

Chilli value chain analysis and upgrading strategy: Southern Shan State and Mandalay Region, Myanmar



International Labour Organization (ILO)

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Acronyms

ASEAN	Association of South East Asian Nations
BDS	Business Development Services
CBI	Centre for the Promotion of Imports from developing countries
CSR	Corporate Social Responsibility
CSO	Central Statistical Organization
EBIT	Earnings Before Interests and Taxes
FDA	Food and Drug Administration
FIE	Food Ingredients Europe
GAP	Good Agriculture Practice
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ILO	International Labor Organization
ISO	International Organization for Standardization
MAFPEA	Myanmar Food Processors and Exporters Association
MES	Myanmar Engineering Society
MFVP	Myanmar Food and Vegetable Producers
MOALI	Ministry of Agriculture, Livestock and Irrigation
MOC	Ministry of Commerce
MOGPA	Myanmar Organic Grower and Producer Association
MSMES	Micro, small, and medium enterprises
NGO	Non-Governmental Organization
NIE	Natural Ingredients Trade
NORAD	Norwegian Agency for International Development Cooperation
PPES	Personnel Protective Equipment
PPP	Public Private Partnership
PTB	Physikalisch Technische Bundesanstalt
QI	Quality Infrastructure
QM	Quality Management
R&D	Research and Development
ROI	Return on Investment
SECO	State Secretariat for Economic Affairs
SIAL	Salon International de Alimentation
SWOT	Strengths Weaknesses Opportunities Threats
UMFCCI	Union of Myanmar Federation of Chambers of Commerce and Industry
UNECE	United Nations Economic Commission for Europe
UNIDO	United Nations Industrial Development Organization
UN	United Nations agencies
VC	Value Chain

1. Introduction

Background

In 2014, the ILO initiated two projects to support entrepreneurship and MSME development in Myanmar. One is funded by SECO and focuses on the tourism sector. The other is funded by NORAD and is cross-sectoral. Together, these projects expect to contribute to the start-up of 1,000 enterprises and the creation of 3,800 jobs.

As part of the NORAD-funded work, the project planned to carry out value chain analyses to identify current constraints for MSMEs and opportunities for MSME upgrading in value chains with high potential. In May 2016, a consultant reviewed potential value chains and geographical areas the project could focus on. Based on the recommendations from this consultancy, as well as further desktop research and meetings with relevant stakeholders, the project team selected the chilli value chain in Southern Shan State.

In July 2016, the project team carried out a mission to Southern Shan State, which involved meeting key actors from the value chain, as well as relevant government actors, UN agencies and CSOs. As a result of this mission, a rapid market assessment of the chilli sector in Southern Shan State was produced.

The result of this assessment showed the potential for growth and development within the chilli sector. Following this, a value chain analysis team carried out a mission in Southern Shan State and Mandalay Region to analyse the chilli value chain and to produce upgrading strategies. The results are presented in this report.

Methodology

The methodology applied is based on the value chain approach. It focuses on the detailed mapping on all levels of the chain, from the functions and actors on the micro level to partners and support institutions on a meso level, up to rules and regulations having influence on the value chain on a macro level.

More detailed information on the application of the value chain approach can be found under http://www.ilo.org/empent/areas/value-chain-development-vcd/WCMS_366005/lang--en/index.htm or <http://valuelinks.org/manual/> the VC manual created by the German cooperation (GIZ).

The field research was conducted by a team of 4 specialists with expertise in value-chain development, SME development, agricultural development and food safety. The approach taken to the analysis included four main research activities: value chain mapping, secondary data review; primary data collection using focus groups and semi-structured interviews; and a workshop for analysis and drafting of the upgrading strategy. These are outlined below.

1. Value chain mapping

A team comprised of ILO staff and consultants carried out a detailed mapping of the value chain as a first step. The mapping involved identifying the key actors and functions involved in the chain. The value chain mapping also involved breaking down the chilli value chain into several different sub value chains. These sub chains have the same raw material, but processing transforms this raw material into different products which are sold to different markets. It is crucial to consider this differentiation for the upgrading strategy, which is market driven and product based.

2. Secondary data review

A review of available secondary sources of information was also undertaken as part of the research process. The data sources came from the internet, the ILO value-chain analysis team and key stakeholders met during the primary data collection process.

3. Primary data collection

A research framework and work-plan were developed in advance of the mission by the ILO Technical Officer and the consultant. The framework was used to identify and plan the primary data collection activities. Primary research was then carried out on a mission which took place from 10 to 25 October 2016. Focus group and key informant semi-structured interviews were undertaken in Southern Shan State and Mandalay Region. A full list of actors interviewed is provided in Annexe 1.

4. Workshop for analysis and drafting of the upgrading strategy

The information from the research process was analysed by the research team on an ongoing basis and the team held a day-long workshop on the 21 October to consolidate the analysis and draft the upgrading strategies for each value chain.

Presentation of results in this report

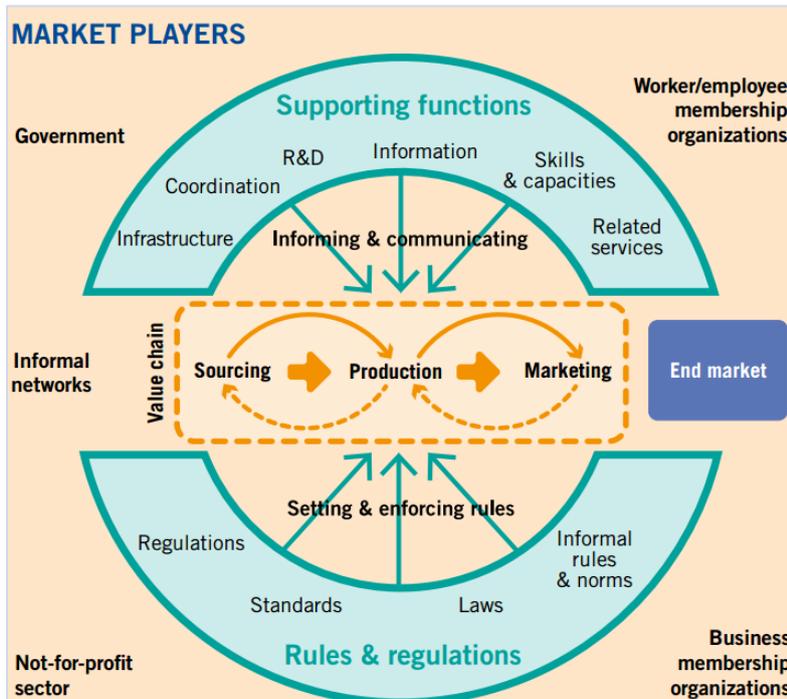
The findings in this report are presented in accordance with the M4P framework's categorisation of the key components of market systems. These are:

- **Core value chain:** “the full range of activities that are required to bring a product or service from conception, through the intermediary phases of production and delivery to final consumers, and final disposal after use”¹. This includes activities such as design, production, marketing, distribution and support services up to the final consumer.
- **Supporting functions:** these include infrastructure, financial services and skills training, among others. The presence of these functions can improve the performance of actors in the core value chain. Equally, the underperformance of the chain can often be traced back to a lack of, or weaknesses in, these functions

¹ Kaplinski & Morris:

- Rules:** These include labour legislation, regulations at all levels of government, quality standards and government policies. They also include informal norms and values, which are the customary rules of behaviour that shape interactions and ideas about what is good, right, fair and just. These may be explicit or implicit. Absent or inadequate rules or poor enforcement can reduce the performance of a value chain.

Figure 1: the market system, including the value chain²



² Adapted from The Springfield Centre (2004) Operational Guide to Making Markets Work for the Poor

2. Mapping of the chilli value chain

The different sub-value chains

The detailed mapping is shown in annex 2. The mapping exercise identified several different sub-value chains for different chilli products. The following section describes the main products which are produced from chilli in Myanmar.

Fresh Chilli

Fresh chilli is not treated or processed and can be consumed directly after harvesting. It is used in certain recipes and has a smaller customer-base in Myanmar than whole dried chilli or chilli powder. Pickled tea (tea salad) processors use fresh chilli in their product, as well as restaurants and private households. The use of fresh chilli by consumers is very similar to whole dried chilli, though it has a lower storage life.



Figure 2 Fresh Chilli

Whole dried Chilli

After harvesting, the chilli is dried and sold whole. Preservatives are not usually added to the product, as the drying extends the shelf-life. This form of chilli can be considered as an intermediate product as in most cases the whole dried chilli is processed to further products like chilli powder or flakes. It remains the most important semi-finished product for the chilli market in Myanmar and is the most common format for exporting of chilli.



Figure 3 Whole dried chilli

Chilli powder /flakes

Chilli flakes and powder are produced through grinding dried chilli. Sometimes the chilli is roasted prior to grinding. Chilli flakes and powder are very popular in Myanmar and can be found in most of the local dishes. The processing is not only done on an industrial level, but many consumers crush and grind chilli at home, either

for their personal consumption or for reselling it locally. Some processors also extract the red color for use as food coloring.



Figure 4 Chilli flakes / powder

3. Description of value chain actors and functions

Following the value chain mapping in annex 2, the most important functions are explained in the following text. Minor sub-value chains, such as fresh chilli, or niche products that only a few actors are engaged in, like organic production or the input supply activities on farming level, are presented in separate boxes.

In Mandalay Region and Southern Shan State the production steps are very similar, but the production period and the production intensity are quite different. The diagram below shows the main differences. These are explained in more detail in the subsequent descriptions of functions and actors.

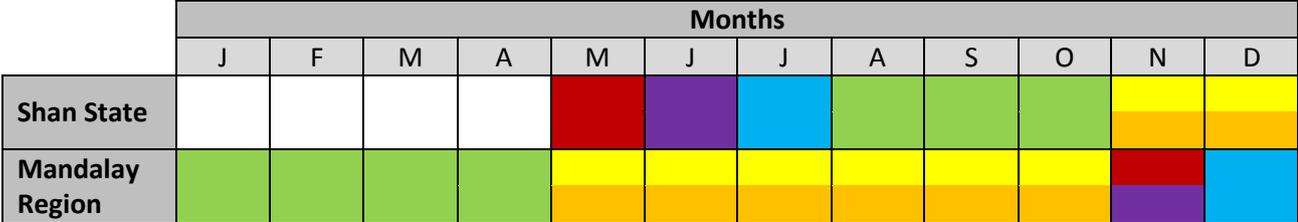
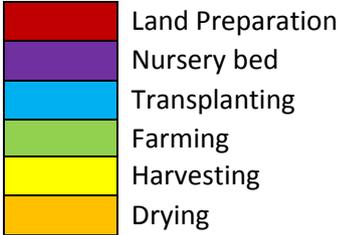


Figure 5 Production schedule for Southern Shan State and Mandalay Region



The key differences between production in Mandalay Region and Southern Shan State are:

- Shan State has no farming activities during the dry season, because production is rainfed, whereas irrigation allows production to continue during the dry season in Mandalay Region
- Shan State and Mandalay Region have different harvesting periods
- The harvesting period is longer in Mandalay Region

Seed production and distribution

There are big differences in the seed production and distribution systems used by chilli farmers in Southern Shan State and Mandalay Region. In Shan State, farmers retain their seeds from the previous season, whereas most of the farmers in Mandalay Region are buy seeds each year.

East-West Seeds is one of the main suppliers of seeds in Myanmar, but seeds produced by various Chinese and Thai seed companies are also commonly used. In Mandalay Region, most of the farmers are already planting new varieties (mainly Tongla 692), that are well adapted to the climate in this area.

Southern Shan State has a different climate, which is cooler and experiences higher precipitation. Low temperatures during the dry season mean that cultivation during this period delivers low productivity. As such, the period when cultivation is viable is longer in the Mandalay Region. The varieties adopted by farmers in these areas are in line with this. More specifically, the growth cycle of the varieties used in Southern Shan State is 5-6 months, which can be mostly completed within the rainy season, whereas it is 6-8 months for the varieties used in Mandalay Region, so it must be carried out using irrigation.

As well as their short growing cycle, which makes rainfed cultivation possible, farmers in Southern Shan State also reported that high drought resistance is another reason why they prefer traditional varieties, given that dry periods occur in the rainy season and they do not have access to irrigation. However, germination rates were reported to be lower than commercially produced varieties and broadly speaking, the yields are lower. In addition, the characteristics of the chilli (such as pungency, shape and colour), are far more varied with traditional varieties, which makes it more difficult to meet the requirements of markets that require uniform products. In contrast, the Tongla 692 variety which is commonly used in Mandalay produces a very uniform product and has higher germination rates.

Concerning the logistics, farmers in Southern Shan State retain their seeds from each season to plant during the next season. They store them locally in their farm. East-West-Seeds rely on a distribution channel through companies that are input suppliers for agro-chemicals and seeds.

Nursery bed

Nursery beds are used in both Southern Shan State and Mandalay Region. A small plot, separate to the main fields, is prepared by adding cow dung and fertilizer. In Southern Shan State these plots are then sown in shortly after the beginning of the rainy season, in June. In Mandalay Region, they are sown at the beginning of the dry season, in November, using irrigation. In most cases, the nursery beds are open and not protected against heavy rains, solar irradiation and insect attacks. Specifically, mulch or netting is not employed in most cases. However, some farmers interviewed in Mandalay Region were laying banana leaves as mulch to protect the seeds until germination.

Land preparation

Land preparation for the main fields is done in parallel to the growth of seedlings at the nursery bed. The vast majority of farmers interviewed in both Southern Shan State and Mandalay Region cultivate 1-3 acres of chilli. A few farmers cultivate 4-5 acres of chilli and a very small number were found to be cultivating larger areas up to 20 acres. Most farmers in

the study areas own more land than this or could rent larger areas. However, farmers reported that the main reasons for only farming 1 acre were that chilli farming is very labor intensive, particularly at the harvesting stage, and that the price of chilli fluctuates significantly, which makes profits uncertain.

In both of the study areas, land is normally ploughed with rotatillers, or using buffaloes or cattle as draft. If farmers have sufficient finances, they apply cow dung and inorganic fertiliser to the soil prior to transplanting.

Transplanting process

Transplanting is done from the nursery bed to the growing area. In general the growing period in the nursery bed is up to 30 days. Most of the time the nursery bed and the field are very close and no greater distance has to be covered. Transplanting is carried out manually and the success rate in Shan State depends partly on the rain coming within the next 24 hours after transplanting. In Mandalay Region irrigation solves the water problem, but in the study area a root fungus was affecting up to 25% of the transplanted chilli. Most of the farmers in both areas dig one small hole per plant and, if they can afford it, they add organic and inorganic fertilizer directly to the root zone.

Farming

The main difference between Mandalay Region and Shan State is the period of farming, as outlined in figure 5.

The majority of farmers in both study areas reported that they use fungicides and insecticides. Please refer to annex 4 for the main diseases affecting chilli. The application of these agro-chemicals reported by farmers does not follow best practice. Personnel Protective Equipment (PPE) - such as gloves, rubber boots and long sleeved clothing made from resistant material – is either not available or not used. Likewise, farmers were often poorly informed about correct dosage and timing of application.



Figure 6 Chilli farming in Shan State (local variety)



Figure 7: Chilli farm in Mandalay Region (hybrid)

Harvesting

Harvesting takes place in Shan State from October-December, depending on the region. For Mandalay Region the harvesting period starts in May and continues until October. Farmers in Mandalay Region reported that the hybrid varieties they grown can be harvested up to 16 times per season. In Shan State, the yield can achieve up to 600-700 viss (960 - 1120Kg) of dried chilli per acre. When conditions are weak the yield can drop to 300-400 viss (480-640Kg) per acre.

In Mandalay Region, the yield is much higher. Only during the last two harvesting months the size of the chilli is smaller and the quality lower. Per acre and per season the yield was reported as varying from 1400 - 2000 viss per acre. These figures are feasible but further verification would be useful. In Mandalay Region, farmers reported that they carry out up to 16 harvests per season, in the approximate quantities stated below:

Harvest N°	Quantity harvested (in baskets*)	Quality level
1	10-15	High quality (good color, big size)
2	10-15	
3	25-30	
4	25-30	
5	70-80	
6	70-100	
7	70-100	
8	70-80	
9	25-30	Low quality (smaller size)
10	25-30	
11	25-30	
12	25-30	
13	15-20	
14	15-20	
15	15-20	
16	15-20	

Table 1 Harvest periods in Mandalay Region

*3.5 viss (5.6Kg) per basket

Labour is crucial for the harvesting process, as harvesting is carried out by hand (see also economic analysis of the chilli value chain). The labor comes most of the time from the village itself or neighboring villages. The harvesters or farm labor are also farmers, having no activities at that time as they are engaged in other crops. In the study areas, farmers report that only very few harvesters are purely labourers, with no farming activities of their own.

After harvesting, the value chain splits into different sub-value chains: Fresh Chilli value chain and whole dried chilli value chain (International and domestic). It is important to note that different actors are carrying out the functions listed below on both industrial and household levels.

Sub value chain: Fresh chilli

Fresh vast majority of fresh chilli is sold on the domestic market rather than being exported. The most important market is Yangon, but some smaller markets in different areas of Myanmar sell fresh chilli in limited quantities. The vast majority of the fresh chilli sold in Yangon, is traded first through the Thiri Mingalar fresh market in Yangon. Brokers source the chilli and supply it to Yangon, from the farm to the wholesaler market. 5 large fresh chilli wholesalers were found to be operating at this market. Their total turnover in terms of volume is approximately 9,000 viss (14,400 Kg) per day. The chilli is sourced from all chilli growing areas, depending on the availability of chilli. The wholesalers trade more than 10 different varieties. Retailers buy directly from this wholesale market and resell to restaurants, shops and small markets. The market share of fresh chilli is small compared to that of dried chilli and the shelf life is limited to 3-4 days, making the product quite sensitive.

Drying process at farmer level

Farmers in Mandalay Region and Shan State use the same methods for drying the chilli. The chilli is spread on plastic or bamboo sheets on the floor in front of farmers' houses. The drying conditions are not optimal for food safety. Contamination of the chilli through livestock, humans and dust cannot be avoided and fungus growth cannot be controlled. This causes problems with Aflatoxins later on (see annex 6).

In Mandalay Region the drying process can take only 3-4 days, depending on the weather conditions. In Shan State the same process can take up to 18 days, due to the differences in climate and the fact that in Shan State the drying process is carried out in the winter.



Figure 8 Chilli drying process in Shan State

Farmers in both regions carry out a basic sorting process. They remove the damaged and rotten chilli, as well as chilli which has turned white.

Sub value chain: solar dried chilli, industrial level value chain

Solar drying process

One company in Mandalay (Snacks Mandalay Co. LTD) has invested in 2015 in two larger solar dryers. Fresh Chilli is sourced from villages around Mandalay. Fresh chilli is quickly dried in the solar dryer, which provides a high quality end-product. Some farmers also supply partially dried chilli, which is then dried to the appropriate level at the premises.

The solar dryer is like a green house, absorbing the infra-red light of the sun and producing an average temperature of 60°C. In such a facility the chilli is dried in 2-3 days. To speed up the process it is possible to run a combustible heater at night. 1 ton can be dried in one green house (2 greenhouses = 2 tons). The investment for such a solar dryer is roughly 15,000 USD.

The company also installed a storage house for storing the chilli once dried in a clean and safe environment. Good storage conditions also ensure that the product to retain its red color for longer.

The company also intends to launch an organic product line. Currently 400 acres of farm land is on the way to be certified by Control Union, a certification body based in Myanmar.



Figure 9: Example from a solar dryer from India – the company did not allowed us to take pictures

Loading and logistics

The dried chilli is packed in bags, loaded on trucks and transported to Bangkok in Thailand. The transporting company is a private company. The payment is done once the goods are handed over to the customer.

Processing / packaging

The main customer of the chilli drying company in Myanmar is located in Thailand and processes whole dried chilli to chilli powder and other chilli-based products. The further steps in the value chain are not fully known by the interviewed stakeholder.

This sub VC could act as a model for the sector, but at present only one company was found to be engaged as a professional dryer, with links to higher value markets.

Sub value chain: Organic whole dried chilli

One company (Biofoods Ltd), based in Sri Lanka, trades whole dried chilli from Myanmar. Their first organic initiative involved working with tea producers from Shan State in cooperation with GIZ. Next, they started working with chilli farmers in Mandalay Region and Shan State. Villages in remote areas were most promising as they had very limited access to agro-chemicals, which has meant that the majority of farmers use a production system that is already organic. The company then provided additional training to farmer in order to ensure they could meet organic standards. Certification was then carried out by Control Union, in accordance with EU/USAID standards.

In June 2015, 1 ton of dried chilli was exported to Germany and 6 tons to Sri Lanka for further processing. In April 2016, 8 tons was exported to Germany, but additional farmers are required in order to increase the quantities traded. According to Biofood the demand from their customer alone is approximately 60 tons/year.

According to Biofoods, Myanmar could act as a good hub for chilli production, because chilli is available all through the year. However, the use of agro-chemicals is high, which means that there is a lot of work to be done to source organic chilli.

For farmers, the shift from organic to conventional production takes a minimum of two years. They also have to make additional efforts to secure certification, which can be time-consuming. In addition, it is important that neighboring farmers do not carry out conventional production nearby, which can be challenging in some areas.

Transport from farmer to wholesaler

Farmers reported that they normally organise the transport of their produce to the local wholesaler. This form of transport is most common during the high season. In The low season, farmers normally do not have sufficient volumes to make it efficient to transport chilli themselves. At this point, it is common for either wholesalers to organise the transport, or for collectors to visit farmers and collect their produce directly. The sales price is reduced when wholesalers or collectors arrange the transport. (Please refer to the economic analysis section for further information).

Intermediate wholesaling at production areas

Intermediate wholesalers are located in the villages and smaller towns around the production areas. Most chilli farmers can easily access these sales points. Most wholesalers do not only trade chilli, they also trade various other vegetables and fruits. They are paying the farmers according to market demand and product quality. Farmers can sell to different wholesaler. However, in many trading centres, the wholesalers fix the prices together for each day. Wholesalers are having quite developed relationships with the farmers. Some of them provide loans and seeds to the farmers, provided that they sell to them and with a

deduction in the sales price of the chilli. Many of these businesses are based on trust and not on contractual basis.

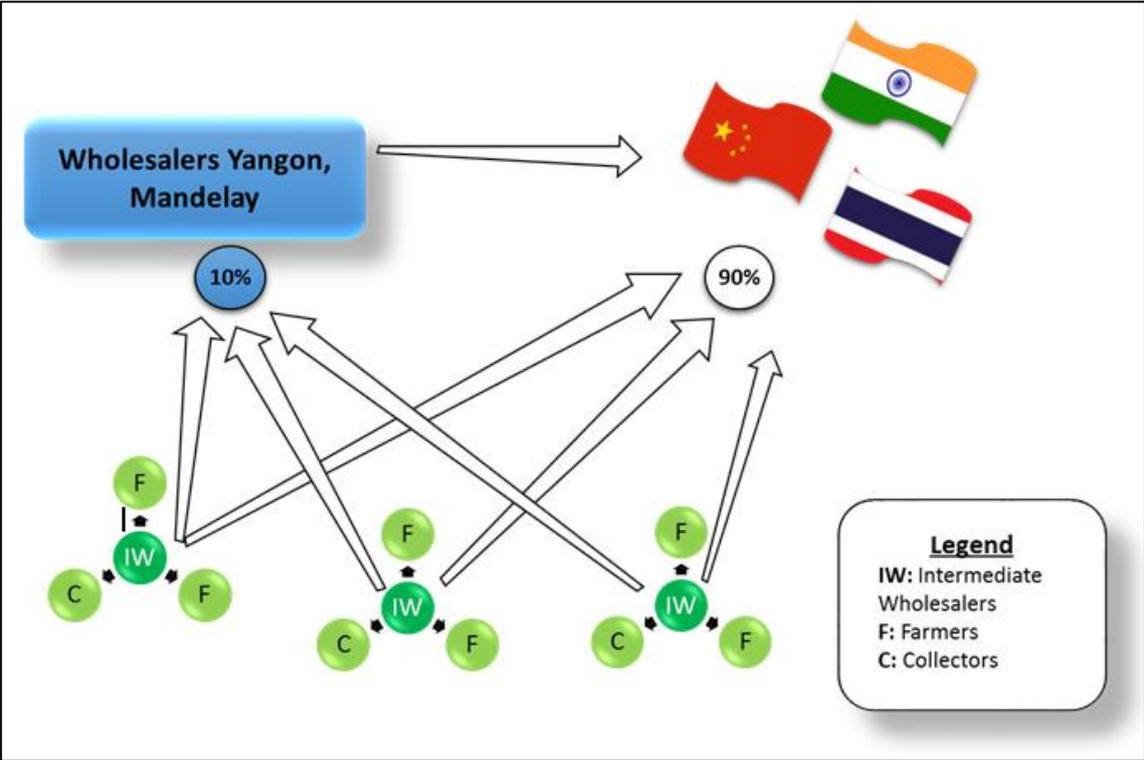


Figure 10 Intermediate wholesaler distribution network

The intermediate wholesalers not only buy and resell the chilli, but they also grade the chilli according to the different quality levels, re-drying it if necessary, storing and organising the transport to their customer. To operate, the wholesalers must have permanent cash flow availability, because farmers are paid on the spot.

Their quality criteria are quite basic: the product should be free of white chilli, having a red color and be as dry as possible. All varieties, sizes and quality levels can be sold, though the prices vary.

Most of their customers are in the border trade areas of Muse and Chinshwehaw, where goods are traded for the Chinese market. Some customers are in Thailand and border trade is done at Myawaddy. The border trade to India was reported to be very limited in volume.

Domestic customers of the intermediate wholesalers are mainly based in Yangon. Close relationships exist between the intermediate wholesalers in the rural areas and Yangon. Business is done via phone calls and oral agreements. The deals at the border trade are organized similarly.



Figure 11 Intermediate wholesaler in Mandalay Region, close to Mandalay

Intermediate wholesaling in Yangon

Intermediate wholesalers in Yangon are mainly located at Bayint Naung wholesale market. Roughly 40 large wholesalers dominate this market, having a strong influence on pricing and sales structure. According to the wholesalers interviewed, the main wholesalers at this market meet every day to set the price of chilli for the different categories of products and qualities.

These intermediate wholesalers are sourcing from all production areas in Myanmar, as well as China, India and Vietnam. The proportion of chilli originating from these different areas varies by season. Their suppliers are most of the time regional wholesalers. A very limited number of farmers sell to them directly. Their business is based on procurement or commission. Procurement means that the wholesalers buy the chilli and then own it. In that case, they need to find buyers, they are practicing stock sales and no ordering. The second option is commission-fee based. A customer (for example a processor) receives the chilli through the Yangon wholesaler, who is sourcing it from a supplier outside of Yangon. The wholesaler gets a handling fee of round about 5%. The advantage is that brokering does not require a cash flow.

Most of the wholesalers have storage rooms, which enable them to store several hundred bags (20-25 viss, 32-40Kg) for a few days. Nearby, cold storage facilities can also be rented for longer storage periods (1 viss (1.6KG) can be stored here for 50 Kyats per month).

The wholesalers carry out a basic visual quality check on the chilli when it arrives, mainly looking for fungus. If the product is particularly low quality, then it is sent back. But this does not happen very often.

Their customers are retailers, processors, other wholesalers in Yangon, as well as wholesalers involved in the border trade to Thailand, China and India. Exact figures on proportion of sales to these different markets are not available.

Border trading

Border trade is one of the most important sales points for chilli in Myanmar. Approximately 90% of the chilli produced in Myanmar is forwarded to one of the border trade points: Muse and Chinshwehaw for China and Myawaddy for Thailand. Wholesalers in Mandalay Region reported that they export over 90% of the chilli through these trading points and the majority of this goes to China. The business transactions are not transparent because wholesalers are dealing with brokers in Muse or Chinshwehaw, who do not share any information about who they sell to and other aspects of their business. These middlemen are reselling the product on a commission basis to wholesalers in China. Language barriers and a lack of willingness to talk to outsiders made it impossible to research this part of the value chain. As such, it was not possible to find out the exact structure of the supply chain or the end markets and the end products that are sold on them.

Domestic marketing

Chilli sold from the wholesalers in Yangon or other larger cities is distributed to smaller wholesalers or shops and retailers. They sell the whole dried chilli directly to the consumers, which are private persons, restaurant owners or home-based processors.

Industrial processing

Industrial processing of chilli includes the grinding and crushing of whole dried chilli to flakes or powder, the packaging into individual pots, as well as the marketing and sales. The vast majority of the products these chilli processors produce sold on the domestic market. Some companies produce products that are indirectly exported through Burmese agents (e.g. to Malaysia), but the product is not adapted to the foreign market requirements and is marketed to Burmese expats in neighboring countries. The certification provided by FDA (Food and Drug Administration) is sufficient to export to Malaysia. For these products, there are no further food safety requirements from the retailers.

The quality infrastructure related to this industry is minimal. Tests on the raw material or the final product are not conducted. Chilli processors reported that the only additives used in production of chilli flakes were 2% salt, plus some FDA compliant food coloring. Forthcoming research by the FDA will research this in further detail.

In Yangon, larger processing companies produce 5-10 tons per day on average and smaller ones only 1 ton.

Processors in Yangon reported that they do not actively search for new buyers. This suggests that competition between processors is currently limited and that the domestic market is not saturated yet. Foreign competitors may pose a threat in the future, because the quality of their products and packaging tend to be higher. A change in rules and regulation on fungus control, as well as effective law enforcement in this regard, might also affect the processors.

Home-based processing

Home-based processing is usually carried out in private apartments by individuals on a very small scale level. They normally use is a small grinder (electrical or manual) and package the processed chilli in simple plastic bags sealed with a heat sealer. The produce is normally sold to local markets, small shops and private households.



Figure 12 Grinder for chilli homebased processing

A limited number of households are carrying out this business. Their weekly production is very low, though exact figures are unclear because there is limited data available on these processors. Home-based processors should get a license for their business, but most of them are doing it without. Taxes should only be paid after 5 years of proven business activities.

Input supplier: agro-chemical companies

Many farmers prefer to use agro-chemicals in an attempt to increase yields and improve quality of the end product. In particular, farmers use fertiliser for nutrient management and pesticides for pest management. Different diseases affecting chilli are detailed in Annex 4.

The following chart explains how the agro-chemical business is organized in Myanmar:

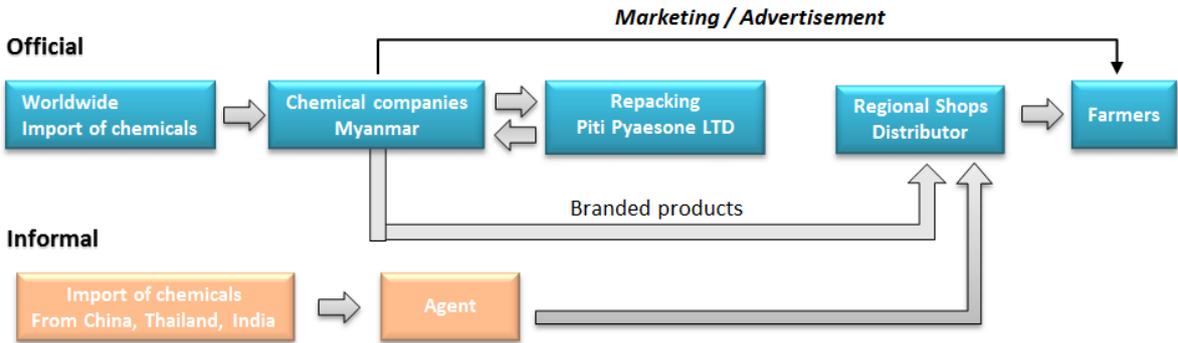


Figure 13 Organization of Agro-chemical business

The agro chemical supply is mainly organized through two channels: the official channel and the informal channel. The official channel is organised as follows: readymade chemicals are imported in bulk by domestic companies and repacked at a repacking company which owns

the license for this activity. The repacking consists of packing the chemicals in small containers that are labelled according in a way that conforms to relevant Myanmar laws. The largest repacking company, Piti Pyaesone Ltd, belongs to the biggest agro-chemical supplier in Myanmar, named Awba (www.awba-group.com). Other smaller brands are paying a fee in order to realize the repacking at Piti Pyaesone. There are dozens of companies in the agro-chemical business sector.

The informal channel involves unregistered and direct imports of agro-chemicals from neighboring countries, particularly China and Thailand. In many cases these are not repacked or re-labelled, but are sold direct to farmers in the format that they were imported. Though it should be noted that for fertilizer, many companies (often smaller businesses) are repacking imports from China or Thailand. Products sold through this channel are less expensive, but are not labelled according to Myanmar requirements. The labelling is in Chinese or Thai and instructions cannot be read by the user. In some cases, chemicals are sold directly out of drums (visible in the figure below, behind the man in the white shirt). They are simply repacked in plastic bags, without any labelling.



Figure 14 Agricultural input dealer in Aung Ban

The products from both of these channels are then sold to farmers by small agricultural input dealers. Every smaller town has several such distributors for agro chemicals. Myanmar agro-chemical companies often provide the products to these companies on credit and the distributors pay back the loan when the products are sold. This business model is typically applied without formal contracts or agreements. The distributor is most of the time obliged to sell the products within a defined timeframe, otherwise it will be retaken by the companies. The chemical companies also normally set the sales price of the products. Price lists are forwarded to the distributors on a regular basis.



Figure 15 Advertisement of different agro-chemical companies in Shan State

Agro chemical companies conduct intensive marketing activities at the village level. Even in remote areas, advertisement of different chemical providers is omnipresent.

Marketing teams are visiting the villages and promoting their product range. Training on the safe and appropriate use of the chemicals is not normally provided. For the most part, these are pure marketing events, with the objective of increasing sales.

Distributors prefer the informal option of selling products, as their margin is higher and the sales price lower. But they do need a solid cash flow to operate in this way, because a credit system does not exist for the informal supply chain. As such, they often rely on Myanmar companies for their supply.

Example of purchase and sales prices for fungicide from Thailand and Myanmar are provide below:

Country of origin: Thailand

Buying price: 5.000 Kyats

Selling price: 8.000 Kyats

Country of origin: Myanmar

Buying price: 10.000 Kyats

Selling price: 12.500 Kyats

Further on the pricing lies in the hands of the distributor. In general the agro-chemical business is well developed but the handling and usage by farmers needs serious improvements, as outlined in the SWOT analysis.

4. Rules and supporting functions

The following chapter presents the 'Rules' and 'Supporting functions' which have an impact on the functioning of the value chain. Please refer to the section in the introductory chapter if further definition of these terms is required. A diagram summarizing all rules and supporting functions is provided in annex 5.

Rules

Food safety

Government

The Department of Food and Drug Administration is responsible for over-seeing and ensuring food safety and the safe production of foods for sale to consumers. According to the National Food Law (1997), food businesses should be registered and certified by the FDA. To gain certification, the FDA must inspect the business. In practice, the exact criteria against which the inspection is carried out are slightly unclear, however, with some processors reporting that they were given a specific 'checklist' and some not. In addition, the FDA is hampered by a lack of resources, which makes it difficult to certify and monitor food safety across such a large sector.

Other organizations involved in ensuring product quality are the Ministry of Health, whose laboratory is capable of biological and chemical analysis, and the Ministry of Industry, whose food control laboratory aids it in its function of licensing food manufacturing establishments. Lastly, the Food Industries Development Supporting Laboratory of the Myanmar Food Processors and Exporters Association conducts quality and safety analyses on food and water.

Private standards and certification

Globally a variety of private standards exist in relation to food safety, such as ISO 22000 Food Safety Training and Assessment; FSSC Food Safety System Certification; Hazard Analysis Critical Control Points (HACCP); and Good Hygiene Practices (GHP). Research identified 9 companies in Yangon which are able to provide certification to one or more of these standards. Research also identified 10 companies in Yangon which are able to provide training in one or more of these standards.

NGOs

Myanmar Consumer Union: is an NGO founded in 2012. They have over 200 members, from different industries. Their mission is to create awareness amongst consumers about food safety issues related to the food they consume and to about their consumer protection rights. The NGO fully relies on the fee contributions of their members and donations, which provides limited funds. The Union is still in a development phase and needs more funding and a greater network in order to increase the outreach of their activities. However, it is an

important organization that might have a bigger influence on consumers' behavior and market requirements in the future.

Agricultural production practices

Government

The key ministry driving legislation in relation to agricultural production practices is the Ministry of Agriculture, Livestock and Irrigation (MoALI). There are several laws related to production practices at farming level are the Pesticide law (1990), the Seed law (2011), the Plant Pest Quarantine Law (1993), the Fertilizer law (2002) and the Law Amending the Fertilizer Law (2015).

There are major issues with enforcement of some of these laws, however. As noted in chapter 3, the import, labelling, sales and application of agrochemicals is largely being carried out without adherence to the Pesticide Law and the Fertiliser Law.

Private sector

A number of international private standards exist related to agricultural production practices, such as Good Agricultural Practices (GAP). There are also several companies in Yangon which are able to provide certification of compliance with GAP standards and several companies which provide training to farms in GAP.

Land

The Farmland Law (2012), The Embankment Act (1909), The Vacant, Fallow and Virgin Lands Management Law (2012) are the key laws related to the use of land for agricultural practices.

Studies have highlighted major issues with land tenure. For example, Johnstone (2015)³ concluded that land tenure is insecure for most smallholder farmers for a range of reasons:

- 1) a long, complex registration process resulting in low land registration;
- 2) rigid land classifications that do not reflect existing land use;
- 3) lack of recognition of customary land use rights;
- 4) weak protection of registered land use rights;
- 5) inefficient land administration;
- 6) active promotion of large-scale land allocations without adequate safeguards

In addition, issues with land-grabbing have been highlighted as a relevant issue, particularly for farmers in Southern Shan State (Burke, 2015)⁴.

³ Johnstone, R. (2015). Agro-Input Supply Sector Review with focus on Southern Shan State. Winrock International.

Supporting functions

Infrastructure

Production areas

The infrastructure in the Mandalay Region is fairly good. Most villages are connected by paved roads to the Yangon – Mandalay Expressway, which is a major highway that connects Mandalay to Yangon. Mandalay also has an international airport with regular flights.

In the main chilli-growing areas of Southern Shan State - Pinlaung and Kalaw townships - transport infrastructure is variable. The highways provide excellent links to Aung Pan market. From Aung Pan, the roads to Mandalay and Yangon are good. As such, communities situated close to the highways, generally have access to good transport infrastructure. However, those situated further from the highways have access to variable quality of roads linking them to the highway. Some of these roads are not tarmacked, which makes them difficult to pass in the rainy season.

Export from Yangon

For exports of dried chilli, the harbor in Yangon provides adequate infrastructure for international trade.

Export to China

Export to China is usually carried out by truck through the border at Muse in Northern Shan State. From either Southern Shan State or Mandalay region there are paved roads to Muse, but the roads are narrow and wind round numerous hillsides, making this a long journey. Conflict can also disrupt this transport route.

Research and development

At present, the government is not actively researching chilli production. However, individual companies from the private sector are certainly involved in research related to the chilli farming. For example, East West Seeds is developing new varieties of chilli and field-testing existing varieties in new locations. Likewise, there are numerous seed companies in other Asian countries which are developing improved seed varieties for similar agro-ecological conditions to those in Mandalay Region and Southern Shan State. However, for the most part, the results of research by private agribusinesses are not public.

⁴ Burke, A. (2015). What holds vegetable farmers back? Conflicts, governance and market assessment, Making vegetable markets work for smallholders program. Mercy-corps.

Co-ordination

Associations

Myanmar Fruit and Vegetable Producers Association (MFVP) is the main association under UMFCCI which has a mandate to act in the interest of chilli producers. They aim to improve production and marketing of a wide variety of fruit and vegetable crops. Their approach is based on creating clusters for specific crops in specific parts of the country and providing training to these clusters. There are currently 29 clusters across the country, some with physical offices. At present, a chilli cluster does not exist, though there is potential for creation of a cluster in the future. Myanmar Organic Grower and Producer Association (MOGPA) also falls under the umbrella of MFVP and aims to promote organic production.

Myanmar Food Processors and Exporters Association (MFPEA) also falls under UMFCCI and operates in the interest of food processors, including chilli processing companies. They have a laboratory within their office, which members can use.

Farmer groups

A limited number of farmers groups have been formed within Southern Shan State and Mandalay Region by various projects. However, the vast majority of chilli farmers in these areas are not organised into farmers groups. Informal coordination between farmers seems to be strong in places. Most notably, farmers reported that they provide each other credit, rent tillage equipment and loan trucks to each other.

Financial services

Formal

A number of formal financial services are available in parts of Mandalay Region and Southern Shan State. The main providers and services are listed below.

- Proximity finance: Offer crop loans at 2 amounts (250,000 and 300,000 Kyat). Repayment time of 1-12 months, with interest of 2.5% per month + 1% flat fee. A group guarantee system is used. Also offer 'asset financing' for purchases of their irrigation and solar equipment
- Triodos: provide micro and medium sized loans. Requires a contract between producer groups, buyers and banks
- Pact: offer loans with 2.5% per month interest. Use a group guarantee system
- Yoma: provide loans for hire-purchase of agricultural equipment
- SME Development Department: provide small loans to SMEs. Limited budget is allocated to each township to provide these loans
- Myanmar Agricultural Development Bank: provides low interest loans, but not for chilli farming

However, these services are only available to farmers in specific locations (normally close to branches of the service provider), for specific purposes and with specific conditions that still exclude certain farmers. As such, the majority of farmers in both Mandalay Region and Southern Shan State have inadequate access to formal financial services.

Informal

Informal finance is widespread. In particular, input dealers, collectors and wholesalers, as well as informal moneylenders provide loans to farmers. Typical interest rates are as follows:

- Input dealers: 2-5% interest per month
- Collectors and wholesalers: 2-5% interest per month or a reduced price for the sale of chilli to the collector/wholesaler is negotiated
- Informal moneylenders: up to 10% interest per month

Overall, the interest rates to these actors are high and, in the case of collectors and wholesalers, they often force farmers to sell produce back to the loan provider at lower prices, which drastically reduces the overall profitability of the business.

Information and advisory services

Government

No government agricultural advisory services for chilli production were identified in Mandalay Region or Southern Shan State.

NGOs

NGOs have implemented a number of projects in Mandalay Region and Southern Shan State, which provide training to farmers to improve agricultural production. For example, in Southern Shan State, Metta and Parami have both implemented projects with this objective. These initiatives provide useful advisory services to farmers for the duration of the project, but the funding is available for limited periods and can only support the delivery of these services on a limited scale. In addition, a very small proportion of these services have been focused on chilli production, with a far greater emphasis on vegetable farming.

Private sector

For-profit provision of agricultural advisory services is very limited in Myanmar as a whole. Large farmers may be able to hire national or international consultants to provide such advice, but the costs are far too high for smallholder farmers. One social enterprise - Proximity Designs – has begun to offer advisory service which target smallholder farmers and charge affordable fees. However, this currently only available for rice farmers in the Delta Region. East West Seeds has been offering production training to vegetable farmers, in a collaboration with Mercy Corps, who identifies farmers to train. However, no chilli-specific training is available at present.

Input dealers, who focus on selling seeds, pesticides and fertiliser, are a major source of agricultural advice to farmers. When selling these products, they often answer questions about how the products should be used. The key issue is that these dealers have limited knowledge about best practice regarding the usage of these products, which affects the quality of their advice. Likewise there are clear incentives to give advice which will increase sales, such as recommending excessive application of pesticides.

A significant proportion of farmers in Mandalay Region and Southern Shan State have access to smartphones. There is clear potential for information on markets, weather and

production practices to be delivered to farmers through this channel. In English, there are large amounts of information available related to chilli production, though this is not necessarily easy to access or user-friendly and the majority of chilli farmers do not speak English. Some pilots have been implemented which aim to provide information to farmers in apps presented in Myanmar language, though at present very limited services are available in Myanmar language or Hpa O.

5. Selection of target sub value chain, regional focus and objective

The mapping made clear that chilli is not a single value chain, but is divided into different sub-value chains, serving different markets with different products. These are fresh chilli, whole dried chilli and processed chilli. A small workshop was held in Aung Ban on 21st October 2016, together with the ILO consultant team in order to identify the sub-value chains with the highest upgrading potential. Criteria were defined and scored based on a rating system (1= very low, 2= low, 3= average, 4= good, 5= excellent). Using this system, the potential of each sub- value chain was defined as follows:

Table 2 Scoring of sub-value chains against criteria

<i>Criteria</i>	Fresh Chilli	Whole dried chilli	Processed chilli
<i>Numbers of MSMEs</i>	1	5	3
<i>Potential for economic growth of MSMEs</i>	2	3	3
<i>Potential for decent jobs creation</i>	1	2	2
<i>Interest in cooperating on a project level</i>	1	4	1
<i>Potential for market opportunities</i>	1	4	2
Total score	6	18	11

Explanatory notes on the results

Fresh chilli: In the study areas there are very few farmers selling fresh chilli and a very limited number of traders. Processing of any kind (such as hot water treatment against fungus, correct packaging or handling) is not practiced and there is no cold chain in place. As such, access to international markets for fresh chilli would require major investment in developing a complex supply chain management system, including a cold chain. This sub-sector of chilli is not suitable for a project with interventions over short timeframes.

Whole dried chilli: most of the chilli in Myanmar is dried by farmers and/or by wholesalers. As such, there are huge numbers of actors involved. It is a semi-finished product, with some critical food safety issues, but these are much more feasible to improve than developing the supply chain necessary for fresh chilli. Farmers and wholesalers are aware of the value of this product and it would be easy to find stakeholders on value chain level for the implementation of activities to develop this sub-value chain.

Processed chilli: currently chilli processors have good potential for growth, because demand is increasing and the raw material is produced in-country, which is a competitive advantage. But current processing practices are a long way from the standards required to access higher-value export markets. Equally, although growth of processors might create a certain

number of jobs, it is unclear whether it would result in any major benefits for farmers. As such, the scale of impact could be limited.

Regional focus and objective of the value chain upgrading strategy

Mandalay region and Southern Shan State were identified as the target areas for interventions at production level. Both regions are relatively close, so parallel implementation of project activities in both these areas would be feasible. A further important chilli growing area is Ayeyarwaddy region, but this is far from Mandalay Region and Shan State. The focus of interventions with traders and retailers of the product should include all Myanmar, as well as overseas actors.

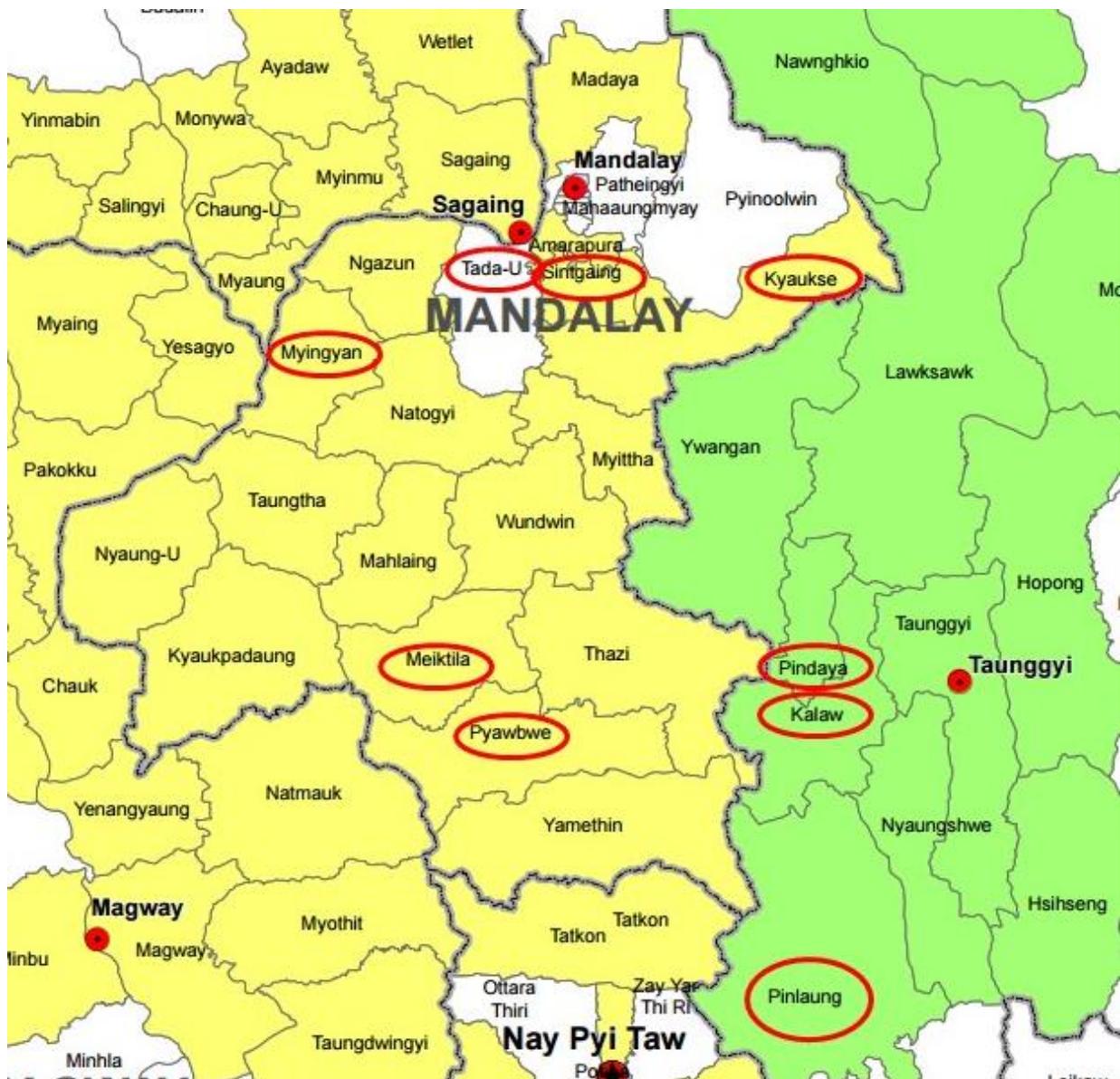


Figure 16 Mapping of major chilli growing areas in Mandalay Region (yellow) and Shan State (green) per townships (red circle)

In order to plan the upgrading strategy, it was essential to create an objective which the strategy aimed to achieve. This was planned to be feasible within a 3-5 year project timeframe. With this in mind, the following objective was formulated:

- **Objective: Increased profit and /or job creation for MSMEs in the whole dried chilli value chain within 5 years**

The target group of this objective is MSMEs. In the selected value chain (whole dried chilli), these are mostly farmers and wholesalers. The upgrading strategy is explained in the last chapter as further information on markets and economic data in the following chapters provides background required to understand the upgrading strategy.

6. SWOT analysis of whole dried chilli value chain

The SWOT analysis (Strengths, Weaknesses, Threats and Opportunities) was conducted for each actor group in the target value chain. Strengths and weaknesses originate from the value chain (micro level) itself and threats and opportunities from markets and outer influences. A summarised and detailed SWOT analysis are presented below.

Summary of the SWOT analysis

Between Southern Shan State and Mandalay Region there are two main differences in relation to the use of seeds. In Mandalay Region, hybrid seeds are purchased every season, which have the strength of higher yields. In Shan, the yield is lower due to the use of local varieties that are retained from the previous harvest. The number of varieties and in particular their specifications are so far not well known. This particular finding has an impact on the strategy for the two regions.

Cultivation processes in both areas are affected by a series of weaknesses and threats:

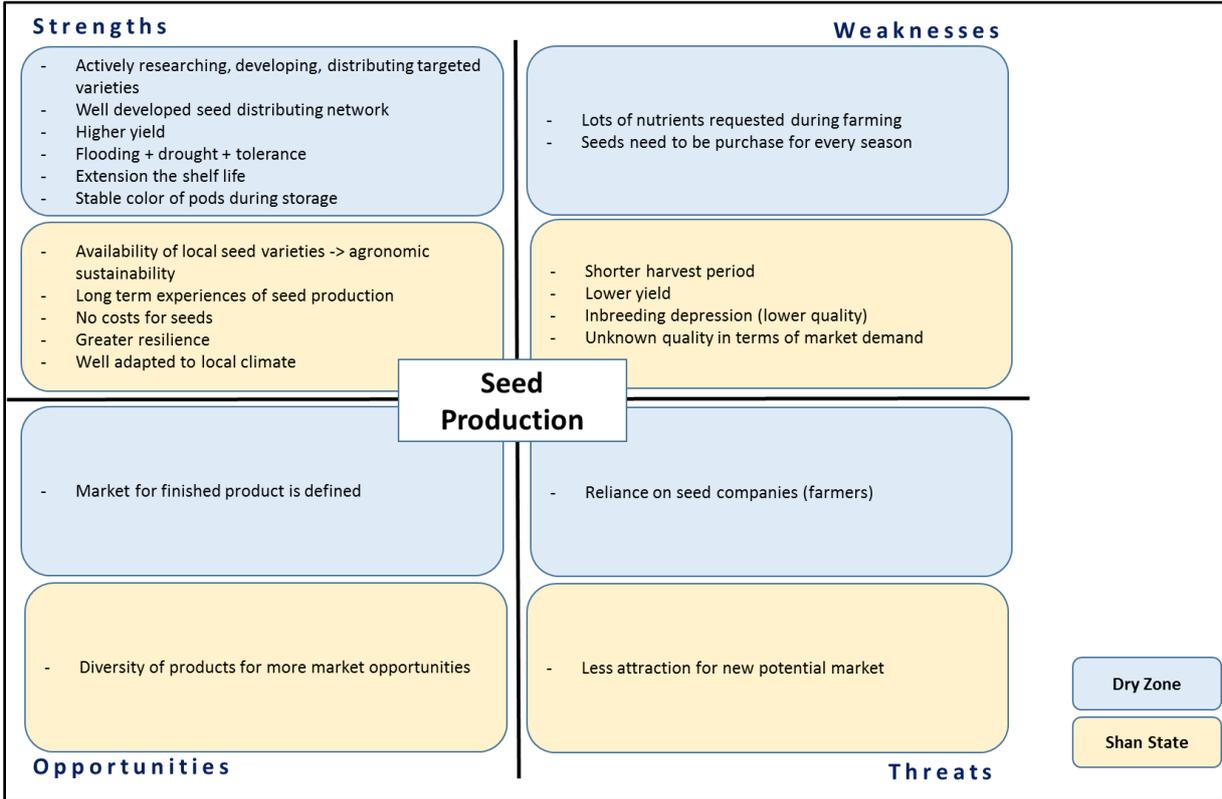
- Chilli farming is labor intensive, especially on the farming level and wages are continuously increasing
- Climate change becomes a serious threat if irrigation systems are absent and production losses are the consequence
- Effective use of fertilizers and pesticides, is one way to maximize yields. However, at present, agrochemicals are not used effectively, in terms of dosage, timing and application methods. This reduces their impact on productivity and is damaging to the workers applying them and neighbor populations; to the environment, particularly where chemicals enter aquatic ecosystems; and to the food safety of the chilli. Agro chemicals companies are not making significant efforts to ensure farmers use these products safely
- Drying is carried out under poor hygienic conditions, exposing chilli to contamination risks. In Shan State the long drying time of up to 10 – 14 days stimulates and accelerates the growth of fungus and mycotoxins (for chilli mainly Aflatoxin see annex 6 for further details). Mandalay Region has better drying conditions
- An established system of collectors and wholesalers ensures that farmers are able to sell their produce, but the prices are typically low, especially when farmers rely on these buyers for credit. The vast majority of farmers have no access to alternative, higher value markets.

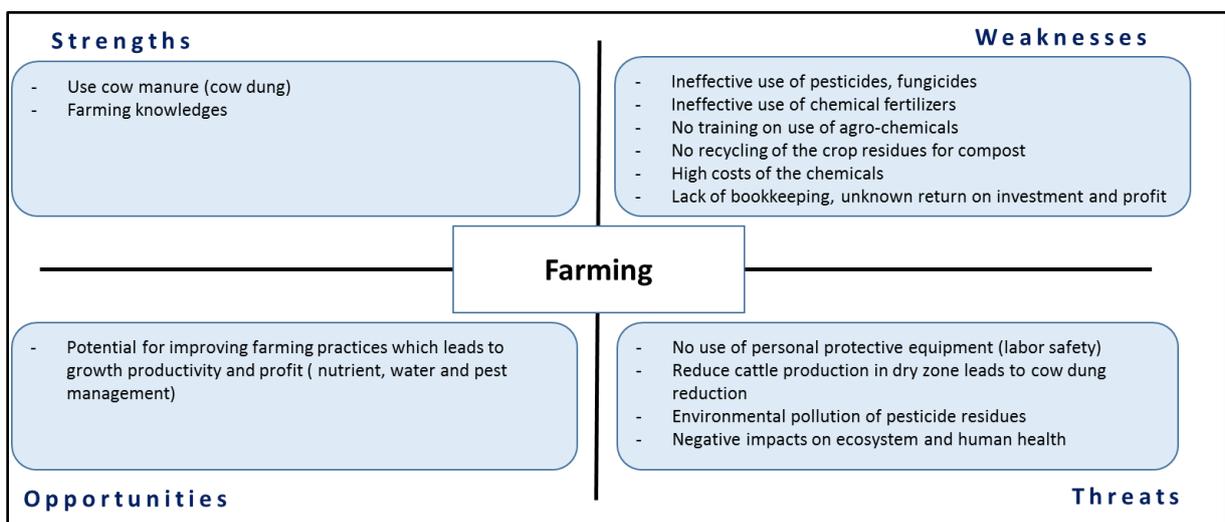
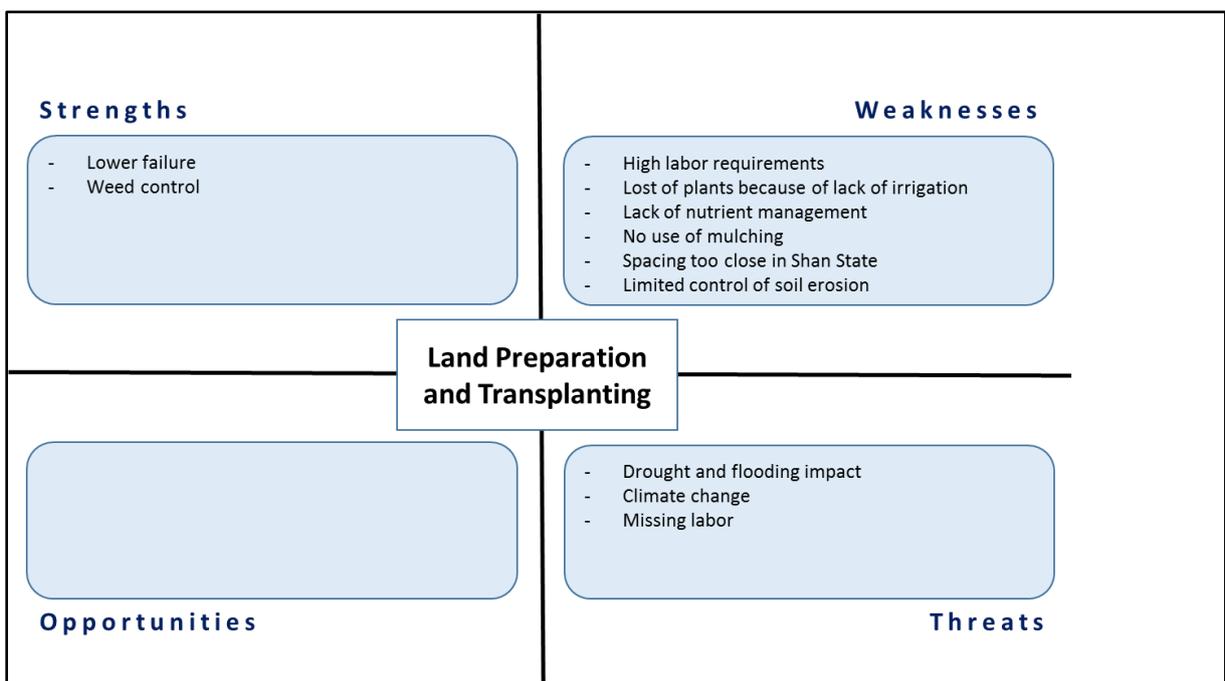
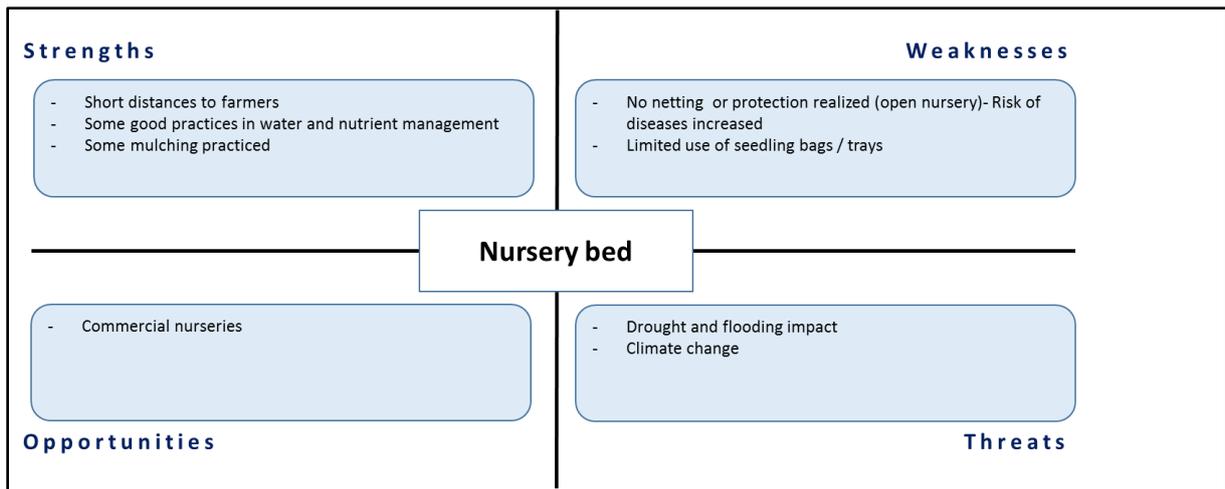
There are very few actors at the wholesaler level, both in Yangon and in areas that sell to border traders. The low number of actors, together with the price-fixing arrangements between them, mean that farmers get low prices when selling through this channel and that

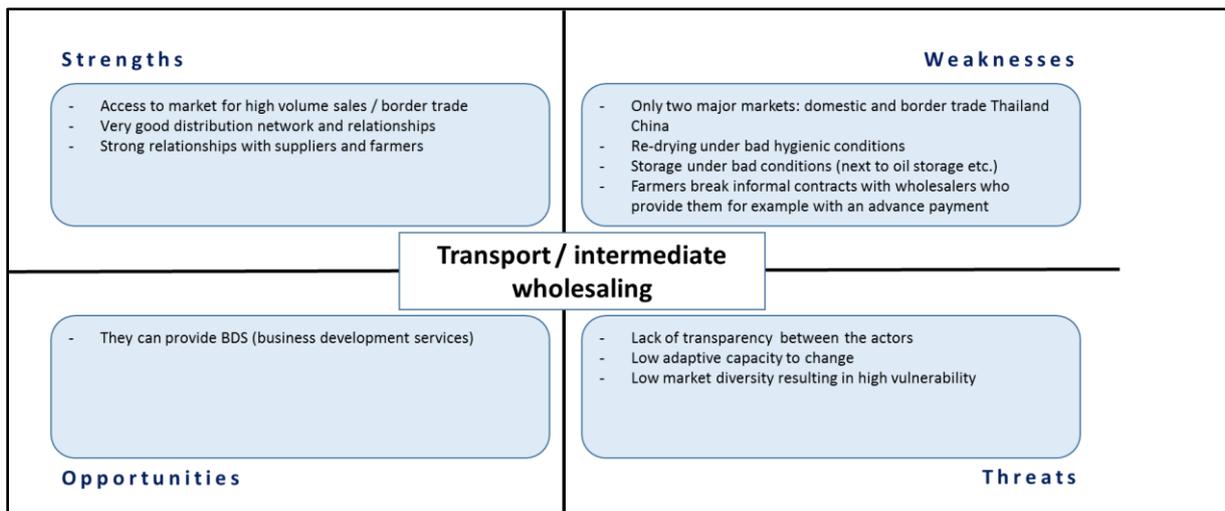
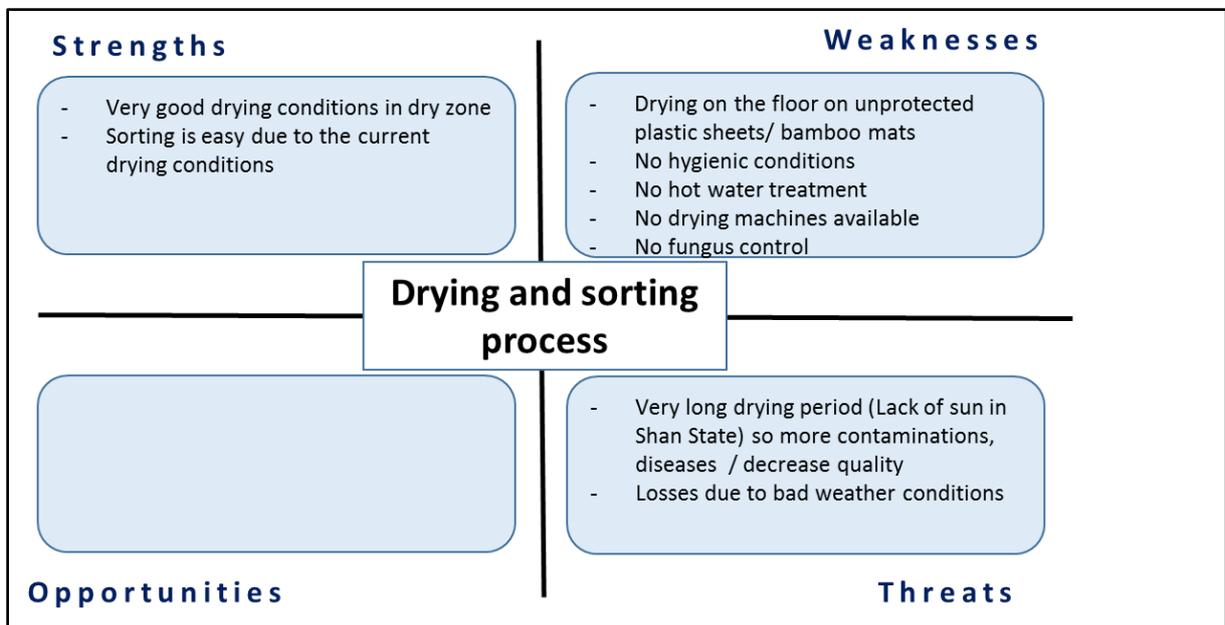
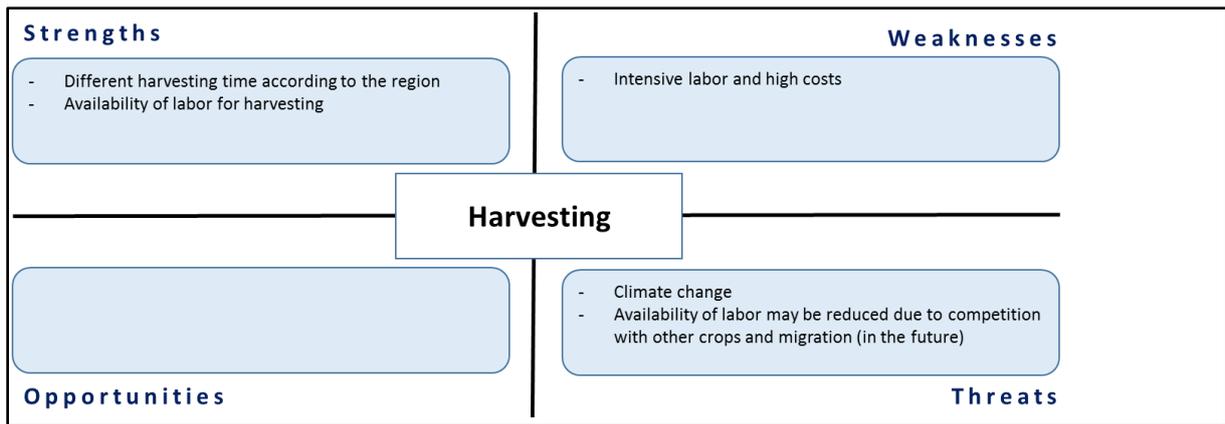
there is little likelihood of these actors finding new markets, because they profit very well from current arrangements.

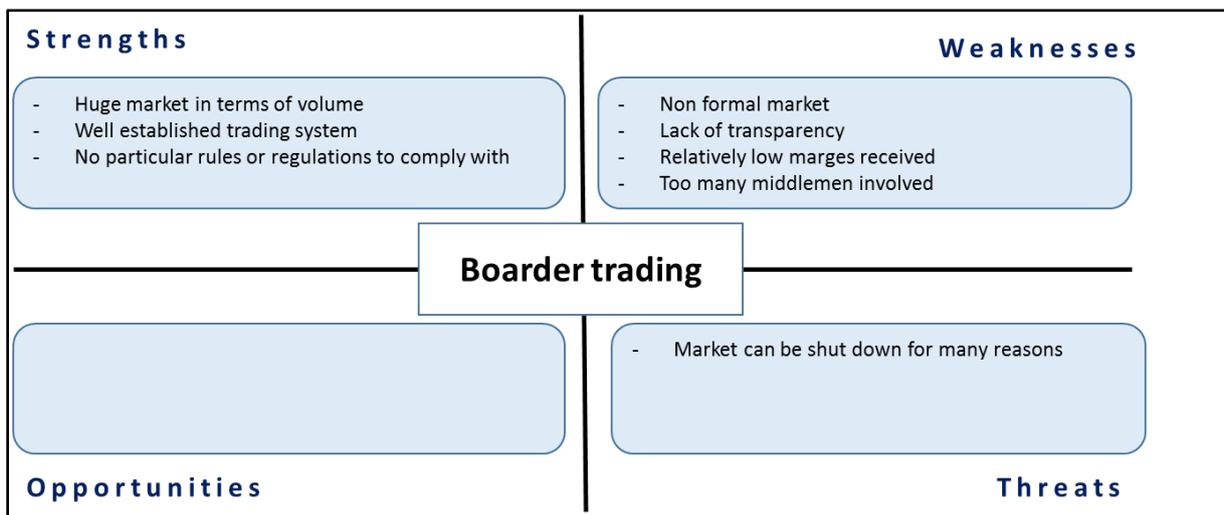
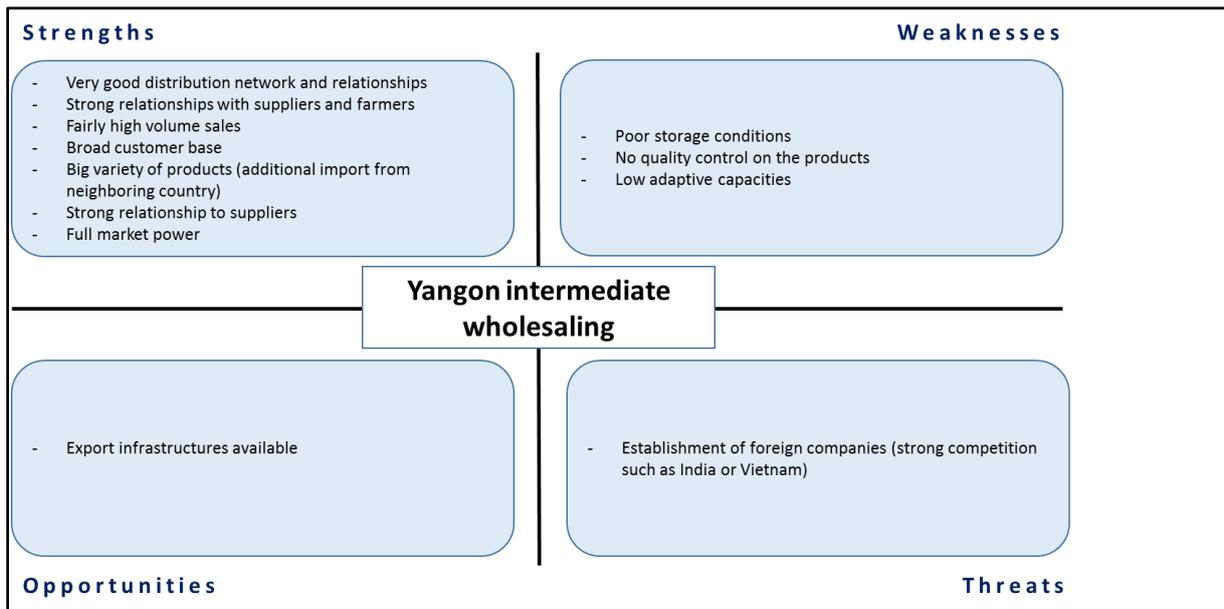
One strength of the border traders is that they are able to purchase very large quantities of chilli. However, border traders are not passing on information about the requirements of buyers in the end markets they sell to, such as preferred varieties. As such, farmers cannot respond to the needs of these buyers, which makes the whole value chain unresponsive to market demand and less competitive in the end-markets where the chilli is sold.

Figure 17 SWOT analysis of the whole dried chilli sub value chain









7. Economic analysis of whole dried chilli production

The following section provides an economic analysis of whole dried chilli production at farmer level. It should be noted that in Shan State, most of the farmers reported that they do not carry out book-keeping. As such, the data for costs, yields and sales were estimated by farmers. In Mandalay Region, only one farmer group was interviewed, so some caution should be exercised in interpreting this data. Finally, it should be noted that the yield figures are presented in 'viss', which is the local metronomic unit for weight. 1 viss is equal to 1.63 kg.

Breakdown of costs

In Chilli farming, the highest cost is the labor that is necessary for land preparation, transplanting and harvesting the chilli. Farmers reported that labour costs have consistently increased over recent years. This is probably largely due to economic growth in Myanmar and Thailand, which has created opportunities for migrant labour. In Southern Shan State, poppy farmers also pay higher wages, which has pushed labour prices up in general. In addition, most farmers only employ labourers from their own village, which provides a limited pool of potential workers. At present, labour costs range from 4.000-5.000 Kyats per day in Shan State and Mandalay Region.

The table below shows the distribution of costs between transport, labour and inputs. The figures are absolute figures. As such, input supply for Shan State is higher, even though they do not use seeds. However, their harvest costs are lower compared to Mandalay Region, due to their lower yields. Due to the fact that labor is one of the most important cost factors, further processing steps (like stalk removal) are usually avoided. Stalks could be removed from the chilli, but only through intensive use of labor. The price received "stalk-off" is ¼ higher but would hardly cover the additional labor costs.

Figure 18 Mandalay Region and Shan State: breakdown of transport, labor and input costs

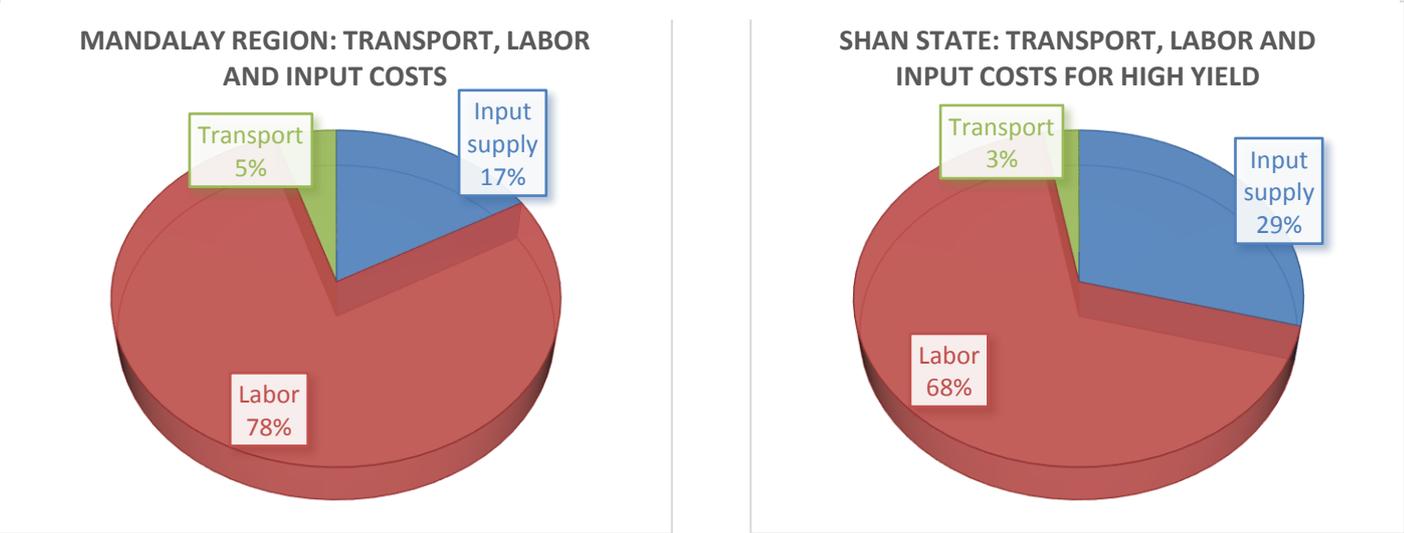
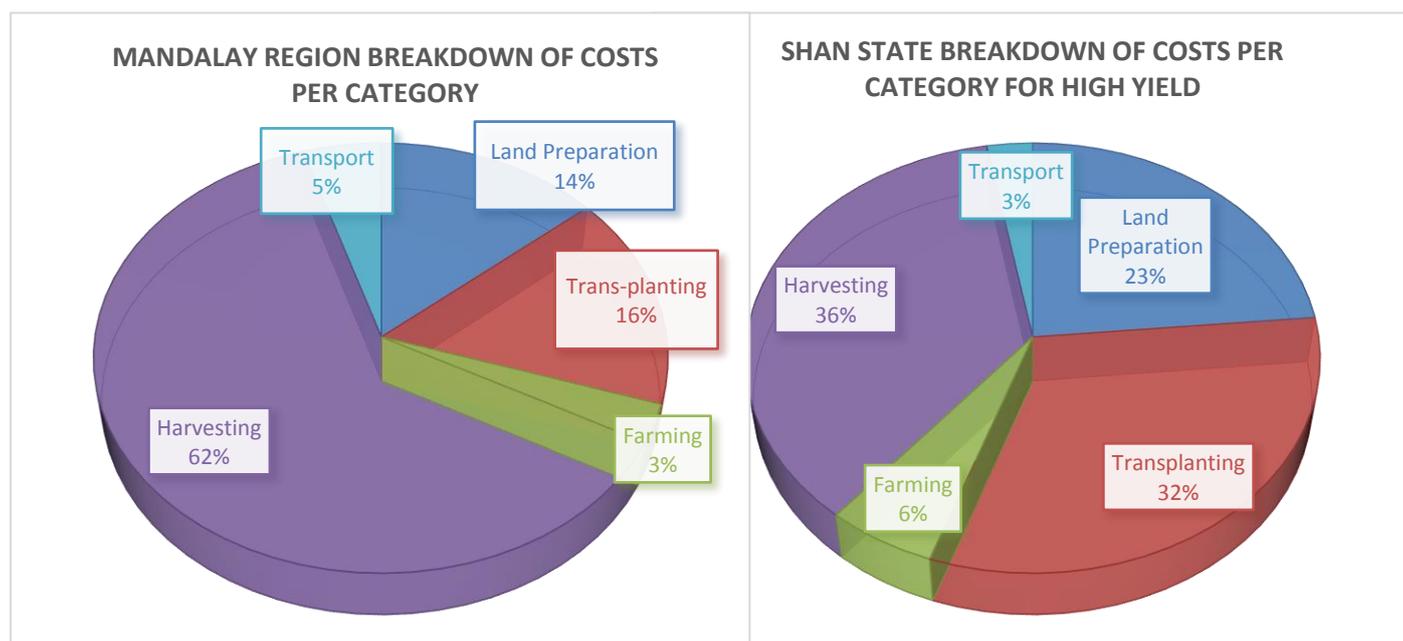


Figure 19 Mandalay Region and Shan State: breakdown of costs per category



The above breakdown of costs per budget line of category shows that inputs like fertilizers and chemicals are negligible compared to costs of labor. Transplanting and harvesting are labor intensive and cover almost 2/3 of the costs.

Profit and loss calculation: Shan State

The profit and loss calculation below is based on data gathered during the different interviews. Figures were compiled and averages taken for some data, such as labor cost (4.000 – 5.000 MYK = average 4.500 MYK). The figures are calculated for the case where farmers sell directly to wholesalers, rather than to farm-gate collectors, due to the fact that collectors are only involved in 20% of sales. These collectors typically take 50-100 MYK/viss of each sale, but they also carry out the transport to wholesalers. As such, their impact on the overall calculation is very minor and is covered by the transport budget line.

For Shan State, two scenarios are displayed: one for an average of a higher yield (600 viss per acre) and one with a lower yield (300 viss per acre). Shan State farmers reported lower yields/acre compared to Mandalay Region. The sales price for the production is averaged to 2.500 MYK / viss. The quantities of low, medium and high quality could not be measured clearly.

Depreciation of materials (like farming tools, e.g. plows) is not taken into consideration for this calculation as the investments undertaken are minor.

Costs

Land Preparation				
Categories	Quantities/acre	Unit	Price/Unit in MYK	Total in MYK
Cow dung	2,5	1 Ton	60.000	150.000
Chemical fertilizer	200kg (4 bags)	1 bag of 50 Kg	25.000	100.000
Sub-Total				250.000
Transplanting				
Categories	Quantities/acre	Unit	Price/Unit in MYK	Total in MYK
Workers	75 (men days)	1 day	4500	337.500
Sub-Total				337.500
Farming				
Categories	Quantities/acre	Unit	Price/Unit in MYK	Total in MYK
Fungicide + Pesticide (including labor)	X	X	x	50.000
Weeding	X	X	x	10.000
Sub-Total				60.000
Harvesting				
Categories	Quantities/acre	Unit	Price/Unit in MYK	Total in MYK
High yield Production	600	Viss*	≈ 642*	≈ 385.000
Low yield Production	300	Viss*	≈ 642*	≈ 192.500
Sub-Total				
Transport				
Categories	Quantities/acre	Unit	Price/Unit in MYK	Total in MYK
High yield	600	Viss	50	30.000
Low yield	300	Viss	50	15.000
Sub-Total				
TOTAL COSTS				
High yield			≈ 1.062.500 MYK	
Low yield			≈ 855.000 MYK	

Sales

Sales				
Categories	Quantities/acre	Unit	Price/Unit in MYK	Total in MYK
High yield	600	Viss	2500**	1.500.000
Low yield	300	Viss	2500**	750.000

Profit

Profit			
Categories	Costs	Sales	Sales – Costs
High yield	≈ 1.062.500 MYK	1.500.000	437.500 MYK
Low yield	≈ 855.000 MYK	750.000	- 105.000 MYK

* one worker = 7 viss dried chilli per day / remuneration in average 4500 MYK

** average sales price

Break-even calculation in Shan State

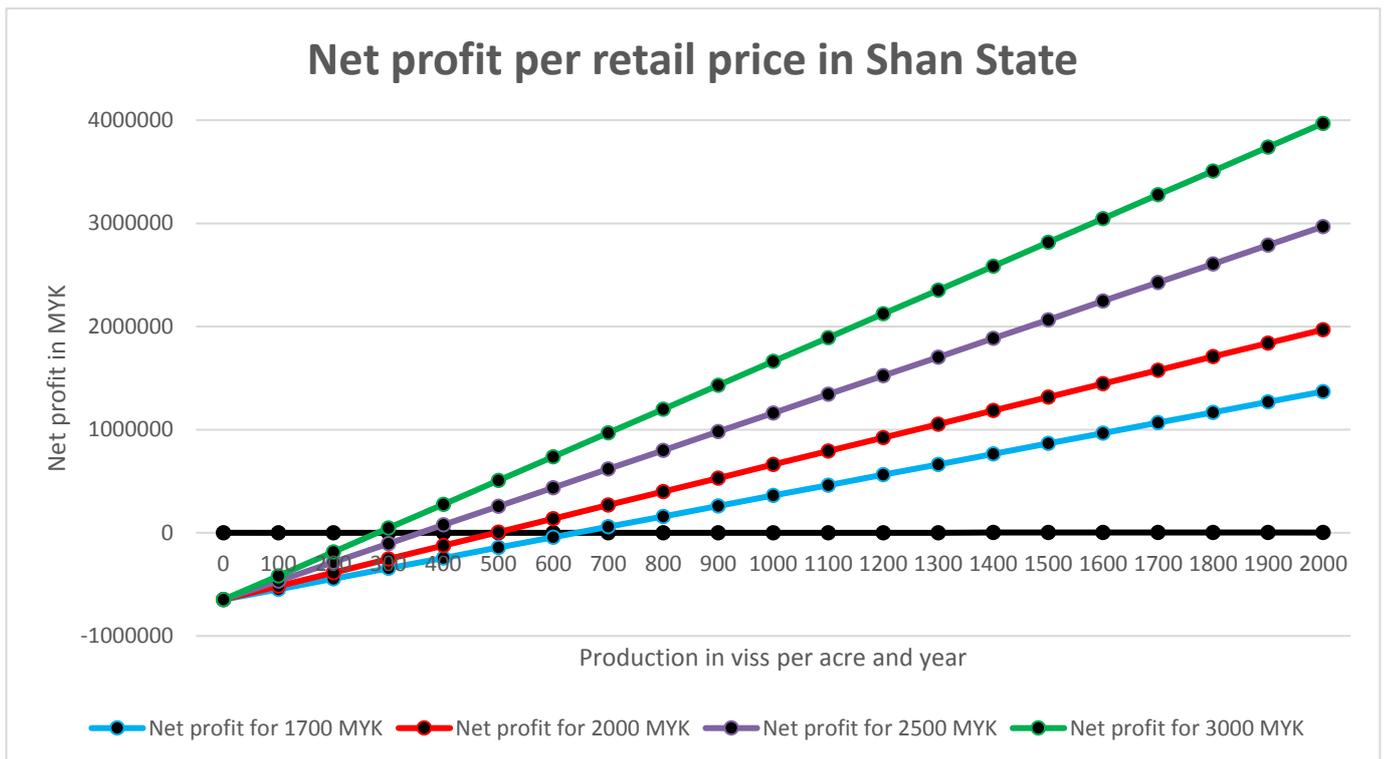


Figure 20 Break-even calculation for Shan State

For the calculation of the break-even point, four scenarios are displayed, based on different sales prices (1700 MYK/viss, 2000 MYK/viss, 2500 MYK/viss and 3000 MYK/viss). Losses start below the bold black line.

Conclusion: At present, the overall profit of Shan Chilli farmers is quite low, unless sales prices or yields are high. Farmers can cover their costs, but profits are minimal unlikely to attract stakeholders to invest. The major challenges to profitability are low yield, low prices received and the high costs of labour.

Profit and loss calculation: Mandalay Region

Costs

Land Preparation				
Categories	Quantities/acre	Unit	Price/Unit in MYK	Total in MYK
Seeds	X	X	X	40.000
Cow dung	2,5	1 Ton	60.000	150.000
Chemical fertilizer	200kg (4 bags)	1 bag of 50 Kg	25.000	100.000
Sub-Total				290.000
Transplanting				
Categories	Quantities/acre	Unit	Price/Unit in MYK	Total in MYK
Workers	75 (men days)	1 day	4500	337.500
Sub-Total				337.500
Farming				
Categories	Quantities/acre	Unit	Price/Unit in MYK	Total in MYK
Fungicide + Pesticide (including labor)	X	x	x	50.000
Weeding (labor)	X	x	x	10.000
Sub-Total				60.000
Harvesting				
Categories	Quantities/acre	Unit	Price/Unit in MYK	Total in MYK
High quality Production	1400	7 Viss*	4500	900.000
Low quality Production	630	7 Viss*	4500	405.000
Sub-Total				
Transport				
Categories	Quantities/acre	Unit	Price/Unit in MYK	Total in MYK
High quality	1400	Viss	50	70.000
Low quality	630	Viss	50	31.500
Sub-Total				
TOTAL COSTS				
High quality			1.657.500 MYK	
Low quality			1.124.000 MYK	

*one worker = 7 viss dried chilli per day / average remuneration 4500 MYK. $1400/7 \times 4500=900,000$

Sales

Sales				
Categories	Quantities/acre	Unit	Price/Unit in MYK	Total in MYK
High Quality	1400	Viss	3000	4.200.000
Low quality	630	Viss	1500	945.000

Profit

Profit			
Categories	Costs	Sales	Sales – Costs
High Quality	1.657.500 MYK	4.200.000	2.542.500 MYK
Low quality	1.124.000 MYK	945.000	- 179.000 MYK
Overall Profit			
	Profit high quality	Profit low quality	OVERALL PROFIT
	2.542.500 MYK	- 179.000 MYK	2.363.500 MYK

Break-even calculation Mandalay Region

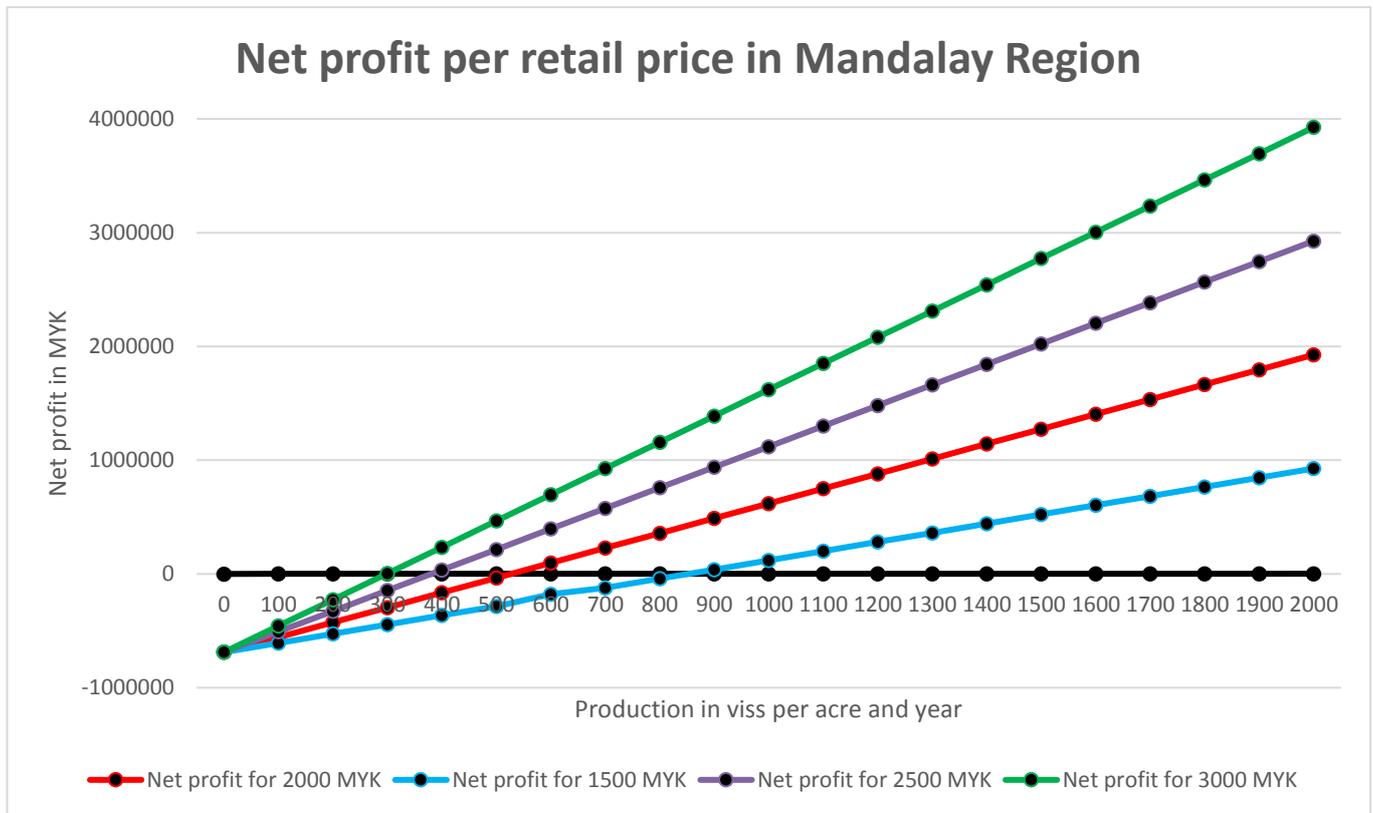


Figure 21 Break-even calculation for Mandalay Region

Compared to Shan State, the break-even for farmers in Mandalay Region is more favourable. This is due to the fact that yields are higher.

Conclusion: based on the available data, the profit for farmers in Mandalay Region is greater than that of farmers in Shan State. Though it must be noted that a limited number of farmers were interviewed in Mandalay Region, which means that caution should be exercised when interpreting this data. In addition, although the profit is greater than that in Shan State, the prices received are still low and do generate high overall profits. As such, getting higher prices is key to increasing the profitability of chilli farming in this area.

8. Market analysis for whole dried chilli

Global chilli production

The biggest chilli producing countries are listed in the table below, together with data on their production.

Country	Production in 2012 (tons)
India	1.300.000
China	290.000
Peru	175.000
Bangladesh	172.000
Pakistan	150.000
Thailand	145.000
Myanmar	128.000
Ghana	100.000
Ethiopia	100.000
Vietnam	93.000
Mexico	60.000
Others	394.260

Table 3 Most important countries growing chilli - Source FAO 2012

Although this data is slightly dated, the broad picture is remains the same, with India by far the biggest producer, followed by China. Myanmar can be considered as one of the top 10 producers in the world. The official figures from CSO Myanmar Statistical Yearbook suggest that production in Myanmar is relatively stable, with small variations around 120,000 tons per year.

2011	2012	2013	2014	2015
128.000 tons	117.000 tons	118.000 tons	115.000 tons	121.000 tons

Table 4 Myanmar chilli production according to CSO

Myanmar contributes approximately 4% to total global chilli production. Given the large number of producing countries, this is a relatively high figure.

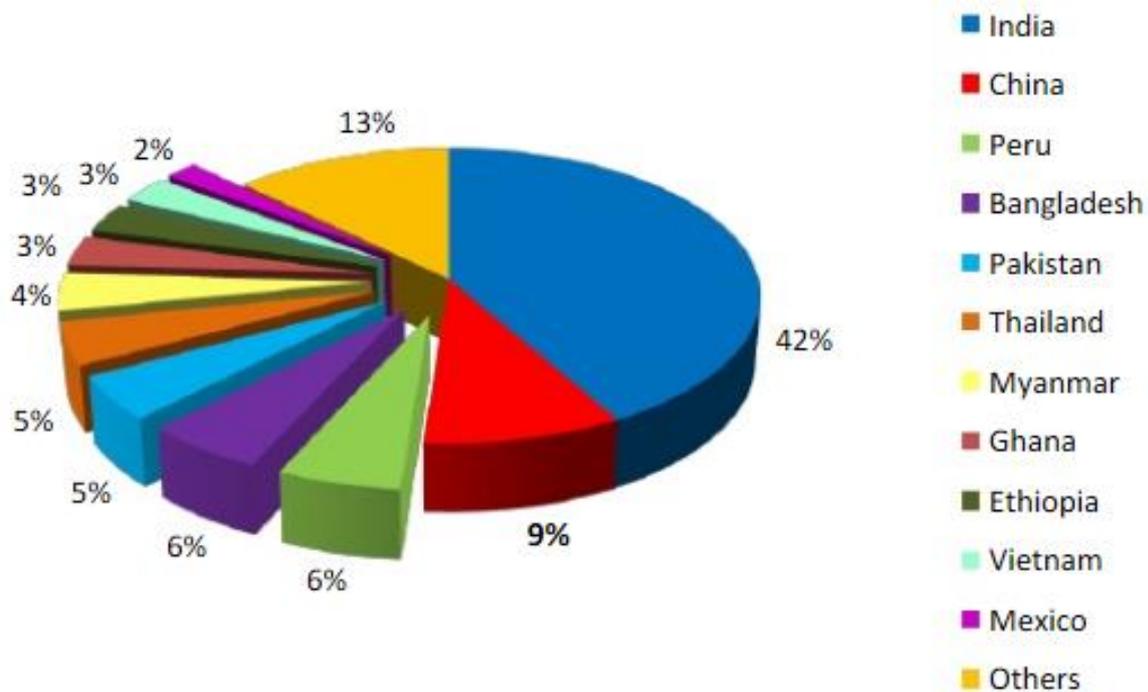


Figure 22 Contribution in terms of quantity of major producing countries to the global production in 2012, source FAO

Yield per hectare of main producer countries

There is a large difference between the three countries with the highest yields and the other producers. Peru has the highest yield (11 ton/ha) which is partly explained by the common application of irrigation. China has relatively high yields (6.7 ton/ha) but they are almost on the same level as 20 years ago. India has significantly lower yields (1.6 ton/ha) which have not grown in the past decade. A distinction has to be made between yields of the larger professional farmers and those of smallholders. In India, yields of professional farmers can be up to 5 ton/ha, while that of smallholders can be as low as 0.2 ton/ha. Yields in Ghana (9th largest producer) have developed strongly (from 1.7 ton/ha in 1991 to 7.1 ton/ha in 2012). This growth is partially driven by investments, new seeds and in GAP training.

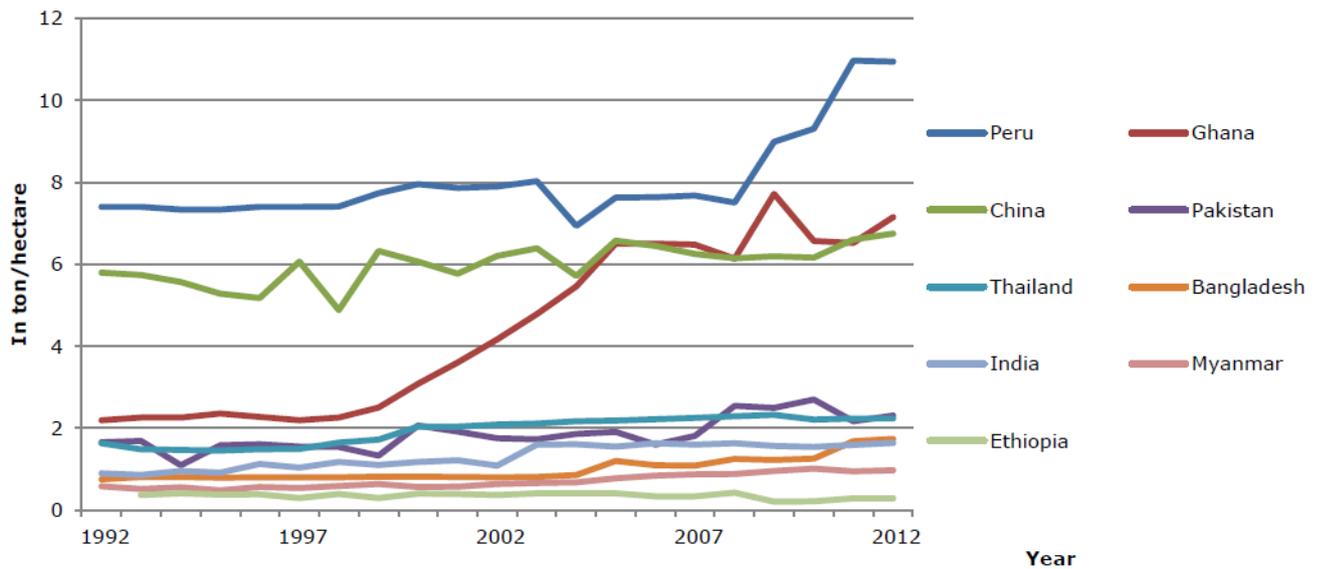


Figure 23 Development of dried chilli yields of top 9 producers - Source FAOSTAT 2014

Trading figures

There are hundreds of different chilli varieties with different colors, sizes and pungency. However there are only a few species of chilli that are traded internationally on a large scale. Common chilli traded internationally are the Guntur Sannam - S4 (India), Tiensin (China), Fukien (China), Aji (Peru) and Bird-eye chilli (Africa). Different chillis have different characteristics but they are often mixed with other chilli to control the heat (pungency).

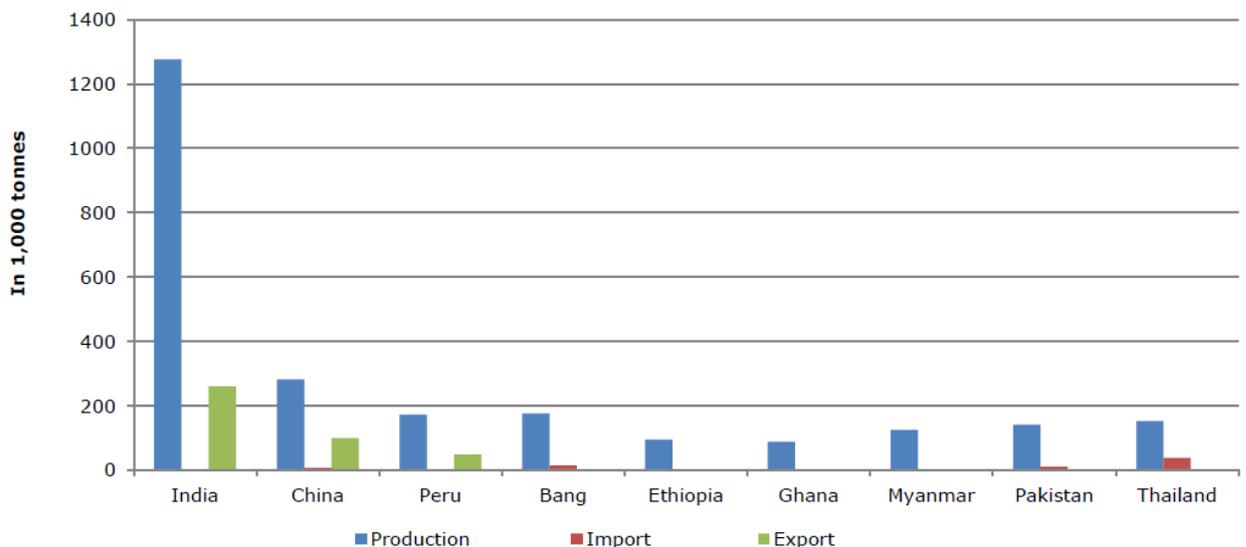


Figure 24 Production and trade of dried chilli by most important producers - Source FAOSTAT 2014

It is important to note that countries like China are only importing 8,000 tons/year, while producing almost 300,000 tons/year in average. According to the FAO data, Myanmar does

not export chilli. However, the reports about border trade which were collected during this study suggest that 90% of national production is exported via the border trade. Obviously, the border trade entries from Myanmar are not registered and declared as such.

The largest export of chilli is India, followed by China and Peru. One interesting fact from the 2012 FAO data is that Pakistan’s exports reduced from 5.000 tons in 2010 to 1.200 tons in 2012. The main reason for this is that chilli imports from Pakistan into the European Union and Japan were banned, due to excessive aflatoxin levels. This example from Pakistan shows that if Myanmar wants to target these markets, it must meet the relevant food safety standards.

Chilli importing countries

The biggest importing countries of dried chilli are the US, Malaysia, Sri Lanka, Spain, Thailand and Germany. The figures below are from 2011, but the overall picture has not changed within the last 5 years.

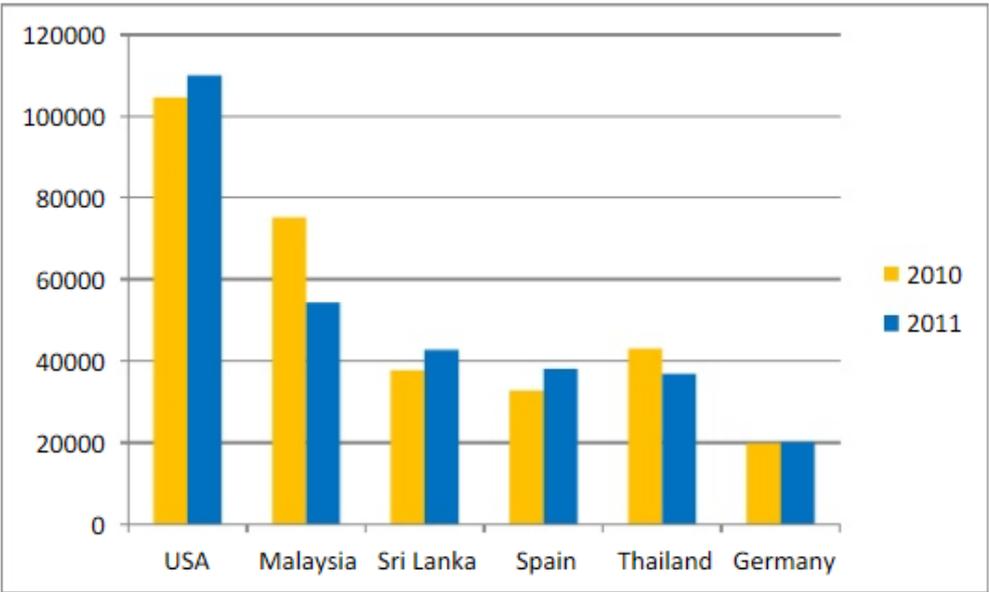


Figure 25 Chilli imports (tons) by major importing countries – Source FAO

It is interesting to take a closer look at the Chinese and Indian export towards the main importing countries. India exports a huge quantity of chilli but at a lower price, while China is getting a slightly higher price. Both countries are exporting to the largest importer, the USA, but at different prices. The reasons for the different prices can only be assumed: Chinese chilli is mainly exported to the US while India is mostly exporting to Asian countries; like Malaysia and Singapore. Therefore the Chinese might have a better market access and customer base in the US. In addition the harvesting seasons are different. Also the quality might be different in terms of product specification, but also in quality assurance and food safety.

Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Chinese small	1,35	1,35	1,35	1,47	1,45	1,45	1,45	1,45	1,35	1,35	1,35	1,35
India S4	1,18	1,17	1,15	1,25	1,25	1,25	1,28	1,30	1,30	1,30	1,20	1,18

Table 5 Monthly average price (USD/lb) in the US market 2014*

*1lb = 0,453kg

When the above figures for the price of Indian and Chinese chilli on the US market are compared to the price of Myanmar chilli on the domestic market, it is clear that the Indian and Chinese chilli receives a much higher price. For example, Myanmar chilli is sold on the domestic market at 3000MYK/viss, or 1.34 USD / kg. Whereas 1kg of Chinese chilli is sold to the US at 1.35 USD/lb, or 2.9 USD/kg, which is twice as much.

The figures are not directly comparable, because the varieties may be different and the quantities traded internationally may be huge, which would reduced the price received. However, the data does suggest that the prices received on the US market are far higher.

Market requirements

Basic requirements according to the UNECE (United Nations Economic Commission for Europe) Standard for Whole Dried Chilli Peppers (DDP-24) are as follows:

- intact; however, slight superficial damage is not considered as a defect
- sound; produce affected by rotting or deterioration such as to make it unfit for consumption is excluded;
- clean, practically free of any visible foreign matter;
- sufficiently developed;
- free from living pests whatever their stage of development;
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta;
- free from blemishes, areas of discoloration or spread stains in pronounced contrast with the rest of the produce affecting in aggregate not more than 25 per cent of the surface of the produce;
- free from mold;
- free of abnormal external moisture;
- free of foreign smell and/or taste.

The condition of the whole dried chilli peppers must be such as to enable them:

- to withstand transportation and handling;
- to arrive in satisfactory condition at the place of destination

These very basic requirements can be found in many standards for whole dried chilli.

One promising market for producers is mainland China. The basic requirements for this market are outlined in Annex 8. Research with Chinese chilli importing companies were not fully clear on the requirements, but did provide the following information:

- To export dried chilli products to China, suppliers need to provide the Certificate of Origin and a food hygiene license or certificate. The proof of GAP/GMP does not seem to be necessary for import.
- The requirements for chilli products vary significantly from company to company. Common criteria for selection are: moisture level, length, color (redness) and health condition (percentage of mildewed chilli, percentage of mold and Aflatoxin).

However, further research about the Chinese market would be very useful, because this market is diverse and may have significant potential.

Other ASEAN countries (mainly Malaysia, but also Singapore and Indonesia- requirements in Annex 8) import chilli for further processing. Their requirements are based on national food standards, which are not particularly specific in relation to dried chilli (annex 8 presents requirements for Malaysia, Singapore and Indonesia). The main issues which these requirements focus on are Aflatoxin and pesticide residue limits. For Aflatoxin, Malaysia has a limit of 35 microgram/kg, which is quite high compared to Singapore (5 microgram/kg).

Sources of further information about new markets, as well as opportunities for networking with buyers, are presented in Annex 9.

Market potential for Myanmar chilli in specific target markets

China

The Chinese market may have significant potential, even though China also produces significant amounts of chilli. The potential to sell large quantities to China has already been partially realized by border traders in Myanmar. However, the potential for selling at higher prices has not. There are certainly buyers within China that will pay higher prices for chilli that meets specific requirements, but at present, this market is not being accessed. For other products, such as mango, Myanmar producers have managed to identify specific buyers that pay higher prices for better quality products and have established direct trading relationships with these buyers. Compared to mango traded through conventional border trade, the price received by producers is 2.5 times higher.

ASEAN countries

ASEAN countries, including Thailand, Malaysia, Singapore and Indonesia, not only consume chilli, but also process it, and are therefore also searching for suppliers to the processing industry. Significant demand exists in these countries, but competition from India is high. India has a well-established trading position in the regional market and is able to produce chilli in large volumes and at low prices. A benchmarking process should be carried out to research the prices, season, quality and volume of chilli which is exported from India, and to understand how these compare to those from Myanmar.

Across these markets, no particular management scheme is requested by buyers. However testing on residues and harmful substances is crucial. In addition, tests will also be carried

out by customers and non-compliance would lead to rejections. As such, to access these markets would require actors in the Myanmar value chain to meet the specified food safety standards.

EU and US

Major markets can also be found in the US and the EU, but both markets are very challenging in terms of competition and requirements. For conventional products, the major difficulty is to compete with already existing supply structures from large producing countries. Without a significant volume produced, a standardized quality and a highly efficient supply chain, market access becomes impossible. If these markets were to be targeted, they have greater potential for niche, high value products, such as organic or Fair Trade production.

Conclusions

The information currently available suggests that China and ASEAN countries have high potential as targets for export of Myanmar chilli. In the long term, other large export markets might be of interest, including the US or EU market. But as a first step, Asian markets have less stringent requirements and business relationships are likely to be easier to establish. To increase access to Asian markets, farmers and other value chain actors need information on market requirements, pricing, volumes, logistics, packaging, export requirements, licenses, standards and certification schemes.

Once business relationships are established with regional customers and lessons have been learned about how to do this effectively, further market development towards the EU or US should be reviewed.

9. Cross-cutting considerations: labour, gender, environment and conflict

Labour

Child labor is certainly present within the chilli value chain, particularly on farms, where household labour is used. Wholesalers also employ children for certain jobs, though the total number of labourers at the wholesaler level is far lower than that involved in farming.

There are major occupational safety and health risks for chilli farmers. In particular, farmers are applying hazardous agrochemicals without wearing Personal Protective Equipment (PPE). In some cases, agricultural machinery, such as rotatillers, do not have appropriate guards. Respiratory diseases can also be caused for farmers or wholesalers who have a high level of exposure to dried chilli in confined spaces and without Respiratory Protective Equipment (RPE).

Gender

In the study areas, gender roles in core farming tasks are not clearly defined. Both men and women were equally engaged in land preparation, transplanting and harvesting. Some heavy physical tasks, such as loading, were also reported to be carried out mainly by men. In some cases, men reported that they are more engaged in the sales process than women. It was difficult to ascertain to what extent women had control of the income from farming following sales, but this merits further investigation.

Environment

The overuse of pesticides is a major environmental issue associated with current chilli farming practices in the study areas. The overuse of pesticides can contaminate aquatic ecosystems; cause mortality of non-target organisms and natural enemies of pests; and have negative impacts on soil properties. Some areas reported high levels of fertiliser use, which also cause issues if they leach into aquatic ecosystems. In Mandalay Region, irrigation may deplete water bodies and may cause salinization of the soil.

However, chilli farming should not be singled out as particularly environmentally destructive. The farming practices which cause negative environmental impacts are employed across a wide variety of crops. Equally, changes to chilli farming practices could greatly reduce these impacts.

Conflict

The conflict situation in Shan State is a serious consideration for any intervention in the chilli sector. Conflict may have a variety of negative impacts on the chilli value chain. In particular,

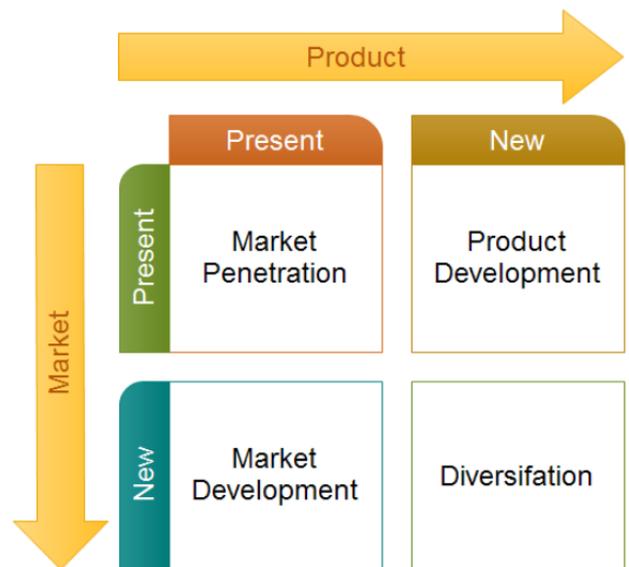
conflict in Northern Shan State has serious potential to disrupt the transport routes to China and can reduce market access to this area for chilli produced anywhere in Myanmar. In addition, land-grabbing may be accelerated in areas of unrest. In some areas, farmers may also be put under pressure by powerful factions to grow poppies, rather than chilli. Finally, the recruitment of young men into armed groups may reduce the availability of household labour. However, it should be noted that the prevalence of these issues varies greatly between different areas within Southern Shan State.

Conversely, chilli value chain development may also have positive impacts on conflict dynamics. Trade between different ethnic groups could strengthen relations between these groups. Likewise, poverty reduction may reduce one of the causes of conflict.

10. Upgrading strategy

Following the analysis of the value chain and the formulation of the objective stated above (Increased profit and /or job creation for MSMEs in the whole dried chilli value chain within 5 years), an upgrading strategy was produced for the whole dried chilli value chain.

To structure the process of planning the upgrading strategy, the Ansoff economic model was used. This involves categorizing and analyzing strategies, based on their two characteristics - market and product – as presented in the adjacent figure.



The above analysis showed that farmers are not employing good agricultural practices (e.g. agro-chemical management), farming optimal varieties, using efficient processing technologies (drying process), or carrying out effective book-keeping and financial management. The farmers are also facing problems accessing favourable markets, because they are currently selling to wholesalers who fix the price of chilli. Taking into consideration the results of the analysis, the strategy outlined below is recommended.

It should be noted that the upgrading strategy was developed by the consultants and ILO staff who conducted the value chain analysis. Prior to implementation of value chain development interventions, it would be advisable to confirm the feasibility of the strategy with key actors from the value chain.

Market development

90% of the chilli produced is already exported via border trade but the farmers are not getting a higher price for the chilli that is exported. The flow of information to farmers about buyer requirements is very weak. The quality requirements are defined by wholesalers and these actors are dominating the market. In order to achieve the overall objective, new markets need to be developed in order to get a higher price per unit sold. A direct linkage to these markets down to the farming level would result in real added value for farmers. They would get paid more for a product that is in compliance with customers' requirements. Investments would be rewarded through higher prices that were agreed in advance. Transparency in all business transactions would make their business more reliable and sustainable.

The other strategic options would be less attractive for achieving the objective. 'Market penetration' (higher production of the same product for the same market) would demand an increased productivity for an existing market. The market would absorb the additional

volume, but the dependency on the wholesalers remains strong. Because the wholesalers are not willing and/or able to reach more attractive markets (those markets beyond the border trade), the increase in supply might actually cause a reduction in sales prices per unit, if there was no increase in demand. As such, producing and selling greater volumes might not actually generate increases in profits for farmers.

‘Product development’ (targeting existing markets with a new product – either a new variety or a processed form of chilli) would require a high level of marketing skills and new production skills, as well as large investments in new technology. Aside from the processors of chilli flakes and powder, none of the current actors in the value chain would be able to perform this task.

‘Diversification’ (new product for a new market) would be the most challenging approach. It could certainly be considered for niche products and markets. For example, there have already been small-scale successes in Shan State at producing organic chilli for export markets. The market for organic products is growing, but shifting from the current farming practices to organic farming requires intensive technical inputs and takes several years. As such, in the near future it is worth considering for small scale interventions, but would be complex to achieve on a large scale in a short timeframe.

Strategic areas of intervention

Market development has been defined as the key strategy to achieve the objective of ‘Increased profit and /or job creation for MSMEs in the whole dried chilli value chain within 5 years’. The different areas of intervention described below present the broad strategy which is proposed for the implementation phase. In order to develop a more detailed strategy, the special characteristics of both target areas, Mandalay Region and Shan State, have to be taken into consideration.

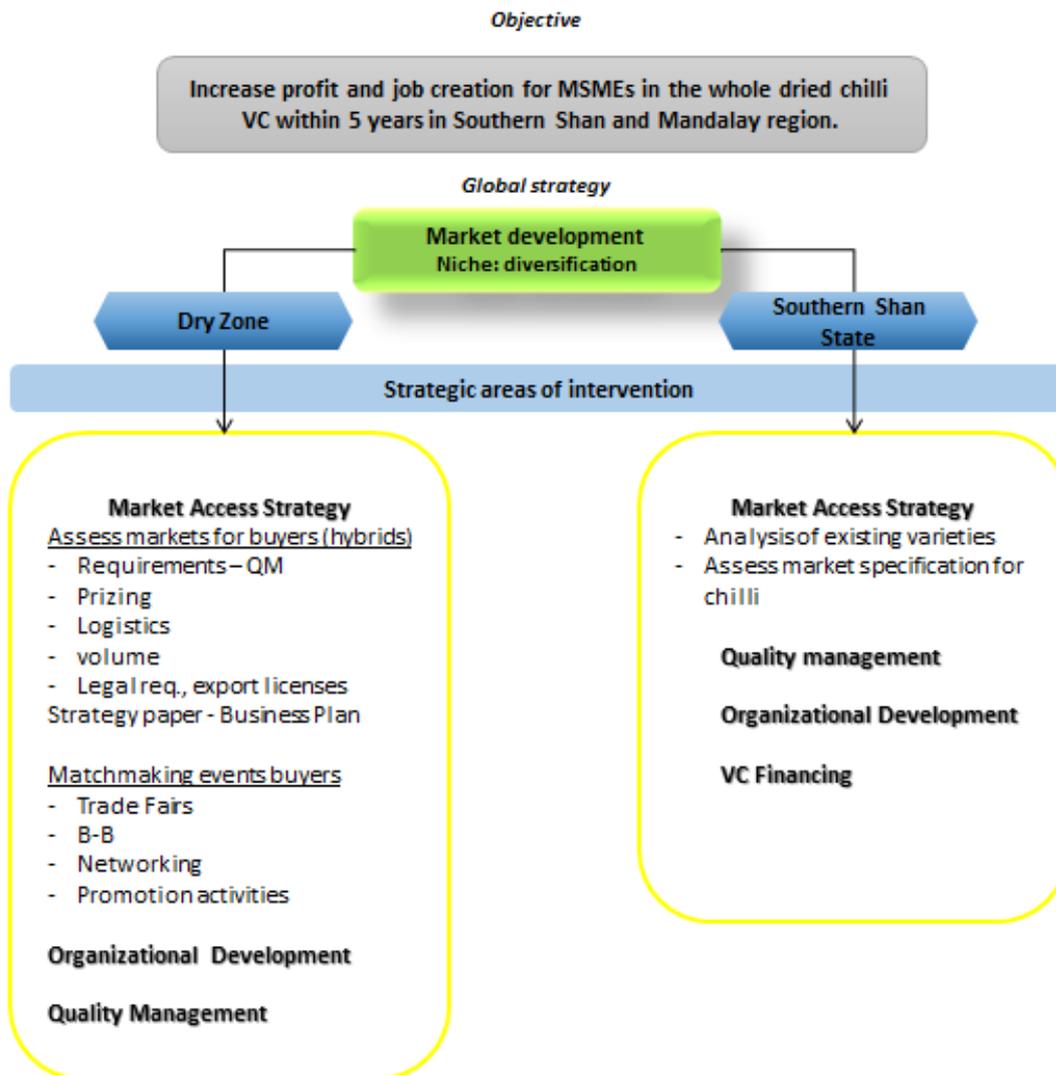


Figure 27 Summary of the upgrading strategy

Upgrading strategy for Southern Shan State

According to the findings of this analysis, farmers in Southern Shan State grow many different varieties of chilli. The exact number of varieties and their exact specifications are not known. However, markets demand products with well-defined characteristics (eg. colour, size and pungency). To target higher value markets it is essential to have clarity about the characteristics of the varieties grown and the characteristics which are demanded by different target markets. As such, it is recommended that an assessment is carried out to **assess the characteristics of existing varieties grown in Southern Shan State.**

The different varieties should be analyzed technically, including colour, size, pungency, number of seeds, thickness of skin and any other characteristics which are relevant to buyers. Differences that are market-sensitive and cannot be analyzed in the field through visual checks should be analyzed in a laboratory. Once the varieties have been characterized,

the assessment should establish the number and location of farmers that are growing each variety, and the total volumes produced by these farmers.

Once chilli data sheets are available, a market assessment should be conducted in order to establish the exact characteristics that target markets require. This should then be compared to the characteristics of the chilli varieties produced in Southern Shan State and high potential varieties should be identified.

If the characteristics of existing varieties are not appropriate for any potential target markets, then introduction of new varieties should be considered. However, research should be conducted to ensure that the agronomic performance of new varieties is sufficiently strong under farming practices which can realistically be implemented by farmers in the target area. The challenges involved for farmers to successfully farm new varieties should not be underestimated and farmers may require significant technical support to make this change.

As such, it is recommended that existing varieties should be promoted wherever the market for these varieties is strong. As such, the research on varietal characteristics and the characteristics demanded by different target markets is a crucial first step. Once this has been completed, several further strategic questions need to be answered:

- How farmers can increase production of high potential traditional varieties?
- How farmers can access the target markets?
- How farmers can deliver required volumes to buyers, manage the logistics required and secure the necessary investments to ensure these?

Upgrading strategy for Mandalay Region

The situation in Mandalay Region starts from another level of development. Farmers are mostly using a hybrid variety called Tongla 692, which has well-established characteristics and these characteristics are in demand by buyers and consumers. The advantage of this variety is not only that better prices and higher yields can be achieved, but market access starts on a higher developmental stage compared to the situation Shan State.

Because they already know their product and their production capacity, farmers from Mandalay Region could start the market access strategy immediately. Therefore in a **first step, market and buyer requirements** from potential markets need to be assessed. What are the requirements in term of product quality, volume and post-harvest treatment? The main market requirements from different markets are explained in the market analysis chapter. The multitude of compliance issues and supply chain challenges makes it impossible for single famers to access these international markets. Already at this stage, **organizational development** plays a key role for successful implementation of this upgrading strategy. It is crucial to identify wholesalers or other value chain actors with the relevant market knowledge and network required to access new markets.

A strategic plan for how to approach the identified market(s) has to be developed. It should include the necessary changes, the investments requested and their financing. A business plan should show clearly when a return on investment can be expected and a risk management plan should cover the risks of failure and counter measures if needed.

The biggest challenge for farmers is to improve the drying process and to reduce the risk of contamination and fungal infections to a minimum. Without a controlled drying process, it might be impossible to start a long lasting business relationship with international buyers. Improved traditional drying methods could be a first step to reduce fungal infections to a minimum level. Measures which could be quickly adopted include avoiding any contact of the chilli with the soil, animals or other sources of contamination; respecting the thickness of the layer of drying chilli; raking the chilli up to 10 times a day; protecting from humidity and cleaning the drying surface after each use. Adopting these measures could be a first step towards producing chilli which complies with buyer requirements. In the long-term, however, only well monitored drying conditions in a protected solar heater can assure optimal standards for food safety are met. The following calculation shows the Return on Investment for a solar dryer investment, including different scenarios:

Evaluation of the Return on Investment (RoI) for solar dryer

To run an export-oriented chilli business successfully, well-managed farming and drying processes are essential. The risk of excessive pesticide residues or contamination through uncontrolled and unhygienic drying, is by far too high. However, the adoption of improved drying process certainly requires investment. The use of solar driers should be considered, if farmers want to:

- Comply with buyer requirements
- Reduce the risk of contamination
- Avoid mold and the toxic secondary metabolite Aflatoxin
- Assure volumes and time to market through a controlled drying processes

Following business case would be realistic for farmers in Mandalay Region:

Assumption: 1 solar dryer is purchased at 12.000 USD with a production capacity of 1 ton of dried chilli in 2 days. An additional 3000 USD would be required for further investments, such as the storage room and equipment. Total investment would be 15.000 USD per dryer.

Further investments like certification of ISO 9001, or similar standards certifying the process, are not included in the calculation. Land cost, rental of land, building permits etc. are also not part of this calculation.

The RoI is EBIT (Earnings Before Interests and Taxes). Depreciation of the solar dryer is not considered, especially as the durability of such a dryer is unknown.

The production costs per the chapter “economic analysis” are included in the calculation.

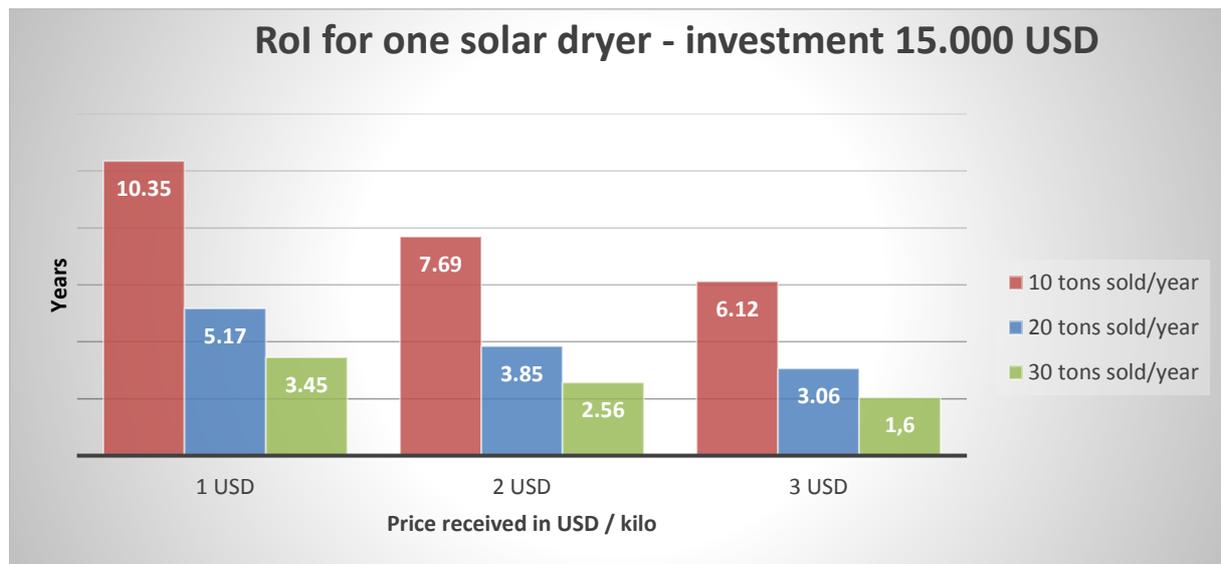


Figure 28 Return on investment in Mandalay Region

The Rol shows the investment of the solar dryer after x years. Production costs are included but no profit is distributed. Therefore the personnel needs have to be integrated in the calculation.

The graphs show clearly that only with maximum utilization and reasonable prizes the business becomes realistic. 30 tons of dried chilli are equal to round about 30 acre of land in Mandalay Region. This quantity demands a certain organizational effort, on market and production level, but remains feasible. It can be assumed that after 3.5 years, the investment of a solar dryer is covered.

But in order to start international business several dryer and several farmer groups need to be organized enough to handle the demands in terms of volume.

The necessary investments can be realized in cooperation with banks, buyers, private investors or projects. Different models of PPP (Public Private Partnership) or Joint Ventures should be taken into consideration.

The operational **second phase** starts with **matchmaking events with potential buyers**. Participation at trade fairs, promotion activities and networking is essential. Appointed and trained persons should represent the group of potential exporters and develop relationships with traders, processors, retailers or other interested and potential customers.

The **third phase - the implementation phase** - would comprise the consolidation of the organizational development of the producers in order to comply with the quality and quantity requirements of the new market. This is an essential step to ensure that the quality requirements are implemented on all levels of the value chain. This includes ensuring that

quality management is achieved in the use of agro-chemicals and Good Agricultural Practices. After production, hygienic practices need to be introduced and improved on the post-harvest level. In particular, the drying process has to be improved. At a minimum, contamination of the chilli through unprotected drying on the ground or the street needs to be prevented.

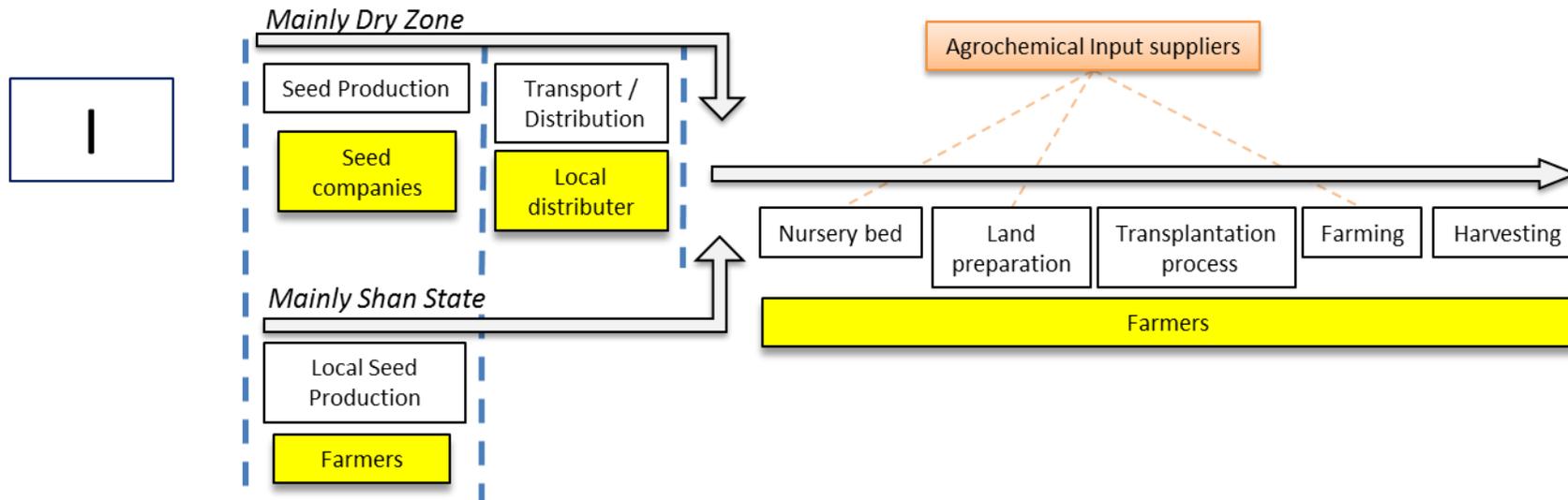
Current drying practices are not only unhygienic but are also inefficient. Solar driers may be the only sustainable solution for delivering the consistent quality products on time, which is necessary to maintain long-term business relationships and reduce rejections. Financing of such investments has to be taken into consideration as early as possible in the process of value chain upgrading.

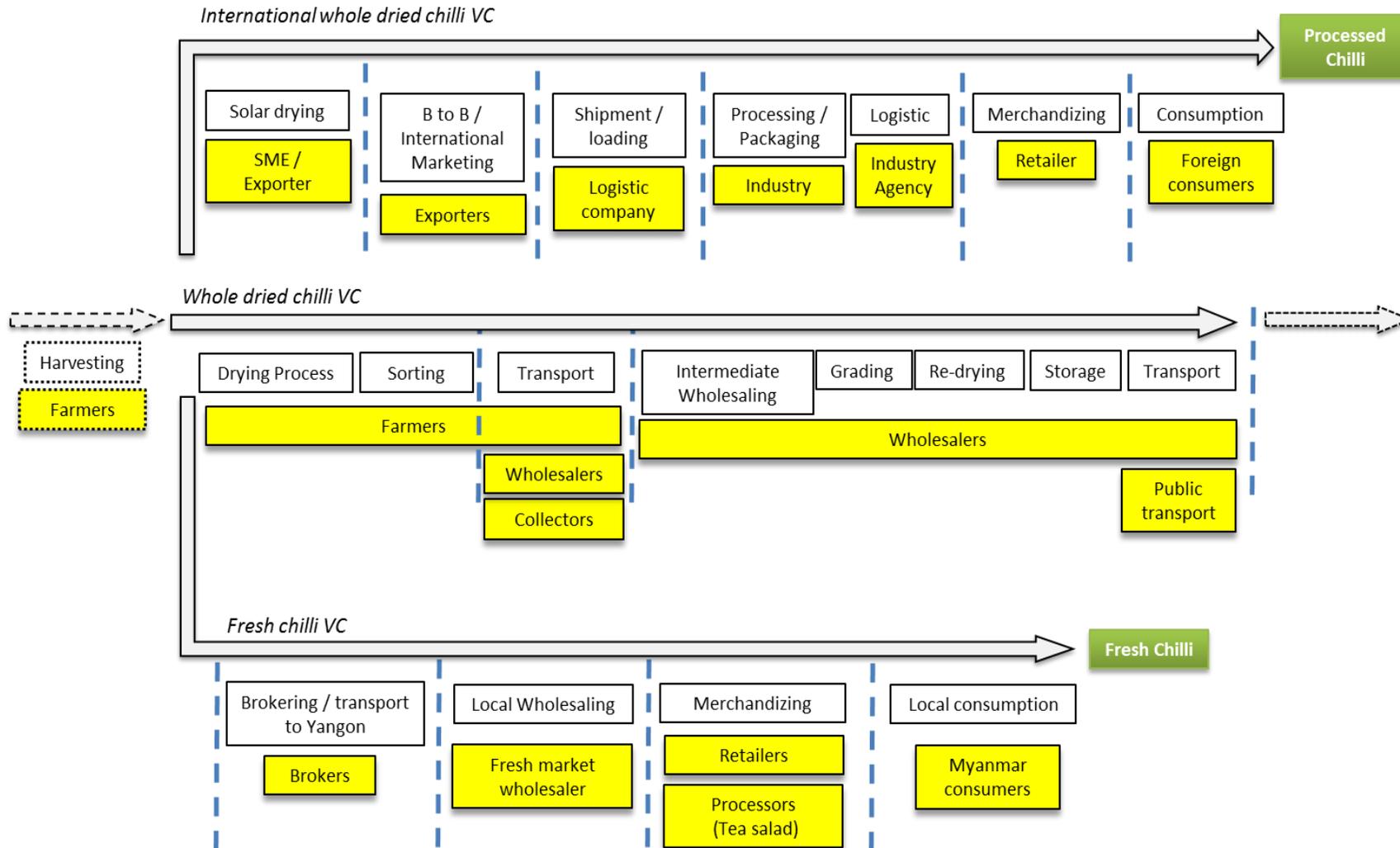
Annex 1: List of interviews

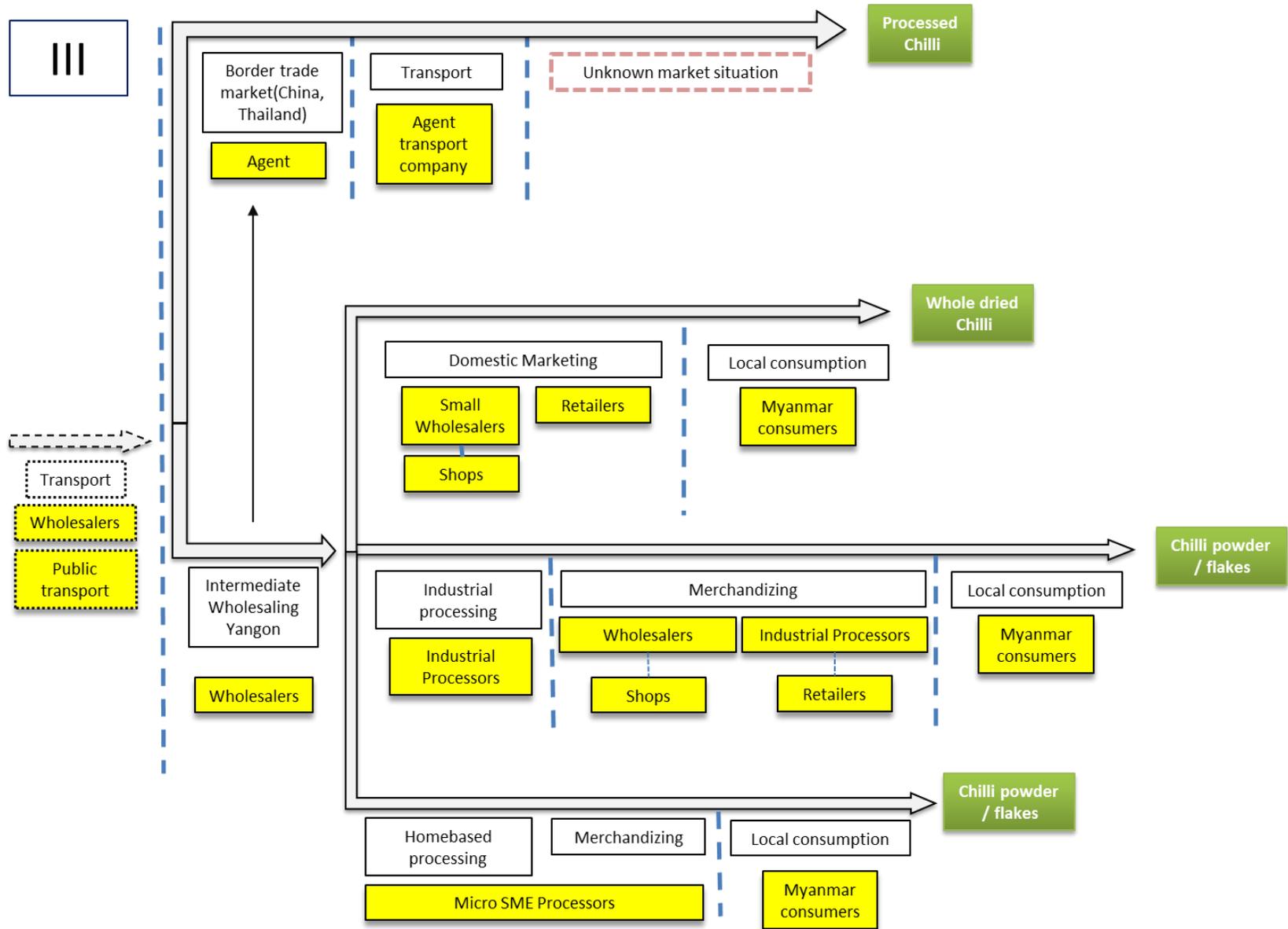
Day	Date	Activity	Location	Venue	Name of Contact Person
Mon	10-Oct	Mission briefing	Yangon	ILO Office	
Mon	10-Oct	Mission planning	Yangon	ILO Office	
Mon	10-Oct	VC mapping	Yangon	ILO Office	
Tue	11-Oct	Meet with chilli processors from MFPEA	Yangon	UMFCCI	
Tue	11-Oct	Meet East West seeds	Yangon	East West Seeds Office	U Thein Htun, Daw Marlar Soe
Tue	11-Oct	Meet ECOMA	Yangon	ILO Office	
Wed	12-Oct	Meet consumers Union	Yangon	ILO Office	U Mg Mg
Wed	12-Oct	Meet micro scale processor	Yangon	Thamaing	Daw Kyin San Myint
Wed	12-Oct	Meet wholesalers at Bayint Naung market	Yangon	Bayint Naung	
Thu	13-Oct	Meet SPSH	Yangon	ILO Office	Ko Sai Phyo Lwin Oo
Thu	13-Oct	Further Shan State mission planning	Yangon	ILO Office	
Thu	13-Oct	Meet Golden Gate at Bayint Naung market	Yangon	Bayint Naung	
Thu	13-Oct	Meet wholesalers at Thiri Mingalar market	Yangon	Thiri Mingalar	
Fri	14-Oct	Travel Yangon to Aung Ban			
Sat	15-Oct	Farmers meetings: Nang Taing Village	Pinlaung	Nang Tai Village	U Mg Phan
Sat	15-Oct	Farmers meetings: Ywar Htit / Long Poe	Kalaw	Lone Poe	Ko Eain Da
Mon	17-Oct	Farmer meeting: Kyauk Su	Kalaw	Kyauk Su	Lin Lin Oo (Winrock)
Tue	18-Oct	Aung Ban wholesalers	Pinlaung	Tun Tauk	U Tun Aung Lwin
Tue	18-Oct	Small scale processor	Aung Ban		
Tue	18-Oct	Department of Agriculture, Kalaw township	Aung Ban	Aung Ban	U Salai
Tue	18-Oct	Input dealers	Aung Ban	Aung Ban	Ko Kyaw Ngwe
Wed	19-Oct	Travel Taunggyi to Mandalay Region			

Wed	19-Oct	Farmer meeting: Kyauk Se	Kyauk Se	Taw Twin Village	Dr. Khaing Wah Tun
Wed	19-Oct	Wholesaler meeting: Kyauk Se	Kyauk Se	Kyauk Se	Nay La ThuKha Wholesaler
Wed	19- Oct	Chilli Dryer	Tan Tar Oo	Parami Mango Farm, Solar Dryer	Dr. Pyae Phyo Aye
Thu	20-Oct	Mandalay Kaing Tan Market Wholesaler market visit	Mandalay	Kaing Tan Market	
Thu	20-Oct	Meeting with Mandalay wholesaler	Mandalay	Sein La Min	Ko Sein Moe
Thu	20-Oct	Meeting with Kyauk Se wholesaler	Kyauk Se	Kyauk Se	Ko Aye Lwin
Thu	20-Oct	Travel Mandalay Region to Taunggyi			
Fri	21-Oct	Strategic planning day	Aung Ban		
Sat	22-Oct	Travel Aung Ban to Yangon			
Sun	23-Oct	Rest day	Yangon		
Mon	24-Oct	Debriefing with CTA	Yangon		
Mon	24-Oct	Meeting with Awba chemicals	Yangon	Awba Building	U Cho Win Hlaing
Mon	24-Oct	Meeting with FDA Yangon branch	Yangon	FDA- Office, Yangon Office	Dr. Khin Saw Hla
Tue	25-Oct	Strategic planning and task allocation	Yangon		

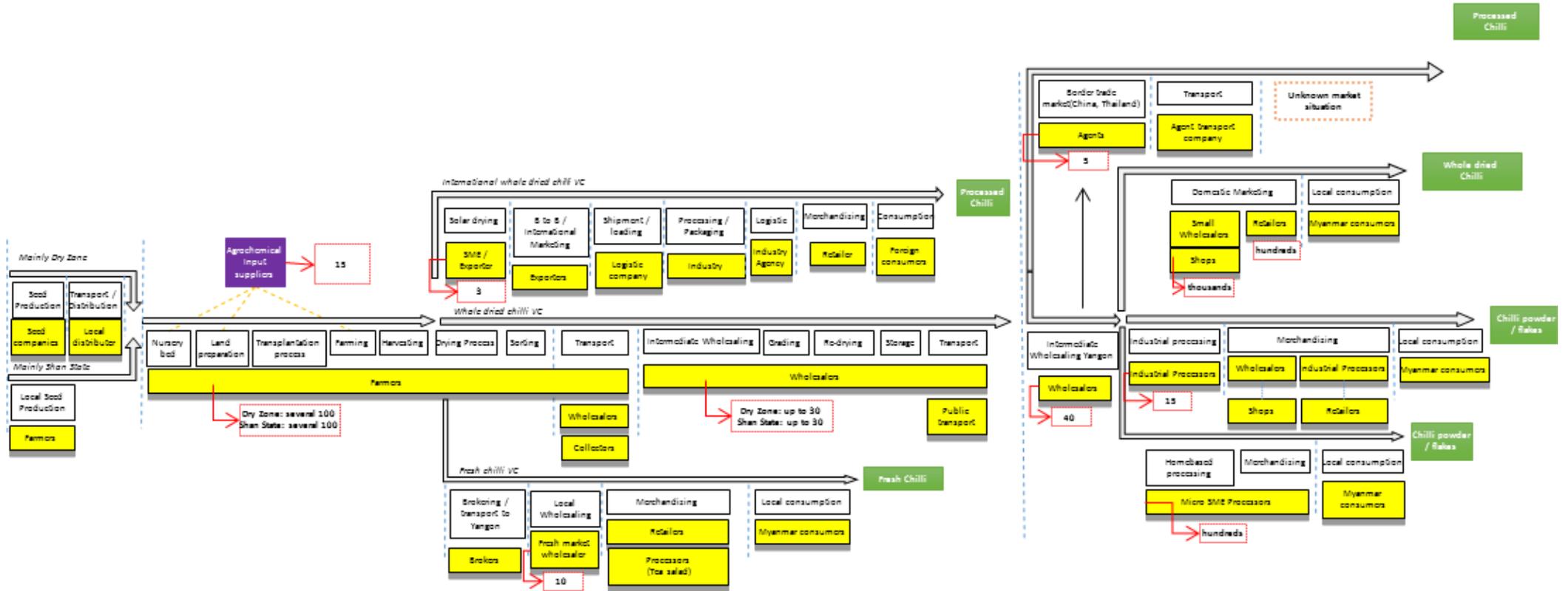
Annex 2: Detailed chilli value chain mapping







Annex 3: Chilli value chain overview



Annex 4: Main chilli diseases in tropical area

Disease	Type	Favorable conditions for development	Symptoms / Damages	Disease management
Fruit borer				
	<p>Young larvae feed on flower buds and young pod by making a circular hole. Later, the larvae feed on seeds usually with its head inside the pod and rest of the body outside</p>	N/A	<p>A circular hole is noticed at the base of the pedicel. Premature dropping of flower and pods. Fruit turns to white colour</p>	<p><u>Cultural methods:</u></p> <ul style="list-style-type: none"> • Summer deep ploughing. • Setup pheromone trap with Helilure at 15/ha for monitoring. • Growing Marigold in chilli field: due to yellow colour of flower it attracts insect pest for egg laying this helps to manage pest incidence to some extent. <p><u>Biological and chemical control also available</u></p>
Root knot nematode				
	<p>Nematodes are microscopic organisms which are also called as thread worms, eelworms or round worms. They inhabit the region around the roots in the soil.</p>	Warm weather	<p>This insect pest damages the root system by forming the small galls on the roots of the plant. The affected plants become yellow and wilt.</p>	<p><u>Cultural methods:</u></p> <ul style="list-style-type: none"> • Crop rotation • Fallowing and ploughing during summer months • Use of organic amendments • Use of resistant and tolerant varieties <p><u>Physical methods:</u></p> <ul style="list-style-type: none"> • Heat treatment of soil • Hot water treatment of planting material • Solar drying • Summer ploughing- • Soil solarization or pasteurization- • Oil - Spraying 15% water soluble hydrogenated fish oil also reduces infestation by nematodes. • Floation of seeds- <p><u>Chemical Control:</u></p> <ul style="list-style-type: none"> • Soil fumigants

Disease	Type	Favorable conditions for development	Symptoms / Damages	Disease management
<ul style="list-style-type: none"> Use of insecticides which are also nematicidal 				
Damping off				
	<p>Damping off is caused by a fungus. It is a very common disease in nurseries. The disease appears immediately after the onset of monsoon rains.</p>	<p>High soil moisture and relatively higher soil temperature favor the rapid development of the disease. The disease is further aggravated in ill-aerated soils with poor drainage having thick stand of the seedlings.</p>	<p>Seed may rot or the seedlings may be killed before they emerge from the soil. Stem of young seedlings may also be attacked after emergence showing water soaking lesions and shriveling of stem which fall over and die. In nursery the disease may appear in patches in 2-4 days, the entire lot of seedling may be destroyed.</p>	<ul style="list-style-type: none"> Use plug transplants and a soilless pathogen-free growth medium to avoid damping-off. Mixing of local field soil or manure with soilless growth medium may result in severe damping-off. Water plants only when the soil or growth medium is dry, preferably in the morning to allow drying to occur by the late afternoon. Avoid contact with ground soil or other sources of contamination For seedbeds, choose well-drained nursery locations. Avoid overcrowding of plants. Avoid the movement of infested soil or contaminated plant material into the nursery bed. Workers should clean their hands and tools before handling healthy plants Treat seed with hot water, followed by application of a fungicidal seed protectant, and sow into pasteurized soil (71°C for 30 min) or another growth medium that is free of damping-off fungi. Alternatively, incorporate fungicides into the planting mix to control soil-borne seedling diseases.
Anthracnose				

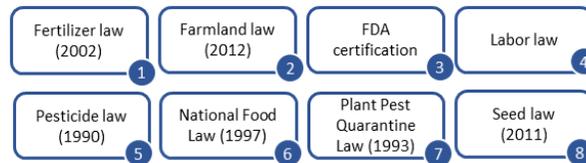
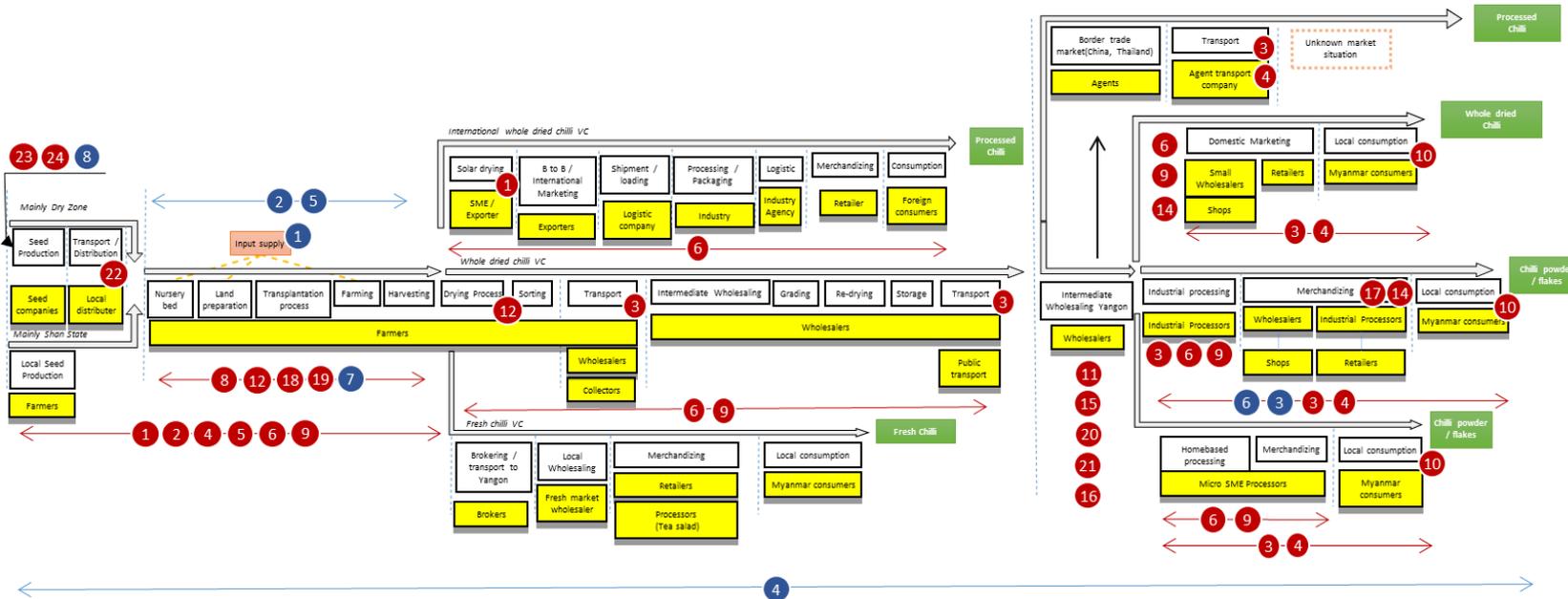
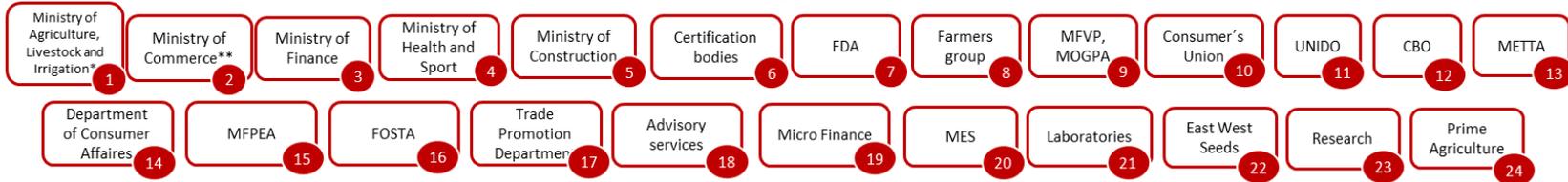
Disease	Type	Favorable conditions for development	Symptoms / Damages	Disease management
	<p>Anthracnose is a group of fungal diseases, usually <i>Colletotrichum</i> or <i>Gloeosporium</i>, that affect a variety of plants in warm and humid areas.</p>	<ul style="list-style-type: none"> • Ideal temperature is 28-32 °C. The pathogen infects the host at a minimum temperature of 22-25° C. • Relative humidity: An RH of above 80 % is ideal. Heavy prolonged dew deposition is important for die-back development. 	<p>Symptoms are seen on leaf, stem and fruit. Small, circular spots on the skin of the fruit and expanded in the direction of long axis of the fruit. The fruits with many spots drop off prematurely resulting in heavy loss of yield. Fungus may also attack the fruit stalk and spread along the stem causing dieback symptoms.</p>	<ul style="list-style-type: none"> • Use pathogen-free seed • Crop rotation. • Fungicides can reduce losses: chlorothalonil or mancozeb • Furrow irrigation avoid sprinklers and overhead irrigation
Aspergillus flavus				
	<p><i>Aspergillus flavus</i> is specific during and after harvest. The infection occurs on stored fruits and the contamination with aflatoxin deteriorates the quality and make</p>	<ul style="list-style-type: none"> • Late harvesting in chilli • Moisture content and relative humidity are the most important factors for Aflatoxin production. • Moisture content of 12-20% is congenial for accumulation of Aflatoxin. 	<ul style="list-style-type: none"> • Deterioration of grain quality • Emerged seedling decay • Threat to human, livestock health and international trade • Unfit for marketing and consumption 	<ul style="list-style-type: none"> • Avoid moist conditions during post-harvest stages. • Avoid continuous mono-cropping. • Post harvest field drying. • Planting dates must be adjusted so that the crop matures at the end of the rainy season and post harvest conditions favour rapid and effective drying of crop.

Disease	Type	Favorable conditions for development	Symptoms / Damages	Disease management
	the produce unfit for consumption.	Most rapid when moisture content is up to 14-30% and RH 85%.		
Leaf Curl				
	Chilli leaf curl spread usually through insect pests such as Aphids, Thrips or Broad Mites. The disease is important and causes heavy losses in the yield and quality of fruits.		The main symptoms are an upward curling, puckering, and bunching of leaves. The leaves are also reduced in size. Severely affected plants produce fewer, smaller, and deformed fruits.	<ul style="list-style-type: none"> • Crop rotation • Weed control • Chemical treatment
Leaf spot				
	The leaf spot disease is caused by bacteria. It is seen both in nursery and main field. The disease causes loss due to defoliation and reduction in photosynthesis. Bacteria can survive in seeds	<ul style="list-style-type: none"> • Mean temperature 22.5-23.5oC, relative humidity of 77-85 per cent, more sunshine hours (>5 hr per day) and more • Number of rainy days • Intermittent rains 	The disease first manifests as small brownish spots on the leaves and gradually develops into the big circular grayish spots with whitish center. Later they form into large lesions due to coalescing of the spots. Infection on fruit stalk and calyx is also very common in severe cases	Use of pathogen- free seeds Crop rotation
Powdery mildew				

Disease	Type	Favorable conditions for development	Symptoms / Damages	Disease management
	<p>Powdery mildew is caused by a fungus. It is causing heavy yield loss ranging from 14 to 20 per cent, due to severe defoliation and reduction in photosynthesis, size and number of fruits per plant. This disease is very common from November to February.</p>	<p>It grows best when temperatures are warm and humidity climbs above 85 percent. Wind can spread the spores from one plant to another, as can rain splash and insects, to a lesser extent.</p>	<p>White powdery coating appears mostly on the lower surface and sometimes on the upper surface. Correspondingly on the upper surface yellow patches are seen. Severe infection results in the drying and shedding of affected leaves. Powdery growth can also be seen on young fruits, and branches. Diseased fruits do not grow further and may drop down.</p>	<p>Spraying of fungicides like</p> <ul style="list-style-type: none"> • Carbendazim – 1ml/lit • Penconazole - 1/lit • Propiconazole – 1ml/lit • Wettable sulphur – 2.5g/lit • Hexaconazole -1ml/lit • Difenconazole -1ml/lit <p>are effective in managing this disease. (UAS, Dharwad and UHS, Bagalkot)</p>

Annex 5: Rules and Supporting functions

Supporting functions



Rules and Regulations

*including 12 departments
 **including 3 departments

Annex 6: Mycotoxin and Aflatoxin in whole dried chilli

Mycotoxin is a toxic secondary metabolite produced by fungus, commonly known as molds. The term mycotoxin is usually reserved for the toxic chemical products produced by fungi that readily colonize crops. One mold species may produce many different mycotoxins, but the most dangerous is called Aflatoxin.

Aflatoxins are poisonous and cancer-causing chemicals mainly produced by the fungus *Aspergillus*. It can be found in many crops. The characteristics of the tropical climate plus a weak product handling (mainly the drying process) make molds grow quickly. Aflatoxin becomes a serious problem in that case. Many countries have established strict rules and regulations governing Aflatoxins. The EU has set maximum permitted levels for aflatoxin B₁ in nuts, dried fruits, cereals and spices (chilli) to range from 2-12 µg/kg. US food safety regulations have set a maximum permitted level of 20 µg/kg for aflatoxin.

As current tests on the level of Aflatoxin in whole dried chilli are not conducted in Myanmar, it can only be assumed that the drying time and conditions are an ideal environment for fungus of all kind and thus for the metabolite Aflatoxin.

Annex 7: Pungency of Chilli

Commercial varieties of whole dried chilli are characterized by pungency in accordance with the following table:

Level of pungency	Total capsaicinoids (µg/g dry weight)	Pungency Intensity (Scoville units ^a)	Examples of commercial types
Mild	60 - 200	900 - 3000	Ancho, Mulato, Pasilla
Medium	201-334	3001 – 5 000	Guajillo, Cascabel, Catarina
Medium to hot	335 – 2009	5 001 – 30 000	Puya, De árbol, Chipotle
Hot	2010 – 6670	30 010 – 100 000	Piquín (Bird Eye)
Extra hot	> 6670	> 100 000	Habanero

The Scoville scale is a system to measure the pungency in chillies. High performance liquid chromatography (HPLC) can also be used to measure content of capsaicin in chillies. Pungency is the sharp or intense sensation caused by the effect of the capsaicins after the ingestion of chilli or its sub-products. Capsaicinoids are the compounds responsible for the pungent or hot flavor in the chillies. The main and most pungent of all capsaicinoids is the Capsaicin, which is found in the seeds and placenta of the peppers. Verification of pungency is optional. In case of verification, pungency must be reported in the Scoville scale, but analyzed using the High Performance Liquid Chromatography (HPLC) method.

Annex 8: Food safety requirements for target markets

CHINA

According to the Chinese Standards for Food Additives – GB2760-2015, a food additive is “an artificially chemosynthetic or natural substance to be added to foods in order to improve food quality, color, fragrance and taste, and for the purpose of preservation and processing technology. Flavoring substances, gum-based substances in the paste base candy, processing aids in food industry are also included in food additives.”. Thus the Chinese legislation establishes chilli as a natural flavoring substance which is permitted in foods.

Concerning the maximum level of Aflatoxin B1 (the most critical prohibited substance in chilli), the Chinese legislation set the limit at 5 µg /kg. Within the same framework, China set residue limits for pesticides in dried chilli (table below). The residues have to be tested in the whole dried chilli (with the removed stalk).

Fungicides	
Residue	Limit (mg/kg)
Dichlofluanid	20
Dinocap	2*
Carbendazim	20
Tolyfluanid	20
Quinoxifen	10*
Fenarimol	5
Triadimenol	5
Triadimefon	5
Propamocarb	10
Quintozene	0,1
Tebuconazole	10

Pesticides	
Residue	Limit (mg/kg)
B1a and B1b	0,2
Azinphos-methyl	10
Profenofos	20
Tebufenozide	10
Diazinon	0,5
Cyfluthrin	1
Fenpropathrin	10
Pirimicarb	20
Spirotetramat	15*
Cyhalothrin	3
Permethrin	10
Cypermethrin	10
Acephate	50

Acaricide	
Residue	Limit (mg/kg)
Cyhexatin	5

Plant growth regulator	
Residue	Limit (mg/kg)
Ethephon	50

Synergist agent	
Residue	Limit (mg/kg)
Piperonyl butoxide	5

Pesticide / Acaricide	
Residue	Limit (mg/kg)
Bifenthrin	5

*temporally limits only

SINGAPORE

According to the Singapore food regulation, Chilli shall be the dried, ripe fruit of the genus Capsicum and may contain brownish yellow flat seeds and shall be free from insect infestation and extraneous colouring matter.

It shall contain:

- not more than 3% calyces and pedicles;
- not more than 1% foreign organic matter;
- not more than 8% total ash;
- not more than 1.25% ash insoluble in hydrochloric acid;
- not more than 30% crude fibre;
- and not less than 12% non-volatile ether extract.

The legislation for importing chilli and specifically dried chilli is not totally clear. The import Requirements of Specific Food Products (updated un 2014) established that imported products have to

According to the regulatory of mycotoxins in ASEAN countries (2015), the maximal limit of Aflatoxins allowed in food in Singapore is 5 µg/kg for Aflatoxin B1 and 5 µg/kg for Total Aflatoxins.

MALAYSIA

The Malaysian Food Law is not specific on dried chilli only the maximal limits of total aflatoxins in food is defined with 35 µg/kg.

INDONESIA

The Indonesian law does not specify under which category (vegetable or condiments for example) dried chilli is. However, the general import requirements for foods involve a control of hazardous chemical contaminants such as:

- Pesticide residue (see table below for chilli)
- Heavy metals (see table below for chilli)
- Mycotoxin

In general, chilli could be imported to Indonesia if:

- Countries have recognition for its food safety control system
- Countries have a registered food safety testing laboratory.

Type of Pesticide	Maximum Limits (mg/kg)
Karbendazim	2

Profenofos	5
Quinoxifen	10

Heavy Metal	Maximum Limits (mg/kg)
Cadmium	0,05
Lead	0,1

Data in the table above are presented for fresh red chilli pepper.

According to the regulation of mycotoxins in ASEAN countries (2015), the maximal limit of Aflatoxins allowed in food in Indonesia is 15 µg/kg for Aflatoxin B1 in spices and 20 µg/kg for Total Aflatoxins in food in general.

Annex 9: sources of market information and opportunities for networking

Activities should be undertaken to know more about market intelligence, buying principles, competitors and requirements even before having a market ready product. Relevant sources of information and opportunities for networking with buyers are presented below.

International associations: The most important sector association is the European Spice Association, having a broad global member network. Full member list of the European Spice Association, which includes contact details of national sector organizations and affiliated companies are available online. Further interesting association is the American Spice Trade Association. Further interesting contacts could be established through the International Pepper Community (IPC), Vietnam Pepper Association and Spice Board India.

Trade Fairs: The most important international trade fairs are:

Anuga: the largest trade fair for food and beverages in Europe. It is held every year in Cologne, Germany and hosts relevant sections for spice exporters: Fine Food, Bread and Bakery and Organic Food.

Salon International de Alimentation (SIAL): held every other year in Paris, France. It is a general trade fair for food and beverages, with a strong focus on France. It has more diverse sections including relevant sections for spices: Pavilions of the World, Infood and Organic

Food Ingredients Europe (FIE): a smaller trade fair, focusing exclusively on ingredients, including raw materials and semi-finished products offered for sale to the food industry. The trade fair is held at different locations in Europe every year.

Natural Ingredients Trade Fair (NIE): is organized by the same organizers as FIE, and is held every year

Biofach: a trade fair focused exclusively on certified organic products. It is surprisingly large for such a specific niche and held every year in February in Nuremberg, Germany. Spice exporters can be accommodated in the sections with international pavilions. Biofach also includes an annual conference on developments in the global organic industry.

Food Ingredients Asia FI-Asia: is organized by FIE in Vietnam, Indonesia and Thailand in 2015 and will continue to do so in 2016.

Expoalimentaria: a major commercial event, held annually in September in Lima.

Annex 10: Food safety training, advisory and certification providers

Company	Services	Contact	Email/website
ACM Myanmar	<p>Services</p> <ul style="list-style-type: none"> • Audit • Certification • Training • Verification <p>Training: Quality related courses</p> <ul style="list-style-type: none"> • Food Safety Management systems (FSMS) • Internal FSMS / QMS Audit • Supplier Safe Quality Assurance Audit • IRCA Auditor / Lead auditor Course • Verification and Validation of Control Measures • Product Identification and Traceability • Microbiological Hazards and Their Control <p>Quality Management Systems Certification</p> <ul style="list-style-type: none"> • ISO 9001:2008 • ISO 14001:2004 • ISO 22000:2005 • ISO 27001:2005 • HACCP • OHSAS 18001:2007 	<p>148, 2nd Floor, 45 Street Botahtaung Township, (Upper Block) Yangon Republic of The Union Of Myanmar</p> <p>Tel: 0095-9-5081288, 09784410733, 018610151</p> <p>acmmyanmar@acmcert.com ngseokguan@gmail.com</p>	<p>http://www.acmcertmiddleeast.com/acm-myanmar.html</p>
Certification International Myanmar	<p>CI is part of SOCOTEC. CI-Myanmar is based in India, no known office in Yangon, though their website suggests they are able to operate in Myanmar.</p> <p>Their core services are the provision of training and certification for a range of standards, including ISO 9001 and ISO 22000</p>		<p>http://www.cert-int.com/services/certification-international-myanmar/#details</p>

Company	Services	Contact	Email/website
Control Union	Globally, they provide certification in BRC, FSSC 22000, HACCP and ISO 22000. Have office in Myanmar	RM No. 413/A, 4th Floor (La Pyayt Wun Plaza), 37, Alan Pya Pagoda Road, Dagon Township, Yangon, Myanmar +95 11221650/ +95 95098631	http://www.controlunion.com/en/contact/mm
ECOMA consultancy Co. Ltd	Provide training to assist companies in achieving ISO 22000 and HACCP certifications. Not clear whether they provide training and consultancy on all components of these standards, or only selected components where they have expertise.	F3/A, Kanthayar Street, Ward 4, FMI City Housing Scheme, Haligtharyar Township, Yangon, Myanmar Ranil Nawarathne, Country manager ranil@ecomaconsultancy.com ; 09254537945	http://ecomaconsultancy.com/index.html
Exalted Group	Provide certification services for ISO 9001, ISO 22000 and HACCP	No 68, 94th street, Mingalar Taung Nyunt Township, Yangon (+95) 1 385895	http://www.exaltedgroup.com/our-services/
FoSTA	Provide training in HACCP, GHP and GMP	Daw Win Win Kyi kyiwinwin@gmail.com	
Guardian Independent Certification (Myanmar) Co., Ltd.	Provide certification and training for ISO 9001, ISO 22000 and HACCP	No.355, 7th Floor, Theinphyu Road, Mingalar Taung Nyunt Tsp, Yangon. E-mail: drtinlatt.gicm@gmail.com , lla.gicm@gmail.com Phone : 01 246618, 09 5062354, 09 252543177	Global: http://www.gicg.co.uk/
Globalgroup	Provide training and certification in ISO 9001, ISO 22000, HACCP, GMP	No. 146, 1st Floor, 47th Street,	http://www.globalgroup.net

Company	Services	Contact	Email/website
(Myanmar)	Prices of HACCP training: For 10 participants, training typically costs 30-80,000 Kyat per person for 8 days of training x 4 hour days. If you provide your own venue, a training for up to 35 participants can be delivered for 5-600,000 Kyat	Botataung Township, Yangon, Myanmar T: + 9519000376 to 9 enquiry@globalgroup.net	/offices/myanmar/
ISO Certification Myanmar	Office is in Singapore, but they are operational in Myanmar. Provide training and certification in ISO 9001 and ISO 22000	390 Havelock Road King's Centre #08-01 Singapore 169662 Tel : +65 6733 1231 info@russecertification.com.sg	http://www.isocertificationmyanmar.com/
Myanmar Bureau Veritas Ltd.	Operational in Myanmar since 2012. Globally, they provide certification and training in ISO 9001, ISO 22000 and BRC.	Hledan Center, Room 410, 4th Floor, Corner Pyay Road & Hledan Road, Kamayut T/S, Yangon, Myanmar Tel: +95 1 2307802	http://www.bureauveritas.com/home/worldwide-locations/south_east_asia/myanmar/
My Asia Consulting	Joint venture between Indian professionals and a leading Myanmar Industrialist group: Win Thin & Associates. Provide consulting and certification for ISO 9001:2008, ISO 22000, FSSC 220000, HACCP and GMP. Do not hold open house public training programs in Yangon, but focus on in-house programs for organisations. Generally prefer to keep 10 to 15 delegates per batch. Fee structure for training per man day ranges from USD 1,000 - 1,500 depending on the service and total number of days of training	No 41, Nawa Day Street, Yaw Min Gyi Qtr, Dagon Township, Yangon Ph: 01240992 ; Fax: 01372483 ; HP 0936224903 info@myasiaconsulting.com	http://www.myasiaconsulting.com/management-team.php https://www.facebook.com/myasiaconsulting.myanmar
Societe Generale de	Provide certification services for ISO 22000. Provide Training on HACCP and GMP upon request, using trainers from Thailand.	79/80 Bahosi Housing Complex, Wradan st. Landamaw tsp	

Company	Services	Contact	Email/website
surveillance (SGS)		01211562, 211537 myanmar@sgs.com	
UNIDO	Providing HACCP training and advisory to 7 food processing companies.	Alain Peyré Ph: 092 5796 7140 A.PEYRE@unido.org	

Annex 11: Relevant private standards

Codex Alimentarius Commission (CAC): its guidelines include management principles for the production of plants, livestock, bees and their products; for handling, storage, processing, packaging and transportation of products, and a list of substances permitted in the production and processing of organic foods. The overall goal is the food safety in order to protect on one hand consumers and labors of the food sector, and on the other hand the environment.

The IFOAM (International Federation of Organic Agriculture Movements) Guarantee system: defines how organic products are grown, produced, processed and handled. It reflects the current state of organic production and processing methods and includes a list of substances permitted in production.

Fair Trade: is a social alternative through trading partnership aiming to offer better incomes and conditions to workers in developing countries. The interests of farmers and workers are just as important as other commercial considerations.

Hazard Analysis Critical Control Point (HACCP): is a management system who aims preventing contamination in food production, storage and distribution through the analysis and control of biological, chemical, and physical hazards.

Good Agricultural Practices (GAP) and Good Handling Practices (GHP): they are voluntary management standards assuring that fruits and vegetables are produced, packed, handled, and stored as safely as possible to minimize risks of microbial food safety hazards. The aim is to improve the sustainability of agriculture in a variety of ways including conserving natural resources, improving food quality and safety as well as improving workers' conditions and safety, creating new market opportunities for farmers and improving traceability.

Good Management Practices (GMP): helps managing the farm resources while minimizing the environmental risk. The focus of the practices is on environmental water quality (notably nitrogen, phosphorus, sediment, and fecal contaminants). They do not cover good practice for other aspects of farm management or farm system design.

ISO 9001: it is a standard from the International Standard Organization (ISO). It is an internationally recognized quality management system aiming to provide a framework and set of principles improving the management of an organization.

ISO 14001: is an internationally recognized environmental management system which provides practical tools for companies and organizations of all kinds looking to manage their environmental responsibilities.

OHSAS (Occupational Health and Safety Assessment Series) 18001: belonging to the ISO series. It is an internationally recognized safety management system which sets out the policies, procedures and controls needed for an organization to achieve the best possible working conditions and workplace health and safety, aligned to internationally recognize best practice.

International Food Standards (IFS): this standard is designated for food manufacturers only. The focus is on food safety and the quality of processes and products. It concerns food processing companies and companies that pack loose food products.

British Retail Consortium (BRC): The BRC Standards guarantee the standardization of quality, safety and operational criteria and ensure that manufacturers fulfil their legal obligations and provide protection for the end consumer.