HELVETAS VIETNAM LAOS MYANMAR

Lotus Fiber Value Chain in Myanmar

A study conducted on behalf of the Regional Biotrade Project

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Brief of the Regional BioTrade Project

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The Regional BioTrade Project is a project of the Swiss State Secretariat for Economic Affairs. It is implemented by Helvetas, a Swiss based international Non-Government Organization. The objective of the Regional BioTrade Project is conservation of Biodiversity through sustainable trade in natural ingredients in a manner that increases the competitiveness of local exporter/ importer and the livelihood benefits of the rural population by taking in to account ethical BioTrade principle and criteria.

The Regional BioTrade project promotes sustainable trade of natural ingredients in Vietnam, Laos and Myanmar to conserve biodiversity and develop livelihoods of rural populations. This project aims at building sustainable business models by changing trade of raw materials and natural ingredients to preserve its resource base for future generations and to increase capabilities and competitiveness of local producers, processors and exporters.

The project is focusing on native plants that can be processed locally to obtain natural ingredients with high value and export potential. This will increase value addition within Myanmar, Vietnam or Laos and generate jobs and incomes. Companies following the BioTrade business model build stronger partnerships with producers and secure safe and reliable raw material supply to access new markets that offer higher prices for BioTrade products.

This study has been conducted in the frame of the Regional BioTrade project in Myanmar.

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1. Introduction

Increasingly, the world is realizing that better use must be made of precious natural resources. Today, with the enrichment of people's awareness on environment problems and the demand of environment-friendly fabric, natural fibers have received a great deal of attention due to their great importance of green and health protection properties and have been widely used in many fields, such as textile industry and daily life.

Lotus (Nelumbo nucifera) is one of the most ancient angiosperms originally planted in South America and now grown in semitropical and temperate zones such as Western Asia, Middle Asia, North America, India, China, Japan, etc. Lotus has a long planting history and abound resources in China. As the collection of ornamental, edible, and medicinal values, lotus is a kind of special crop with unique research value. Almost all parts of lotus, i.e., leaves, flowers, seeds, and rhizomes can be used for both edible and medical purposes.

Extracting fibers from lotus stems have been in practice since 1910. Later during the 1990's designers of Japan setup workshops to create a foreign market for their fabric. But due to low demand in Japan, lotus fiber fabric remained a rare and handmade textile.

1.1. History of Lotus Fiber in Myanmar

Lotus plant has high symbol of religion and spiritual power in history in Myanmar. Buddhism considered lotus flower represents the success, peaceful, fresh, graceful and pure mind. Because of its pristine value, Padon-ma-kya is also known as the sacred Lotus. Ancient Myanmar Kings used lotus flower, buds, stems and petals in wall paintings and statue (SK Myanmar Cultural Heritage, 2016). All parts of lotus plant are useful, stem is for producing lotus fiber, flower is for offering to Buddha, leave is for packaging food, meat etc. Lotus leaves are also use as plate to decorate food. Lotus root and seed are also edible (Hlaing T. , 2016).

A variety of lotus called Padon-ma-kya grows wild in the shallows of the lake and produces a large, fragrant pink flower. The lotus flower is adored for its characteristic of rising above the muddy water, indicating how one can rise above defilements of life. Apart from motivation for life, the plant also provides fibers which are used for making a rare kind of cloth matching with the flawless virtues of the silk. Moreover, lotus plant is believed to have healing abilities and wearing a fabric made from lotus fiber is also believed to have the same effects. Lotus plants are pure by virtue, and they radiate this purity through their fibers. These are the raw materials used to create the special cloth used for the robes of Buddhist monks. A unique fabric from the lotus fibers is produced only at Inle Lake, Myanmar and is used for weaving special robes for Buddha images called Kya Thingahn (lotus robe).

In Myanmar, lotus weaving was conceived nearly a century ago when a woman named Daw Sa Oo picked a lotus flower from Inle Lake to offer at a Buddhist temple. Lotus fiber production was begun from that skilful woman weaver in an eastern village of KyaingKhan village, Inya Village tract, Southern Shan State, Myanmar. She was a 50 years old handicraft master who successfully wove the lotus robe for the very first time. She wanted to donate special gift to a monk who is the head Abbot at the local Buddhist Temple (Moyadi, 2017; Sarah Shaw, 2013). She plucked a lotus flower for offering to Pagoda and she recognized the filament coming out from lotus stem after plucking (Counting Flowers, 2011; Moyadi, 2017). So, she got an idea to reel them together to

weave textile from lotus stems (Kennedy, 2016). She weaved a robe by hand and donated to monk (Counting Flowers, 2011). Daw Sa Oo was the very first lotus robe weaver in Myanmar. She offered lotus robe to the famous monk from Golden Peacock Hill, Northwest of Inle lake. She also offered to the Inle Phaungdaw U Buddha images during their public obeisance in Inle regions. She made her living by lotus robe weaving.

After she dies, lotus weaving was nearly extinct. From that time on, her relative's U Tun Yee and Daw Ohn Kyi family saved the dying profession and revivified it. They started a Padonma Kyathingan Production Co-operative Ltd to maintain the lotus robe weaving in a systematic and modernize way. They are now continuing with the lotus robe weaving and introducing new techniques in Inle Lake, which include the original style of lotus fiber (Hlaing C. S., 2016). They have main office at Inle and two branches in Yangon and Taunggyi. They produce monk robe (tailored in accord with the Vinaya rules), lotus fabric and shawl which attract monks and tourists (ASK, 2017).

Lotus weaving was started in Inn Paw Khon Village 20 years ago. In the past years, the weavers only produce lotus robe. They started to produce lotus scarf, shirts and hat to attract tourists. Lotus products are either pure lotus or mixed with silk or cotton (Myat Taw Win, 2017). Some villagers are growing lotus plant but it is still not enough to meet the market demand of lotus fiber production (Kennedy, 2016; Myat Taw Win, 2017). Nowadays, people from Inle are going to other parts of Myanmar where they can extract lotus fiber. They went to Sunn-Ye Inn, Yat-Saut Township, Loi-Kaw Township (Phaya-Phyu/Phaya-Ni, which is similar to conditions of Inle Lake), Sagaing Region and Yangon Region (Myat Taw Win, 2017).

Lotus fiber industry is increasing promoted by the demand international visitors and local users in Inle which is high economic impact for women especially in rural area where lotus is naturally available in Myanmar nowadays. Lotus fiber industry is one of the sectors which involve promotion of conservation of biodiversity through sustainable trade in natural ingredients that increase the competitiveness of local community via economic and social benefits in Myanmar.

1.2 Objective

To understand the stakeholders summery that includes the main players in the market functions of lotus fibre / thread production and its finished products in Myanmar and in global markets as far accessible as possible, the companies/weavers working with them, the value chains through which they are traded, the policies affecting these chains, and the socio economic of stakeholders involved including their capabilities, incentives and constrains.

2. Methodology

2.1 Desk study

Information about lotus fiber was searched on three webpages; Facebook, Google and Google Scholar by using both Burmese and English languages. Keywords used are lotus fiber/silk/fabric/scarf Myanmar, Kyar-Chi (lotus fiber in Burmese), Kyar-tha-bet (Lotus scarf/shawl), Poe-kyar-Pa-Wah (lotus & silk scarf), Kyar-Thinkan (Lotus Robe), Padon-ma- kya (the sacred lotus) and Inle Kyar-Chi (Inle lotus fiber). The review on Facebook includes public post from organizations, online shopping, local new media and personal users. On Google search engine,

English keywords are mainly used. The online review covered information from both Myanmar and International.

During the desk research, information was gathered (online including Facebook searches in Burmese language, through organisations, programmes, personal contacts, etc.) and document available information on:

- Exporter companies/ local traders/ wholesalers/ Lotus fibre producers (gather profiles, enter information on potential companies in the list provided),
- Available Lotus fibre products (collect existing product lists, reports; summarise in English insights you have or get when doing the desk research in the respective word template shared),
- The policy framework relevant to the respective sector, e.g. Textile and Garments Sector from National Export Strategies (NES) of Myanmar and Handicraft sector
- International and local Stakeholders (stakeholder lists, activities, reports on their activities or capacities), including other development programmes active in the field related to Lotus fibre products
- And other information relevant to the Lotus fibre value chain and products (evaluations, reports, value chain analyses, etc.)

2.2 Field research

Study areas:

The field visits involved rapid and intensive two-week expedition to the selected study sites, where a number of various stakeholders were interviewed. The field study was conducted in four areas such as (1) Sunn-Ye Inn in Inn Kone village, Sint Kaing Township, Mandalay Region, (2) Innma Lake, Thegone Township in the Pyi District of Bago West Region (3) Wetthe Lake, Salin Township, Minbu District of Magway Region (4) Inle Lake, Naung Shwe Township, Shan State based on the findings of desk review as the main producing areas of fiber and weaving industry and marketing centre in Myanmar (Figure 1).

Figure 1: Map of the study areas

As there was no quantitative data collection and as the study is based on the "expert opinion", the findings of the study are of qualitative value; including several case studies. However, in order to ensure consistency of the findings, same information was collected by interviewing different stakeholders involved in a given sector. The list of persons contacted for the study is given in Annex 1. Interaction with various stakeholders was facilitated by either one-to-one interview, discussion in small groups of varied stakeholders, or focus group discussion with the groups of lotus fiber producing labourers.

Data Collection Methods:

- Focus Group Discussion (FGD) to producers at village or village tract level of main production area of lotus fiber
- Key Informant Interview with COLLECTORS and WHOLESALERS at village level
- Key Informant Interview and Semi structure interview with PROCESSORS in Inle lake
- Key Informant Interview and Semi structure interview with MAIN RETAILAR of lotus fiber product at Inle lake

Data Collection: Information, fact and figures were collected related the following areas:

- Production/supply chain info specific to the product
- Companies/ exporters specific to the product
- Market and trends specific to the product

- Policy framework (issues) and programmes specific to the product and the related sector
- Stakeholder (local and international) specific to the product
- Other info specific to the product
- General assessment and bottlenecks & opportunities specific to the product

Figure 2 : Key informant interview in Inle lake and Sunn-Ye Inn, Sint Kaing Township

2.3 Limitations

Information collected from Online might be missing details because some are based on his/her personal post or commercial purposes. According to Facebook privacy policy, only data from public post are collected. When using Myanmar keywords, Google search engine show very few information. Regarding the field survey, time availability of respondents and some mind set keeping the secret for business were limitations for primary data collection as the lotus industry is not common business in Myanmar.

3. Production of Lotus Fiber in Myanmar

3.1 Type of lotus use for weaving

Lotus with long stem is the best for lotus weaving. Padon-ma-kya (Nelumbo nucifera), also known as the Sacred Lotus or Chinese water-lily or Indian lotus ,is the major type of lotus used for weaving in Myanmar (Ashin Jawti, 2016; US, 2017). Padon-ma-kya has two varities, large and small Padon-ma-kya. Both types have spike on stem, small Padon-ma-kya has spike on full length of stem while large Padon-ma-kya has spike on half-length of stem (Hlaing C. S., 2016). The lotus stem is composed of fiber mixture and exclusively high quality cloths are produced from weaving this fiber together (Kennedy, 2016). Padon-ma-kya prefers running water and mainly grows in water around 7 feet deep (Hlaing C. S., 2016; Ashin Jawti, 2016). This type of water can produce fine texture lotus fiber (Hlaing C. S., 2016). Padon-ma-kya is growing in mud. Its leaves and flowers rise above the water. The bright magnificent flower blossom in the morning and petals close in the evening (Cashmere & Pearls, 2017).

Figure 3 : Padon-ma-kya and its flower in Sunn-Ye Inn, Sint Kaing Township

Only the pink color Padon-ma-kya and the stems which are submerged in the water are perfect to produce strong and durable fiber. White and blue Padon-ma-kya cannot use for fiber production (Khine, 2016) . In Myanmar, Innle Lake and WetThel Lake (Salin) are major source of Padon-ma-kya fiber production. Padon-ma-kya can also found in other parts of Myanmar such as the Mong Nai lake-Loilem (the Eastern part of Shan State), the Phaungtaw Lake and the Saka Inn (Kayah State), Sunn-Ye Inn (Sint-Kaing Township,Mandalay Region) and KanGyiDaunt Lake (TeSel Township,Sagaing Region) (Hlaing C. S., 2016; Khine, 2016; Hlaing T. , 2016)

3.2 Why lotus fiber is popular and luxurious?

According to the documentation from Cashmere & Pearls (2017), lotus matches the human body condition. It helps human body and spirit by restoring the natural harmony (Moyadi, 2017). Lotus plants are coming out of the deep water and beautifully blossoming, which similar to how human can do beyond their originality (Sarah Shaw, 2013). The pink Padon-ma-kya is the ideal type of lotus and called as sacred flower (Cashmere & Pearls, 2017). The lotus weavers wear the lotus fabric themselves and they believe that lotus fabric can bring good luck to them and it also has the healing powers that remove diseases from their bodies and reduce headaches (Sarah Shaw, 2013; Cashmere & Pearls, 2017; Green with Renvy, 2014). Lotus fabrics are adaptable to weather condition, cool in summer and warm in winter. Lotus fiber also has the original smell of lotus flower (Cashmere & Pearls, 2017). Lotus fabrics are highly expensive, durable, require high skills to weave, for example, robe made from lotus become the most sacred and holy item for offering to the monk (Hlaing C. S., 2016).

Counting Flowers (2011) said that one large lotus scarf needs 1000 lotus stems and weaved for many hours. Wearing a lotus fiber scarf is not just a normal scarf; a person is wearing a thousand lotuses on neck (Counting Flowers, 2011). Lotus fiber production is the most expensive and labor intensive work in the world because small scarf needs around 4,000 lotus stems and takes around one month to finish. Thus why lotus scarf are highly valuable and lotus fibers are used in weaving robes for monk. Lotus fiber products are lightweight, super soft and water resistant (Cashmere & Pearls, 2017). On Moyadi online page, they attracted the customer by saying that lotus fiber is “the world’s rarest and most sacred natural fiber” and their scarf are 100% made by hand and it gives the spiritual power and soft texture. One of their scarfs, which are 26 inches wide and 78 inches long, needs 10,000 lotus stems. They also highlighted that lotus fiber production is nature friendly process (Moyadi, 2017). Lotus based products are luxurious and it has the potential to develop the socioeconomic status of Inle Lake (Kennedy, 2016).

3.3 Properties of lotus fabric

The lotus fabric looks like a blend of linen and silk, with unique properties, such as being light, soft, and special breathable. It was not as warm as the cashmere but it breathed like linen without wrinkling badly and repels stains as well. Cool in summer and warm in winter, lotus fabric is highly breathable and wearable year-round. With a texture similar to raw silk and linen, lotus fabric is soft, light-weight, and naturally waterproof. Besides its supposed calming powers, the Burmese claim that it helps relieve headaches, neck aches, and health issues related to the throat, lungs, and heart. As Myanmar opens its doors and shares its cultural treasures with the world, lotus weaving stands out as a unique cultural heritage that will not remain undiscovered for long.

Recently, Italian fashion designer Loro Piana developed a line of lotus clothing and introduced it at the Parisian design fair. His 100 % lotus double-breasted sport jacket valued at around €4000 ($5600) made waves in the luxury fashion world. Japanese buyers have also shown great interest in the lotus fabric. Due to the limited number of lotus plants on Inle Lake and the thousands of lotus required for a single garment, lotus stalks are now being brought in from elsewhere in Myanmar to meet the growing demand. For long-term development of this micro-industry, sustainable lotus growing and harvesting practices are needed. On the contrary, it will become the means to support future generations, thus allowing this art to survive.

3.4. Production sites of lotus fiber

3.4.1 Sunn-Ye Inn Lake in Sint Kaing Township, Mandalay Region

Sunn-Ye Inn or Lake is located in Inn Kone village, Sint Kaing Township, Mandalay Region, Myanmar. Its area is 4 square miles and Shan Yoma mountain ranges are located at the east of the lake (Shwe Myanmar Travel Information, 2017). Different types of lotus are grown in Sunn-Ye Inn; Blue lotus (Kya-Padee, lotus bead), Padon-ma-kya and Red lotus. Padon-ma-kya has three types or three colours, white, red and pink lotus. Among them, pink lotus is the most abundant one in Sunn-Ye Inn. The villagers from Inn-kone village are extracting lotus fiber from Sunn-Ye Inn (Shwe Myanmar Travel Information, 2017; Villager, 2017).

3.4.2 Innma Lake in Thegone Township, Bago West Region

The residents around Innma Lake make a healthy profit mainly from lotus fiber production. Innma Lake is located in Thegone Township in the Pyi District of Bago West Region. It is filled with lotus plants and water hyacinth (Bay-dah). Two major types of colorful lotus (Khwe Kyar and Padon-ma-kya) have been found in different parts of the lake. The residents in Theingone, Yedarshyae and Htanpinmott villages mainly rely on the lotus fiber business for profits since 2010. However, the lotus fiber quality in Innma Lake is not good quality based on the ethical manner of fiber producers. There are about 160 households in Theingone village and about 120 households make lotus fiber. In Yedarshyae and Htanpinmott villages, there are 500 and 115 households respectively and about 30 households form each village make lotus fiber. The other residents from these villages depend on fishing and working as seasonal labor on sowing and harvesting times in rice farms. One of the villagers from Innma introduced lotus fiber extraction technology in 2008. He met an Inn people from Inle and was interested in this business. So he invited 20 people from Inle who know how to extract from lotus fiber to distribute the technology in this area (Field survey).

Good quality fibers **Poor quality fibers**

Figure 4: Comparison of lotus fibers from Innma

3.4.3 Wetthe Lake in Salin Township, Magway Region

Wetthe Lake is situated in the West of Salin Township in the Minbu District of Magway Region, beside Salin to Say-Toke-Tayar highway. It was built by King Naya Pati Sithu during the Bagan Kingdom in 1194. Wetthe Lake is closed to 5 village groups, Anauk-Kan-Taung, Aout-Hline, Tamar-Pin-Chaung and Sin-Kyoune. Its area is 1.7 square miles (1088 acres) and one pagoda is located in the center of the lake. There are over ten residential villages along the lake and eight villages (Kanbaung, Wonpyae, Magyigone, Shanywargone, Sinkyone, Ywarthit, Tamarchaung and Ngarlinban) make fiber from lotus stem since seven years ago. Around 2010, people from Inle Lake visit Salin Township to pilgrim the pagoda. They taught Salin people how to produce lotus fiber stem. From that time, Salin people commercially produce lotus fiber. The village groups around the lake are commercially producing lotus fiber. There are ten commercial producers in Salin Township. Padon-ma-kya is growing around the lake and the peak season is around rainy season. During the winter, the availability of Padon-ma-kya is usually lower than normal because of pest and weather condition (Hlaing T. , 2016).

3.4.4. Inle Lake in Naung Shwe Township, Shan State

Inle Lake is one of the famous lakes in Myanmar. It is situated in Nyaung Shwe Township, Southern Shan State. The total area of Inle Lake is 63 square miles and 2900 feet above sea level (Hlaing C. S., 2016). It is a huge freshwater lake on which 70,000 people are depending. Inle Lake is fairly shallow and most of its area is cover with reed. There are eight different ethnic groups living around Inle Lake and the largest ethnic group is Inn-thar. Each group have their own cultural traditions and the most distinctive is their traditional foot paddling (Sarah Shaw, 2013; Kennedy, 2016). The houses in Inle Lake are stand above the surface of water and boats are mainly use for transportation (Hlaing C. S., 2016). Inle people make their living by farming on the water surface or nearby land, gardening, livestock breeding, fishing and boat driving for tourists. Other business includes traditional handicraft such as weaving, lotus fiber extraction, creating silverware and so on (Hlaing C. S., 2016). Most people in Inle Lake are Buddhism and have natural affection for the lotus plant (Sarah Shaw, 2013; Kennedy, 2016).

Padon-ma-kya is the important signature of Inle Lake. It grows naturally in the water. Padon-ma-kya is most abundant in Kyaing-Khan and Inn-Paw-Khon villages. The ancestors believe that lotus is the scared and bring good luck to people. Lotus plants have been used to make Buddha statue and lotus robe for the monk. There are two villages in Inle Lake where lotus fiber are weave, Kyaing Khan and Inn Paw Khon villages. Kyaing Khan is the very first place in Inle where lotus weaving was started (Myat Taw Win, 2017).

3.4.5 Salin Natural Lake in Salin Township, Magway Region

Villagers from Shan-Kone village, Salin Township produce raw lotus fiber from the Salin Natural Lake over last two years. Inn-Tharr (people who live in Inle) rented a house at their village and produced lotus fiber. They taught from Inn-Tharr and started to produce raw lotus fiber by themselves and export to Inle region (MWD, 2014).

3.4.6 Kan-Gyi-Daunt Lake in Tesel Township, Saging Region

Lotus fiber was produced from Kan-Gyi-Daunt Lake, Ywar-Shay village, Tesel Township, Saging Region. Raw lotus fibers are exported to Inle, Taunggyi in order to use in weaving robe, bags and clothes (Khine, 2016).

3.5 Processing Steps of Lotus Fiber Documented by Local and International Observer

3.5.1 Collecting lotus stems

Inle Case Study

From June to November, rainy season in Myanmar is the best season when lotus plants are fully thriving and abundant (ASK, 2017). It is because the level of water has effect on the lotus growth (Myat Taw Win, 2017). All kinds of lotus stems are used, either stems with flower or stems with leave (Myat Pwint Chel, 2017). In the past, wild lotus stems are collected. At the present time, lotus stems are collected from own plantation (Myat Taw Win, 2017). It only needs one time to grow lotus plants and become several plants after one year. Mya Pwint Chel traditional shop only use stems from pink lotus which is either young or old. Mya Taw Win shop only use young lotus, stem with small leave which float above the water, and is the best for fiber extraction. The collectors used canoe or small boat to harvest the lotus without harming the the plant to conserve the lotus (Moyadi, 2017). Collection of stems is done by hand plucking from the root of lotus plant which encourages the lotus growth. (Myat Pwint Chel, 2017; Myat Taw Win, 2017).

Lotus stem collectors, mostly man, might be owner of lotus plantation or workers from tomato plantation or people who do not have own plantation. The collectors also do other work, fishing or farming after the lotus collection season. One collector can get 7 to 15 bundles of lotus plants per day depending on the density of lotus plantation (one bundle contains around 180-200 lotus plants). After collection, the stems are soaked in water for two nights to get strong filament and prevent from drying (Myat Pwint Chel, 2017; Hlaing C. S., 2016). It should not exceed two nights for water soaking and the fiber must extract within 10 days after collection (Hlaing C. S., 2016). Before extracting fibers, spikes on the stems are cleared by sackcloth or small knife not to hurt the extractor (Myat Taw Win, 2017; Hlaing C. S., 2016). The stems are re-bundled after clearing the spikes and put vertically to seep off the water (Hlaing C. S., 2016).

Sunn-Ye Inn case study

Lotus stems are usually collect in the early morning around 5 am and finish around 10 am. The main collectors are man and collect the lotus stems every day. The peak season for lotus stem collection is the rainy season and the lowest season is the cold season. They only collect the lotus stems of young lotus which does not have flower and which have leaves floating over the water. The villagers collect the lotus stems by cutting which they believe that cutting lotus stems is the most sustainable way to collect the stems because lotus stems regrowth after two days. By cutting the stems, lotuses are more abundant in Sunn-Ye Inn and they can collect the stems throughout the year. However, raining season is the most favourable of lotus fiber production and winter

season is the less production season. The villager said people from Inle lake pluck the lotus from the root and it can slower the lotus growth rate. After cutting the stems, lotus leaves are throw into the water to provide nutrient for water. Therefore their cutting practice is more better than the rooting practice (Villager, 2017).

Innma case study

Lotus stems are usually collect in the early morning and the collectors are mostly the men. By cutting the stems, they collect the lotus stems every two days in the same place because lotus stems regrowth after two days. Therefore, the can collect the stems throughout the year. The peak collection season of lotus stem is from July to November and the lowest is from January to April. Mainly, they only collect the lotus stems of young lotus which does not have flower and which have leaves floating over the water.

Wetthe case study

Lotus stems are usually collect in the early morning and the collectors are mostly the women. By cutting the stems, they collect the lotus stems every two days in the same place because lotus stems regrowth after two days. Therefore the can collect the stems throughout the year. However, the summer and rainy seasons are more favourable than winter season. In winter season, the water temperature is cold and the fiber content of lotus plant is less. Moreover, there is aphid infestation on the plants in winter season. The aphid infection causes the leaf become dry and eventually the plant will die. The lotus stems contain the most fiber content in February and March. Mainly, the collectors only pull the stems of young lotus which do not have flower and which have leaves floating over the water. After cutting about 15-20 lotus stems which have 5-6 feet in length, the stem collectors usually make a bundle. Most of the stem collectors remain the leaves inside the lake to save the time. But in Salin Township, lotus leaves are used as a major packaging material for flower, meat, fish and food, etc. They have also been sold for 300-500 kyats for 100 leaves. The price depends upon the size of the leaves. Therefore, some people cut only the leaves and sell to food sellers.

Figure 5 : Lotus collector women from Wetthe lake

3.5.2 Producing lotus fiber

After harvesting, the lotus leaves and stems are separate. Only lotus stems are used for fiber production. Leaves are used for other purposes such as packing and decorating food. Lotus stems are clean with water after picking up. Lotus stems are wrapped with water soaked towel all the time to prevent from drying. Two to three pieces of stems are put together on a small table and rolled with hand to get threads. All the threads are combining together with spindle (Ashin Jawti, 2016; Hlaing T. , 2016).

A bunch of four to five lotus stems are taking at a time to strip. The outer parts of the stem which is about three cm (centimetres) from the end is carefully cut with a small knife and gently pulls apart to get fiber. These raw fibers are half meter long and all of them are rolled together on a damp board. The process is repeated again and again by adding more fibers. In order to join one piece of thread to another, about ten cm long thread is leave at the end of the board and rolled together with the next fibers bunch to get a long thread. The thread is spun by hand on the spinning wheels which is made from old bicycle bits. Lotus threads are colour with various natural dyes and dry by hanging out over the lake (Kennedy, 2016).

Lotus fibers are porous and water is used to twist and roll them together. Lotus fibers are washed again with water after spinning. The natural colour of lotus fiber is greyish yellow or pale yellow with different colour variations along the thread (Sarah Shaw, 2013; Green with Renvy, 2014).

The stem from the Padon-ma-kya is cut into an inch length and extract all fiber with patience. All the fibers are gathered by loom and tied together as a pack. One pack weight 8 grams. Raw fiber is dry under the sun to maintain the natural colour (Khine, 2016).

The stem is scored lightly about 3 inches down from one end by using a sharp knife. Filament is extracted by twisting off the tip and gently rolled about two feet long on a wooden slab. This process

is repeated again and more fiber strands are rolled together. These fiber strands are joined and spun several times to get thick yarn. During the whole process, water is spread over the fiber to keep the moisture. Finally, the yarn is rinsed with clean water and naturally dried in open air in order to maintain the natural colour (Moyadi, 2017).

Inle case study

Women are the major fiber extractor in Inle Lake. In the past old days, fiber extractor must be single, unmarried women. Women avoid extracting fiber during their period. The extractor must clean herself and take the five Buddhist precepts before the fiber extraction. If not, she will not successfully extract the fiber which means that lotus fibers will be brittle and easily broken. Nowadays, married women are also extracting the fibers (Hlaing C. S., 2016). Women above 40 years of age are the skillful extractor (Myat Pwint Chel, 2017) and young women are work together as apprentices (Hlaing C. S., 2016). Three to five lotus stems are put together on a small wooden board, the stems are place on the left side of board and a tray or big deep bowl is on the right side (Myat Pwint Chel, 2017; Myat Taw Win, 2017). It is not easy to break the stem by hand. Thus why, a small sharp knife is used to break the stem by making a small cut around it (Hlaing C. S., 2016). All the lotus stems are pulled and twisted apart to extract the fiber (Hlaing C. S., 2016; Myat Taw Win, 2017; Myat Pwint Chel, 2017). The fibers are stick on the wooden board and rolled together with hand to get a long fiber thread. After the fiber extraction, the empty stems are thrown into the water to use as a natural fertilizer for lotus plants (Myat Pwint Chel, 2017).

Sunn-Ye Inn case study

Women are mostly participate in the lotus fiber production. Lotus fiber extractor can be any ages between 5 and 50 years. Students also work for lotus fiber extraction after school time, weekends and holidays. Lotus stems are clean with water after picking up. All the stems are wrapped with water soaked towel for the whole day to prevent from drying. One lotus stem is around 2 feet. Each stems are cut into 4 inches long pieces to hand pull the fiber. Four to five pieces of stems are put together on a small table and cut with a small knife to extract lotus fiber. All the fibers are rolled with hand to get threads and make lotus yarn by using spindle (Villager, 2017).

Innma case study

Fibers are extracted within one day after cutting the lotus stems. Women mostly participate in the lotus fiber production. Lotus fiber producer grabs about 4-5 stems together and cut about 2-3 inches of lotus stems with a small knife and pull out their spongy fibers on a wooden table. All the fibers are rolled with hand to get threads and the threads are spun as a lotus yarns. After the lotus yarns are dried for hours under the shade, they can be sold to the village collector. The entire process of fiber extraction and spinning it into yarn is completely handmade and making this process takes time. So, it limits the quantity produced.

Wetthe case study

In Wetthe area, both stem collection and fiber extraction are mainly occupied by women. Extraction method of the lotus fiber is nearly the same as Imma area but the extractors from Wetthe area are more systematic and have more efficiency. The extractor grabs a whole bundle including about 15 lotus stems and cut about 2-3 inches by using the small and long saw that is tied on fiber extraction wooden table (see in Figure 5). Normally, the extractors can produce about 17 grams of lotus fiber from 35 bundles of lotus stems. To get this amount of lotus fiber, they have to take time 2 hours for stem collection and 3 hours for fiber extraction. Based on their experience, if the lotus stem are extracted fiber in the next day after cutting, they can get more fiber.

Lotus fiber extractor

Cutting lotus stem using small and long saw (Wetthe lake)

Wooden board

Lotus Yarn

Figure 6 : Extracting lotus fiber

3.5.3 Quality management on the lotus stem collection an fiber production

3.5.3.1 Stem Collection

The ideal stem for the fiber production in all study area is young pink lotus which has leaves floating over the water and does not has flower. Although lotus stem can collected throughout the year, stem collector prefer to collect during the rainy season which is the peak season for lotus plants and rich in fiber. Some sites also said summer but winter season is not good for lotus stem which is agreed by almost all sites. Most of the collector prefer to collect in the morning because they can do other work in the afternoon and less tiring than other day time. After collecting the stems, it is important to soak in water to prevent from drying. Each study sites have their own schedule for water soaking. Some sites collect stems for more than one day and some are not. For example, Sunn-Ye Inn collect stems for daily use and extract the fibers within a day. But in Wetthe Lake, they prefer to extract in next day after collection. Therefore, it is depending on the collector preferences on stem collection and the only important thing is it must be Padon-ma-kya and the collected stem needs to maintain the moisture for the whole process.

3.5.3.2 Fiber Production

The technique for producing lotus fiber only require simple material, a sharp knife and wooden board but the extractor need skills and to be fast in cutting and extracting fiber from the stem. The

most important thing is both fibers and lotus stem need to keep the moisture all the time. If not the extracted fiber will not be strong and can disrupt the weaving. Lotus fiber was extracted by rolling on a small wooden board and after rolling several times, the wooden board become wet and it darkens the lotus fiber colour or makes it dirty. After finishing with fiber extraction, it is require washing with water and sundry to sell. Finished lotus fiber can keep in an air tight container up to two months. But the fiber extractor does not know or tested about how long they can keep the fibers. According to field survey and interview from Inle weaving centers, some fiber seller added cement particles in lotus fiber thread to gain more weight in selling. There is also some fiber seller who does not properly clean the fiber. Unlike lotus stem collection, it is very important to get the qualify fiber which is clean and strong to make lotus products.

3.5.4 Weaving and producing final products

3.5.4.1 Lotus fabric

All the fiber threads are pulled down onto the tray/bowl one by one to become layers which makes it easy to roll up as a lotus fiber skein, Figure 6 (a) (Hlaing C. S., 2016). All the lotus fibers are extracted and spun under the shade. The threads are clean with water before drying under the sun, Figure 6 (b) (Myat Pwint Chel, 2017). After drying, lotus threads are spun with the traditional spinner to get reel, Figure 6 (c). The quality is depending on the skills of the extractor to get fine or coarse thread. It takes more time to get fine thread, which is smooth and favor by weaver (Hlaing C. S., 2016). Lotus threads are applied with traditional glue, which is obtained from rice, to make it strong enough to weave. Before weaving, glued threads are rubbed with wax, prepared as a clutch and put in the traditional loom to get ready, Figure 6 (d). Raw lotus scarf is formed cutting the lotus fabric from the loom, Figure 6(e). This raw scarf is tough and hard, so it needs to clear defects and washed to make it soft. After that, fridge is added and natural dye is used to produce marketable scarf. A lotus fabric comes only in original lotus colour (Myat Taw Win, 2017).

(a) Lotus threads

(c) Drying lotus yarn

(b) Spinner (to form reel)

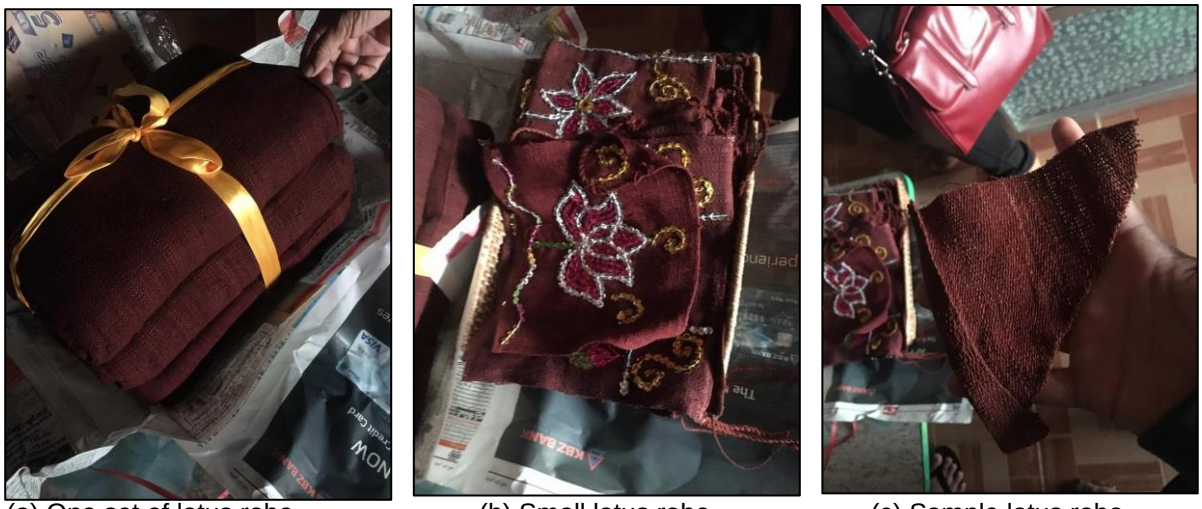
(d) Traditional Loom

(e) Raw lotus scarf

Figure 7 : Preparation for lotus fiber weaving in Inle

3.5.4.2 Lotus robe

Weaving a lotus robe is not easy work; it needs hard work, time and money. From 12 to 14 stages are requiring in producing a set of lotus fiber robe. Natural dye is used to get the colour suitable for the monk (which is reddish). Lotus fiber robes are usually offered to Buddha/Monk at Kathina ceremony (around Novemeber) and Waso Robe-offering ceremony (around July). One lotus robe set would use 3 to 5 kg of raw lotus fiber, around 200 thousand lotus stems, cost around 700 $ for fiber only and takes 20 to 45 days to weave. Because of higher original price and fewer buyers, only few shops sell lotus robe (Hlaing C. S., 2016; MWD, 2014). Some shops have small size lotus robe for Buddha and sample lotus fabric, from which customer can order by looking at the sample Figure 7 (ASK, 2017)



(a) One set of lotus robe (b) Small lotus robe (c) Sample lotus robe

Figure 8 : Lotus robe (a) One set of lotus robe, (b) Small lotus robe and (c) Sample lotus robe

3.6 Waste Management

3.6.1 Lotus Plant

As lotus stems are only use for fiber production, other part such as leave is removing from the stem. Stem collector cut the leave and sells at the local market near them because lotus leaves are used to pack food, meat and fish etc in most parts of Myanmar. If there is no market demand for lotus leaves or far from the local market, lotus leaves are throw into the water to provide nutrient for water and plants (Villager, 2017). The extracted stems are also throwing into the water for the same purpose.

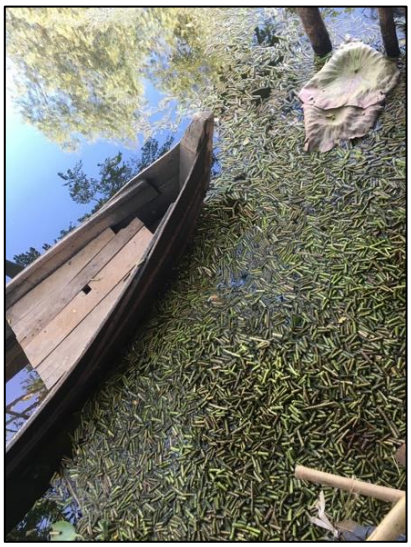


Figure 9: Extracted lotus stem pieces

3.6.2 Lotus fiber

In Inle Lake, the excess pieces of lotus fiber were just keeping by the weavers or owner of weaving shops.But Ms.Phyu Ei Thein, founder of Sunflowers Group Social Enterprise, collected them and reuses as a lotus fiber painting. According to Ms. Phyu Ei Thein, the fiber extractor, weavers and shop owners have one tradition that is they offer candle light to the Buddha by using the very first lotus thread as a candle wick before weaving. So, she recommended the weavers and shop owners to reuse as candle wick. But they refuse to do it because they prefer to use the very first fiber. Ms. Phyu Ei Thein tries to collect excess lotus fiber pieces as much as she can to reuse because she value the weavers and the lotus plants.

3.7 Cost on raw lotus fiber, labor and finished products

3.7.1 Price of raw lotus fiber based on location source

In Salin Township, One gram of raw lotus fiber is from 1100 to 1350 kyats, one worker can get 3000 kyats per day (MWD, 2014). The price of lotus fiber in Salin Township is 380,000 kyats for 1.63 kg. The stem collectors get two thousand kyats per pack which contain 400 stems of lotus. The fiber drawers get 1000 kyats per pack. One pack can draw up to 2 grams of fiber. The price of lotus fiber is 2 lakhs per 1.63 kg in Tesel Township (Khine, 2016). The prices of raw lotus fiber are described in Table1. The amount of raw lotus fiber is converted from Viss which is Myanmar unit of measurement to kg International Unit. The lotus fiber prices were varied by quality which is based on production area and year.

Table 1 : Price of raw lotus fiber based on location source

No.	Price (USD)	Unit (kg)	Year	Source of raw material
1	136	1	2013	Inle, Taunggyi
2	182	1	2016	Inle, Taunggyi
3	227	1	2017	Inle, Taunggyi
4	99	1	2014	Salin, Magway
5	172	1	2017	Salin, Magway
6	91	1	2016	TeSel, Sagaing

Source: Inle- (Hlaing C. S., 2016)
Salin- (Hlaing T. , 2016) ; (MWD, 2014)
Tesel- (Khine, 2016)
Note : Price is exchange from Myanmar Kyats to US Dollars (1$= 1350 kyats)
Unit, 1kg= 0.61 Kyat Tharr (Myanmar weight measurement)

3.7.2 Labour and material cost estimation for producing lotus scarfs

There are three types of worker in Inle, daily-wage worker, piece-worker and apprentice. Lotus stem collector can be daily-wage or piece worker depending on the ownership of boat. Fiber extractor and weaver are piece-worker. Apprentice can earn small money and snacks from the loom owner. Different wages for stem collector in Inle, based on boat load of lotus stems, are around 1$ (2012,2013), 4.5$ (2014, for hard worker), 3$ (2016) Within one night, they can extract between 30 and 50 grams of fibers from 1000 lotus stems. From a boatload of lotus stems, they can extract 246 grams of fiber and it takes three days to finish it (Hlaing C. S., 2016). Mostly, the stem collectors gather and extract fiber by themselves. Only few collectors sell the stems.

The workers prefer to sell lotus fiber than stems because they can earn more money. One weaver can earn 2$ per day. (Mya Taw Win, 2017). In Salin, average daily wages per person for lotus fiber production is from 2$ to 7.4$ as a home business (Hlaing T. , 2016). In Sunn-Ye Inn, rainy season is the best season for lotus fiber collection and got the highest price. One worker can produce 3 to 5 grams and earn 4.6$ to 7.7$ per day. People who don't have boat can also participate in the lotus fiber production process but they have to share the money with the stem collector into 50:50 ratio (Villager, 2017).

In Wetthe area, one extractor can produce 33 to 50 grams per day. The current price of lotus fiber is about 120 kyats per gram. In previous years, the price of lotus fiber was about 180 to 250 kyats per gram. At that time, the extractors could earn over 8000 kyats per day. But they earn only about 5000 kyats per day at current low price. The daily wage of farm labor is about 1500 to 2700 kyats for women in this area. From this area, over 250 kilograms of lotus fiber are produced monthly in average. For Innma, one extractor can produce 15 to 33 grams per day and earn 140 kyats per gram. The daily wage of farm labor is about 3000 kyats for women in this area. People who don't have boat can also participate in the lotus fiber production process but they have to share the money with the stem collector into 50:50 ratio. Other part-time jobs can earn around 2$ to 5$ depending on the work load (Mya Taw Win, 2017).

Weaving center in Inle region buy and weave lotus fiber from other places. They do lotus fiber extraction process just for demonstrating the tourist. They buy lotus fiber from Taunggyi or some seller come to their place. Although other type of work for making lotus scarf require skillful labour, clearing the defects from the raw lotus fabric or scarf can be done by shop owner's family members or sales girl at the shop. They usually clear the defects during their spare time or at night when the shop is close. So, it is not very common to give money for clearing the defects from raw lotus scarf. The price shown in Table.2 is calculated based on the information from shop owner of Mya Taw Win.

Every shop in Inle has to pay commission fee for selling products. They have pay 20% to the boat driver and another 20% to the tourist guide for bring customer to their shop (Mya Taw Win, 2017). This added the price of each product in Inle, especially for the luxury items. Moreover, these shops are located at their house, they do not need to pay money for renting room or house.

No other material cost is needed for lotus fiber and scarf production. For lotus fiber production, the extractor only need small wooden board, small sharp knife and tray. All these materials only cost very little amount of money or even use their own household items. Same with the lotus weaving, the weavers can use their traditional weaving machine, which they already use it for weaving cotton and silk. If it is to start the weaving business for the very first time, the initial cost is for buying or making traditional wooden weaving machine which cost around 148$. Some large shops in Inle also disburse for the weavers to buy weaving machine and the weavers pay back with their work. Spinning machine is also their traditional machine and can create it by using old wheel from bicycle. The glue, which makes the lotus fiber strong enough for weaving, is obtained from rice. Therefore, no other material is added in the cost estimation (Table 2).

Table 2 Estimation cost, retail price and profit for producing lotus scarves

No.	Type of Work	Time Spent	Quantity of lotus fiber (Kg)	Cost (USD)	
				With own lotus fiber	Buy lotus fiber from others
1	Stem collection	0.5-1 day	1	7.4	-
2	Fiber extraction	21	1	159	-
3	Lotus fiber	-	1	-	204.5
4	Spin to get reel (1st time)	4 days	1	4.5	4.5
5	Applying glue on the yarn	0.5-1 day	1	2.3	2.3
6	Spin to get reel (2nd time)	0.5-1 day	1	2.7	2.7
7	Preparing Clutch	0.5 day	1	7.4	7.4
8	Weaving	3 days	1	22.2	22.2
9	Clearing the defects	2 days	1	29.6	29.6
10	Adding fringe	0.5-1 day	1	2.2	2.2
Total Cost				237.3	275.4
Total Number of Scarf (72×8 inches)			1	10	10
Retail Price Per Scarf*				23.7	27.5
Average Retail Price Per Scarf				80	80
Commission fee (20% each to boat drive & tourist guide)				36	36
Estimated Profit Per Scarf				20.3	16.5

Note: *The retail price of scarf is estimated for original pure lotus without dye.
Source: Researcher's estimation based on the field survey in Mya Taw Win, Inle.

3.7.3 Price of Lotus fiber final products

Based on the online data, these are typical lotus fiber products in Myanmar, 1) Shawl, 2) Fabric, 3) Belt, 4) Bag, 5) Blanket, 6) Robe, 7) Longyi, 8) Shirt and 9)Tapestry Hanger. The detail information is shown in Table 3. The highlighted prices, which are from Myanmar Online shop, are converted from Myanmar Kyats to US Dollars. Most online shop from Myanmar did not include size information on their page. They only mentioned the general price for example, around 100$. Only Nandawun Online Shop (NDW OS) describes the price in US dollars and size information. In Inle lake, the price of pure lotus scarf is ranging from 45$ to 600$, lotus mixed with silk is from 30$ to 90$, shirt is above 100$ and lotus fabric is 154-220$ per meter, Figure 8. (Myat Pwint Chel, 2017; Mya Taw Win, 2017; ASK, 2017).

Pure lotus scarf Mixed scarf with lotus & silk

Figure 10 : Lotus scarves from Inle

Table 3 : Price of lotus fiber products in Myanmar (online search)

No.	Product Type	Material	Size	Price (USD)	Date	Source*
1	Shawl (small, muffler)	Pure Lotus	19×198cm	135	Dec,2017	NDW OS
2	Shawl(medium)	Pure Lotus	32.5×176cm	270	Dec,2017	NDW OS
3	Shawl(Big)	Pure Lotus	66×205cm	480	Dec,2017	NDW OS
4	Shawl (Small)	Pure Lotus	-	100	Oct,2017	ISL OS
5	Shawl (Big)	Pure Lotus	-	147- 293	Oct,2017	ISL OS
6	Shawl	Pure Lotus	12"×80"	150	Nov,2017	SCLC OS
7	Shawl	Pure Lotus	-	44-59	April,2017	FB User

8	Shawl	Pure Lotus	11.8"×70.9 "	251.45	Dec,2017	CF OS
9	Shawl	Pure Lotus	19"×72 "+1.5" fringe	405	Dec,2017	C&P OS
10	Shawl	Pure Lotus	12"×72"+2" fringe	211.42	Dec,2017	C&P OS
11	Shawl	Pure Lotus	12"×72"+2" fringe	405	Dec,2017	C&P OS
12	Shawl	Pure Lotus	20"×78"+2" fringe	405	Dec,2017	C&P OS
13	Shawl	Pure Lotus	19.5"×72"+2" fringe	405	Dec,2017	C&P OS
14	Shawl	Pure Lotus	20"×72"+3" fringe	405	Dec,2017	C&P OS
15	Shawl	Pure Lotus	20"×72"+2" fringe	405	Dec,2017	C&P OS
16	Shawl	Pure Lotus	19"×72"+1.5" fringe	405	Dec,2017	C&P OS
17	Shawl (Small)	Pure Lotus	6"	100	May,2017	MWD
18	Shawl (Big)	Pure Lotus	9"	147	May,2017	MWD
19	Shawl	Pure Lotus	9-10"×56-60" 15"×57-60" 50"×72"	371-1125	Dec,2017	MYD OS
20	Shawl (Small)	Lotus & Silk	-	5.5	Nov, 2017	SCLC OS
21	Shawl (Medium)	Lotus & Silk	-	70	Oct,2017	ISL OS
22	Shawl (Big)	Lotus & Silk	-	92	Oct,2017	ISL OS
23	Shawl	Lotus & Silk	14.5"×70"+2" fringe	188.91	Dec,2017	C&P OS

24	Shawl	Lotus & Silk	17"×70"+3" fringe	195.94	Dec,2017	C&P OS
25	Shawl	Lotus & Silk	15"×70"+3" fringe	211.77	Dec,2017	C&P OS
26	Shawl	Lotus & Silk	13"×72"	337.5	Dec,2017	MYD OS
27	Shawl	Lotus & Silk	26"×78"	562.50	Dec,2017	MYD OS
28	Shawl	Lotus & Silk	34×166cm	165	Dec,2017	NDW OS
29	Shawl (mix with pink)	Lotus & Silk	39×180cm	165	Dec,2017	NDW OS
30	Shawl	Lotus & Silk	36×190cm	165	Dec,2017	NDW OS
31	Shawl	Lotus & Silk	36×188cm	195	Dec,2017	NDW OS
32	Shawl	Lotus & Silk	40×166cm	165	Dec,2017	NDW OS
33	Shawl	Lotus & Silk	34×166cm	165	Dec,2017	NDW OS
34	Lotus Fabric (Small)	Pure Lotus	Width-45cm	165	Dec,2017	NDW OS
35	Lotus Fabric (Big)	Pure Lotus	Width-63cm	201	Dec,2017	NDW OS
36	Lotus Fabric	Pure Lotus	1 meter	318	April,2018	Samatoa
37	Lotus Fabric (80% Lotus)	Lotus & Silk	1 meter	190	April,2018	Samatoa
38	Lotus Fabric (50% Lotus)	Lotus & Silk	1 meter	145	April,2018	Samatoa
36	Belt (2 way, belt and bag with tapestry)	Pure Lotus & Tapestry	Belt-130cm Bag 13×13cm	27	Dec,2017	NDW OS
37	Belt	Pure Lotus	Length-176cm	45	Dec,2017	NDW OS
38	Bag (with tapestry elephant)	Pure Lotus & Tapestry	18×29cm	57	Dec,2017	NDW OS
39	Robe	Pure Lotus	-	1614	Dec,2017	ISL OS

40	Robe	Pure Lotus	-	1467	Oct,2017	MMDN
41	Robe	Lotus & Silk	-	330	Oct,2017	MMDN
42	Robe	Pure Lotus	-	1174	Nov,2017	Personal Blog
43	Longyi	Lotus & Silk	72"	110	Oct,2017	ISL OS
44	Shirt	Pure Lotus	-	330	May,2017	MWD
45	Tapestry Hanger	Lotus & Tapestry	100×90 cm	165 195 231 135	Dec,2017	NDW OS
46	Tapestry Hanger	Lotus, Tapestry, Teak	75×75 cm	120	Dec,2017	NDW OS
47	Lotus SPA Eye Mask	Lotus, Silk, Herbal		99-74.25	Dec,2017	MYD OS

Note: Source*

1. NDW OS - Nandawun Online Shop
2. ISL OS - Inle Silk & Lotus Online Shop
3. SCLC OS - Silk, Cotton & Lotus Clothe Online Shop
4. FB User - Facebook User
5. CP OS - Counting Flowers Online Shop
6. C & P OS - Cashmere & Pearls Online Shop
7. MWD - Myawaddy (Myanmar media on facebook)
8. MYD OS - Moyadi Online Shop
9. MMDN - MMDigitaNews.com (Myanmar Webpage)
10. Samatoa - Samatoa Lotus Textiles Website

Units: Price are exchange from Myanmar Kyats to US Dollars (1 $=1350 Kyats)

3.8 Lotus processors, training program and contact address of wholesale and retail shops

3.8.1 Lotus processors

Moyadi

Moyadi is an ethical brand which sells the pure lotus fiber products. It begins as a forum to explore the role of ethical brands in social and economic transformation. The profit from the Moyadi is aim to benefit the society which include the promotion of equitable and sustainable development and economic growth. They sell lotus shawl and lotus spa mask all over the world (Moyadi, 2017).

Counting Flowers

Counting Flowers is a social enterprise which leads to improve the communities and the environment. Social enterprises are mainly focus on social impact rather than profit. It was founded by Elike van Sluis from Netherlands in 2010. In 2007, she travelled around the world with her husband and searched the beautiful scarves. They noticed that scarves are made by poor artisans, especially women, with simple devices at home. Raw materials for scarves are obtain from natural plants. The artisans can work and earn extra income at home without leaving the family. It takes a lot of time and effort to get one scarf. So, they come up with the idea to improve the livelihoods of artisans in developing countries by working with them.

They mainly work with artisans who are independent small entrepreneurs or employed at the Fair trade organization or member of a cooperative. Counting Flowers do not donate money to artisans. They help artisans to make money by themselves. Counting Flowers is offering unique, handmade and fair trade scarves at a reasonable price. Counting Flowers is currently working with 17 artisans, weaving cooperatives and Fair trade organization from 13 countries. Counting Flowers only buy scarves from artisans where there is no forced labour, child labour or discrimination in weaving. They try to knows and visit the artisans as much as they can.

To offset CO2 emissions, Counting Flowers also support tree planting and sustainable energy projects in developing countries. They only buy scarves which are made from natural products and produces in an environmentally friendly way. Firstly, they buy samples from distributors or dealers and trace the talented, creative and reliable artisans. If possible, they directly order samples from the artisans. They proceed to order large quantities after confirming the quality of samples and purchase from the customers. Some artisans working with Counting flowers produce eco-labeled scarves and shawls, free of chemical or artificial fertilizer.

All the profit goes to girl's education project in developing countries. The artisans get 50% and 15% is for delivering the products to the buyer. Counting flowers used 100% of profit to finance education projects in developing countries. They support two foundations, Young Focus Foundation and WEAVE Foundation. From 2011 to 2014, all the profits were financed for Young Focus Foundation and they equally financed Young Focus and WEAVE Foundations in 2015 and 2016. Young Focus Foundation support the education of children living at Manila's largest garbage belt Smokey Mountain. WEAVE Foundation support women, girls and small children living in refugee camps, located near Mae Hong Son in the mountainous northwest of Thailand, along the Thai-Myanmar border. WEAVE offers Women Study Programs for girls in the camp to study women rights, community development, English language and computer training. Counting Flowers contribute financially for a two-year training of WEAVE which include sixty girls in the age of 16 to 21 (Counting Flowers, 2011).

Samatoa

Samatoa was founded by Awen Delaval, an ecotextile designer, from French. He got an idea to develop natural textiles industry in Cambodia during his trip to Asia. He recognized the lotus fiber robes from Burmese monks in 2009. He set up his own laboratory in Siem Reap home to research the perfect lotus to create unique lotus flower fabric. In 2003, Samatoa established the foundations of a solid fabric composed of the best experts in bio-textiles and ethical fashion. Samatoa is a social textile enterprise focusing on the values of fair trade and sustainable development to create an alternative to the textile industry. Samatoa supported to restart the endangered lotus weaving in Cambodia.Creating the greenest and most innovative textile in the world, Samatoa was

recognized in 2012 by the UNESCO Prize for excellence for its unique lotus flower fabric. Its unique lotus, silk, kapok and banana based fabrics are becoming increasingly popular amongst international designers in ethical fashion and luxury industries. Samatoa is responsible for the manufacturing processes from beginning to end – from yarn to finished product – with no intermediaries or outside providers which ensure the quality of their products. Samatoa has over 10 years experiment with local natural fibers such as lotus, pineapple, banana, water lily, romchek, kapok, papyrus, palm, silk, coconut, water hyacinth, and rice leaves. They developed expert team including spinners, weavers, seamstresses and designers following traditional Cambodian methods and 100% ecological and handmade process. From Samatoa's lotus flower fabric industry, 30 vulnerable Cambodian women emancipated and supported for women empowerment. Their enterprise is trying to support Cambodian people by providing long lasting employment for women, educating lotus farming to poor communities, paying people fairly (living wage as well), considering labour rights (including paid leave, health insurance), treating respectfully along with their sustainable fashion business. Samatoa is basically rely on ecofibers which is best for social, environmental and economic practices. Today, the demand is soaring and the company must support its growth to achieve sustainable development. Samatoa wants to win market shares by responding in priority to requests for lotus flower fabric and create the necessary leverage to sustain its overall growth. Currently, Samatoa is working with 8 partners and their clients are from USA, Canada, France, Germany, Hong Kong and Singapore (Samatoa, 2016).

Sunflowers

Sunflowers group is a social enterprise which aims to promote the art market and textile products of Myanmar. Since 1994, Sunflower was started as family business, that is Art Gallery and Art Class, which is run by Artists Maung Maung Thein and Chaw Ei Thein, and textile artist Phyu Ei Thein. They become a social enterprise group in 2013. In 2004, Phyu Ei Thein begins the textile manufacturing by cooperating with local hand-loom weavers and weaving schools. The major focus of sunflowers group is to value ethical work and sustainable fair trade in Myanmar. Their products are made from lotus, silk, cotton and Myanmar Cheik. They also collect products from Amarapura, TaungGyi, Kyauk Me, Mon Ywa, ShweTaung, Kyee The, Inn Ma, Myit Kyi Na, Inlay, Nyaung Shwe and Paungde to sell in Myanmar, Japan and abroad. Sunflowers group also have their own weaving studio, Sunflowers Organic Dye Weaving Studio, in Nyaung Shwe. They started the weaving studio in 2015 and working with 15 professional weavers, 3 production staffs and 3 office staffs. In 2016, they open one weaving studio, called Mae Latma, in Paung-de Township, Pyay District. There are 6 weavers and 1 manager in Mae Latma. The aim of Mae Latma is to revive once famous Paungde cotton mosquito net fabric weaving, and to generate income for local women with their quality textile products. Every year, sunflower groups also participate in textile & crafts exhibitions in Myanmar and Japan.

3.8.2 Training programs for lotus fiber production

A weaving school is located near the Inle Lake. Daw Khin Win Kye, the master weaver is the head of the school. She and her husband moved to Inle Lake region to help the school. She teaches the weaving and her husband teaches the natural dyeing process. This school is run by donations from the NGOs (Non-Governmental Organizations). The tuition and hostel fee is free for every student. All the students are girl around sixteen years of age who already learned the basic weaving from their mothers or grandmothers. Students can learn the advance weaving, such as lotus silk weaving and making intricate patterned i kat fabrics, and natural dyeing process. The aim of the weaving school is to improve the skills of weavers and help to open the own shop (Moyadi, 2017).

3.8.3 Contact address of organization, wholesale and retail shops of lotus fiber products

Based on the desk study, some contact address of wholesale, retail and organization related to lotus fiber industry in Myanmar are observed in Table 4 and photos in Figure 9.

Table 4 : Contact address of organization, wholesale and retail shops of lotus fiber products

S. No.	Organization/Individuals	Contact information (address)	Phone no. & email address
1	Khit Sunn Yin Lotus, Silk and Cotton Hand Weaving Centre	East Quarter near Inn Paw Khon Village, Inle	+95(0)95213689 Email: hninhnina@gmail.com Twitter@WanderShopper
2	Nang Mya Oo, Mya Set Kyar Lotus & Silk Fabric	Inn Paw Kone village, Inle	+95(0)9-521162, 081-209476, +95(0)9-5164177
3	Nang Mya Oo, Mya Setkyar Lotus & Silk Fabric	No.131(B) Shwe Wah Street, Nyaung Shwe Haw Gone Quarter, Taunggyi	+95(0)95211662, 081-24072, 081-22457
4	Ko Phoe Thar Htoo (Sale respondent)	Kyaing Khan Village, Inle	+95(0)9-785044890
5	Ko Than Hlaing Silk and Lotus Weaving	Inpawkhon Village, Inle	+95(0)95211891 Email: silkandlotusweaving@gmail.com
6	Ma Kyi Kyi Win Traditional Costume Shop	9, Main Road, Myolei Quarter, Nyaung Shwe	081-209667
7	Royal Palace, Silk, Lotus & Cotton Hand Weaving Center	Inle Lake	
8	Inle Treasure , Silk, Lotus & Cotton Hand Weaving Center	North Quarter Inpawkhon, Inle Lake	+95(0)9428371003, +95(0)936168442
9	Nandawun Myanmar Gems & Handicrafts Centre	No.55, Baho Road, Corner of Baho Road &	+(951)221-271,212-409 Fax(951)524-580

		Alone Road, Alone Township, Yangon	Email:mbcbook@myanmar.com.mm Website: www.MyanmarHandicrafts.com
10	National Museum	All counters/shops inside the building, Yangon	
11	Myanmar Textile House	No.429, kabaaye pagoda lane, corner of Thurathardi street and Shwewar street near Dragon Mountain hotel Mayangone Township, Yangon	+95(0)976762198, +95(0)966314569, +95(0)973506046 Website: www.myanmartextilehouse.com
13	Kyar Chi Trading	Salin	+95(0)9256094846
14	Inle Silk & Lotus Online Shop	Yangon	+95(0)9421164800
15	Counting flowers	UK	Countingflowers.co.uk info@countingflowers.co.uk +316 53 12 04 15.
16	Cashmere & Pearls	US	Facebook- Cashmere & Pearls Cashmere.pearls@gmail.com
17	Moyadi	US	customerservice@moyadi.com https://www.moyadi.com/
18	Myat Pwint Chel, Silk & Lotus Weaving	Inpawkhon Village, Inle Lake	
19	Mya Taw Win, Natural Dye, Silk, Lotus & Cotton Hand Weaving Center	North Quarter, Inpawkhon Village, Inle Lake, Southern Shan State	+95(9)254968720
20	Aung Sakkyar Lotus Robe Production, Co-Operative LTD Inle : Main Office		Email: nanlotus2@gmail.com, nyimalay.jp@gmail.com Website: www.lotusmyanmar.com

		Kyaingkhan Village, Nyaung Shwe Township, Southern Shan State	+95(9)5179505, +95(9)49360544
	Yangon Branch (1) Nan Ngwe Nyunt, Retail & Wholesale	Block(5), Room(7), 1st floor, Kan Street, Hlaing Myintmo Housing, Hlaing Township, Yangon, Myanmar	+95(1)507106, +95(9)5110913
	Taunggyi Branch (2)	No(82), Ngu war Street, Naungphyu Sakhan, Nya Mhay(3), Taunggyi Township	+95(9)428326965, +95(9)428329037
21	Sunflowers Organic Dye Textile & Crafts Shop	No. 54,1st floor, Shan Kone St (358.61 mi) Sanchaung Township, Yangon	+95(0)9450011956 Website : sunflowersgroup.org
22	Samatoa	Cambodia	Tel: +855 92 52 9001 / +855 12 28 59 30 Email: contact@samatoa.com www.samatoa.com

Figure 11 : Some lotus product shops in Inle

3.9 Export situation of lotus fiber in Myanmar

Myanmar does not yet systematically export its traditional fabrics and there are no official associations to promote the industry. It currently relies largely on tourists for small-scale revenues. The tourist hot spot of Inle Lake in Shan State is currently the only location in Myanmar where lotus fiber is extracted and used to create textiles on any significant scale. According to lotus fiber exporter from Inle, The fibers are majorly exported to China, Japan and Italy. Among them, China is the most. But export ceased since September 2017. In the year 2016, nearly 70% of export was to China and the other 30% was to Japan and Italy (Htoo, 2018). China and India import silk and cotton. Weaving centers in Inle purchase import fibers and products through Taunggyi. Traditional shops in Inle also sell Thailand products such as shirt, scarf and bags etc. The import products are directly imported to Mandalay which the economic capital of Myanmar. According to Phyu Ei Thein, tourists buy at the shop in Myanmar for personal use or to sell in their country. Sunflower Groups also confirmed that they exported some lotus based products to foreign countries but it just few. It is not huge export markets for them. They just sent the order item for customer. There is a France customer who bought Myanmar handmade rattan furniture since 15 years ago. In 2017, he started to buy other Myanmar handmade products like lacquered products, bamboo handicrafts and lotus fabrics, ect.. Nowadays, he can create a brand BAOLGI to distribute handmade products especially from Myanmar in Europe and U.S markets. In February 2018, CBI (Centre for the Promotion of Imports from developing countries) will arrange a show at Frankfurt to display handmade products form developing countries. He will display the Myanmar handmade products for the promotion of exports from Myanmar (Thein, 2018). Khine Jiu Jiu Lynn, sales manager at Khit Sunn Yinn, said that a product made from lotus bud is seven times more expensive than regular silk due to its many qualities, which include being naturally stain resistant, waterproof, soft to the touch, breathable and wrinkle-free. Myint Thein Htun, the owner of Khit Sunn Yinn, said that he is keen to export his products and has the capacity with 120 skilled workers, but fears a lack of quality control could be

a problem. “We can’t export our products because they’re hand-made. Customers want their textiles to be uniform, and we can’t guarantee that, particularly for the finishing and colors,” he said. He pointed out small imperfections in scarves, explaining, “A weaver can only use their eyes to see whether a thread has broken. If we were using machines, the machine would automatically stop when a thread breaks. Also, hand-woven mistakes can’t be fixed. Likewise, because we hand-dye the colors, we can’t ensure the colors are uniform.” Mr Htun added: “We could buy machines but this is a local industry and a lot of people would lose their jobs” (Mudditt, 2014). Moreover, Myanmar is still trying to produce products that has guarantee label such as eco-label, child-labor free and also labor rights is an important concern for the lotus fiber export to Europe. Although, some traditional shops in Inle sell lotus products with variety of colour, good packaging and also accept credit card payment, online selling to internationals customer is still undeveloped. Concern with the tax, payment system (commission fee to online payment such as paypal), shipping services, refund and return services are important for exporting industry in Myanmar. Stakeholder involvement and agreement with related sector such as Ministry of Commerce, Ministry of Foreign Affairs, Ministry of Agriculture, Livestock and Irrigation, Ministry of Natural Resources and Environmental Conservation is necessary for lotus fiber export.

4. Policy Framework for Lotus Fiber Production in Myanmar

Lotus fiber and finish products have not registered in DTPCA (Department of Trade Promotion and Consumer Affairs). It does not include in trading products of Myanmar.

About DTPCA

Functions of DTPCA

a) To enhance Market Expansion and Market Access of domestic products into international market through multilateral trading system or through regional or bilateral initiatives.
b) To explore new and potential markets through Market research, domestic and international trade information.
c) To conduct Trade Fairs, Exhibitions in country and abroad to attract trade partners and to expand markets
d) To organize business matching /meetings, business Delegation and Missions to international markets
e) To participate in international and regional trade promotions organizations, conferences and forums
f) To promote the efficiency of private sector by formation of business organizations, commodity exchange centers,
g) To encourage private Public Partnership
h) To assist and support SMEs including rural small-scale industries.
i) To organize trainings and seminars all over the country to disseminate market information, market potentials, products standards and quality requirements to the producers, manufacturers and business communities emphasizing on promoting trade.
j) To establish Trade Information Centers in the major cities at initial stage and then extend to all the States and Regions of the country.
k) To development a Quality Management System for the Agricultural Export Products and for overall trade sector development.
l) To conduct special training courses for the staff in order to provide better services and to build up the capacity to operate Trade Information Centers efficiently and effectively. To cooperate with stakeholders, governmental agencies, international organizations, INGOs and development partners to design formulate and implement trade promotion strategy, policy and action plan.

4. Value chain, constraints and potential of major stakeholders of lotus fabric industry

4.1 Value chain and constraints of major stakeholders of lotus fabric industry

In Sunn-Ye Inn, there are two lotus fiber buyers. They also give the money in advance and the fiber extractor has to pay back with the lotus fiber. The buyers do not compress the prices and both of them pay the same price for lotus fiber. The villager said there is always market demand which is in Inle for lotus fiber, same as in the past ten years. The buyer only paused one to two months per year while other buyer continues buying. During this time, the excess lotus fiber can keep up to two months in air tight container (plastic bag) as they learned from the buyers. The villagers said they heard 1.63 kg of lotus fiber can make 7 to 8 scarfs. The lotus fibers from Sunn-Ye Inn are exported to Taunggyi, and Inle in Shan State, Myanmar (Villager, 2017).

In Inle, the loom owner use lotus fiber from own plantation or buy from others (Mya Taw Win, 2017; Myat Pwint Chel, 2017). In the past, lotus fiber from Inle lake was used in weaving process. Nowadays, lotus fiber from Pyay, Kyauk-se, Monywa townships and Kayah State were used. They prefer clean and strong lotus fiber for weaving and fibers from Monywa Township is the most favorable one. They can also buy fibers from other parts of Myanmar. The price of lotus fibers is usually fluctuated around the cold season when lotus is rare and more tourists are coming to Inle Lake. Lotus plants are most abundant around October and September.

In 2016, the price of raw lotus fiber is up to 296$ for 1 viss (1.63 kg) of lotus fiber which is the highest price during the history. There are eight weaving centers in Inn Paw Kon Village. All of them buy the raw lotus fiber in same price and no competition between each other. Tourists usually study lotus fiber production process and buy traditional products at the traditional shops in Inn-Paw-Khon village. Because it takes time to go to Kyaing-Khan village. There are weaving centers and traditional shops in Inn-Paw-Khon village who sell lotus fiber products. Lotus based products are either pure or mixed lotus with silk or cotton. The price is differed with sizes (Mya Taw Win, 2017; Myat Pwint Chel, 2017). To obtain more visitors, each traditional shop has to share their profit with the boat driver and local guide who brings customer to their shop. For local customer, they only need to pay 0.73$ per boat to the boat driver. For foreign customer, the boat driver get 20% and the local guide get 20% per purchase (Mya Taw Win, 2017).

The marketing channel of lotus fiber is simple in Innma and Wetthe areas. The main stakeholders are lotus fiber extractors, fiber collectors and fiber exporters and fabrics makers. The village fiber extractors normally sell to village fiber collectors and then they send to lotus fiber exporters and fabrics makers in Inle. About 200 women are participating in lotus fiber extraction from each area. There is only one fiber buyer at Innma village but in Wetthe area, there are three fiber buyers. There is no market competition for village collector in Innma area. Normally the village fiber collectors are commission men and get 1% profit upon the fiber price.

There is only one lotus fiber buyer who introduced the fiber extraction technology to Innma area. From Innma, nearly 100 kilograms of lotus fiber were produced in a month at the beginning 5 years. But in recent years, only 50 kilograms of lotus fiber have been produced in a month. The area of the Imma Lake has been gradually decreased due to the expansion of the fish ponds within the Lake. The fish pond owners do not allow other people cutting the lotus stems in their ponds. They alos have to remove the lotus plants because they believe lotus plants inhibit the fish growth. It can cause the scarcity of lotus plants. Since October 2017, there was no fiber production in this area. The collector from Imma village stopped buying the fiber form these villages because of the quality of fiber. The extractors mixed with muddy water while rolling the fibers to get more weight.

The worst thing was that they used a solution containing cement powder instead of water. These bad habits of extractors decreased the quality of fiber. The poor quality fiber cannot be used for making the fabrics from the lotus fibers. As the fabrics from the lotus fibers are unique and very expensive, there is no demand for poor quality fiber.

Wetthe Lake produces raw lotus fiber by 163 kg per year and earns 380 lakhs per year. Raw lotus fiber from Wetthe Lake was export to Inle regions where they weave as lotus robe. In Inle region, the natural Padon-ma-kya plants are not enough to meet the market demand. So, the lotus fiber production in Salin Township becomes popular business. Nowadays, the commercial producers in Salin Township are making lotus plantations of their own and producing lotus fiber in large quantity all year round. The township government is trying to help to produce lotus robe from the raw lotus fiber. If they can produce lotus robe, the economic conditions will become better and more job opportunities for the lotus fiber producers (Hlaing T. , 2016).

Concerning the constraints, availability of raw material might be the biggest challenge for the lotus fiber industry. Due to increasing demand of lotus based products, it is important to obtain good quality and large quantity of raw lotus fiber. One big lotus scarf needs 1000 to 4000 lotus stems (Myat Taw Win, 2017; Counting Flowers, 2011) and a set of lotus robe needs around 200 thousands of lotus stems (MWD, 2014) .

The whole process for lotus products needs time, money, raw materials and detail work than other natural fiber base products. Because of that lotus products are 7 times expensive than silk products. (Myat Taw Win, 2017). Weaving of lotus fiber is also a very time consuming process and require great attention for every piece of work (Counting Flowers, 2011). It takes around 20 to 30 days to finish one scarf. Moreover, a skill of labor is also important to obtain the good quality lotus fiber and products. It is also most labor intensive work than other weaving process (Counting Flowers, 2011).

Regarding the value chain analysis, most of the extractors form specific areas except Inle Lake does not have direct connection and linkage with weaving industry. The current price of lotus fiber is very low in Wetthe Lake; the extractors have lack of price incentive and decrease their production. Moreover, the weighting system of local collector is unfair. In Imma Lake, due to the impurity in fiber extraction, no one could extract and sell fiber to Inle since two months ago. The limited number of lotus plants on Inle Lake and the thousands of lotus required for a single garment, lotus stalks are now being brought from elsewhere in Myanmar to meet the growing demand.

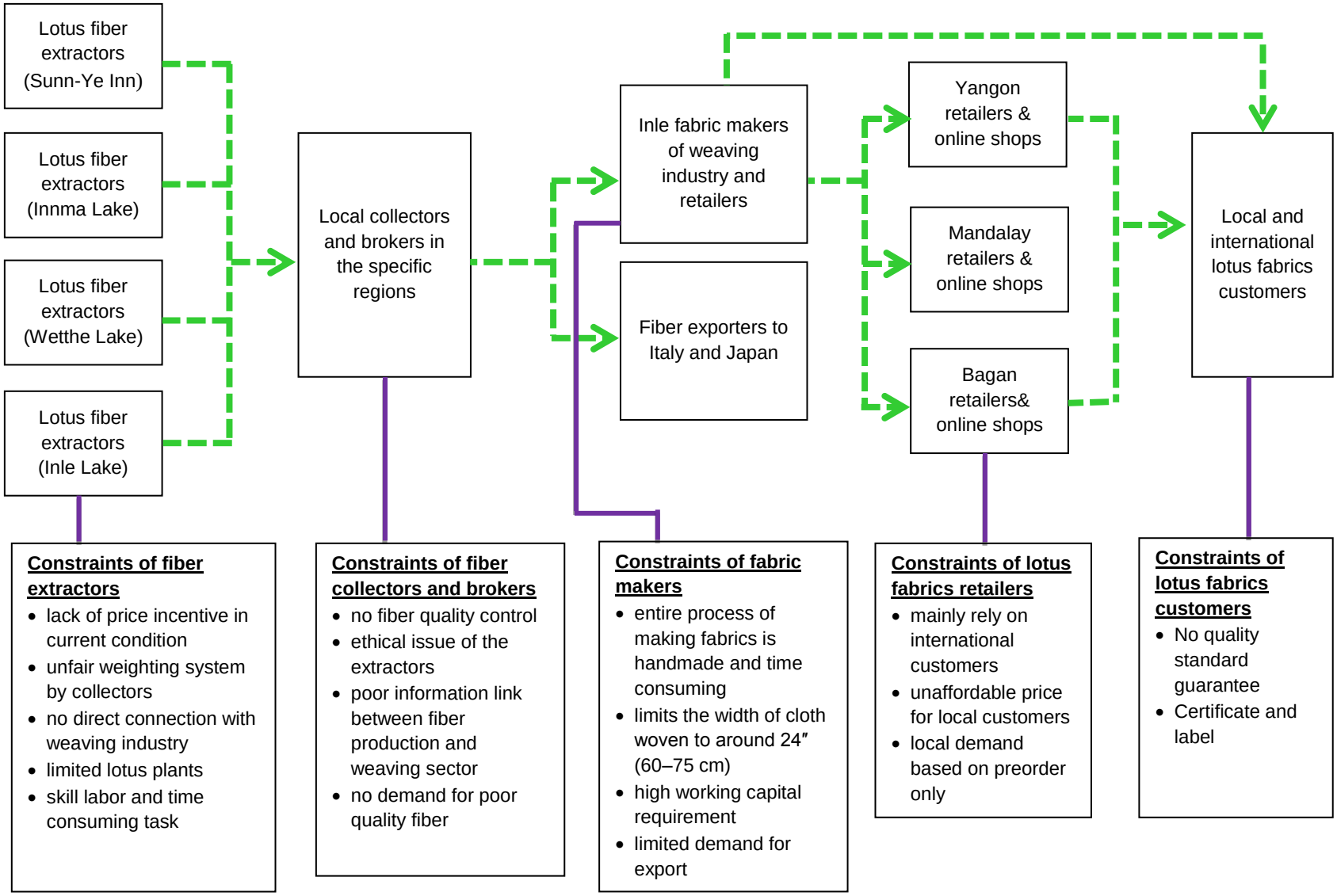
Generally there is no quality control in fiber extraction; therefore some extractors make impurity in fiber to get more weight. For such kind of poor quality fiber, there is no demand from weaving industry. It would be more serious upcoming problem between lotus fiber production areas and fabric production weaving sector in Inle.

The entire process of fiber extraction, spinning it into yarn and making the fabric is completely handmade making the process time consuming. This also limits the quantity of the fabric produced and makes the price high. Lotus fabric is woven on a traditional frame loom. Weaving components include a cloth beam, a large warp spacer–beater, and a pair of heddles supported by a transverse bar resting above the frame. The heddles are connected by rope to a pair of wooden, disk-shaped foot treadles. There is no warp beam on the loom. The excess warp is stored behind the weaver and released as weaving progresses. This limits the width of cloth woven to around 24″ (60–75 cm). Due to long duration to sell out the fabrics, the fabrics makers required high working capital.

Based on the demand side of the market, the lotus fabrics demand mainly depends on international customers in Inle because of its really luxurious unaffordable price for local customers in Myanmar. Only demand of lotus fiber robe for donation has local customers in Myanmar however, it’s very

limited amount which has been produced by preorder basis. For the customer side, there is no certificate and guarantee of quality for real lotus fiber products (Figure 10).

Figure 12 : Value chain and constraints of major stakeholders of lotus fiber industry



4.2 Value chain and potential of major stakeholders of lotus fabric industry

The fiber extractors in surveyed areas are really active and positive with the lotus fiber extraction. At Sunn-Ye Inn, 60 households are extracting fiber every day and the amount differs on the availability of lotus stems. As mentioned earlier, lotus fiber extracting and stem collection is less tiring than other jobs and good income family business. It is possible to attracts other villages near Sunn-Ye Inn to join the lotus fiber extraction. Sunn-Ye Inn also has potential to establish lotus plantation (with good quality lotus species). Innma lake has the biggest number of extractor household than other areas and still large number of village household around the lake (Figure 13). Lotus fiber from Innma lake has problem in fiber quality. It can be solved by providing training, knowledge sharing activities and discussion with the extractors. There are 10 commercial lotus fiber producers in Wetthe Lake and export fiber to Inle. Salin natural lake, Kan-gyi-daunt lake also export fiber to Inle. The surveyed areas are currently extracting fiber with the techniques from the Inle people and passing the techniques from one person to other. Systematic training for fiber collection and extraction at village level (time, quality and moisture control), discussion and information sharing is needed for strengthening lotus fiber industry.

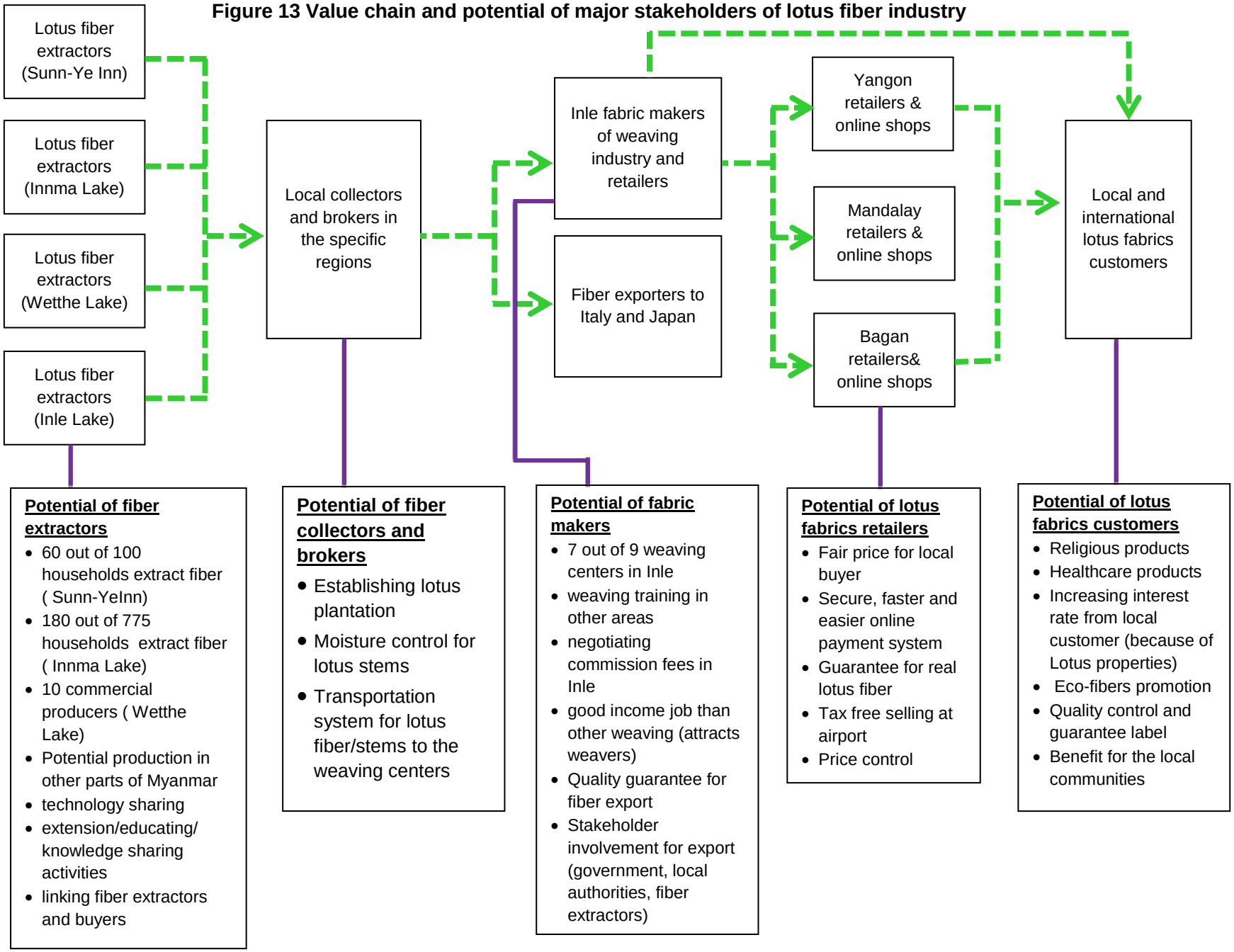
There are only 7 out of 9 weaving centers in Inn-Paw-Khone village, Inle did lotus weaving. There is also one weaving school in Inle region. Other areas of Myanmar, such as Sunn-Ye Inn, which not very far from Mandalay, also has potential to initiate lotus weaving training and SME development. The Sunn-Ye Inn itself is already attracts the local customers with it's own beauty and villagers around Sunn-Ye Inn are already extracting lotus fibers. According to Inle people, they prefer lotus fiber from Sunn-Ye Inn than others. Inle region is the only place in Myanmar where lotus fiber is weaving. Inle people mostly extract lotus fiber just for demonstration to the tourist. It is possible to establish weaving centers in other areas where lotus fiber is extracting. It is also better to maintain the quality of lotus fiber (moisture control for stems and fibers) and reduce other cost such as transportation of fibers.

Creating or linking with commodity market near fiber extracting areas is another possible way to expand the lotus fiber industry and no other commission fee will be added to the raw fiber price. Then, fiber extractor can sell their fiber at any time. Providing advanced money for people who want to start weaving business and pay back with the lotus fiber or fabrics. The important thing is quality control and price transparency at the commodity market. Collecting lotus fiber at village level is still good way but the fiber price will differ upon the location which added cost to the lotus products.

Retail shops in Yangon, Mandalay and Bagan are major market for handicrafts (Figure 13). These shops target international customer and mostly sell luxury items. They already have experience with the international customer and have facility like credit card payment, good quality products and packaging. Same with shops in Inle, they have to pay commission fee to the tourist guide and also renting fee for their shops. So, they sell with different prices which depend on the location of the shops and commission rate. But these retail shops can guarantee the quality of the products than small online shops. Online shops are popular all over the world and becoming enlarge in Myanmar. The limitations include inactive shops, unequal price, selling fake products, return and refund services. Local payment system is mainly relying on banking and other system such as wave money (which transfers money through phone or by small agents). Though, online shops become the fastest advertising for selling products in Myanmar and people got information through facebook than other media. This can be solved by selling with fixed price and guarantee label for genuine lotus fiber products. Local market has great potential for lotus fiber industry due to the trend changes in Myanmar, people become more interested in eco-products and prioritize for health than past years.

Selling at duty free shops in airport is also another target for international customers. Then customers can safely and easily buy the lotus products and can obtain VAT refund at the airport. Plant products and some handicrafts are included in no permitted items to bring on the airplane or to another country. It must have ethical label and genuine label for that. So, duty free selling is another way to attracts the international customers (also for ethical customers).

Figure 13 Value chain and potential of major stakeholders of lotus fiber industry



5. Impact of lotus fiber industry on rural community

Producing lotus fabric has very little impact on the environment which is clean, natural and renewable process. Weaving and fiber producing is done by using hand, does not need to use fuels and chemicals to extract the tough filaments or fibers. The entire process of fiber production needs patience (Moyadi, 2017). Lotus fiber production is a sustainable process for the Inle Lake. It also provides job opportunities for the people who are living in and around Inle Lake. People who stop or did not go to school are mainly involved in the lotus fiber production. Graduate people are working as an accountant in Traditional Products Shop (Mya Taw Win, 2017). Louts stem collection is less tiring and good income job than other part-time jobs. Around 200 women are getting income every day without going anywhere in Salin Township (Hlaing T. , 2016).

Stem collector can take break time and adjust the working hours. The job also covers the living expenses of the family than other jobs because the husband usually collects the stems and the wife extract the lotus fibers. The elder weavers are trying to maintain the lotus weaving, Inn-Tharr traditional handicraft, by teaching the young workers. The loom owners are also participating to keep this cultural heritage. Nowadays, annual shows, seminars and demonstrations of lotus fiber production were held at the Inle Lake for local and international tourists (Hlaing C. S., 2016).

Regarding the economic impact, lotus fiber production is benefit to Theingone, Yedarshyae and Htanpinmott villages in Innma area and Tamarchaung and Sinkyone villages in Wetthe area by providing job opportunities and better income for the villagers. Generally, the income from the lotus fiber production is more than daily wages. Lotus fiber production is a small family business that all family members can work together at home and can earn stable income for the whole year. There is no migration in the village as they have good opportunity for stable income by lotus fiber production.

Environmental and social impacts of the fashion industry are growing, but there are many ways that we can not only reduce negative environmental impact, but also increase positive environmental and social benefits through informed choices of materials and intelligent design. For example, the villagers from the Inn Kone village become less independent on the forest and get income from the lotus based business such as boat tour in the lake and opening small shops for the visitors while they can earn by lotus fiber production business by women and young girls.

Since 2013, the village leader banned picking lotus flowers in order to maintain the signature of the lake which attracts the tourist and to help the natural regeneration of lotus. The search continues for the ideal natural fiber; organically cultivated with zero or minimal artificial assistance, ethically manufactured, sustainable, processed without chemical aid, with reusable by-products, and completely biodegradable. These are reducing the carbon footprint of the individual manufacturing process of the material, from plant cultivation to fabric manufacture rather than the cost reduction by using artificial materials and process. As the fabrics from lotus fibers are 100 percent organic, the production process is sustainable and environmentally friendly manufacturing process. Moreover, the waste of lotus steam after exacting the fiber can be used as fertilizer to the planting field and feed for livestock.

The cutting practice of lotus stem also makes positive impact to the lotus plans without shortage of lotus stem. Moreover, the waste of lotus team after exacting the fiber can be used as fertilizer to the planting field and feed for livestock otherwise it is thrown to the Sunn-Ye Inn for compost. That will be affected for lotus growth. The growth of lotus plants has no effect on the water quality of Sunn-Ye Inn too.

Social impacts of lotus fiber production were also enquired at the Inn Kone village. The villagers said there is no social problem related to lotus fiber production and all the family members can help each other in their business. Based on the main stake holders of lotus fiber production, women in different ages are main player in fiber production while man is cutting the lotus stem. Women became income earner make them empower in the household. Moreover, lotus fiber business creates more stable livelihoods and more strengthening social capital in community without migration and environmental stress (Villager, 2017).

6. Conclusions and Recommendations

The lotus fiber industry brings the positive economic and social impact on local community by promotion of conservation of biodiversity through sustainable trade in natural ingredients in Myanmar. Especially rural women have high competitive impact through job opportunity and income earnings from lotus fiber production and weaving sector make them empower in their family as social benefit. Nowadays, rural migration is pronounce in Myanmar, however, there are very low women migration in the study areas where have the job opportunity of lotus fiber production. Moreover, lotus fiber production which is positive environmental impact would be strengthening by attractive eco-tourism program with improve infrastructure for competing with other industries. The regional authorities would aware the potential of lotus fiber industry for the community and it would be the dilemma for setting the priority among the competitive sectors in some areas.

In case of value chain study, transparency of market information is needed along the value chain of lotus fiber industry for both side of market. Some bottle necks would be improved in supply side by market information of demand side and weaving industry would be back smoothly to the fiber producing stakeholders who have very poor knowledge of market information currently. The quality standard guarantee certificate and geographical identification label would be required for customers for expanding and promotion the Myanmar lotus fiber fabrics in world market.

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8. Annexes

Annex 1: List of respondents for the field work and Online Interview

Sr. No.	Name	Gender	Age	Address
1	U Bo	Male	37	Inn Kone Village, Sunn-Ye Inn
2	Ma Phoo Ngone Win	Female	15	Inn Kone Village, Sunn-Ye Inn
3	Ma Aye Aye Aung	Female	17	Inn Kone Village, Sunn-Ye Inn
4	Ma Pan Pan	Female	14	Inn Kone Village, Sunn-Ye Inn
5	U San Min	Male	54	Inn Paw Khon Village, Inle Lake
6	Daw Mya Thet Mu	Female	56	Inn Paw Khon Village, Inle Lake
7	Ma May Thet Khaing	Female	20	Inn Paw Khon Village, Inle Lake
8	U Than Naing	Male	46	Village fiber collector/broker, Innma vilage,
9	Daw Htwe Tin	Female	67	Innma village, Innma Lake
10	Daw Bi Sein	Female	45	Theingone village, Innma Lake
11	U Naing Gyi	Male	40	Htanpinmott village, Innma Lake
12	Daw Kyi Kyi Khaing	Female	43	Sinkyone village, Wetthe Lake
13	Ma Hla Htwe	Female	32	Tamarchaung village, Wetthe Lake
14	Daw Po Ei Phyu	Female	30	Department of Agriculture, Sint Kaing Township
15	U Thura	Male	55	MOALI, Pyay Township
16	Daw Phyu Ei Thein	Female		Sunflowers Group

Brief Biography of Authors

Theingi Myint, Ph D

Theingi Myint is an Agricultural Economist working in the field of rural development especially agricultural marketing and value chain analysis, project planning and management, socioeconomic impact assessment and rural development policy. She has a Ph.D in Agriculture within the Sandwich Program of University of Giessen, Germany and Yezin Agricultural University. For her Ph.D. she did the research on “Myanmar Rice Market: Market Integration and Price Causality”. She started her career in Yezin Agricultural University since 1992. Now she has more than 25 years of work experience in University and rural development projects with some International and local organizations such as ICRISAT, SEARCA, IRRI, IFPRI, CSEAS-Kyoto University, ACIAR, WB, IDE, JICA, ERIA, IPSARD, MRF and HELVETAS during which she has gained experiences in agricultural marketing and trade, socioeconomic impact assessment, rural livelihood and gender analysis, value chain management and labor migration. Since 2014, she is working as a Coordinator of ACIAR Project: “Strengthening Institutional Capacity, Extension Services and Rural Livelihoods in the Central Dry Zone and Ayeyarwaddy Delta Regions of Myanmar” and "Increasing Productivity of Legume-based Farming Systems in the Central Dry Zone of Myanmar” (SMCN-2011-047) up to 2017. From 2018 to 2022, she is working as an national Collaborating scientist and value chain expert in ACAIR project of “Sustainable and Inclusive Development of the Cattle and Beef Industry in South-East Asia and China” AGB/2016/196, coordination with University of Queensland, IFPRI, ACIAR, UN HELVETAS_Vietnam and MOALI_Myanmar. At the meantime, she is working as a Professor in Department of Agricultural Economics, Yezin Agricultural University, Nay Pyi Taw, Myanmar.

Miss Khin Nyein San

Ms. Khin Nyein San is a Forester working in the field of natural resources management especially forest management, rural development project and socioeconomic impact assessment. She has an M.Sc in Natural Resources Management from NTNU (Norwegian University of Science and Technology), Trondheim, Norway. For her M.Sc, she had done her research on “Impacts on the biodiversity by living inside a protected area, Natma Taung National Park, Myanmar; A human perspective” in Chin State. She started her career as a Range Officer since 2011. She has more than 6 years of work experience in natural resources management and now working with HELVETAS during which she has gained experiences in rural agricultural marketing, value chain analysis, socioeconomic impact assessment, sustainable livelihood development and sustainable agricultural development. At the meantime, she is working as a Range Officer of Dry Zone Greening Department, Ministry of Natural Resources and Environmental Conservation, Mandalay, Myanmar.

Mr. Aung Phyo

Mr. Aung Phyo is an Agricultural Economist working in the field of rural development especially agricultural marketing, project planning and management and socioeconomic impact assessment. He has an M.Sc in Agricultural Economics from Yezin Agricultural University. For his M.Sc, he had done his research on “Profitability of Groundnut Oil Small Millers in Myingyan Township, Mandalay Region”. He started his career in Yezin Agricultural University since 2012. He has more than 5 years of work experience in university and rural development projects with some International Organizations such as IRRI, ACIAR, GRET, JICA and now HELVETAS during which he has gained experiences in rural agricultural marketing, value chain analysis, socioeconomic impact assessment, sustainable livelihood development and sustainable agricultural development. At the meantime, he is working as an Assistant Lecturer of Department of Agricultural Economics, Yezin Agricultural University, Nay Pyi Taw, Myanmar.