1.23**	**3.22**	**0.76**	**1.40**	**1.73**
Cucumber								
2009	1.87	1.35	1.25	2.27	3.23	0.66	0.73	2.62
2010	2.13	1.36	1.50	1.84	2.41	0.77	0.99	2.36
2011	1.61	1.13	1.19	0.87	2.94	0.76	1.87	1.40
2012	1.78	1.69	1.35	0.90	3.44	0.95	1.50	1.98
2013	1.68	1.52	1.08	1.53	3.36	1.18	1.68	1.56
2014	1.79		1.08	1.70	3.60	1.05	1.91	1.73
Average	**1.81**	**1.41**	**1.24**	**1.52**	**3.16**	**0.90**	**1.45**	**1.94**

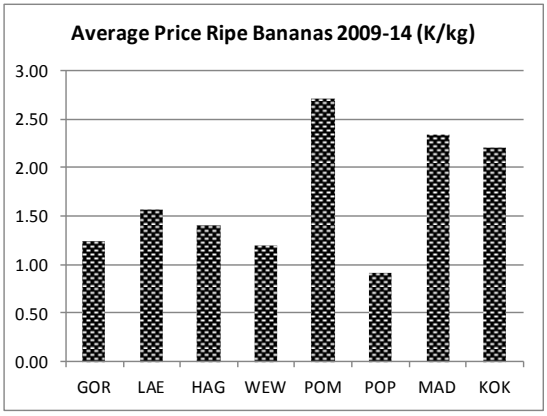
Year	GOR	LAE	HAG	WEW	POM	POP	MAD	KOK
Garlic								
2009	16.99	5.87	13.50	10.00	9.86		12.97	19.78
2010	25.74	9.01	11.73		39.66		15.17	16.34
2011	28.28	33.85	17.39		63.34		37.77	24.84
2012	23.52	92.37	16.93	20.00	12.60	2.42	18.21	36.13
2013	28.64	31.43	17.47	7.78	21.73	2.43	23.09	29.69
2014	24.30		18.37		21.63	1.60	18.01	
Average	**24.58**	**34.51**	**15.90**	**12.59**	**28.14**	**2.15**	**20.87**	**25.36**
Ginger								
2009	4.15	3.94	3.37	4.31	5.63	4.74	7.61	8.20
2010	3.86	5.37	3.39	5.15	7.06	4.92	7.40	7.89
2011	4.72	4.11	4.10	3.47	8.30	2.71	7.11	11.01
2012	5.10	4.52	4.35	2.46	5.53	2.42	5.01	11.71
2013	4.50	5.94	4.58	3.04	9.92	1.98	7.40	9.52
2014	4.58		3.73	2.96	12.83	2.17	8.94	7.36
Average	**4.49**	**4.78**	**3.92**	**3.57**	**8.21**	**3.16**	**7.25**	**9.28**
Lettuce								
2009	1.67	2.51	2.30		8.73		8.30	11.89
2010	3.50	3.76	2.90		10.81		9.32	13.79
2011	2.80	3.89	3.23	3.84	11.47		5.59	12.55
2012	4.34	3.94	5.40	1.76	5.52		5.18	12.76
2013	3.71	3.02	3.44		10.76		23.00	18.02
2014	3.78		2.95		8.70		3.71	12.04
Average	**3.30**	**3.42**	**3.37**	**2.80**	**9.33**		**9.18**	**13.51**
Bulb Onion								
2009	4.89	3.17	4.23				6.84	
2010	5.24	4.22	5.23				8.78	9.09
2011	5.88	3.78	6.65	3.17	5.04		6.40	
2012	5.96	3.36	7.74	3.09	5.21		4.78	16.85
2013	5.47	3.00	5.21	4.55	5.18		6.12	16.06
2014	4.97		5.12		6.14		6.79	
Average	**5.40**	**3.51**	**5.70**	**3.60**	**5.39**		**6.62**	**14.00**
Spring Onion								
2009	2.32	3.12	2.01	3.08	16.56		6.49	5.26
2010	3.15	2.83	2.01	4.24	13.39		10.60	6.50
2011	3.21	3.00	1.85	2.67	14.02		4.30	6.22
2012	2.85	3.03	1.87	2.50	8.55		3.24	5.68
2013	3.02	2.59	2.77	4.15	20.65		3.87	5.04
2014	3.46		2.19	3.69	21.69	2.67	5.31	8.71
Average	**3.00**	**2.91**	**2.12**	**3.39**	**15.81**	**2.67**	**5.64**	**6.24**
Orange								
2009	2.63	2.53	2.85	1.62		0.61	5.23	2.01
2010	2.80	2.25	2.65	1.28	4.17	0.77	6.42	2.29
2011	3.19	1.89	2.93	0.83	3.69	1.09	6.10	2.14
2012	3.16	1.63	2.78	1.01	4.86	1.75	2.36	2.54
2013	3.22	1.41	2.58	1.70	6.97	2.02	5.55	3.09
2014	2.88		2.80	1.98	8.08		4.62	2.72
Average	**2.98**	**1.94**	**2.77**	**1.40**	**5.55**	**1.25**	**5.05**	**2.47**

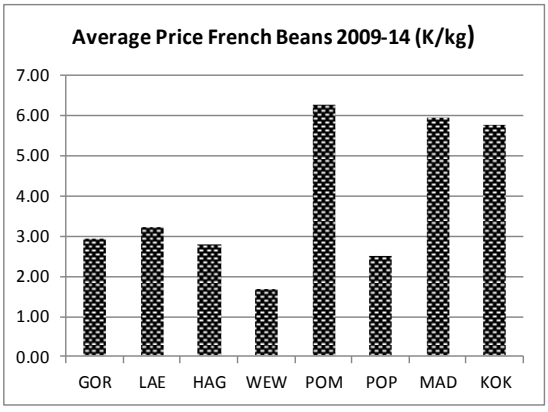
Year	GOR	LAE	HAG	WEW	POM	POP	MAD	KOK
Peanut								
2009	6.62	3.11	6.86	3.07	8.96	2.46	6.48	4.57
2010	6.70	3.63	6.84	3.17	9.89	3.50	7.29	4.38
2011	6.73	3.56	8.77	1.93	7.11	2.41	6.74	5.93
2012	7.06	1.82	8.53	1.98	7.04	3.05	3.60	6.44
2013	6.95	1.43	7.21	3.44	11.05	2.75	5.31	
2014	7.63		6.78	3.27	15.06	1.50	5.84	6.11
Average	**6.95**	**2.71**	**7.50**	**2.81**	**9.85**	**2.61**	**5.88**	**5.49**
Pineapple								
2009	1.72	1.70	1.56	1.19	4.36	0.53	1.19	4.15
2010	1.79	1.90	1.80	1.10	3.74	0.55	1.31	3.93
2011	2.48	2.47	1.90	0.93	3.65	0.99	4.35	3.14
2012	2.49	2.14	2.35	1.03	4.86	1.15	3.23	4.03
2013	2.61	1.80	2.68	2.02	6.61	1.29	4.26	3.08
2014	2.29		2.38	2.65	6.41	1.18	4.30	3.29
Average	**2.23**	**2.00**	**2.11**	**1.49**	**4.94**	**0.95**	**3.11**	**3.60**
Potato								
2009	1.89	1.89	1.76		3.91		0.87	1.96
2010	2.05	1.67	2.25	1.36	3.65		1.08	1.08
2011	2.29	1.81	2.13	1.70	3.58	0.95	2.21	1.23
2012	1.99	1.80	1.90	1.58	4.57		2.19	0.79
2013	1.87	1.29	1.79	3.65	4.32	0.97	2.01	4.90
2014	1.98		2.20	3.27	4.20	1.03	2.96	2.05
Average	**2.01**	**1.69**	**2.01**	**2.31**	**4.04**	**0.98**	**1.89**	**2.00**
Sweet Potato								
2009	0.50	1.12	0.50	0.84	1.62	0.30	0.42	0.99
2010	1.05	1.41	0.79	0.85	1.84	0.30	0.55	0.90
2011	0.74	0.68	0.82	0.54	2.09	0.58	1.23	0.93
2012	0.86	1.02	1.09	0.64	2.59	0.79	1.36	0.80
2013	0.89	0.86	0.87	1.69	2.28	1.14	1.32	0.80
2014	1.04		1.02	1.33	2.59	1.20	1.74	1.07
Average	**0.85**	**1.02**	**0.85**	**0.98**	**2.17**	**0.72**	**1.10**	**0.92**
Taro								
2009	0.71	0.88	0.84	0.98	2.30	0.54	0.48	0.80
2010	1.02	1.44	0.90	0.88	2.89	0.53	0.52	0.78
2011	0.84	0.97		0.80	2.79	0.68	0.47	1.13
2012	0.87	1.01			1.98	1.61		1.26
2013	0.97	1.12		1.72	2.50	1.15	1.21	0.75
2014	1.31		1.46	1.98		1.06	1.47	0.80
Average	**0.95**	**1.08**	**1.07**	**1.27**	**2.49**	**0.93**	**0.83**	**0.92**
Tomato								
2009	2.25	2.69	2.55	2.76	4.26	2.31	9.32	3.57
2010	3.00	4.58	3.04	3.28	7.27	3.04	11.87	3.48
2011	3.16	5.60	4.32	1.80	4.74	2.01	5.08	3.45
2012	3.17	6.85	4.82	2.11	5.03	2.33	3.77	3.50
2013	3.61	4.95	4.35	3.48	6.30	1.74	6.22	4.24
2014	2.55		4.48	3.32	7.00	1.63		4.49
Average	**2.96**	**4.93**	**3.93**	**2.79**	**5.77**	**2.18**	**7.25**	**3.79**

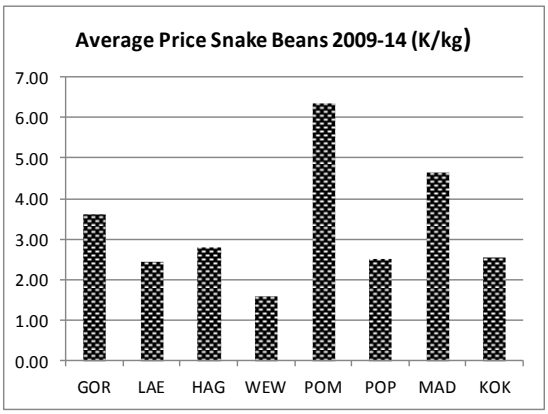
Figure 1: Prices (K/kg) of Selected Items in Urban Markets, Averages for 2009-2014

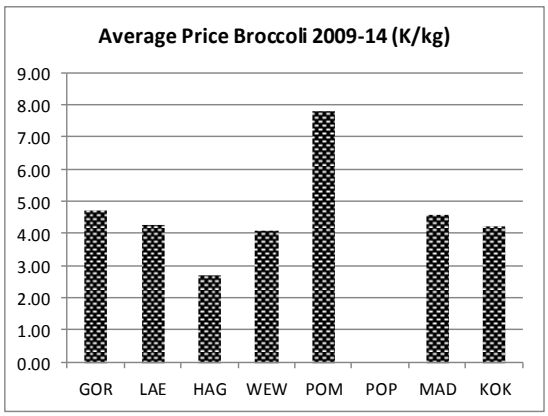


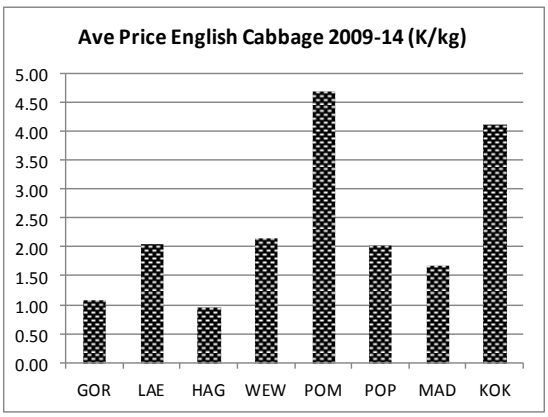


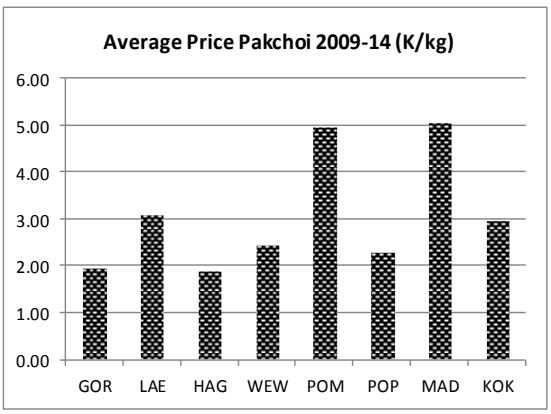


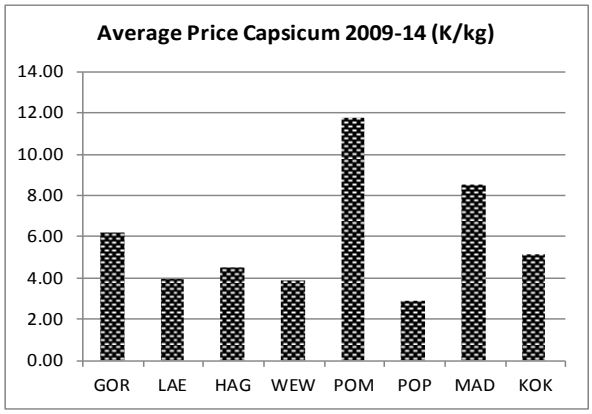


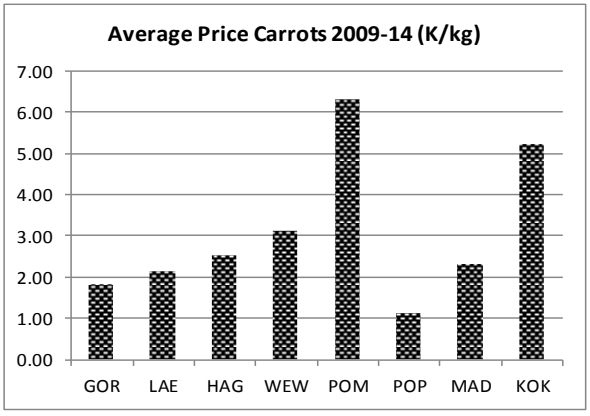


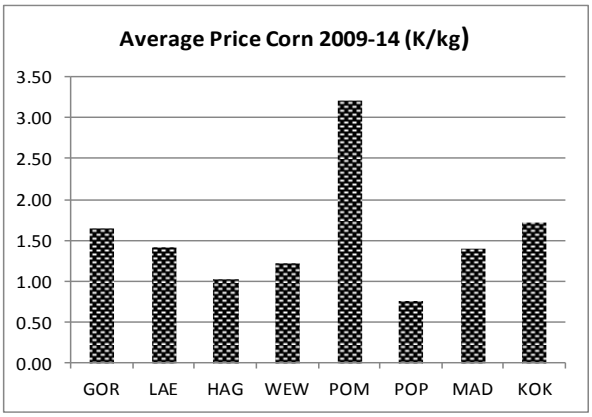


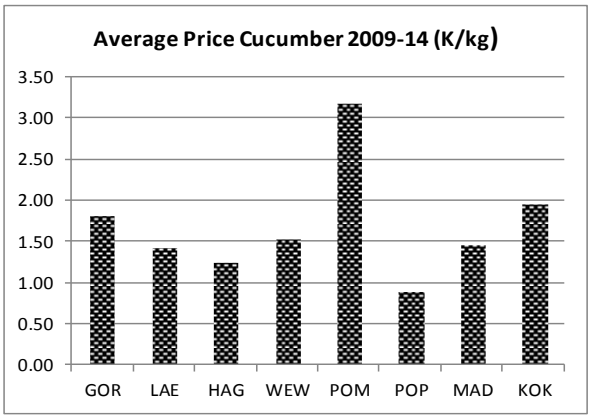


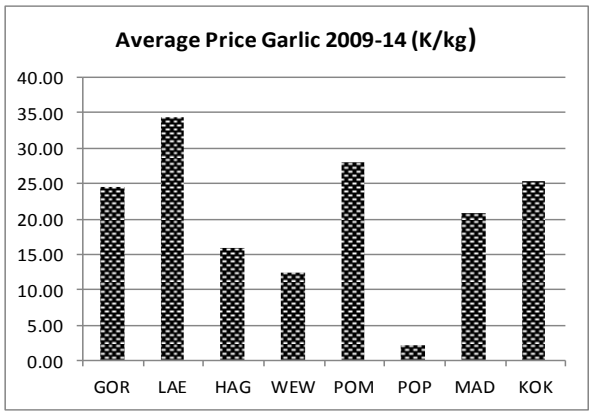


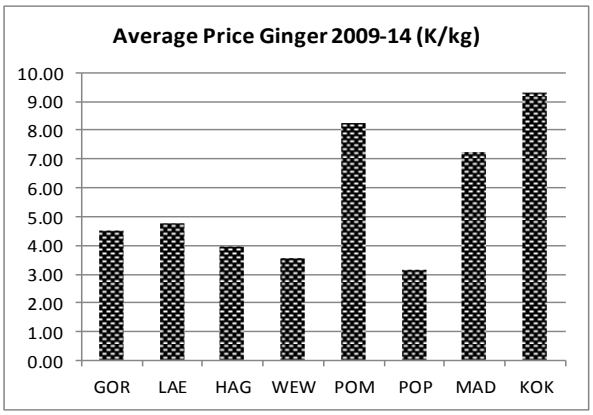

Average Price Capsicum 2009-14 (K/kg)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
GOR LAE HAG WEW POM POP MAD KOK

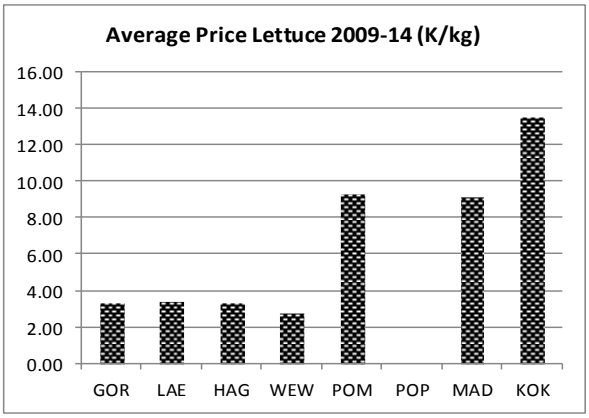

Average Price Carrots 2009-14 (K/kg)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
GOR LAE HAG WEW POM POP MAD KOK

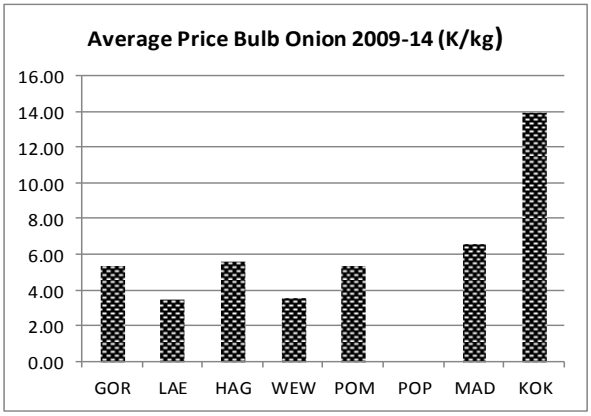

Average Price Corn 2009-14 (K/kg)
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
GOR LAE HAG WEW POM POP MAD KOK

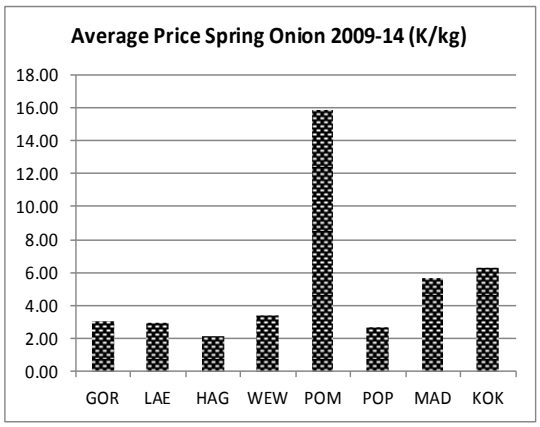

Average Price Cucumber 2009-14 (K/kg)
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
GOR LAE HAG WEW POM POP MAD KOK

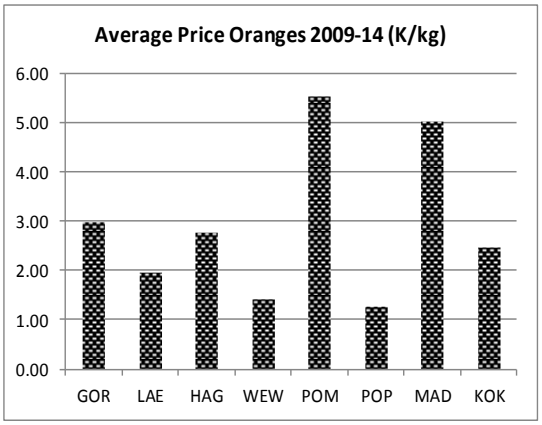

Average Price Garlic 2009-14 (K/kg)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
GOR LAE HAG WEW POM POP MAD KOK

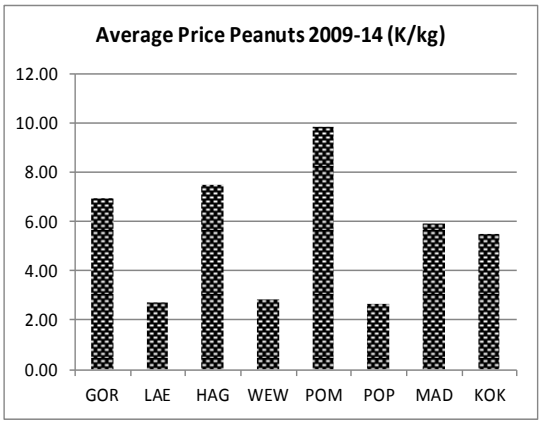

Average Price Ginger 2009-14 (K/kg)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
GOR LAE HAG WEW POM POP MAD KOK

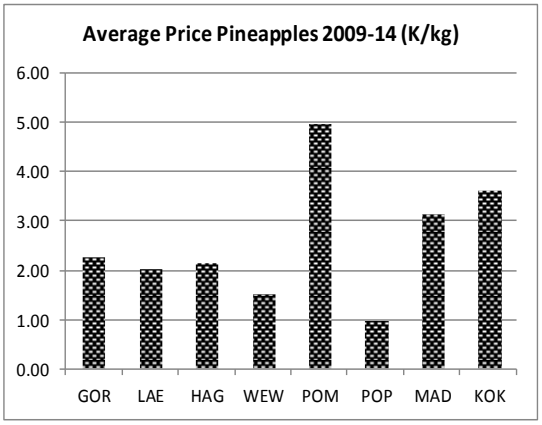

Average Price Lettuce 2009-14 (K/kg)
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
GOR LAE HAG WEW POM POP MAD KOK

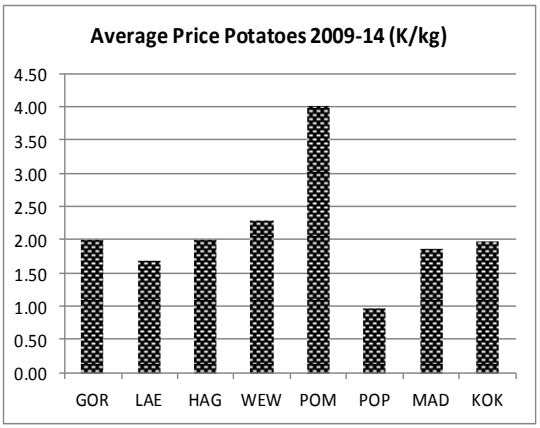

Average Price Bulb Onion 2009-14 (K/kg)
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
GOR LAE HAG WEW POM POP MAD KOK

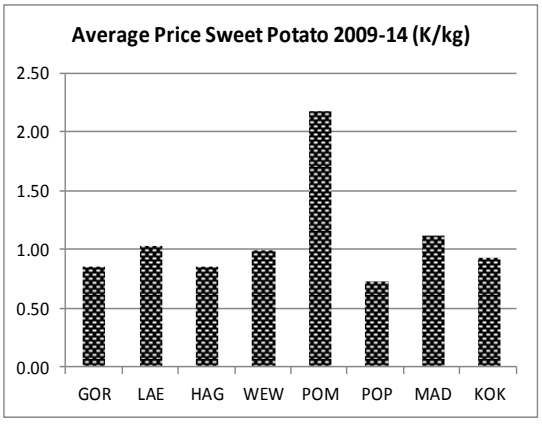

Average Price Spring Onion 2009-14 (K/kg)
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
GOR LAE HAG WEW POM POP MAD KOK

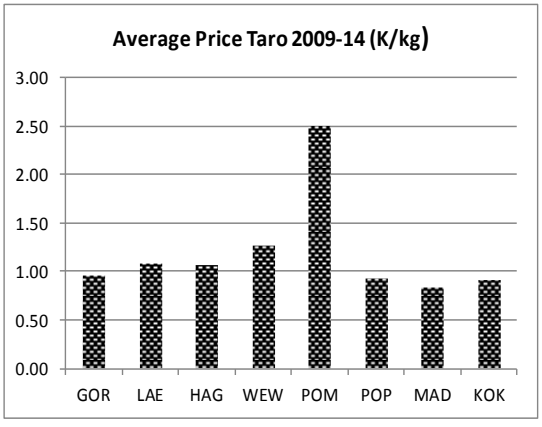

Average Price Oranges 2009-14 (K/kg)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
GOR LAE HAG WEW POM POP MAD KOK

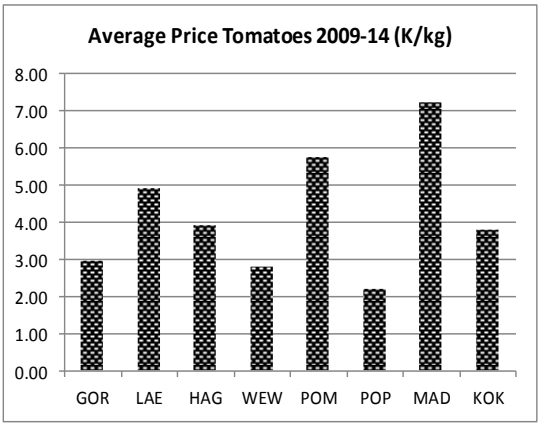

Average Price Peanuts 2009-14 (K/kg)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
GOR LAE HAG WEW POM POP MAD KOK


Average Price Pineapples 2009-14 (K/kg)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
GOR LAE HAG WEW POM POP MAD KOK


Average Price Potatoes 2009-14 (K/kg)
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
GOR LAE HAG WEW POM POP MAD KOK


Average Price Sweet Potato 2009-14 (K/kg)
2.50
2.00
1.50
1.00
0.50
0.00
GOR LAE HAG WEW POM POP MAD KOK


Average Price Taro 2009-14 (K/kg)
3.00
2.50
2.00
1.50
1.00
0.50
0.00
GOR LAE HAG WEW POM POP MAD KOK


Average Price Tomatoes 2009-14 (K/kg)
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
GOR LAE HAG WEW POM POP MAD KOK

Appendix F

PNG Trade Statistics

Appendix F PNG Trade Statistics

Table 1: Value of Exports to Principal Destinations, 2003-2014 (PKG millions)

	2003	2004	2005	2006	2007	2008	2009 a/	2010	2011	2012	2013	2014
Australia	3,571	3,746	4,384	5,200	5,624	6,840		7,278	6,883	5,868	6,109	6,705
Japan	1,002	901	1,148	1,829	2,367	2,049		2,320	2,273	2,711	2,253	5,283
China	522	400	372	475	466	604		1,036	985	627	1,155	3,064
Philippines	274	352	533	1,247	1,091	1,202		1,141	1,188	458	763	515
Germany	520	686	737	569	1,153	741		615	941	842	503	697
South Korea	421	505	754	562	355	729		580	401	170	412	385
Netherlands	90	123	96	41	175	292		398	837	545	382	713
Singapore	164	187	107	77	221	230		307	147	240	74	1,619
Great Britian	195	301	188	188	232	438		296	322	208	264	314
United States	212	181	146	143	223	248		122	276	212	133	182
Others	853	1,036	1,682	2,501	853	2,284		1,509	2,133	1,294	1,290	2,150
Total	7,822	8,417	10,148	12,831	12,760	15,656		15,602	16,386	13,175	13,338	21,626

a/ No data available Source: Bank of PNG Quarterly Economic Bulletins

Table 2: Value of Exports by Major Category, 2001-2014 (PGK millions)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Gross Value of Exports (K millions)														
Oil and Gas	1,889	1,431	1,632	1,652	2,283	2,989	2,984	3,506	1,645	2,225	2,434	2,134	2,031	9,792
Minerals	2,974	3,314	4,226	4,324	5,332	7,420	7,847	8,286	7,445	9,470	9,021	7,281	7,495	7,969
Agricultural and Other	804	1,085	1,391	1,688	1,950	1,653	2,295	2,969	2,226	2,961	3,790	2,695	2,745	3,091
Forest Products	332	414	416	460	476	527	631	538	477	744	768	627	730	962
Marine Products	75	94	125	262	193	191	222	293	233	114	260	330	234	346
Total	**6,075**	**6,338**	**7,790**	**8,386**	**10,234**	**12,780**	**13,979**	**15,592**	**12,026**	**15,513**	**16,273**	**13,067**	**13,235**	**22,160**
Percent of Total														
Oil and Gas	31	23	21	20	22	23	21	22	14	14	15	16	15	44
Minerals	49	52	54	52	52	58	56	53	62	61	55	56	57	36
Agricultural and Other	13	17	18	20	19	13	16	19	19	19	23	21	21	14
Forest Products	5	7	5	5	5	4	5	3	4	5	5	5	6	4
Marine Products	1	1	2	3	2	1	2	2	2	1	2	3	2	2
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: Bank of PNG Quarterly Economic Bulletins

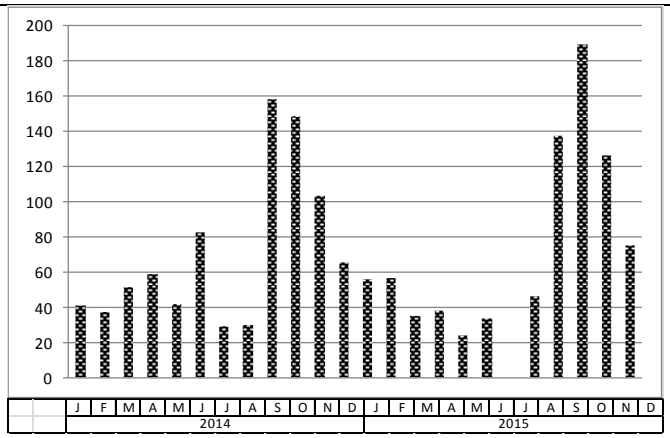
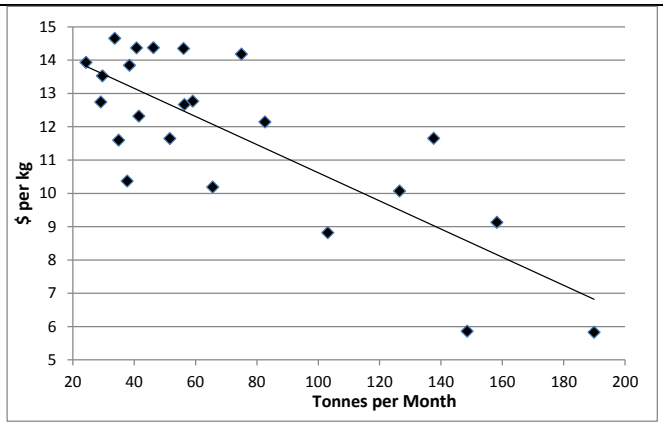
Table 3: Volume of Principal Commodity Exports, 2001-2014 ('000 tonnes)

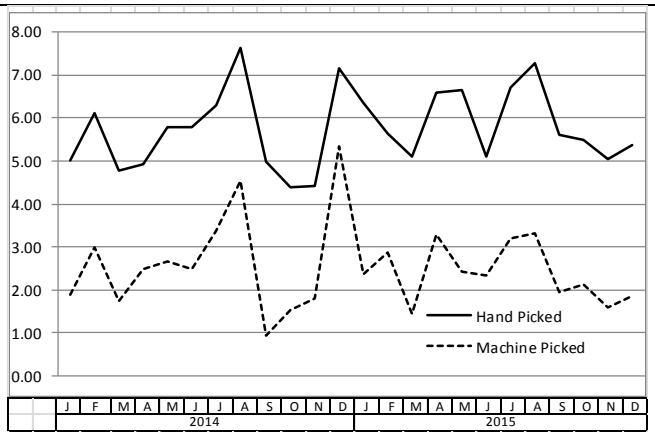
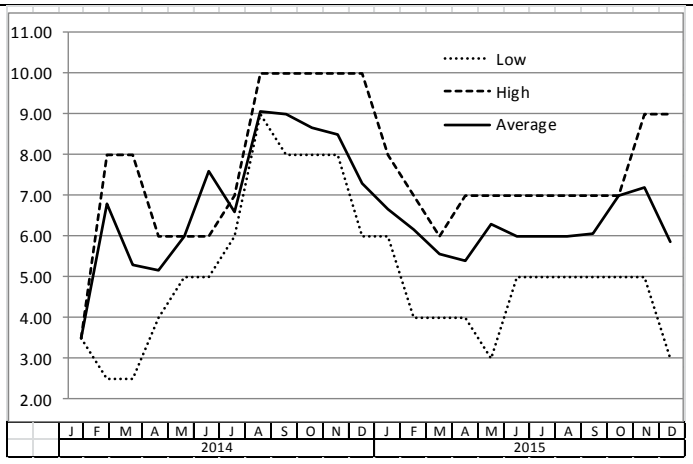
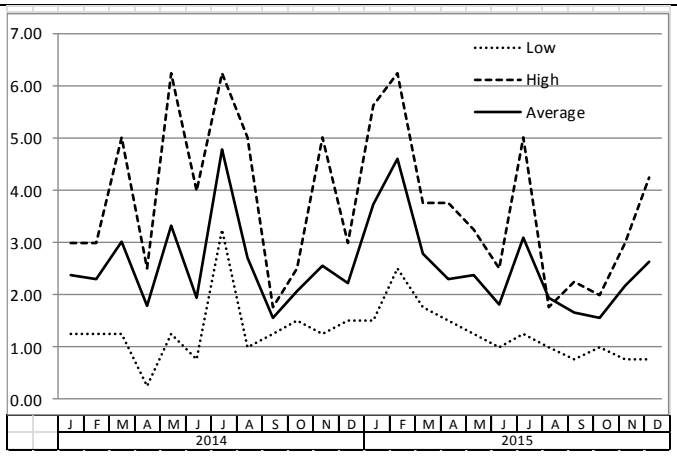
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Exports (tonnes '000)														
Palm Oil	309	248	327	339	346	362	368	446	428	486	572	483	487	515
Coffee	65	45	69	63	72	52	55	67	62	56	74	56	49	48
Copra	22	15	8	19	22	13	13	33	15	19	44	33	16	48
Cocoa	38	24	40	42	44	44	48	53	48	41	47	38	39	34
Coconut Oil	16	17	48	45	54	42	51	62	45	46	45	22	14	11
Rubber	4	3	4	4	5	4	4	5	5	5	4	5	3	3
Tea	8	4	7	8	7	7	6	6	6	5	4	4	3	2
Total	**462**	**357**	**503**	**520**	**551**	**524**	**545**	**672**	**610**	**657**	**790**	**640**	**610**	**661**
Percent of Total														
Palm Oil	67	70	65	65	63	69	68	66	70	74	72	75	80	78
Coffee	14	13	14	12	13	10	10	10	10	9	9	9	8	7
Copra	5	4	2	4	4	2	2	5	2	3	6	5	3	7
Cocoa	8	7	8	8	8	8	9	8	8	6	6	6	6	5
Coconut Oil	3	5	9	9	10	8	9	9	7	7	6	3	2	2
Rubber	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Tea	2	1	1	2	1	1	1	1	1	1	1	1	0	0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

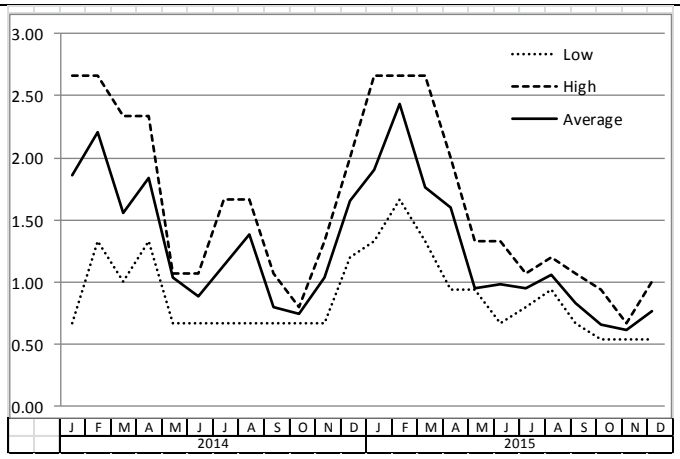
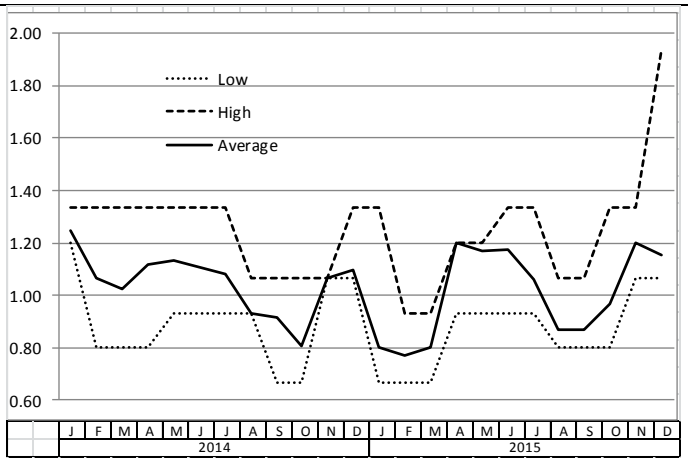
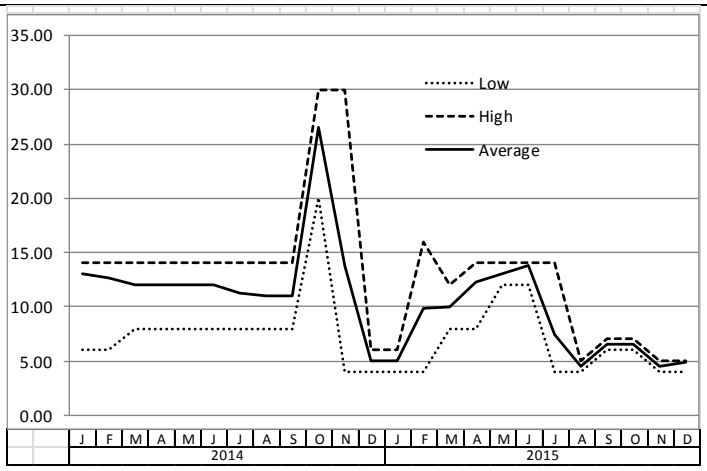
Appendix G

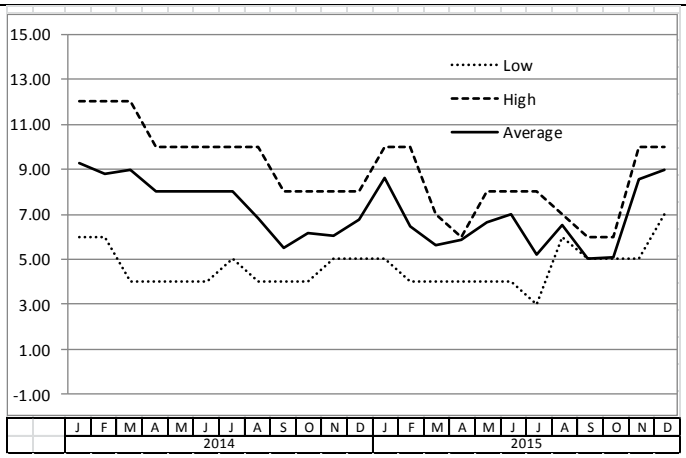
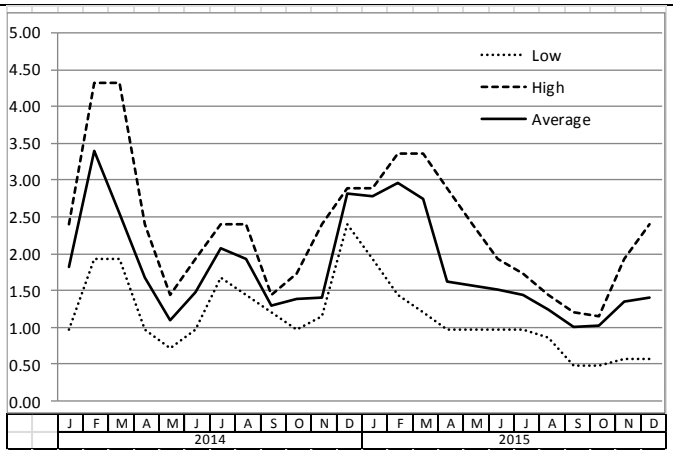
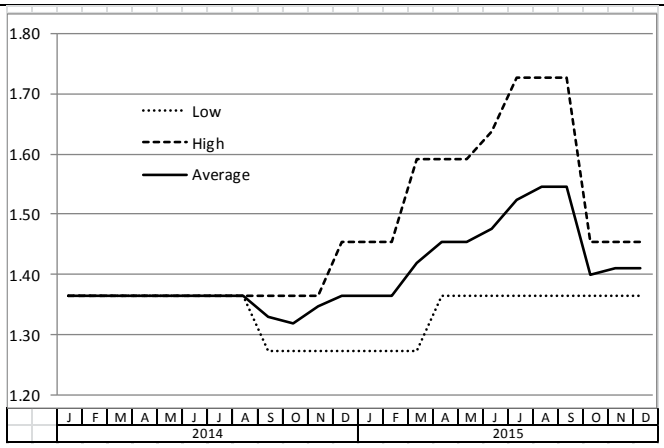
Analysis of Brisbane Wholesale Market Data

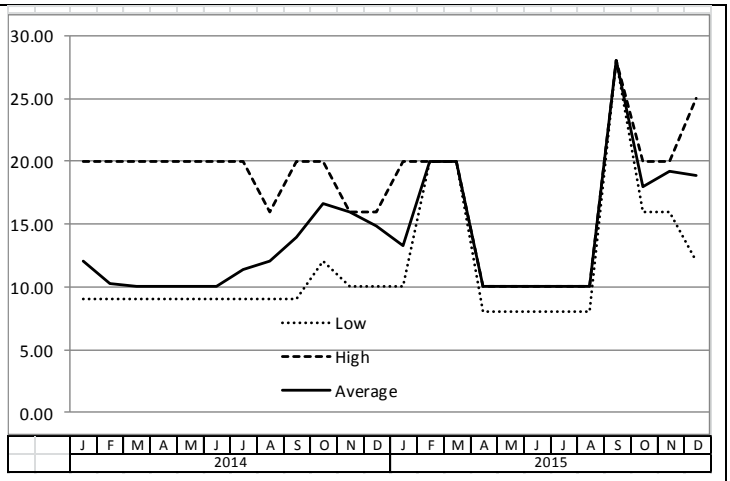
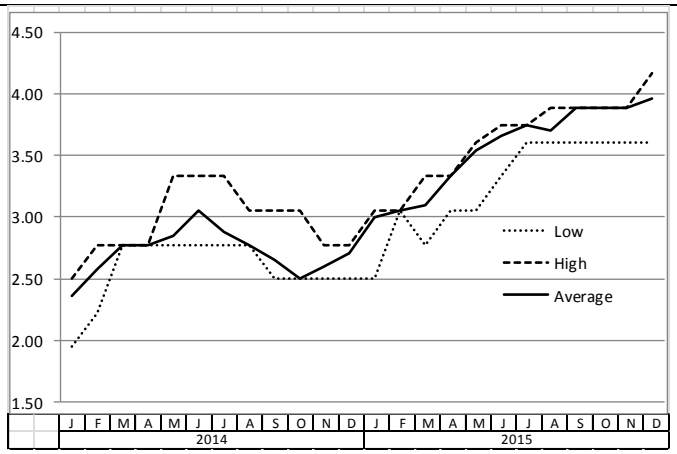
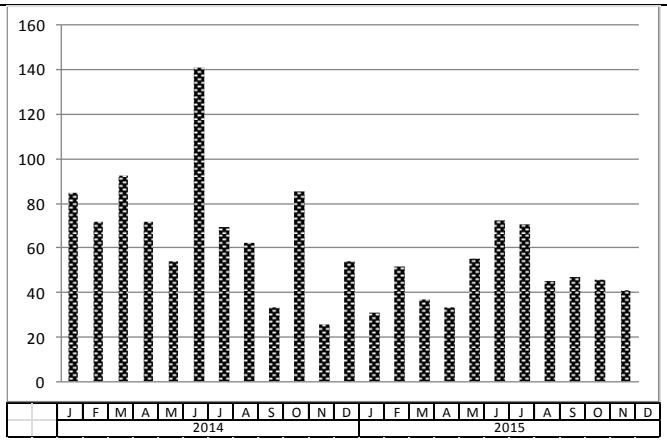
Appendix G Analysis of Brisbane Wholesale Market Data

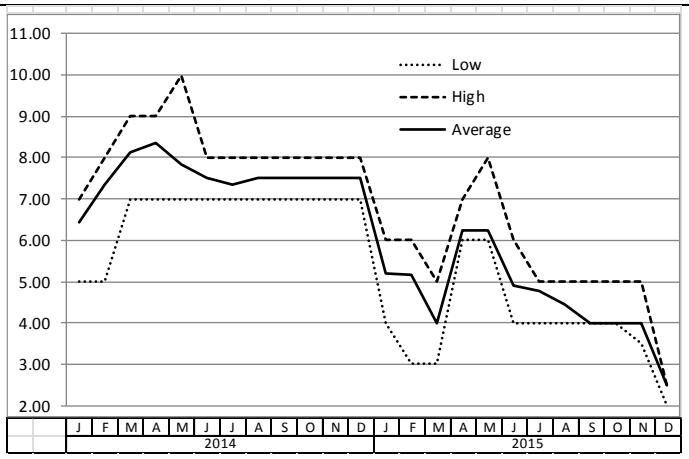
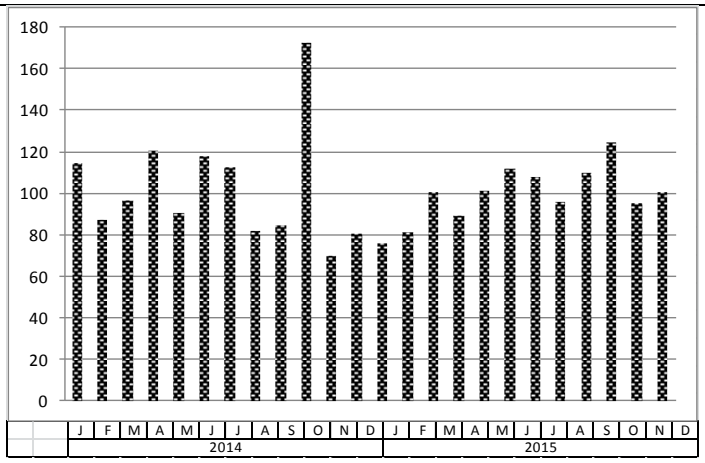
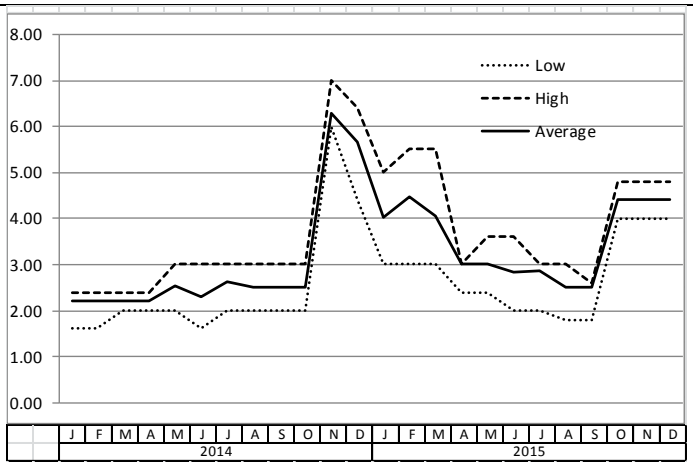
Asparagus Green, Bunched Average Price per kg Local and Imported Prices are strongly seasonal with local supplies abundant in September to January Market supplied by imports during off season	
Asparagus Monthly Volume (tonnes) Supply is strongly seasonal. Domestic supplies available from September to January Only imported produce available during other times	
Asparagus Prices vs. Monthly Supply Prices are markedly higher during months when supplies are less than about 80 tonnes	

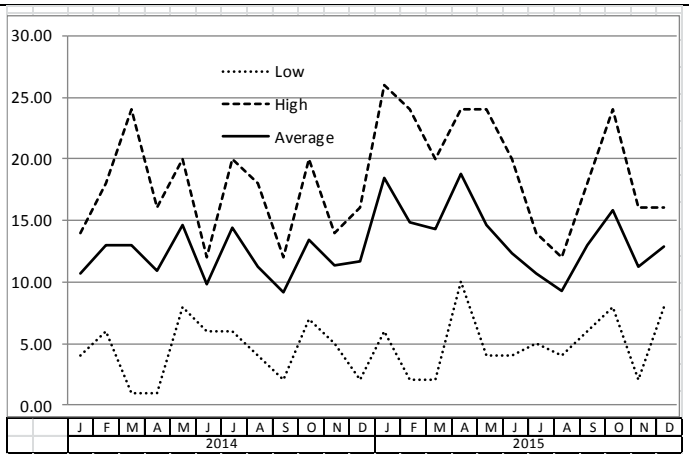
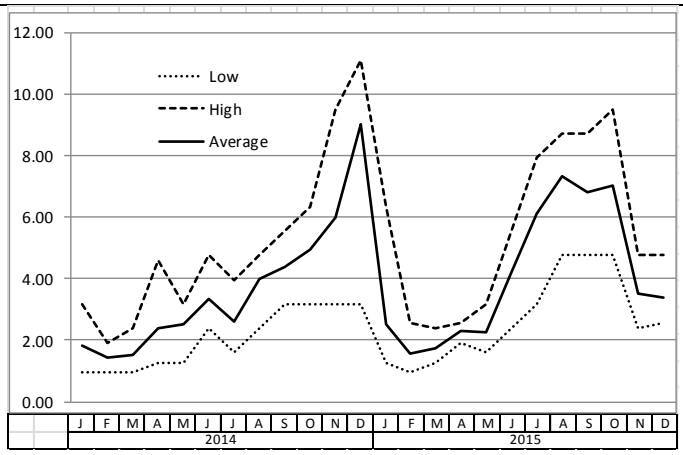
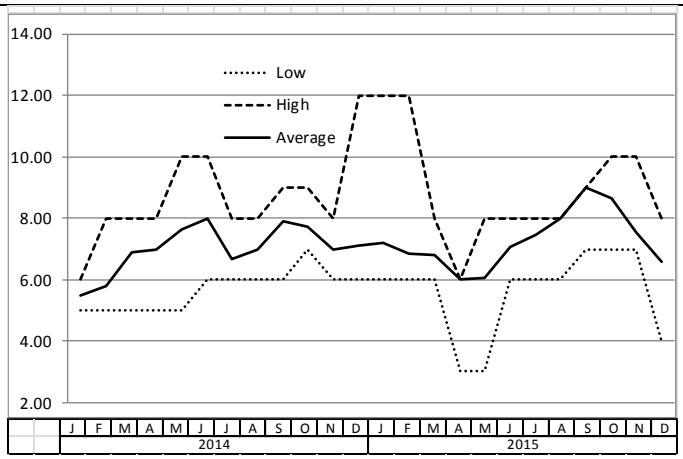
Beans Round, Stringless Average Price per kg Hand and Machine Picked No significant seasonality but prices for hand-picked mostly in $5-6/kg compared with $2-3/kg for machine harvested No imported produce	
Snake Beans Price per kg Low, High, Average Prices fluctuate over a wide range ($5-8/kg) but tend to be higher in the Australian winter No imported produce	
Broccoli 8kg pack Price per kg Low, High, Average No significant seasonality Prices fluctuate mostly in the $2-4/kg range but can be as low as $1/kg or as high as $6/kg No imported produce	

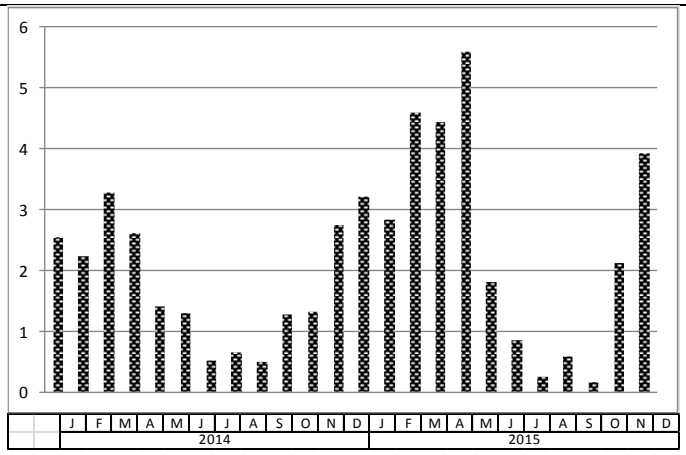
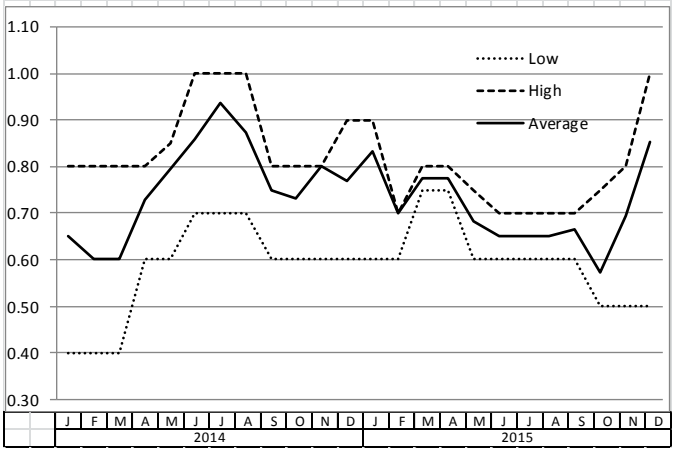
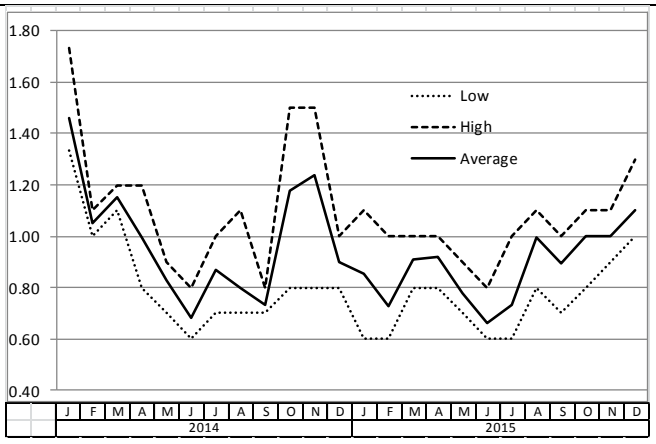
Cabbages Ballhead, Medium Price per kg Low, High, Medium Prices tend to be higher in Australian summer Jan-Feb-Mar with prices of $1.50-2.50/kg At other times prices mostly $0.50-1.50/kg No imported produce	
Carrots 15 kg carton Price per kg Low, High, Average Prices fairly steady between $0.80 and $1.20 per kg No imported produce	
Chillies Birdseye, Red Price per kg Low, High, Average Prices mostly in the $5-15/kg range but with occasional price spikes to $20/kg or more. Birdseye variety more expensive than others. No imported produce	

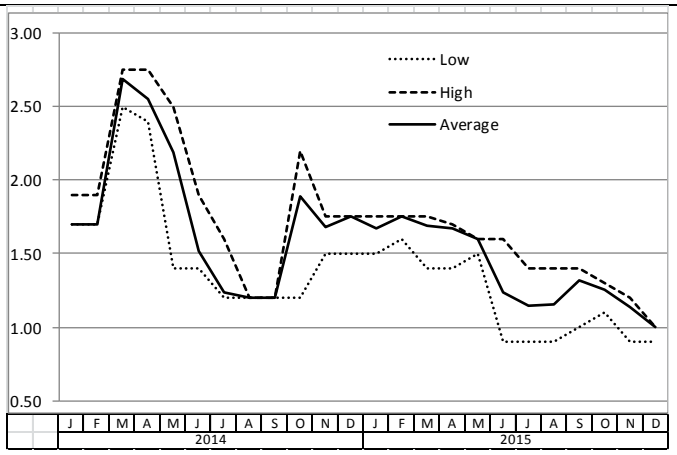
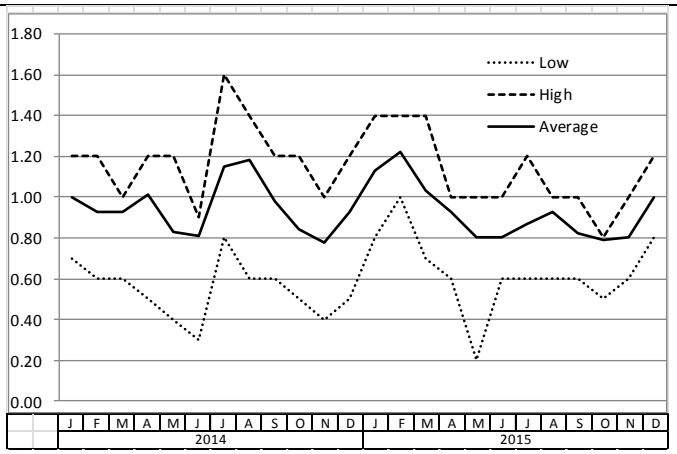
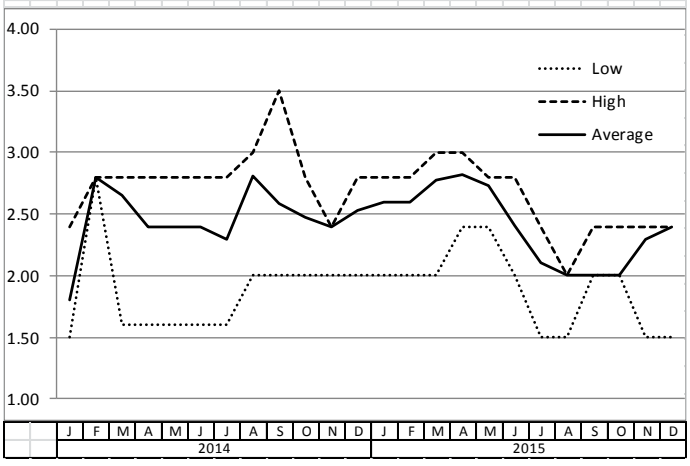
Chillies Hot, Red, Long Price per kg Low, High, Average Cheaper than Birdseye, with prices mostly in the $5-9/kg range but higher for good quality No imported produce	
Chokos 32L carton Price per kg Low, High, Average Small volumes traded. Prices mostly in the $1-2.50/kg range but higher during the Australian summer (Jan-Feb-Mar) No imported produce	
Coconuts Sack of 20-22 nuts Price per nut Low, High, Average Prices consistently above $1.30/nut and have been much higher during 2015 All imported	

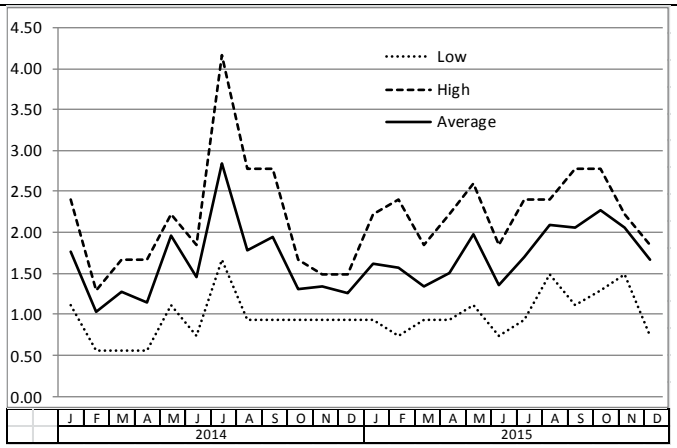
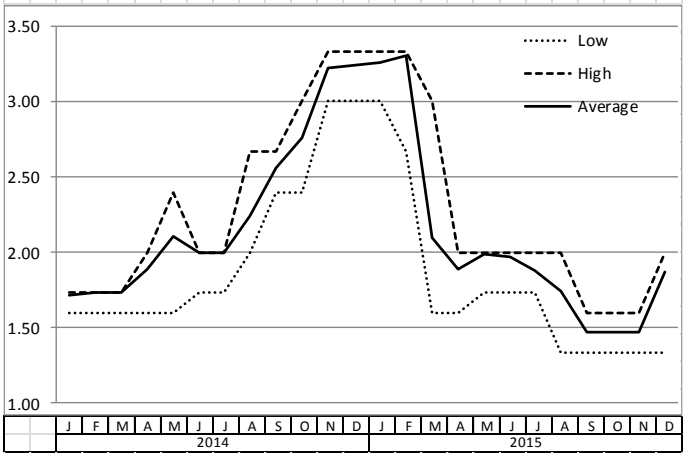
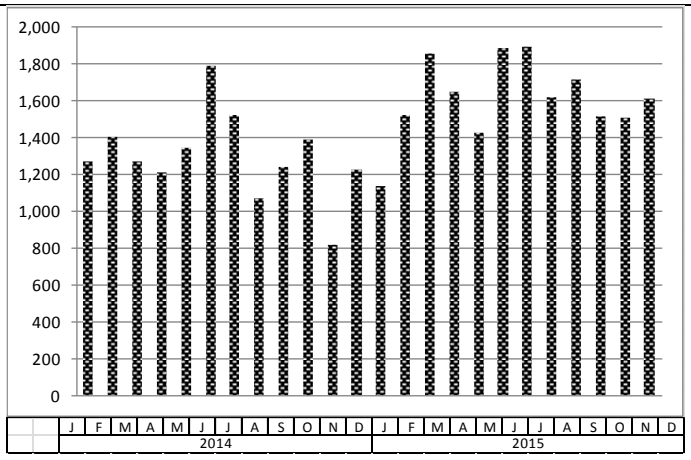
Garlic Local, Medium 4-6cm Price per kg Low, High, Average Local garlic sells for large premiums over imported product. $10-20/kg versus $2-3 for imports	
Garlic Imported, 18L carton Price per kg Low, High, Average Most imported garlic comes from China and is heavily discounted compared to local product. Imports also from Spain, Argentina and Mexico Imports supply the bulk of the market	
Garlic Monthly Volume (tonnes) No identifiable seasonality in supply due to combination of imported and domestic product	

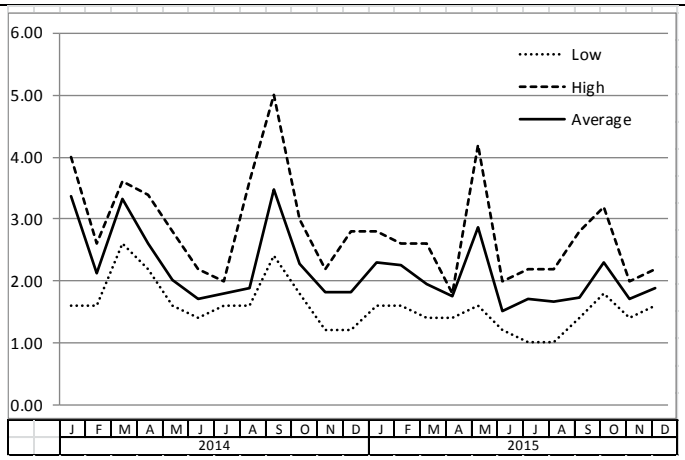
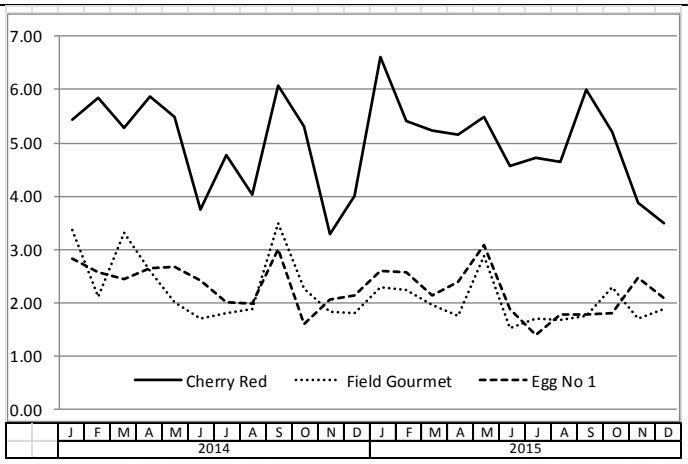
Ginger Medium Price per kg Low, High, Average All supplies come from Queensland Prices appear to be trending downwards No imported ginger on the market in 2014 or 2015	
Ginger Monthly Volume (tonnes) No identifiable seasonality in supply	
Leeks 10 kg carton Price per kg Low, High, Average Prices are around $3-6 per kg in Nov-Dec-Jan. Lower at other times, mostly $2-3/kg No imported produce	

Lettuce Headed Price per carton Low, High, Average Prices vary widely between $5/carton and $20 per carton depending mainly on quality. No significant seasonality No imported produce	
Tahitian Limes No 1, 9L carton Price per kg Low, High, Average Market supplied entirely from Queensland Prices are strongly seasonal with peak prices in Sep-Oct-Nov of $6-10/kg No imported produce	
Okra Price per kg Low, High, Average Prices mostly in the range of $6-9/kg Volumes traded are small No imported produce	

Okra Monthly Volume (tonnes) Volumes are very low, sometimes less than one tonne per month Very limited availability during winter months	
Onions Brown, Medium, 61-75 mm, 20kg bag Price per kg Low, High, Average Large tonnages traded year round Many varieties and packaging formats Prices per kg are low, mostly in the $0.60-0.90/kg range No imported produce	
Pineapples Smoothleaf, Medium Price per piece Low, High, Average Supplied entirely from Queensland Prices tend to be higher in Oct-Nov-Dec but rarely exceed $1.20 per pineapple No imported produce	

Potatoes Washed White, Medium, 20kg bag Price per kg Low, High, Average Large tonnages traded year round Many varieties and packaging formats Sourced from different parts of Australia Prices mostly in the $1-2/kg range No imported produce	
Shallots Price per Bunch Low, High, Average Prices fairly stable between $0.80 and $1.20 per bunch No imported produce	
Spring Onions White Price per bunch Low, High, Average Prices fairly stable between $2.00 and $3.00 per bunch No imported produce	

Sweet Corn 18L Carton Price per kg Low, High, Average Prices mostly in the $1.00-1.50 range Winter prices (Jun-Sep) higher No imported produce	
Sweet Potato Gold, 15kg carton Price per kg Low, High, Average All supplied from Queensland Prices fluctuate over a wide range from $1.50 to over $3.00/kg No imported produce	
Sweet Potato Monthly Volume (tonnes) Monthly sales generally between 800 and 1,600 tonnes with no clear seasonal pattern Prices are markedly higher during lower volume months	

Tomatoes Field Gourmet, No1 Medium 10kg carton Price per kg Low, High, Average High volume product Prices average around $2.20/kg but can exceed $3.00/kg at times No imported product	
Tomatoes Various Varieties Average prices per kg Many varieties and packaging formats Cherry types have significantly higher prices No imported product	

Appendix H

Value Chain Analysis

Appendix H Value Chain Analysis

A value chain analysis was conducted for selected commodities where price data are available for both the PNG domestic market (as shown in Appendix E) and the Brisbane wholesale market (Appendix G). Three marketing pathways were considered: export from Lae by sea freight and export from Port Moresby by both sea and air freight. Eight sea freight and four air freight commodities were analysed based on the following:

PNG retail market price (Lae or POM)	PGK/kg	Average of last six years (FPDA data)
PNG wholesale price (Lae or POM)	PGK/kg	Retail price less retailer's margin of 33%
Grading and packing cost	PGK/kg	Cost of labour and packaging materials
Packout percent	%	Percentage meeting export standards
NAQIA fees (including fumigation)	PGK/kg	
FOB value	PGK/kg	Total cost to point of shipping
Tonnes per refrigerated sea container	tonnes	Not applicable for air freight
Sea or air freight cost	PGK/kg	
CIF value	PGK/kg	Value of produce on arrival in Brisbane
CIF value	AUD/kg	Based on exchange rate PGK 2.12 per AUD
Customs and quarantine	AUD/kg	Based on cost per consignment
Fumigation cost	AUD/kg	Based on cost per container
Losses and shrinkage	%	Percent of produce wasted or lost
Cost per kg delivered to wholesale agent	AUD/kg	Cost per saleable kg delivered in Brisbane
Wholesale price:		Based on monthly averages 2014 and 2014
Low	AUD/kg	20th percentile
Medium	AUD/kg	Mean
High	AUD/kg	80th percentile
Wholesale agents margin	AUD/kg	15% of wholesale price
Net return to exporter	AUD/kg	Wholesale less margin less cost delivered
Net return to exporter	PGK/kg	Based on exchange rate PGK 2.12 per AUD
Exporter's margin	%	Net return as percentage of PNG wholesale

Sea Freight: Lae to Brisbane

		Unit	Cabbage	Carrot	Garlic	Ginger	Bulb Onions	Pine--apples	Potatoes	Sweet Potato
Lae price, retail		PGK/kg	2.07	2.15	34.51	4.78	3.51	2.00	1.69	1.02
Lae price, wholesale		PGK/kg	1.56	1.62	25.95	3.59	2.64	1.50	1.27	0.77
Grading and packing cost a/		PGK/kg	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Packout percent a/		%	70	70	70	70	70	70	70	70
NAQIA fees (incl fumigation)		PGK/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
FOB value		PGK/kg	2.61	2.70	37.46	5.52	4.16	2.54	2.20	1.48
Tonnes per container		tonnes	10	12	8	12	12	12	12	12
Sea freight		PGK/kg	0.24	0.20	0.30	0.20	0.20	0.20	0.20	0.20
CIF value		PGK/kg	2.85	2.90	37.76	5.72	4.36	2.74	2.40	1.68
CIF value		AUD/kg	1.35	1.37	17.81	2.70	2.06	1.29	1.13	0.79
Customs and quarantine		AUD/kg	0.05	0.04	0.06	0.04	0.04	0.04	0.04	0.04
Fumigation		AUD/kg	0.04	0.03	0.05	0.03	0.03	0.03	0.03	0.03
Losses/shrinkage		%	20	10	10	10	10	20	20	10
Cost/kg delivered to agent		AUD/kg	1.79	1.60	19.91	3.08	2.37	1.71	1.51	0.97
Wholesale Price	Low	AUD/kg	0.67	0.81	2.78	4.00	0.60	0.73	1.20	1.60
	Medium	AUD/kg	1.26	1.05	3.12	6.08	0.71	0.94	1.56	2.11
	High	AUD/kg	1.67	1.20	3.63	7.90	0.80	1.10	1.75	2.71
Wholesalers margin	Low	AUD/kg	0.10	0.12	0.42	0.60	0.09	0.11	0.18	0.24
	Medium	AUD/kg	0.19	0.16	0.47	0.91	0.11	0.14	0.23	0.32
	High	AUD/kg	0.25	0.18	0.54	1.19	0.12	0.17	0.26	0.41
Net to exporter	Low	AUD/kg	-1.22	-0.91	-17.55	0.32	-1.86	-1.09	-0.49	0.39
	Medium	AUD/kg	-0.72	-0.71	-17.26	2.09	-1.76	-0.91	-0.19	0.83
	High	AUD/kg	-0.37	-0.58	-16.83	3.63	-1.69	-0.77	-0.02	1.34
	Low	PGK/kg	-2.60	-1.94	-37.21	0.67	-3.94	-2.30	-1.04	0.84
	Medium	PGK/kg	-1.53	-1.50	-36.59	4.42	-3.74	-1.93	-0.39	1.75
	High	PGK/kg	-0.79	-1.23	-35.68	7.70	-3.58	-1.64	-0.05	2.84
Exporter's margin	Low	%	-167	-120	-143	19	-149	-153	-82	109
	Medium	%	-98	-93	-141	123	-142	-128	-31	229
	High	%	-51	-76	-137	214	-136	-109	-4	370

a/ Includes cost per kg of grading labour, cartons or sacks
b/ Percent of produce of export standard

Sea Freight: Port Moresby to Brisbane

		Unit	Cabbage	Carrot	Garlic	Ginger	Bulb Onions	Pine--apples	Potatoes	Sweet Potato
POM price, retail		PGK/kg	4.69	5.32	28.14	8.21	5.39	4.94	4.04	2.17
POM price, wholesale		PGK/kg	3.53	4.00	21.16	6.17	4.05	3.71	3.04	1.63
Grading and packing cost a/		PGK/kg	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Packout percent a/		%	70	70	70	70	70	70	70	70
NAQIA fees (incl fumigation)		PGK/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
FOB value		PGK/kg	5.43	6.10	30.61	9.21	6.18	5.69	4.73	2.72
Tonnes per container		tonnes	10	12	8	12	12	12	12	12
Sea freight		PGK/kg	0.24	0.20	0.30	0.20	0.20	0.20	0.20	0.20
CIF value		PGK/kg	5.67	6.30	30.91	9.41	6.38	5.89	4.93	2.92
CIF value		AUD/kg	2.67	2.97	14.58	4.44	3.01	2.78	2.32	1.38
Customs and quarantine		AUD/kg	0.05	0.04	0.06	0.04	0.04	0.04	0.04	0.04
Fumigation		AUD/kg	0.04	0.03	0.05	0.03	0.03	0.03	0.03	0.03
Losses/shrinkage		%	20	10	10	10	10	20	20	10
Cost/kg delivered to agent		AUD/kg	3.45	3.39	16.33	5.01	3.43	3.57	3.00	1.61
Wholesale Price	Low	AUD/kg	0.67	0.81	2.78	4.00	0.60	0.73	1.20	1.60
	Medium	AUD/kg	1.26	1.05	3.12	6.08	0.71	0.94	1.56	2.11
	High	AUD/kg	1.67	1.20	3.63	7.90	0.80	1.10	1.75	2.71
Wholesalers margin	Low	AUD/kg	0.10	0.12	0.42	0.60	0.09	0.11	0.18	0.24
	Medium	AUD/kg	0.19	0.16	0.47	0.91	0.11	0.14	0.23	0.32
	High	AUD/kg	0.25	0.18	0.54	1.19	0.12	0.17	0.26	0.41
Net to exporter	Low	AUD/kg	-2.88	-2.70	-13.96	-1.61	-2.92	-2.95	-1.98	-0.25
	Medium	AUD/kg	-2.38	-2.49	-13.68	0.15	-2.82	-2.77	-1.67	0.18
	High	AUD/kg	-2.03	-2.37	-13.24	1.70	-2.75	-2.63	-1.51	0.69
	Low	PGK/kg	-6.11	-5.72	-29.60	-3.42	-6.18	-6.25	-4.20	-0.54
	Medium	PGK/kg	-5.05	-5.29	-28.99	0.33	-5.98	-5.87	-3.55	0.38
	High	PGK/kg	-4.31	-5.02	-28.07	3.61	-5.82	-5.58	-3.21	1.46
Exporter's margin	Low	%	-173	-143	-140	-55	-153	-168	-138	-33
	Medium	%	-143	-132	-137	5	-148	-158	-117	23
	High	%	-122	-125	-133	58	-144	-150	-106	90

a/ Includes cost per kg of grading labour, cartons or sacks

b/ Percent of produce of export standard

Air Freight: Port Moresby to Brisbane

		Unit	French Beans	Snake Beans	Broccoli	Sweet Corn
POM price, retail		PGK/kg	6.26	6.37	7.83	3.22
POM price, wholesale		PGK/kg	4.71	4.79	5.89	2.42
Grading and packing cost a/		PGK/kg	0.24	0.24	0.24	0.24
Packout percent a/		%	70	70	70	70
NAQIA fees (incl fumigation)		PGK/kg	0.05	0.05	0.05	0.05
FOB value		PGK/kg	7.11	7.23	8.80	3.85
Air freight		PGK/kg	5.40	5.40	5.40	5.40
CIF value		PGK/kg	12.51	12.63	14.20	9.25
CIF value		AUD/kg	5.90	5.96	6.70	4.36
Customs and quarantine c/		AUD/kg	1.00	1.00	1.00	1.00
Fumigation c/		AUD/kg	0.80	0.80	0.80	0.80
Losses/shrinkage		%	20	10	10	10
Cost/kg delivered to agent		AUD/kg	9.63	8.62	9.44	6.85
Wholesale Price	Low	AUD/kg	1.77	5.00	1.25	0.93
	Medium	AUD/kg	2.52	6.41	2.54	1.62
	High	AUD/kg	3.26	8.00	3.74	2.22
Wholesalers margin	Low	AUD/kg	0.27	0.75	0.19	0.14
	Medium	AUD/kg	0.38	0.96	0.38	0.24
	High	AUD/kg	0.49	1.20	0.56	0.33
Net to exporter	Low	AUD/kg	-8.12	-4.37	-8.38	-6.06
	Medium	AUD/kg	-7.49	-3.17	-7.28	-5.47
	High	AUD/kg	-6.86	-1.82	-6.26	-4.96
	Low	PGK/kg	-17.22	-9.26	-17.76	-12.84
	Medium	PGK/kg	-15.87	-6.72	-15.44	-11.60
	High	PGK/kg	-14.54	-3.86	-13.28	-10.51
Exporter's margin	Low	%	-366	-193	-302	-530
	Medium	%	-337	-140	-262	-479
	High	%	-309	-81	-226	-434

a/ Includes cost per kg of grading labour, cartons or sacks

b/ Percent of produce of export standard

c/ Average consignment 500kg. Includes all handling and documentatin charges

Appendix I

Summary of Supply, Demand and Market Access Issues

Appendix I Summary of Supply, Demand and Market Access Issues

Items on Initial Short List of 20 Commodities

	Aibika	Asparagus	Broccoli	Cabbage	Carrot	Choko	English Potato
Supply and Market Access Issues							
Production volume	Medium	Low	High	High	High	Low	High
Production system a/	SH	SH	SH/CO	SH/CO	SH/CO	SH	SH/CO
Suitable for sea freight	No	No	No	Yes	Yes	Uncertain	Yes
Proximity to sea port	Yes	No	No	Yes	Yes	Yes	No
Financing needs	Low	High	Medium	Medium	Medium	Low	High
Seasonal	No	Yes	No	No	No	No	No
Fruit fly host	No	No	No	No	No	Yes	No
Current market access: Australia	No	Yes	Yes	Yes	No	No	No
Current market access: NZ	No	No	No	No	No	No	No
Current market access: MSG	??	??	??	??	??	??	??
Potential Australia access	Medium				Low	Low	Low
Potential exporter margins	Low	High	Low	Low	Low	Low	Low
Potential for processing	Low	Low	Medium (freeze)	Low	Low	Low	Low
Domestic prices	Uncertain	Medium	High	High	High	Low	High
Demand Issues							
Target demographic sector(s)	Pacific Islanders	Mainstream	Mainstream	Mainstream	Mainstream	Mainstream	Mainstream
Target market(s)	Brisbane	Brisbane	Brisbane	Brisbane	Brisbane	Brisbane	Brisbane
Export market size	Small	Medium	Large	Large	Large	Small	Large
Price seasonality in Australia		High	Low	Medium	Low	Medium	Low
Imported produce in Australia		Yes	No	No	No	No	No
Market Opportunity b/	Long Term	Immediate	Immediate	Immediate	Immediate	Immediate	Immediate

a/ SH = Smallholder CO = Commercial

b/ Immediate: existing markets that can be immediately expanded; Short Term: market opportunities that can be developed in a short period; Long Term: opportunities that could possibly be exploited in the longer term.

	Ginger	Leek	Lettuce	Lime (Tahitian)	Onions	Pineapple	Shallots
Supply and Market Access Issues							
Production volume	High	Medium	Medium	Low	Medium	High	Low
Production system	SH	SH	SH/CO	SH/CO	SH/CO	SH/CO	SH
Suitable for sea freight	Yes	No	No	Uncertain	Yes	Yes	Yes
Proximity to sea port	No	No	No	No	Yes	Yes	No
Financing needs	High	Medium	Medium	High	Medium	High	Low
Seasonal	No	No	No	Yes	No	Yes/no b/	No
Fruit fly host	No	No	No	Uncertain	No	No	No
Current market access: Australia	No	No	No	No	No	No	No
Current market access: NZ	Yes	No	No	No	No	No	No
Current market access: MSG	??	??	??	??	??	??	??
Potential for Australian access	Low	Medium	Medium	Low	Medium	Medium	Medium
Potential exporter margins	Medium	Low	Low	Medium	Low	Low	Low
Potential for processing	High	Low	Low	Medium (juice)	Low	Low	Low
Domestic prices	High	Medium	Medium	High	High	Medium	Medium
Demand Issues							
Target demographic sector(s)	Mainstream	Mainstream	Mainstream	Mainstream	Mainstream	Mainstream	Mainstream
Target market(s)	Brisbane	Brisbane	Brisbane	Brisbane	Brisbane	Brisbane	Brisbane
Export market size	Large	Medium	Medium	Small	Large	Large	Small
Price seasonality in Australia	Low	Medium	Low	High	Low	Medium	Low
Imported produce in Australia	No	No	No	No	No	Some	No
Market Opportunity b/	Immediate	Immediate	Immediate	Immediate	Immediate	Immediate	Immediate

a/ SH = Smallholder CO = Commercial

b/ Immediate: existing markets that can be immediately expanded; Short Term: market opportunities that can be developed in a short period; Long Term: opportunities that could possibly be exploited in the longer term.

	Snake Gourd	Spring Onion	Sugar Fruit	Sweet Corn	Sweet Potato	Tomato	
Supply and Market Access Issues							
Production volume	Low	Medium	Low	High	Very High	High	
Production system	SH	SH/CO	SH	SH/CO	SH/CO	SH/CO	
Suitable for sea freight	No	No	No	No	Yes	No	
Proximity to sea port	Uncertain	No	Uncertain	Yes	Yes	Yes	
Financing needs	Low	Low	Medium	Low	Medium	Medium	
Seasonal	Uncertain	No	Uncertain	No	No	No	
Fruit fly host	No	No	Probably	No	No	Yes	
Current market access: Australia	No	No	No	No	No	No	
Current market access: NZ	No	No	No	No	No	No	
Current market access: MSG	??	??	??	??	??	??	
Potential for Australian access	Medium	Medium	Low	Medium	Medium	Low	
Potential exporter margins	Low	Low	Medium	Low	High	Low	
Potential for processing	Low	Low	Medium (pulp)	Low	Medium (freeze)	Medium	
Domestic prices	Medium	Medium	High	High	Low	Medium	
Demand Issues							
Target demographic sector(s)	??	Mainstream	Pacific Islanders	Mainstream	Pacific Islanders	Mainstream	
Target market(s)	Brisbane	Brisbane	Brisbane	Brisbane	Brisbane	Brisbane	
Export market size	Small	Medium	V. Small	Medium	Large	Large	
Price seasonality in Australia		Low		Medium	Low	Low	
Imported produce in Australia		No	No	No	No	No	
Market Opportunity b/	Long Term	Immediate	Long Term	Immediate	Immediate	Immediate	

a/ SH = Smallholder CO = Commercial

b/ Immediate: existing markets that can be immediately expanded; Short Term: market opportunities that can be developed in a short period; Long Term: opportunities that could possibly be exploited in the longer term.

Additional Items Suggested for Consideration by the PHAMA Team

	Beans (French)	Beans (Snake)	Chillies	Coconuts	Garlic	Okra	
Supply and Market Access Issues							
Production volume	High	Medium	Medium	High	Low	Low	
Production system	SH/CO	SH/CO	SH/CO	SH/CO	SH/CO	SH	
Suitable for sea freight	No	No	No	Yes	Yes	No	
Proximity to sea port	No	No	Yes	Yes	No	Yes	
Financing needs	Medium	Medium	Medium	Low	Medium	Medium	
Seasonal	No	No	No	No	No	No	
Fruit fly host	No	No	Yes	No	No	No	
Current market access: Australia	No	No	No	Yes	Yes	Yes	
Current market access: NZ	No	No	No	Yes	No	Yes	
Current market access: MSG	??	??	??	??	??	??	
Potential for Australian access	Medium	Medium	Low				
Potential exporter margins	Medium	Medium	Medium	Medium	Low	Medium	
Potential for processing	Low	Low	High (freeze)	High	Medium	Low	
Domestic prices	Medium	Medium	Medium	Low	Medium		
Demand Issues							
Target demographic sector(s)	Mainstream	Asians	Mainstream	Pacific Islanders	Mainstream	Asians	
Target market(s)	Brisbane	Brisbane	Brisbane	Brisbane	Brisbane	Brisbane	
Export market size	Large	Small	Medium	Medium	Large	Small	
Price seasonality in Australia	Low	Medium	Medium	Low	Low	Low	
Imported produce in Australia	No	No	No	Yes	Yes	Some	
Market Opportunity b/	Immediate	Immediate	Immediate	Immediate	Immediate	Short Term	

a/ SH = Smallholder CO = Commercial

b/ Immediate: existing markets that can be immediately expanded; Short Term: market opportunities that can be developed in a short period; Long Term: opportunities that could possibly be exploited in the longer term.

Appendix J

Major Findings by Commodity

Appendix J Major Findings by Commodity

Supply Issues	Demand Issues	Biosecurity Issues
Aibika		
• Widely grown as a backyard crop used for household consumption. • Many different varieties grown both highland and lowland areas • Perishable – only suitable for air freight.	• Only known to Pacific Island communities in Australia and New Zealand • Consumed in other MSG countries (also known as "slippery cabbage") • Small amounts grown on Atherton Tableland in north Queensland for local Melanesian communities • No known market information in Australia and New Zealand	• Minor risk - surface pests
Conclusions re Aibika • Some prospects for marketing to Pacific Islanders in Australia and New Zealand, but would require development of specialised marketing pathways to target Pacific Island communities. • Volumes would be small. • Low priority.		
Asparagus		
• Grown mainly in the highlands – recognised open pollinated commercial variety (Mary Washington) which is well known in Australia • Quality is good and with proper grading and packing could reach export standard • Highly perishable – only suitable for air freight • Available year round	• The Australian market is supplied mainly by imported asparagus during the winter months • Imports come from Peru, Thailand, Mexico and USA • Wholesale prices are high – generally in the range of AUD 10-14/kg in the winter months • Australian prices are highly seasonal. Target winter window, May to August • Australian production is in the temperate zone, mainly Victoria	• Approved for access to Australia. • Requires phytosanitary certificate – free of pests, weed seeds and other contaminants • Minor risk - surface pests
Conclusions re Asparagus		

Supply Issues	Demand Issues	Biosecurity Issues
• High value item, and one of the few products where imports have a significant share in the off season (winter) market in Australia. • Demanding product to grow and handle but has potential due to high prices available in Brisbane market. • Medium/high priority.		
Broccoli		
• Widely grown in the highlands and transported by air to Port Moresby for sale • Quality is reasonable but poor post-harvest handling management causes much deterioration • Highly perishable requiring cold storage and air freight from highlands to Port Moresby	• Very popular product with strong domestic demand in urban centres • High quality broccoli is consistently available in the Brisbane wholesale market • All Australian supplies are domestic • Wholesale prices are generally in the range of AUD 2-4/kg but can be as low as AUD 1.00/kg or as high as AUD 6.00/kg	• Minor risk - surface pests
Conclusions re Broccoli • PNG broccoli would struggle to be competitive in the Brisbane wholesale market where abundant supplies are available year round. • Any move into exports would require major improvements in the marketing pathway from farm gate to point of export. • Low priority.		
Cabbages		
• Widely grown in both highlands and lowlands and available year round • Reasonably resilient to poor post-harvest management and transport practices • Easy to grow and harvest • May be possible to sea freight cabbages to Australia	• Prices in Australia tend to be higher in the summer months at around AUD 1.50-2.50/kg • At other times cabbages are very cheap, generally in the range of AUD 0.50-1.50/kg • All Australian supplies are domestic	• Minor risk - surface pests
Conclusions re Cabbages • Cabbages are a low value product, abundantly supplied year round by local growers in Australia. • Low priority.		
Carrots		

Supply Issues	Demand Issues	Biosecurity Issues
• Widely grown in the highlands • Resilient to poor post-harvest management and transport practices • Probably possible to sea freight carrots to Australia with proper cold chain management	• Wholesale prices in Australia are fairly steady and generally quite low: between AUD 0.80 and 1.20/kg • Grading standards are very high • All Australian supplies are domestic • Many speciality types (baby carrots, purple, yellow etc.) becoming available	• Moderate risk - soil based nematodes
Conclusions re Carrots • Carrots are a bulk low value vegetable commodity. • Demand is price sensitive and there is little chance of PNG being competitive. • Low priority.		
Chokos		
• Limited supply base with chokos only occasionally seen in local markets • Easy to grow (mainly as a backyard crop) and handle • Moderately perishable: would have to be air freighted	• Small volumes of chokos are traded in Australian wholesale markets • Prices are mostly in the AUD 1.00-2.50/kg range, tending to be higher during the Australian summer • All Australian supplies are domestic	• Minor risk - surface pests
Conclusions re Chokos • Low value product, thinly traded in the Brisbane wholesale market. • PNG supplies are limited and erratic. Very poor prospects in the Australian market. • Low priority.		
English Potatoes		
• PNG production of potatoes in the highlands has recovered from the devastation caused by potato late blight • However, production is still not adequate to supply the domestic market • Almost all domestic supplies are one variety, which has limited storage life and poor processing characteristics	• Potatoes are a high volume/low value commodity traded in Australian wholesale markets • The market is highly differentiated with an increasing range of varieties and types sources from different parts of Australia • Large tonnages are traded year round mostly in the AUD 1-2/kg range	• Moderate risk - soil based nematodes and borers

Supply Issues	Demand Issues	Biosecurity Issues
Conclusions re Potatoes		
• Australian potatoes are abundant and cheap most of the time. • PNG would have very limited prospects of exporting potatoes profitably to Australia. • Low priority.		
Ginger		
• Ginger is widely produced in the highlands and always available in urban and local markets • Most ginger is sold in fresh/immature form • Relatively undemanding crop in terms of harvest and post-harvest management • Probably possible supply Australia by sea freight	• All Australian supplies come from Queensland • Prices have been trending down over the last two years from AUD 6-9/kg in early 2014 to AUD 3-5/kg in late 2015 • Although PICs have recently been granted access to the Australian market, no imported product was available to the end of 2015	• Moderate risk - soil based nematodes and scale
Conclusions re Ginger		
• The Australian ginger growing community has fought very hard to prevent importation of ginger from Fiji and other sources. • Similar resistance can be expected to any moves to supply ginger from PNG. • Medium/low priority.		
Leeks		
• Grown mainly in the highlands but not regarded as a mainstream vegetable product • Limited supplies are found in highlands and urban markets • Fairly perishable and requires good post-harvest cold chain management	• A minor product in Australian wholesale markets • However local supplies are always available • Wholesale prices are around AUD 3-6/kg in the summer but lower at other times, mostly AUD 2-3/kg	• Minor risk - surface pests and moderate risk - soil based nematodes
Conclusions re Leeks		
• Leeks area minor product in both PNG and Australia. • Prices are unlikely to cover the cost of packaging, handling and air freight. • Low priority.		

Supply Issues	Demand Issues	Biosecurity Issues
Lettuces		
• Difficult to produce high quality lettuces in PNG, especially in the lowlands • Very sensitive to high temperatures and post-harvest management needs to be first class to deliver a reasonable product • Most lettuce found in PNG markets is un-hygienic and of poor quality	• Food safety issues are a major concern in the Australian market for all salad vegetables • Wholesale prices vary widely between about AUD 5 and AUD 20 per carton depending mainly on quality • There is not imported produce in the wholesale markets • A wide range of speciality types and varieties is on offer	• Minor risk - surface pests
Conclusions re Lettuces • Quality and food safety concerns would be very challenging in accessing the Australian market. • Prices are unlikely to cover the cost of packaging, handling and air freight. • Low priority.		
Limes (Tahitian)		
• Several types of limes are produced in the highlands. These are generally known as “bush limes” • Port Moresby supermarkets import Tahitian Limes which sell in small amounts for very high prices, around PGK 50/kg • A lead time of 3-5 years would be required to establish commercial plantations of Tahitian limes suitable for export	• All of Australia’s Tahitian limes are grown in Queensland, some of which are exported to NZ • Wholesale prices are strongly seasonal with peak prices in Sep-Oct-Nov of AUD 6-10/kg • At other times wholesale prices are around AUD 2-4/kg	• Major risk - citrus disease (citrus canker) if present in production areas
Conclusions re Tahitian Limes • Development of a Tahitian lime export business would require a substantial investment in orchards over a 3-5 year period. • It is uncertain whether prices would be high enough to justify such an investment. • Medium/Low priority.		
Bulb Onions		
• PNG struggles to produce enough onions to supply the	• Australian wholesale markets process large	• Minor risk - surface pests and

Supply Issues	Demand Issues	Biosecurity Issues
domestic market • Significant volumes of imports to supply Port Moresby • Local prices are high, but storage life of local onions is low • Could be transported by sea freight if well dried/cured	volumes of onions sourced from various areas depending on season • Many varieties and packaging formats • Prices are low, mainly in the AUD 0.60-0.90/kg range • All Australian supplies are domestic	moderate soil based nematodes
Conclusions re Onions • Low prices and consistent availability mean that PNG onions would never be competitive in the Australian market. • Low priority as an export – better prospects as an import substitute.		
Pineapples		
• Produced widely, mainly in lowland and mid-altitude areas • Production is seasonal and of variable quality • Most PNG pineapples do not meet export standards	• Almost all pineapples in Australia are produced in Queensland • The Brisbane market is supplied entirely from Queensland, but there is some imported fruit in Sydney and Melbourne • Wholesale prices tend to be higher in Oct-Nov-Dec but rarely exceed AUD 1.20 per pineapple • Imported product (from Philippines) is cheaper but struggles to compete	• Moderate risk - surface pests
Conclusions re Pineapples • Port Moresby prices for pineapples are consistently higher than Brisbane prices and quality is variable. • Low priority.		
Shallots		
• Minor product, not seen regularly in PNG markets • Unclear where supply is coming from • May be possible to use sea freight if produce well dried/cured	• Fairly low volumes traded in Brisbane wholesale market • Prices are fairly stable between AUD 0.80 and 1.20 per bunch • All Australian supplies are domestic	• Minor risk - surface pests and moderate soil based nematodes

Supply Issues	Demand Issues	Biosecurity Issues
Conclusions re Shallots		
• It would be difficult to find a niche for this speciality item in the Australian market. • Low priority.		
Snake Gourd		
• Minor product with limited supplies available in PNG retail markets • Difficult to package and transport • Suitable for air freight only	• Rarely seen in Australian wholesale markets • Speciality item sold mainly by Asian green grocers • Source of Australian supplies not known	• Major risk – if fruit fly host. Minor risk – if non fruit fly host
Conclusions re Snake Gourd		
• Limited domestic supply with a very small market in Australia. • Low priority.		
Spring Onions		
• Produced in the highlands and transported to Port Moresby by air freight • Product quality is good but requires good post-harvest management and cold storage to be maintained • Available all year round	• Food safety issues are a major concern in the Australian market for all salad vegetables • Wholesale prices are fairly stable between AUD 2.00 and 3.00 per bunch • This translates to quite high prices per kg but there is no imported product on the market	• Minor risk - surface pests and moderate soil based nematodes
Conclusions re Spring Onions		
• Transport logistics and the need to source product from the highlands means that it would be difficult to be competitive in the Australian market – food safety concerns would deter many buyers. • Low priority.		
Sugar Fruit		
• Highly valued fruit in PNG but mostly produced informally and not commonly found in retail markets • When available sells for around PGK 0.70 per fruit • Little known about its storage life or post-harvest	• Not known in the Australian market	• Major risk – if fruit fly host. Minor risk – if non fruit fly host

Supply Issues	Demand Issues	Biosecurity Issues
requirements		
Conclusions re Sugar Fruit • Limited supply, strong local demand and unknown status in the Australian market. • Low priority.		
Sweet Corn		
• Easily grown in both highlands and lowlands • Regularly available in PNG markets but not of export quality • Perishable product, would have to be exported by air freight	• Wholesale prices are mostly in the AUD 1.00-1.50 range, somewhat higher in winter • All Australian supplies are domestic •	• Minor risk – surface pests
Conclusions re Sweet Corn • Low value item – returns would not cover air freight costs. • Low priority.		
Sweet Potato		
• PNG's major staple food crop with production estimated to be 2-3 million tonnes • Grown as both a subsistence and cash crops • Large range of traditional and improved varieties • Almost always abundant in local in food markets, generally with prices around or less than PGK 1.00/kg, except in POM • Suitable for sea freight, with fumigation	• About 70% of sweet potato consumed in Australia comes from Queensland • Production is about 100,000 tonnes • Four main varieties, but orange/gold variety (Beauregard) is 90% of the market • NARI has trialled Beauregard successfully at Aiyura • Prices fluctuate over a wide range from AUD 1.50 to over AUD 3.00/kg • All Australian supplies are domestic	• Moderate risk - soil based nematodes and borers
Conclusions re Sweet Potato • Sweet potato prices in Australia are higher than English potatoes and onions. • Prices in PNG are very low, and if the correct varieties are grown it may be possible to export profitably in refrigerated sea containers to Brisbane market.		

Supply Issues	Demand Issues	Biosecurity Issues
• Medium/High priority		
Tomato		
• Widely grown in both highlands and lowlands • Fragile and highly perishable • Transport and post-harvest management is challenging • Limited range of varieties produced • Market prices mostly PGK 3-4/kg, higher in POM • Only suitable for export by air freight	• Food safety issues are a major concern in the Australian market for all salad vegetables • Available year round from different parts of Australia, both field grown and hydroponic-greenhouse • Very wide range of varieties and packaging formats on offer • Standard varieties wholesale for AUD 2-3/kg; cherry types AUD 4-6/kg	• Major risk – fruit fly host
Conclusions re Tomato • Apart from food safety concerns among retailers, it is doubtful whether PNG grown tomatoes would be competitive in Australian wholesale markets. • Low priority.		
Beans (French)		
• Good quality French beans grown in the highlands all year round • With correct grading and packaging these could be of export quality • Good cold chain facilities are required for an air freight export pathway • Local market prices are PGK 2-4/kg, much higher in POM (over PGK 6/kg)	• Mainstream commodity in all Australian wholesale markets • All Australian supplies are domestic, with some exports to NZ in winter • Significant price premium for hand-picked beans which wholesale for AUD 5-6/kg compared to AUD 2-3 for machine harvested	• Minor risk – surface pests
Conclusions re French Beans • Good quality product but high cost of air freight would make it challenging to be competitive in Australian wholesale markets except when prices are very high. • Medium/low priority.		
Beans (Snake)		

Supply Issues	Demand Issues	Biosecurity Issues
• Not as abundant as French beans but generally available in local markets • Prices similar to French Beans	• Speciality item in Australian wholesale markets • Mainly used by Asian consumers • Prices fluctuate over a wide range (AUD 5-8/kg) but tend to be higher in the Australian winter • All Australian supplies are domestic	• Minor risk – surface pests
Conclusions re Snake Beans • Prices a bit higher than French beans but high cost of air freight would make it challenging to be competitive in Australian wholesale markets except in winter when prices are at their highest. • Medium/low priority.		
Chillies		
• Widely grown in highlands and lowlands, but in small quantities • Birdseye and other types always available in local markets • Mixture of varieties sizes and colours	• Chillies are a high priced item in Australian markets • Wholesale prices are mostly in the AUD 5-15 kg range with occasional prices spikes to AUD 20/kg or more • Birdseye and other small/hot varieties are more expensive than others • All Australian supplies are domestic	• Major risk – fruit fly host
Conclusions re Chillies • Because of high prices there are possibilities of developing a profitable export pathway from PNG to Australia based on air-freight to Brisbane wholesale market. • Medium/high priority.		
Coconuts		
• Widely produced and consumed throughout the lowlands and islands • Grown mainly as a semi-subsistence/semi-commercial crop with no inputs other than labour. • Mature/brown nuts and fresh drinking nuts offered for sale in all markets	• Demand for dry nuts in Australia is modest (about 2,600 tonnes) but has increased significantly in recent years. • There is almost no competition from domestic suppliers. • The Australian market for fresh drinking nuts is	• Minor risk – surface pest

Supply Issues	Demand Issues	Biosecurity Issues
• Semi-perishable but can be exported by refrigerated sea container • Local market prices generally around PGK 1.00 per nut	small but developing rapidly. • Wholesale prices are consistently above AUD 1.30/nut and have been much higher during 2015.	
• Coconuts are currently being exported from other PICs and there is potential for expansion and diversification into fresh drinking nuts. • Wholesale prices in Australia for mature/brown nuts are well above PNG market prices. • Medium/high priority.		
Garlic		
• Garlic is grown in the highlands and is of reasonable quality • However, the bulk of the market is supplied by imported garlic from China • Local market prices are PGK 15-30/kg • Relatively easy to store and transport provided it is properly dried and cured •	• The Australian market is supplied mainly by imports from China with lesser amounts coming from other countries • One of the only fresh food commodities in Australia where the market readily accepts imported produce. • Wholesale prices for imported garlic are AUD 2.50 to AUD 4.00 per kg • Prices for locally produced garlic are much higher: AUD 10-20/kg • Some consumer concerns about the food safety of imported garlic due to irradiation and other treatments	• Moderate risk - soil based nematodes
Conclusions re Garlic • Although relatively easy to store and transport, PNG garlic would have to compete in Australia with imported Chinese garlic which is cheap and abundant. • Low priority.		
Okra		
• Widely grown in PNG lowlands and highlands but mainly as a subsistence or backyard crop • Very tolerant of hot conditions and can be grown quite easily in the lowlands • Since the product is not common in the local market it	• Mainly consumed by people of Indian, Middle Eastern or Mediterranean origin. • Sells for AUD 6-8/kg in Brisbane wholesale market. • Volumes are increasing as okra becomes more	• Minor risk – surface pests

Supply Issues	Demand Issues	Biosecurity Issues
would have to be produced as a specialised export crop	widely consumed • The market favours small, immature okra 5-6cm long and quite firm.	
Conclusions re Okra • Potential to develop okra as a specialised export crop grown in the lowlands around Port Moresby. • Could be sent to Brisbane market by air freight, but only in relatively small quantities Medium/Low priority.		

Appendix K

Interim Report Workshop

Appendix K Interim Report Workshop

PHAMA
Pacific Horticultural & Agricultural Market Access Program
An Australian Government, AusAID initiative

Fresh Produce Exports – Economic and Technical Feasibility

Australian Government Aid Program
URS | KALANG

Welcome

- Introductions
- Agenda
- About the PHAMA Program

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Activity scope

- Methods
  - Development of national priority list
  - In country consultation
  - Compilation quarantine considerations
  - Economic feasibility considerations

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Quarantine/biosecurity

- Current access to Australia
- Current access to NZ
- Current access to MSG

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Aus/NZ/MSG

Common name	Scientific Name	Countries with approved access
Asparagus	*Asparagus officianalis*	Australia
Betel nut	*Areca cathecu*	New Zealand
		Australia
Brassica spp	*Brassica spp.*	Australia
Capsicum	*Capsicum annuum*	Fiji
Cassava	*Manihot esculentus*	New Zealand
Coconut	*Cocos nucifera*	Australia
		New Zealand
Garlic	*Allium spp.*	Australia
Giant taro corms	*Alocasia macrorrhiza*	Australia
Ginger	*Zingiber officinale*	New Zealand
Lettuce	*Lactuca sativa*	Fiji
Taro	*Colocasia esculenta*	New Zealand
Tomato	*Lycopersicon esculentum*	Fiji
Tarua	*Xanthosoma sagittifolium*	New Zealand
Yam	*Dioscorea sp.*	New Zealand

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Quarantine/biosecurity

- The market access process for new products
  - Detailed technical submission outlining production and key pests
  - Proposed options to manage risks of key pests
  - National Plant Protection Organisation lead role
  - Lengthy and technically intensive process

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Economic Considerations

- Rationale for fresh produce exports
- Methodology of assessment
- Overview of fresh produce sub-sector
- Export opportunities and constraints
- Domestic market prices
- Australian wholesale prices
- Value chain analysis
- Priorities for export pathway development
- Recommendations

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Rationale

- Why fresh produce and how?
- Diverse range of products year round
- Almost 100% subsistence and domestic
- Virtually zero exports – why?
- Other PICs export fresh produce
- Large market in Aust and NZ
- But access difficult
- Where to focus effort?

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Methodology

- Long list narrowed down to 20

Aibika	Choko	Lime	Spr. Onion
Asparagus	Potato	Onion	Sugar fruit
Broccoli	Ginger	Pineapple	Sweet corn
Cabbage	Leek	Shallots	S/potato
Carrot	Lettuce	Snake gourd	Tomato

- Added six more: French beans, snake beans, chillies, coconuts, garlic, okra
- Supply issues, demand, biosecurity, value chain analysis
- Generic issues (not commodity specific)

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Sector Overview

- Intensively studied – especially highlands
- Fairly consistent findings over time
- Exports low priority vs. import substitution and development of domestic pathways
- Similar issues in domestic and export
- Prospects exports limited while domestic pathways not functioning well

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Constraints

- Transport infrastructure
- Air freight capacity and cost
- Access to finance
- Law and order
- Subsistence orientation/price expectations
- Urban market infrastructure
- Poor post-harvest management/quality losses
- Lack of trust
- Exports: fruit fly, high costs

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Opportunities

- Agro-ecological diversity
- Strong/growing domestic market
- Urban supermarkets, catering etc.
- High level of imports
- Asian markets
- Specialised high tech methods
- Development of cold chain

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Other Studies

Bourke, Birch, Chang, Spriggs etc.

- Very limited export potential
- POM market largely supplied from Central
- Importance of consistency and quality
- Roads, facilities, grading/packing, quality, costs, storage, support services etc… etc….
- Sector is not "export ready"
- Social considerations – complex relationships among value chain actors
- Conclusion: Problems/issues well understood - don't need any more studies!

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Export Opportunities: Australia

- Imports A$1.2 bn: but only $50/capita
- High degree of self sufficiency due to:
  - Agro-ecological diversity
  - Quarantine
  - Inspection/clearance fees
  - Food safety, traceability, "ethical sourcing"
  - Consumer aversion
  - Few wholesalers interested in importing

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Export Opportunities: NZ

- Smaller market but much more imported
- Supplied by other PICs, Aust, N&S America, Philippines etc.
- Highly seasonal – winter window
- 5 or 6 key importers/wholesalers
- Biosecurity less demanding
- But transport linkages/costs higher

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Export Opportunities: Other

- MSG countries (ex PNG) 2.1 million
- But potential market (incl. tourists) 0.3m
- Market access relatively easy
- Some niche opportunities
- But produce similar things to PNG
- Access to Asian markets easier – for everyone – and prices very competitive
- Exchange rate trends

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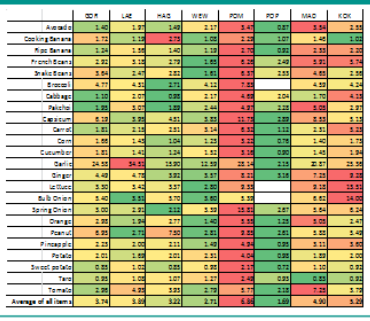
Price Data: PNG (FPDA)



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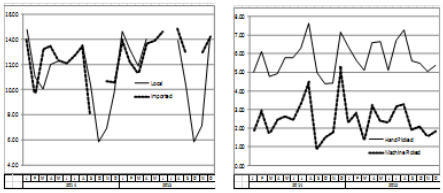
Price Data: Brisbane

- 26 Commodities, monthly 2014-15



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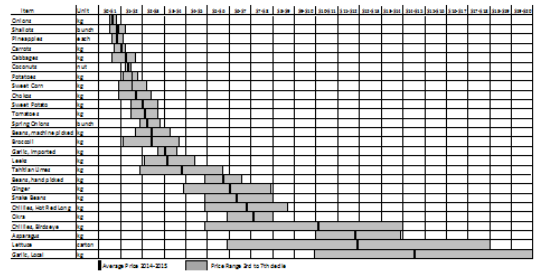
Summary of Brisbane Prices



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Value Chain Analysis

PNG retail market price (Lae or POM)	PGK/kg	Average of last six years (FPDA data)
PNG wholesale price (Lae or POM)	PGK/kg	Retail price less retailer's margin of 33%
Grading and packing cost	PGK/kg	Cost of labour and packaging materials
Packout percent	%	Percentage meeting export standards
NAQIA fees (including fumigation)	PGK/kg	
FOB value	PGK/kg	Total cost to point of shipping
Tonnes per refrigerated sea container	tonnes	Not applicable for air freight
Sea or air freight cost	PGK/kg	
CIF value	PGK/kg	Value of produce on arrival in Brisbane
CIF value	AUD/kg	Based on exchange rate PGK 2.12 per AUD
Customs and quarantine	AUD/kg	Based on cost per consignment
Fumigation cost	AUD/kg	Based on cost per container
Losses and shrinkage	%	Percent of produce wasted or lost
Cost per kg delivered to wholesale agent	AUD/kg	Cost per saleable kg delivered in Brisbane
Wholesale price:		Based on monthly averages 2014 and 2014
Low	AUD/kg	20th percentile
Medium	AUD/kg	Mean
High	AUD/kg	80th percentile
Wholesale agents margin	AUD/kg	15% of wholesale price
Net return to exporter	AUD/kg	Wholesale less margin less cost delivered
Net return to exporter	PGK/kg	Based on exchange rate PGK 2.12 per AUD
Exporter's margin	%	Net return as percentage of PNG wholesale

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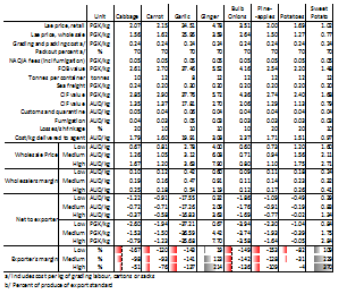
Value Chain Analysis



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Other Consideratoins

• Production volume	• Production system
• Suitability for sea freight	• Proximity to sea port
• Financing needs	• Seasonality
• Fruit fly host?	• Current/potential market access
• Domestic prices	• Potential exporter margins
• Australian market size	• Australian market seasonality
• Imported product in Australia?	• Market opportunity (short/long term)

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Conclusions

- Medium/High priority:
  - Asparagus: winter supply gap
  - Sweet potato: specific variety
  - Chillies: high prices but fruit fly?
  - Coconuts: current market access
- Medium/Low priority:
  - Ginger: political resistance
  - Tahitian Limes: citrus canker?
  - Beans (French and Snake): need to be cheaper
  - Okra: mostly non-commercial at present

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Report recommendations

1. Discuss asparagus, chillies, coconuts and sweet potato potential exports with NPPO and determine MA strategy;
2. Work with NPPO to build capacity to establish and maintain exports;
3. Determine if there is interest in trial shipment of coconuts from Lae to Brisbane;

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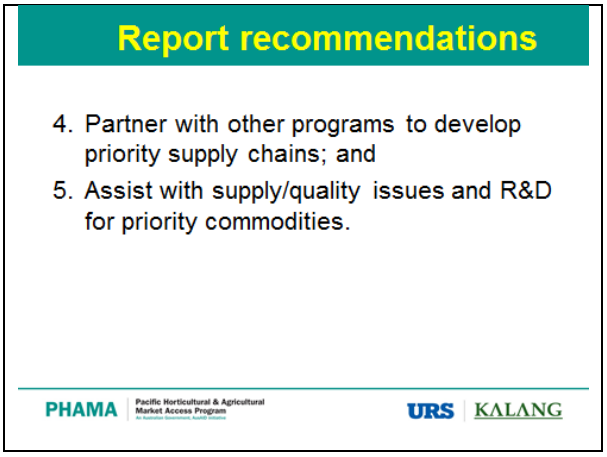

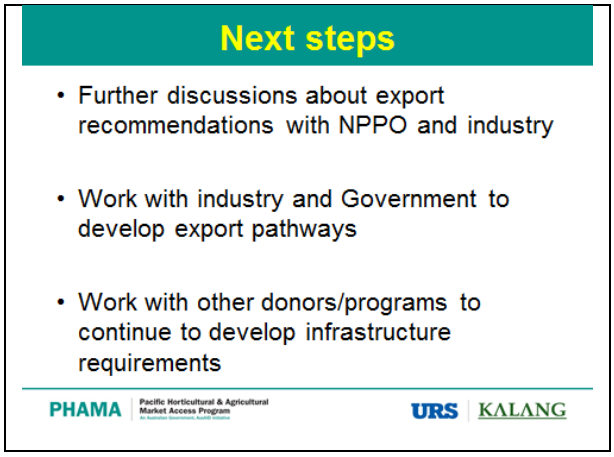

List of Workshop Participants: 22 March 2016

Name		Occupation	Organisation
Ramakrishna	Akkinapally	Deputy Director General	NARI
Kapah	Alu	Plant Health Officer	NAQIA
Priscilla	Baga	AQO	NAQIA
Sergie	Bang	Director General	NARI
Saina	Berry	Manager	Wisky Fresh
Emily	Flowers	Country Manager	ACIAR
Josephine	Inguba	AHO	NAQIA
Ben	Kimbe	Business Manager	SFML
Birte	Komolong	Principal Scientist	NARI
Noel	Kuman	Program Manager	FPDA
Julienne	Leka-Maliaki	Program Manager (Governance)	Australian High Commission
Maria	Linibi	President	PNG Women in Agriculture
Amanda	Mararuai	Senior Technical Officer (Plants)	NAQIA
Jodie	McAllister	Counsellor (Governance)	Australian High Commission
Alan	McLay	President	Lae Chamber of Commerce
Otto	Ngere	RPPO	NAQIA
Heni	Nigani	SAHI	NAQIA
Bingalu	Ogoil	AQO	NAQIA
Alan	Oliver	Agriculture Officer	World Bank
Norah	Omot	Director, Enabling Environment	NARI
Zacchareus	Posane	AQO	NAQIA
Ian	Richards	Manager, Freight Services	PNG Air
Graeme	Ross	Manager	Alele
Noah	Saruwa	Post-Entry Quarantine Officers	NAQIA
Raj	Shahi	Manager, Fresh Produce	City Pharmacy
David	Stewart	Manager	NKW Fresh
Sidney	Suma	Country Manager	PHAMA, PNG
Gallit	Tamir	Business Manager	Nine Mile Farm
James	Tira	Air Freight Manager	Air Niugini
Ulaiah	Tongon	Plant Health Officer	NAQIA
Carolyne	Yallen	Plant Health Officer	NAQIA

Appendix L

List of Persons Contacted

Appendix L List of Persons Contacted

Details of the persons conducted through the conduct of this study are provided in the table below.

Organisation Abbreviations:

CELL	Consort Express Lines Ltd.
CIMC	Consultative Implementation and Monitoring Council
FPDA	Fresh Produce Development Agency
IAI	Innovative Agro Industry Ltd.
IFC	International Finance Corporation
IPA	Investment Promotion Authority
MCPNG	Manufacturers Council of PNG
NAQIA	National Agricultural Quarantine Inspection Authority

Name	Name	Position	Organisation	Email addresses removed for privacy	Phone numbers removed for privacy
Chris	Akiro	Salesman	Veggie Trader		
Joel	Alu	Managing Director	NAQIA		
Conrad	Antin	Senior Extension Adviser	FPDA		
Robin	Api	Managing Director	Wagi Farming Supplies		
Gaby	Apianga	Seed Potato Inspector	FPDA		
Gibasa	Asiba (Dr)	Chief Veterinary Officer	NAQIA		
Sergie	Bang (Dr)	Director General	NARI		
Stephanie	Bawo	Sales Manager, Airfreight Department	Air Niugini		
Greg	Bosa	Crops Advisor	DAL, Morobe		
Paul	Brown	Marketing Advisor, Tininga Ltd	IFC/MFAT		
Paul	Buhagiar	Manager	Agility Logistics		
Stuart	Craker	General Manager	CELL		
Mark	Cuthbertson	Manager	Bismark Maritime		
Rob	Duthie	Technical Director	PHAMA		
Ian Russel	Enriquez	Regional Vet Officers	NAQIA		
Sipo	Fale	RAQO	NAQIA, Lae		
Stuart	Fancy		Greenfresh		
Peter	Gendua	RDC	NARI		
Wayne	Gorowe		Ambo Fresh Produce		
Wilson	Guhe	Animal Health Officer	NAQIA		
Yanny	Guman	Company Secretary	SFML		
Dale	Hamilton		PHAMA		
Edward	Handere	Port Manager Goroka	Air Niugini		
Hefung	Hati	Team Leader, Red2 Project, Tambul	NARI		
Lauari	Ikavape	Investor Servicing and Promotion Division	IPA		
Akon	Ivelo	Farmer/Village Extension Worker	FPDA		
John	Jave	Acting Director	NDAL		
John	Jones	Managing Director	NCS Holdings Ltd		
Robinson	Kale	Manager	Kales Farm		
Nime	Kapo (Dr)	General Manager, Technical and Advisory Services	NAQIA		
Paul	Kautete	Sales Executive	Post PNG Ltd		
John	Kawape	Fresh Produce Supplier			
Dorothy	Kila	National Supply Chain Manager	NCS		
Ben	Kimbe	Business Manager	SFML		
Lucas	Kinendiwa	Divisional Manager - …….	FPDA		
Daure	Kiromat	Senior Marketing Officer	IPA		

Name	Name	Position	Organisation	Email addresses removed for privacy	Phone numbers removed for privacy
James	Kirpe	Seed Potato Inspector	FPDA		
Albert	Kish	Coordinator	Rashin Ltd.		
Pikah	Kohun (Dr)	RDC, Livestock	NARI		
Pere	Kokoa	Chief Plant Protection Officer	NAQIA		
Thomas	Kol	Extension Adviser	FPDA		
Birte	Komolong (Dr)	Strategy Planner	NARI		
Noel	Kuman	Program Manager – Value Chain Innovation	FPDA		
Julienne	Leka-Maliaki	Program Manager (Governance)	DFAT		
Maria	Linibi	President	PNGWIA		
Robert	Lutulele	Divisional Manager, Research Policy	FPDA		
Saina	Maip	Manager	Berry Maip Fresh Produce		
Anton	Mais	Principal Scientist	NARI		
Bernard	Maladina	Managing Director	NSSL		
Martenus	Mape	Manager, Claims	PNG Air		
Amanda	Mararuai (Dr)	Senior Technical Officer, Plant	NAQIA		
Jodie	McAlister	Counsellor (Governance)	DFAT		
Alan	McLay	Executive President	Lae C of C		
Masiala	Mek	Marketing Officer, Port Moresby	FPDA		
Orlando	Mercado	Laboratory Manager, Kila Kila	NAQIA		
Noki	Moki-ui	Snr Animal health Officer	NAQIA		
Otto	Ngere	Regional Plant Protection Officer	NAQIA, Lae		
Heni	Nigani	Senior Animal Health Officer	NAQIA, Lae		
Mauro	Okrupa	Research Associate, Red2 Project, Tambul	NARI		
Ireire	Olewale	Program Manager (Governance)	DFAT		
Alan	Oliver		World Bank		
Norah	Omot (Dr)	Program Director, Enabling Environment	NARI		
John	Onguglo	Chairman (SF Cooperative Society)			
Martin	Paina	Animal Health Program Manager	NAQIA		
Simon	Paiya	Advisor, Agribusiness and Marketing	FPDA		
Saki	Peter	Director	Kane Farming		
Christine	Petroff	Admin and Finance Officer	PHAMA		
John	Pono	Divisional Manager, Corporate Affairs	FPDA		
Isidora	Ramita	Researcher	NARI		
Jane	Ravusiro	National Coordinator	PHAMA		
Peter	Rei	Sales and Marketing Manager	Post PNG Ltd		
Stewart	Rom	Marketing Officer	IPA		
Graham	Ross		Alele		

Name	Name	Position	Organisation	Email addresses removed for privacy	Phone numbers removed for privacy
Janet	Sape	Director	PNGWIB		
Sim	Sar (Dr)	Program Director, Agricultural Systems	NARI		
Noah	Saruwa	Plant Health Quarantine Officer	NAQIA		
William	Sawang	Senior Agricultural Quarantine Officer	NAQIA, Lae		
Chey	Scovell	Chief Executive Officer	MCPNG		
Serah	Sipani	Associate Operations Officer	IFC		
Kud	Sitango	R&D Coordinator, Tambul	NARI		
Sabine	Spohn	Microfinance Specialist	ADB		
David	Stewart	Kainantu Depot Manager	NKW Group		
Sidney	Suma	Country Manager	PHAMA		
Gallit	Tamir	Business Development Manager	IAI Ltd.		
Kawage	Teka	Livestock Advisor	NDAL		
David	Thompson	General Manager, Operations	NAQIA		
James	Tira	Executive Manager, Airfreight Department	Air Niugini		
Ulaiah	Tongon	Plant Health Officer (Plant Pathology)	NAQIA, Lae		
Lovelyn	Ungere	Senior Project Officer, Agriculture and Natural Resources	CIMC		
Poela	Utama	Extension Advisor, Port Moresby	FPDA		
George	Waenari	Snr Livestock Officer	NDAL		
Barnabus	Wahawe	OIC, Momase Region	FPDA		
Anton	Waimba		HYBV F/V		
Grant	Wakerley		MAPAI Transport		
Joachim	Wangla	Apiculture Technical Officer	NDAL		
Joel	Waramboi	Principal Scientist	NARI		
Busa	Wenogo	Senior Project Officer, Informal Economy	CIMC		
David	Wissink	GM, Sustainability and Community Affairs	Morobe Mining JV		
Carolyne	Yallen	Plant Health Officer (Botany)	NAQIA, Lae		
Maracus	Yaviro		Kongi Fresh Produce		
Jesse	Yawane	Livestock Officer	NDAL		
Ebbie	Zurenuos	Service Provider, Finchhaven	FPDA		

Appendix M

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