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The Feasibility of Fresh Ginger Exports from Papua New Guinea to New Zealand

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Abstract

The Papua New Guinea 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 Papua New Guinea imports into New Zealand. A trial shipment of fresh ginger from Papua New Guinea passed the Biosecurity New Zealand inspection with ease and was considered to be of exportable quality, but no further shipments have occurred. In this paper the technical and financial viability of exporting fresh ginger from Papua New Guinea to New Zealand was assessed in terms of the following criteria: technical capability of meeting market requirements for consistency in quality and volume and dealing with quarantine and other market access issues; market opportunities for growth and sustainability; financial investments required and how they will be financed; and organisational/management capability of coordinating the ginger supply chain from farm to markets overseas. 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 due to the up-coming PNG LNG Project and other mining activities. 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.

Introduction

Papua New Guinea has an abundance of land that is suitable for agricultural production. The agricultural sector plays a significant role in providing livelihood and employment to the vast majority of the population. According to official statistics, nearly 80 per cent of the population still live in the rural areas and are engaged in subsistence and semi-commercial farming (Ministry of Agriculture and Livestock, 2006). Many different types of fresh produce and tree crops are grown in Papua New Guinea because of the diverse climatic conditions and fertile soils. Papua New Guinea has been exporting coffee, palm oil, cocoa, rubber, copra and timber for decades. In its Medium Term Development Strategy (2005-2010), the Papua New Guinea government reiterates its desire to increase income and reduce poverty through export-driven economic growth, including fresh produce (Ministry for National Planning and Monitoring, 2004).

In 2006/07, the Papua New Guinea National Agriculture Quarantine and Inspection Agency and Biosecurity New Zealand conducted an analysis, for a number of agricultural commodities, of the risks that Papua New Guinea pests and diseases may pose to New Zealand fruit and vegetable industries if Papua New Guinea products were allowed to be imported into New Zealand. Eight commodities were cleared as potential export crops to New Zealand, with Biosecurity and Quarantine Arrangements (BQAs) granted (Maino, 2009). The eight commodities were ginger, taro, betel nuts, coconut, yam, pit-pit, sweet potato and cassava. These BQAs would expire in June 2008 if not utilised. Among the list, fresh ginger was identified as the priority export crop because it is a spice (and as such is easier to manage); it is higher-valued than other fresh produce on the export list; and there seemed to be a ready market for it, particularly in New Zealand.

In mid 2007, the National Fresh Produce Export Facilitation Committee was formed to manage the export of fresh produce to New Zealand. The Committee was composed of a number of government agencies, led by the Fresh Produce Development Agency (FPDA).^[2] The argument at the time for direct government involvement in developing the ginger export sector was that the private sector would not commit to take on this challenge until it was proven to be profitable, and, therefore, government should take on the responsibility to manage the production and exporting of ginger to gain information and experience in the fresh produce exporting business. Papua New Guinea has not successfully exported fresh produce overseas before, despite efforts with crops such as pineapple. It was planned that government agencies would train the farmers in the principles of quality production and organise the farmers into co-operatives to ensure consistency in supply. It was envisaged that the private sector would eventually be responsible for the export of this fresh produce and therefore should meet the cost. However, there was no proposal for any form of private-public partnerships and, therefore, it is not clear at what stage in the market development process the transition would happen.

A trial shipment of 40 kg of fresh ginger was air-freighted to New Zealand in September 2008 with the BQA being extended for the trial. The shipment passed the Biosecurity New Zealand inspection with flying colours and was considered to be of exportable quality with no defects. Since then, two importing companies in New Zealand have expressed interest in importing fresh ginger from Papua New Guinea, but no further shipments have occurred.

Exporting ginger to New Zealand, if it could be proven practical, would serve two important political purposes. First, it would help demonstrate the Papua New Guinea government's resolve in pursuing an export-led growth strategy. Second, it would help demonstrate the New Zealand government's willingness to support such a strategy, especially from a development assistance perspective, and help consolidate the diplomatic relationship between the two countries. However, for such an endeavour to be sustainable, it must consider commercial realities, in addition to political will. With this reservation, in 2009 FPDA initiated a feasibility study to assess the technical and financial viability of exporting fresh ginger from Papua New Guinea to New Zealand.

In this paper, we report on the result from the feasibility study in the following aspects:

- Technical capability of meeting market requirements for consistency in quality and volume and dealing with quarantine and other market access issues;
- Costs and competition;
- Market opportunities for growth and sustainability;
- Financial investments required and how they will be financed; and
- Organisational/management capability of coordinating the ginger supply chain from farm to markets overseas.

Ginger Explained

Ginger is a tuber of the ginger plant, *Zingiber officinale* (Weiss, 2002). The ginger plant has a long history of cultivation and is widely grown in tropical Asia, West Africa and the Caribbean. India, China, Nigeria, Indonesia, Bangladesh, Thailand, Philippines, and Jamaica are the major producers of ginger. There are some 400 varieties of ginger, providing the opportunity for a wide range of ginger products. Ginger is available in a number of forms: fresh, dried, pickled, preserved, crystallised (or candied), powdered or ground, ginger oil and oleoresins. There is limited substitution between different forms. For example, fresh ginger can be substituted for ground ginger at a ratio of 6 parts fresh to 1 part ground, although the flavour of fresh and dried ginger are not exactly interchangeable. Ginger has both culinary and medicinal uses. Ginger is to be found in food, soft drinks and alcoholic beverages. The ancient Greeks were known to use ginger extensively in their pharmacopoeia. The Chinese use ginger for tooth ache, malaria, rheumatism, diarrhoea and excess mucus. Traditionally, ginger also has been used for its aphrodisiac properties.

Depending on the usage, ginger is harvested at different times. Fresh ginger might be harvested 5 months after planting; ginger for preserving 5 to 7 months after planting; and ginger for drying (mature rhizomes, containing richer aroma, flavour and pungency) after 8 to 9 months. Ginger is harvested by using mechanical diggers or by hand. After harvesting, ginger is graded according to end use. Ginger processed into dried form is in high demand in the world market. To prepare dried ginger the rhizomes are boiled then peeled, scraped or sliced, then sun dried. The dried ginger may then be pulverized to produce ground ginger. Ginger can also be processed to produce oil by steam distillation using either fresh or dried rhizomes. India is one of the top producers of ginger oil.

The most familiar form of ginger traded in the world market is dried ginger, followed by preserved and fresh ginger (Plotto, 2002). The dried form of ginger is mostly traded in European countries. India is the largest producer of dried ginger and contributes approximately 35 per cent to the total world production. The United Kingdom, United States and Saudi Arabia are the major ginger importing countries. Confectionery ginger, constituting 3 per cent of the world trade, gives a higher rate of return compared to the fresh or dried rhizomes. Australia, China, Fiji and Thailand are the major processors and exporters of confectionery ginger. Ginger oil and oleoresins are also widely traded for their flavouring and medicinal properties.

Ginger prices are usually more stable for processed forms than fresh. In assessing what forms of ginger to export, it is worth noting that some fresh ginger is imported but then processed and re-exported. This means that when identifying an export market, potential market segments for Papua New Guinea ginger (fresh or dried) and competition (competitors and price competitiveness) in those segments must be understood.

The New Zealand market for fresh ginger

Table 1 shows that total imports of fresh ginger into New Zealand increased steadily from 600 tonnes in 2004 to 731 tonnes in 2008. Note that there was a decline from 797 tonnes in 2007 to 731 tonnes in 2008, due to an over-supply in 2007 (PITIC New Zealand, n.d.).

The expanding market for ginger in New Zealand is an outcome of the changing tastes of the New Zealand population, their desire for more “exotic” foods, and a growing Asian population. These forces have resulted in an increase in Asian retail outlets and supermarkets which are the main outlets for imported ginger into New Zealand (PITIC New Zealand, n.d.).

Table 2 shows the market shares of supplying countries. It can be seen that in 2004 Australia and Fiji were the major suppliers, with market shares of 51.63 and 45.27 per cent, respectively. China was a distant third at 3.09 per cent. Thailand entered the market in 2006 and by 2008, Thailand was the major supplier with a 93.95 per cent market share; the remaining shares went to Fiji (3.97), Japan (1.13) and Australia (0.82).

Table 1. Fresh ginger imports into New Zealand by country of origin (in kg), 2004-2008

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---------------|---------|---------|---------|---------|---------|
| Australia | 309,362 | 274,716 | 221,640 | 56,010 | 6,000 |
| China | 18,520 | 28,359 | 45,695 | 19,565 | 0 |
| Fiji | 271,239 | 368,762 | 187,619 | 90,860 | 29,022 |
| Hong Kong | 0 | 0 | 0 | 10 | 0 |
| India | 48 | 0 | 10 | 0 | 50 |
| Japan | 0 | 5295 | 9840 | 8290 | 8,278 |
| Malaysia | 0 | 0 | 0 | 0 | 4 |
| Sri Lanka | 0 | 0 | 0 | 6 | 6 |
| Thailand | 0 | 0 | 265,669 | 621,547 | 686,506 |
| USA | 0 | 0 | 530 | 0 | 0 |
| Vietnam | 0 | 0 | 0 | 500 | 870 |
| Total imports | 599,169 | 677,382 | 731,003 | 796,788 | 730,736 |

Table 2. Fresh ginger imports into New Zealand by country of origin (in %), 2004-2008

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|-----------|-------|-------|-------|-------|-------|
| Australia | 51.63 | 40.56 | 30.32 | 7.03 | 0.82 |
| China | 3.09 | 4.19 | 6.25 | 2.46 | 0.00 |
| Fiji | 45.27 | 54.44 | 25.67 | 11.40 | 3.97 |
| Hong Kong | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| India | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 |
| Japan | 0.00 | 0.78 | 1.35 | 1.04 | 1.13 |
| Malaysia | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sri Lanka | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Thailand | 0.00 | 0.00 | 36.34 | 78.01 | 93.95 |
| USA | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 |
| Vietnam | 0.00 | 0.00 | 0.00 | 0.06 | 0.12 |

Thai ginger is considered as having excellent quality, a competitive landed price, consistent supply throughout the year and long storage ability of up to five weeks at 10°C (PITIC New Zealand, n.d.). Not only does it supply ginger in various forms (including “green” and “organic” products), but it also has hundreds of exporters involved in ginger export and other spices. On one Thai ginger exporter’s website (<http://www.alibaba.com/product-free/105779467/ginger.html>), it says “Fresh ginger from Thailand origin with good grades passed the quality standards of HACCP (Hazard Analysis of Critical Control Point), MGP

(Manufacture Good Practice), AGP (Agriculture Good Practice)”; “we provide fresh and dried ginger in any size as your specification” and “we can support the product all year round”. Also on related websites, there are indications that Thailand can supply according to customers’ product specifications and that the industry is market-oriented. The exporters include specifications of the size of the rhizomes (e.g., 150-250 grams, 250-350 grams or 300 grams and above) and state that there is a “minimum order of 20 tonnes”, “we can support 500-1000 tonnes a month”, and “we can supply within a month”, etc. It is doubtful that PNG will be able to make such claims and compete on such terms any time soon.

Ginger production is highly seasonal (McGregor, 2007). Traditionally, Australian ginger, which dominated the New Zealand market, was imported mainly over the November to January period to top-up dwindling supplies of mature Fiji ginger which has a June-October season. However, the supply of ginger from Thailand has now meant that there is a fairly constant and steady supply throughout the year. Thai ginger arrives in New Zealand in 20-foot containers, containing 1,512 cartons, each weighing 10 kg (PITIC New Zealand, n.d.).

Changes in the market shares of the major suppliers can be explained in part by changes in price competitiveness (Table 3). In 2008 Thai ginger landed in New Zealand with an average price (CIF) of NZ\$2/kg, compared with ginger from Fiji at NZ\$2.72/kg and ginger from Australia at NZ\$7.37/kg.

Table 3. Unit import value for fresh ginger imports into New Zealand by country of origin (in NZ\$/kg), 2004-2008

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|-----------|------|------|------|------|------|
| Australia | 5.20 | 5.71 | 4.83 | 3.41 | 7.37 |
| China | 1.22 | 2.63 | 2.67 | 2.37 | 0.00 |
| Fiji | 2.24 | 2.47 | 2.09 | 2.09 | 2.72 |
| Hong Kong | 0.00 | 0.00 | 0.00 | 2.90 | 0.00 |
| India | 8.04 | 0.00 | 3.80 | 0.00 | 9.76 |
| Japan | 0.00 | 5.24 | 6.00 | 5.20 | 5.52 |
| Malaysia | 0.00 | 0.00 | 0.00 | 0.00 | 7.00 |
| Sri Lanka | 0.00 | 0.00 | 0.00 | 0.67 | 1.33 |
| Thailand | 0.00 | 0.00 | 2.43 | 1.86 | 2.00 |
| USA | 0.00 | 0.00 | 3.01 | 0.00 | 0.00 |
| Vietnam | 0.00 | 0.00 | 0.00 | 2.07 | 2.22 |
| Average | 3.74 | 3.82 | 3.13 | 2.04 | 2.11 |

From Tables 1 to 3, some summary observations can be made about the New Zealand market for fresh ginger:

- New Zealand is a relatively small market for ginger (compared with total world imports);
- The market is quite competitive and unstable, with changing market positions for suppliers;
- The average import price has declined from NZ\$3.72/kg in 2004 to NZ\$2.11/kg in 2008; and
- Market shares seem to be determined mainly by price, which is known to be quite variable.

Ginger production in the Sogeri region of Papua New Guinea

Currently, ginger is grown primarily in the area of Sogeri and Owers Corner. The Sogeri Plateau is 46 km east from Port Moresby. At 800 metres above sea level the air is cool and pleasant. Owers Corner near Sogeri is the starting point for the famous Kokoda Trail (see Figure 1 for a map of the Central Province of Papua New Guinea). The main ginger variety is the Taiwanese variety. Many of the families in the Sogeri area have been growing ginger for half a century. Previously, ginger grown in the area was used only for home consumption. Commercial production and marketing started in around 1996/1997.

Volume

The number of farmers from McDonalds Corner to Owers Corner is around 80, with a total production of 400-500 bags, each bag weighing 50 kg. This means the annual production in this area alone could be around 20–25 tonnes. Total ginger production from Central Province could be as high as 50 tonnes. The population in Ward 6 is around 600 and the majority of the population grow ginger. However, sufficient information on areas planted, yields or general cultivation practices in this area could not be obtained to arrive at an estimation of total production. One thing that is clear is that there is so far no need for fertilisers or any other chemicals for pest and disease control.

Quality

In general, consumers prefer large rhizomes because they are easier to handle. Ginger from the Sogeri area seems to be of high quality, as assessed by the New Zealand importers during the trial shipment and our own observations during a visit to the region. Among farmers, there seems to be a clear understanding of what constitutes “good quality” – fat, juicy and fresh looking. Ginger is classified into large, medium and small, but there are no specific grading standards. Ginger is sold at the Gordons market in Port Moresby (the biggest open-air market in Port Moresby), in either 50 kg, 25kg or 5kg bags without sorting or grading, although severely under-sized rhizomes tend to be saved as seeds for replanting in the next season.

Figure 1. Central Province of Papua New Guinea**Price**

According to some farmers at Owers Corner, the price for a 50 kg bag ranges from K150 (K3/kg)^[3] during the peak season (April-May-June) up to K300-400 (K6-8/kg) later in the season (September-December/January). In the Sogeri area, ginger is planted around September-October (the beginning of the rainy season) and mature ginger is harvested 8-9 months later. Although immature ginger can be harvested in 5 to 6 months, Sogeri farmers supply only mature ginger. More research is needed to determine whether production seasonality exists and if so what the pattern is to verify the possibility that Papua New Guinea can supply fresh ginger to New Zealand all year round.

During our visit to the retail markets in Port Moresby (in September 2009), fresh ginger was selling at around K10/kg at the Boroko Foodworld Supermarket, K3/kg at the Green Fresh (a

fresh produce wholesaler), and around K3-4/kg by farmers selling in bulk to re-sellers at the Gordons market. At the Boroko Foodworld we found several high-valued processed ginger products in jars imported from overseas. They include: Ginger Pieces in Marinade (by Aristocrat) at K10.30 for 150 grams (K69/kg); Ginger Ground (by Masterfood) at K8.37 for 25 grams (K335/kg); Ginger Freshly Grated (by Masterfood) at K10.28 for 160 grams (K64/kg); Grated and Minced Ginger (by Continental) at K9.39 for 210 grams (K45/kg); and Ginger Minced (by Thai Gourmet) at K9.12 for 100 grams (K91/kg). This means imported processed ginger cost between K45 to K335 per kilogram.

Problems

Lack of transport and bad road conditions are the principal constraints to marketing facing the ginger farmers in the Sogeri area, especially for those at the Owers Corner near the beginning of the Kokoda Trail. People Moving Vehicles (PMVs - Public Transport) rarely come into this area because the roads are usually impassable. Typically, the men and women farmers carry ginger in billums or in bags, and walk over hills and rugged terrains for three hours to Sogeri Station to catch a PMV. Often, they start their walk to Sogeri Station at 3 am so they can arrive at Gordons market before it opens at 8:30 am. Only very rarely was pick-up arranged at the village. The costs of transport to Port Moresby include K20 per 50 kg bag for the produce and K5 per person one-way. In addition, there are loading costs (K2 per bag) and market gate fees (K2 per bag). The lack of transport effectively puts a limit on production and marketing potential. A farmer complained that sometimes ginger rots in the shed because they could not go to the market as planned. It is also understandable that people who do go to the market would not be doing it as often as they can because of the ordeal which they have to go through.

On the day of our visit to the Sogeri region, the road and traffic from Port Moresby to Owers Corner were good. The road had been recently graded and it took about 1.5 hours to reach Owers Corner from Port Moresby in a 4-wheel drive (4WD) vehicle. However, it was not clear whether and how often the road would be maintained in the near future.

During consultations with Sogeri farmers, there was no mention of low prices, access to basic services (water, electricity), pests and diseases, pre- and post-harvest handling or quality issues. Their experiences were very different from those of more perishable fresh produce farmers for whom quality deterioration and product losses are major issues. However, we noticed that ginger

was cultivated on steep slopes and new gardens are prepared by first burning off the bushes. These practices may be more acceptable for smallholder and semi-commercial farming, but it would have adverse effects on soil fertility and soil conservation over time, especially if production was expanded to commercial scale.

During our field visit, farmers wanted to know what price they would receive for ginger export. We could not answer the question since the price would be determined more or less by the world market and would be highly variable. In fact, the pricing of ginger would be a huge challenge for any ginger buyers. Papua New Guinea farmers tend to have very high price expectations because they tend not to distinguish the difference between the farm price and the retail price or are not fully aware of the costs associated with marketing. Consequently, they prefer to go to the market themselves, rather than selling to local buyers, despite the distance and high costs of transport (Chang, 2010). The other concern for buyers would be farmers selling to other markets when the market price is high and returning only when the market price is low, regardless of any prior agreement to supply.

Another potential problem to be considered is the availability of clean water. Water usage can be expected to be very high because raw ginger has high soil content while one of the quarantine requirements is "clean and soil free". It was estimated that about 12% of the weight of the raw ginger was actually soil coating the outside of the ginger. Washing will require large amounts of clean water while generating high volumes of waste/dirty water. The Sogeri area seems to be surrounded by creeks. However, if farmers were to use the creek for washing, it would mean climbing down and up the hills many times over. In addition, there could be dispute among neighbours regarding access to water and water pollution.

Other observations

One interesting thing that we discovered is that each family member has his/her own garden. Although land preparation and harvesting are done together, the harvest belongs to the designated owner of the garden. In this case, women and girls, and even children, also have their own plots and can keep the incomes they earn. These unique arrangements may have implications for organising farmers into marketing groups. The other thing we learnt was that previously, there was an attempt to do marketing as a group. Five hundred bags were consolidated at the Ward's councillor's premises^[4] intended for export. But it did not eventuate

and days later the bags were returned to their owners. It is understandable that farmers are now very wary about any suggestions of exporting ginger or group marketing.

The potential for Papua New Guinea fresh ginger exports to New Zealand

McGregor (2007) identified five key success factors for exporting horticultural products from developing countries. They are:

- Suitable agronomic conditions to produce products with identified markets and ready access to an international airport or seaport;
- The availability of air and sea freight capacity to target markets at reasonably competitive freight rates;
- Private sector marketing capability;
- Quarantine pest status and management, particularly fruit flies; and
- Ability to resolve sanitary and phytosanitary and other market access issues.

Here we address these issues in relation to exporting fresh ginger from the Sogeri areas of the Central Province in Papua New Guinea to New Zealand.

Agro-Climatic conditions

Ginger thrives in a high temperature/high rainfall environment, but demands well-drained soil. It is grown in semi-tropical to tropical areas at altitudes between 500m-1600m above sea levels, with both a heavy rainy season and a hot dry season. The agro-climatic conditions in Sogeri/Vanapa/Brown River meet these requirements.

Identified markets

Currently, the focus is fresh ginger to the Auckland market in New Zealand because of the initiatives of the New Zealand High Commissioner to Papua new Guinea. The trial shipment of 40 kilograms to two importers in New Zealand received positive responses. However, there is no indication what the demand is likely to be in future. “We will take whatever you send us” seems to be too good to be true and it is risky for Papua New Guinea to go ahead without firm agreements on quality, volumes and prices.

Ready access to international airports and sea ports

Ginger from the Sogeri area, which is within two-hour’s drive from Port Moresby, has access to Port Moresby Port and Jackson Airport. However, there is no direct air or sea link from Port Moresby to Auckland. All air and sea freighted cargos will need to go through Brisbane. There

could be time delays while waiting for connections in Brisbane. It takes about three weeks from Port Moresby to Auckland via Brisbane by ship (Shipping company representative, pers. comm. 2009). But the whole journey will take about 32 days because when the ship docks in Brisbane for gas it undergoes inspection for 10 days before sailing to Auckland. Shipping companies advised against shipping fresh ginger by sea due primarily to the time factor. The stop-over in Brisbane may also cause quarantine issues, as previously experienced by the ill-fated pineapple export to New Zealand in the 1980s which were refused entry by the Australian Quarantine and Inspection Services.

Air and sea freight capacity

There are two airlines (Air Niugini and Heavi Lift) and several shipping lines (e.g., Inchcape Shipping) that can take Papua New Guinea ginger to New Zealand. Currently, there is a 2.4-tonne capacity on Air Niugini with a daily flight from Port Moresby to Brisbane. Heavi Lift goes to Brisbane once every fortnight.

Competitive freight rates

The air freight quotes for Air Niugini and Heavi Lift (Airline company representatives, pers. comm, 2009) were as follows:

Air Niugini – Port Moresby to Auckland via Brisbane

- K8.09/kg at 1,000 – 2,000kg;
- K0.17/kg – International Security Surcharge;
- K1.65/kg – Fuel surcharge;
- K30 –AWB (air waybill or bill of lading) fee; and
- K30 – Terminal handling fee.

This amounts to K9.91/kg (assuming a full container load of 15 tonnes and an exchange rate of AUS\$0.47/K), excluding other local charges (inspection fees, cartage and agency fees) and 10% GST.

Heavi Lift Freight Rates – same route

- AUD\$3.50/kg at 1,000 kg and above (inclusive of airline surcharges); and
- K100 – AWB and terminal handling fees.

This amounts to K7.539/kg (under the same assumptions as for Air Niugini).

The Heavi Lift freight charges are more appealing than Air Niugini. However, Heavi Lift does not have arrangements with carriers connecting Brisbane to Auckland; hence, any consignment could be delayed in Brisbane if no good connection is available.

Based on these preliminary figures, it appears that at the moment the landed costs (via air) of Papua New Guinea fresh ginger in Auckland could be around K12 – K15 per kg (assuming a farm price of K3/kg and an exchange rate of NZ\$0.58/K). This is equivalent to around NZ\$7-9 per kg. At these landed costs, Papua New Guinea ginger is definitely not competitive compared with existing suppliers, such as Fiji (NZ\$2.72) and Thailand (NZ\$2/kg) (as shown in Table 3, last column).

Sea freight rates (with reefer containers) can be expected to be cheaper than air freight, but there are complications. First, it may take three weeks or more for sea freighting, during which time quality may deteriorate. Second, if the volume is less than a full container load (around 15 tonnes), it would need to be sent in pallets or even in boxes, and perhaps shared with other cargos. There could be further delays in shipment and deterioration of quality while waiting for the container to be filled or sorted. Finally, it can be reasonably expected that the smaller the volume, the higher the freight cost per kg.

It should be noted that costs of road transport within Papua New Guinea are also high relative to other countries (Global Development Solutions, 2008). High transport costs and road problems have been identified numerous times as the number one problem for fresh produce marketing (Chang, 2009).

Private sector marketing capability

Currently, there are no fresh produce exports from Papua New Guinea. The main agricultural exports from Papua New Guinea are coffee, oil palm, cocoa, copra and vanilla, as well as some small amounts of pepper and dried chilli. These are handled largely by the private sector with identified markets and well-established supply chains. The involvement of government in these sectors is limited to research and extension. Therefore, one can expect some of those exporters to have the marketing capacity for ginger exports. Unfortunately, most of these exporters are located in Lae on the northern coast of Papua New Guinea and in East New Britain, except

Paradise Spices (mainly vanilla) and Sogeri Spices (mainly dried chilli) who are based in Port Moresby. Neither of the latter two is interested in fresh ginger exports at the moment.

Our initial assessment of the private sector marketing capacity for fresh ginger is not positive. First, many reviews of fresh produce marketing in Papua New Guinea (mostly from the Highlands to either Lae or Port Moresby) have indicated protracted problems in transport, logistics, marketing infrastructure, and consistency in quality and supply (Wilson 2008, Global Development 2008, Peter 2001, Epstein 2000, Burdon 1998, Daysh 1995). It seems that fresh ginger shipments from Sogeri experience similar problems and those problems will not go away simply because there is now an export marketing opportunity initiated by the government. It should be remembered that the profit incentive is the key element for any private sector involvement (including farmers, exporters and importers). Even if the profit incentive exists, an internationally competitive industry must be supported by well-developed related and supporting industries (Porter, 1998). This is clearly not the case in Papua New Guinea at the moment. Second, according to Porter (1998), an industry's international competitiveness depends crucially on the demand conditions in the domestic market. That is, a highly competitive domestic market with demanding consumers is a pre-requisite for preparing the suppliers, farmers, wholesalers and exporters alike, for highly competitive and demanding export markets. Without being through this type of market discipline over time, it would be difficult, if not impossible, to make the great leap forward from a production-oriented system to a market-oriented system.

Quarantine and other market access issues

The quarantine requirements for ginger shipments to New Zealand are that the produce must be accompanied by an international Phytosanitary Certificate and that they are subject to inspection and treatment on arrival in New Zealand if necessary. As stipulated in the "Import Health Standard on Ginger from Papua New Guinea", ginger must be clean (practically free of any visible foreign matter), packed in clean new packaging, practically free of soil contamination and free of damage caused by pests (MAF Biosecurity New Zealand). Like Papua New Guinea, Fiji and Vanuatu also have BQAs in place to export ginger to New Zealand (McGregor 2007).

As pointed out by McGregor (2007), quarantine and phytosanitary issues may not be as serious a problem for spices such as ginger as for fruit or vegetables. However, food safety certification requirements of importing countries are increasingly likely to be a major barrier to entry. It can

be expected that Hazard Analysis and Critical Control Point (HACCP) certification, which is standard practice for processed food, will become necessary for fresh produce exports. However, many things can go wrong.

In late 2008, Fiji ginger exports to Australia were found to be contaminated with nematodes and banned. The ban was lifted in June 2009, but Australia insisted that future consignments must be free of live insects, disease symptoms, contaminated seeds, soil and other debris prior to arrival in Australia (Commodity Online, 2009). To comply with the requirements, importers into Australia are required to have an import license and green ginger can only be imported by an importer who is supplying to firms for further processing. Chinese ginger to Europe was found to contain the pesticide aldicarb sulfoxide. These are just a few examples of how easily an export market can be jeopardised, or even lost for the foreseeable future, by a small oversight or mistake by exporters.

Other risk factors to be considered are:

- Price fluctuations due to exchange rate variations and changes in demand/supply conditions in major ginger producing and consuming countries; and
- Other trade barriers such as tariff regime changes and embargoes due to political reasons.

Financial feasibility

Currently ginger is supplied by individual smallholder farmers who go to Gordons market only occasionally. Both production and marketing are primitive, without the benefit of modern technology or the necessary marketing infrastructure. If an export supply chain was to develop from scratch, several capital investments must be made for washing, sorting/grading, quarantine inspection, packing, cool storage and transport. These may include:

- Troughs/drums and high pressure pumps for washing;
- Packing sheds and cool rooms both near the collection point in the Sogeri area and in the exporter's receiving point; and
- 4WD vehicle for pick-up from the farms and drop-off at the collection point.

These basic investments are necessary regardless of who is taking on the responsibility of produce consolidation at the villages and/or exporter's receiving point.

Several quotations for equipment and facilities are provided in Maino (2009):

- Washing/packing sheds K500,000
- Cool rooms K300,000
- Housing/inspection K70,000
- Transport K120,000

Other investments required would be organising farmers into marketing groups; educating and training farmers about buyers and quarantine requirements; pre- and post-harvest handling; book-keeping; staggering production; etc. The total investment costs over 3-5 years would be around K2.75 million, including recruiting several extension officers to be based in Sogeri (Maino, 2009). With the current production of ginger in the Sogeri area and the competitiveness in the world ginger market, it is unlikely these investments would yield positive returns even in 10-15 years' time. The proposed investments, however, could be better justified if they were aiming at the development of the fresh produce industry in Central Province to serve the domestic market while building export capacity.

Social, economic and environmental impact

There is no doubt that developing an export market for fresh ginger in the Sogeri area has the potential to increase rural employment and improve incomes and living conditions for many smallholder farmers. However, it seems soil degradation and water pollution may be potential problems as ginger is grown in steep slopes and new gardens are created by first burning off native bushes. There may be a need for the use of fertilisers and chemicals as farmers move into a commercial scale of production.

Future Options

Alternative product forms

Although the current focus is on fresh ginger, what about other product forms such as dried, ground or pickled ginger? In our view, these product forms ought to be considered in tandem with the development of the fresh ginger market. However, all of these involve some form of processing. Given that processing will require additional capital investment, consistent supply in large volume and meeting quality assurance for food safety and quality standards, it is deemed technically infeasible for Papua New Guinea at the moment. The same argument may apply to producing organic or pesticide-free ginger products for niche markets. Currently, Thai ginger is extremely competitive in the New Zealand market, with good quality, low price, good keeping quality and year-round supply. However, Papua New Guinea ginger may have a market

advantage in that it is produced naturally, without any use of fertilisers or chemicals. This means that it is possible to market Papua New Guinea ginger as a higher-valued differentiated product, as opposed to a low-cost commodity. However, to realise this potential market advantage, there must be strong demand and willingness to pay price premiums for such products. It is not clear whether such demand conditions exist in New Zealand or other markets and whether the size of the market is big enough to be profitable. In addition, it is not clear whether the price premium or additional sales associated with a certified premium product would more than offset the costs of certification and establishment of a traceability system.

Alternative markets

To explore potential export markets for fresh ginger such as Australia and Japan, detailed market research is required to ascertain that such opportunities do exist, in terms of quality, off-season requirements, quarantine arrangements and cost competitiveness. According to McGregor (2007), there are market opportunities for Fiji to export fresh ginger into Japan (potentially a market of several thousand tonnes) and Australia (potentially 300-400 tonnes), but both countries are excluded on quarantine grounds. To export fresh ginger to Japan and Australia, the soil in which the ginger is grown must be certified free of nematode, and *Radopholus similis*.

There is also a potentially huge demand in the domestic market for ginger, with the influx of Chinese and other Asians into Papua New Guinea due to the PNG LNG Project and other mining projects around the country. In fact, the domestic market is, in our view, looking much more attractive than the export market for at least the next few years.

Alternative business models: FPDA versus Private-Public Partnerships

It has been previously argued that “FPDA should take on the responsibility to manage the production and export of ginger for information and to experience the exporting fresh produce business” because “the private sectors are not committed to take on this challenge until it is proven profitable”. However, arguably FPDA, as a government agency, should focus on the provision of public goods, such as market information, research and extension, which FPDA has been doing well for the past two decades.

If investors decide not to take part in a private business venture (e.g., exporting ginger) because of the lack of profitability or capacity, or because of high risks, it does not necessarily mean that

a government agency can do better and hence should intervene. Furthermore, the argument that FPDA should take on export opportunities and then once it is proven a worthy investment ‘pass it on’ to the private sector is not a valid strategy as a private-public partnership is necessary from the beginning.^[6] For those industries where statutory marketing authorities or marketing boards have originally been operated by government and then later become private companies, this occurs not by “passing it on” to the private sector, but by “privatisation”. It is not clear how an export business developed by FPDA can then be passed on to the private sector years later without some kind of prior arrangements for a smooth transition. Government-operated enterprises are hard to pass on to the private sector (even if they are proven profitable) simply because the operating environments are different and their business models may not work for the private sector, unless there is private sector consultation and involvement from the start of those projects.

Globally, direct government involvement in agricultural marketing has become a thing of the past except in special cases. Governments which used to support the agricultural sector through parastatal^[6] or statutory marketing boards, input and credit subsidies, price support, tariffs and import quotas etc have learned that these direct government interventions are costly, they distort allocation of resources, they breed inefficiency and they result in industries becoming less competitive internationally. Some of these measures are also no longer admissible under World Trade Organisation agreements which prohibit various forms of government assistance to the farm sector.

The main economic argument for government intervention is in the case of market failures where either a market does not exist or the market is not producing the desirable output. Market failures arise because of imperfect information (eg prices unknown or unavailable); imperfect markets (eg monopoly, high transaction costs, immobility of factors of production); public goods (eg. defense and national security); or externalities (eg. environmental damages due to deforestation or land clearing, spillovers due to research and development). Furthermore, even when market failures exist, government intervention is justified only if it passes further scrutiny. That is, does it produce net public benefits? Does it restrict competition? Can policy goals be achieved through other means?

Direct government intervention in agricultural marketing or exporting often does not pass these tests, except in the case of imperfect information. Even in cases where there is imperfect information, government intervention should still be restricted to research and development and provision of market information and extension services that satisfy public goods requirements. In countries such as the United States, Australia and those in Europe, most support services traditionally provided by the government are now either entirely in the hands of the private sector or in partnership with the public sector simply because together they complement each other and can deliver better results.

Another issue is motivation and performance in government-operated enterprises. The question is: In the absence of close supervision, necessary skills or proper remuneration, how strong an incentive is there for government employees to make a concerted effort to ensure customers' requirements are met or a reasonable return on investment is achieved? Would they voluntarily work inconvenient or extra long hours to make things happen?

In addition, a government agency acting as an exporter of fresh produce may be in direct competition with the private sector. Not only does it compete with other buyers for the supplies of produce, but also it might not compete fairly on commercial terms because it can afford to subsidize its operations in various ways (eg. free pickup, buying at higher price, selling at lower price, etc). Over time, it may also discourage private investments into the exporting business. It seems the time has come for any government agency, including FPDA, to redefine its strategic role in fresh produce marketing and move away from an interventionist approach to one that is facilitative.

Every export market is highly competitive, as illustrated by the number of suppliers, and changing market shares, in a relatively small New Zealand market for fresh ginger, with extremely stringent quarantine restrictions. The recall of Chinese ginger in the United States (due to traces of a harmful pesticide) and the ban on Fiji ginger in Australia (due to an incidence of nematodes contamination) are just a few warnings of what can be expected in taking on export marketing. This means the market is unforgiving and preparation beforehand must be as complete as possible. It is not something to learn and experience as you go along, as suggested earlier by Maino (2009).

Conclusions

The future of ginger production and commercialisation for export markets is characterised by both opportunities and constraints. The main opportunity for Papua New Guinea ginger is that there appeared to be a market for it in New Zealand with Biosecurity Quarantine Arrangements now in place between the Papua New Guinea National Agriculture Quarantine and Inspection Agency and the Biosecurity New Zealand. The quality of ginger produced in the Sogeri area in the Central province was confirmed by buyers in New Zealand during a trial shipment to be of good quality. The major constraint is that the export market is highly competitive, with fluctuating demand and prices. Currently, Papua New Guinea fresh ginger is not price competitive in New Zealand. Its landed price (via air) is around NZ\$7 to NZ\$9 per kg, which is almost four times the landed cost of Thai ginger (NZ\$2/kg) with similar quality.

Based on our assessment, it is deemed premature for Papua New Guinea to expand fresh ginger export into the New Zealand market any time soon because it is both technically and financially infeasible. In contrast, the domestic market is full of potential with the demand for ginger, as well as other fresh produce, set to increase substantially in the next few years due to the upcoming PNG LNG Project and other mining activities. In our view, a broad-based agricultural development program for fresh produce in Central Province as a whole, which includes ginger in the Sogeri area, and which targets the domestic market, would better meet the needs of the farmers and help prevent the possible influx of imports into Papua New Guinea.

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^[2] FPDA is a government agency in Papua New Guinea established under the PNG Company Act to develop a commercially viable and sustainable horticultural industry through research and extension in production and marketing.

^[3] In September 2009, the exchange rate for one PNG Kina was AUS\$0.47.

^[4] In Papua New Guinea, ward refers to the basic unit of the local level government, consisting of several villages in one location. The hierarchical government structure is: national, provincial, district and local level government.

^[5] Previously, FPDA used the same argument for its Market Development Project which involved FPDA buying fresh produce from the farmers and selling it to supermarkets. However, the Project failed miserably because of serious design problems and there was no capacity building of the private sector nor an exit strategy to “pass it on” (Chang, 2010).

^[6] Parastatals are organizations which are owned or controlled wholly or partly by the government.