Myanmar Crop Selection and Value Chain Mapping Report

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Information and Data Collection took place in Yangon, Hpa-an, and Myawaddy in Myanmar from 23 March to 6 April, 2013

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Executive Summary

Kayin State lies in the south-eastern part of Myanmar and is linked to Thailand. The rural people in Kayin State are poor. In rural areas there has been an on-going conflict between Kayin ethnic group and the government for several years. However, Kayin State is richly endowed with natural resources, including agricultural land for crop production, water resources and minerals (iron, copper, lead, etc.). Farmers grow a variety of crops in fields located on silted-land and on hill-sides. Paddy is the main crop of Kayin State. Most agricultural products are for local consumption. Following the cease fire in that region, border trade to Thailand opened officially six months ago. Myanmar exports agricultural products and others commodities from the interior through the cross-border transit points. Among products from Kayin State, only cash crops, maize and mung bean, are exported to Thailand through Myawaddy and Mae-sot.

This study identifies the alternative crop selections for cross border value chain study and for economic development. The study also identifies trading constraints in order to evaluate the market chains which involve all actors in agriculture production. The overriding goal is to improve the livelihoods of poor farmers by boosting their incomes. The Team interviewed key informants in government departments and in the private sector who participate in maize production and are included in farmer focal groups.

From the survey, it was apparent that almost all Maize grown in Myawaddy is exported to Thailand as raw materials. This trade passes through small traders and collectors. However, it should be noted the produce is not of high quality, mainly because of the heavy rainfall in the producing area.

Maize has market potential for farmers and there is high demand for the product from animal feed factories in Thailand. In addition to current production, the state government is planning to extend Maize production in Hpa-an, as winter crop, in collaboration with CP-Myanmar Group to produce quality products to command a higher price. In spite of the planning, there are production challenges and exporting policy constraints.

Maize is a suitable crop for cross-border exporting due to the capacity of small and medium participating farmers, market ability, easy market access, price stability and the participation of the private sector as a key element the value chain development. In addition, the Kayin State has a good potential for extending maize area due to land capacity, available irrigation system and favorable climatic conditions.

Summary of findings

Summary of key barriers in Maize value chain
Governance
1. Poor physical infrastructure, especially in terms of farm road, as well as lack of drying facilities and weak facilitation of extension services lead to considerable losses

of marketable production

2. Poor facilitation to set up applicable regulations in exporting product officially
3. Unstable security in the maize production area
4. Weak information sharing and facilitation in grading, classification and quality standards to differentiate product pricing and to reward farmers for producing a quality product. An important informational gap is the absence of SPS standards
5. Absence of other market quality standards and certification potentially discourages production of high quality maize.
6. Weak association among farmers results in their failure to minimize the high input costs and gives them low bargaining power
7. Insufficient government facilitation in cross-border market transactions

Market Constraints

1. Absence of efficient market distribution channel for accessing agricultural inputs, particularly seeds and agro-chemicals needed to minimize production cost
2. High cost of hired labor and absence of labor saving devices
3. High input cost and total dependency on imports from Thailand. Agricultural inputs are not available at the local market.
4. Absence of a transparent market transaction mechanisms for farmers to trade maize
5. Uncertain Thai government policy to import maize from Myanmar
6. High cost of transporting
7. Trading season is only 2 months per year
8. Monopsony market (single market)
9. In Hpa-an, the market is at embryonic stage. There is no local collector/local dealer/ investors yet.
10. All maize cross-border trade is done through informal channel which is difficult for government to provide the services and support to the informal value chain nodal players.

Institutional

1. Weak extension services, particularly for rural farming communities
2. High use of chemical herbicides and fertilizers may have adverse affect on environment and workers. The use of these inputs will also violate SPS regulations and may prohibit imports from Myanmar in order to protect Thai growers.
3. Absence of low cost facilities to help farmers measure moisture content of maize
4. Lack of know-how regarding post-harvest handling and storage techniques, resulting in low prices
5. Weak farmers associations and producing poor quality products to help pool resources and to organize community or attract investors
6. In Myawaddy, local input supplier is not present at local market. Therefore, the market information could not share effectively to small-holder farmers

Human Resources

1. Poor on-farm storage facilities and post-harvest handling
2. Lack of information about both input and output prices

3. Shortage of seasonal labor
4. Weak facilitation of department service providers
5. Lack of experience of local traders in managing contract farming, processing and value adding activity

Introduction

The Mekong Institute proposes to implement a series of field research, capacity building programs and business network development to enhance institutional and human resource capacities of farmer producer and marketing groups, provincial and local chambers of commerce and industry, agriculture- based SME associations and concerned local government agencies to promote cross-border agriculture value chains in selected twin provinces along the East West Economic Corridor (EWEC). The core strategic questions to be answered by this initiative are: What are the conditions required for smallholder farmers and concerned organizations in the EWEC to contribute to rural poverty alleviation and regional economic integration?

MI and Swiss Development and Cooperation Agency have entered to the agreement to implement the project along the EWEC entitled "*'Capacity Development for a More Inclusive and Equitable Growth, in the Greater Mekong Subregion (GMS).'* This project aims to promote the development of agriculture value chains of selected agriculture commodities along the EWEC with emphasis on twin border provinces. The general approach of the proposed project is to assess the current status and requirements for value chain development of selected agriculture commodities along the EWEC and design specific strategies to improve productivity, income and growth at the various nodes of the chain. The outcome would be "improved productivity of smallholder farmers and SMEs of target twin provinces through better access to commercial agriculture value chains along the EWEC". This outcome will contribute to the EWEC economic development and in a more inclusive and equitable manner.

This study comprises with two main parts. First part of the study is to identify the potential crop in the pilot area based on following criteria;

1. The overarching strategy is supply push (increasing production and quality) and demand pull (improving market linkages)
2. The selected value chain must be pro-poor meaning that the poor and smallholder farmer must be priority and benefit from the project.
3. The selected value chain must have market potential. The selected commodity is highly demanded both domestic and international market. One important requirement of the project is to promote regional integration among the countries in the GMS. Therefore, the selected product should have potential to trade cross-border especially along the EWEC.

4. All stakeholders' perception in promoting agro-product value chain in policy, incentives and environmental impact. Also, the selected value chain must be less environmental impact.

The second part is to focus on the value chain analysis to analyze the core processes of selected chain, assess the efficiency of the coordination of each process and key actor participation along the chain. The project intends to contribute to the effective linking of smallholder farmers to the market and to optimizing their profits from the value chain. The study aims to help decision makers of the project to formulate the strategic vision and to develop links between farmers with business partners and other business development service providers. To develop these linkages, the value chain analysis study serves as the entry and critical point for the project to design the activities for the next 3 years of the project.

Part 1: Value Chain Prioritizing and Selection

Introduction

The trip to identify and selecting the potential value chain for poor farmers in Hpa-an city, Kayin state took place during 24 – 27 March 2013. This study aimed to indentify the pro-poor value chain in Kayin state where the project named "Capacity Development for a More Inclusive and Equitable Growth, Greater Mekong Subregion (GMS)" would operate. Focusing on EWEC cross border value chain strengthening will be piloted in Myanmar and other 5 provinces in other 3 countries along the EWEC. During the survey, the Team conducted key informants interviews with the relevant government officials, private companies and farmers. The team also organized the focal group discussion with participation of relevant officials and members of local Chamber of Commerce and Industry. After the key informants interview and focal group discussions, the team also visited maize producers who were members of maize production pilot project promoted by CP Group in Hpa-an. This visit helped the Team to understand the potential crop production and to capture farmer's perspective on selected cropping alternatives.

Background of Kayin State

The project aims to contribute the rapid economic development and inclusive growth within targeted EWEC communities by providing employment opportunities and increasing the income of lower socio-economic and marginalized of all operators. EWEC was selected as the site for the project because it is now endowed with the most complete infrastructure required for development (e.g. roads, hydropower, post harvest processing and trading networks) along the higher end of the value chain. Incidentally, this region is also one of the poorest with many rural communities in Myawaddy, Kayin State-Myanmar living in poverty. (National Rural Poverty 25.6%, Kayin 17.4%)[1]

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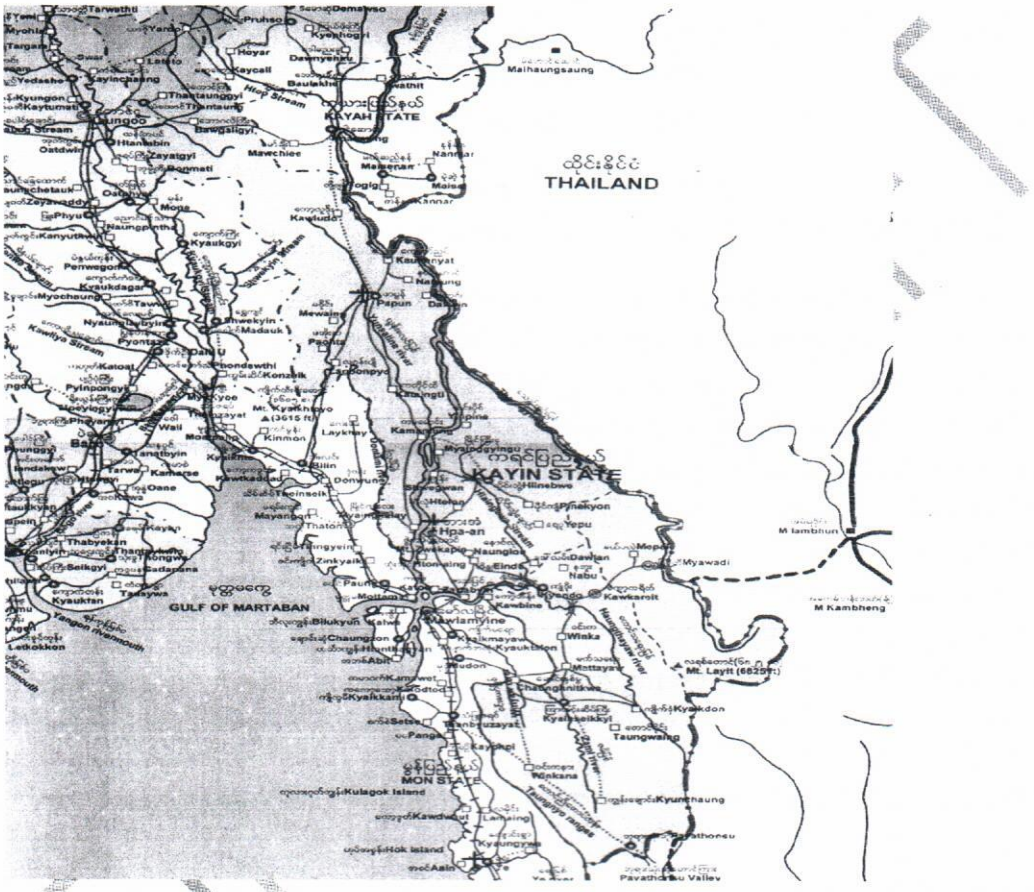
1 Interim Country Partnership Strategy: Myanmar, 2012-2014, Integrated Household Living Conditions Survey, 2004-2005 and Integrated Household Living

The study describes the market chain and the key chain actors involved in agriculture production in border trade. The goals of the study are: (i) to understand the dynamic in the agriculture commodities market; and (ii) to identify production and border trade constraints. This study presents important data on production and marketing of the commodity that are required to evaluate the efficiency of current practices by the small and medium farmers and traders. The constraints identified by small and medium farmers and other actors will enable the formulation of activity targets for the specific program.



Map 1: Kayin State Map

Kayin State Background Information

Area: 30381.667 sq-km (11730.849 sq-miles)
Population: 1,431,377
Capital City: Hpa-An
Religion: Buddhism, Christianity, Leke
The Kayin State is located in eastern part of Myanmar connected with Thailand. It also shares borders with the Shan and Kayah State in the north and Mon in the west Myanmar. Kayin

Conditions Survey, 2009-2010. p. 4

State has a hot and humid climate because of the mountain ranges that lie behind it and its close proximity to the sea. The lowest annual rainfall in the region is 3,000 mm and the highest is 4,750 mm. The region receives most of the rain in summer.

The main rivers in the province are Thanlwin, Thaungyin and Attaran rivers. The ethnic groups living in this region are mainly Kayin and Myanmar. Other groups like Pa-O, Shan, Mon and Rakhine are also residing there. The capital of Kayin province is Hpa-an. Paddy is the main crop. Winter groundnut is cultivated on silted-land and monsoon groundnut on hill-side farms. Other crops grown in the region are sesame, beans and pulses, sugarcane, rubber, areca, coffee, coconut and fruits. Other Kayin natural resources include as iron, lead, copper, tin, coal and antimony. These minerals are mined in Myanmar province as well.

Kayin State, due to 50 years of conflict is emerging as one of the least developed states in Myanmar. As Myanmar is undergoing transformation into democratic country, a ceased fire has been arranged with all of the armed groups in Kayin State (2011).

With the advent of peace, the Kayin state will become an important region because of its geographical location near the border area and its rich natural resource endowment.

With the State borders Thailand and lies along the East West Economic Corridor of Greater Mekong Sub- Region. These geographic factors give the Kayin State great potential for soci-economic development. This value chain study is one of the very few projects undertaken in the Kayin State following the cessation of hostilities. The unstable security situation in the past and its location in remote areas with poor facilities create a big challenge for value chain development within and between the bordering states. The value chain of agricultural products at the state level is an incomplete system and only primary activities prevail. Therefore, makes an important contribution to identify the missing links of the value chain and provides an opportunity to make substantive recommendations for key actors in upgrading and strengthening the nodal linkages in the chain, especially among farmers SME enterprises and markets.

Cross-border Trade Situations between Kayin State of Myanmar and Tak Province of Thailand

Border trade between Myanmar and Thailand at Myawaddy district and Maesot district has only opened officially six months ago following improvements in area security. Therefore, export data are not fully obtainable. For this reason, the data collection has relied on unofficial records provided by government officials, traders and farmers.

Most of products are traded between the two counties in the form of raw or semi-processed products. Agricultural commodities come mainly from inner part of Myanmar. These consist of rice, onion, garlic, chili, pulses, beans, potato and rubber. Low quality and cheap rice is mainly for the consumption of Myanmar migrant workers in Mae Sot. Maize and mung bean are grown in Myawaddy and traded to Thailand through small traders and collectors by using informal routes. There are more than 19 unofficial cross-border gates along the border. Border trade of these crops is unofficial; thus availability and validation of data is somewhat

difficult. Almost all agricultural inputs including fertilizer, pesticides, farm equipment and farm machinery are imported to Myanmar from Maesot district in Thailand.

Typical cross-border trade and transaction authorizations involve many Departments for approval and inspection before exporting. However, these functions appear not to function very well at border gates. The bulk of the trade appears to Mei river, which is very narrow and shallow. Therefore, it is almost impossible to control formal trade by local and small traders. There is Plant Quarantine Department under Department of Agriculture is based in Myawaddy and regularly checked for agriculture commodities. It is unclear what SPS requirements, if any, are in force, but SPS certification will become increasingly important as EWECs operates in a more cooperative framework, begin in 2015.

Cross-Border Trade Volume and Values

The estimated volume of maize traded through border is about 90,000 metric ton per year and the value is between US$ 160,000 to 180,000 per year (Source: Department of Agriculture). However, this figure is different from the estimated number given by the Department of Myanmar Agricultural Product Trading of Kayin State which estimates the maize volume exported to Thailand around 3,398,522 baskets or 81,003 ton (2011-2012). The volume of mung bean traded through border is about 30,000 tons per year. Department of Agriculture clarifies that, since these products are not for food consumption or animal feed using by local people or industry, it is assumed that all products are only for export to Thailand. Table 1 shows the import and export volume between Thailand and Myanmar (all gates)

Table 1. Export products and volume to Thailand (Myawaddy Trade Zone) in 2011-2012 financial year

Value- Million USD

No.	Commodities	Quantity (Ton)	Value
	Agriculture Product		
1	Fresh peanut pod	818.05	0.607
2	Green maung bean	230.46	0.160
3	Bocate Beans	230.50	0.128
4	Betelnut	60.00	0.100
5	Maize	300.00	0.083
6	Matpe	84.00	0.050
7	Turbe	6.00	0.010
8	Dry chili	5.00	0.009
9	Hot pepper	5.00	0.008
10	Onion	10.00	0.005

Source: Annual Report, Dept. of Cross-border Trade, Ministry of Commerce, 2012

Myanmar mainly exports agriculture commodities such as beans, rice, chili, onion, rubber, etc.. The major cash crops are maize and mung bean in Myawaddy. These are being traded through several informal routes. Myanmar imports industrial goods, housing material, garments, household utensils and food commodities. The agriculture products exported to

Thailand are almost in raw status. A large volume of maize and mung bean, mainly grown in Myawaddy district, Kayin State, are exported to Maesot, Thailand.

Part 2: Maize Value Chain Analysis

Methodology of study

Desk study

- Training and workshop conducting on agricultural value chain and criteria for the development was taking place first.
- Guiding questionnaire for the survey were prepared and developed
- Reviewing secondary data on export products from Myanmar to Thailand by cross border management
- Developing data sheets for the data entry
- Semi structured interview questionnaires were developed

Methods

- Meetings with authorities of the state, briefing them objective of study and exchanging of views on concerned policies
- Brief presentation to the groups (departmental, private sectors associations
- Asking participants to evaluate the criteria
- Conducting focal group discussion, rank the identified crops based on the sub-criteria
- Conducting interview with farmers, collectors, exporters and supporters(focal associations and private sector companies)
- Conducting border visits to Myawaddy- Maesot

Scope of the study

According to information received from stakeholders, civil society and various communities, the Value Chain Mapping Study was primarily focused on mapping the value chain of maize from the point of input providers to cross border animal feed factory in Thailand. The geographical area covered for this study comprised Kayin State - predominately the capital city of Hpa-an and more specifically in Myawaddy District bordering Thailand. Field visits were made to villages where maize cultivation is undertaken. Most of the plantations are based on ex-forest areas where timber extraction previously occurred.

The limitations of this study include severe time constraints, limited access to villages, due to increased insecurity in the region, and miscommunication and misunderstanding with Ministries and Departments regarding permissions, scheduled meetings and permitted travel within the region. This study time-frame was approximately 10 days spread between Hpa-an and Myawaddy. The study followed the schedule made prior to the trip. During the trip, the team missed the opportunity to see the Chief Minister due to his absence at Hpa-an. However a meeting between the Kayin State Government led by the Secretary of the State Government and three ministers and departmental officials during the Team's visit. In addition to the meetings with concerned departments, there were successful meetings with the private sector.

The conduct of the study in Myawaddy was limited by travel restrictions in certain areas-including foreigners and local Myanmar staff because of security concerns. For this reason, the permission to visit the largest village of maize producers (75% of total production in Myawaddy in Shwekokko village) was not granted. However township authorities arranged for the Team to visit Hwave where there was a successful conduct of a focal group discussion in a Shan village with maize farmers.

General information on maize production in Hpa-an and Myawaddy

Rice production dominates the largest proportion of the agricultural sector in the state (595,784 tons) followed by sugar cane and maize production, 160,527 and 95,223 tons respectively. Rice is mainly produced for domestic consumption and majority of farmers only produce 1 time/ year. Only a fraction of farmers in irrigated areas are able to grow a second rice crop. Sugar cane is the second largest crop production of the state. The sugarcane output is milled and processed in other states and regions. Maize is the third most important crop of the state and more than 90% of production produced at Myawaddy and exported to Thailand.

As mentioned earlier, the government put a lot of effort in encouraging the private sector to invest and promote maize production for poverty reduction after the conflict ended. Other important crops planted in the state and large areas in middle regions of the country are pluses and beans representing Myanmar is one of the biggest producers and exporters in ASEAN region and are one of the leading producers in the international scene. Lastly, rubber plantation is one of the largest plant productions of the state. It is widely grown along the road from Hpa-an to Myawaddy with large plantation plots. However, the data of rubber plantation is not available at this time.

Table 2. Maize production compared to other major crops in Kayin State

	Crop	Production (Ton)	Planted Area (Acres)
1	Rice	595,784	166,232
2	Sugar Cane	160,527	2,731
3	**Maize**	**95,223**	**17,706**
4	Mung bean	30,516	22,128
5	Ground Nut	24,731	12,403
6	Sesame	5,630	6,971
7	Sun Flower	892	956
8	Black Gram	611	592
9	Pigeon Pea	136	135
10	Rubber	N.A.	N.A.

Source: Department of Agriculture (2012)

Key regulations and policies of Department of Agriculture and related organizations

The Department of Agriculture (DOA) under Ministry of Agriculture and Irrigation at state level presented its development strategies to develop agricultural sector of Kayin state by emphasizing on following objectives;

- Improving accessibility of farmers to inputs and investment
- Improving land use planning
- Improving seed quality
- Capacity building for farmers on modern farm technologies and mechanization
- Improving road accessibility accessible to farm and market
- Farmer group formation to increase their bargaining power
- Financial support to small holder farmers through the Rural Development Bank
- Increasing profitability and productivity for farmers

Besides, the state DOA strategies, there are also directives given by the Union Government, especially to promote maize production. In 2012, the President of Myanmar, Gen. Thein Sein, paid a visit to Thailand and met with CP Company President. One of the highlights of their meetings to CP Company is to invest in Kayin and Kayah state. In September 2012, Mr. Dhanin Chearavanont, a President of CP Group, visited Kayin government and agreed to pilot maize production project for 200 Acres, by providing an 80% subsidy on input cost to farmers. In 2013, CP aims to expand the production to cover 2,000 acres in the state by full supports from both state and union government. This benchmark project makes significant improvements of supply chain of agricultural products and it is the first commercial crop promotion in partnership between government and private sector. With the partnership of CP group, farmers will be able to access to high quality seeds, fertilizers and modern techniques in collaboration with government departments. In the marketing side, all maize will be purchased through the contract farming arrangement which can quarantine the minimum price and quality of maize.

The policies and regulations of the Thai government related to cross-border trade is also an essential consideration when analyzing the cross-border value chains between Thailand and Myanmar. One of the most significant cooperation agreements between Thai and Cambodia, Lao PDR, Myanmar and Vietnam government is the Ayeyawady - Chao Phraya - Mekong Economic Cooperation Strategy (ACMECS). Within the ACMECS framework, 10 agricultural products, including maize, from neighboring countries can be imported to Thailand with zero tariffs. The import of these products must to be done through contract farming arrangements by Thai investors. The Thai government will approve the volume of produce to be imported annually. In the fiscal year 2013, there are 17 investors in Tak province officially registered to import maize from Myanmar with approved volume of 30,040 tons and covered 48,700 rai of land in Myawaddy. In practice, there are some challenges for traders and investors to follow the ACMECS. First challenge is about the cross-border transaction procedure. Even Maize is allowed to import tax free, but traders are required to present official documents to the Customs Office at the borders for example Certificate of Original (C/O), Phytosanitary certification together with other required papers. However, the concerned government office to provide this service is not functional well yet in Myanmar. The certificates and official documents cannot be issued at the Myawaddy Office yet. Therefore, it is very hard for traders to follow the official trade channels and most

of exports occur through informal channels which are more practical and do not require any documentation.

The second challenge is from Thai government procedure. The approval of import agricultural products is an annual basis. Therefore, investors are unable to plan long-term investments with Myanmar business counterparts because the rules are variable.

Moreover, import approvals are insecure and are subject to change depending on the demand-supply situation of agricultural products in Thailand. If the cost of maize in Thailand is very low, the import procedure tends to be very strict to limit the products supplied to Thai market. Thai farmers always perceive. Governments decisions are subject to politics and politically made decisions do not always benefit the efficiency of value chains.

Market structure and supply chain of maize in Kayin State

Table 3. Status of maize cultivation in Hpa-an and Myawaddy district

District	Harvested Area (ha)	Yield/ Hectare (kg)	Production (ton)	No. of Families
Hpa-an	644	4,350	2,800.1	164
Myawaddy	17,062	5,420	92,423.2	4,265
Total	17,706	5,380	95,223.3	4,429

Source: DOA, Hpa-an and Myawaddy, 2013

These data were estimated by the officials from Department of Agriculture. Maize producers in Hpa-an are under the pilot project supported by CP Group in partnership with the Union and State Government. During the March visit, the first production was ready to harvest in early April.

In Myawaddy, farmers started growing maize about 5-6 years with Thai trader's support. Maize traders in Thailand work though Thai or Myanmar brokers who are responsible to coordinate with Myanmar collectors in Myanmar side. These collectors collect maize from farmers within their village and 3-4 neighboring villages. All products are exported to Maesot and Tak province crossing Mei river.

Socio-economic environment of maize value chain in Kayin State

The Kayin State, following the cease fire between ethnic Kayin group and government, became one of the important regions to implement the development of socio-economic programmes to assist the rural poor people along the border area between Myanmar and Thailand.

Maize, widely grown in Myawaddy, was exported to Thailand for animal feed through cross-border from Mae-sot. Farmers in this region are well aware of advanced cropping practices such as intercropping of maize with mung bean to boost soil fertility (nitrogen). They are also aware of direct seeding under vegetative cover (SCV) to maintain water holding capacity and soil fertility which is lost by uptake of maize. Currently, the market for maize is stable and

there is high demand in Thailand. These factors provide an excellent opportunity for farmers in the State to produce maize.

Therefore, the state government has targeted maize cultivation in Hpa-an in cooperation with FDI-CP group as contract farming to extend maize land to 2,000 acres in coming years. For this reason, small farmers can get a chance to practice maize production and receive agricultural inputs as capital or in kind, and receive training in modern agricultural techniques including post-harvest. By receiving crop management training, producers become towel aware of how to produce quality crops and make more money from selling the products by grade than their current practice of selling by volume. Farmers can benefit higher potential supply for agri-inputs by establishing local suppliers (retailer shops). Today all of the maize from Myawaddy is exported through a single route, to Thailand. Formation of farmer associations involving small and medium farmers can achieve their ownership and bargaining power to negotiate prices for their products.

Moreover, the road link from Hpa-an to Myawaddy is under construction and will be finished in 2014, leading to improve transport services. This project will help collectors/ traders bringing products from Kayin State to Thailand by the shortest route requiring about 2 hours for transportation. Local collectors will have the opportunity to collect large volumes from Hpa-an, and have use of the cross-border bridge. This will greatly facilitate the cross border maize trade. From this intervention, collectors can work 2 seasons; rainy season in Myawaddy and winter in Hpa-an for year round income. Furthermore, this intervention should facilitate private sector willingness to invest on maize production especially in Hpa-an such as post-harvest facilities. In addition, larger exporters will likely participate in the maize industry once the transportation facilities and security are improved. Some business providers realized the benefits of using farm machinery to improve the efficiency of improving maize cultivation in the State, and have started to import farm machines: hand-tractors, harvesters and seeders resulting in changing mechanize farming near future to overcome the shortage of seasonal labor. CIGIAR and IRRI have developed low cost, on farm drying and storage equipment for use by farmers to reduce moisture to the required 14% and to protect stored crops from fungus (mycotoxins), insects and rodents. Encourage the private sector to invest in mechanization for planting, harvesting, shelling and charge farmers a modest fee per hectare for these services can result physical losses from 5 to 10%, as well as reduce harvesting costs by 20%. (Source: www.knowledgebank.irri.org). Another of many examples of on-farm low cost post harvest devices (source: http//www.knowldegebank.irri.org).

What is a low-cost (SRR) dryer?

A low-cost dryer is a farm-level dryer that removes water from wet grains by forcing ambient air or slightly pre-heated air through the grain bulk that is stored in a circular bamboo bin. It is a batch dryer—i.e., the same quantity of grain is kept stationary in a holding bin until drying is completed. It is suitable for farmers with small rice fields (~1 ha).

Why do we use an SRR dryer?

The SRR dryer is the only rice dryer that has gained acceptance as a farm-level dryer. It is affordable (costs between $100 and 200) and produces better quality grain than sun drying. It uses the low-temperature drying principle. The SRR dryer is slightly cheaper than the STR dryer and has lower labor requirement, though drying time is much longer.

How do we use the SRR dryer?

Features

Easy to operate
Mobile
Can be used for rice, corn, peanuts and other commodities
Simple design allows local production and ensures easy maintenance and repair

Operation (electric heater)

During day time (8 am – 6 pm), the fan is turned ON, and the resistor is turned OFF.
First night: With fan ON, the resistor can either be ON or OFF. If the resistor is used, drying time is reduced but energy consumption is higher.
Second night: Both fan and resistors are ON. Without supplemental heat, moisture content of paddy near the inner cylinder might be low enough to be re-wetted by ambient air of high relative humidity.
Third and succeeding nights: Both fan and resistors are turned OFF. Paddy moisture content has been reduced to a level low enough that allows for waiting for the next day to use heat content in the air.
Monitor moisture content and temperature regularly. Stop drying when average moisture content reaches the desired final moisture content.

Considerations

Increasing the temperature reduces drying time but results in uneven drying.
Increasing the airflow shortens drying time and reduces the moisture content but increases energy cost.

**SRR is a Vietnamese term meaning "Low-Cost"*

Technical specifications

Drying performance

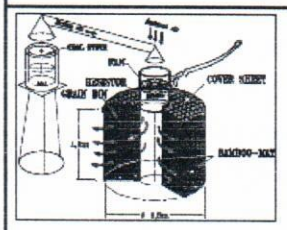
Capacity	1 t batch $^{-1}$
Grain layer	Up to 1 m, depending in capacity
Drying air temperature	Ambient temperature and slightly pre-heated air (low-temperature drying) 5- 9 °C above ambient air
Drying time	4 days form 24% to 14%
Drying rate	0.1 % h $^{-1}$

Drying bin

Circular, made from bamboo mats or wire mesh

Fan and heater options

Fan	Two-stage axial fan made from automotive fan rotors
Air volume flow rate	0.35 m^3 s $^{-1}$
Pressure creation	350 Pa
Electric motor	0.7 kW
Alternative	Electric heater: 1,000 W



Coal consumption: 0.9-1.0 kg h^{-1}

Maize cropping cycle in Hpa-an and Myawaddy

There are different maize production season in Hpa-an and Myawaddy which affect to the quality of maize. In Hpa-an, maize cropping cycle starts after rice harvest, in December - January. Farmers can use their rice paddy field to grow maize in winter season and water is available from the existing irrigation system. The harvest time is in early April when it is dry and a lot of sunlight to properly dry maize. This time of the year is the most appropriate to harvest maize with high quality. While in Myawaddy, where the area is located in mountainous and very dry and with no existing irrigation system, farmers start their maize plantation in May or June when rainy season begins and they harvest in September or October. During harvesting time, there is still heavy rain in the area. Farmers could not transport the maize out of the field due to poor road conditions. Most of them build their own crude on the field to keep maize until November - December when farm is accessible and market in Thailand open. Keeping maize in the poor storage facility for a few months causes the quality of maize fall significantly. With high humidity, fungus, insect and rodent infestation, etc. Without proper post harvest management and facilities to maintain the quality

of maize, farmers have to sell their low quality maize to the market and low prices, thereby reducing their bargaining power. They can not prolong their storage period to wait the most profitable price due to there is no facility.

Table 4. Cropping system of maize in Hpa-an

Month	Activities	Rain fall
December- January	Land preparation Sowing seed	6-8 mm
January- March	Fertilization, weeding	6-8 mm
April	Harvesting maize	41 mm

Table 5. Intercropping of maize with mung bean in Myawaddy

Month	Activities	Rain fall
May	land preparation sowing seed spraying herbicide (one day after planting)	Minimum (<3,048 mm)
End of May 10, 2013 (20 days after planting)	1st fertilization	Minimum (ca. 3,048 mm) (sometime strong rain)
June (40-50 days after planting)	2nd fertilization Spraying herbicide	Heavy rain (maximum 4,826 mm)
August (100 days after planting)	Spraying herbicide Mung bean start growing (broadcasting) Cut maize leaves to cover soil (soil and water conservation)	3,048-4,826 mm
August- September (20 days after mung bean cultivation)	Harvesting maize On- farm storage of maize	Minimum (<3,048 mm)
October	Harvesting mung bean Storage of mung bean	<1000 mm
November- December	Trashing maize Transport from Farm- Collector selling	<500 mm

In Hpa-an, the cycle starts in November until April. The rainfall during this time is very low. Farmers need to pump water to their fields from the irrigation system. The use of high energy depend pumps substantially increases the farmers production costs. To solve this problem, farmers should be taught to make their own bio-diesel from Jatropha and run pumps from low speed diesel engines capable of operating with farmer extracted diesel oil.

Low rainfall is a limitation for the Agricultural Extension Department which plans to promote maize production in Hpa-an. The land expansion must be in the irrigated area. However, the quality of maize is quite high since it is very dry and can be stored for longer

periods. One of advantage to harvest in April is better accessibility of farm-to-market roads. In April, the farm roads are in better condition. It is easier for farmers to transport their product to market during this time.

Table 6. Cropping calendar for intercropping of maize with mung bean in Myawaddy

Description	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maize									
Land preparation									
Seeding									
Growing times									
lopping									
Harvesting									
Mung bean									
Seeding									
Growing times									
Harvesting									

Gender aspect in maize value chain:

Basic role and responsibility of farmers segregated by sex

During the field survey, we were able to conduct focus group discussion with Thai community only. This perspective should only reflect to this community and may not applicable in Kayin communities. The focus group discussion was done separately between men and women to ensure safe space to speak without hesitance of presence of another sex.

Table 7. Summary of women and men role and responsibility at Huay San village, Myawaddy in related to maize value chain

Sex	Role and Responsibility	Decision making in related to value chain
Man	• Mainly takes the responsibility land preparation including plowing, harrowing, digging holes for seeding • spraying herbicide • sometime when exploring removing of the tree trunks, burning and cleaning the debris of the bush • lopping maize leaves to cover the soil for maintaining moisture for the next crop green gram • harvest corn ear and thrashing • loading and offloading and carrying the	• Decision making for the family issue is claimed by men that it is under their control but "prior consult to their wife is required". • Mainly control the production techniques in the field. • Manage the laborers who assist in the field • Most of hard works or dangerous work for

Sex	Role and Responsibility	Decision making in related to value chain
	harvested crop to aimed destination	example herbicide spraying is done by hired laborer.
Woman	• Accompany man by bringing and preparing meals at the field • putting maize seeds along the holes developed by man • application fertilizer • broadcasting green gram seeds along the inter row of maize plant • selecting and grading of harvested corn, • thrashing maize seed and fill and packing maize seed in sacks • manage money due to lack of management by man	• Financial management is controlled by women. The reason given by both men and women is women can spend money carefully and wisely but men are trend to spend money for social issue. • Obtaining agricultural inputs and marketing their maize is under women decision. Women are the one who always go to the market or order the bus driver to buy the inputs. When it is time to trash and sell their product women also contact the collectors. • Dealing with trader, collector and hiring labor

Source: Focus group discussion, Huay San village, Myawaddy, March 2013.

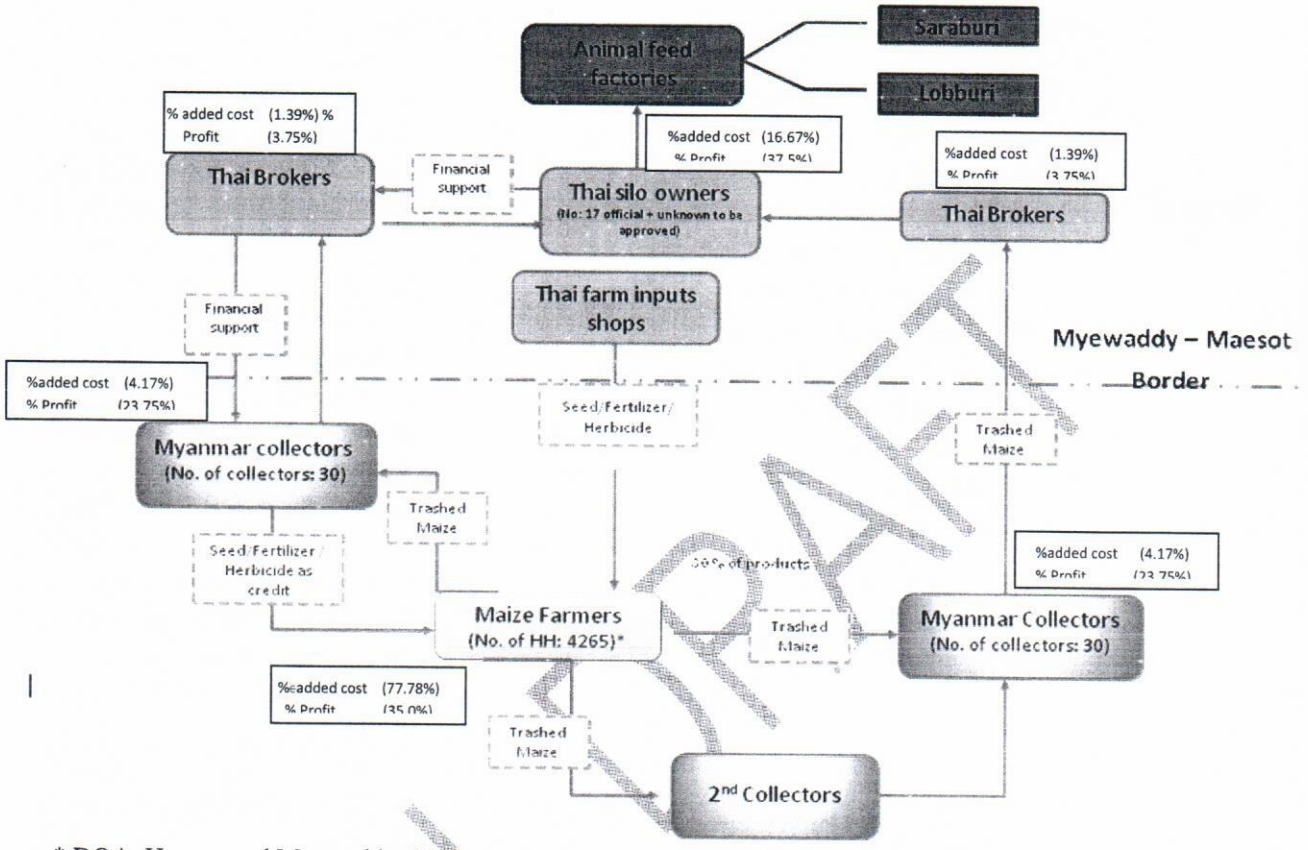
For traders, there are both men and women traders in the village. In perspective of discussion participants, there is no distinction between women and men traders. The effective of traders are depending on their financial capacity and network in Thailand rather than their gender.

Farm-to-Market supply chain

The marketing system of maize in Hpa-an is still in the very beginning stage. The marketing system is incomplete because it was just a pilot project with CP group. The actors along the chain are only producers and CP group functions as input supplier, collector and processor.

In Myawaddy, the marketing system involves more actors but this chain is also incomplete. There are only producers and numbers of collectors. There is no value adding activity on the Myawaddy side. Farmers harvest maize and store it in the simple-built storage facilities on their farm for a few months before selling. The use of low cost post harvest technologies developed by CIGIAR and IRRI, previously described, would enable the farmers to add value within the farm boundary. Then collectors simply collect trashed maize from farmers and transport maize to Mei river for the cross border trade through informal channel. The cross-border trade of maize operates only for 2 months per year in November to December.

To link with the market in Maesot, farmers in Myawaddy greatly rely on the support from collectors and brokers in communicating and managing the cross-border transaction. There are some procedural issues of each actor in linking to the market in Thailand.



* DOA; Hpa-an and Myawaddy, 2013

Figure 1. Accessing agricultural inputs and market for maize

Cost and return analysis of smallholder farmers

Maize production pattern in Myawaddy district is widely practiced by intercropping mung bean. The maize production relies on only the rainfall in the area. Therefore, the cycle can start in May or June when rainy season just begins. Before harvesting maize 20 days, mung bean is planted on the same field as an intercrop. Maize leaves are chopped to cover soil for shading and preventing loss of moisture. This intercropping pattern helps reduce significant use of fertilizer for mung bean due to the remaining fertilizer following maize production. Therefore, the cost of production of mung bean is quite low. Farmers mentioned during the interview that the production cost included the cost of intercropping with maize production but earned a separate profit from mung bean sales (see Table 5 production cycle).

Most of the cost of maize production is for planting, weeding and harvesting for hire labor. The average daily wage for hired labor is 2,900 - 3,480 Ks/day (100-120 bahts/day). The cost of labor varies depend type of work, for example, labor cost for herbicide spraying is 170 baht/ day while cost of labor of other activities is about 100-120 baht. The average total production cost per 1 kg of maize is 5.6 bahts. The diagram (Figure 2) below indicates that the highest production cost is the expenses for fertilizer which is amounts to 28.72% followed

by the cost for labor for harvesting, weeding and land preparation combined with planting cost at 23.05%, 21.54% and 14.25 (6.93+7.28)% accordingly. The highest expense in maize production cost is fertilizer. All farmers imported chemical fertilizers from Thailand. The cost of fertilizer is around 850 bahts/ bag included 100-150 bahts/ bag of transportation cost. The cost of fertilizer and labor used for fertilizing is accounted for 28.72 % of the overall production cost. The fertilizer cot is relatively higher in Myawaddy due to high transportation cost across the border. Farmers have to pay about 100-150 bahts/ bag to the bus drivers or Myanmar collectors who help them buying fertilizer from Maesot. There is none of farmer apply animal manure or green compost for fertilizing their land. Chemical fertilizer is widely use because it is easy for farmers to manage and number of animal is not enough to produce animal manure.

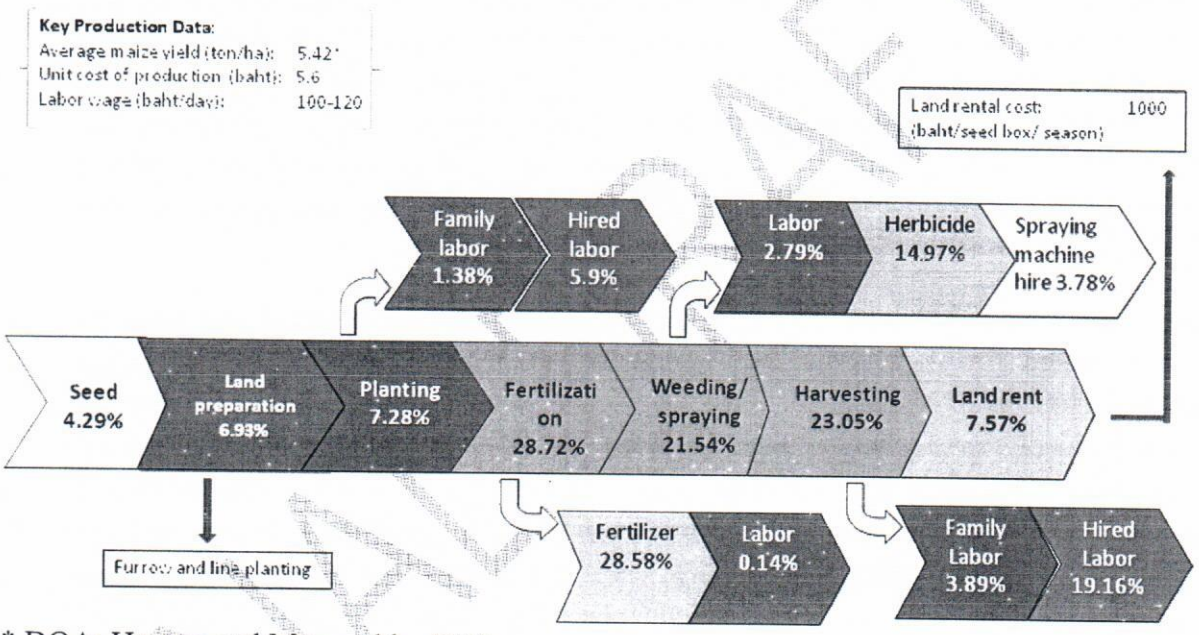
Harvesting: The second highest cost after fertilization (23.05%). Farmers have to employ laborer to help them harvest in the field. Most are from Bago region. Local workers are not sufficient to meet the demand at harvesting time in September and October. There is a need to import the labors from Bago region as these laborers have less work opportunity and limited land. The harvesting is done by hand. If farmers use 2 baskets of seed and employed 10 workers, it will take them around 10 working-days (8 hrs/ day). The cost of labor for this type of job is around 100-120 bahts/ day.

Weeding: This cost includes the cost of herbicide, renting cost for spraying and labor for spraying, accounted 21.54%. Every farmer applies the herbicide to control weed. It requires less intensive labor and it is easy for them to manage weeding in the fields, as noted by farmer groups in discussing the competitive advantage of maize farming during the focal group discussion. Compared to other crops, maize requires less technology and is easy to manage because of less labor intensive measures for herbicide application. In one cycle of maize production, farmers have to spray herbicide 2-3 times. Due to the risk of using chemical herbicide, the labor cost is higher compared to other farm work. The cost of spraying is 170 bahts/day compared to other work 100-120 bahts/day.

Land preparation and Planting: land preparation and planting accounts for 14.25% (combined between land preparation (6.29%) and plating (7.28%) of the total production cost. This cost is mainly paid for laborers who are hired to help farmers with slash and burning of weeds and sowing the seeds. The cost of labor for this type of job is 120 baht/ day. The use of hand tractors for land preparation is common for farmers in the area. Hand tractors are also widely used to till rice fields. Almost all the farmers normally buy the hand and multi-purpose tractors for their rice and maize production. Hand tractor with wagon is necessary for transportation of maize from farm to village. In rainy season, other truck could not access the field due to poor farm road condition but this hand tractor is feasible. The cost of a pedestrian tractor is ranges from 50,000 -100,000 bahts up to its engine capacity. A small riding tractor costs 300,000 to 600,000 bahts.

Seed cost: The cost of seed is not high compared to other costs (4.29%), but it is important for enhanced productivity. The majority of seed is hybrid and imported from Thailand. The

most common seed brand is CP 888. The cost of hybrid seed is 650 bahts/ bag or 10 bahts/ kg, including the cost of cross-border transportation. Maize seed is only available in Maesot, not in Myawaddy. Some farmers produce maize seed and sell it to their neighbors at lower prices, around 200-300 bahts/ 10 kg. However, the quality is not certified and it is only available in the villages connected to Thai villages. The CP Vice President explained that it is possible this seed may come from farmers who participated with company seed development research. From the information received from the Department of Trade Promotion in Hpa-an, the average yield is 5,201.9 kg/ha. This yield is similar to the productivity rate of its neighboring countries which are 2.3-5.2 ton/ha in Lao PDR, 2.06-5.10 ton/ ha in Thailand and 2.28-3.65 ton/ ha in Vietnam (Source: World Bank Integrated Value Chain Analysis, 2005). However, this figure is compiled from the government officials from Hpa-an not Myawaddy district and there could be significant differences between these two districts.



* DOA; Hpa-an and Myawaddy, 2013

Figure 2. Value chain for maize production in Kayin State

Table 8 indicates that farmers contribute to the highest percentage added cost of total added cost among all actors (77.78%), the second highest cost contribution comes from the Thai silo owner (16.67%), the Myanmar collector (4.17%) and the lowest is broker (1.39%). The profit proportions of of each actor are similar. The highest percentage of profit is received by the silo owner (37.5%) and farmers (35.00%), followed by collector 23.75% and the lowest percentage of profit is broker, only 3.75%. In term of marginal percentage, the farmer represents the highest proportion of total margin at 62.50%, followed by the silo owner (24.11%), collector (11.16%) and the lowest percentage of margin at 2.23% is the broker.

Farmers and Thai silo owners earn highest income and profits among all actors. This is the key reason why farmers continue to growing maize and try to expand the land area. Farmers even earn more when they calculate the profit earnings from mung bean as an intercrop

which requires fewer inputs. As long as the Thai market is available and the border transaction and procedure are supportive, farmers will continue farming maize. In some villages in Myawaddy, where the government and company extension services are not available yet, there are opportunities to expand the production area but there is a need to establish and ensure security and basic infrastructure including road, post harvest handling and credit support.

Table 8. Relative financial position of actors in VC of maize in Myawaddy (Baht/kilogram)

Value chain actors	Cost			Revenue	Profit		Margin	
	Unit cost	Added unit cost	% added cost	Unit price	Unit profit	% profit	Unit margin	% margin
Farmer	5.60	-	77.78	7.00	1.40	35.00	7.00	62.50
Collector	7.00	0.3	4.17	8.25	0.95	23.75	1.25	11.16
Broker	8.25	0.1	1.39	8.50	0.15	3.75	0.25	2.23
Silo owner	8.50	1.2	16.67	11.20	0.15	37.50	2.70	24.11
		7.2	100		4	100	11.2	100

Source: Field Survey at Myawaddy, March 2013

Thai silo owners also earn relatively high profits after farmers. This is consistent to their role in contributing to value addition. Silo owners sponsor farmers through informal contract farming by providing seed and financial support channeled through local collectors. The most significant contribution to the chain is improvement of gain quality after shipping from Myanmar. The silo owner has to dry maize to reduce moisture until 14-5%, average moisture of Myawaddy maize above 17%. The cost to improve the quality is 0.5 baht/ kg including drying management, gasoline, machine, trashing (in case it was not trashed), electricity and labor cost. If farmers were able to use low cost post harvest technology previously discussed, the silo owners could save 0.50 baht per kg. This would reduce their profit to 37%. It would appear that this slight reduction of the silo owner's profit margin would not be a financial inconvenience. Farmers would be able to capture the value addition from post harvest value adding on the farm.

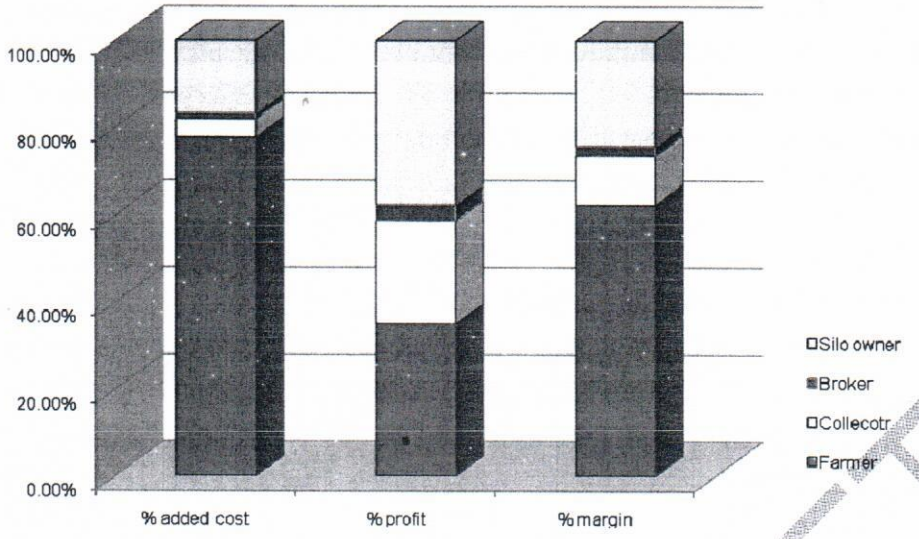


Figure 3. Comparison of percentage of added cost, profit and margin of all actors along the Chain

The above diagram shows that the profit and margin per unit for both collector and broker are relatively low. However collectors still have a reasonable income due to large volume of maize under their management. There is potential to increase income of these small traders to undertake more value adding activity by increasing the quality of maize. It is strongly recommend to dry maize gain before shipping to Thailand. The basic facility to dry maize for example; collecting center, cement floor for drying or the advanced drying container should be installed in Myawaddy if the volume of maize is large enough to generate profit. This role is very important for maize value chain development in the future to generate more value added process in Myanmar before exporting and contributing to local employment and economic.

Another actor who plays the role in the cross-border of maize value chain is broker. Even they gain relative low (0.15 baht/Kg or 3.5%) but their role is important. As long as, the cross border transaction is not managed formally, the role of these brokers is to help traders to manage cross border transactions both formal and informal. These brokers can create the linkage of the cross-border value chain in terms of ensuring the smooth coordination and communication between Thai entrepreneur, Myanmar traders and farmers. Many Thai businessmen do not want to deal with complicated informal trade procedure. Therefore, the brokers can do this dirty work in dealing with many agencies both formal and informal.

In Thailand, maize price is determined by using moisture level, size of grain and level of fungi see Table 8 for more details. However, farmers in Myanmar normally can sell maize to Thai traders with lower price compared to maize from Thai farmers. In 2012, the maize price was 7.3 bahts/ kg in Myawaddy and 8.5-9 bahts/ kg in Thailand.

Table 9. Maize standard and price determination used by Thai traders

Grade	Quality	Price
A	Moisture is less than 14.01 – 14.5%. No fungus, big size and no broken grain	No deduction
B	Moisture between 14.6 -15%	The total weight will be deducted 6 Kg/ ton
C	Moisture between15.1 – 15.5 %	Deducted 12 Kg/Ton
	Moisture between 15.6 -16%	Deducted 18 Kg/ ton
	Moisture between 16.1 -16.5%	Deducted 24 Kg/ ton
	Moisture between 16.6-17.0 %	Deducted 30 Kg/ton
	Moisture between 17.1-17.5 %	Deducted 36 Kg/ton

Source: Department of Commerce, Thailand

The price of each grade is different 0.10 baht/ kg and the total weight is deducted according to the content of moisture. Maize from Myawaddy is sold in mixed quality and high moisture level about 17-22% (Source: Thai trader in Mae-sot). The price of maize from Myawaddy is low because Thai silo owners need to dry it again before selling to feed companies.

Critical Problem of Value Chain in Myanmar

A. Farmers

The main problems encountered by farmers are the following:

- **Low quality of product**. In Myawaddy, farmers produce maize during the rainy season and harvest in September and October, heavy rainfall period. Poor road conditions cause inaccessibility of trucks to their field. Farmers need to have simple storage based in the CIGIAR and IRRI models to keep maize dry and insect, rodent and fungus free until it is accessible in November and December. With this approach, when farmers sell maize to Thailand, the moisture is will be around 14-14.5%, equivalent to the Thai grading standard. The present moisture content of maize (around 17%) is considered as C Grade and subjected to weight deduction 36 kg/ ton (see Table 9). This problem is related to several factors;
  - Road condition to access farm is poor and not accessible during rainy season. Therefore, farmers need to keep their maize on farm storage which exposed to moisture, loss from pest, rodents and fungi.
  - Farmers are not aware of the market required standards including moisture, grades and SPS. They often mix grades and receive the lower market price due to low quality. The price and standard differentiation are not well known to farmers and traders. Therefore, both lack incentive to improve product quality.
  - There is poor effective extension service in the area to train farmers to improve their quality of maize or provide equipment to measure the moisture before selling. This is the proper role of the private sector, such as input suppliers, collectors, silo owners and CP.
  - There is no drying facility available in Myawaddy to reduce the moisture before shipping to Thailand for example cement drying floor or dryer machine. Rather than invest in expensive dryers on the Myanmar side, a better option would be to have farmer groups in setting up low-cost on farm post harvest handling. The technology is available and it should be used. CIGIAR and IRRI have invested a lot of time and effort to solve post harvest handling at the farm level.
  - It is impossible of Myawaddy farmers to delay their production to winter to avoid the problem of poor roads and high moisture due to the lack of irrigation systems.
  - Even farmers mentioned that they earn low prices but continue growing it since there is no better option on growing cash or alternative crop. However, when farmers understand that they can produce higher quality with better prices and they form groups to take advantage of group lending micro-finance operations, they will rise to the occasion.

- **Absence of storage and drying facilities**. Maize storage is built simple located on farm and high risk to be damaged by rodent, insect, fungi and moisture. Before sending to Thailand, there is no process to improve the quality operated in

Myawaddy. All quality improvement of maize is done by Thai silo owner by drying on cement floor and using drying machine before sending to animal feed mills. The cost of installation of drying is too expensive to invest, mentioned by CP group. A medium-size drying storage costs more than 10 million bahts. Therefore, it will be high investment for local businessman to put this large amount of money for drying process at present. The use of IRRI and CIGIAR post harvest handling at the farm level is the solution to adding more value on the Myanmar side.

- **High cost of agricultural inputs:** Agricultural inputs are imported from Maesot through different channels; by village bus, collector or themselves. The cost of inputs plus transportation cost is average 20% higher than Thailand. The local farm shop is not also available in Myawaddy. Therefore, farmers have only few options to access good quality of inputs in reasonable price. Lack of direct communication with input suppliers and upstream market operatives results in farmers' not being able to negotiate prices and prevents them from getting accurate and updated information on agricultural inputs and market conditions.
- **Poor extension service**. Government extension services are available at the province, district and township level. However, farmers perceive that they hardly see the government extension services to support their production and marketing. Some areas are not accessible by the extension workers due to insecurity. There is also a lack of farming database system to support the policy making decision process. The basic information on number of farmers involved in each crop, plantation areas, productivity, cost and return, etc can be retrieved from the concerned government offices, but the data are inconsistent and unreliable. However, the government is trying to improve the system. For example land services are taking place in Myawaddy.

- **Lack of financial support for farmers to invest on farm production.** As maize cultivation is very costly, most farmers in the area struggle to finance the farming due to a lack of funds necessary for investment and working capital. There is very limited financial support for few farmers available at Hpa-an but there are no rural or agricultural banks is available in Myawaddy. At present, most of farmers invest in their farm using their own saving, and if it is needed, they will request interest free loans from their relatives. However, if farmers want to expand or improve their production, it is almost impossible for them to finance additional investment. There is very limited access of smallholder farmers to financial institute for rural and agricultural development bank. Loans and credit systems for smallholder farmers in Myanmar are in an embryonic stage. Therefore, financial services do not yet have wide area coverage.

- **Labor shortage.** Insufficient labor is one another main problem encountered by farmers every year. This is due mainly to the fact that most of the young family

members are migrating to Thailand (in particular - Mae -sot) as there are better wages and ample jobs in Thailand. Most labor comes from Bago Region as well – which is far away. Sometimes during the peak season of cultivation they have to compete for hiring labor with higher wages. The outward migration of labor is an endemic problem throughout the EWEC. The only solution of this problem is to promote private sector investment in equipment so the operators can provide services to farmers at much lower costs than hiring manual labor.

B. Collectors and Exporter

- The role of collector and exporter is very important to link smallholder farmers to the exporting market in Thailand but their contribution to add value is low. Most of their work is to coordinate and manage the transportation and transaction from village crossing border to Thailand.
- Agriculture product border trade is not yet fully developed in Kayin State due to poor transportation facilities from Hpa-an to Myawaddy. Also basic facilities such as electricity are not readily available in both Hpa-an and Myawaddy. Therefore, processing factory for export oriented trade has difficulty developing in the state. However, value adding in Myanmar should be a medium to long term objective.
- The volume of maize production in Hpa-an and Myawaddy is still small and its location is very far from trading points and trade is inhibited by poor transportation facilities. Therefore, there are few incentives for large investors from other parts of Myanmar to invest in this business.
- There is limited access to get services from the government offices for exporting: for example the certificate of phytosanitary and certificate of origin. Actually, none of the collector and exporter, who interviewed, received this service from the government or support for local collectors. The main reason is, currently, they do not want to deal with the complicated procedure of the government.

SWOT analysis on cross-border maize value chain between Myawaddy and Mae-sot District

I. *Strengths:*

1. Producers

- Market assurance and price stability
- Farmer in Myawaddy have maize growing experience for 5-6 years
- Some of small scale farmers and medium farmers obtained input credit from collectors
- Reasonable costs and returns for farmers and silo operators
- Leaves and stalks used for maintaining water and soil erosion. Mung bean broadcasting within the row of maize system based on direct seeding with permanent plant cover (SCV:Systèmes de culture sous couverture végétale)

- Zero tillage of mung bean cultivation can minimize the production cost and increase the overall profit of farming production
- Mung bean intercropping reduces erosion and improves the soil fertility on maize cultivation land
- High potential of FDI- CP already involved
- Potential for expanding maize cultivation land especially in Hpa-an
- Irrigation system in Hpa-an is available for maize cropping cycle during winter season
- High quality maize can be produced in Hpa-an

2. Collectors

- Informal and small collectors are more flexible to do business. Most of them also do their own farm or live within the village.
- Require low investment only for collecting and managing transportation
- Some of them receive working capital from Thai silo owners with no interest
- Some collectors can speak both Thai and Myanmar and can effectively communicate with business partners in Thailand
- Some collectors manage the financial support and inputs given to farmers by Thai investors. Therefore, they receive trust from both sides.

3. Brokers

- Can deal with complicated cross-border transaction
- Service is not costly and affordable for smallholder farmers

4. Thai Silo Owners

- Possess facilities to dry and improve the quality of maize before selling to animal feed factories
- Benefit from the availability of reasonable transportation services
- Provide the financial support and inputs to farmers
- Enjoy low maize prices from Myanmar

II. Weaknesses

1. Producers

- Low quality of maize in Myawaddy due to heavy rainfall during harvesting and poor on-farm post-harvest management.
- Unaware of quality standards and market information, leading to low motivation to enhance the quality and better production plan
- High cost of chemical fertilizer and not available in Myawaddy market
- Products cannot be collected at the farm immediately after harvest so farmers have to store 2-3 months subject to moisture, rodents, fungus and insect, etc.
- Most environmentally damaging crop due to high nutrient uptake and sloped farming land.

- Needs high technology and investment in producing maize to reduce post harvest losses
- Farmers have very limited knowledge of markets and prices and are linked only through intermediaries. High post harvest losses and little understanding of product moisture percent acceptable. Poor quality product.
- Farmers not collectively organized for more effective bargaining power
- Seasonal labor shortages with high labor costs
- A large component of value occurs in addition across the border
- Poor rural and farm road access in some areas. In rainy season, maize cannot be transported from farm to market.
- Farmers are captives of a single market. If Thai import quotas decline, farmers do not have alternative markets and are market risk vulnerable

2. Collectors

- Currently, there are no processing facilities in the entire state for maize. Collectors play limited role to add value before exporting.
- Limited production and favorable business climate to encourage collector investment post- harvest infrastructure
- High transportation cost due to poor farm road condition and informal fee along the routes
- Lack of market information leading to a weak marketing information sharing especially with farmers
- No assistance given to collectors to increase their capacity on cross-border trade and entrepreneurship
- There is no proper collecting center and storage operated by collector. The center is only temporally operated within their housing compounds.
- There no collectors in Hpa-an yet. It is pilot stage to develop the value chain.
- The trading season is only 2 months/ year, November and December. The rest of the year, no business activity for the trader.

3. Brokers

- Operate informally
- Cannot receive any support from the government to develop their businesses

4. Thai Silo Owners

- Need to invest for drying process before selling to feed mills. That may not be necessary if on-farm post harvest becomes preferred option.
- Need to register with Thai government to import maize through official channel
- Have to buy high moisture of maize from Myawaddy due to poor post-harvest management and high rainfall during the harvesting season. This can be overcome of simple low cost post harvest technology at farm level.

III. Opportunities:

1. Producers

- Experience and willingness of private sector to invest
- Farmers already understood some yield boosting technology such as SCV and mung bean intercropping
- Regional integration can allow to import easier and cheaper inputs, machineries and technologies
- Women participation in maize production

2. Collectors

- ACMECS cooperation and AFTA allows exporting maize to Thailand with zero tariffs.
- Regional integration and linkage
- Road to link Hpa-an and Myawaddy is under construction and will be finished in the end of 2014. The transportation and movement of people and goods will be significantly improved.
- Increasing domestic economic development in Myanmar after wider open the country economic

3. Thai Silo Owners

- High demand for animal feeds throughout EWEC and China
- Expansion of maize production area increase the volume of cross-border trade

IV. Threats:

1. Producers

- Natural disaster and epidemic of plant disease and insect leading to low productivity
- Unstable security can affect the expansion of the production land
- High labor cost due to young people migrate to Thailand to get better employment opportunity
- In Hpa-an, farmers do not have much experience to grow maize
- A single market. If Thai import quotas decline, farmers do not have alternative markets and are market risk vulnerable

2. Collectors

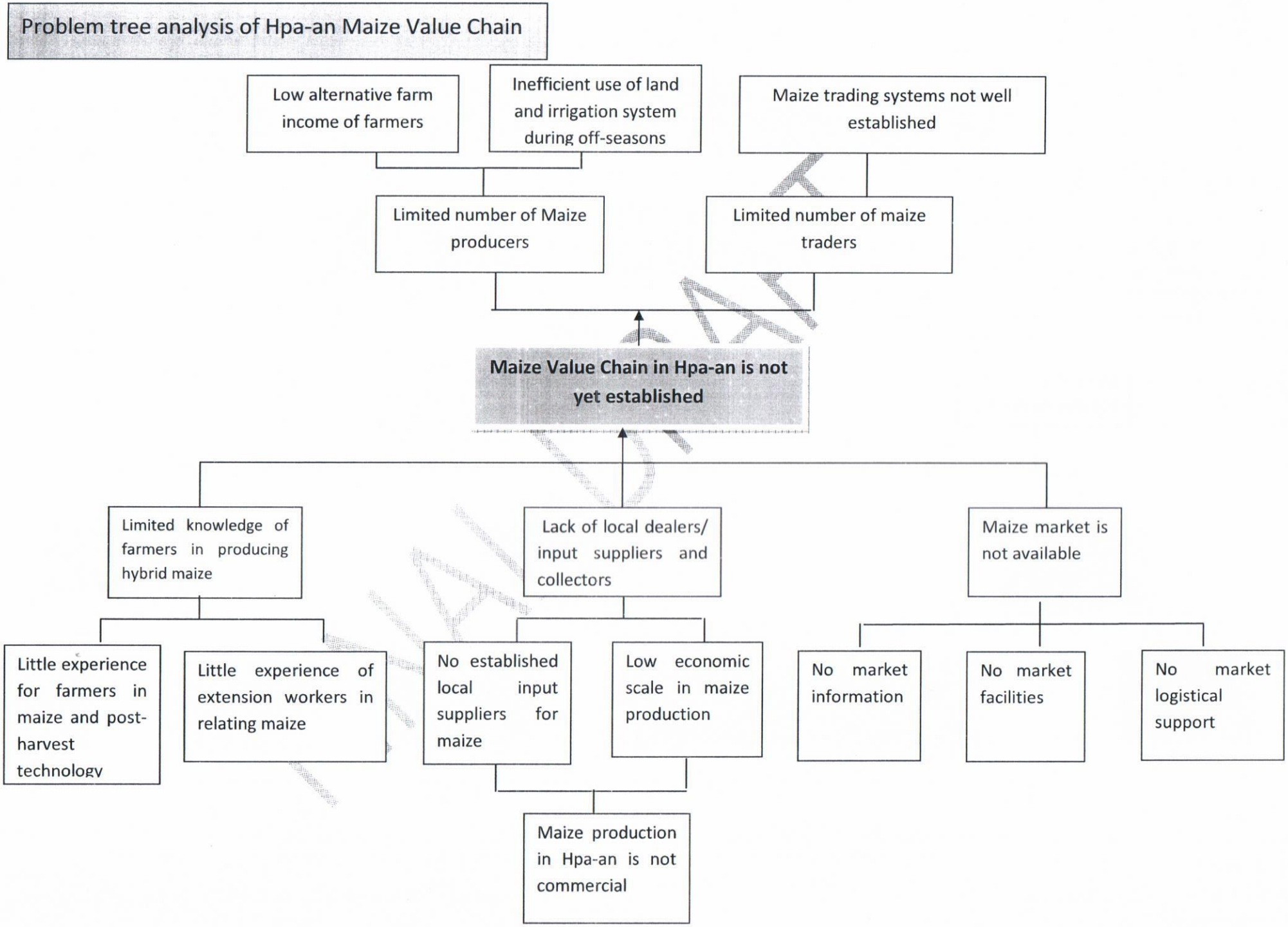
- Single market dependency (Thailand) especially in Myawaddy.
- Subject to changing import quotas due to Thai government policy on domestic agricultural price in Thailand
- Government regulations may force exports through official border channels and threaten the easy access and transaction through informal cross river channels
- Weak cross-border regulation and facilitation

- Poor basic facilities could result in agro-business in Hap-an and Myawaddy fail to start and expand.

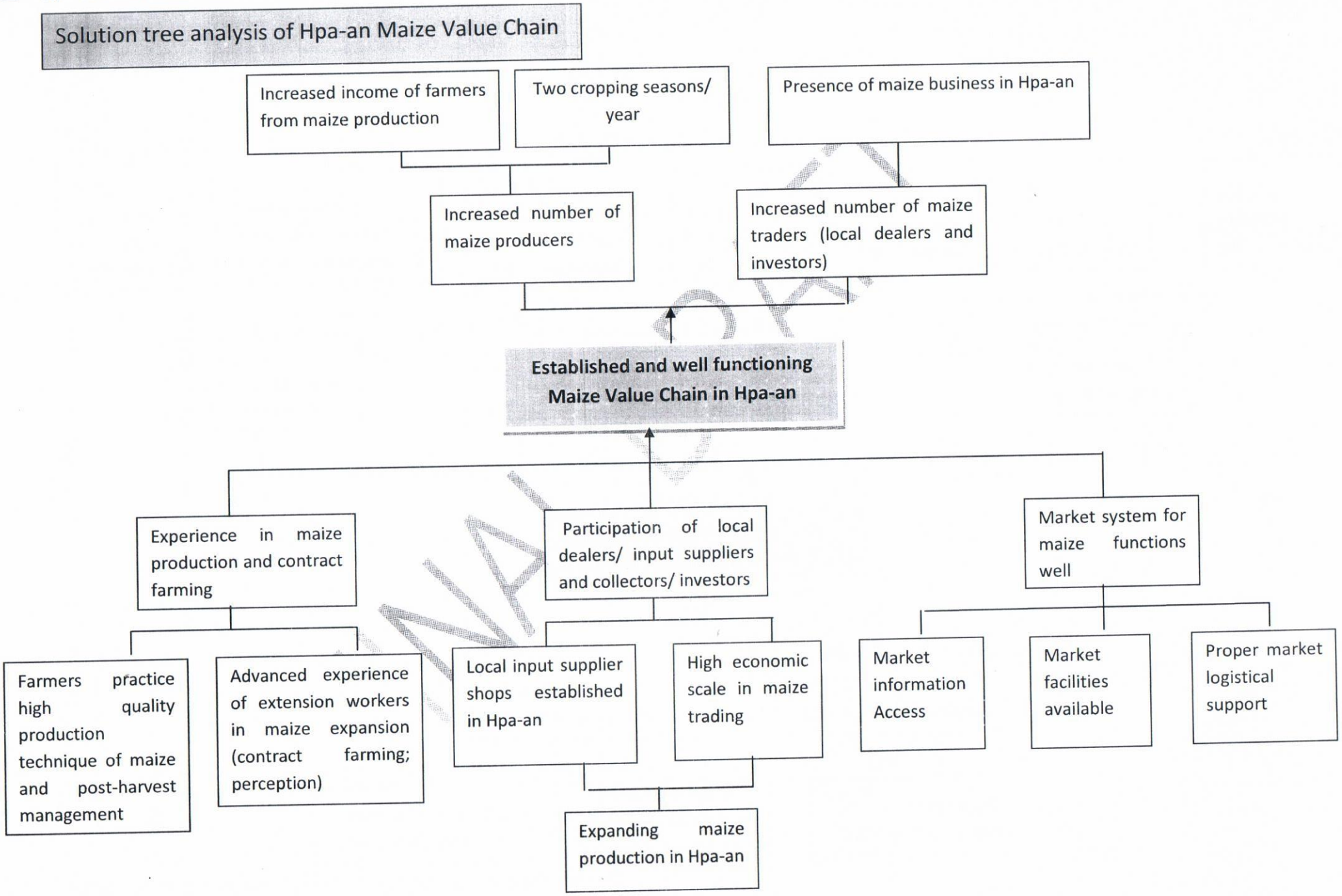
3. Thai Silo Owners

- The price of maize in Thailand is low, the government can stop importing maize from neighboring countries

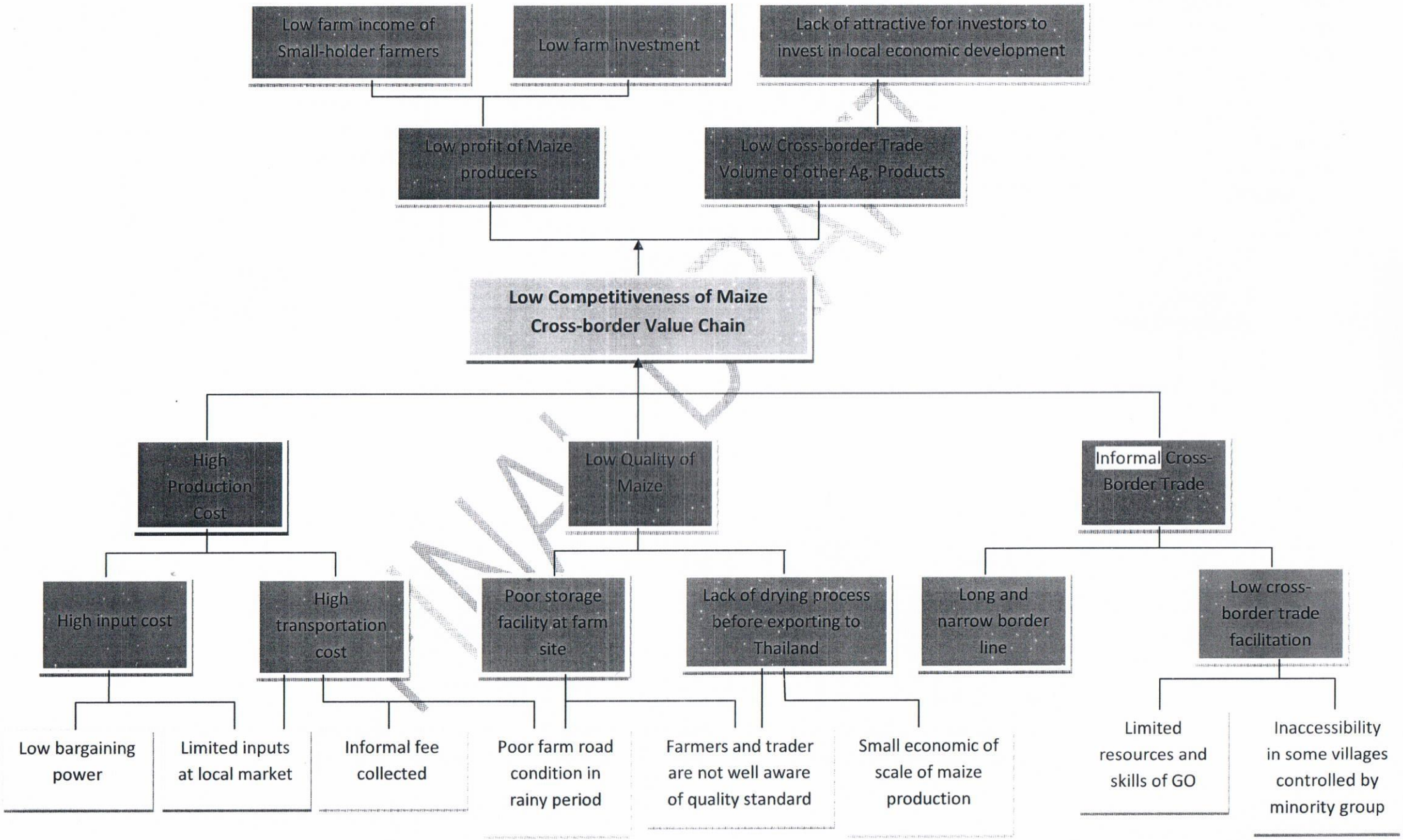
Problem tree analysis of Hpa-an Maize Value Chain



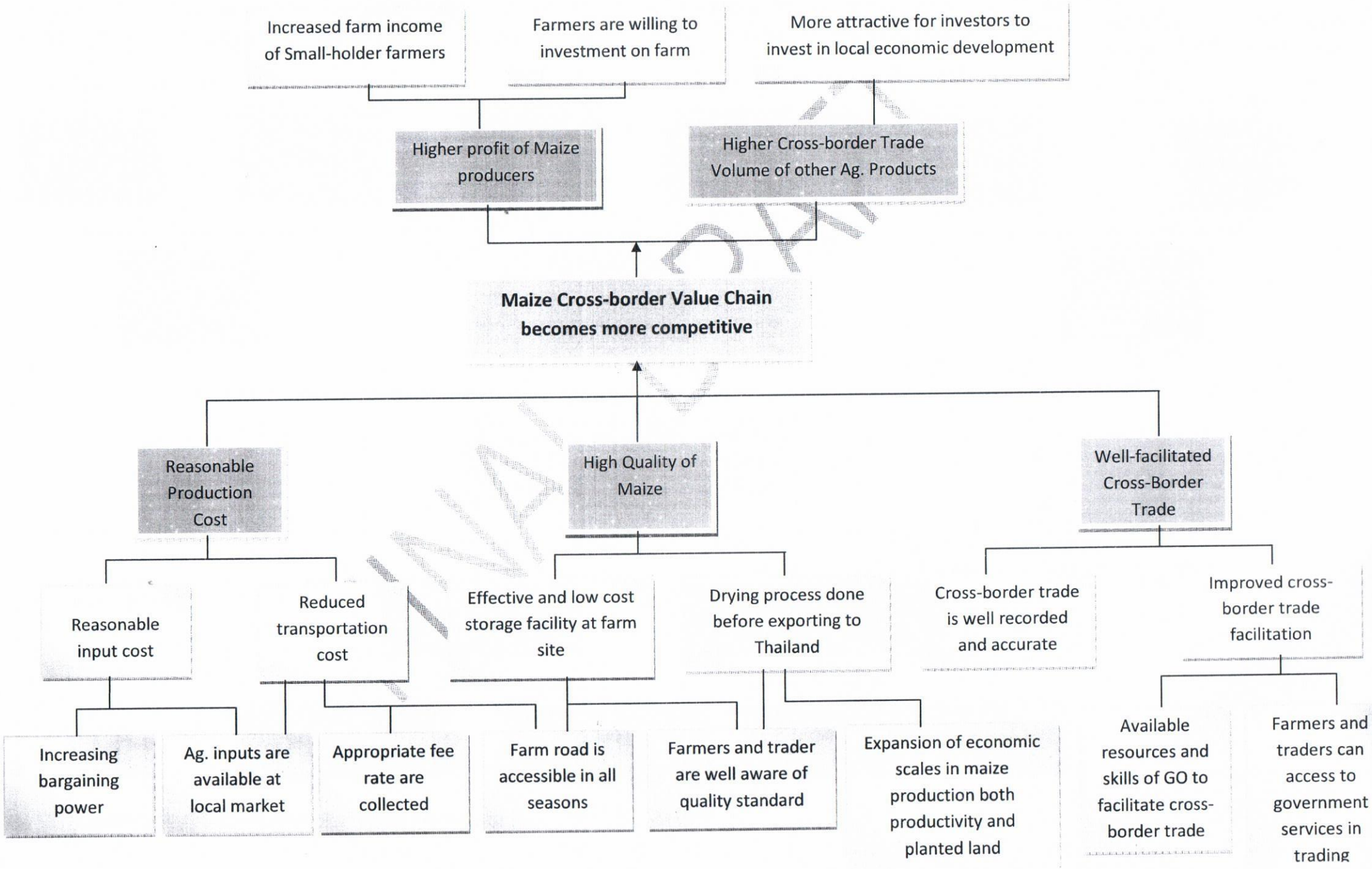
Solution tree analysis of Hpa-an Maize Value Chain



Problem tree analysis of Myawaddy Maize Value Chain

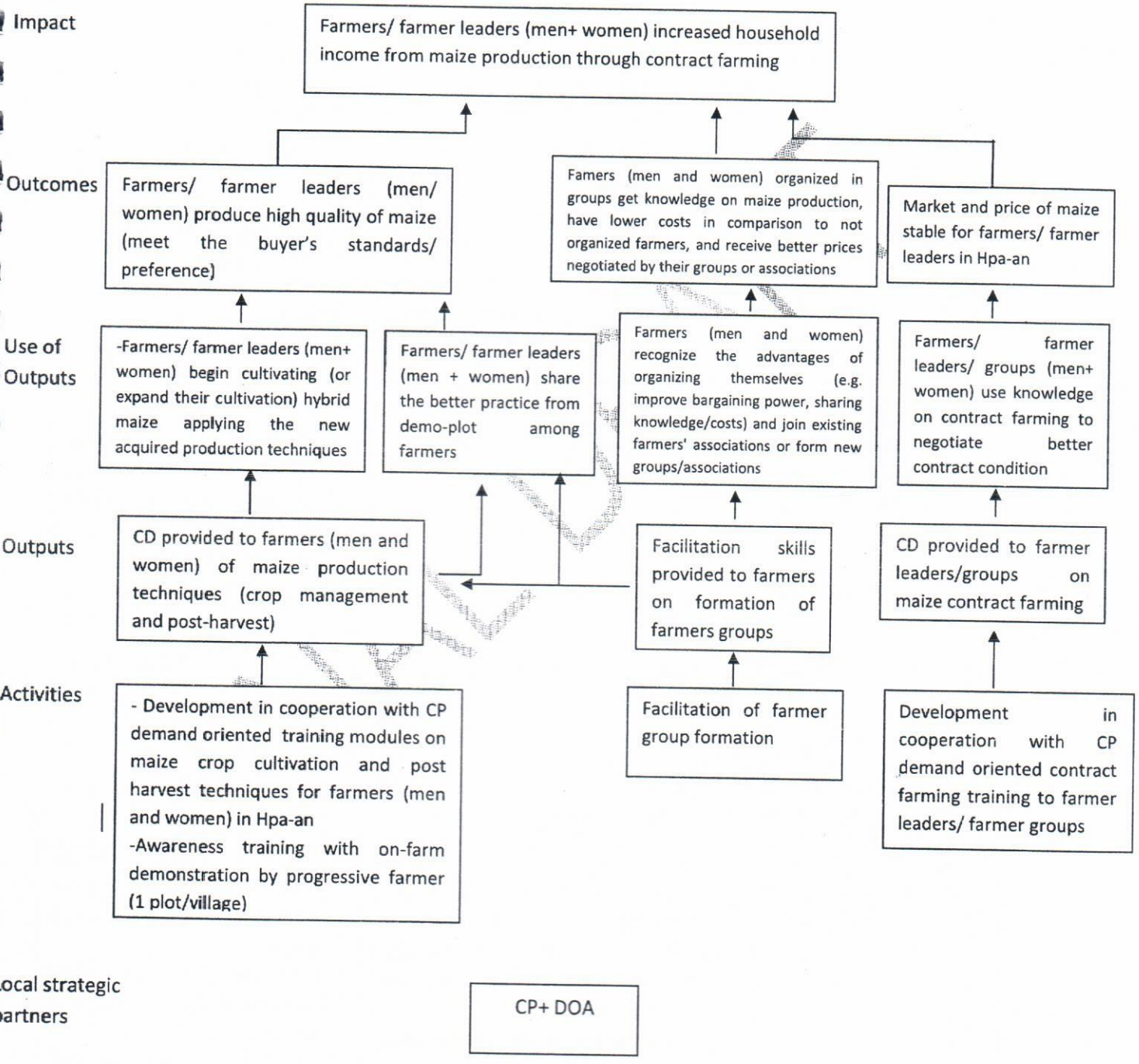


Solution tree analysis of Myawaddy Maize Value Chain

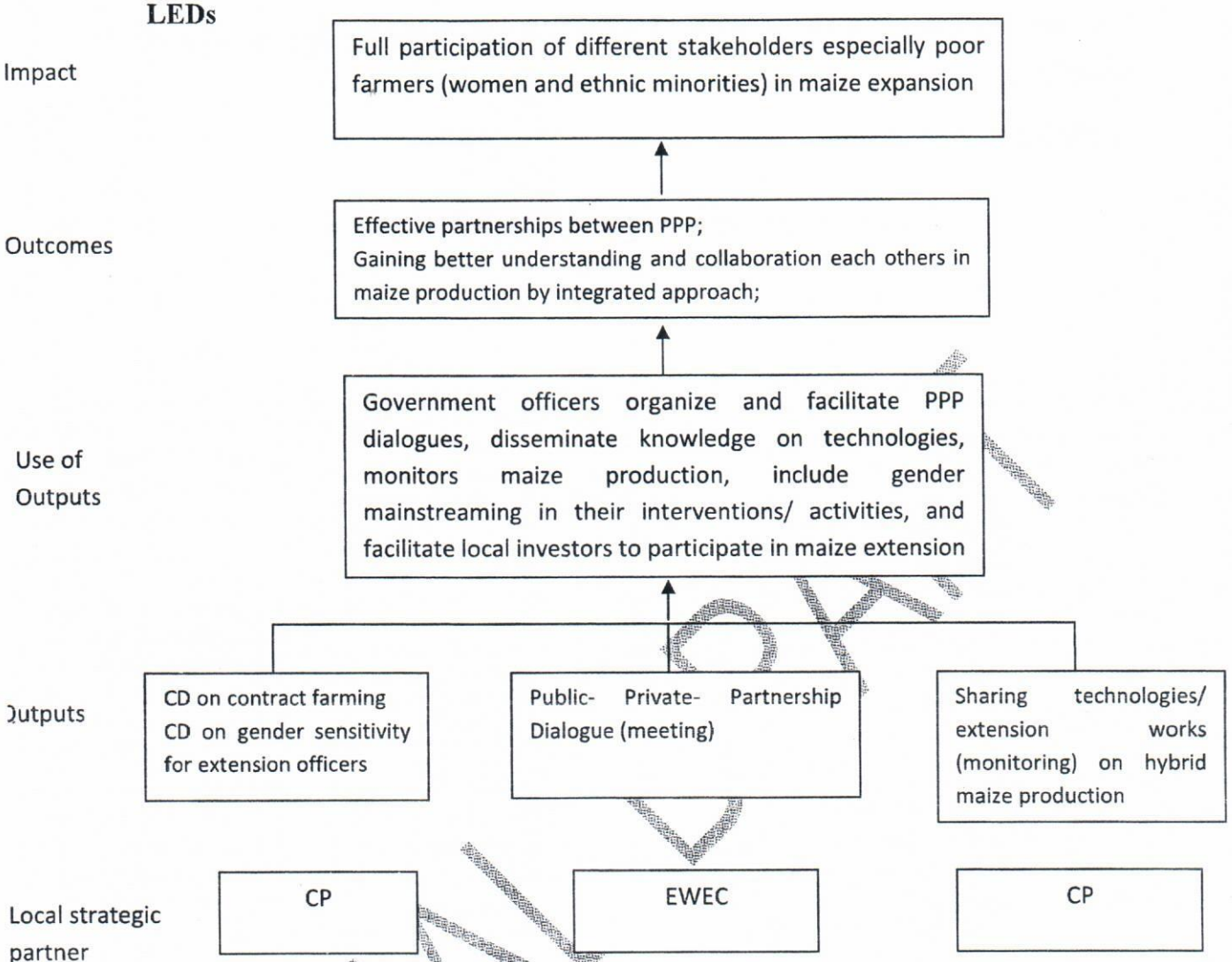


Recommendation for Maize Value Chain strengthening in Hpa-an (Result Chain)

FARMER



LEDs



Collectors / traders in Hpa-an

Recommendation	Strategy	Outcome
Luck of local input providers and collectors in **Hpa-an**	• Link between potential private sectors (local collectors, CCI, etc.) and company (CP group) • Facilitate the partnership agreement between company and local dealers • Promote maize production in Hpa-an by contract farming • Capacity strengthen local collectors on contract farming and post-harvest handling	✓ Could extend maize production and set up the market system of maize in Hpa-an ✓ Establish the partnership between investor and local dealer and/or farmers ✓ Local dealers are capable to work with farmers ✓ Could expand the maize production ✓ Could set-up local market system and well function

Recommendation for Maize Value Chain strengthening in Myawaddy

Recommendation	Strategy	Outcome
1) Farmers		
Key Issues to be Addressed 1.1 Low quality of maize due to lack of knowledge on post-harvest handling and infra-structure	• On-farm low-cost demonstration of post-harvest storage; provide necessary equipments such as moisture meter and practicing to collectors and selected farmers • Supporting functions such as infrastructures, coordination, information, related services, etc. • Use of CIGIAR and IRRI technology	✓ Improved quality of maize ✓ Moisture level is at 14-15%
1.2 Lack of knowledge about grading the product	• Awareness raising to collectors, farmers and local suppliers on maize quality through study trips, training and discussing with buyers' need in Thailand • Encourage Thai maize buyers to increase the price on quality maize, and farmers to sell their products to grantee buyers	✓ More bargaining power of farmers; reduce production costs; easy to access input available at local market; increase profit/ kg
1.3 Not aware of the agricultural inputs price and not involve directly 1.4 High cost of Input: about 20% higher in Myawaddy than in Thailand	• List down available market information sources for example FAO, Thai website, etc. • Develop the distribution channels through information sheet, SMS, community radio, village center, DOA, collectors, local shops, etc. • Form farmers into producer and marketing groups in buying inputs collectively, and encourage local investor to engage with Thai inputs supplier/ companies to establish local shop in Myawaddy	✓ Access market information; Plan in inquiring the input and selling their output price, Capacity to trace the current market situation and trend ✓ Products reach the marketing standard of maize (moisture at 14%); Farmers and collectors aware the standard quality and how to check; make more money from higher quality product; Capable of measuring moisture percent of maize on farm; Access more bargaining power in marketing; minimize the post- harvest losses
1.5 Small economic scales in maize production	• Increase economic of scale by improving productivity/ land and expansion of cropping areas.	✓ Volume of maize increased ✓ Increased number of investors on maize trade

		and value adding activities in Myawaddy district
2) collectors / traders		
2.1 Lack of drying process before loading the product	• Improve performance of farmers and local entrepreneur to attract more investments. • Facilitate the linkage between investors and local suppliers to test and set up low-cost storage technology and dryers working collectively with farmers using CIGIAR and IRRI technology	✓ Minimize post-harvest losses and gain the high quality product
2.2 Low value addition	• Establish the drying facilities at local on-farm level • Instruct the collectors about quality standard and market demand	✓ Could add more value on maize ✓ Aware of market standard of maize
3) Government departments		
3.1 Available resources and skills of GO to facilitate cross-border trade 3.2 Farmers and traders can access to government services	• Link and introduce maize value-chain key actors with local government departments • Find out the functional procedures and policy necessary in official trading • Facilitate government departments to participate in formal cross-border trade efficiently	✓ Efficient and well-functioning cross-border trade ✓ Clear role and responsibility of government officers in facilitating maize production and cross-border trade