

April 2011

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منظمة الأغذية  
والزراعة  
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联合国  
粮食及  
农业组织

Food  
and  
Agriculture  
Organization  
of  
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United  
Nations

Organisation  
des  
Nations  
Unies  
pour  
l'alimentation  
et  
l'agriculture

Продовольственная и  
сельскохозяйственная  
организация  
Объединенных  
Наций

Organización  
de las  
Naciones  
Unidas  
para la  
Agricultura  
y la  
Alimentación

## COMMITTEE ON COMMODITY PROBLEMS

### INTERGOVERNMENTAL GROUP ON BANANAS AND TROPICAL FRUITS

#### FIFTH SESSION

**Yaoundé, Cameroon, 3 – 5 May 2011**

OPTIONS FOR SUPPORTING THE FORMATION OF SMALLHOLDER  
ORGANIZATIONS, QUALITY IMPROVEMENT, VALUE ADDITION  
AND CREDIT AVAILABILITY TO ENHANCE INCOME OF  
SMALLHOLDERS IN THE VALUE CHAIN

## *Introduction*

The review of several value chain development case studies reveals how the impossibility to access financial services - savings, credit, payments, and insurance - is one of the major obstacles to smallholder inclusion in value chains. The difficulties in accessing financial markets reduce opportunities of upscaling production and most importantly exacerbate households vulnerability to income fluctuations. Persisting vulnerability may in turn affect smallholders decision to supply to the market and lead to the further depletion of household assets in order to face adverse events and shocks such as weather risks and price fluctuations.

In most developing countries, the financial sector failure is caused by three major components: the weakness or lack of an enabling environment—a weak regulatory and enforcing environment, poor physical and financial infrastructure, and policies that repress financial market development. Second, transaction costs of providing financial services in rural areas are particularly high due to the low levels of economic activity, poor infrastructure. Third, financial institutions rely on a weak institutional capacity for providing financial services in rural areas. An additional constraint is represented by the limited knowledge of the functioning of specific value chains by financial institutions.

The set of interventions FAO is undertaking under the EU funded All ACP Agricultural Commodities Programme (AAACP) in the area of value chain diagnosis and the design of strategies to facilitate smallholders access to the financial market are brought to the attention of policy makers as an example of an approach aimed at ensuring value chain integration and credit availability to smallholder producers.

The AAACP Programme has set up specific modalities under which value chain development priorities and areas of interventions had to be defined. These consisted in the development of value chain strategies for selected ACP countries following a stakeholder participatory approach. Three consultation workshops, led by the International Trade Center - one of the partners in the AAACP programme together with FAO, World Bank, UNCTAD and CFC- were held to define a sector strategy for the fruit and vegetable sector in Samoa.

## **A supply chain finance and risk management scheme for addressing financial needs and constraints to smallholders' participation in Samoan Fruit and Vegetable Value Chain**

The present contribution describes the development of activities undertaken by FAO under the AAACP programme in the area of value chain diagnosis, customized financial and risk management strategies to enhance smallholder inclusion in the fruit and vegetable value chain in Samoa.

### ***1. An Analysis of Selected Fruit and Vegetable Value Chains in Samoa***

Overall, Samoan fruit and vegetables market dynamics are characterized as follows:

A fragmented supply composed of farms between 1.5 and 6 acres in average that do not coordinate nor belong to associations. The majority of producers operate in a household economy system and have different income sources mainly from agriculture (animal and different crops) but also from remittances sent by family members living abroad.

Demand is also fragmented and mainly composed of few agro-processing firms, exporters, supermarkets and hotels/restaurants. The common factor is that the buyers tend to rely on imports to secure consistency and quality. Some supermarkets are importing up to 1 ton of fresh vegetables per week, mainly from New Zealand.

The participatory sector stakeholder led value chain analysis<sup>1</sup> identified the following performance constraints which vary according to the value chain segment: insufficient volumes of produce to meet demand; lack of market information, inability to commercialize in central market due to high cost of transport, impossibility to use customary lands as collateral and the related difficulty in accessing finance were the main issues for the smallholders. On the side of the buyers the lack of coherent and comprehensive market information, the absence of demand driven supply were some of the main constraints mentioned by the processors, retailers, hotels.

From the stakeholders discussions it also emerged that the Fruit and Vegetable sector is not yet categorized or perceived as a viable sector for the producers and there is a significant lack of investment in it, mainly due to the difficulty to access land and to the fragmented nature of supply.

There is a lot of risk aversion to investing in the industry and financial support for production and processing has not been considered seriously by financial institutions. The producers are small and unarticulated and very little effort has been made to support them or help them to grow. Additionally, technological innovations have been absent and the majority of support programs have been geared towards food security with little link to commercialization needs. In fact, most of the planting material and extension support is of low quality and not market driven or properly planned. Farmer practices and knowledge also result in low yields and inconsistent quality.

Available data are subject to significant limitations: last census was held in 1999; production had to be estimated as the latest official data were collated in 2002; trade data refer to flows registered by customs at each consignment; domestic prices and

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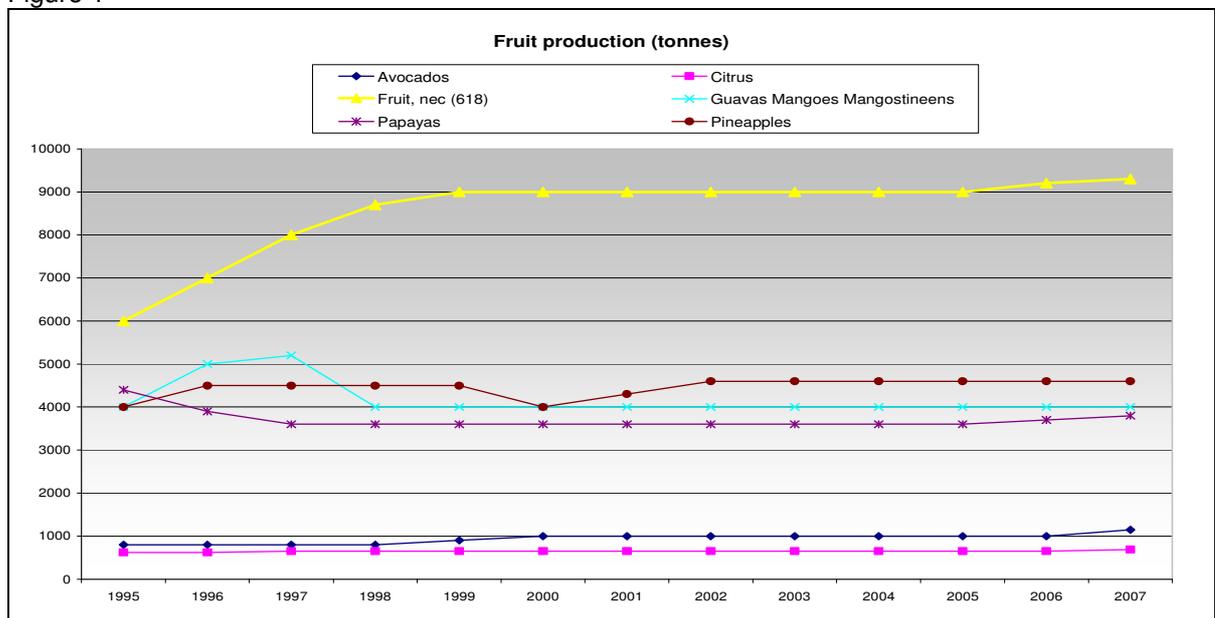
<sup>1</sup> The value chain analysis was facilitated in a workshop held in Apia on November 13&14 2008 with approximately 80 sector stakeholders including representatives of all segments in the chain (35 farmers, 4 processors, 25 government officers, 2 banks, 10 buyers (supermarket, hotels, restaurants))

information on demand and supply at the national level are also limited as the central market, Fugalei, provides information only for selected vegetables sales and only part of the volume of transactions.

Current data do not allow for reliable information on the proportion of production that is marketed as opposed to home consumed. Data from the 1999 Agricultural census suggest that although 75 percent of the population, equivalent to 15,000 producers, belongs to the agricultural sector, only 6.5 percent can be classified as commercial producers. The remaining households produce mainly or entirely for home consumption.

Since 2002, production data from FAOSTAT database have been estimated using technical judgement. However, in most cases, production levels of selected fruits in the period 2002-2007 appear unchanged (Figure 1).

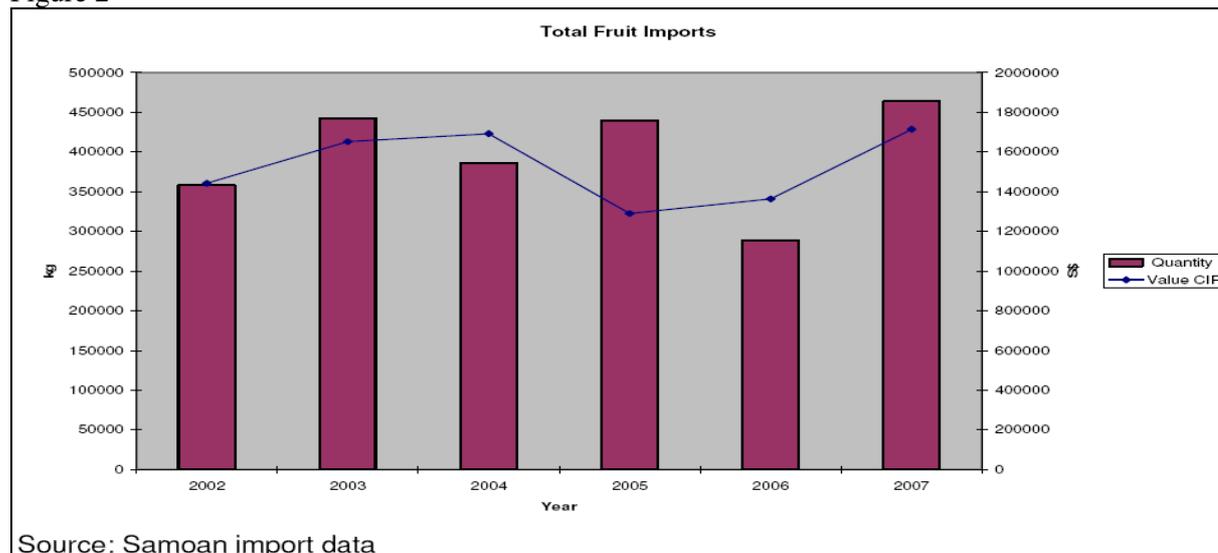
Figure 1



The dependency of Samoa from imported fruits and vegetables resulted in the identification of import substitution by local production as a strategy to develop the fruit and vegetable sector in Samoa.

In aggregate, import quantities and values have trended upwards (Figure 2) and this is also the case for most individual products, such as onions.

Figure 2



Currently, exports are limited to noni and coconut derivatives. In addition to the partial information from the Fugalei market about domestic supply and demand, an appraisal on the market potential represented by the hospitality and tourism segments has been provided by a “hotel survey” undertaken in 2008 by the University of South Pacific (USP). The USP survey indicates that the demand for local agricultural products by both restaurants and hotels is significant. Hotels and restaurants purchase coconuts, bananas and papayas only from the local market, while apples, oranges and avocados are all imported. Quality is the main concern for buyers together with the erratic domestic supply, is the main reason why imported products are purchased on a regular basis. The high price of produce is not the primary concern if quality is assured. The required quality standards for fruit and vegetables are basic: grading, packaging, and post-harvest treatment and are not widely respected by domestic suppliers.

The two tropical fruit evaluated are papaya and breadfruit. Together with other selected vegetables these crops have been chosen for the following reasons: i) papaya and breadfruit are amongst the most consumed fruits in Samoa; ii) Papaya is available all year round making it a particularly consistent fruit type to work with; iii) Breadfruit has widespread cultivation in Samoa with approximately 89,000 producing trees in 2000.

### 1.1 Papaya

Papaya is a fruit that has high potential in both the domestic and export market. The export market potential for the product into markets that can be feasibly served from Samoa is estimated by McGregor, Stice and McGregor (2009) as per the following table.

| Country      | Current Market (Tonnes) | 5 year projection (tonnes) |
|--------------|-------------------------|----------------------------|
| New Zealand  | 270-230                 | 1,100 – 2,300              |
| Australia    | 500-520                 | 1,500-3,000                |
| US           | 100-200                 | 200-300                    |
| Japan        | 50-100                  | 250-300                    |
| <b>Total</b> | <b>920-1120</b>         | <b>3050-5900</b>           |

Source: adapted from McGregor, Stice and McGregor (2009)

The projections were made using import volumes and corresponding growth data for papaya from 2004 to 2008 into New Zealand. It is assumed that current growth trends will continue over the 5 year projection period. The projections suggest a significant opportunity, particularly in New Zealand and Australia. However, in seeking to obtain a share of this potential market, Samoa would be in competition with other countries currently supplying the New Zealand market such as the Philippines (58%), Fiji (37%) and Cook Islands (5%).

### *1.1.1 Gross Margin Analysis for Papaya<sup>2</sup>*

Gross margins calculations refer to a two acre plot of papaya (Annex I), it is assumed that 50% of production will be exported and 50% sold on the domestic market. Given the current saturation of the domestic market for local varieties, the assumption of stability of prices for papaya over time on the domestic market (SAT\$<sup>3</sup>15.00 per basket) has been made. Hawaiian Papaya on the other hand typically varies in price depending on availability moving in a range from S\$1.00 to S\$2.00 per fruit commanding a price premium. S\$ 0.65 is used as the local price in the gross margin on the assumption that increased and consistent supply may result in the stated price minimum similar to the indigenous varieties of this fruit. The export price on the other hand is taken from the current export price of papaya to New Zealand.

Under these assumptions, a gross margin of S\$12,433.25 is generated over a three year rotation on two hectares of land. The costing for packaging is recognised as one of the highest costs for both the domestic market, in terms of required labour to make the traditional baskets and export product, in terms of boxes.

Other costs for papaya production and commercialization are represented by seedlings, land preparation, fencing, fertilizer and transport.

## **1.2 Breadfruit**

Breadfruit plantations as such do not exist due to the widespread dispersion of this crop (estimated 89,000 trees for a population of 180,000) which saturates the domestic market during peak seasons.

New marketing opportunities could arise once the High Temperature Forced Air (HTFA) technology is established for accessing a market of approximately 30,000 Samoans as well as other Pacific Island migrants living in New Zealand. As with papaya, viable exports of breadfruit are constrained by volumes required to take advantage of the cheaper sea freight option.

Labour, transport and packaging costs are the most relevant items. The cost of financing remains a potential constraint to setting up commercially viable operations. At the actual conditions a loan repayment would reduce the potential return of the crop by almost half.

## **2. An assessment of financing needs for fruit and vegetables producers**

Following the value chain analysis a survey to determine the needs and the constraints that affect fruit and vegetable chain stakeholders' access to finance was indicated by the Samoa fruit and vegetable sector stakeholders as a required activity. This exercise was intended as a starting point to identify feasible value chain finance and risk management

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<sup>2</sup> Adapted by Tamasese (2009) on the basis of data from the Ministry of Agriculture

<sup>3</sup> 1 Samoan Tala = 0,41 US\$

schemes to be pilot tested with selected fruit and vegetable sector stakeholders in Samoa, including farmers, buyers and financial institutions.

The assessment was conducted on a sample of 140 farms by the Small Business Enterprise Center (SBEC) a NGO that provides a financial guarantee to the farmers that seek to apply for a commercial bank loan and do not have collateral. The uptake of the services offered by SBEC is very low due to its scarce management capacity and knowledge of the agricultural sector. Having SBEC undertaking the survey was also a way to familiarize the institution with the agricultural sector.

### **2.1 Main Features of Surveyed Farms**

In addition to information on the farm family financial flows, the survey collected information on production and marketing of six major crops: four perennial tree crops (breadfruit, papaya, lime and plantain) and two annual vegetable crops (tomatoes and cabbages). The selection was based on the potential relevance of these products for either export expansion or import substitution, according to the results of the previous studies.

The sample of farms and their location roughly reflects the distribution of holdings on the four main regions in Samoa as it resulted from the last census.

The surveyed farms have an average size of 5.33 acres, 0.81 of which are devoted on average to one or more of the selected fruit and vegetables. Of the 140 interviewed farmers, a total of 39 out of 140 farmers reported two or more of the surveyed crops. Tomatoes and head cabbages are often planted together on the same land, either to save space and also for agronomic reasons. In particular, Lime is present as often with other crops as it is alone, and is mostly associated with Papaya and Plantain; Cabbage is also very often intercropped with Tomato on the same land (Table 1).

Table 1. Reported crop combinations

|            | With:      |      |        |          |        |         |
|------------|------------|------|--------|----------|--------|---------|
|            | Breadfruit | Lime | Papaya | Plantain | Tomato | Cabbage |
| Breadfruit | 13         | 2    | 6      | 2        | 2      | 0       |
| Lime       | 2          | 8    | 8      | 5        | 4      | 1       |
| Papaya     | 6          | 8    | 18     | 5        | 4      | 0       |
| Plantain   | 2          | 5    | 5      | 17       | 3      | 0       |
| Tomato     | 2          | 4    | 4      | 3        | 29     | 13      |
| Cabbage    | 0          | 1    | 0      | 0        | 13     | 13      |

Most of the surveyed farmers (119 out of 140) tenure land under customary agreements. Customary agreements imply that land use is granted to each individual farmer from the *Matai* (village head), who is vested with the authority to decide on the use of land. While it is clear that the individual farmer cannot use the land as a collateral to access credit, it is not clear the extent to which the customary agreement does grant an individual farmer sufficient continuity in land access and constitute an incentive to invest in land improvement.

Furthermore, the continued access to the land is subordinated to the maintaining of an active service to the family and the village, which include provision of a quantity of food deemed sufficient, considering the amount and quality of land tenured, and therefore –

together with other risk management considerations – would likely preclude full specialization of most Samoan farmers in fruit and vegetable production.

Table 2 - Samoa Land Ownership

| Land Type    | Upolu            |             | Savaii           |             |
|--------------|------------------|-------------|------------------|-------------|
|              | (ha)             | (%)         | (ha)             | (%)         |
| Customary    | 77,087.4         | 27.1        | 153,470.3        | 54.0        |
| Government   | 18,908.3         | 6.6         | 11,739.0         | 4.1         |
| Samoa Land   | 9,485.0          | 3.3         | 4,473.0          | 1.6         |
| Freehold     | 5,630.2          | 2.0         | 1,043.2          | 0.4         |
| Town Area    | 2,429.3          | 0.9         |                  |             |
| <b>Total</b> | <b>113,540.2</b> | <b>39.9</b> | <b>170,635.8</b> | <b>60.1</b> |

Source: Samoa Bureau of Statistics, 2006

### 2.3 Household Cash Flow Information

Despite the fact that the interviewed farmers were probably among those more heavily engaged in market transactions, the level of financial literacy is, on average very low, which contributed to the difficulty in answering some of the questions.

Of the 140 interviewed farmers, 52 reported data on earnings from farming, ranging from a minimum of 3,300 dollars to a maximum of 74,000 dollars per farm; 47 reported data on cash expenditures related to farming, ranging from a minimum of 200 dollars to a maximum of 17,000 dollars per farm.

We do not know whether not reporting the data on earning and/or expenditure means that the activity implied no cash transactions, or if the data is missing. Only 19 farmers reported data on both earnings and cash expenditures from farming, and for those farms, the net cash return ranged from a minimum of 3,300 to a maximum of 71,180 dollars. The wide range of values and the limited number of responses make us little confident that these data reflect the actual cash flow of fruit and vegetable production.

Some useful indication can be obtained from the answers on the major household financial needs, as inferred by the analysis of the responses to the questions concerning families' cash expenditure.

Table 3 Households' expenditures

|                                     | Family | School | Church | <i>Fa'alavelave</i> | Other | Total  |
|-------------------------------------|--------|--------|--------|---------------------|-------|--------|
| <b>Total</b>                        | 96794  | 35430  | 22935  | 13603               | 25809 | 194571 |
| <b>% of total</b>                   | 49.7%  | 18.2%  | 11.8%  | 7.0%                | 13.3% | 100.0% |
| <b>Number of time &gt; 0</b>        | 113    | 90     | 110    | 56                  | 93    | 125    |
| <b>Average (among those &gt; 0)</b> | 857    | 394    | 209    | 243                 | 278   | 1557   |
| <b>minimum</b>                      | 4      | 10     | 10     | 20                  | 10    | 50     |
| <b>maximum</b>                      | 6000   | 1500   | 600    | 1000                | 1783  | 6800   |
| <b>Average of individual share</b>  | 43.1%  | 18.4%  | 13.7%  | 13.3%               | 11.5% | 100.0% |

On average, the 125 households reporting expenditures, declared cash outflows of 1,557 dollar, ranging from a minimum of 50 to a maximum of 6,800 dollars.

The categories that absorb the higher shares of expenditure are: family expenditures (49.7% of the total in the sample), school (18.2%), church (11.8%) and *fa'alavelave* (contributions to the community) (7.0%), which together account for about 87% of the reported expenses. Among the other expenses, accounting for the remaining 13.3%, transportation was the most common cited item.

It is interesting to note that community related expenditure such as church contributions (13.3%) and *fa'alavelave* (11.5%), absorb almost one quarter of the household expenditures, on average, in our sample. From the information on households expenditures it can be inferred that only a minor share of earnings from fruit and vegetable sales is actually re-invested in agricultural production.

It is very likely that these figures give only a limited image of the actual income flow in a typical Samoan family, considering that many transactions occur in-kind, through exchanges of live animals and handmade art crafts such as mats which absorb a relevant amount of women labor.

### ***2.5 Awareness of Financial Products***

To the question of whether they were aware of financial products available for their agricultural projects, only 34 out of 142 (or 24%) interviewed farmers answered positively. These were also farmers who had accessed finance from financial institutions for their farming activity. Financial support came from SBEC guarantee loans, microfinance loans from SPBD and small loans from the Development Bank of Samoa. 29% of farmers interviewed had other sources of finance, with more than 50% of these farmers citing remittances from families overseas used to finance their farm operations. Other mentioned sources were: other income generating activities including wage labour. This is usually the case for a Samoan family where some members of the family run the plantation, others work and some are overseas and send money over to support their families.

Previous work have pointed to the problem that in order to invest into fruit and vegetable expansion, there is need for an upfront capital. The actual need for capital anticipation in expanding fruit and vegetable production, depend on the type of production that is envisaged and on the minimum scale of production required for a viable operation. As reported by Tamasese (2009), the expansion of fruit and vegetable production by small commercial farms on minimum viable scale might require investments ranging from SAT 26,871 for three acres of breadfruit, and this does not include the cost of acquiring the land.

### ***2.5 Issues and Constraints relating to finance for farms***

The main constraints that have been identified by the respondents in operating their farms were access to inputs, capital availability and access to finance. Only semi-commercial or commercial farms who have other sources of cash income can afford to pay salaries, thus also labor was mentioned as a constraint to the expansion of fruits and vegetable operation.

Issues relating to access to markets and export markets were also identified, as well as inconsistencies in supplies of needed inputs, such as seeds, pesticides and fertilizers, as obstacles to fruits and vegetables cultivation. Although the major constraints are identified in the susceptibility of crops to weather risks, pests and diseases, thus revealing the important demand for effective extension services.

Constraints in accessing loans differ by farm type - subsistence, semi-commercial and commercial - and farm size. Due to the incidence of transaction costs, many farmers cannot satisfy the requirements of the banks in terms of farm sizes. Usually, banks are not willing to extend loans for long periods of time, and therefore repayment must be made in few large installments, which are likely to be too burdensome to be sustained by smaller farmers who would consume most of the vegetable production. For the semi-commercial farmers, which could afford repayment thanks to the availability of other sources of cash, the main constraints are the lack of collateral for accessing loans as well as the high administrative requirements by the banks, including the need to provide cash-flow projections, whose preparation is beyond many farmers' level of education and tradition in book-keeping. For commercial farmers, the major constraint in accessing finance is identified in the poor credit history they have with the financial institutions.

### *2.6 Value chain coordination as a vehicle to accessing finance*

Drawing from the survey results possible actions to be implemented in Samoa, that may increase smallholders' participation in a substantially improved fruit and vegetables value chain, have to build on organizational arrangements for the development of innovative forms of collateral to enhance farmers' access to finance.

The objective of the present implementation proposal is to reduce the gap between farmers and financial institutions through the development of risk pooling schemes that have the function to reduce smallholder default risk and ease access to seasonal and short term credit. The innovative type of collateral builds on the principle of mutuality, as a risk management tool, and consolidated business linkages with fruit and vegetables buyers as a pre-condition to the development of the above mentioned type of schemes.

An effective financial and risk management scheme calls for value chain coordination that must occur both horizontally, at the *farming system* level, and vertically, at the *value chain* level. When fungible collateral is not available business linkages can be considered as a revenue generating asset that would enhance creditworthiness and improve agricultural producers capacity to repay loans. In this regard, the proposal on the financial and risk management scheme will need to build on the ongoing efforts to establish more stable commercial linkages between farmers and buyers. The fruit and vegetable hub which is one of the milestones of "The Fruit and Vegetable Sector Strategy", together with the interventions to stimulate aggregation at the producer level and facilitate the relationship with buyers, are all pre-conditions to the development and piloting of a successful finance and risk management scheme.

Not surprisingly, a limiting factor to the potential expansion of fruit and vegetable value chain in Samoa has been identified as the lack of effective supply coordination and the provision of adequate marketing services to the two major destination markets: the local touristic industry, for vegetables and some fruits, and New Zealand and other foreign markets especially for papaya and, possibly, breadfruit.

One possible way of ensuring continued supply of products of consistent quality, as required particularly by export markets, is the establishment of plantation-like specialized farms, in which production control is centralized under the direct control of a single firm. One alternative is that the coordinating functions are performed by the elected managing body of a cooperative or other farmers associations. The major advantage of structuring the sector around highly coordinated producer association is that this provides producers with the capacity to enter into viable contractual agreements (either formally or

informally) with processors, exporters, and/or retailers, while maintaining the flexibility needed for small scale, usually high risk, farming operation such as occurring in fruit and vegetable production.

The major issues to be addressed concern the programming of the production according to the local needs, so that neither suppliers nor buyers have to deal with the risks of fluctuating prices and/or lack of supply, in terms of both quality and quantity.

The fruit and vegetable sector strategy envisages the creation of a hub to provide commercial intermediation, technical assistance and other services to its users. As a first step, the feasibility of the financial scheme will be tested by choosing a product or a range of products which are already produced by village farmers and sold on local markets and by exploring the possibility that a selection of the best produced quality could be the subject of a contractual agreement with a local purchaser.

## **2.7 A financial scheme for subsistence and semi-commercial fruit and vegetable producers<sup>4</sup>**

Consistently with what stated in the previous paragraphs, a description of the organizational and contractual relationships on which the financial scheme will build on are given. Secondly, details on the engineering of the finance and risk management mechanism will be provided.

The scheme will have to build on a contractual agreement with a local purchaser (supermarket/hotel/restaurant) for the supply of a minimum target quantity of one or more fruit and vegetable product (Papaya, Tomato, Head cabbage, Other) on a weekly calendar over the entire season, where the buyer specifies the quality, quantity and period of request and the average fixed price that will be paid. In case of failure to deliver, a penalty is charged to allow the buyer to procure the product otherwise. The risk of failure and the cost of the penalty could be covered with a commercial insurance policy. Upon advance notice of at least one week, the buyer may request to receive more than originally contracted for that week, but not less. A schedule of regular monthly payments is also established. The contractual agreement could also be facilitated through a “hub” where purchaser and producer may benefit from logistic facilities. The hub might also allow for consolidation of the demand coming from more than one purchaser, thus allowing for a larger scale supply contract, involving more than one fruit and vegetable product. .

An association of producers, such as the Samoa Farmers Association and/or Women in Business, that takes on the responsibility of accepting and fulfilling the contract obligations with the buyer or the hub is required. All farmers should have the opportunity to participate in the association, though the model is particularly suited for currently small semi-commercial and subsistence farmers. The board of the association will:

- Decide on how to distribute the agreed production plan through shares assigned to individual producers. Each producer is committed to deliver her/his own share, and is responsible for quality, quantity and time of delivery.

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<sup>4</sup> The current status of activities in the area of access to finance allowed to provide an overview of the main features of the proposed financial scheme while the identification of farmers and buyers for the piloting activities is currently ongoing.

- In accordance with the relevant *councils* of the involved villages, and in recognition of the existing social organization that gives the entire village the authority on governing the communal resources, an overhead that the village will receive, as a percentage of the contracted price or of the total revenues from the contract, can be determined. This is intended to compensate the village for the common resources that farmers will need to utilize in their fruit and vegetable operations. The final objective of establishing an overhead is to create the required incentives for the village to make the resource available to the fruit and vegetable production without compromising the village's food and income security as guaranteed by the agricultural use of common resources. At the same time, it shall preserve the autonomy of control of individual farmers on the production decisions.
- Manage an **operational fund**. The farmers will have the right to access the operational fund, free of interest cost; to obtain short term loans (within the season) required for anticipation of the production expenses, using the product they have committed to deliver as a guarantee. The fund can be established within SBEC or the Development Bank of Samoa, and could be fed by an initial loan and by the advance payments from the buyer. All payments from the buyer are received by the fund, and the corresponding shares released to individual producers after deduction of the outstanding debts with the fund and the village overhead. As an alternative, the producers' organization may find it convenient to collectively procure inputs and provide them as an in-kind credit to individual producers.<sup>5</sup> In this case, the producer organization itself, and not the individual farmers, will need to access credit for anticipation of the input costs.
- Manage a mutual insurance fund fed by individual producers' contributions intended to cover idiosyncratic events that might affect individual producers' yields. The design of the fund will detail the criteria of contribution by individual members, and the conditions for accessing it in case of occurrence of adverse events, in addition to the required monitoring and administration activities. The mutual fund might also be linked to accounts with the National Provident Fund, so that the unused funds in the mutual insurance fund could be used to feed farmers' savings or pension fund, in an innovative way of integrating production risk management and social security. Two other elements that will be determined at this stage, are the already mentioned possibility of a financial agreement with the villages or the head of the extended families on which the right to use the land is bestowed, and the signing of an insurance coverage for events that may compromise the entire production and the mutual insurance fund can be established within SBEC or the Development Bank of Samoa.
- Creation of an extension team, which will assist farmers in the technical matters related to the production and post harvest treatment of the product, to be sure that quality adheres to the contractual obligations.

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<sup>5</sup> To the extent that there may be economies of scale in procuring inputs in bulk, there may be significant savings in total input costs.

## *Conclusions*

Concerning the role that institutions, including the Government and FAO, can play in the piloting phase this articulates as follows:

- Validation of proposals through discussions with various stakeholders. In the case of Samoa, the findings of the financing needs assessment and the resulting financial proposals were discussed and validated through discussions with the Samoa Fruit and Vegetable stakeholders;
- Especially with reference to smallholder inclusion and in countries like Samoa where rural communities have a preminent role, activities should be designed in order to capitalize on existing forms of aggregation such as the above proposal of designing a community based risk management tool (mutual insurance fund);
- Facilitating contacts between producers and potential buyers. The end point of this phase should be to identify buyers and farmer groups to be involved, the object and the terms of a contract. Furthermore, the group of farmers might need to be established as a legal entity (cooperative, association, etc.) in order to have the authority to subscribe the contract and manage both the operational fund and the mutual insurance fund;
- Evaluating the production costs and assess the potential margins involved; The group of farmers will act as the entity who procures inputs and investments materials by accessing loans, and providing them to group members in kind. The cost of the inputs to be paid by farmers will be discounted from the price paid to them by the association upon delivery of the output
- Providing expertise in the design and set up of the operational fund and the mutual insurance fund in combination with capacity building activities targeted to both the financial institutions and the producers and producers associations dealing with the new financial instruments. With regards to the functioning of the operational and mutual fund, an assessment of the amount of capital that will have to be anticipated through a loan/group lending on the basis of the expected revenues of the farmers will have to be undertaken. The collateral will be represented by the agreement between the farmer and the buyer or in the case of the hub between the farmer and the hub itself. On the basis of this agreement the bank will enter the scheme by providing credit for the purchase of a number of inputs

**Table 6: Gross Margin and Net Income Costing for Papaya production**

| <b>Development Budget for Papaya</b>       |        |                  |                     |                     |
|--|--------|------------------|---------------------|---------------------|
| <b>Assumptions</b>                         |        |                  |                     |                     |
| No of trees per acre:                      |        | 450              |                     |                     |
| Acres Planted                              |        | 2                |                     |                     |
| Plant Spacing (m2)                         |        | 9                |                     |                     |
| Growth period (mths)                       |        | 36               |                     |                     |
| Land prep costs /acre                      |        | 3150             |                     |                     |
| Fencing                                    |        | 3000             |                     |                     |
| <b>No. of fruit/tree Harvested:</b>        |        |                  |                     |                     |
| Year 1                                     | 2.5    | 6750             |                     |                     |
| Year 2                                     | 3      | 32400            |                     |                     |
| Year 3                                     | 2.5    | 27000            |                     |                     |
| Fruit Mortality                            |        | 10%              |                     |                     |
| Proportion Sold Export                     |        | 50%              |                     |                     |
| Proportion Sold Domestic                   |        | 50%              |                     |                     |
| Export Price (\$/fruit)                    | \$     | 1.00             |                     |                     |
| Average Weight per fruit                   |        | 0.50             |                     |                     |
| Domestic Price (\$/Fruit)                  | \$     | 0.65             |                     |                     |
| Packaging Cost (6 fruit per box)           | \$     | 0.30             |                     |                     |
| <b>Income (\$)</b>                         |        |                  |                     |                     |
|  | Year 1 | Year 2           | Year 3              |                     |
| <b>Export Market</b>                       |        |                  |                     |                     |
| No. of Fruit Sold                          |        | 3,038            | 14,580              | 12,150              |
| Sale of Papaya                             | \$     | 3,037.50         | \$ 14,580.00        | \$ 12,150.00        |
| <b>Local Market</b>                        |        |                  |                     |                     |
| No. of Fruit Sold                          |        | 3,038            | 14,580              | 12,150              |
| Weight Sold (kg)                           |        | 1,519            | 7,290               | 6,075               |
| Sale of Papaya                             | \$     | 1,974.38         | \$ 9,477.00         | \$ 7,897.50         |
| <b>Total Income</b>                        | \$     | <b>5,011.88</b>  | \$ <b>24,057.00</b> | \$ <b>20,047.50</b> |
| <b>Direct Costs (\$)</b>                   |        |                  |                     |                     |
| Planting Material (450 seedling @ \$0.50)  |        | 450              | 0                   | 0                   |
| Land preparation                           |        | 6300             |                     |                     |
| Sting (1 litre@\$24.40/Litre)              |        | 48               | 0                   | 0                   |
| Fencing                                    |        | 6000             |                     |                     |
| Crop Husbandry                             |        |                  |                     |                     |
| Fertilizer (NPK 12:5:20@ \$67/40kg Bag)    |        | 1072             | 804                 | 804                 |
| Marketing                                  |        |                  |                     |                     |
| Transport to market (\$10 per trip)        |        | 240              | 520                 | 520                 |
| Transport to HTFA facility (\$30 per trip) |        | 720              | 1560                | 1560                |
| Hire of market stall (\$5.00/Day)          |        | 60               | 260                 | 260                 |
| Packaging Costs                            | \$     | 911.25           | \$ 4,374.00         | \$ 3,645.00         |
| Labour                                     | \$     | 1,600.00         | \$ 4,720.00         | \$ 4,720.00         |
| <b>Total Direct Costs</b>                  | \$     | <b>17,401.25</b> | \$ <b>12,238.00</b> | \$ <b>11,509.00</b> |
| <b>GROSS MARGIN (4)</b>                    | -\$    | <b>12,389.38</b> | \$ <b>11,819.00</b> | \$ <b>8,538.50</b>  |
| <b>FIXED COSTS (\$)</b>                    |        |                  |                     |                     |
| Bins (5 @ \$25/Bin)                        |        | 125              |                     |                     |
| Ladders (2@ \$300/Ladder)                  |        | 600              |                     |                     |
| Registration for export Association        |        | 20               | 10                  | 10                  |
| Total Fixed Costs                          |        | 745              | 10                  | 10                  |
| <b>NET INCOME (\$)</b>                     | -\$    | <b>13,134.38</b> | \$ <b>11,809.00</b> | \$ <b>8,528.50</b>  |
| <b>Labour Inputs (Days)</b>                |        |                  |                     |                     |
| Task                                       | Year 1 | Year 2           | Year 3              |                     |
| Land Preparations -Spraying & Slashing     | 8      | 0                | 0                   | 0                   |
| Planting                                   | 12     | 0                | 0                   | 0                   |
| Weed Control                               | 12     | 12               | 12                  | 12                  |
| Fertilizing                                | 4      | 4                | 4                   | 4                   |
| Fruit thinning                             | 8      | 12               | 12                  | 12                  |
| Harvesting and packing                     | 12     | 104              | 104                 | 104                 |
| Marketing                                  | 24     | 104              | 104                 | 104                 |
| Total labour requirements - days           | 80     | 236              | 236                 | 236                 |
| Total Number of full time labour           | 0.33   | 0.98             | 0.98                | 0.98                |
| Average Wage Rate (\$/unit)(Days)          | 20     | 20               | 20                  | 20                  |
| Total Cost of labour                       |        | 1600             | 4720                | 4720                |
| <b>Nett Income</b>                         | -\$    | <b>13,134.38</b> | \$ <b>11,809.00</b> | \$ <b>8,528.50</b>  |
| <b>Crop Income:</b>                        |        |                  | \$                  | <b>7,203.13</b>     |

**Table 13: Gross Margin Figures for Breadfruit Production**

**Development Budget for Breadfruit**

**Assumptions**

|                         |           |
|-------------------------|-----------|
| No of trees per acre:   | 28        |
| Acres Planted           | 3         |
| Sqm in an Acre          | 4047      |
| Plant Spacing (m2)      | 144.53    |
| Growth period (mths)    | 120       |
| Total Trees             | 84        |
| Cost Per Seedling       | \$ 2.00   |
| Pesticide Cost Per Acre | \$ 24.40  |
| Days to clear Land      | 5.00      |
| Cost to clear per day   | \$ 450.00 |

| No. of fruit/tree Harvested:     | Fruit per Tree | Fruit per Harvest | Yield in kg |
|----------------------------------|----------------|-------------------|-------------|
| Year 1                           | 0              | 0                 | 0           |
| Year 2                           | 0              | 0                 | 0           |
| Year 3                           | 50             | 4200              | 5040        |
| Year 4                           | 150            | 12600             | 15120       |
| Year 5                           | 180            | 15120             | 18144       |
| Fruit Mortality                  |                | 10%               |             |
| Proportion Sold                  |                | 100%              |             |
| Export Price (\$/fruit/Kilo)     | \$             | 2.00              |             |
| Domestic Price (\$/Fruit)        | \$             | 1.00              |             |
| Packaging Cost (6 fruit per box) | \$             | 0.50              |             |
| Trips to market                  |                | 52                |             |
| Cost per trip                    |                | 200               |             |

| Income (\$)       | Year 1 | Year 2 | Year 3      | Year 4       | Year 5       | Year 6       | Year 7       |
|-------------------|--------|--------|-------------|--------------|--------------|--------------|--------------|
| No. of Fruit Sold | 0      | 0      | 3780        | 11340        | 13608        | 13608        | 13608        |
| kg of Fruit Sold  | 0      | 0      | 4536        | 13608        | 16330        | 16330        | 16330        |
| Total Income      | \$ -   | \$ -   | \$ 9,072.00 | \$ 27,216.00 | \$ 32,659.20 | \$ 32,659.20 | \$ 32,659.20 |

|   |                    |                  |                     |                     |                     |                     |                     |
|---|--------------------|------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Direct Costs (\$)                       |                    |                  |                     |                     |                     |                     |                     |
| Planting Material (seedling @ \$2.00ea) | \$ 168.00          | 0                |                     |                     |                     |                     |                     |
| <b>Land preparation</b>                 |                    |                  |                     |                     |                     |                     |                     |
| Clear land                              | \$ 6,750.00        |                  |                     |                     |                     |                     |                     |
| <b>Crop Husbandry</b>                   |                    |                  |                     |                     |                     |                     |                     |
| Fertilizer (NPK 12:5:20@ \$67/40kg Bag) | 0                  | 0                | 0                   | 0                   | 0                   | 0                   | 0                   |
| <b>Marketing</b>                        |                    |                  |                     |                     |                     |                     |                     |
| Transport to HTFA or market             | \$ -               | \$ -             | \$ 10,400.00        | \$ 10,400.00        | \$ 10,400.00        | \$ 10,400.00        | \$ 10,400.00        |
| Hire of market stall (\$5.00/Day)       | \$ -               | \$ -             | \$ 260.00           | \$ 260.00           | \$ 260.00           | \$ 260.00           | \$ 260.00           |
| Packaging Costs                         | \$ -               | \$ -             | \$ 2,268.00         | \$ 6,804.00         | \$ 8,164.80         | \$ 8,164.80         | \$ 8,164.80         |
| Labour                                  | \$ 440.00          | \$ 280.00        | \$ 2,360.00         | \$ 2,360.00         | \$ 2,360.00         | \$ 2,360.00         | \$ 2,360.00         |
| <b>Total Expenses</b>                   | <b>\$ 7,358.00</b> | <b>\$ 280.00</b> | <b>\$ 15,288.00</b> | <b>\$ 19,824.00</b> | <b>\$ 21,184.80</b> | <b>\$ 21,184.80</b> | <b>\$ 21,184.80</b> |

|                         |                    |                  |                    |                   |                   |                   |                   |
|-------------------------|--------------------|------------------|--------------------|-------------------|-------------------|-------------------|-------------------|
| <b>GROSS MARGIN (4)</b> | <b>-\$8,623.00</b> | <b>-\$580.00</b> | <b>-\$8,596.00</b> | <b>\$5,012.00</b> | <b>\$9,094.40</b> | <b>\$9,114.40</b> | <b>\$9,114.40</b> |
|                         |                    |                  |                    | \$835.33          | \$1,515.73        | \$1,519.07        | \$1,519.07        |

|                                     |                    |                  |                    |                   |                   |                   |                   |
|-------------------------------------|--------------------|------------------|--------------------|-------------------|-------------------|-------------------|-------------------|
| <b>FIXED COSTS (\$)</b>             |                    |                  |                    |                   |                   |                   |                   |
| Bins (5 @ \$25/Bin)                 | 125                |                  |                    |                   |                   |                   |                   |
| Ladders (2@ \$600/Ladder)           | 600                |                  |                    |                   |                   |                   |                   |
| Stick Picker (@ \$30 each)          | 30                 |                  |                    |                   |                   |                   |                   |
| Pruning saw (@ \$50 each)           | 50                 |                  |                    |                   |                   |                   |                   |
| Registration for export Association | 20                 | 20               | 20                 | 20                | 20                |                   |                   |
| <b>Total Fixed Costs</b>            | <b>\$ 825.00</b>   | <b>\$ 20.00</b>  | <b>\$ 20.00</b>    | <b>\$ 20.00</b>   | <b>\$ 20.00</b>   |                   |                   |
| <b>NET INCOME (\$)</b>              | <b>-\$8,623.00</b> | <b>-\$580.00</b> | <b>-\$8,596.00</b> | <b>\$5,012.00</b> | <b>\$9,094.40</b> | <b>\$9,114.40</b> | <b>\$9,114.40</b> |

| Family Labour Inputs (Days)            | Year 1           | Year 2           | Year 3             | Year 4             | Year 5             | Year 6             | Year 7             |
|--|------------------|------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Task                                   |                  |                  |                    |                    |                    |                    |                    |
| Land Preparations -Spraying & Slashing | 4                | 0                |                    |                    |                    |                    |                    |
| Planting                               | 6                | 0                |                    |                    |                    |                    |                    |
| Weed Control                           | 6                | 6                | 6                  | 6                  | 6                  | 6                  | 6                  |
| Fertilizing                            | 2                | 2                | 2                  | 2                  | 2                  | 2                  | 2                  |
| Fruit thinning                         | 4                | 6                | 6                  | 6                  | 6                  | 6                  | 6                  |
| Harvesting and packing                 | 0                | 0                | 52                 | 52                 | 52                 | 52                 | 52                 |
| Marketing                              | 0                | 0                | 52                 | 52                 | 52                 | 52                 | 52                 |
| Total labour requirements - days       | 22               | 14               | 118                | 118                | 118                | 118                | 118                |
| Average Wage Rate (\$/unit)(Days)      | 20               | 20               | 20                 | 20                 | 20                 | 20                 | 20                 |
| <b>Total Cost of family labour</b>     | <b>\$ 440.00</b> | <b>\$ 280.00</b> | <b>\$ 2,360.00</b> |