



PROMISING VALUE CHAINS IN THREE TOWNSHIPS OF CHIN STATE, MYANMAR

Value Chain Analysis Report

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Acronyms

| | |
|--------|---|
| BDS | Business Development Services |
| CORAD | Chokhlei Organization for Rural and Agriculture Development |
| CRS | Catholic Relief Services |
| DICA | Directorate of Investment and Company Administration |
| DOA | Department of Agriculture |
| GRET | Groupe de Recherche et d'Echanges Technologiques |
| EFY | Elephant Foot Yam |
| FDI | Foreign Direct Investment |
| FGD | Focus Group Discussion |
| GDP | Gross Domestic Product |
| HH | Household |
| KII | Key Informant Interview |
| KMSS | Karuna Mission Social Solidarity |
| MFI | Micro Finance Institution |
| MICS | Multiple Indicator Cluster Surveys |
| NGO | Non-Government Organization |
| PACE | Productive Agriculture through Community Engagement |
| SALT | Sloping Agriculture Land Technique |
| SRG | Self-Reliant Group |
| LIFT | Livelihoods and Food Security Trust |
| UNDP | United Nations Development Program |
| UNICEF | United Nations International Children's Emergency Fund |
| VC | Value Chain |

Executive Summary

Chin State is located in western Myanmar and shares borders with India and Bangladesh as well as with Rakhine State and Sagaing and Magway Regions of Myanmar. It is the second smallest state in the union with an estimated population of only 478,690.¹ CRS is currently implementing a food and nutrition security project, Productive Agriculture for Community Engagement (PACE), supported by LIFT, a multi-donor funding consortium. Though the agriculture efforts in the PACE project focus largely on maize and beans, market opportunities are increasing for farmers in Chin as infrastructure continues to improve. As farmer interest shifts from maize and beans to market crops, it is important for the PACE team to have a better understanding of the farmers' broader market efforts, potentials and challenges. This study aims to explore the value chain enhancement potential of different crops cultivated by communities in three townships of Chin state, two of which (Falam and Thantlang) are targeted by the PACE project.

Though the study townships fall under a similar agro-climatic zone, there is significant difference in community cash crop preferences which is influenced by factors like socio-economic conditions of farmers, their access to markets, quality of irrigation, location of the villages and long-term aspirations. Yet, there were some commonalities in crop filtering parameters like profitability, low investment requirement, experience of cultivating particular crop/s and level of risk. Rapid improvements in infrastructure, namely roads, is facilitating better access of farmers to markets and improved agri-inputs. However, farmers' access to extension information on improved agricultural practices and to finance remains low leading to significant challenges in pre-production and production stages. Relatively easy access to agri-inputs like fertilizers and pesticides combined with limited knowledge of appropriate agrochemical use, and reduced soil fertility due to slash and burn farming systems, has resulted in excessive use of chemical inputs, especially for vegetable crops to increase and/or maintain farm productivity. Unabated, this can pose serious ecological, economic and health risks for communities in the medium to long term. While farmers seemingly content with the market prices and trader relations, the study found that lack of exposure to collective marketing and basic value addition possibilities is limiting their income potential.

The study found significant opportunities for working with farmers on pre-production, production and post-production aspects of cash crops like elephant foot yam, stinky beans, tomato, onion, grape and cauliflower to increase efficiencies on triple bottom line – profitability, community empowerment and sustainable use of natural resources. Some of the opportunities like increasing production and profitability can be realized through medium term (3-4 years) interventions while others requiring more extensive, collective behavior change like agro-enterprise development, access to financial services, crop diversification and capturing new markets, etc. will require longer term (5-6 years) interventions.

¹ Source: Population and Housing Census 2014

Contents

| | |
|--|----|
| Acknowledgements..... | 2 |
| Acronyms | 3 |
| Executive Summary..... | 4 |
| A.1 Background and Study Objectives | 7 |
| B. Methodology..... | 7 |
| B.1 Selection of Study Areas Townships and Villages..... | 7 |
| B.2 Data Collection Methods | 8 |
| B.2.1 Desk Review | 8 |
| B.2.2 Qualitative Data Collection | 8 |
| B.2.3 Data analysis and value chain prioritization | 9 |
| B.3 Challenges and Limitations | 9 |
| C. Findings | 10 |
| C.1 Profile of Chin State and Study Townships | 10 |
| C.1.1 Climate | 11 |
| C.1.2 Land Utilization and Tenure..... | 11 |
| C.1.3 Infrastructure | 12 |
| C.1.4 Agricultural Production Systems..... | 13 |
| C.1.5 Food Security and Key Social Indicators | 13 |
| C.2 Priority Value Chains – Tedim Township | 14 |
| C.2.1 Key VC Crops and Rationale..... | 14 |
| C.2.2 Market Map and Key VC Actors (Cauliflower) | 15 |
| C.2.3 Market Map and Core VC Actors (Grape)..... | 15 |
| C.2.4 Challenges and Risks | 16 |
| C.2.5 Opportunities | 17 |
| C.3 Priority Value Chains – Falam Township..... | 18 |
| C.3.1 Key VC Crops and Rationale..... | 18 |
| C.3.2 Market Map (Onion) | 19 |
| C.3.3 Market Map (Tomato) | 20 |
| C.3.4 Core Value Chain Actors | 21 |
| C.3.5 Challenges and Risks (Onion and Tomato) | 22 |
| C.3.6 Opportunities (Onion and Tomato) | 23 |
| C.4 Priority Value Chains – Thantlang Township | 24 |

| | |
|---|----|
| C.4.1 Key VC Crops and Rationale | 25 |
| C.4.2 Market Map (Stinky Bean) | 26 |
| C.4.3 Core Value Chain Actors (Stinky Bean) | 26 |
| C.4.4 Challenges and Risks (Stinky Bean) | 27 |
| C.4.5 Opportunities (Stinky Bean) | 28 |
| C.4.6 Market Map (EFY) | 28 |
| C.4.7 Core Value Chain Actors (EFY) | 29 |
| C.4.8 Challenges and Risks (EFY) | 30 |
| C.4.9 Opportunities (EFY) | 30 |
| C.5 Business Service Providers | 31 |
| C.6 Gender Analysis | 34 |
| E. Recommendations | 37 |
| F. Conclusions | 39 |

A. Introduction

A.1 Background and Study Objectives

CRS has been working with partners organizations in Myanmar since early 1990s. CRS set up an office in Myanmar in 2011 and signed a Memorandum of Understanding (MoU) with the Ministry of Social Welfare, Relief and Resettlement in 2016. Currently, CRS has projects focusing on emergency response, agriculture and nutrition, health and natural resources management. Productive Agriculture through Community Engagement (PACE), is a three-year project supported by a multi-donor Livelihoods and Food Security Trust Fund (LIFT) fund and being implemented by CRS in three township, namely, Falam, Thantlang and Matupi, in northwestern Chin state and focused on increasing household food security, income, and nutrition.

The PACE project is half way complete and CRS intends to conduct a value chain study to develop a road map for formulating agricultural value chains strategy in Chin state. The value chain development and upgrading strategy will enable CRS, KMSS, State and Township Government, and communities to develop inclusive, competitive and resilient value chains (gender and youth sensitive and possibly nutrient-rich value chains). This will help producers (men, women and youth) and groups become market ready and engage with sustainable value chains and markets for economic growth and poverty alleviation.

The current study focused on an in-depth exploration of value chain intervention potential for various key crops produced by the communities with an intention of arriving at top two to three most potential crops. Following were the key objectives –

- I. Conduct a scoping exercise with territorial approach with focus on partnerships & organization, product selection and business development services.
- II. Selection of priority value chain products (2-3).

B. Methodology

B.1 Selection of Study Areas Townships and Villages

The analysis was conducted in three townships within northern Chin State—Falam, Thantlang and Tedim. CRS Myanmar is currently implementing the PACE project in Falam and Thantlang and hopes to build on project activities in this area through the introduction of a value chain programming component. LIFT consortium member, CORAD is currently implementing activities in Tedim; however, value chain activities are nascent and limited to a small number of villages, thus there is opportunity to complement and support CORAD value chain activities in other villages within the township. The analysis team visited two villages within each township during the data collection process. Current PACE villages were prioritized for Falam and Thantlang townships, and villages with known market-oriented agriculture activities were prioritized in Tedim township. Villages visited are listed in table 1.

Table 1: List of Villages Visited

| State | Township | Villages Visited |
|-------|-----------|------------------|
| Chin | Falam | Laizo |
| | | Lungbum |
| | Thantlang | Khuahrang |
| | | Tlangrua |
| | Tedim | Vangteh |
| | | Ngen Nung |

B.2 Data Collection Methods

The value chain analysis methodology consisted of a desk review and primary data collection through a territorial analysis approach and use of qualitative tools.

B.2.1 Desk Review

The desk review was conducted prior to field visit and following the field visit to corroborate findings. Key documents reviewed included:

- PACE project documents including proposal and progress reports
- A recent value chain analysis conducted by the LIFT consortium member CORAD
- Relevant government policies and reports related to population census, agriculture, economic development and demography of Chin State.
- Other sectoral reports produced by agencies like Asian Development Bank, World Food Programme, Food & Agriculture Organization and Myanmar Institute for Integrated Development etc.

B.2.2 Qualitative Data Collection

Qualitative data was collected through focus group discussions (FGDs) with farmers and farmer groups and key informant interviews (KIIs) with value chain actors. Key value chain actors targeted in the analysis included core actors such as producers, collectors/aggregators, wholesalers, processors and retailers; service providers such as microfinance institutions, transporters, extension and technical service providers including the department of agriculture, other NGOs; and when possible, regulatory or governing actors.



Interpreters Practicing Tools during Orientation in Hakha

The value chain analysis leads developed guides for the focus group discussions and key informant interviews that are based on guidance from the Rapid Market Appraisal Manual and contextualized for Chin State based on information from the desk review and conversations with CRS-Myanmar staff.

The analysis team which included three CRS staff, one partners staff from KMSS and five enumerators assembled in Hakha, Chin state for a two-day tool orientation and training workshop. During the workshop the analysis leads discussed best practices for facilitating focus group discussions, clarified the study objectives and ensured that the enumerators

understood the objectives and questions to be posited during each focus group discussion and key informant interview.

Following the training workshop, the study team broke into three sub-teams and traveled to the respective townships for the week-long data collection process. The teams began with focus group discussion with male and female farmers. The farmer discussions led to the prioritization of a short-list of cash crops—three per village. Criteria considered for initial crop selection included:

- Percent of farmers growing the crop for sale
- Farmer experience in growing the crop
- Potential for value addition
- Initial investment requirements
- Profitability
- Existing markets
- Environmental impact of growing the crop at scale
- Farmer interest and risk-taking ability
- Common crop preference of men and women

The list of prioritized crops helped to frame subsequent conversations with other value chain actors. A list of all actors interviewed can be found in Annexure 1. One of the analysis sub-teams also traveled to the town of Kalaymyo in Kalaymyo District to interview wholesalers and input suppliers as interviews in the townships revealed that the town is a major market for many of the farmers. A list of actors interviewed can be found in Annexure 1.

B.2.3 Data analysis and value chain prioritization

An analysis workshop was held in Hakha Town on May 7-8. The three sub-teams re-convened and met along with PACE project staff to agree upon a short-list of six promising value chains (two per township), identify opportunities and challenges related to each value chain as well as those specific to women, map the prioritized value chains and identify information gaps and any necessary follow-up. This information was then presented to the Myanmar country program on May 11 and used as an input to guide further value chain prioritization using the Value Chain Prioritization Matrix tool from CRS' Value Chain Toolbox.

B.3 Challenges and Limitations



An FGD in Progress in Laizo Village, Falam

There were several challenges encountered during the value chain analysis process that limited the team's ability to ensure robust information. These were:

- Most enumerators did not have a strong background in agriculture, thus their ability to probe or request clarifications of information that seemed questionable was limited.
- Laizo is newly established village where communities relocated following a major landslide in their original village. Most of the communities are engaged in off-farm activities as agriculture is yet to be established in the village. This community was an outlier.
- Untimely rains limited availability of farmers for participation in FGDs.
- There was high heterogeneity between villages with regard to prioritized crops. This could make it difficult to hone in on one or two value chains that could be promoted in all target areas.

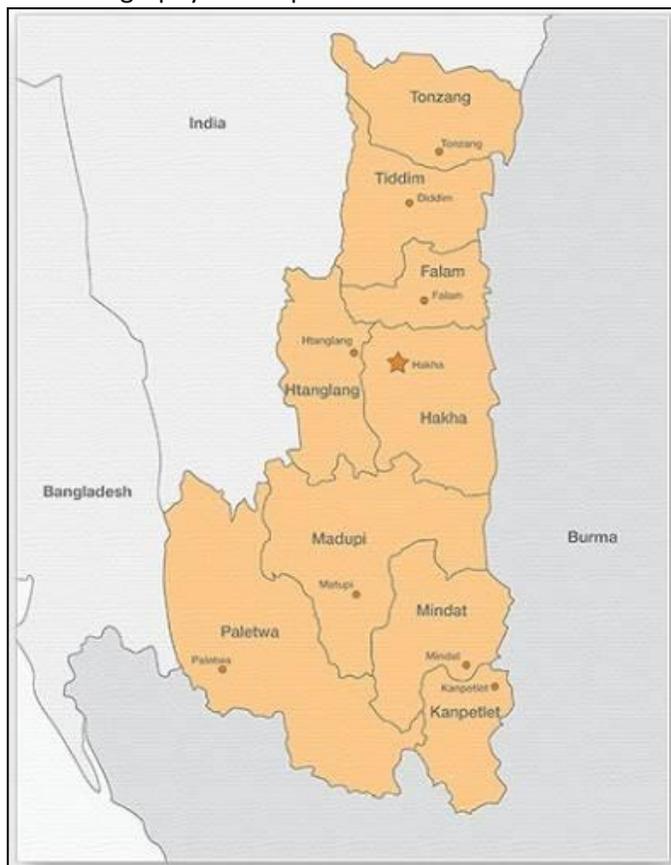
- Farmers and traders had limited information on commodity movement from Kalaymyo making it difficult to create comprehensive value chain maps.

To address some of the challenges listed above it would have been beneficial to include an additional day prior to data collection to accompany enumerators as they field tested the tools. As a group we could have then addressed any residual uncertainty about the objectives and questions of the KII and FGD guides and discussed what expected ranges may be for crop yields, labor and input requirements, etc. This would have helped enumerators to flag concerning information and immediately probe further. Regarding village selection, it would have been helpful to have clearer selection criteria so that could have been communicated to the partner KMSS staff who were coordinating visits. Depending on the proposed scope of the value chain intervention, it may be necessary to conduct FGDs in additional villages to identify larger trends in cash crop production. It may also be necessary to spend more time in Kalaymyo and other major market towns to fully understand product flow.

C. Findings

C.1 Profile of Chin State and Study Townships

C.1.1 Geography and Population²:



Chin State is located in the western part of Myanmar and shares borders with India and Bangladesh as well as with Rakhine State and Sagaing and Magway Regions. With an estimated population of only 478,690³, it is the second smallest State in the Union (about 1% of Myanmar’s total population). In area, Chin State is 13,907 square miles, or 5.3% of total area of Myanmar. Its population density is very low, < 14 persons per square km. Chin State is known as the “Chin Hills” due to its mountainous geography. Its mountain ranges run north to south throughout the length of the State and have an average elevation of 5000 to 8000 feet, with the highest point being Mount Victoria at 10,500 feet (3,200 m). The mountains are steep with very narrow valley floors providing little flat land for agriculture. The terrain is extremely rugged, creating major problems for road construction and agriculture and affecting all aspects of peoples’ lives.

The administrative capital of Chin state is

Hakha and the state is divided into three districts and nine townships as below –

² Source: Support to Chin State Comprehensive 5-Year Development Plan and Annual Planning 2016-2021

³ Source: Population and Housing Census 2014

Falam district: Falam, Tedim and Tonzang township

Hakha district: Hakha and Thantlang township

Mindat district: Mindat, Matupi, Kanpetlet and Paletwa township.

Each Township is made up of number of villages. Villages are grouped into Village Tracts led by a Village Tract Administrator elected or publicly chosen by villagers.

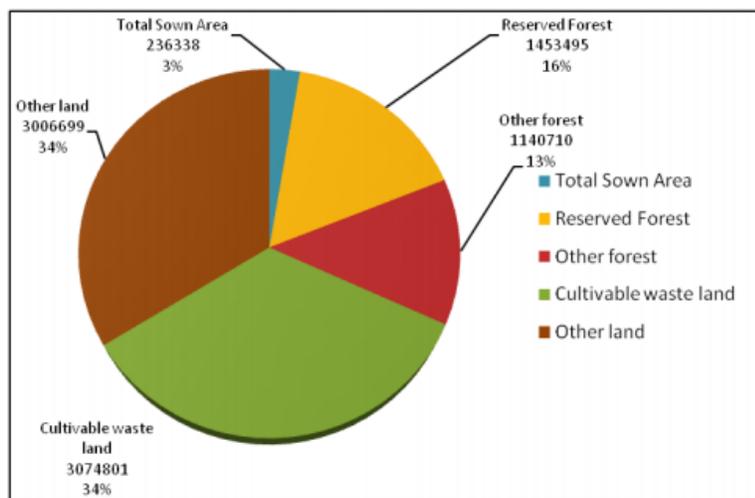
| Township | Population ⁴ | Sex Ratio (M/F) | Cultivable Land (Acre) | Per Capita Income (MMK) |
|-----------|-------------------------|-----------------|------------------------|-------------------------|
| Tedim | 87,623 | 91.8 | 29,021 | 219,565 |
| Thantlang | 50,374 | 93.8 | 28,489 | 263,953 |
| Falam | 41,457 | 96.4 | 24,925 | 240,779 |

C.1.2 Climate

The climate is monsoonal in character with April and May being the hottest months, with average, daily maximum temperatures in excess of 30 degrees C; November to January are cold with minimum temperatures as low as minus 4.4 degrees C. Temperature has a significant effect on agricultural production. Cooler temperatures provide an opportunity to grow many vegetables and fruits (e.g. strawberries) and horticultural crops (e.g. grapes and stone fruit) that will not grow in Myanmar’s hotter, Dry Zone plains. Most rain occurs in the warmer months from May to October and peaking in August. The average total annual rainfall across the state is about 1800 mm. The dry months are November to January. However, it should be noted that rainfall varies across the State according to topography and elevation and impacts crop yields in each area. Chin State has very little irrigated land and any prolonged dry period during the growing season is a high risk-factor impacting food security in households throughout the State.

C.1.3 Land Utilization and Tenure

The State’s primary natural resources are forest-based, although severe long-term deforestation means just 16% of land is covered with “reserved forest” and 13% with “other forest”. Most of the population depends on agriculture for their subsistence, while only 3% of the land area is cultivated. An estimated



34% of land is designated by the Government as “Cultivable Wasteland”, making it suitable for agriculture such as paddy (rice land), ya (dry land), and garden land. The government can grant this land to state-owned economic organizations, joint ventures, other organizations and private individuals to use for agriculture, livestock breeding or aquaculture enterprises. Under the category “Other land”, grazing ground, roads, towns, villages,

⁴ Source: The 2014 Myanmar Population and Housing Census, Chin State, Census Report Volume 3D

railways, dams and irrigation canals, factories, mines, ponds, lake and river, etc. are included. Pic (– Breakdown of land use across Chin State, by land use type).

The allocation of areas to be cultivated by individual households is decided collectively and annually by the community. A Land Administration Committee or the Village Tract Administrator manages this process. Plots of one to four acres are distributed to households based on family size, available labor, and past record in using the plot. Land purchasing has not been part of traditional practice but has started in some villages. With the increased interest in the highly profitable cultivation of Elephant Foot Yam (EFY) business people from the main town have been buying land in surrounding rural villages.

⁵The Farm Land Law was passed in March 2012. Under this law, existing farmers are, in theory, allowed to mortgage, rent, and exchange or sell their land. There remains, however, numerous bureaucratic procedures that complicate the selling and buying of land, and few farmers have been able to take advantage of the new law. The Vacant, Fallow and Virgin Land Management Law, passed at the same time as the Farm Land Law, allows national companies, private investors and others to utilize vacant, fallow and virgin land for agricultural and livestock projects. Now, 381 private companies have been granted 0.96 million hectares for commercial farming in the country.

C.1.4 Infrastructure

Chin State lacks effective road infrastructure, and this affects everything from agriculture and industry to health and education. Poor roads make exporting agricultural or industrial goods very expensive and often, not competitive on the open market. Imports are also expensive, increasing production costs for agriculture and industry and adding to living costs for the entire population. This is especially difficult for those communities that are not self-sufficient in food. There are very few towns in Chin State that have reliable 24-hour electricity supplies. Much of the current generating capacity is hydropower and nearly all schemes do not have sufficient capacity to meet the demand, forcing a need to rotate supply to consumers.

Chin state is the least developed among Myanmar's 14 states and regions and has suffered from lack of foreign direct investment (FDI). According to Directorate of Investment and Company Administration (DICA), Chin state is the only region in the country with zero investment between fiscal years 1994-95 and 2017-18. FDI is absent even though all nine townships of Chin enjoy a tax exemption up to seven years. One of the key reasons for low FDI has been poor infrastructure and geographical location. Agribusiness, with focus on cash crops, has been identified as one of the key sectors with high impact potential⁶.

As per 2015 data from Ministry of Agriculture and Irrigation, about 16.2% of cropped area is irrigated from dams and pumping stations in Myanmar. Water management along the tertiary canals is mainly under the responsibility of informal water user groups⁷.

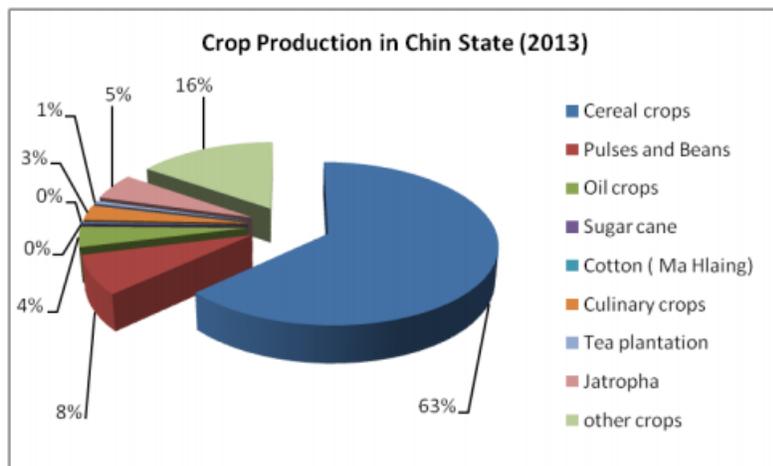
⁵ Source: Special Report FAO/WFP Crop and Food Security Assessment Mission to Myanmar; 16 March 2016

⁶ <https://www.mmtimes.com/news/dirt-poor-chin-state-hidden-gem-investors.html>

⁷ Source: Special Report FAO/WFP Crop and Food Security Assessment Mission to Myanmar; 16 March 2016

C.1.5 Agricultural Production Systems

Within the sown areas there are five categories of farming: a) wet land farming (paddy cultivation); b) dry land farming; c) horticulture land; d) alluvial land; and, e) hill plot.



An estimated 80% of the sown areas are occupied by hill plots. Of a total sown area of 236,338 acres, approximately 80% is under shifting cultivation. All the townships have a very low ratio of total sown area. The crops grown are determined primarily by elevation. Cereals make up 63% of total crop production. The category “Culinary crops” (3% of the total area)

consists of onion, chilly, garlic and ginger. The category “Other crops” (<1% of land area) consists of perennial crops, fruit trees and vegetables.

54% of the cereal production is rice. Other production includes maize, red millet and yellow millet. Rice and maize are grown for home consumption but with larger holdings, some are sold. Maize is mainly used for human consumption with some used to feed pigs and poultry. About 18,000 acres of millet is planted and used mainly for alcohol production or is sold for cash. Rice is planted both in shifting cultivation (upland rice) and on terraces (wet land rice – either rain-fed or irrigated). The main cash crops are potatoes, sunflower, groundnut, lentil bean, soy bean, and niger.

An estimated 80 % of cultivation in Chin State is shifting cultivation. Crop yields for paddy and maize in Chin State are among the lowest in Myanmar. This is due to poor soil, poor access to improved seeds, limited use of chemical fertilizers and poor water availability and management in paddy production. There is considerable potential to increase production in most of the crops currently being grown using improved seed/planting material and where appropriate applying the correct amount of chemical fertilizer. However, despite possible increase in yield of low value staple crops, the farmers in the hilly areas may not be able to compete with farmers in the lowlands who have better access to inputs and transportation.

C.1.6 Food Security and Key Social Indicators

Most villages in Chin State experience food shortages every year, usually in March and April, immediately before the arrival of the monsoon. Coping strategies include the growing of cash crops and/or the cutting of firewood for sale to purchase food. This insufficiency of food production is reflected in the health of the children of Chin State– A UNICEF/MICS “Myanmar Multiple Indicator Cluster Survey 2009-2010” found 9.4% of Chin children are under 2500 g (5.5 lbs) at birth, ranking Chin State as the state in the Union with the worst indicators of underweight babies. More than 30% of children are undernourished and 58% suffer severe to moderate stunting. These are also the poorest nutritional indicators of any state in the Union.

For the year 2013-2014 the Gross Domestic Product (GDP) per capita for Chin State was only MMK 330,000 (US\$ 336) compared to about MMK 730,000 (US\$ 745) for Myanmar as a whole. The overall employment rate in Chin State is estimated at 54%. The poverty rate in Chin State is 73%, the highest in the country. The State only produces about 70% of the grain it needs.

C.2 Priority Value Chains – Tedim Township

Tedim Township located within Falam District in Northern Chin State has the largest population of all Chin State Townships. The two villages visited within this township were Vangteh (360 HH) and Ngen Nung (160 HH), located at 18 and 6 miles from Tedim Town, respectively. Both communities practice permanent agriculture on hillsides and grow both subsistence and cash crops. Although, production of cash crops is more recent in Ngen Nung village. Average landholding in Vangteh is 2 acres and two-thirds of farmers have access to gravity-fed irrigation. Landholdings are smaller in Ngen Nung at one acre, and 40% of farmers have access to irrigation. Loss of soil fertility is a challenge in both communities.

C.2.1 Key VC Crops and Rationale

The key crops produced in the study area included maize, beans (6 varieties), mustard leaf (*Brassica juncea*) and taro for staple crops and cauliflower, cabbage, tomato, garlic, grape and again mustard leaf for cash crops. Focus group participants preferred cauliflower and grape for income generation for the following reasons:

Cauliflower

- Most households in Vangteh are cultivating cauliflower and have a substantial experience
- The price is relatively stable compared to other vegetables
- The price is higher than for cabbage, another commonly grown crop
- Demand for cauliflower is high because few communities are producing the crop
- Potential to increase profitability by reducing production costs
- Cost-benefit ratio of 1.6 and net profit of \$403 per acre using conservative estimates.⁸
- Peak growing season in Tedim complements growing seasons in other production areas (Kalaymyo, Kalewa), so prices remain relatively high.
- There is little competition with imported cauliflower

Grape

- There is high and growing demand for grape by local winemakers; there is a known buyer who will purchase all available production
- Prices have been stable and are now increasing
- Grape cultivation is not labor intensive once plantations are established
- Perennial crop
- Cost-benefit ratio of 2.3 and net profit of \$580 per acre.
- There is strong interest in grape growing on the part of the community, and farmers are already investing in new plantations or expansion of existing plantations.

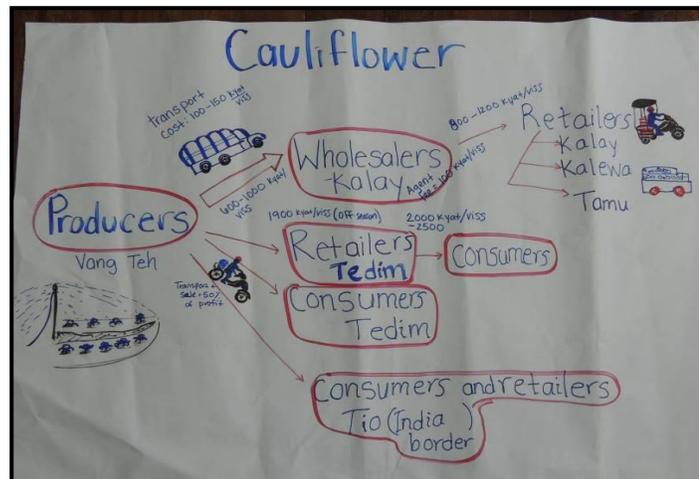
⁸ The labor costs for land preparation and harvesting reported by the farmer entrepreneur who was interviewed for the profitability analysis were very high and likely atypical for the area.

- The government of Myanmar has selected this as a priority crop for the township. And, while this does not necessarily translate to significant investment in this value chain, other NGOs like CORAD and the Department of Agriculture are interested in supporting grape production and the local wine-making industry.

C.2.2 Market Map and Key VC Actors (Cauliflower)

The cauliflower value chain in Tedim township is a short value chain in which farmers sell directly to informal wholesaler markets, informal retailer markets, or even directly to consumers. From Vangteh the produce is transported by truck to farther markets (Kalaymyo) or by motorbike to local markets (Tedim Town, India border). From the large market town of Kalaymyo, wholesalers sell to retailers who then onward sell in Kalaymyo, or other large towns including Kalewa and Tamu at the Manipur state bordering India. Farmers indicated that their preference is to sell to wholesalers in Kalaymyo, but if prices are too low, they will instead choose to sell to nearby Tedim town or Mizoram state on India border. Currently, farmers are not aggregating their product; they sell individually to wholesalers or retailers.

The farmers in Vangteh communicate with wholesalers in Kalaymyo or India border towns via phone to discuss current prices, supply and volume demands. They have no other source for market information services. Although wholesalers may offer a price range, the final price is only set when the produce arrives to the market town. Depending on available cash, the wholesalers may purchase the produce from the farmers. More commonly, though, they charge a brokerage fee or agent fee of about K60 per kilogram for selling to other wholesalers or retailers.

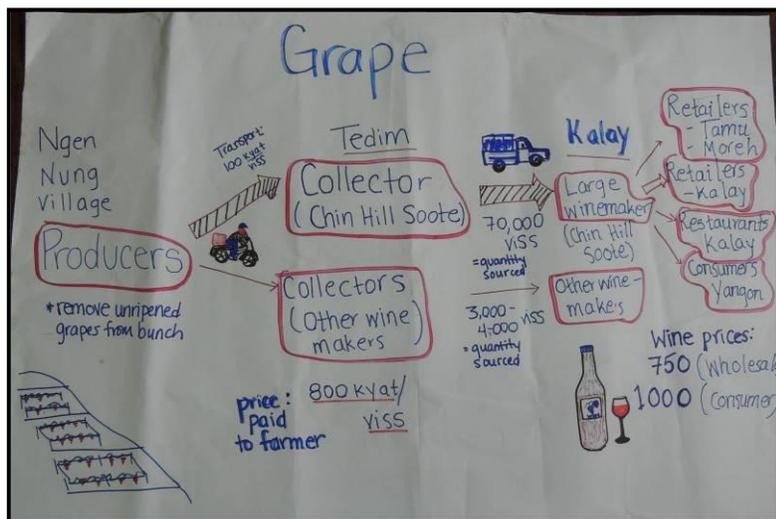


Transporters play an important role in this value chain and help to facilitate the transaction between farmers and wholesalers. They transport product directly to wholesalers for a fee of MMK 60-90 per kilogram. This fee is paid from the wholesaler to the transporter and deducted from the profits of the farmer. To reach local markets, many farmers rely on neighbors with motorbikes to transport their goods who act as transporter cum sales agents. These local transporters often charge 50% of the sale price for transporting and selling goods in local markets like Tedim town.

See table under C.3.4 for a summary of core actors involved in the cauliflower (as well as onion and tomato) value chains.

C.2.3 Market Map and Core VC Actors (Grape)

The grape value chain is also an example of a short value chain. Farmers in Tedim township sell to processors (winemakers) who then sell wine wholesale to retailers or directly to consumers. Core actors in the chain are producers, winemakers and retailers including shops and restaurants. Farmers transport grapes to Tedim Town where they sell directly to local winemakers or to Chin Hill Sootte who has collectors located in Tedim Town. Farmers who do not have their own transport pay 0.05 USD per kg to transport grapes 6 miles from Ngen Nung to Tedim Town. Last harvest, farmers earned K490 per kilogram, but grape buyers have made a verbal commitment to pay MMK613 per kilogram for this year's



harvest.

There are five winemakers in Kalaymyo town. The largest is Chin Hill Sootte who has been producing wine from Chin State grapes for five years. The owner currently purchases grapes from more than twenty villages in Tedim township and produces over 50,000 bottles of wine per year. The core business is production of the sugary table wine that is common in the region. Chin Hill Sootte sells directly to consumers for MMK1000 or wholesale to retailers in Kalaymyo, Tamu and the India border towns of Tamu and Moreh at MMK750 per bottle. The proprietor also produces aged wines and would like to expand production of these in the future. The finer wine does not appear to be of a high quality, and he could also benefit from technical assistance to improve the quality of the wine.

There are also a couple of smaller winemakers in Tedim Town, however, they produce their own grapes. These smaller winemakers sell wine from their homes or local small shops and restaurants. One winemaker interviewed produces between 500 and 1000 bottles of wine per year which he sells for MMK2500 – MMK3000.

C.2.4 Challenges and Risks

| Type of Risk/Challenge | Cauliflower | Grape |
|--|---|--------------------------------------|
| | Level of Risk ⁹ (High, Low, Medium) | Level of Risk (High, Low, Medium) |
| Susceptibility to pest and disease: Both cauliflower and grapes are susceptible to pests and disease. Farmers apply high amounts of pesticides without knowing the correct product, dosage and timing. | High | High |

⁹ Level of risks are analyzed as perceived by farmers

| | | |
|--|--------|--------|
| This has both economic and environmental/health consequences | | |
| High barrier/cost to entry: Cauliflower and grape are both knowledge intensive to produce relative to other crops. Establishment of grape arbors is also cost-prohibitive for many farmers. | Medium | High |
| Post-harvest losses: For cauliflower, losses occur due to exposure to moisture during the rainy season which can cause heads to rot. Browning cauliflower receive a 50% price reduction in the market. Grape losses occur because of lack of uniform ripening of the bunch; buyers will not accept unripe grapes and farmers must remove them. | Medium | Medium |
| Loss of soil fertility: Cauliflower production is input-intensive. Many farmers do not practice good soil fertility management and must apply increasing amounts of fertilizers to maintain yield. | High | Medium |
| Change in supply: Currently there are few villages in the region producing cauliflower, however, more villages are seeing a market opportunity and beginning to produce the crop. Increases in supply could cause the market price to decrease. For grape, there is an over-reliance on one primary buyer who purchases 70% of the volume produced in Tedim. If this buyer is no longer present, then demand for grape could drastically reduce. | Medium | Medium |
| Scaling up: Land-constrained farmers and poorer farmers who still need to produce subsistence crops may not have the necessary land and/or capital available to be able to scale up grape and cauliflower production. Small winemakers lack finance and infrastructure to increase the volume of the wine they produce. | Medium | High |
| Lack of technical assistance: There is little to no technical assistance available. For newer crops, such as grape, farmers may not be aware of good agricultural practices and practices specific to their climatic conditions. Lack of technical knowledge may affect the quality and yield of grape. More training is needed in general in soil fertility management and integrated pest management. For the larger winemaker in Kalaymyo, there is a need for technical assistance to improve the quality of wine in order to penetrate new markets. | Medium | High |

C.2.5 Opportunities

Cauliflower

Most immediate opportunities for value chain upgrading and increasing farmer profits are related to increasing production efficiency, timing production to coincide with times of low supply and higher prices, and greening of the value chain. Farmers are investing a great deal in the purchase of agri-inputs,

namely synthetic fertilizers and pesticides, and much could be done to reduce costs and applications. Other opportunities include:

- Improve post-harvest handling to avoid browning of crown and significant reductions in price.
- Soil testing to identify nutrient deficiencies such as Boron which can result in browning of the cauliflower crown.
- Facilitate improved market information services and help farmers to plan production in order to take advantage of periods of low regional supply. This may be easier for more well-off farmers who do not need to dedicate land to staple crop production and thus have greater flexibility in timing of cauliflower planting, as well as those farmers with access to irrigation.
- Explore options for improved storage and home processing and consumption
- Promote aggregation and collective marketing to reduce transaction costs and achieve economies of scale
- Look at current nursery practices and promote improved practices if needed to reduce seed input costs.

Currently, Vangteh farmers benefit from the comparative advantages of producing a somewhat unique product and having the know-how to produce the product relatively well. If more villages in Tedim township and other surrounding areas begin to produce the crop or if Chinese imports enter the market, then they may lose these comparative advantages. It may be of interest to explore market opportunities for other similar products such as broccoli.

Grape Near-term opportunities to support the grape value chain are through product upgrading—both for farmers and winemakers, training in improved production practices to increase grape quality and reduce agrochemical use and to improve wine quality. To address lack of uniform ripening, leaves should be removed to facilitate ripening and increase in sugar content. Additionally, farmers could explore product diversification such as the production of grape juice and raisins. CORAD is also supporting a small number of grape producers in the villages of Lim Khai and Se Zaang to increase quantity and quality of grapes and strengthen relationships with buyers. CRS-Myanmar could explore potential collaborations with CORAD to increase scale of grape value chain support.

Longer-term opportunities are promotion of improved varieties (which will require research) that could increase opportunities for selling to fine winemakers or to the fresh market as table grapes, and promotion of a regional appellation or brand to increase visibility of Tedim wines.

C.3 Priority Value Chains – Falam Township

Falam township is located in the northern part of Chin State. Falam town is situated at about 3hrs drive from the Chin State headquarter of Hakha town. The topography is mostly hilly with majority of the communities practicing slash and burn for agriculture. The average landholding is one acre. Almost 50% of the households in the assessed village had access to irrigation done through gravity systems.

C.3.1 Key VC Crops and Rationale

The key crops produced are - maize, onion, coriander, garlic, grapes, pumpkin, beans, tomato, cabbage, cauliflower, ginger. The staple crops are maize and rice, though rice is not produced by the communities and bought from markets.

The most preferred crops by communities for generating cash income were onion and tomato for the following reasons –

- All households grow onion and almost 80% households grow tomato
- Onion and tomato are being grown for the last 10-15 years and hence there is high degree of community familiarity with these two crops
- Reasonably good climatic conditions for production
- The crops contribute significantly to the household income
- Tomato is grown more than twice a year by at least 40% of the farmers
- Production of these crops has been increasing moderately over the last five years
- Onion and tomato are easy to market, and communities never faced challenges in sale
- Market prices for onion and tomato have been satisfactory over the last ten years with no major fluctuations reported
- Onions are not perishable and hence can be stored and sold when the prices are favorable
- High BC ratio of 2.7 (net profit of \$517 per acre) and 3.3 (net profit of \$1556 per season per acre) for onion and tomato respectively. detailed BC analysis is given in Annexure 2.

C.3.2 Market Map (Onion)



The study found that farmers sell about 70% of their onion production while the rest is used for domestic consumption. About 60-70% of the total sales are made to the wholesalers who are based in Kalaymyo town which is about 5-6 hrs drive from the villages. The rest of the produce is sold to the aggregators and retailers both within the village and Falam town. About 40-50% of the produce is sold immediately after the harvest in April-May and rest is sold in a staggered manner based on needs between June-September.

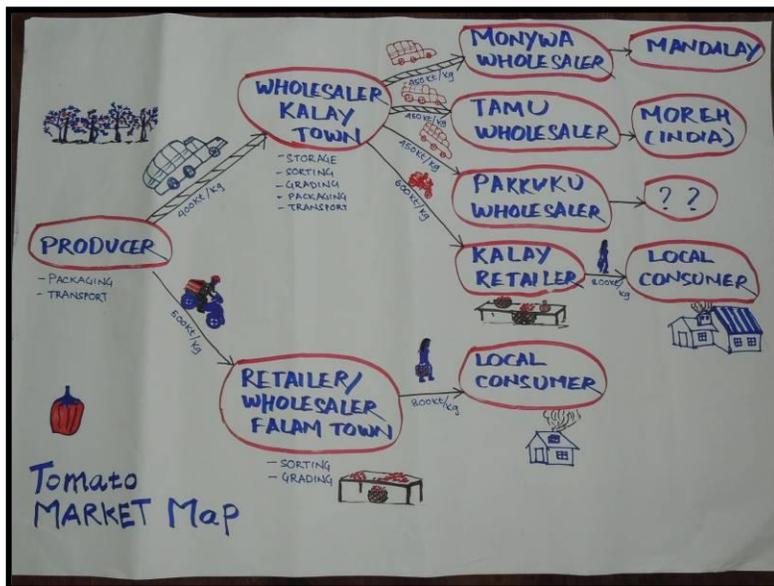
Market prices are lowest during the harvesting time in April-May (MMK500/kg). Prices gradually increase up to MMK 1000/kg in September. About 20-30% of the harvest is sold in Aug-Sep when the prices are high. The price is mainly decided by the traders. Due to existing good relationships with traders, the farmers don't enquire prices from multiple traders. Overall there is satisfaction among farmers with the price they are getting for onions. It needs to be noted that farmers have very little information about the market prices for onions in different markets and movement of onions to other markets from Kalaymyo. Farmers get about 20-25% higher price while selling it to retailers in Falam town as transportation is arranged by themselves. Farmers sell to wholesalers, retailers and aggregators depending on the volume. If the volume is large, then is sold to wholesaler and volume is very small, then sold to aggregators. When sold to wholesalers, the farmers receive payment in two to three weeks. However, farmers receive immediate cash payment when sold to aggregators and retailers as the quantity is often less.

The farmers arrange transportation themselves while selling it to aggregators and retailers, but the while selling to wholesalers, the transportation is arranged by the later. The common mode of transportation for farmers is motor cycle and buses while the wholesalers use trucks. Farmers sell their produce individually to buyers and awareness on collective marketing, its pros and cons is negligible.

Farmers sell the onions with very elementary value addition which includes segregating very small onions and packaging in 40kg bags. Both retailers and wholesalers prefer to buy onions which are sorted based on size and are willing to pay a higher price. However, farmers did not seem to have awareness on buyer requirements on sorted onions. Farmers also shared lack of time and additional labor requirements as one of the barriers for sorting.

C.3.3 Market Map (Tomato)

Farmers sell nearly 90-95% of their tomato production while the rest is consumed. Tomato is consumed fresh and there are no practices of storing tomato in dried or paste form. Tomato is sold to wholesalers in Kaley and retailers/wholesalers in Falam with about 60-70% of the produce is sold to Kaley. Farmers sell in Falam market when the volume is small, and they need immediate cash. There is considerable seasonality in tomato price which ranges from MMK400-MMK1200. The prices peak in August-September when the supply is low. Overall the price trend is increasing over the last three years with average price increasing from MMK300 to MMK500.



While selling to wholesalers the transportation is arranged by the wholesaler from Kaley. However, while selling to retailers/wholesalers in Falam, farmers arrange their own transportation. Sometimes farmer use motorbikes and other times they use buses. Bulk transportation through trucks is not available between villages and Falam. Farmers tend to get higher price when sold in Falam as they have to account for the transportation cost as well. Additionally, there is more scope for bargaining with retailers at Falam market compared to wholesalers at

Kaley. However, the Falam market is not big enough to absorb all the supply from nearby villages. With the wholesalers, there is little scope for price negotiations unless the demand is very high, and supply is low. Generally, there is no prior communication between the farmers and retailers/wholesalers in Falam for a sale event. Farmers turn up with their produce and price is settled through negotiations. Neither farmers nor traders seemed to have any challenges in such mechanisms. Farmers are paid in cash at the same time. However, payment can be deferred if both parties are agreeable to it.

Farmers, wholesalers and retailers are overall happy with the quality of tomato produced. Farmers don't do sorting/grading while selling. They only remove the very small ones and use for consumption. Rest all sizes are mixed and sold. The tomatoes are packed in wooden crates which are made by farmers themselves. Traders have preference for tomatoes which are neither too ripe nor too raw. Also, there is preference for bigger sized tomatoes. Most of the retailers grade the tomatoes into small and big ones and sell it at different prices. Retailers shared that they can provide better price if the produce is graded/sorted and quality is high as it saves their time and labor. However, no such concerted communications have taken place so far with the farmers.

Retailers in Falam don't have access to quality storage either individually or collectively. This results in at least 15-20% losses in volume and price. As the quality of tomato deteriorates, the retailers dispose it off by selling at a very low price. Due to storage problems, the retailers are not able to buy large quantities and take advantage when the prices are low. The retailers are willing to pay rent for good storage facilities (cheaper rental, less losses) if it benefits them.

C.3.4 Core Value Chain Actors

Following table highlights the type and role of key value chain actors in the onion and tomato value chains. These are also the core actors involved in the cauliflower value chain –

| Actor | Profile and Role |
|------------|---|
| Wholesaler | <ul style="list-style-type: none"> - Mostly located in Kalaymyo town and trade in multiple agri-commodities - Nearly 60% of the wholesalers in Kalaymyo are women - Apart from buying farm produce, also provide services like transport and agri-inputs like fertilizers to farmers without charging interest - Commodity prices are determined by wholesalers' association during beginning of the season. Wholesalers, by and large, adhere to the prices determined by the association. However, cases of providing slightly higher prices and/or add-on services, was also reported. - Take up value addition activities like sorting, grading and repackaging after receiving produce from farmers - Own large warehouses for storing produce - Some wholesalers also serve as retailers and engage in sale of agri-inputs like seeds, fertilizers, pesticides etc |
| Aggregator | <ul style="list-style-type: none"> - Are typically the large farmers and traders in the village with higher capacity to store and capital to buy produce from local farmers - Buy smaller quantities from farmers and sell to the wholesalers and retailer after aggregating a sizeable quantity - <i>There are no aggregators for Tomato.</i> |
| Retailer | <ul style="list-style-type: none"> - Located in all towns and trade in smaller quantities - Nearly 80-90% of the retailers are women and share space in market yards and/or operate from their homes or individual spaces - Buy farm produce from wholesalers and directly from farmers - Retailer prefer to do business with farmers rather than wholesalers as farmers are more flexible in price and payment terms. Similarly, |

| | |
|--|---|
| | <p>farmers also prefer to deal with retailers for the same reasons.</p> <ul style="list-style-type: none"> - Often face challenges in buying larger quantities and take advantage of lower sale prices due to storage and working capital constraints - Take up value addition activities like sorting and grading - Are open to providing small credit to farmers |
| Agri-input vendors | <ul style="list-style-type: none"> - Typically sell multiple products like grocery, hardware, construction material along with agri-inputs - Mostly sell inputs like pesticides, herbicides, fertilizers, vegetable seeds (small quantities) and sprayers - Very little awareness on recommended dosage of chemical inputs - Both men and women are engaged in this business |
| Transporters (non-core actor) | <ul style="list-style-type: none"> - Transport products to larger markets like Kalaymyo from township centers or villages - Charge per unit of weight or by the bag depending on the crop - Transporters facilitate transactions between farmers and wholesalers; wholesalers will send payments back to farmers via transporters and sometimes inputs such as fertilizer and pesticides |
| Microfinance Institutions (non-core actor) | <ul style="list-style-type: none"> - See Business Support Services Section |

C.3.5 Challenges and Risks (Onion and Tomato)

| Type of Risk/Challenge | Tomato Level of Risk ¹⁰ (High, Low, Medium) | Onion Level of Risk (High, Low, Medium) |
|---|---|--|
| <p>Farmers are using high doses of chemical inputs like fertilizers and pesticides without appropriate technical guidance or knowhow. In some cases, the use was 2-3 times more than the recommended levels. Such high level of chemical inputs not only increases the cost of production, but also contributes to soil degradation and pollution of water sources in the long run.</p> | High | High |

¹⁰ Level of risks are analyzed as perceived by farmers

| | | |
|--|--------|--------|
| Lack of adequate water or drought like conditions during critical stage like bulb formation etc impact the quality and quantity of production. Tomato production is even more sensitive to water as it is grown 2-3 times a year including dry seasons. Onions are particularly more sensitive to humidity and associated fungal diseases such a late blight and grey mould and often require different practices and varieties for different seasons. | High | Medium |
| Post-harvest losses in onion are estimated to be around 12-15% (400-600kgs per HH per year), mainly due to poor storage conditions at home. The maximum damage is reported during rainy season due to exposure to moisture. | Low | Medium |
| Farmers mostly don't have access to credit from formal financial institutions. Hence increasing area under onion and tomato crops may pose challenges as farmers would need capital for land clearance, labor and other inputs like irrigation. | Medium | Medium |
| Market demand for onion and tomato has been increasing steadily over the last 10 years. Traders and buyers don't foresee a significant decline in price in the event of spike in local production as there is high demand in Kalaymyo and other secondary markets. The onions have shown a steady increase in price from MMK850/viss in 2010 to MMK1600/viss in 2017. | Low | Low |
| Farmers don't have access to timely and reliable extension services from government, NGOs or other sources like input vendors. The government extension is limited by financial and human resources and hence does not have the wavelength to reach remote communities. The input vendors also don't have the technical insights and experience to guide the farmers. | Medium | Medium |

C.3.6 Opportunities (Onion and Tomato)

Balanced Use of Chemical Inputs:

Use of chemical inputs like pesticides and fertilizers has increased significantly over the last 10 years coinciding with the trend of communities shifting away from shifting cultivation. As per the agriculture department at Falam, the use of fertilizers is increasing 15-20% every year in order to increase the production. Farmers also reported use 2-3 times higher use of fertilizers than the recommended levels. Similarly, pesticides are being used as a preventive measure even without pest incidence. The indiscriminate use of chemical inputs is mainly influenced by the behavior of big farmers in the communities. Short supply of organic fertilization material like compost, manure etc, is also contributing

to increased dependence on chemical inputs. While all these measures are contributing to increasing production, in the long run the risk of soil degradation is high.

There is a great scope of promoting balanced use of chemical inputs by addressing the skill and knowledge gaps in farmers. It can be done through proven best practices like demonstration plots and farm field schools. Locally appropriate option of organic fertilization can also be piloted and promoted.

Promoting Soil and Water Management:

Hilly topography and reduced vegetation coverage due to shifting cultivation is contributing significantly to erosion of top soil and reduced moisture content in soil immediately after the monsoon season. Both factors are leading to reduction in yield and quality of onions and tomato which is acknowledged by the farmers. This provides for a great opportunity to work with farmers for promoting locally appropriate and cost-effective soil and water conservation measures.

Reduce Storage Losses:

About 12-15% storage loss in onion was reported which included rotting losses and sprouting losses. The losses were higher for farmers who did not have adequate storage space. Low cost and effective onion storage models using locally available materials like bamboo and wood can be promoted by integrating key storage principles like proper ventilation and raised storage platform.

Value Addition:

Both wholesalers and retailers shared their willingness to offer higher prices for sorted and graded onions and tomatoes. Such basic value addition is not being done by farmers as they are not aware of the higher price that traders are willing to offer. While sorting and grading will increase the farmer workload, it will also provide an opportunity to increase their income. However, strong facilitation and negotiations are needed to ensure that farmers are not exploited by offering higher price for small quantity of larger tomatoes and prices of smaller tomatoes significantly discounted.

Collective Marketing:

For commodities like onions and tomatoes, the prices are determined by the wholesalers' association at Kaley. Majority of the traders follow the prices determined by the association, however, during years when there is high demand and low supply, the traders tend to get competitive and offer different prices to farmers. Farmers generally don't engage in any price negotiation with traders due to a variety of reasons like trust, lack of alternatives, perceived high opportunity cost in market investigations and lack of skills. Collective marketing can be a feasible option for farmers to access markets with higher profitability.

Seed Production:

The local varieties of tomato and onion are considered suitable for the climatic conditions and preferred by the consumers for its taste. Farmers produce and use their own seeds for onion and tomato. Seed replacement is very low barring few occasions when farmers exchange seeds with other farmers in the village during need. While the study did not delve deep into the seed production issues, there could be opportunities of strengthening the existing community practices around seed production (quality of OP lines) and storage.

C.4 Priority Value Chains – Thantlang Township

Thantlang township is located in Hakha district and almost 50-60% of the households are engaged in agriculture as their primary livelihood option. The average landholding is 2-3 acres. Access to irrigation is limited with households owning land in low lying areas and the rest of farms are rainfed. Lack of capital

to invest in irrigation material is one of the limiting factors as well. Slash and burn practices are still prevalent but the trend of permanent agriculture is picking up in general

C.4.1 Key VC Crops and Rationale

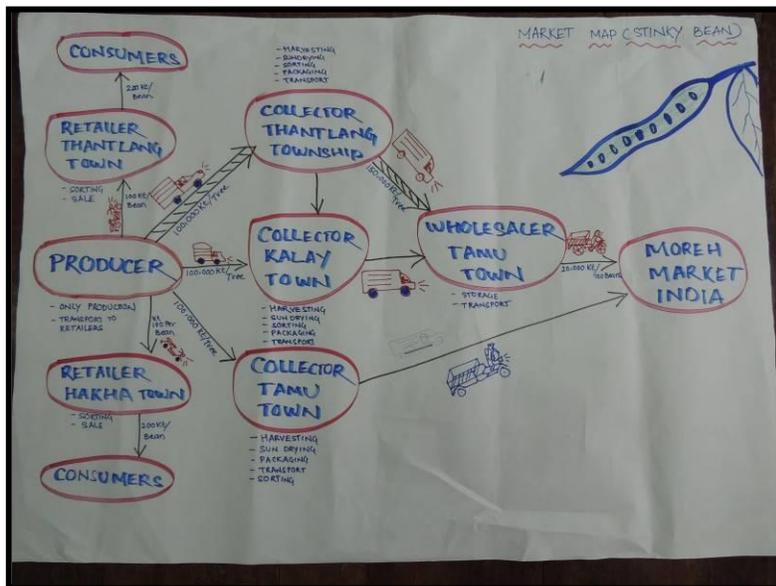
The key crops grown by communities include – maize, rice, millet, beans, potato, pigeon pea and elephant foot yam (EFY), stinky beans (*Parkia speciosa*) and seasonal vegetables like chili, brinjal, cabbage, garlic, onion and pumpkin etc. The key crops which are sold for income generation are EFY, stinky beans, chilly, garlic, onion and brinjal.

The study identified EFY and stinky beans are most preferred crops for generating cash income for the following reasons –

| Stinky Bean | Elephant Foot Yam |
|---|---|
| Suitable for local soil and climatic conditions | Suitable for local soil and climatic conditions |
| High on nutrition value | High on nutrition value (carbs, protein, carotene etc) |
| Large number of HHs are already growing | About 10% of the HHs are growing, but more people are willing to adopt EFY crop |
| High market demand and ease in selling | Steady increase in export-led demand |
| Good market price | Good market price |
| Perennial crop and hence overall labor requirement is low | Low labor requirement compared to other crops |
| Low investment compared to other cash crops | Low investment compared to other cash crops |
| High scope of value addition like drying and sorting to increase returns | High scope of improving quality of processing (mainly drying into chips) to increase farmer incomes |
| Can be stored in dry form for sale at a later date when prices are high | Can be stored in dry form for sale at a later date when prices are high |
| BC ratio of 58.3 (net profit of \$443 per three trees per year) ¹¹ | BC ratio of 2.7 (net profit of \$473 per acre) |
| | Strong community interest to adopt EFY crop |
| | EFY produced in Chin is considered to be of premium quality with high mannan content |

¹¹ Detailed BC analysis given in Annexure 2

C.4.2 Market Map (Stinky Bean)



Each HH owns on an average 2-3 stinky beans trees which are planted in home stead or farms. Almost 90% of the produce is sold while the rest is consumed either in fresh or dry form. The producers are only responsible for taking care of the trees while most of the other activities along the value chain are owned by actors like collectors and traders. The collectors from nearby towns of Thantlang, Kalaymyo and Tamu visit the villages during November-December and inspect the trees to assess the likely production based on flowering and

early pod development. Based on the assessment the trees are purchased by the collectors and an advance payment of 50% is made. The collectors visit the village intermittently to monitor the crop before harvesting it in February-March and making the balance payment to farmers. No cases of payment default by collectors or side-sale by farmers was reported. The pods are harvested by laborers employed by the collectors themselves. When the trees are young, and harvest is low, the farmers themselves harvest the pods, transport on motorbikes and sell it to retailers in Thantlang and Hakha town. The collectors sell the produce to wholesalers in Tamu town which is then sold to trader in Moreh town in India. Manipur state in India is the largest consumer of stinky beans produced in Chin state. Due to steady demand from India for stinky beans, the farmers reported a stable and attractive price for their produce. Each tree on an average is sold for MMK100,000-MMK200,000 to the collectors. When harvested and sold to retailers, the farmers fetch about MMK100 per pod. Farmers were not able to share estimates about yield and hence it was difficult to compare the sale of trees vis-à-vis pods.

C.3.4 Core Value Chain Actors (Stinky Bean)

| Actor | Profile and Role |
|-------------------|---|
| Producers/farmers | <ul style="list-style-type: none"> - Small landholding or landless farmers - Majority of the farmers own 2-3 trees; very few own more than 10 - Mostly responsible for production - Have very little information about market prices of stinky beans in Tamu and Kalaymyo markets |
| Collectors | <ul style="list-style-type: none"> - Mostly located in Tamu, Kalaymyo and Thantlang town - Are responsible for harvesting, sun drying, sorting, packaging and transporting the commodity |
| Retailer | <ul style="list-style-type: none"> - Located in all towns and trade in smaller quantities - Nearly 80-90% of the retailers are women and share space in market yards and/or operate from their homes or individual spaces - Buy farm produce from wholesalers and directly from farmers |

- Take up value addition activities like sorting, grading and bundling

C.4.5 Challenges and Risks (Stinky Bean)

| Type of Risk/Challenge | Level of Risk (High, Low, Medium) |
|---|-----------------------------------|
| Stinky bean trees take at least 4-5 years for the first harvest after planting. This could be a significant challenge for scaling up within a medium term (4-5 years) project set up | High |
| At present communities are sowing seeds for multiplication resulting in slow growth and low survival of germinated seeds. No nurseries or healthy planting material is locally available. | Medium |
| Community knowledge and skill on improved methods of crop management is low. Pest attacks are reported leading to decrease in production. | Medium |
| The trees are susceptible to strong winds and forest fire which is a common occurrence due to prevailing slash and burn practices. | Medium |
| <p>Currently India is a major market for stinky beans. Following factors can pose challenges –</p> <ul style="list-style-type: none"> - Export restrictions in the past have adversely affected trade. However, at present India recognizes its special relationship with Myanmar and restrictions have been relaxed. Secondly, informal trade links exist between communities along the border which, to some extent, negates impact of trade restrictions. - Farmers in India are also increasingly adopting stinky bean cultivation, thus increasing local production. However, given the scale of demand, local production in India is not expected to impact farmers in Myanmar significantly. | Low |
| Stinky bean is not considered as main source of income or key crop by farmers and hence low priority is accorded to this crop as far as maintenance is concerned. This is partly due to absence of any interventions by government and NGOs to promote this crop and demonstrate its true economic potentials. | Medium |

C.4.6 Opportunities (Stinky Bean)

Promotion of Improved Management Practices

Some of the key areas, which need a further and detailed investigation, for improving production of stink beans are –

- Promote good seed selection and planting practices
- Promote good canopy management practices
- Value addition options like drying the beans can be investigated further to help farmers increase their returns and also protect from low prices immediately after harvesting.
- Intercropping with crops like banana and EFY to help farmers earn income in the first 4-5 years before the stinky bean trees start yielding and ensure efficient use of space and reducing risk through crop diversification.

Collective Marketing

Promotion of collective marketing and agro-enterprises will help farmers better organize themselves and increase their access to market information on prices, demand and supply. It will also provide them a platform to better negotiate with existing traders for price and other transaction terms. Collective marketing with a reasonable scale will likely allow farmers to explore other profitable markets like Tamu and Moreh. Based on further feasibility assessment, farmers can venture into product diversification by taking up stink bean processing activities like drying

Elephant Foot Yam

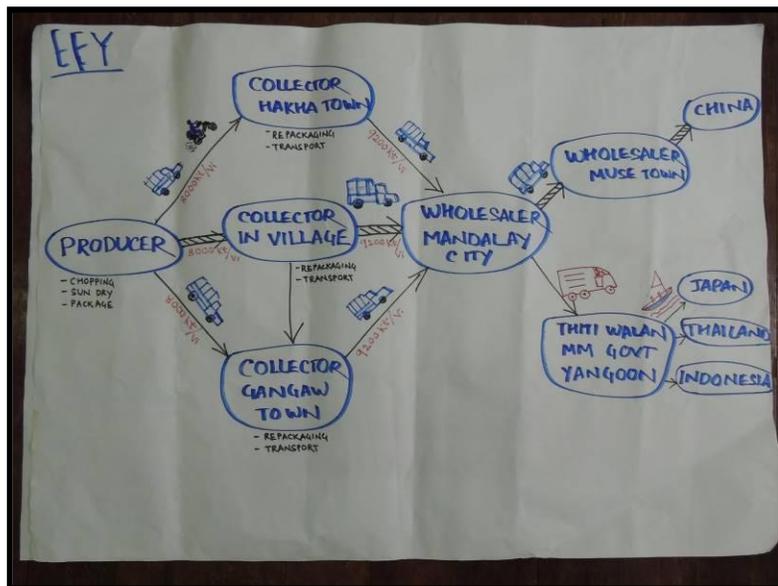
EFY has been successfully grown in southern Chin state (especially Mindat and Kampetlet) for decades. In 1996 exporters from Japan showed interest supposedly due to superior quality EFY produced in Chin. Since 2010, many companies like K&L and Myanmar Belle Company arrived and started teaching large traders how to produce think chips¹². Since then the crop is gaining popularity among farmers for its high returns, less labor requirements and relatively low investment need. In the surveyed project village about 10% of farmers have started growing EFY and more are planning to adopt this crop.

C.3.2 Market Map (EFY)

EFY is almost exclusively grown for sale purpose. Almost 80% of the produce is sold while rest is retained as planting material. Collectors from Hakha and Gangaw town buy chopped and dried EFY from farmers. In few cases, there are aggregators/collectors are the village level who also buy from farmers. The collectors are often open to buying chips from farmers as per their convenience. The village level aggregators/collectors sell the produce to collectors at Gangaw. From Hakha and Gangaw markets, the produce moves to wholesalers in Mandalay. From Mandalay the produce is sold to wholesalers in Muse, Thiti Wallan and Yangon. From Muse the EFY chips are exported to China while from Thiti Wallan and Yangon, the chips are shipped to Japan, Thailand and Indonesia. Very few traders engage in buying of fresh EFY for processing into chips due to the high transportation cost. All the payments are made during the purchase and no case of advance payment by collectors/traders to farmers was reported. Transportation is done in two ways. Sometimes farmers transport the chips to collectors/traders on motorbikes in which case they are paid MMK1500 per 30 Viss to a place one hour away. If the

¹² Value Chain Assessment: Elephant Foot Yam Production in Southern Chin State, Myanmar Institute for Integrated Development; January 2017

collectors/traders travel to the village, then the transportation cost is deducted from the farmer payments.



Almost all the EFY trade in Myanmar is export oriented. China and Japan are major export markets for EFY. The main difference is the Chinese market purchases chips of all qualities while the Japanese market is more stringent on quality parameters. Domestic consumption of EFY is limited to EFY noodles and “fake meat”. Both these processed products are still at a nascent stage in terms of scale and popularity. Fake meat uses fresh EFY and hence the feasibility of transporting and processing large quantities of EFY from Chin to other regions may be

bleak. Consumption of fresh EFY (mostly non-irritant variety) is very limited to consumers in Yangon who use it for Indian curries.

At present, there are no stringent quality requirements from buyers in the study villages. The main consideration for buyers is uniformly cut and well-dried EFY. The general practice is to chop the EFY into slices and sun dry them. On an average it takes about 7-10 days for the farmers to dry the chips. The time required for drying is also related to weather conditions and thickness of the slices. Farmers sell dry EFY of good quality for MMK8000 per Viss to the collectors both at village level and Hakha, Gangaw towns. The price increases to MMK9200 per Viss for sale to wholesalers in Mandalay. The traders interacted with could not share price information in Muse and Yangon cities. The current prices for dry EFY are at least 40-60% more than the prices in 2015. However, the price of dry EFY varies significantly based on the quality. Thicker and fungus-blackened EFY chips are sold at a price as low as MMK1500 per Viss.

EFY producers in Chin have competitive advantage over other producers in the region. EFY produced in Chin is considered to be of higher quality as growing conditions are particularly favorable. Secondly, majority of farmers in Chin don’t apply chemical inputs to EFY crop like fertilizers, pesticides and weedicides and are sundried (without using charcoal or Sulphur), hence considered “organic”.

C.3.4 Core Value Chain Actors (EFY)

| Actor | Profile and Role |
|-------------------|---|
| Producers/farmers | <ul style="list-style-type: none"> - Cultivate EFY on 1-1.5 acres of land - Responsible for producing EFY and post-harvest which includes washing, chopping and drying - Sometimes arrange for transportation - Store small quantity of EFY in form of tubers and bulbils - Very rarely store dried chips for sale at a later date to due to space |

| | constraints |
|---------------------------|--|
| Collectors/traders | <ul style="list-style-type: none"> - Typically, trade in multiple commodities depending on season - Sometimes involved in growing EFY also - Intermediaries between farmers and large traders/wholesalers in towns - Responsible for transportation, sorting and storing |
| Large traders/wholesalers | <ul style="list-style-type: none"> - Trade in multiple commodities - Responsible for transportation, sorting, grading and storing - Does more stringent sorting and grading based on thickness of chips, color and drying quality |

C.4.5 Challenges and Risks (EFY)

| Type of Risk/Challenge | Level of Risk (High, Low, Medium) |
|---|-----------------------------------|
| EFY takes at least 3-4 years (depending on method of propagation) for the first harvest after planting. This could be a significant challenge for scaling up within a medium term (3-4 years) project set up | High |
| Need for shaded area for EFY plantation | Medium |
| Non-availability of quality planting material for first time growers and expansion mostly due to <ul style="list-style-type: none"> - Low retention of quality planting material as farmers tend to sell most of the produce - Lack of skills around selection and right use of planting material | Medium |
| Lack of skills (cutting thin chips) and conducive conditions (misty weather and unexpected rains) for proper processing. Improper drying and fungal damage results in significant decrease in price | High |
| Currently very few households (10%) are growing EFY in project villages though there is high interest among farmers to adopt EFY | Medium |
| Fencing is needed to protect the crop from animals which can potentially add to cost of production and needs upfront investment | Medium |
| Discrepancies on weights and chip quality parameters between farmers and traders | High |

C.4.6 Opportunities (EFY)

Promotion of Quality Planting Material

The local EFY variety of Chin state is considered to be of high quality. Farmers can significantly increase their production through yield increase and/or expansion by adopting best management practices on storing and use of planting material whether through true seeds, leaf bulbils or tubers as each option has its own advantages and disadvantages. Apart from technical trainings, farmers can also be offered

economic management skills to facilitate decision making to improve retention of planting material for expansion. Enterprise development around planting material, especially leaf bulbils, can be a feasible approach of formalizing “seed” supply chain.

Promotion of Improved Drying Techniques

Following options of improving drying quality of chips can be promoted to produce high quality chips leading to better prices for the farmers –

- Use of fish nets can be promoted to shortening the time required for drying and reduce the presence of mold. An open, suspended drying apparatus can be constructed using fish nets which can be collapsed and stored inside during moist conditions. Such methods have been proven to be effective in Matupi, southern Chin.
- Adjustable slicers can be promoted primarily to allow farmers choose the chip thickness and uniform size leading to quicker and better drying. In the long run, it leads to less labor requirement as farmers get more acquainted with the slicers. The slicers are relative cheap and available at K 15,000-20,000 each.

Promote Intercropping

Intercropping with suitable crops (leguminous plants stinky bean, pigeon pea, bush common bean - *Phaseolus vulgaris* etc) has multiple advantages of improving soil quality and providing additional income from the same patch of land. However, care needs to be exercised to ensure that the crop density is just right to contribute to soil fertility and not hamper EFY growth due to excessive shading and competition for nutrition.

Collective Marketing

Agro-enterprise development and collective marketing can be promoted to increase bargaining power of farmers and address their key concerns with traders which are - weighing and consistent/transparent chip quality parameters. Collective marketing and associated economies of scale, in the long run, can potentially help farmers access other profitable markets as well. However, following challenges to collective marketing needs to be assessed in more details –

- Farmers’ decision on harvest, process and sale timing mostly depends on their cash needs and it can vary from farmer to farmer.
- Sale price of dried chips fluctuates significantly depending on quality. If quality consistency is not maintained, it can lead to different farmers getting different price.

There are few examples of farmer cooperatives not succeeding in collective marketing of EFY. One being, Mindat-based Ar Yone Oo EFY Growers and Traders Association (AYO Association). Such examples need to be studied further.

Storage Facilities for Dried Chips

Constructing farmer-managed storage facilities can protect farmers from seasonal price fluctuations by providing them with safe storage option their dried chips. Secondly, the ability to store chips will increase the bargaining power for the farmers. The storage facilities can be developed at cluster or individual village level depending on the current, projected production levels and community dynamics. The governance of the storage facility should be rested with the farmer groups and hence adequate capacity building of the farmer groups on governance aspects should be factored in.

C.5 Business Service Providers

In general, there are a lack of business development services in Northern Chin State. Advisory services are almost non-existent except for limited services provided by the Department of Agriculture and a handful of NGOs. There are no dedicated agricultural input suppliers at the township level, however a

limited offering of agri-inputs is available through small shops. Most farmer travel to the larger Kalaymyo to access inputs and advice, both of which are of questionable qualities. Sources of credit are also limited, and there are few if any accessible sources of agriculture-specific credit. In two-thirds of the villages visited, the government loan program, Myaseingyaung, is the most commonly accessed source of credit. This program does not offer financial education though. A more detailed description of findings for each type of business development service provider follows.

C.5.1 Transporters

Many farmers do not have access to their own transport and must pay for transport services. Motorbikes are the most common form of transport to reach nearby markets and buses or trucks to reach farther markets.

Transport costs reported by the FGD and KII participants are about 0.05 USD per kilogram on motorbike or truck. This price might increase depending on distance from market. For example, transport by truck from Tedim to the trading town of Kalaymyo is less expensive than from farther Falam. If motorbike owners are acting as transporter cum vendors, then they may also require a 50% net profit split.

Transporters serve as a link between farmers and wholesalers. They will facilitate the sales transaction and may also transport agricultural inputs that are sent by the wholesalers to the farmers. Lastly, for stinky bean and EFY, collectors will travel to villages and cover transport costs to onward markets.

C.5.2 Agri-input Vendors

There are limited agri-input suppliers and products available in villages or nearby towns. In Tedim Town there were only a handful of small shops with a limited offer of agricultural inputs and supplies and no agriculture-specific stores. Most farmers source inputs from Kalaymyo where there are around 10 dedicated agricultural input suppliers.

The agri-input suppliers in Kalaymyo sell pesticides, herbicides and sprayers and fertilizers such as urea and NPK. Many of the agrochemicals are imported from other countries with labels in Thai or Chinese and are of a low quality. The vendors also provide limited technical advice, but it appears that knowledge of correct use of agrochemicals is limited. One vendor commented, “The farmers know better than I.” Some companies also provide the sales agents with a small budget to provide demonstrations on correct use of agrochemicals in villages near to Kalaymyo. However, budgets are very limited prevent agents from traveling to farther townships within Chin State. Some vendors also sell seed, but this is often limited to hybrid vegetables like okra, eggplant, cauliflower, tomato and some hybrid maize.

Both fertilizer vendors and pesticide/herbicide vendors must be certified every two to three years in order to demonstrate compliance to safe handling of agrochemicals and ostensibly knowledge of correct use. The requirement for certification is likely one reason that there are few if any dedicated agri-input vendors in more remote townships.

C.5.3 Financial Service Providers

Although some FGD participants reported that they are accessing finance, they said that it is not sufficient to meet finance needs. The main sources of finance FGD participants are accessing are the Mya Sein Yaung village finance program and from family and friends. The Mya Sein Yaung loan program is funded by the Myanmar government and implemented in selected villages in Chin State. The government has allocated MMK 30,000,000 (about 22,000 USD) per participating village for low interest loans (1% per month) with no collateral requirement. Loan amounts are dependent on the number of households wishing to access the loan fund, and average loan size in the two villages visited in Tedim

Township were MMK 350,000 (257 USD). This loan program was only present in two-thirds of the villages visited during the analysis. Challenges with this program are that there is no financial education component and loan disbursement is not necessarily timed with agricultural activities. The lack of concomitant financial education led to delays in repayment during the first loan cycle and lack of investment in income-generating activities. Less common is receiving loans from family and friends and participation in savings groups. Participants said that some people do take loans from relatives or friends at a monthly interest rate of 5%, but this is usually avoided.

Savings groups or self-reliant groups (SRGs) were present in a few of the villages visited and offer another source of finance, especially for women. Women reported not taking loans specifically for agricultural purpose, but some female FGD participants said they had access to finance through participation in savings groups. Average loan size from a savings group in Ngen Nung were about 300-350 USD and had to be repaid in three months at an interest rate of 2% per month. It appears that the concept of a savings group or “self-help group” is still new, and currently only a small percentage of HH are participating. A UNDP project facilitated group formation in 1995, and 2/3 of these groups are still functioning in five villages. KMSS has also formed SRGs, and in Ngen Nung community members have self-formed additional groups.

At the township level, Thit Sar Oo Yin, a microfinance company formerly known as Chin Microfinance, offers different loan products and financial education training. They are currently working in 34 villages and have over 3,000 clients, the majority of which are women. The company also has plans for new agriculture-specific loan products such as seasonal loans which they plan to roll out in October or November 2018. Thit Sat Oo Yin has offices in Kalaymyo, Falam, Hakha, Thantlang, and Tonzang. The reach of this company is still limited, but they could serve as a potential finance partner for projects implemented in the territories in which they operate.

Table 2 Loan Types Offered by the Microfinance Company, Thit Sat Oo Yin

| Type of Loan | Loan size | Requirements | Additional services or information | Number of this type disbursed |
|-----------------------|--|---|--|-------------------------------|
| Group Loan | Mini – MMK 160,000 (117 USD) Maxi – MMK200,000 (147 USD) Interest rate: 2.5% per month | Must form group of 5 members. May take maxi loan after two years. Members serve as guarantors; no collateral. | Thit Sat Oo Yin also provide small business management training at the village-level. | 2500 |
| Micro Enterprise Loan | MMK 600,000 – 1 million (441 to 736 USD) Interest rate: 2.5% | Two years of group membership. May access higher amount after 18 months. | 60% of loan recipients are women. Loans used for agriculture, small trading and retail | 469 |
| Wholesaler loans | MMK 1.5 –2.5 million (1000 to 1800 USD) Interest rate 2.5% | Recipient must be an active member in a self-reliant group (SRG) | Loan cycle is one year | 22 |

Other financial institutions operating in Northern Chin State include the Agricultural Bank and Cooperative Bank. The analysis teams did not interview representatives from either institution. However, other key informants suggested that it was difficult to access loans from the Agricultural Bank because of a requirement to have a land registration form showing the right to cultivate. Additionally, these loans are only given for maize and paddy production, and there is a limited loan fund amount of 442,000 USD per township. More information is needed about loan products offered by Cooperative Bank.

C.5.4 Extension and Advisory Services

Farmers in the three townships have limited access to extension and advisory services. The Department of Agriculture (DoA) has a very low budget, few staff and limited outreach. Focus group participants had little confidence in capacity of DoA staff and reported that they did not access services from the DoA. Services and trainings provided by the DoA include training on Sloping Agriculture Land Technique (SALT) and provision of perennials to rehabilitate five acres per township, training in compost production, home gardening and dissemination of information about improved practices. They also support demonstration plots at the request of communities. DoA representatives said, budget permitting, they have the following planned activities: establishment of a farmer field school in Tedim, creation of associations for stinky bean, coffee and/or elephant foot yam growers and establishment of grape and avocado nurseries.

Other sources of extension and advisory services include NGOs. Some FGD participants reported having received training on compost and natural pesticide production from the NGO, GRET. CORAD is also providing some technical support for grape growing but not in the villages included in this analysis.

C.6 Gender Analysis

A robust gender analysis was not performed as part of this study. However, a gender lens, mainly focusing on context, challenges and opportunities specific to women, was applied to the focus group discussion and key informant interview questionnaires. The analysis teams also held separate focus group discussion with men and women farmers to identify differences in context, challenges and opportunities for the two groups. Findings are organized by the six gender domains—roles responsibilities and time use; access to and control of resources; power relations; participation and leadership; knowledge, beliefs and perception, and legal environment—and presented in table 3.

| Domain | Findings |
|--------------------------------------|--|
| Roles, responsibilities and time use | <p>Women are responsible for most of the reproductive work in the household, and they contribute substantially to productive work, mainly agriculture. Women are responsible for much of the agricultural activities including land preparation, planting, weeding, and harvesting. Men typically assist with fertilizer and pesticide application. Men are primarily in charge of marketing for most crops, but women take more of a decision-making role for crops such as stinky bean, EFY and sometimes garlic, women also have more of a role in decisions around marketing (determining price, buyer, and timing). This may be because transactions can happen at the farmgate, or in the case of garlic, small amounts are sold as cash is needed for household items.</p> <p>Aside from production, women living in towns are also involved in agricultural value chains as retailers and wholesalers. Most vegetable wholesalers in Kalaymyo are women.</p> |

| | |
|------------------------------------|---|
| Access to and control of resources | <p>Farms are managed jointly; women do not have control over individual plots. Women have use of land, but they typically do not own it. Men are the primary decision makers about which crops to plant, when to plant and where. Men control most of the profits from sale of agriculture products. Men in one FGD said that women may keep 10% of profits. When selling small amounts of vegetables on local markets, women may also retain the small profits to purchase household items.</p> <p>Loans from Mya Sein Yaung are taken in the husband's name which limits women's access to and control over finance. Women are able to take loans from Thit San Oo and do participate in self-reliant, or savings groups.</p> |
| Power relations | <p>Male FDG participants indicated that men lead in household decision making. However, there was some discrepancy between responses, and some men said that women can have the final say on household decisions such as when and to whom to sell certain crops such as garlic. However, men control profits when selling to wholesale markets.</p> |
| Participation and leadership | <p>More information is needed to determine the extent of women's involvement in formal decision-making structures. Female FDG participants and key informants reported that women are involved in self-reliant groups or savings groups and comprise the majority of membership. Women's participation in trainings and meetings organized by NGOs and community meetings varied between villages.</p> |
| Knowledge, beliefs and perception | <p>In Chin culture once a woman is married she is considered part of the husband's family. Parents give preference to male children (who they believe will provide for them later in life) and are more likely to invest in the education of male children than female children if economic resources are constrained.</p> |
| Legal environment | <p>There is no formal land registry, but land typically belongs to the male head of household and is passed on to male children. If a woman becomes a widow the husband's family decides whether she can continue to farm on her husband's land.</p> |

Considerations and Opportunities

Women have very little decision-making power and control over resources. Although women provide much of the labor for agricultural activities, men still take the lead on marketing activities and decide how to use profits. Given this, any value chain intervention should employ a “whole household” or “farming as a family business” approach in order to ensure that gains from project interventions benefit all household members.

There are several entry points for supporting gender-inclusive value chains where women are already participating. These include facilitating women's access to finance via support of savings or self-reliant groups activities and formation of new groups and collaborating with the microfinance company, Thit San Oo Yin to increase access to loans for women. Women already comprise the majority of self-reliant group members, and Thit San Oo Yin is already targeting women for its loan products. More challenging—and perhaps delicate—would be to engage in influence activities at the village-level to advocate for women to be able to take out individual loans from the Mya Sein Yaung loan fund. Women are also actively involved in value chains not just as producers but as retailers and wholesalers as well. These small-scale entrepreneurs could be supported to grow their businesses.

Women and men jointly manage the farmstead instead of managing separate plots, thus, there are no clear gender divisions between crops aside from what is grown in homestead gardens. However, there are some crops that women have more decision-making power over such as garlic and mustard. Mustard is highly perishable and less likely to be taken to farther wholesale markets. Therefore, women will often take small amounts to local markets and sell it door-to-door, retaining the profits to purchase household items. Although, this crop may not ideal from the perspective of a value chain intervention (little opportunity for upgrading, value addition or collective marketing), it serves a potentially important role for income generation for women, and the promotion of other value chains should not come at the expense of crops that are economically important to women.

D. Prioritization Matrix

To further analyze the study information and help further prioritize the crops for a value chain intervention, a prioritization matrix was developed with two components, impact and feasibility. Following were the key criteria selected by the CRS Myanmar team for both the components –

| Component | Criteria (Weightage) |
|-------------|--|
| Impact | <ul style="list-style-type: none"> - Potential to increase income of the target communities (25%) - Potential to attract and engage with youth (10%) - Extent to which the crop (production, post-harvest, marketing etc) is gender friendly (10%) - Extent to which the crop contributes to increasing household food security by enhancing availability of food and/or income (20%) - Extent to which sustainable management of natural resources can be promoted through crop (15%) - Extent to which the crop provides an opportunity to work with large number of target communities and at a sizeable volume (20%) |
| Feasibility | <ul style="list-style-type: none"> - Extent to which various key business development or value chain services are currently available (10%) - Extent to which the current and projected market demand of the crop is favorable (15%) - Extent to which the crop is smallholder friendly – low investment, low labor requirement, less risky etc (20%) - Scope that the crop provides for affecting significant upgrading or impact in the areas of production, post-harvest, marketing etc (10%) - Extent to which CRS has the required capacities and experience to work on the crop or commodity (10%) - Extent to which CRS partners have the required capacities and experience to work on the crop or commodity (15%) - Extent to which the enabling policy and regulatory environment is favorable to the crop (10%) - Extent to which the donor has prioritized the crop and likely to support investment around it (10%) |

The six shortlisted crops (EFY, stink bean, tomato, onion, grape and cauliflower) were evaluated in a participatory manner and given score. The final results showed higher scoring for crops like EFY, stinky

bean, onion and tomato. The exercise was useful in bringing CRS and partner team together and brainstorm around impact and feasibility. However, a second round of prioritization exercise is recommended to engage with communities (target groups), subject matter specialists and revisit the scoring based on available evidence and lesser reliance on assumptions.

E. Recommendations

Considering factors like community profile, value chain context and crop-specific risks and opportunities, the recommendations are divided into two categories - short term (2-3 years) and long-term (4-6 years). Similarly, some recommendations are crop-specific while others are more generic or cross-cutting in nature.

| Crop/commodity | Short Term (2-3 Years) | Long Term (4-6 Years) |
|--------------------------------------|---|--|
| Crop-specific Recommendations | | |
| Onion | Promote improved storage practices to reduce losses | Promote collective marketing and agro-enterprise development |
| | Promote improved seed production and storage practices | |
| | Promote seed replacement through farmer to farmer diffusion | |
| | Promote basic value addition like sorting and grading | |
| Cauliflower | Promote low-cost nursery development practices | Promote collective marketing and agro-enterprise development |
| | Promote off-season cultivation | Facilitate better access to market information on demand/supply to inform planting decisions |
| | Promote improved post-harvest management, including packaging, handling, to reduce losses | Crop diversification to explore similar high value crops like broccoli; product upgrading options like dried cauliflower |
| Grape | Promote improved practices for quality improvement (pest management, uniform ripening, pruning, trellising etc) | Promotion of locally appropriate new varieties for product diversification like table grapes, juice, raisins through adaptive research |
| | Technical support to wine makers for quality wine production | Improve access to finance to increase scale and quality of production through investment in durable construction material and reduce recurring costs |
| Tomato | Promote improved seed production and storage practices | Promote collective marketing and agro-enterprise development |
| | Promote seed replacement through farmer to farmer diffusion | Access to storage facilities for retailers at market to reduce storage losses |
| | Promote basic value addition like sorting and grading | |
| Stinky Beans | Promote improved cultivation practices like seed selection, canopy | Increase scale of plantation |

| | | |
|--------------------------------------|--|--|
| | management | |
| | Promote intercropping with EFY, banana etc | Promote collective marketing and agro-enterprise development |
| | Promote feasible option of value addition like drying | |
| EFY | Promotion of healthier planting material including option of entrepreneurship development on seed business | Promote collective marketing and agro-enterprise development |
| | Promote intercropping with suitable leguminous crops and stinky beans | Storage facilities for farmers |
| | Promote efficient drying techniques (suspended fish nets, slicers etc) | |
| Cross-cutting Recommendations | | |
| Soil and Water Management | Promote balanced use of chemical fertilizers | |
| | Promote options of organic fertilization like green manuring (<i>Sesbania sp</i>), intercropping and crop rotation | Soil and water conservation (SWC) measures to decrease erosion and improve soil moisture |
| | Promote efficient irrigation practices (techniques/models and scheduling) | |
| Pesticide Management | Promote appropriate dosage and safe use of pesticides | |
| | Skill building of input vendors on recommended usage of chemical inputs | |

As can be seen from the table above, the short-term recommendations are focused around individual behavior changes and aim at improving productivity, profitability (by reducing cost of production and increase in production) through small changes in their existing practices and behaviors. While innovations are important, precaution needs to be taken to ensure that there is adequate time in the project to provide mentoring support to communities for long term adoption of improved practices.

One of the key long-term intervention suggested is agro-enterprise development and promotion of collective marketing. This involves significant community mobilization and group-based behavior changes. Given the socio-economic conditions, business development services, scale and quality of production and overall capacities, the farmers in the project area are not yet ready for collective marketing. Any intervention along the value chain must address the capacity building needs of producers first. Following key steps can be adopted for promotion of agro-enterprises –

- Organize farmers into small, informal producer groups and use the platform to introduce and promote improved agricultural practices to increase quantity and quality of production. This opportunity can also be used to increase profitability by reducing the cost of production. Depending on the crop, this step may take 2-3.5 years to show outcomes, early adoption/behavior change and consolidate farmer trust.

- The second step is formation of marketing committees which could be a subset of the producer groups with a specific mandate of engaging with market actors to negotiate better terms and conditions for the farmers. The marketing committees also engage with various value chain service providers to facilitate access of these service to the farmers.
- The marketing committees are provided with training inputs on marketing basics, 7 steps of linking farmers to markets and SMART (Skills for Marketing and Rural Transformation) skillsets¹³, the modules for which have been developed by CRS.
- The producer groups can also be exposed to other interventions like savings and credit. And based on the interest of farmers, Savings and Internal Lending Communities (SILC)¹⁴ can be promoted.

F. Conclusions

Based primarily on production and marketing factors, the current scoping exercise has helped in identifying key cash crops that have a strong potential for increasing farmer incomes. The study was able to collect and analyze information from producers and immediate markets. However, more information needs to be collected from market actors situated farther along the value chain like large wholesalers, processors, retailers and consumers. This holistic analysis will help in identifying the most appropriate intervention point to strengthen value chains and farmer engagement in markets for higher returns.

The study has clearly identified crop specific and few generic opportunities which can be leveraged to bring significant improvements in the production and profitability for farmers over two to three years and that could be the focus in the short run. CRS and KMSS can develop strategies focusing on collective marketing and agro-enterprise development if there is a long-term commitment. With the current capacities and skills, the communities would need consistent and intense mentoring support.

¹³ SMART skills focus on five areas – organizational development, financial skills, market & enterprise skills, natural resources and innovation (<https://www.crs.org/our-work-overseas/research-publications/smart-skills-rural-development>)

¹⁴ <https://www.crs.org/our-work-overseas/program-areas/microfinance/silc-road>

Annexure 1
List of Actors Interviewed

| LOCATION | ACTOR | NAME | NUMBER |
|--|------------------------------------|--|---------------|
| TEDIM TOWNSHIP | Coffee Processor | Niang Lamh Huai | 09-451715995 |
| | Small-scale winemaker | Pa Kham | 09-425544663 |
| | NGO – CORAD | Mun Mang, Township Manager | |
| | Farmer Entrepreneur (3) | Lian Do Pau | |
| | Microfinance company (Thit San Oo) | Lian Do Khan, Branch Manager | |
| | Department of Agriculture | Lian Kop Za, Deputy Staff Officer | |
| | Winemaker | Pum Khen Kham | |
| | Vegetable retailer | Man | |
| | KALAYMYO | Wine maker, Chin Hills Soote | Gin Lian Kham |
| Input dealer (fertilizers and pesticides) | | Kam Ling | 09-400473098 |
| Input dealer (representative of Golden Lion company) | | | |
| Wholesaler (buys from Tedim township) | | Nu Nek KhenCing | 09-457092650 |
| Wholesaler | | Nu Nei and Tual Khaw Lian | 0948037073 |
| Wholesaler (onion from Falam) | | Thang Ke | 09425601562 |
| Stinky bean agent | | Thang Kam | 09-457598058 |
| FALAM TOWNSHIP | | Thitsar Ooyin Co. Ltd, MFI | San Piang |
| | Pa Hre | CORAD | 09420979994 |
| | Thawng Za Mang | CORAD | 0933350730 |
| | Than Za Hmung | Farmer Entrepreneur – Garlic, Lungbum | NA |
| | Biak Thang | Farmer Entrepreneur – Tomato, Lungbum | NA |
| | Sangs Za | Farmer Entrepreneur – Onion, Lungbum | NA |
| | Daw Tlung Sui | Wholesaler/Retailer, Falam Market | 09253282815 |
| | Kyaw Kyaw Aung | Project Manager, Department of Agriculture | 0933503707 |
| | Val Boih | Input Vendor, Falam Market | 09423231737 |
| Khuang Cuai | Input Vendor, Falam Market | NA | |

In addition to the above list, four focus group discussions were conducted in each township; two with female farmers and two with male farmers.

Annexure 2
Profitability Analysis

| Profitability Analysis of Onion (1 Acre) | | | | |
|--|---------------------|------------|------------------|-------------------|
| Type of Input | Measurement Unit | # of Units | Unit Cost (Kyat) | Total Cost (Kyat) |
| Land preparation | Machine hours | 7 | 10,000 | 70,000 |
| Seed (Own Seeds) | - | - | - | - |
| Fertiliser - Urea | Bag | 3 | 19,000 | 57,000 |
| Fertiliser - NPK | Bag | 2 | 24,000 | 48,000 |
| Pesticides | Bottle | 1 | 11,000 | 11,000 |
| Weeding | Person days (10hrs) | 10 | 5,000 | 50,000 |
| Intercultural operat | Person hours | 360 | 500 | 180,000 |
| Transportation | Per bag (40kg) | 60 | 100 | 6,000 |
| Packaging | Per bag | 60 | 300 | 18,000 |
| Total Cost (Kyat) | | | | 440,000 |
| Total Cost (\$) | | | | 331 |
| Gross Income | | | | |
| Sale | Per kg | 2,400 | 500 | 1,200,000 |
| Net Profit (Kyat) | | | | 760,000 |
| Net Profit (\$) | | | | 571 |
| BC Ratio | | | | 2.73 |

| Profitability Analysis of Tomato (1 Acre) | | | | |
|---|-------------------------|------------|------------------|-------------------|
| Type of Input | Measurement Unit | # of Units | Unit Cost (Kyat) | Total Cost (Kyat) |
| Land preparation | Person days (10hrs) | 4 | 5,000 | 20,000 |
| Seed (Own Seeds) | - | - | - | - |
| Trellising (Labor) | Person days (10hrs) | 8 | 5,000 | 40,000 |
| Trellising (Material) | Per plant for 2 seasons | 6,000 | 30 | 90,000 |
| Fertiliser - Urea | Bag | 2 | 19,000 | 38,000 |
| Fertiliser - NPK | Bag | 3 | 24,000 | 72,000 |
| Pesticides | Bottle | 20 | 18,000 | 360,000 |
| Weeding | Person days (10hrs) | 8 | 5,000 | 40,000 |
| Intercultural ops | Person hours | 360 | 500 | 180,000 |
| Transportation | Crate | 200 | 100 | 20,000 |
| Packaging | Crate | 200 | 150 | 30,000 |
| Total Cost (Kyat) | | | | 890,000 |
| Total Cost (\$) | | | | 669 |
| Gross Income | | | | |
| Sale | Per kg | 7,400 | 400 | 2,960,000 |
| Net Profit (Kyat) | | | | 2,070,000 |
| Net Profit (\$) | | | | 1,556 |
| BC Ratio | | | | 3.3 |

| Profitability Analysis of Cauliflower (1 Acre) | | | | |
|--|---------------------|------------|------------------|-------------------|
| Type of Input | Measurement Unit | # of Units | Unit Cost (Kyat) | Total Cost (Kyat) |
| Land preparation | Person days (10hrs) | 30 | 5,000 | 150,000 |
| Seed (Own Seeds) | Packet | 3 | 8,000 | 24,000 |
| Fertiliser - NPK | Bag | 5 | 22,000 | 110,000 |
| Manure/compost | Basket | 200 | 400 | 80,000 |
| Pesticides | Can | 3 | 10,000 | 30,000 |
| Labor-pesticide | Person days (10hrs) | 1 | 5,000 | 5,000 |
| Labor-fertilizer | Person days (10hrs) | 3 | 5,000 | 15,000 |
| Weeding | Person days (10hrs) | 30 | 5,000 | 150,000 |
| Harvesting | Person days (10hrs) | 20 | 5,000 | 100,000 |
| Transportation | Viss | 1,500 | 200 | 300,000 |
| Packaging | Crate | - | - | - |
| Total Cost (Kyat) | | | | 964,000 |
| Total Cost (\$) | | | | 725 |
| Gross Income | | | | |
| Sale | Per Viss | 1,500 | 1,000 | 1,500,000 |
| Net Profit (Kyat) | | | | 536,000 |
| Net Profit (\$) | | | | 403 |
| BC Ratio | | | | 1.6 |

| Profitability Analysis of Grape (1 Acre) | | | | |
|--|---------------------|------------|------------------|-------------------|
| Type of Input | Measurement Unit | # of Units | Unit Cost (Kyat) | Total Cost (Kyat) |
| Trellising structure | Pole | 40 | 3,000 | 120,000 |
| Labor trellising | Person days (10hrs) | 12 | 5,000 | 60,000 |
| Labor-pruning | Person days (10hrs) | 20 | 5,000 | 100,000 |
| Fertiliser - NPK | Bag | 4 | 22,000 | 88,000 |
| Weeding | Person days (10hrs) | 5 | 5,000 | 25,000 |
| Harvesting | Person days (10hrs) | 5 | 5,000 | 25,000 |
| Transportation | Viss | 1,700 | 100 | 170,000 |
| Packaging | Crate | - | - | - |
| Total Cost (Kyat) | | | | 588,000 |
| Total Cost (\$) | | | | 442 |
| Gross Income | | | | |
| Sale | Per Viss | 1,700 | 800 | 1,360,000 |
| Net Profit (Kyat) | | | | 772,000 |
| Net Profit (\$) | | | | 580 |
| BC Ratio | | | | 2.3 |

| Type of Input | Measurement Unit | # of Units | Unit Cost (Kyat) | Total Cost (Kyat) |
|--------------------------|---------------------|------------|------------------|-------------------|
| Land preparation | Person days (10hrs) | 3 | 5,000 | 15,000 |
| Seed (Own Seeds) | Pung | 4 | 20,000 | 80,000 |
| Planting | Person days (10hrs) | 4 | 5,000 | 20,000 |
| Weeding (3 years) | Person days (10hrs) | 108 | 4,000 | 432,000 |
| Harvesting | Person days (10hrs) | 5 | 5,000 | 25,000 |
| Cutting and drying | Person days (10hrs) | 20 | 5,000 | 100,000 |
| Transportation | Viss | 2,000 | 200 | 400,000 |
| Packaging | Bags | 40 | 350 | 14,000 |
| Total Cost (Kyat) | | | | 1,086,000 |
| Total Cost (\$) | | | | 817 |
| Gross Income | | | | |
| Sale | Per Viss | 400 | 7,000 | 2,800,000 |
| Net Profit (Kyat) | | | | 1,714,000 |
| Net Profit (\$) | | | | 1,289 |
| BC Ratio | | | | 2.6 |

| Profitability Analysis of Stinky Bean (3 Trees) | | | | |
|---|---------------------|------------|------------------|-------------------|
| Type of Input | Measurement Unit | # of Units | Unit Cost (Kyat) | Total Cost (Kyat) |
| Land preparation | Person days (10hrs) | 1 | 5,000 | 5,000 |
| Seedling | Per seedling | 3 | 100 | 300 |
| Planting | Person days (10hrs) | 1 | 5,000 | 5,000 |
| Fencing | Per tree | 3 | 2,000 | 6,000 |
| Total Cost (Kyat) | | | | 10,300 |
| Total Cost (\$) | | | | 8 |
| Gross Income | | | | |
| Sale | Per tree | 3 | 200,000 | 600,000 |
| Net Profit (Kyat) | | | | 589,700 |
| Net Profit (\$) | | | | 443 |
| BC Ratio | | | | 58.3 |