



Agricultural Input Supply Strengthening

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Abbreviations & acronyms

Avansa	USAID's <i>Avansa Agrikultura</i> Project
CSPG	Community seed production groups
DAC	USAID's <i>Dezenvolvimentu Agrikultura Komunitaria</i> Project
FAO	Food and Agriculture Organization of the United Nations
IPM	Integrated pest management
MAF	Ministry of Agriculture and Fisheries
MDF	Market Development Facility (Australian Aid)
M4P	Making Markets Work for the Poor
NGO	Non-government organisation
OHM	<i>Organizasaun Haburas Moris</i>
PPE	Personal protective equipment
TA	Technical assistance
ToR	Terms of Reference

Executive summary

The following points briefly outline the findings of the assessment:

- The quantity, quality and availability of agricultural inputs is substantially improving. Farmers in the visited locations can access a wide variety of name brand vegetable seed, farm chemicals, and in most cases fertiliser. Prices have dropped compared to previous years, there is competition among both wholesale and retail suppliers, and off-brand and expired stock is almost completely absent.
- Availability is likely to further improve in the coming months. Two large companies, Kmanek and Vinod Patel, are shifting their operations towards a wholesale model and hope to supply networks of small rural retail shops. Both also provide free training and advice to their customers. Vinod Patel has partnered with Loja Agi Agrikultura to distribute fertiliser, and this will be the first time it is widely available since Indonesian times.
- Shop owner knowledge has somewhat improved, but consumers educating suppliers drive this and there is still widespread misunderstanding, some of which is dangerous, of the safe and effective use of inputs. Written resources in the shops are useful, but those available are incomplete, out-dated, or not fit for purpose.
- TOMAK should work on the demand side of the system. Farmers who safely and effectively use an input will promote further demand in their communities. Unsafe or ineffective use will be harmful to communities and stifle innovation in Timor-Leste's agricultural system.
- The National Seed System is functioning well, despite an under-resourced and over-centralised national association (Anaprofiku). Mung bean varieties were only recently released, however, and have not yet made it into widespread production in the system. TOMAK can remedy this by 1) directly supporting the production of sufficient seed (1-2 tonnes) in the short term to ensure its integration into the system; and 2) lobbying the National Directorate for Seed Production to ensure that certified seed reaches community seed production groups (CSPGs) and that there is sufficient budget for the Ministry of Agriculture and Fisheries (MAF) to purchase community seed from groups.
- Based on the assessment, TOMAK can improve access to inputs for its farmers through: 1) producing a set of informational resources for rural input shops and farmers and 2) designing a training of trainers (ToT) to produce agro-input trainers who will then instruct farmers and shop owners on safe and effective input use.

1. Part 1: Input market analysis

1.1. Overview of the assignment

In May 2018, TOMAK engaged a consultant to carry out an assessment of the accessibility of agricultural inputs for farmers working with the program, the activities of other programs working in the input supply sector, and an inquiry into how well the National Seed System is functioning. This information was then to be used to create an activity design with the objective of improving access to agricultural inputs for farmers working with TOMAK. This report outlines the findings of the assessment and the activity design. The consultant completed previous work in the input supply sector in Timor-Leste in early 2014 and mid-2017 (as well as periodic overlap with the sector on other assignments) and comparisons will be made to previous findings from these assignments to document the changes occurring in the inputs sector.

Some additional information regarding the fresh vegetable market, the business activities of local NGO *Organizasaun Haburas Moris* (OHM), and the savings and loan systems used by commercial seed groups was also unearthed during interviews with various stakeholders. While not always related to the ToR, this information may be of some use to TOMAK and is included in Annex 1 of this report. The availability of vegetable seed is also discussed throughout. While not directly related to TOMAK activities, this seed is one of the most commonly purchased inputs and serves as a good indicator of how well the input supply market is operating.

1.2. The current input supply sector in Timor-Leste

Visits to input suppliers in Dili, Baucau, and Bobonaro have revealed that the input supply sector in Timor-Leste has undergone a substantial change in terms of the availability, quality, and price of inputs. In mid-2017, shops reported difficulty in importing fertiliser, chemicals, and vegetable seeds and there was little interest among the large importers in acting as wholesalers in the market. By May 2018, Nilton Aniceto, the owner of input supply store Loja Agi Agrikultura reported that MAF's Department of Agriculture, Horticulture and Extension had streamlined import approval procedures and that he no longer saw the import process as an obstacle. Even more noteworthy is the entry of Vinod Patel into the wholesale inputs market, and the shift in Kmanek's business model from supplying inputs to support farmers in their grocery supply chain to one of a wholesale focused input supply business. Baucau and Maliana are each served by two sizeable input supply shops, and farmers in either area can easily access a range of vegetable seed and farm chemicals. Irrigation supplies, fertiliser, and mechanical equipment are also available, though slightly less so than smaller inputs. Daily market stalls also stock some supplies in both places, with reports that inputs are widely sold on weekly market days.

As the availability of vegetable seed, chemicals, and fertiliser has improved, so too has the quality and price. The Seed System Security Assessment in October 2013 found an abundance of very low quality Chinese labelled vegetable seed in numerous locations around the country (Sperling *et al*, 2013). This seed quickly developed a reputation for low germination rates, and has almost entirely disappeared from the Timorese market. Nearly every input dealer visited referred to this seed when touting the quality of their own products. This is justified, as practically all of the vegetable seed observed during the current assessment was either East West Seed or Chia Tai, which have a good reputation for quality. The older Chinese labelled seed was only found being sold at one place, a mobile phone shop in the Baucau market. While farm chemicals found in shops in early 2014 were often old stock with rusted or damaged containers and obscured labels, this was not found to be the case in the current assessment. A range of insecticides, herbicides, and fungicides in new bottles and

with legible labels printed in Bahasa Indonesia was observed in all shops visited. Prices have also dropped significantly, though to a lesser extent in Baucau. In Early 2014, a litre of Roundup regularly sold for \$17 in Maliana, but now sells there and in Dili today for around \$7, and for \$15 in Baucau. Comparing seed prices was difficult due to differences in variety and package size, but prices for packets of vegetable seed ranged from \$2 - \$10 in Maliana, \$4 - \$20 in Dili, and \$5 - \$20 in Baucau. Maliana shops continue to directly import their goods from Atambua, and can sell at significantly lower prices. Both of the shops there reported that they order the products that they wish to sell from suppliers, and they are delivered a week later in trucks that ship goods across the border.

Shop owners showed more knowledge of their products than on previous assessments, but still lack the expertise to make accurate recommendations to their clients. At all district shops, owners were asked:

- 1) *“What do you sell to farmers who have insects eating the leaves of their crops?”*
- 2) *“What do you sell to farmers to spray weeds?”* and
- 3) *“What do the farmers use Furadan (carbofuran) for?”*

All pointed to synthetic pyrethroids in response to the first question and glyphosate for the second; and half gave a fair description of nematode infestation for the third¹. While this is only the simplest level of knowledge about chemical use, these responses show a basic understanding of what the products are for. For comparison, in this consultant's 2014 assessment, the owner of a large input supply shop in Dili could not tell which of his products were insecticides and which were herbicides. It seems that consumers are educating the sellers, rather than vice-versa, and driving this increase in knowledge. Shop owners learn what farmers ask for to remedy a particular problem, and then make recommendations based on this knowledge. While not ideal, this is far more of a ‘trickle up’ effect for information than was seen in the past. Despite these small improvements, there is still a tremendous lack of knowledge among farmers about pest and disease diagnosis, chemical rotation, integrated pest management (IPM), safe practices, personal protective equipment (PPE), and chemical composition. Suppliers report that farmers are still completely unaware of active ingredients, and depend entirely on trade names for chemical identification. Inexpert staff members, often children, were the attendants at all shops on the initial visit. Some called the shop owners immediately, and some required a second visit in order to speak to the owner. This makes training shop owners problematic, as the person trained might not regularly attend the shop.

Various diagnostic and safety resources from a variety of programs were being used at several of the shops. These included manuals, info sheets, and posters from DAC, MDF, Mercy Corps and Avansa. These resources were highly regarded and were often the only source of information available to shop owners and customers on the safe and effective use of inputs. Availability of these resources is not widespread, however, and none of the shops had a resource on more than one topic. For example, a shop owner may have some basic diagnostic information, but nothing on safe storage, application, or disposal practices. Another may have a chemical safety poster, but no information on proper use. This represents a good point of intervention for TOMAK, as accurate information is scarce and a farmer who safely and effectively uses an input is far more likely to use it again and to promote it in his/her community. Existing diagnostic resources also focus almost entirely on vegetable crops, and TOMAK developed resources would both fill gaps in the published knowledge and align better with TOMAK's objectives. Shop owners highlighted the need for **photo-based** diagnostic information, and resources on **using locally available materials to make PPE**. Shop owners pointed out problems with the resources provided by previous programs, including small and low-resolution photos of pests and references to chemicals by trade names that are no longer used or available. To promote TOMAK value chains, **crop specific resources**, mainly on pest/disease diagnosis and treatment on the TOMAK crops, would be one effective strategy when producing these resources. These could be **targeted at both shop owners and directly to farmers**. Chemical safety information, through both

¹ Those who responded correctly referred to “worms eating the roots of the crop.”

training and resources, would encourage the safe use of the farm chemicals that are already being widely sold to farmers.

Approximately half of shop owners had attended training, including irrigation training from Vinod Patel, safe pesticide use from UNTL and Mercy Corps, and one-on-one training from Loja Agi Agrikultura. The owner of Gunilabe shop in Maliana had attended such training, and reported that he regularly warns customers of the danger of chemical use and recommends that they use PPE. He does not, however, sell any safety products himself and none was observed to be sold in any of the shops visited in the assessment. Promoting the sale of PPE would likely be difficult, but previous programs such as DAC have trained farmers on using locally available materials such as water bottle plastic for face shields and plastic bags in lieu of gloves. While not ideal, these represent far better practices than those currently used by farmers who do not understand the risks and utilise no protective equipment. This training should be targeted at farmers, but inviting shop owners and MAF's *suku*-based agricultural extension workers can only benefit the sector. Many of the CSPGs reported being visited by an extension worker, and shop owners could at least make more informed purchase and storage decisions even if they are not always in attendance at the shop.

1.2.1. Dili shops and wholesalers

In the past, importation of chemicals, fertilisers, and vegetable seeds has mainly centred around single shops, often buying their stock at retail prices in Indonesia and selling directly to their customers from Dili storefronts. Kmanek was the exception but focused most of their efforts on the provision of inputs within their contract farming system. Other general goods stores (i.e. Boaventura) sometimes imported agricultural materials for international programs, but there was little or no wholesale activity in the inputs sector. This greatly constrained small shops' ability to source agricultural products, particularly in the districts, and farmers were therefore limited to buying what they could at high prices from a few Dili retailers. Interviews with Vinod Patel and Kmanek for this assessment revealed that both are moving to a wholesale-focused business model for agricultural inputs. This will substantially improve access in a sector where inputs are already starting to become more available. Both wholesalers hope to link with shops throughout the districts and plan to provide free training and support to their customers to promote further sales. Loja Agi Agrikultura does not have the import capacity of the larger two companies but has already linked to 10 district shops and remains one of the most popular Dili sellers due to the quality of the technical advice provided free with sales.

Kmanek reported that competition for both input sales and produce purchases has led them to separate these two activities and that they are shifting their focus to selling wholesale inputs to other retail shops. Under their previous contract farming schemes, they provided vegetable seeds and other small inputs as a service to their farmers and then deducted the cost of these inputs from the sales price when they purchased produce. They now consider these inputs to be widely available and expect farmers to source their own inputs, either from the Kmanek input shop in Dili or elsewhere. They are no longer retailing agricultural supplies in Aileu, but are still importing large quantities of seeds, mechanical equipment, and irrigation supplies that they hope to wholesale to district shops. They are currently looking for partner shops, and are willing to make either credit or consignment arrangements with small retailers. Some of their materials are already placed at Loja Agi in Buruma, Baucau. A relationship with Akia Shop in Maliana was also formed, but had fallen apart because Akia could source the same small inputs from Atambua for a lower price, and demand for irrigation supplies in Maliana was not sufficient to continue the consignment agreement.



Figure 1. Looking For Partners. Kmanek advertisement from October 2017

Kmanek is also co-implementing a subsidy/credit scheme together with Kaebauk and Avansa that assists farmers in purchasing large inputs such as tillers, hand tractors, and irrigation systems. A previous activity had Avansa paying 50% of the cost of the input, and the farmer taking out a loan from Kmanek for the remainder of the price. Kmanek found this arrangement to be unworkable, however, due to the amount of administrative work required to ensure that the recipients serviced their loans. Under a new system, Avansa pays 40% of the price, and the remaining 60% comes from a loan given to qualifying farmers by Kaebauk. Repayments are made directly from Kmanek to Kaebauk based on the sale of vegetables that the loan recipient produces. The percentage of the sales price that the loan represents is sometimes less than 60% if the farmer also puts down some money at the time the asset is purchased. This system has just begun operating, but all stakeholders interviewed thought it to be better than the previous system.

Vinod Patel is a general goods supplier specialising in hardware and building materials that also imports some agricultural materials. Whilst previously being focused mainly on larger inputs such as irrigation equipment and small machinery, Vinod Patel has recently secured a supply of reportedly high-quality vegetable seeds from a company in Malaysia, agricultural chemicals from the Hexa Corporation, and has ordered several containers of NPK and Urea fertiliser. The seeds and chemicals will be labelled in Bahasa Malay, which will hopefully be understandable by many Timorese farmers due to its similarity with Bahasa Indonesia. The varieties of seed have been tested in Timor-Leste by Avansa and the resulting agronomic information such as altitude requirements printed on the packs. This is the first time that vegetable seed has been labelled with Timor-specific information, a significant innovation in a long underserved market. The vegetable seed will wholesale at \$1.50/pack, which will likely undercut the already reduced prices of other seed in the market. Vinod Patel plans to sell all of these products wholesale, and hopes to link to a network of district shops. They are willing to sell on consignment and may offer credit to suppliers who perform well. They have also formed an agreement with Nilton from Loja Agi Agrikultura to act as their distributor for fertiliser, which he will sell both retail and wholesale to his network of district shops. To strengthen this partnership, Vinod Patel has agreed to provide free storage space to Nilton for the stock he purchases from them which overcomes a constraint that has prevented him from moving large volumes of material in the past. Vinod Patel also has a distributor of drip irrigation supplies in Metinaro, and reports that they sell a significant quantity of drip irrigation supplies through this channel. The distributor was visited by the consultant on a previous assignment, and appears to be a knowledgeable supplier with a sizeable business.

Loja Agi Agrikultura was the first shop to supply free training and technical advice to its customers and remains one of the most popular shops in Dili. Aileu farmers reported that the shop's prices are lower than Kmanek's, and that they often travel to Dili to buy seeds and other inputs there. The shop's owner, Nilton Aniceto, is a former DAC employee with long experience in the horticulture sector. Approximately 25% of his sales are wholesale to other sellers. He supplies ten shops in five districts, installs and trains on drip irrigation systems, and provides online technical support to his customers via WhatsApp. When interviewed, he showed several examples in which his rural customers had sent him a photo of a pest or disease, and he had replied with a diagnosis and a product recommendation. While probably outside the scope of TOMAK, this type of online extension information would be extremely beneficial to farmers. Nilton highlighted the need for printed resources on input use and safety to supply to district retailers and farmers, and pointed out the shortcoming of several of the resources that have been produced in the past. His main concerns were the lack of large clear photos on diagnostic materials, and references to chemicals by trade names that are no longer available in Timor-Leste. Serafim shop in Bairo Pite was also visited, but is presently only selling retail inputs and is not yet linked with any rural shops.

1.2.2. Maliana shops

Two large agricultural dealers, Akia in Raifoun and Gunilabe in the main marketplace, currently operate in Maliana. Akia is a dedicated input shop and Gunilabe has an inputs section separate from their larger general goods shop. Both stock a wide range of vegetable seed, farm chemicals, fertiliser, backpack sprayers, animal feed, veterinary medicine, and other small inputs. Young children were the attendants at both shops on the first visit, but the owners were contacted and interviewed at a later time. The owner of Akia showed a basic knowledge of what farmers were buying, and the owner of Gunilabe had attended a training and had some knowledge of chemical composition and safe handling practices. Akia had previously stocked irrigation supplies and plastic mulch on consignment from Kmanek, but had discontinued this due to low demand. They attributed this lack on demand to the proximity of vegetable growers to the irrigation canals around the town.



Figure 2. Gunilabe Shop, Maliana.

Demand for other inputs such as pesticides, fertiliser, and vegetable seeds were reported to be very high, and both shops were busy when visited. Both shops also had relationships with Loja Agi Agrikultura in Dili, but purchased most of their stock from importers who delivered goods from Atambua. Maliana sits only a few kilometres from the border, and has easy access to Indonesian markets. Seven small market stalls were also found to be selling small quantities of inputs, mainly Urea fertiliser, glyphosate, 2,4-D, and pyrethroid chemicals. People in the area indicated that on the weekly market day, many more traders would be selling a wider range of inputs in the local marketplace.



Figure 3. Market seller with pesticides and fertiliser, Maliana

1.2.3. Baucau shops

Like Maliana, Baucau has two significant agricultural supply shops. Beran shop, across from the Baucau terminal, and Loja Agi in Buruma both stock a similar range to the Maliana shops, including vegetable seed, fertiliser, and chemicals. Loja Agi also sells drip irrigation equipment, and plastic for making grow tunnels. The owner of Loja Agi showed a fair level of knowledge about his products and had attended training provided by MDF, but the Beran shop owner had only a passing knowledge of what people were buying. Loja Agi stocked some supplies from both Kmanek and the Loja Agi Agrikultura shop, but the Beran shop reported buying “from an Indonesian trader”. This is likely to be one of the Dili-based importers that supply general goods shops throughout the districts, but the level of quality of the materials was as good as any other shop with name brand seeds and chemicals. Prices were somewhat higher in Baucau, though less than what would have been found there in previous years. The supply of goods was comparable to that of Maliana, though only Loja Agi stocked bulk quantities of macronutrient fertiliser.

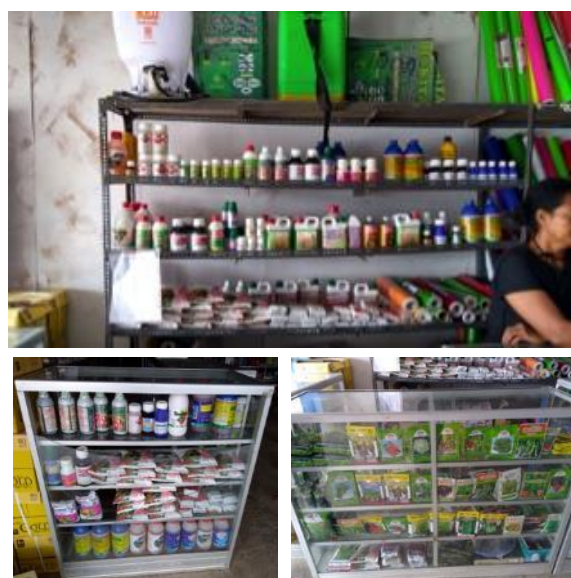


Figure 4. Beran Shop, Baucau Market



Figure 5. Loja Agi, Buruma Baucau (note the safety poster)

1.2.4. Other development programs

MDF, Avansa, and Mercy Corps all have activities with input supply dealers, and there is a risk of saturation of influence along the value chain. Vinod Patel and Kmanek have regular contact from all of these organisations, and many of the districts shops are linked to multiple wholesalers. The increase in supply and quality of inputs, and the decrease in prices, indicate that programs such as TOMAK would be better placed working on the demand side instead of the supply side of the equation. The supply chain constraints that used to affect retailers are steadily reducing, but retailers and their consumers still suffer from a lack of knowledge, resources, and support on the safe and effective use of inputs. A farmer who uses a product safely and effectively to increase productivity is more likely to use it again, and these efficiencies will spread throughout the community. A farmer who, for example, applies the wrong chemical or concentration, or burns a crop with incorrect fertiliser application is likely to avoid using anything in the future. With both successes and failures, this information spreads through communities, and misunderstanding of these technologies can severely limit production over a large area and for a long time.



Figure 6. A page from Avansa's input shop resource book

Avansa's activities in the inputs market mainly centre on their subsidy of large inputs together with Kmanek as covered in a previous section. The program also produces some diagnostic resources, a copy of which was found at Loja Agi Agrikultura in Dili. Farmers working with the program were very pleased with the subsidy and credit scheme, and many had taken out multiple loans in successive years to purchase a second or third large asset. These growers all produce vegetable crops and have a ready market of both regional buyers from supermarkets and local markets in Dili. It is the consultant's observation across multiple assessments that farmers planting commercial crops will invest in inputs, while those focused solely on food security usually cannot or will not. It is the commercial nature of vegetable and other crops that drives innovation and investment.

MDF also produces some resources and provides training to input dealers. Their resources were not found at any of the district shops (though they have mainly worked with Mercy Corps' *Loja Agrikultura*

network), but documentation from MDF shows a booklet with large clear photos and information in multiple languages. MDF has also provided some training to shop owners, including the owner of Gunilabe in Maliana, and assisted with the creation of the National Agricultural Dealer's Association headed by Nilton of Loja Agri Agricultura. The program is currently looking for additional partners to expand the distribution of their resource materials and training.

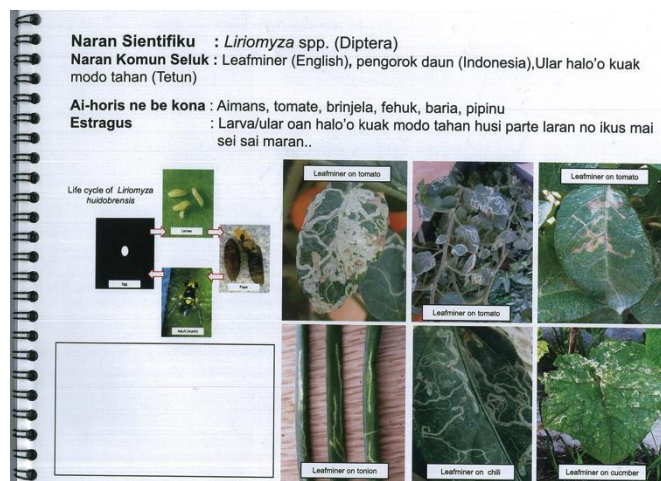


Figure 7. MDF diagnostic book. (Note the large clear pictures)

Mercy Corps continues to support their longstanding *Loja Agrikultura* network with resources and training. It is notable that the large Gunilabe shop in Maliana started under this program. Mercy Corps resources were found at the shop (see Figure 2) and were well regarded by the owner. Mercy Corps also supports a network of 'field agents plus' who start savings and loan groups and then service them with additional support activities including the sale of agricultural inputs.

World Vision, while not directly working with input supply dealers, is developing a mobile money platform that may be useful if TOMAK activities include subsidising large inputs for farmers working with the program. For the last year, World Vision has been developing a system called Kartaun Bele through which financial transfers can be made between two cards via an app on a smartphone. The smartphone is only the transfer medium, so a phone could be used to make a transfer between any two people regardless of who owns the phone. Balances can also be transferred to cards remotely, and data is stored on both the cards and the system to increase security. Transfers can also be made offline, as long as the phone is periodically connected to the internet. The money in the system will be held by BNCTL, but World Vision is open to working with Kaebauk as well if it can be assured that they will have the regulatory permission to handle a sufficient amount of money. Kaebauk is currently limited to holding USD 1 million. World Vision has ordered 10,000 cards for the first phase of implementation and hopes to make them publicly available by the end of 2018. Possible features of Kartaun Bele for phase two include fees for use to ensure the sustainability of the system, incentives paid to agents who accept the card, digital vouchers for use by program beneficiaries, and savings and loan groups acting as 'cash out' points where members of the public can receive cash for their Kartaun Bele digital tokens.

1.3. The National Seed System

TOMAK is working with mung bean farmers, specifically with a variety known locally as Kiukae, but has had some difficulty in sourcing seed produced through the National Seed System. To this end, four Community Seed Production Groups (CSPG), two district MAF offices, and the National Director for Seed Production were visited; and a MAF seed production officer at Betano Research Station was interviewed by phone. The National Seed System was set up with support from the Seeds of Life

program and gradually handed over to MAF, which took full responsibility in 2015. The National Seed System is characterised by the MAF research department testing agronomic and cultural parameters of improved varieties and releasing those that meet a set of requirements, usually based on a yield advantage over local varieties, for public use. 'Certified seed' of the released varieties is then produced by MAF in government facilities or under contract with commercial growers. This certified seed is provided to CSPGs who grow, store, and package high quality 'community seed' which is sold to MAF or NGOs for distribution, as well as to the local community. Varieties of maize, rice, and peanut seed was produced commercially under this system, with sweet potato and cassava cuttings also being grown by many groups as supplementary staple crops.

Meetings with all stakeholders revealed that the system is still functioning well. MAF's longstanding and problematic importation of maize and rice seed has now stopped completely, with the nation's domestic seed requirements for these crops being met entirely by local producers. There was little discrepancy of information among the various levels of the system and all reported that MAF is still producing certified seed, providing it to growers, and buying community seed from the groups. The CSPGs reported regular monitoring visits during their growing seasons (a requirement under the system), and all indicated that they are producing rice and/or maize seed well in excess of the amount required to fill their government contracts. This excess is sold to FAO or NGOs, as well as to members of their communities. In some cases, such as the Raimean maize group in Garuai, seed is sold in local markets across a wide geographic area. Some excess rice seed is milled and either consumed or sold as white rice in local markets. MAF announces the annual national target amount for seed from each variety, and this was well understood by all stakeholders. Budgetary constraints due to the failure of the 2017 election to produce a government led to a reduction of the 2017 targets, but the National Director believed that these would be increased to previous levels in the present year. MAF bought 50 tonnes each of maize and rice seed in 2017, and buys approximately twice that amount in an average year. When queried about obstacles they face, both the district and national MAF noted that logistics are a difficulty as ministry transport is limited, but were otherwise optimistic about the system's ability to continue functioning. Likewise, the CSPGs expressed their satisfaction with the system other than some disappointment in the lowered purchase targets from 2017.

All stakeholders were questioned about Anaprofiku, the national seed producer's association. Anaprofiku was set up to negotiate the annual seed purchase with MAF, and to represent the collective interests of the CSPGs throughout the country. Government procurement systems specify that payments can only be made to registered businesses, which prevents the groups from receiving payments directly for their seed. Business registration processes have somewhat improved in the last few years, but were practically out of reach for farmers groups when the system was developed. The association seems to have complicated the system, however, except for groups in close proximity to Dili. Various stakeholders in Maliana and Baucau expressed their dissatisfaction with Anaprofiku. Where once the groups and local MAF offices dealt directly with each other for setting production targets, organising pick-ups and scheduling monitoring visits, both sides felt that they now had to go through the Dili-based Anaprofiku to organise these exchanges. One CSPG had organised the purchase of plastic bags through Anaprofiku in a previous year, but was unhappy with the quality that they had purchased. Several group members said that Anaprofiku was supposed to be representing their interests, but that they did not receive regular contact from the association and did not feel involved in its workings. Despite their dissatisfaction with the process, no group member reported not being paid for his/her seed on any occasion.

The Naroman group is located less than an hour from Dili, and was more positive about Anaprofiku. They reported having meetings with the association, and were optimistic about a system in which each group member had given \$13 to cover all their packaging and labelling costs, with Anaprofiku organising the collective purchasing of the materials. The group had to pick up these materials themselves, which was only practical because of their nearness to Dili. The National Director for Seed Production also felt that Anaprofiku made the system easier, but highlighted their lack of resources such as transportation. The incongruity of information between the close and far groups and MAF employees suggests that Anaprofiku has over centralised the system. They manage to make

payments to all groups, their most important function, but due to either lack of resources and/or lack of motivation, their communication and other functions do not reach beyond the areas around Dili.

1.3.1. CSPGs

The CSPGs visited included Raimean in Garuai, Naroman in Fahi-Lebu, Rinova in Maliana, and Unidade Samaklot² in Maliana. In all cases, the group seemed to be functioning well, members and/or the group leader were available for an interview, and the group's seed storage warehouse was in good repair and still being used. All of the groups had expanded their storage capacity with supplemental grain bins and repurposed 200 litre drums. The groups were also still active in local seed producer's associations in each area, which consist of 4 to 8 groups that trade labour, negotiate contracts, and consolidate seed for MAF to pick up.



Figure 8. Maize seed storage in Garuai, Baucau.

Rice seed remains less commercially viable in local markets, but all maize groups reported selling up to 1 tonne/year of seed to private individuals as well as filling multiple tonne orders from CRS, World Vision, and FAO. Some of the groups were also producing peanut seed, but one had stopped due to MAF not purchasing what they had produced in 2017. All of the groups started as single-crop seed producers, with many adding an additional crop in their second or third year of operation. Depending on the location and market, most groups have ended up focusing mainly on their primary crop with some still producing a lesser amount of their secondary crop for sale.

1.3.2. Mung bean seed

TOMAK has had some difficulty sourcing seed for the Kiukae variety of mung beans, so the reason for the shortage was investigated as part of the assessment. Kiukae is a high yielding variety developed by the Asian Vegetable Research Development Centre under the name 'VC 1973 A' (marketed as *Delta* in Australia) that was released in Timor-Leste in 2015. Unlike crops such as maize and rice, which had long been produced under the National Seed System, the mung bean varieties were released at the end of the Seeds of Life program which supported their research. Once the variety was released, MAF should have begun production of foundation and then commercial seed, and when sufficient quantities were reached the variety should have been transferred to the CSPGs for wide scale production. Interviews with both district and national MAF seed production officers indicated that, while the ministry has planted some foundation and commercial seed plots in Betano and Viqueque, the process has been slow and quantities sufficient for community seed production have not been reached. There is also some confusion among the seed production staff on government research stations about which Indonesian variety was released as Kiukae.

All visited CSPGs expressed interest in producing mung bean seed commercially, with the exception of Raimean in Garuai where the group members felt that their land was not suitable for mung bean production. CSPGs have the expertise to grow, sort, and package high quality seed, and many have produced mung beans as a food crop in the past. Since TOMAK is promoting the variety, a small intervention into the national seed system to ensure that Kiukae continues to be produced would be advisable to the program and beneficial to the nation. The current National Director for Seed Production is amicable and willing to do what is necessary to kick-start production of Kiukae, but will need some encouragement and some minor assistance to ensure that this happens. To support the continued production of Kiukae in Timor-Leste, including for use in program activities, TOMAK should:

- 1) Engage one or more CSPGs to produce a sufficient quantity (1-2 tonnes) of Kiukae seed to supply the national seed system, and

² Unidade Samaklot is headed by Augusto Barreto in Maliana.

- 2) Lobby the National Directorate for Seed Production to ensure that it is fully incorporated into the National Seed System³.

This latter point will require that MAF include the purchase of Kiukae seed from CSPGs as it does for maize, rice, and peanut varieties. The MAF budget for seed purchase is likely to increase under the new government and the community seed purchase scheme is popular, so this may not be a difficult task.

1.4. Related topics of interest

1.4.1. Actualisation of the fresh vegetable market

With TOMAK's focus on rural livelihoods and the Making Markets Work for the Poor (M4P) approach, information on the workings of the domestic market for agricultural commodities in Timor-Leste is valuable for the program team. As part of this assessment, vegetable farmers in Aileu were visited and notable shifts in the market system there were observed. Excluding coffee, fresh vegetables are the most common cash crop produced in Timor-Leste. Despite this commerciality, fresh vegetable production for sale to Dili-based supermarkets was a largely artificial and highly influenced for many years. Long running contract farming systems meant that a grower was provided with seed and inputs by supermarkets, sometimes provided with loans and subsidies by these buyers or international programs, and then sold their produce to the supermarkets (usually with the price of the provided inputs subtracted from the payment). The supermarkets were therefore the buyer, bank, and input supplier and farmers had little choice or autonomy. Farmers sometimes bought seed and produced crops on their own, but this often led to gluts of less desirable crops and shortages of others. Supermarkets were known for buying produce of substandard quality or in excess of their needs in the interest of "supporting the farmers." The system has changed substantially, however, in the following ways:

- **Competition** – With a significant increase in the number of input sellers, supermarkets are no longer providing small inputs such as seeds. Farmers are sourcing their own small inputs, and competition is driving price down and quality up. Likewise, competition among buyers of produce has led to farmers taking more responsibility for deciding what to grow, and where to sell their crops. Two supermarkets now publish quotas of how much of each product they will buy in each location, and farmers organise production levels themselves. At least three other buyers also purchase vegetables, so farmers are now proactive in contacting other buyers if they have product to sell. These changes represent a substantial shift towards a less artificial market in which farmers are better responding to market demand and each actor focuses on their own place in the value chain without having to 'prop up' the others.
- **Finance** – Farmers who wish to finance the purchase a large input must now secure a loan through a bank or microfinance institution. The system is new and has only been trialled with a few farmers, but Kmanek is no longer offering loans so that option is no longer open to farmers wishing to borrow money towards an input purchase. In the past, the supermarket buyers, often guaranteed by an international program, would have provided this credit. Though some subsidies do still exist, farmers must now operate in a more realistic system where they borrow from a finance institution and deal with an input supplier directly. All farmers who had taken out a loan for a large input said that it had increased their production. More importantly, most had taken a second loan for another piece of equipment when their first loan was paid off. This is not only a more realistic finance environment, but it shows that farmers are willing to invest when there is a functional market system that can consume their produce.

³ An explanation of seed classes and how they relate to the National Seed system can be found here: <http://seedsoflifetimor.org/wp-content/uploads/2013/08/NSSRV-seed-classes-EN-A4-LR.pdf>

Programs working in domestic commodity markets in Timor-Leste often lament the artificiality, prices not reflecting the market, and underdeveloped market systems. Farmers are often seen as unwilling to invest, or to respond to markets without outside influence. The fresh vegetable market, at least in the main production areas, shows that when farmers are making money, competition exists, and a sufficient level of production capacity is reached, real functioning markets develop to the benefit of both producers and consumers.

1.4.2. OHM business model

Training and mentoring on the development of a commodity trading business model for Maliana-based NGO OHM was provided under a previous consultancy. A brief visit to the OHM office in Maliana revealed that the organisation has used the business model and has been operating as a successful red rice trader for several months. They are now selling to 12 supermarkets and small shops in Dili, and retailing additional rice from their office in Maliana. They buy paddy rice from local growers at \$0.60/kg, mill and package it themselves, and sell it for \$4.00/kg in Dili or \$3.00/kg from their office. They reported selling 300kg every 2 weeks, and currently have over 1 tonne of paddy rice in storage at their facility. While time did not allow for a more in-depth look at their transport, packaging, and milling costs, this margin almost certainly produces a good profit. The proceeds from the rice sales go towards funding OHM's development activities in several communities in the area.

1.4.3. Savings and loan activities of community seed production groups

Though not included in the interview guidelines, the topic of savings and loan groups came up at several of the CSPG visits as being a key to the groups' success. Since TOMAK is working with commercial farmers, inputs, and several partners who promote savings and loan groups, this might be of interest to the program. While not officially a Seeds of Life activity, savings and loan groups were set up for CSPGs by a staff member at the request of the groups. These savings and loan groups are still operating and were highlighted by group members as being of substantial benefit to the members. Some groups had opened membership to the wider community and one had over 90 members. The Naroman group has purchased a dump truck and two motorised tricycles with dividends from previous years' loans, which they use to move seed and hire out for additional income. The group had already collected over \$8000 in dividends in the first five months of 2018, which will be distributed among the group members. The groups reported that many members took out loans to start agricultural businesses (usually growing vegetables) or to buy large grain bins for seed storage. Where strong savings and loan groups exist, they provide a potential source of loans for large inputs without the difficulty of bringing in a larger financial institution.

1.4.4. Red rice in Maliana

A large red rice production group was located in Maliana, which might provide a good source of seed, a location for a demplot, or a potential partner for TOMAK. The group is called Guma Ana 1, and farms approximately two hectares of rice paddies just west of a social housing development from Indonesian times in Guma Ana on the edge of Maliana⁴. The group has a crop of red rice nearing harvest now (May 2018), and reported producing around 2 tonnes per year that they sell to OHM, in local markets, and sometimes in Dili. They typically sell their red rice at \$1/skm tin for milled rice, or at \$0.70/kg for paddy.

⁴ The group leader of Guma Ana 1 is Eduardo Gonçalves.

2. Part 2: Activity design for improving access to inputs

As outlined in Part 1, the quantity, quality, and price of inputs are improving, even in rural areas. Knowledge and the informational resources of suppliers have improved slightly, but significant gaps still remain among farmers and suppliers on the safe and effective use of inputs. It is therefore advisable that TOMAK focus its efforts on the demand side of the system, as many farmers are already using fertiliser and pesticides but have minimal understanding of how to get good results and to protect themselves and the environment. Successful input use will catch on quickly in farming communities, while disastrous consequences from misuse will endanger lives and prevent progress in Timor-Leste's agricultural system. **This activity design is based on the logic that access to inputs will improve as demand continues to increase, and that this increased demand will be driven by safe and effective use of inputs brought on by greater knowledge in communities where TOMAK works.**

Written resources such as those in Figures 2, 5, 6, and 7 are in common use at rural input suppliers, but there are major gaps in the information available, some are out-dated, and many are only marginally suited to their intended purpose. Many pest and disease diagnostic resources, for example, lacked clear photos, pest life cycles, and crop damage images; and none covered the crops TOMAK is currently exploring with farmers. Pesticide information was given with out-dated trade names, with no explanation of active ingredient. Most shops lacked even basic information on deciphering pesticide labels or chemical safety. No reference on fertiliser use was found in any shop. All of these issues could be ameliorated significantly with a set of well designed, clearly printed, written resources on:

- 1) Pest and disease diagnosis with treatment recommendations, including rates, with locally available chemicals;
- 2) Basic information on Urea, NPK, and TSP fertilisers and methods of use⁵; and
- 3) Safety information for farm chemicals including identification of active ingredient, understanding labels, health risks, use of PPE (based on local materials), storage precautions, disposal of excess chemical and used containers, spill response, and environmental concerns.

These resources should be made available to shop owners, but also targeted at farmers, either directly or with point-of-sale resources given freely with purchase by the shops. If this latter method were used, it would help to alleviate the problem of non-technical staff often being attendant at the rural shops. Printing and photocopying shops now operate in most rural centres, so providing digital copies to extension workers and other beneficiaries could also help to broaden the reach of the materials. While diagnostic information would need to be assembled specifically for Timorese conditions, more general resources such as those on chemical safety could draw heavily from existing resources⁶.

While resources will be highly beneficial and widely accessible, specialised training on input use would have a greater impact in the areas where TOMAK works. Rather than limiting the reach by training farmers directly, TOMAK should design and implement a ToT on a program of safe and effective input use. Trainers could be recruited from the large wholesale suppliers, particularly Loja Agri Agrikultura staff who do similar training for Avansa and Vinod Patel staff who already train on drip irrigation, but MAF extension workers, rural input shop owners/staff, and even key farmers would also be good candidates. Training could then be organised for TOMAK farmers, but would also reach a wider beneficiary base with shops training their customers and extension workers training farmers groups in their *suku* (village). Both Loja Agri Agrikultura and Vinod Patel already provide free advice and

⁵ This should include photos of each type of fertiliser as many Timorese farmers know them only as 'white', 'red', and 'black' fertiliser.

⁶ For example, CropLife International makes such resources available at: <https://croplife.org/crop-protection/stewardship/responsible-use/>

training to their private customers and partner shops. This would therefore be a cost-effective way for TOMAK to supplement an extant system with accurate information designed to promote input use.

The following logframe outlines these activities and the major costs for their implementation. Training budgets and beneficiary numbers are based on 1 project year of implementation.

Intervention logic		Resources required	Major costs
Objective 1:	<i>Farmers working with TOMAK have improved access to agricultural inputs</i>	□ □	
Outcome 1.1:	<i>Input shop owners have resources on safe and effective use of inputs available to:</i> 1) <i>provide to farmers and</i> 2) <i>make recommendations to customers.</i>		
Output 1.1.1:	A set of printed resources, suitable for provision to shop owners, extension workers and farmers, covering: 1. Diagnosis of pests and diseases for TOMAK crops and treatment recommendations using locally available inputs 2. Basic information on Urea, NPK, and TSP fertilisers and methods of use 3. Safety information for farm chemicals including identification of active ingredient, understanding labels, health risks, use of PPE, storage precautions, disposal of excess chemical and used containers, spill response & environmental concerns 4. Drip irrigation (possibly through reprint/revision of existing materials)	<ul style="list-style-type: none"> • TA up to 20 days for production of materials • Printing 3 resources x 100 copies • Management, admin, logistics, communications staff time 	USD \$13,500 USD \$3,500
Activity 1.1.1:	<ul style="list-style-type: none"> • Develop ToR and engage TA • Layout, printing, production of materials • Socialisation of materials to shop owners and farmers (as necessary for individuals or through training to groups as in 1.2.2 below) • Distribution of materials 		
Outcome 1.2:	<i>Farmers and other input stakeholders (i.e. shop owners, extension workers) trained on safe and effective use of inputs.</i>		
Output 1.2.1:	45 of trainers trained on safe and effective use of inputs available in TOMAK areas. Possible topics: <ul style="list-style-type: none"> • Farm chemical and fertiliser use and safety • Diagnosing pests and diseases • Drip irrigation installation and use (already happening in some areas) Specialised business training for rural shop owners	<ul style="list-style-type: none"> • TA up to 20 days for training design and ToT • Training costs (venue, per diem, etc.) • Management, admin, logistics staff time 	USD \$13,500 USD \$2,400

Intervention logic		Resources required	Major costs
Activity 1.2.1:	<ul style="list-style-type: none"> • Develop ToR and engage TA • Choose ToT participants (i.e. wholesaler staff, extension, shop owners, etc.) • ToT delivery • Schedule trainers to deliver training in 3 districts 		
Output 1.2.2:	1,200 of farmers trained on safe and effective use of inputs available in TOMAK areas.	<ul style="list-style-type: none"> • FFS costs • Management, admin, logistics staff time 	USD \$2,400
Activity 1.2.2:	<ul style="list-style-type: none"> • Schedule trainings/organise farmers in 3 districts • Support training with admin/logistics • Follow up M&E collection on additional customers (farmers) trained 		



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