All ACP Agriculture Commodities Program (AAACP)
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Farmer organisations and the market in Melanesia

Value Chain Mapping for Sweet Potato and Taro in Busurata, Masilana and Takwa, Malaita Province —a case study making up part of the FAO project under the EU AAACP program

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This study and report was supported by the United Nations Food and Agriculture Organisation (FAO) through the EU funded AAACP program. The objective of the program is to improve the livelihoods of producers in commodity dependent ACP countries. The focus of the FAO component was to enhance the capacity of farmers organizations to participate effectively in rapidly changing markets and provide quality services to their members. KGA receives core funding from AusAID and this supported the time of the KGA staff who carried out the value chain study.

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Supporting organisations

United Nations Food and Agriculture Organisation (FAO)
This study and report was supported by the United Nations Food and Agriculture Organisation (FAO) through the EU funded AAACP program.

Australian Agency for International Development (AusAID)

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Part of the Department of Foreign Affairs, AusAID administers the Australian Government's aid budget and provides financial support to development assistance projects and programs in the region. AusAID supported the value chain study.

Partner organisation

Kastom Gaden Association (KGA)
The Kastom Gaden Association works with Solomon Island communities to improve their food security

APC
The objective of the program is to improve the livelihoods of producers in commodity dependent Africa, Caribbean, Pacific (ACP) countries.

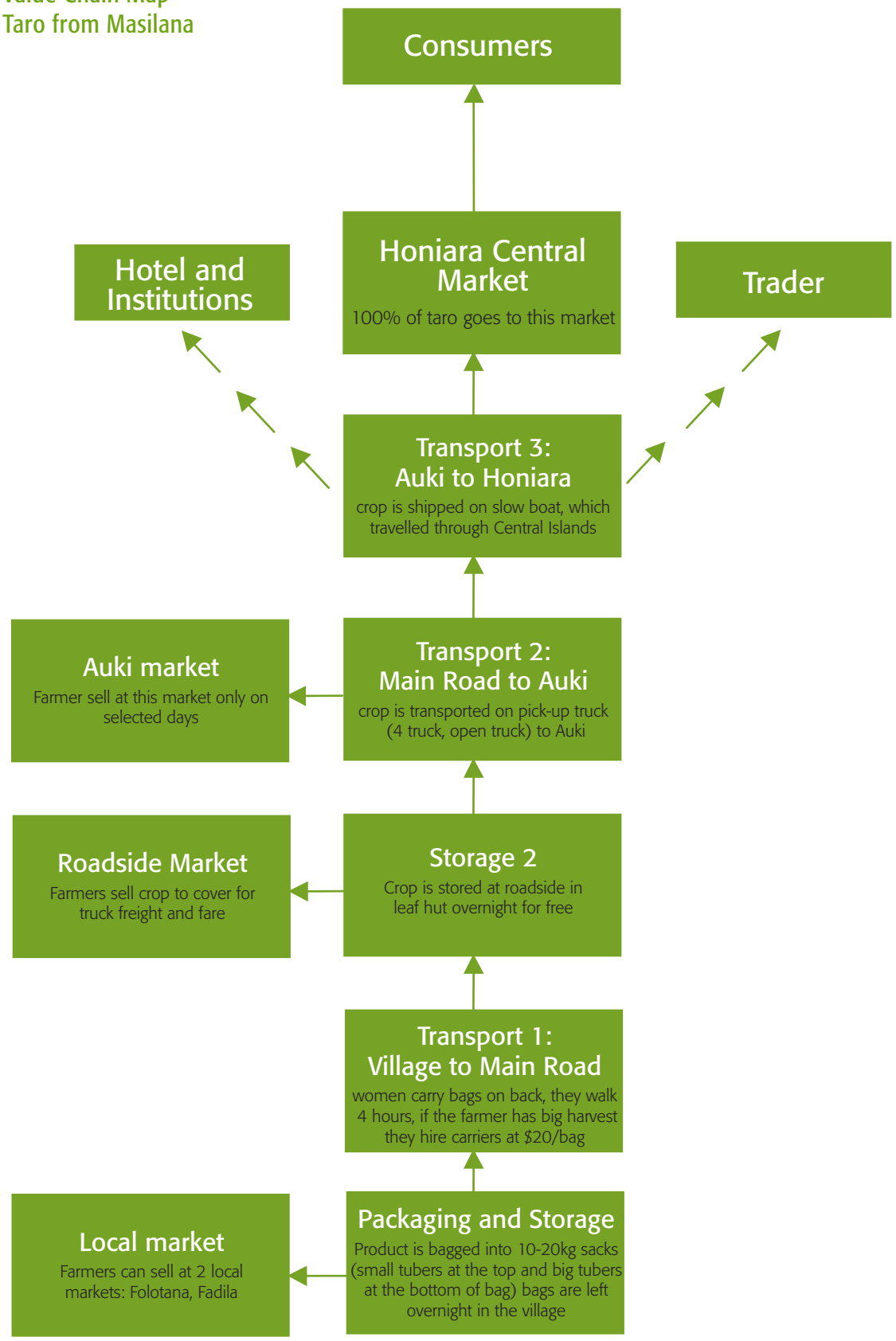
TerraCircle development assistance consultants
The South Pacific development assistance consultancy, TerraCircle, works with local NGOs and agencies, governments and intergovernmental organisations in the region. www.terracircle.org.au

Contents

Abbreviations

AAACP	All ACP agriculture Commodities program
ACP	Africa, Caribbean, Pacific
EU	European Union
FAO	Food and Agriculture of the UN
KGA	Kastom Gaden Association
MAL	Ministry of Agriculture and Lands
NGO	Non Government Organisation
PAPGREN	Pacific Agriculture Plant Genetic Resource Exchange Network
PEDC	Paruparu Education Development Centre
SICHE	Solomon Island Government
SIG	Solomon Islands Government
SPC	Secretariat of the Pacific Community

Value Chain Map –
Taro from Masilana



1. Description

KGA is building its capability to assist farmers with better marketing. Increased income is a high priority for members of the KGA supported Planting Material Network which has 3000 members across the country.

The need for helping small farmers to increase their income is supported by the extreme gap between cash-rich and cash-poor in Solomon Islands. 93% of households, including most of the 85% rural majority, receive only 22 percent of total income. Average urban incomes are more than 3 times average rural incomes (World Bank—2006)

The objective of this study is to obtain a map of the sweet potato and taro producers from areas remote from main markets and to identify the constraints and opportunities along the value chain.

Sweet potato has been selected because it is the major staple and the largest crop of rural Solomon Islands both in quantity and value which is conservatively estimated at SBD$450 million per year (AusAID 2006). The 1997 SIG Village Resources Survey ranked sweet potato and cassava as the most commonly grown subsistence food crops.

KGA has three key partner farmer organisations in Malaita:

- Baetolau Farmers Association
- Guanafiu Farmer School
- Rokotanikeni Womens Association.

Lead farmers from the first two of these were selected to take part in the value chain study.

The information from this study will be used by the Marketing and Value Adding component of KGA to plan how it can assist farmers and other actors on the value chain to improve market opportunities for small farmers. It will also be used as a model for further value chain mapping in support of KGA affiliated small farmers.

Study area

The areas under consideration are Busurata, Masilana and Takwa on Malaita Province and their linkages with local, provincial (Auki) and national (Honiara) markets.

Masilana village, located in the 'highlands', the rugged interior of North Malaita, Malaita Province. The village is made up of one clan and consists of twelve households with 50-75 adults and many more children. Masilana is located on a ridge top with steep valleys on all sides at about 600 metres elevation resulting in a cooler climate than the tropical lowlands on the coast. The village is five hours walk on muddy and slippery bush tracks from the coast and the nearest road which runs along the coast of North Malaita from the provincial centre Auki.

Takwa is a village located in coastal area of North Malaita. There are more than 10,000 people and more than half of them are children. Takwa is a catholic mission area and the station of North Malaita. It has a big wharf, schools and clinic. That is to say this is a big village. To reach Takwa, 6 to 7 hours travel from Auki by truck is needed. The road between Auki and Takwa is often affected by rain, so sometimes it is difficult to reach there in rainy season.

Busurata is one community which is located in inland of Malaita. The area where Busurata is located is called Keaimela/Radefasu. This area has about 9600 people and about half of them are under 20. Although people call it inland, the access to Busurata is not difficult. It is less than 1 hour from Auki to Busurata. The road between Auki and Busurata is arranged better than before, so it is accessible. The location contributes to the cool climate of Busurata. Consequently this study has two main target groups: the consumers of the root crops under study and producers of the sweet potato and taro.

The study was carried through field work between October and December 2011. This included market observation in local markets requested of PMN member farmers in the area. A stakeholder meeting was held in Honiara where the results were presented and discussed with participants able to give their feedback. Finally the report was edited and cross referenced to other KGA information sources and experiences.

The results from the study are presented according to the steps along the value chain from growers to consumers:

- production
- post harvest handling
- transport to road (carrying)
- transport on road
- transport by ship
- produce markets
- other market opportunities and traders.

2. Production

Growing methods:

Traditional

For sweet potato, traditional method of gardening known as bush-fallow is the one mostly practiced, as observed during the visit and revealed by the farmers in the three areas under study, namely, Masilana, Takwa and Guanafiu.

In the bush-fallow method farmers apply the slash and burn approach to clear their gardening areas or plots. Actual planting of potato vine is done one week after clearing. This is to allow time for the ground to dry up a bit.

Hand tools that are normally used for planting especially for making mounds or plough the ground are mattock, hoe, crow-bar, knife, and traditional planting sticks.

Planting material is mostly young potato vines and for each mound about four-five vines are planted or used.

Harvesting time for sweet potatoes ranges from three months to six months depending on variety. After planting, potato gardens are being looked after by weeding and clearing the garden boundaries at three week intervals until harvesting time.

For Taro the traditional planting method is similar. The main difference being that taro requires more fertile soil and long bush fallows are usually cleared for taro.

Taro is not planted in mounds, but rather carefully sized corms are planted into holes created with a traditional digging stick. Due to the need for very fertile soil and the pest and disease conditions discussed later, taro is normally grown in less densely populated and more forested areas where gardens have a bush buffer around them.

This occurs in Masilana and Busurata but not at Takwa where population is too high to support traditional taro growing methods.

Improved–fixed site gardens

Traditionally, farmers burn the land and move from one place to other places to continue gardening. A bush fallow is used to restore soil fertility with the garden site traditional left to recover under fallow for up to 20 years.

This system requires a lot of land and farmers often reduce the fallow period eventually leading to land degradation.

After the introduction of fixed site garden by Kastom Gaden Association, farmers gradually choose to make gardens closer to their house. Fixed site gardening uses same areas for a long time.

For example, one farmer we interviewed keeps his garden in the same area for more than five years. This type of garden is not far away from the house, so it is easy for farmers to look after the garden. This type of garden requires the use of mulching or legume trees—usually glyricidia—to maintain and even improve soil fertility for a longer period of cropping.

During a farm visit we noticed that such practice of fixed site gardening is supported by the farming method whereby mulching and green composting is practiced as well as the use of legume trees scattered in gardens and coppiced for nitrogen rich mulch.

Apart from farming on the same area over a long period of time which saves land used for cropping, this practice also contribute to high yield of root crops and vegetables.

Fixed site garden in Takwa using mulching, composting and crop rotation to grow taro and slippery kabis

Farmers in Takwa prepare to plant gliricidia cuttings into sweet potato garden. This is a new method where the legume trees are cut regularly to provide a nitrogen rich mulch for the crop and through fixing of nitrogen in the soil by nodules on the tree roots.

Key implications for value chain:

Production is not a key constraint for the value chain development. Farmers are successfully growing sweet potato and taro in the highlands.

Farmers, with support of KGA, have developed new models of fixed site gardens which are responding successfully to the land pressure issues.

2.1.3. Pest and disease

Pests and diseases of root crops are problematic to farmers in these areas. The common ones are:

- green leaf folder
- taro beetle
- alomae
- bobone and
- taro leaf blight.

The caterpillars attacked only the potato gardens by eating the potato leaves. This mostly occurs during wet or rainy season. The rainy conditions also cause potato tubers to get soaked and rotten while still in the ground.

Problems with green leaf folders to potato gardens are quite difficult to control as it is associated with the rainy seasons. Apart from problems caused by the caterpillars which seem minimal and seasonal depending on the wet condition, there are no other notable potato pest or diseases in these areas making potato farming the mainstay of most farmers and PMN members living in these areas.

Taro beetle, as common with taro farmers elsewhere, is the main pest causing problems to taro in the areas. Taro beetles attacked the taro tubers by boring holes in them making them less attractive for both consumption and market. According to the farmers interviewed as

well as through direct observation, problems posed by taro beetles are not so serious in terms of total output of each taro plot.

Apart from the taro beetle, the major challenges to taro farming in the three communities are certain taro diseases that are prevalent in the areas which seem to discourage taro farming.

The three main taro disease affecting taro farmers in the communities are:

- alomae
- bobone
- 'taro leaf blight' locally known as 'radua'.

Alomae and bobone have almost similar effects on taro plants. Even though the causes of these diseases are not yet clearly identified by farmers, it is quite obvious that they are viral related diseases. When alomae attack the taro plant, the plant's youngest leaves start having yellowish leaf and curled. It caused the plant to stop growing.

For bobone in particular, the farmers have identified that it tend to attack mostly the female taro plants. They stated that it reduces the yield of the plant although it can recover . The male varieties are the most valued in the market and these are effected by alomae. Alomae will kill the taro plant. There are resistant varieties but these are not given a high market value due to differences in taste and smell.

Taro leaf blight as the name imply, attack only the leaf of taro plants. What the disease does mostly is disfiguring of most if not all the leaves of any single taro plants. The disease cause the taro tubers to get watery and tasteless (we'e in local language) and not fit for consumption after being cooked. The disease's effect on taro tuber is more severe when the disease attacks the taro plants while they are still young compared to when the plants are attacked when already or nearing the maturity stage.

In terms of dealing with the diseases, particularly with those that affect taro, the farmers in these communities have some of their own traditional measures.

The first measure or option was for the farmer to abandon the garden taking into account the viral nature of the disease making it quite uncontrollable at the rural level.

This is especially true for alomae disease and to some extent bobone if careful uprooting and destroying of infected plants, as another remedial measure at the early stage of the disease hitting the farm does not seem to help. In such cases no planting materials from the abandoned garden such as sucker or corms are to be used in the new garden. Another control measures that are applicable only to taro leaf blight are spreading of fire ashes as well as bamboo leaves in the garden.

Kastom Gaden in partnership with MAL has been working with taro farmers in Masilana and other highland communities since 2003 to control Alomae through a range of new and improved traditional management practices.

Farmers trained by KGA understood the viral cause of alomae and the planthooper vector that spreads the disease.

Some farmers still find this a difficult concept, and botanical sprays being tested for control are often perceived as a cure rather than a control measure to reduce taro planthoppers.

The table over the page shows the complex overlay of culture and science that surrounds alomae management (Chevalier 2005). By immediately removing infected plants, being careful to capture any plant hoppers on the plant at the time, and destroying it, alomae can be managed. But it requires a community effort as one infected garden will spread to others in the area.

Farmers in Masilana have had some success in reducing this problem. Coastal farmers are largely unable to control alomae and so the production of prized alomae susceptible varieties is a niche for more isolated and more forested highland farmers.

Key Implications for Value Chain

Pest and disease are challenges for farmers. In the case of sweet potato this is not a major problem. For Taro management of alomae and bobone are major risk factors.

2.1.4. Labour – family or hiring

Farmers from Masilana and Busurata whom the team interviewed stated that they do not hire anyone to work in their garden. They use family labour. In contrast, farmers in Takwa hired labour to clean up the garden and after harvest to carry the produce to the local market.

During discussion about family labour, men are considered as doing the heaviest work such as cutting of trees, digging holes while women and young girls carry out the bulk of the day to day work of planting, weeding, harvesting and transporting of produce from farm to the main road, and marketing. The clearing of gardens is most difficult under long fallow such as that found at Masilana.

Household labour would be the major limitation on expansion of land under cultivation for cash crops at any one time. Improved return on labour is one of the more important criteria used by households when deciding wether or not to adopt new technologies or crops or to expand production. In practice return to labour and the opportunity cost of labour is the key variable combined with the potential productivity of the land available to a household. (World Bank 2006) .

We did not attempt to measure return to labour for sweet potato and taro for these crops although this could be a useful activity in future. The common use of hired labour in Takwa shows an increasing understanding of investment in farm operations by farmers and this opportunity could be built on.

Traditional and modern beliefs and practices about taro and alomae

	Natural	*Social*	*Supernatural*
Traditional Causes of alomae	▪ wind ▪ rain ▪ 'soils ▪ alomae season ▪ snails ▪ eating shell food, turtle, mangrove fruit	▪ female pollution of men—especially sex, menstruation ▪ entering another's garden ▪ not following kastom ▪ loss of traditions	▪ spoiling tabu sites ▪ ancestor anger ▪ spirit/'devil'
Prevention	▪ long fallow periods ▪ planting sticks: pato ▪ cutting shells: kwaro ▪ select best varieties ▪ visit garden daily & regular inspection ▪ planting bamboo ▪ pulling out infected tarok bury or burn ▪ plant smelling trees ▪ transfer healthy plants to other garden	▪ mail & female roles ▪ taboos re eating and drinking before and during gardening ▪ separate gardens ▪ special taro gardens ▪ plant one variety per plot	▪ tabu site protection ▪ invocations/.preayers before planting
Modern Causes of alomae	▪ virus & plant hopper ▪ planting year round ▪ gardens too close: easy spread ▪ shorter fallow periods ▪ cutting down bush and trees ▪ WW2 chemicals	▪ less time due to other commitments—school, church, work ▪ commercial crop/loss of respect for taro ▪ children are learning less about farming ▪ lack of sharing of information re disease	
Prevention	▪ roguing ▪ re-emphasise traditional control	▪ community collaboration	▪ prayer

Source: Chervalier 2005

Implications for value chain:

Helping farmers make farm or crop budgets which include hired labour could help them to expand production if new market opportunities are opened up through changes to the value chain.

2.2 Varieties and planting material access

Farmers we met stated that they source planting materials from their old gardens. The practice is to clear the new garden two to three weeks before transfer of potato is done. As for taro, stalks and suckers are kept for the next garden. In some cases farmers buy planting materials (in bundle) from lead farmers in their areas for SBD$20/ bundle for potato.

Similarly they can source taro planting materials by exchanging of shell money (tafuliae) for a plot of taro garden (one tafuliae being worth approximately SBD$700).

For potato it is free if taken from relatives or friends but usually this is only for three to five mounds and so the farmer must multiply planting material themselves. Varieties are commonly exchanged in this way.

Furthermore, farmers stated that increase in use of new sweet potato varieties has increased in recent years due to government and donor commitment to free distribution of planting materials for multiplication and diversification. KGA has been involved in free distribution since 1995. KGA has been sharing a collection of 20 of the best farmers varieties collected from across Solomon islands as well as pathogen free sweet potato from SPC.

Farmer's ability to select high quality planting material from their harvest and to properly treat and store them for later use is an important factor to achieving high yield. For instance, if taro corm is left for longer the yield of harvest will be small. Storage practices of farmers in the Takwa, Masilana and Busurata areas follow the same process; at harvest time sucker and corm which are healthy are commonly selected, cleaned and then stored beside the garden covered with leaves or kept in a dry place – sometimes at home for replanting.

2.2.1. Varieties grown for market / reasons for selection

There are about seventeen varieties of sweet potatoes grown in the three areas under study namely, Busurata, Masilana and Takwa.

Sweet potato can be classified into two categories namely, the traditional and/or introduced varieties. The latter are South Pacific Community (SPC) varieties distributed by Kastom Gaden Association and the Ministry of Agriculture.

KGA has also shared traditional varieties between provinces of Solomons islands in a collection known as 'farmers best'.

Farmers indicate a large number of traditional varieties as being kept which are: Nambo, kaisofia, kai kwaio, Outu, Jerry, outu, Kaidu, Liota'a, tu months, Sofia, Monsaia, Kaidai, and Kaidaisi.

The following SPC varieties are reported as doing well in the three areas: IB197, IB230, IB135 and IB096 although farmers have stated that they could not recall all the varieties received, which could be more.

Table showing SPC sweet potato varieties distributed by KGA to Busurata and Takwa Farmers from 2008 to 2011

Number	Variety
1	IB07-107- Beauregar
2	IB197- Tony
3	IB07-01-Dingale
4	IB07-136 85016-72
5	IB123-VSP.1
6	IB07-135 IITA- TIB11
7	IB07-133.W223
8	IB096-L50
9	IB07-134-W.226
10	IB07-26 MORESI
11	IB07-03 TIB2
12	IB07-91 Habare
13	IB07-137 USP3
14	IB07-132 W.222
15	IB08-132 Fungalia
16	IB07-32 Neveto
17	IB08-141 Varatara1
18	IB08-142 Napeuale271
19	IB08-143 Anny (SI305)

Taro on the other hand was said to be spoiled by diseases thus only the common varieties grown are tatarasina, bina lofu, tabi, diana, and biraiubu. On Takwa, however, it was evident that not many farmers grow taro as coastal areas are easily prone to pest and diseases. Taro is a niche crop for highland farmers.

Taro farmers in the highlands have prized varieties that are in high demand in rural and urban markets for traditional feasts. These varieties have been maintained for generations and are often carefully protected and only shared with certain groups of people. (Jansen 2002)

Essentially, farmers appear to choose the planted variety based on consideration mainly made on:

1. high yielding potential,
2. if it is able to produce a second harvest
3. taste

2.2.2. New varieties from KGA and farmer responses

Aside from the root and tubers properties farmers stated that yielding of many of the new sweet potato varieties is relatively low compared to traditional varieties.

The common ones used are IB197, IB230, IB135 and IB096 (these numbers are SPC accession codes for the varieties sourced from SPC). The reasons for the relatively poor performance are unclear and must be considered when developing strategy for food security or future development of the potato sector.

For example, poor farmers training on handling of the new varieties could play a role for low performance. These include factors such as storing cuttings and materials used for weeding. In general at present farmers prefer their best local varieties.

KGA has also been distributing varieties of sweet potato with orange flesh. These varieties are high in vitamin A. Recent reports show that these varieties are also popular for fish and chips producers – this is discussed more in the market section.

Key implications for value chain:

Farmers are not selecting varieties for a particular market, but rather based on production and their own taste preferences. As such many farmers are not growing for the market, but rather growing and then looking for a market to sell.

2.2.3. Time to harvest

During the interview it was stated that harvest time of each root crops varied. Taro for instance is harvested twice in a year as compared to sweet potato which is harvested three to four times annually. Furthermore farmers stated that taro is a seasonal crop, but it seems there is lack of farm planning.

Taro is mature at seven to eight months. This could be one of the factors for the value of the crop. However, it was obvious that some farmers harvested their taro crop earlier before the maturity stage. This practice could have been another factor causing losses that were reported by the customer focus group that we have interviewed.

3.0. Transport to market

3.1. Harvesting and carry to village from garden

Farmers from the three areas under study mentioned that taro is harvested twice in a year. The practice is to cut the stalk from the tuber for planting material.

Such practice may lead to taro going bad after four to five days. The taro is harvested using a Oyster shell or locally called 'umari' in lau language in Malaita Province.

After harvest the tubers are cleaned by carefully removing dirt and avoid washing of the tubers. Next is the bagging stage in which taro tubers are staked carefully inside empty twenty kg sacks and carried to the village.

In packing the bags, it is common to put the big tubers at the bottom of the bags and smaller tubers at the top. The following morning the bags are transported to the main road by young girls and women. These women are often women's club and are hired for SBD50 per day. This is cheap compared to SBD20/head which can often result in higher cost for farmers as carriers will make several trips if harvest is big.

At the main road taro is repacked into bigger sacks of 50kg sacks to reduce freights on the truck and ships (these larger bags are too heavy to carry on the bush tracks).

Sweet potato is also carried in a similar manner but for coastal farmers in Takwa gardens are not far from homes or the road.

3.1.1 Carrying from remote areas to roads

Access from the farm to the main road is a major constraint. The distance that must be travelled on foot carrying heavy sacks ranges from four hours to six hours.

This is specifically true for farmers at Masilana. There is no road thus farmers use bush track to carry their root crop to meet the truck at the main road. For this reason most farmers use family labour which is cheap but for big farmers carrying six to ten bags of 50kg sacks is an expensive exercise as each carrier will cost SBD$20 per 20kg sack thus farmers prefer to hire local church groups or other social group.

This leg of transport is usually done by women and young girls, who put the sacks on their shoulder and carry to the main road.

At the main road the taro is repackage into a 50kg sack to reduce the number of bags transported. This is done at the roadside and left for 6 to 8 hours for transportation to Auki. This transport chain presents the following problems to the Masilana farmers and Busurata farmers:

- Employ carriers to carry sacks to the main road. The cost of each carrier is $20/sack, and if the farmer has big crop the cost is even more as the carriers will have to make several trips. In some cases farmers hire youth or church groups to carry their produce which costs $50/day.
- Decrease in quality and damage to tubers due to picking up and putting down the produce several times over the course of the trip to main road.

Damage to crops from long periods of hand carrying appears to be significant. Distance from road also limits the options for what crops can be grown and sold in market (they must be able to withstand this repeated banging and picking up and down during 4 or more hours on rough bush tracks

Key implications for value chain

Reducing post harvest losses through better methods of packing produce for carrying to road

Training of farmers in better post harvest handling

3.1.2 Trucks

There are about eight truck operators identified on the North Malaita Road. They operated five times in a week making only one round trip each day. 100% of the trucks are open truck and mostly three to four tone trucks. They carry a mix of passengers and agricultural produce of many kinds.

Public truck loaded with various agricultural commodities with passengers at Auki Wharf.

These include: small livestock produce, cash crop products, root crops and vegetables. Truck fare is about SBD40 one way from Folotana to Auki but depends on the transport owner. Fifty percent of the truck operators were interviewed. They have a transport association who set the costs, but some times the truck crews charge fares based on distance, road condition and type of produce being transported.

The truck fare is between SBD40 one way (Folotana) to SBD120 one way (Takwa) for travel to Auki. The cost of freights however does not change for the distances but is charged a fix cost for each types of agricultural product and types or size of sacks being transported.

Table: Agricultural produces transported and the various costing.

Description	Type	Cost (SBD)
Copra & Cocoa	-	$40.00
Potato & Taro	10 kg sack-20kg sacks	$5.00-$10.00
	40kg sacks – 50kg sacks	$15.00-$20.00
Vegetables	Chinese basket	$5.00-$10.00

Farmers have reported previously that truck operators sometimes charge a premium price to transport taro compared to sweet potato. This is due to a perception of the higher value of taro. It is an unfair practice as it does not relate to the weight or volume which is usually the same between the two crops.

The transporter will try to pack as much produce as possible on the truck and this packing is usually done in a hurry which can cause damage to tubers. Farmers are responsible for the care of their produce while on the truck but could do little with this system of packing

and the large numbers of passengers who will board the truck during the journey to Auki. Passengers sitting on the produce also caused damage. All the farmers' interview stated that the only damage they notice is brushes on the tubers and some broken or cut tubers. They stated that from their observation there was not a lot of damage. However, about fifteen of twenty-five customers' interview at Honiara said that five tubers out of ten tubers they buy are damaged by the time produce reaches Honiara.

3.3.2. Ships

There are several ships identified as servicing the Honiara-Auki route on a regular basis namely: L.C. Dragon, Lady Wakehurst, Discovery 360, Pelican Express, Salia, Liofagu and Koryou Maru. Ship fare varies from $100 to $220 for one way. The cost of freight also varies from SBD15 to SBD20.

Farmers prefer L.C. Dragon because the fare costed $100 and the freights too is the cheapest. although it took ten hours traveling through various ports of call around Gella Island on the Central Islands Province to reach Honiara..

As for packing, it seemed that root crops are paid less attention as compared to other agricultural products like copra, timber, and animals. Everything is loaded without any shade. So produce is exposed to the sunlight. And farmers are responsible for their cargo on the vessel.

According to L.C. Dragon, the bags transported each trip can vary. If the number of farmer is large, the number of bags traded is from 30 to 50. It means that from 2000kg to 4000kg of root crops are traded each trip

3.3.3. Packaging and post harvest losses

When it comes to post harvest losses of root crop, farmers are not sensitive about it. Lots of farmers say that there are no post harvest damages.

However, there are certain losses. Even if the scratch is very tiny, that can cause serious losses. Lots of farmers are not aware of this fact, so in order to avoid or reduce post harvest losses, the awareness for farmers about post harvest losses is needed.

Furthermore, during an interview with customer focus group at Honiara Central Market it was evident that post harvest loses occurred but without the being identified by farmers.

Of the twenty customers interviewed it was revealed that about three to five tubers of ten tubers they bought at the market were not suitable for consumption. This loss can be linked to the harvesting practice that was observed at farm.

Farmers from they three areas cut the corm off the taro flesh and over a period of time (after five days) it cause the tuber to go bad.

Furthermore the packaging material used by farmers to transport their produce are empty sacks of mill run or flour mostly bought on the streets from relatives of officers from the Bakery Companies in Honiara. These bags are thin and when handling is done in hurry can cause damage to agricultural products.

Another contributing factor to the damage is the stacking of produce on other produce on top of each other without protection when loading and passengers sitting on these bags caused bruises to the products in the bags.

Key implications for value chain

Post harvest damage of up to 50% is reported by consumers in Honiara market. Transport by bush track, road and ship all contribute to this damage as tubers have little protection and are moved many times.

There is a need for better handling of produce during transport and for more consistent and fair pricing by trucks and shipping companies. This could be facilitated through use of standard size and stackable crates.

Post harvest loss: these pictures show damage to Taro tubers due to bad handling (dropping and pressure from loading onto the truck). The areas inside th circle are damaged and not fit for consumption.

4.0. Market outlets

4.1 Local markets

In each local market, price of sweet potato varies from SBD4.75 to SBD5.50 and that of taro is from SBD8.75 to SBD12.50. Compared with the other markets like Auki market and Honiara Market, local markets seem to be small. However, in local market farmers use less money than in urban market. That is why the gross margin profit of some local market is much higher than that of urban market especially the case of sweet potato.

As for Taro, price per kg at Auki is higher than that of local market. As a result, if farmer sell same amount in Auki and local market, the profit will be higher in Auki market.

In the local markets there are also seasonal market opportunities such as on social events like, weddings, deaths and other ceremonies. For instance, in Busurata the Malaita Provincial Government comes once in a year to purchase taro worth about $5000.00.

Additionally, Langalanga customers can order 6-10 40kg sacks of taro which costed $500 each. This adhoc arrangement is also experience in Masilana and Takwa. In Masilana and Takwa the orders are from Manaoba, hatodea and the surrounding areas.

Apart from cash purchase farmers also sell taro for traditional money (Tafuliae). The modern conversion for this form of money is $800.00 SBD.

Farmers in Takwa and Masilana are aware of a trader along the road North Road however, thought that the market is small and the trader's price is low thus the Masilana farmers prefer to sell in Honiara Central Market where as the Takwa farmers take orders from the ad-hoc opportunities available.

4.2 Auki Market

In Auki market, sweet potato is sold at SBD6.25 per kg. Taro is SBD33.33 per kg. It seems that the price of taro is too high in Auki and these figures may not be normal. Even if there are lots of farmers in market, they cannot lower the price because other farmers (at the same time they are competitors) are not happy about it.

On the teams visit to Auki Market on a particular Saturday morning we noticed five taro farmers. We asked a farmer why the price of Taro is high he said that if he tried to lower his price the other farmers would be

Takwa Markets, held twice a week.

unhappy. As they said 'no spoilem maket'. So it is difficult for farmers to cut down on their price. In addition, farmers who sell at Auki market must pay SBD5 for 1day for market fee. It is a big difference between local market and town or urban area market. When farmers go to urban market, they have to take such fees into account.

4.3 Honiara market

People sell sweet potato from SBD6.20 to SBD8.30 per kg in Honiara Central Market. For taro the price is SBD23 for 1 kg. Seemingly, farmers can earn big money in Honiara Central Market but at the same time there are lots of expenses.

It costs SBD30 to travel from wharf to Honiara Central Market with three bags in a taxi which is the usual means of transport. Market fee is SBD10 per day. If farmers like to keep produce in storage room, they have to pay SBD12 per day as a storage fee. But Honiara market is a large market where a big volume of produce is traded each day.

Traders ('black market')

In the Busurata, Masilana and Takwa root and tubers value chain there exist a trader for taro and about 100 sweet potato traders at the Honiara central Market. These traders are known locally as 'black market' in pidgin.

For taro, the trader is Mommy Kwaita who purchased weekly fresh tubers at Auki. She bought three bags of taro at $500 per bag (50kg sack) and sell as cooked at her restaurants in Honiara. In the case of Honiara Central Market traders they buy sweet potatoes from Guadalcanal farmers in bulk and resell in heaps.

According to the traders, each woman purchased between 66.8kg to 200.4kg each day at $250. They resell in heaps (5-6 tubers) at $10/heap in other words approximately $10/kg. These traders are individual house wives and worked in the business six times in a week which means that at least 120 tonnes of sweet potato is traded through this channel each week.

Both the Honiara Central Market traders and Mommy provide payments on delivery which is a great benefit for farmers. Neither has a contractual agreement to purchase sweet potato or taro.

4.4. Private large scale buyers

In addition to market in each place, there are some other market opportunities. For example, they are institutions such as boarding schools, hospital and the correctional service. While we did not interview the correctional service interviews were conducted with two secondary schools namely King George Sixth School, Aligegeo Secondary School, SICHE, and the National Referral Hospital to determine their purchasing habits.

For boarding schools we found that there are 17 boarding schools in the country and each school has between 300 to 400 students. Each school served 3 meals a day and government has allocated $1250.00 per student. This is huge money.

King George Sixth Secondary School (KGVI) which is one of the boarding school located in Honiara. It has canteen for students. They use sweet potato and cassava for meal and the amount of consumption for fortnight is from 225kg to 270 kg.

Not only is KG VI but also there are nine other national boarding schools and fourteen provincial secondary schools located in eight provinces of the country. The amount of money allocated for each student is quite high, but at present schools use lots of rice as a staple food.

If they start to reduce the amount of rice used for meal, perhaps seventeen bags of sweet potato will be used a week per school. Further negotiation with those schools is necessary to get the big and stable market.

Other school like SICHE is also a big market. Every year SICHE invites public for tender and decides with whom they make one-year contract. So the time of public invitation, it is worthy for farmers to apply for it.

National Referral Hospital has potential too. The amount of potato consumed ranges from 250kg to 300kg per day. The purchase of this staple crop is done three times in a week. The amount of taro traded in this market is the same as sweet potato.

4.5 Fish and Chips Shops & Vendors

During the sweet potato/taro study, it was also discovered that there is a high demand for sweet potato for the fish and chips market in Honiara.

The fish and chips market includes both the restaurants and street vendors. Women are the ones selling fish and chips in various locations around Honiara and at the Honiara Central market itself.

In terms of quantity and monetary value, this market niche' alone accounts for more than 18 tonnes of sweet potatoes per week with an estimated value of $103 950.00(SBD).

Simply, this is equivalent to roughly 450 bags of sweet potato of around 41kg per bag per week packed in empty 50kg white sacks bought mainly from the streets of Honiara.

According to the farmers, the prices of each bag/sack can vary from SBD250.00 to SBD400.00 depending on supply which at times affected by the weather patterns.

As a case in point, during rainy seasons especially from February to April each year, the price of sweet potato can rise significantly due to low supply from farmers from the Guadalcanal Plains to the east of Honiara.

By local standard, the market is quite substantial and there is high potential for potato farmers in this market given the fact that the quoted quantities only capture a number of restaurants among many as well as just 30 fish and chips vendors at the central market.

Farmers need to realize this in order to capitalize on this market niche' as well apart from their usual supply for normal house-hold consumption for Honiara public.

For the fish and chips shops/restaurants, a total of fifteen fish and chips outlet that were part of the study revealed buying an average of 270 bags of sweet potato on a weekly basis. These restaurants have different preference for three varieties. The most preferred varieties Nambo; Bakua; and beaurogar. These varieties are easy to peel, less starchy, have good texture and taste.

The restaurants get their stocks mostly at the Honiara Central Market. Occasionally, farmers would stop by these shops/restaurants to enquire about directly selling their sweet potato. None of these shops however have any supply contract with farmers as often farmers are late with their delivery and therefore considered unreliable. Nonetheless, there is still possibility for direct supply to the shops/restaurants to materialize but if only farmers can get themselves organize and honour any supply contract that they might enter into with the shops/restaurant. Or even better still, this is where Honiara-based traders can come in to ensure reliable delivery to the shops/restaurants.

As far as local fish and chips vendors are concern, about 180 bags of sweet potato are required on a weekly basis. About 30 women were identified as local fish & Chips vendors at the central market. They purchased on average 1 to 2 bags of sweet potato from Honiara Central Market directly from farmers each day. On weekly basis, a vendor could buy between 252kg to 504kg of sweet potato. They display their fish and chips in containers. The price per fish & chips packet (brown paper bag) is $10.00 compared to $20.00 - $25.00 in the restaurant.

One interesting finding from these vendors was that apart from selling directly to consumers, they also sell in bulk to fish and chips traders who are known as Black Marketers. These vendors or so-called black marketers who are quite mobile then resell their fish and chips in various high traffic locations in terms of sales around town.

Another interesting discovery was that most of the vendors at the central market are full-time traders who are working for other women who specialize in fish and chips making at their homes. In a small way, they are creating employment for these vendors, and they are paid $200.00 per week as commission. Those that sell through traders on busy market days can buy up to 2 bags of sweet potato each day.

Interestingly, none of these Honiara Central Market Fish and Chips vendor has a contractual agreement with farmers. They buy directly from farmers at the Honiara Central Market although often trade is through friends or relatives to negotiate reasonable price. This is the minimum price of SBD250.00. or as low as SBD180.00.

On various occasion, fish and chips vendors buy from farmers who wanted to return home and have to sell their sweet potato mostly at SBD250.00 which the common minimum price at Honiara Central Market.

As we did not include all vendors along the roadside or vendors selling in-front of shops the volume traded could be more for the fish and chips market. This is a big market opportunity which Non-Government Organizations and Government agencies involved in livelihoods development need to take initiative to make linkage between fish and Chips Market and farmers.

Fish and chips market in Honiara

Buyer	*Number*	*Potato/week (bags/50kg sacks)*	*Total Traded/ week (kg)*	*Price ($)SBD*	*Weekly Market Value ($)SBD*
Stores	15	270	11,340	5.50	62, 370.00
Honiara Central Market Fish & Chips Vendors	30	180	7,560	5.50	41,580.00
Total		450	18,900		103, 950.00

5. Analysis of marketing options

5.1 Gross margin analysis for different markets…

The gross margin profit of each market is listed below. Four scenarios were used:

- Selling ten 20kg bag
- Selling twenty 20kg bag
- Selling five 50kg bag
- Selling ten 50kg.

Judging from the gross margin table based on calculation of only one 20kg bag, farmers of remote village cannot get profit in Honiara. Rather they make loss. To make profit, they have to bring lots of bags to cover huge expense of transportation. Here is the rough calculation on the profit of 10 bags and 20 bags of 20kg bag.

Calculation on the profit of 5bags and 10bags of 50kg bag was also done. With large number, 3 villages shown on the table can make profit. Probably the actual cost will be higher than the estimated amount, but at least they can make profit by bulk sales.

Breakdown of expense used in the table of gross margin profit calculation is written below. Those are rough calculation, so it can change depending on the change in transportation fare, freight, and other factors which are changeable. One thing which is recommendable to farmers is to hire a truck if the amount is huge.

Table: Gross margin profit calculation

Description	Honiara Market			
Sweet Potato				
Market	*Price/10bags (20kg)*	*Price/20bags (20kg)*	*Price/5bags (50kg)*	*Price/10bag (50kg)*
Busurata Farmer				
Selling price	7.25/kg	7.25/kg	250/bag	$250/bag
Expense	704	948	604	748
Income	1210.75	2421.5	1250	2500
Gross margin	506.75	1473.5	646	1752
Takwa Farmer				
Selling price	7.25/kg	7.25 /kg	250/bag	250/bag
Expense	954	1298	854	1098
Income	1210.75	2421.5	1250	2500
Gross Margin	256.75	1123.5	396	1402
Masilana Farmers				
Selling price	7.25/kg	7.25/kg	250/bag	250/bag
Expense	874	1218	774	1018
Income (10bags)	1210.75	2421.5	1250	2500
Gross margin (10bags)	336.75	1203.5	476	1482

Breakdown of expense

Example1: 20kg-10bag (sale in 3days, at Honiara market)

Busurata $704

Garden	Road	AukI	Honiara
Pay for carrier $50	Truck fare $50	Ship fare $200	Truck hire $150

Freight $200(20kg×10)
Market fee $30(for 3days)
Storage fee $24 ($12×2days)

Takwa $954

Garden	Road	Auki	Honiara
Pay for carrier $50	Truck fare $200	Ship fare $200	Truck hire $150

Freight $100($10×10bags
Freight $200($20×10)
Market fee $30 ($10×3days)
Storage fee $24($12×2days)

Masilana $874

Garden	Road	Auki	Honiara
Pay for carrier $50	Truck fare $120	Ship fare $200	Truck hire $150

Freight $100($10×10)
Freight $200 ($20×10)
Market fee $30 ($10×3days)
Storage fee $24($12×2days)

Example2: 20kg-20bag (sale in 5days, at Honiara market)

Busurata $948

Garden	-Road	Auki-	Honiara
Pay for carrier $50	Truck fare $50	Ship fare $200	ruck hire $150

Freight $400(20kg×20)
Market fee $50(for 5days)
Storage fee $48 ($12×4days)

Takwa $1298

Garden	Road	Auki	Honiara
Pay for carrier $50	Truck fare $200	Ship fare $200	Truck hire $150

Freight $200($10×20bags)
Freight $400($20×20)
Market fee $50 ($10×5days)
Storage fee $48($12×4days)

Masilana $1218

Garden	Road	Auki	Honiara
Pay for carrier $50	Truck fare $120	Ship fare $200	Truck hire $150

Freight $200($10×20
Freight $400 ($20×20)
Market fee $50 ($10×5days)
Storage fee $48($12×4days)

Example3: 50kg-5bags (sale in 3days, at Honiara market)

Busurata $604

Garden	Road	Auki	Honiara
Pay for carrier $50	Truck fare $50	Ship fare $200	Truck hire $150
Freight $100($20×5)			
Market fee $30 (for 3days)			
Storage fee $24 ($12×2days)			

Takwa $854

Garden	Road	Auki	Honiara
Pay for carrier $50	Truck fare $200	Ship fare $200	Truck hire $150
Freight $100($20×5)			
Freight $100 ($20×5)			
Market fee $30 ($10×3days)			
Storage fee $24($12×2days)			

Masilana $774

Garden	Road	Auki	Honiara
Pay for carrier $50	Truck fare $120	Ship fare $200	Truck hire $150
Freight $100($20×5)			
Freight $100 ($20×5)			
Market fee $30 ($10×3days)			
Storage fee $24($12×2days)			

Example4: 50kg-10bags (sale in 5days, at Honiara market)

Busurata $748

Garden	Road	Auki	Honiara
Pay for carrier $50	Truck fare $50	hip fare $200	Truck hire $150
Freight $200($20×10)			
Market fee $50(for 5days)			
Storage fee $48 ($12×4days)			

Takwa $1098

Garden	Road	Auki	Honiara
Pay for carrier $50	Truck fare $200	Ship fare $200	Truck hire $150
Freight $200($20×10)			
Freight $200 ($20×10)			
Market fee $50 ($10×5days)			
Storage fee $48($12×4days)			

Masilana $1018

Garden	Road	Auki	Honiara
Pay for carrier $50	Truck fare $120	Ship fare $200	Truck hire $150
Freight $200($20×10)			
Freight $200 ($20×10)			
Market fee $50 ($10×5days)			
Storage fee $48 ($12×4days)			

This calculation used the current price per kg of each market and every expense expected to travel to that market with one bag of produce.

Comparison of prices and gross margin of sweet potato and taro in the different markets based on the assumption of selling one bag and travel to those markets bya single farmer

Sweet Potato

No.	Description	Local Market	Auki Market	Honiara Market
		Price/ kg	*Price/kg*	*Price/kg*
	Busurata Farmer			
	Selling price	5.00	6.25	7.25
	expense	0.00	55.00	310
	Income	83.50	104.40	121
	Gross margin	83.50	49.55	(188)
	Takwa Farmer			
	Selling price	5.50	6.25	7.25
	Expense	0.00	220.00	475
	Income	91.85	104.40	121
	Gross Margin	91.85	(115.60)	(354)
	Masilana Farmers			
	Selling price	4.75	6.25	7.25
	Expense	0.00	135.00	390
	Income	79.30	104.4	121
	Gross margin	79.30	(30.60)	(269)

Travelling with only one bag of sweet potato to Honiara is not a viable option for any of the locations. Only Busurata is able to take one bag to Auki Market and still make a profit of $49. Local markets are the only profitable option for one bag. Takwa market is the most profitable of the three locations.

Taro

No.	Description	Local Market	Auki Market	Honiara Market
		Price/ kg	Price/kg	Price/kg
	Busurata Farmer			
	Selling price	12.50	33.33	20.50
	expense	0	55.00	310.00
	income	305	813.30	500.20
	Gross Margin	305	758.30	190.20
	Masilana			
	Selling price	9.15	33.33	20.50
	Expense	0	135.00	390
	Income	223.30	813.30	500.20
	Gross margin	223.30	678.30	110.20
	Takwa			
	Selling price	8.75	33.33	20.50
	Expense	0.00	220.00	475.00
	Income	213.50	813.30	500.20
	Gross margin	213.50	593.30	25.00

Conclusion of table:

Taro is a much more valuable crop than sweet potato. All local markets very provide good returns to one bag of taro – in general about three times the return of a bag of sweet potato.

Auki market has an extremely high value for taro. But the quantity traded appears to be relatively small and so farmers face risk that they may not be able to sell all their taro.

Honiara market is viable for farmers from Busurata and Masilana making a profit of $190 and $110 respectively. From Takwa the margin would be only $25 but this is not relevant as Takwa farmers are not producing very little taro as a market crop due to the constraints discussed.

5.2 Volume of produce traded in different markets

The total volume of sweet potato and taro traded in each market varies. It seems very small amount of taro has been traded at each local market.

In Takwa only 70 kilos is traded each week, and for the markets closest to Masilana only 130 kilos is sold. This perhaps is due to pest and disease as stated by farmers is one of the factors most farmers do not grow the crop. In addition farmers stated that it take longer to harvest thus people prefer to grow sweet potato.

It was also observed that few opportunities are available for taro however the quantity consumed is also small.

There is a need for more market observations to get a clearer idea of volume. These figures should be treated as preliminary only.

Potato on the other hand is produced widely, and the biggest opportunity is at the Honiara fish and Chip market. The volume traded at this market is about 13000 kilos. This market needs to be tabbed and well investigated to make linkages for interested farmers.

From feed back received the total volume of sweet potato traded in all the markets is 15419 kg per week and for taro the total volume traded is 1589kg per week.

Table showing volume of produce traded in local market

Market	*Sweet Potato ($)*	*Volume traded weekly /kg*	*Taro ($)*	*Volume Traded weekly*
Takwa	5.50	600	8.75	70
Busurata	5.00	-	12.50	
Folotana (Masilana)	4.75	167	9.15	130
Fadila (Masilana)	4.75	167	9.15	130

We were not able to make estimates for the volume of sweet potato or taro trade in Auki and Honiara markets. For Honiara it is substantial.

For example there are an estimated 100 traders who buy and sell sweet potato. If each trader buys 100 kg per day (at $5.50kg) this equates to 10,000kg per day. They sell at $7.50 per kg. This figure does not include sales by farmers who do not use traders.

KGVI and National referral hospital

Market	*Sweet Potato ($)*	*Volume traded weekly /kg*	*Taro ($)*	*Volume Traded weekly*
KG VI School	5.50	360	-	-
National Referral Hospital	4.00	825	6.00	275

6.0. Priority areas for action

Key constraints have been identified:

1. In reaching the scale required to sell sweet potato profitably in the Honiara market.
2. A high level of post harvest damage is experienced by consumers of both taro and sweet potato
3. A very large market is the fish and chips vendors and take aways in Honiara who at present purchase in the main market but could be served by a trader sourcing bulk sweet potato from Malaita
4. Taro is a high value crop and highland farmers have defined their market well – high quality and high valued varieties of taro for meeting traditional demand. There appears to be little opportunity to increase the return per KG although farmers who wanted to increase the scale of production could seek out larger markets but would expect a lower unit price – something they are probably not prepared to accept.

Value Chain steps	KGA action	Priority
Production	Improve distribution of IPPSI produced leaflets on pest and disease management	
	Share farmer experiences in fixed site gardening	
	Assist farmers in Takwa to create a farm budget modeling the cost of labour for sweet potato production	
Post harvest handling	General training of farmers in post harvest handling to reduce damage and raise awareness on consumer concerns	
Transport to road (carrying)	Test different methods of packing and measure damage to taro tubers?	
	Investigate wether any resources would be available for track upgrading to make the journey easier and therefore reduce labour costs?	
	Assist farmer groups and transport operators (and their association) to advocate for better road maintenance by government	
Transport on road and ship	Trials use of stackable crates measuring improvements in post harvest loss and any other benefits	
	Investigate options to make these crates available at an affordable price	
Produce Markets	The best performing 'farmers best' SP and SPC varieties should be presented to fish and chips producers for evaluation and ranking. This can help sweet potato farmers to choose varieties to target this market.	
	More detailed study of volumes and prices in the larger local markets – eg Takwa and Folotana.	
Other market opportunities and traders	The 100 traders in sweet potato as well as other traders in Betel nut who travel regularly between Auki and Honiara markets could be encouraged to develop a trade in larger volumes of sweet potato – either for direct sale as bulk bags in Honiara market in competition with Guadalanal suppliers or through direct marketing to bulk buyers – particularly the fish and chips market.	
	Business models should be researched with a selected group of traders and if it appears viable connect the trader/s with a group of suppliers in any or all of the three producer areas.	

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