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Assessment of Value Chain Management of Sesame in Pwint Phyu Township, Magway Region, Myanmar

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Abstract
Sesame is economically important for producing edible oil and export crops in Myanmar. Empirical research on the sesame value chain is becoming necessary. This study investigated the market performance of 100 sesame stakeholders along the value chain in Myanmar. Interviews with 100 sesame stakeholders along the chain were performed. The results indicated that most of the farmers grew the black sesame (Sahmon Nat) variety because of the higher price and the higher market demand from stakeholders, which increase the marketing margin. Most sesame products flowed to wholesalers and Chinese commission agents in Mandalay, who traded them directly to cross-border exporters to China. Exporters in Yangon traded raw products to Japan and Taiwan and roasted sesame powder to Korea via the Yangon port as normal trade. However, the sesame value chain was very weak in Myanmar because of the unequal marking margin among actors, which was caused by the farmers' lack of negotiation power with other actors along the chain. Among the discovered constraints, the low quality of product and the lack of advanced facilities and technologies were ranked as the major constraints. Therefore, public and private investments should be raised in this sector not only to overcome the major constraints but also to produce international standard-quality seed.
Keywords: key words, Value Chain, sesame, cost, profit and margin, constraints
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1. Introduction

Observing the performance of stakeholders is a good opportunity to understand the actual situation and the strengths and weaknesses of the actors along an agricultural crops' supply and value chain. The relationship between smallholder farmers and market actors along the value chain for agricultural products is considered an essential role in order to overcome the limitations of smallholders' agriculture and livelihoods and to reduce transactional cost. Myanmar's agriculture sector plays a vital role in providing food for an increasing population and earning foreign exchange. While rice sufficiency is considered an important issue in national policy, oilseed crop sufficiency is a main policy issue of Myanmar as well. Among the oilseed crops, sesame is an economically important crop that occupies the world's second largest harvested area, with 21.05% of the total world production, 36.37% of which is in Asia (FAO, 2013).

Sesame is an important crop not only for domestic consumption but also for exporting because it has an important role in the livelihood activities of smallholder farmers and earning foreign income (B. Munyua, 2013). Nevertheless, efficient marketing systems highly affect the development of the agricultural commodities production system and increase farmers' income because it indicates that agricultural commodities are flowing from the production point to the required place with required quality and quantity at the right time at the minimum transaction cost (Asyheshm, 2007).

Although sesame is an economically important crop, stakeholders involved along the oilseed crop value chain face major problems, such as price uncertainty, low productivity and quality of sesame, lack of strict marketing laws and regulations and competition among important edible oils. Moreover, farmers in this region face unfair prices as there is a huge gap between the farm gate price and the consumer price in Yangon[1] and Mandalay[2] because of higher transaction cost. In addition, farmers do not have any roles and responsibilities in the production quality and standards to meet the standardization of markets, especially the export market. The linkages and relationships among actors along the value chain are fragmented. A few studies on the value chain of sesame in 2013 were conducted in Myanmar, but they focused on sesame being exported through normal trade, not through border trade (cross-border exports to China). Moreover, some government interventions for sesame farmers, such as high yielding varieties and access to extension services, have been promoted over the years. In fact, benefit sharing among actors, the number of stakeholders and their activities along the value chain, the transactional processes of sesame and to what extent the involvement of smallholder farmers will be along the chain will change over the years.

Therefore, this study aimed to analyze the value chain of sesame in the Magway Region, Myanmar. Specific

[1] Yangon is the capital city of Myanmar where sesame seed and sesame powder are exported to foreign countries through normal trade.
[2] Mandalay is the second capital city of Myanmar where sesame seeds are exported to the Muse Exchange Center for China border trade.

objectives were (1) to map out and describe the stakeholders' major roles and activities in the chain, (2) to investigate the marketing costs and the margins of various stakeholders, and (3) to assess the major constraints of sesame production and marketing for improving the value chain performance in terms of processing and product upgrading.

2. The Concept of "Value Chain Analysis"

The concept of the value chain represents the combination of processes that are needed to flow a commodity or service from the producers to the final consumers and the disposal after use through various stages of production. An example of a value chain is the sesame products produced in Myanmar that are passed through the different stages of design, production and transactions before reaching the final users not only in Myanmar but also in other countries. According to the general conceptualization, a product is made of raw materials and added to other intermediate products. First, raw materials are passed through different stakeholders before reaching the value-added processors. Then, the raw materials and the intermediate product should flow to the production facilities of the business operators to produce the final products. These final products of the firm will be bought by the final users in both local and international markets. The value chain concept would be useful to discover the different market participants to which a product is flowing before reaching the final users.

2.1 Overview of the Oilseed Value Chain in Myanmar

An overview of some key stakeholders' activities along the sesame value chain in Myanmar is presented below.

(i) **Farmers:** The main production areas of oilseeds crops are Magway, Sagaing and Mandalay. Approximately 90% of all oilseed crops are grown in these areas. According to Favre et.al (2007), sesame seeds provide crop budgets for 3 seasons: the premonsoon, the monsoon and the cool seasons. The sesame yield per acre in the premonsoon season was higher than that in the other seasons. For groundnuts, two seasons – the monsoon and the cool seasons – have approximately the same levels of yield.

(ii) **Brokers**: The brokers buy directly from producers and sometimes provide advance payments to producers. These brokers sell their products directly to other stakeholders along the chain.

(iii) **Wholesalers**: Wholesalers perform several marketing activities along the value chain. They purchase the products from brokers or hire commission agents to buy the products. Some act as wholesalers, millers and exporters.

(iv) **Commission agents:** Commission agents trade the products and receive a commission fee (1 to 2%) of the purchase costs for the completion of the trading process and then work for other stakeholders in different regions based on a trust relationship.

(v) **Oil millers**: In Myanmar, most millers work primarily with producers who have a longstanding relationship with them or some traders in the local township. According to Favre et.al, 2005-2007, the Myanmar Edible Oil Dealers' Association had 3000 members in 2014, but two-thirds of the mills are predominately small capacity, with less than 5 tons of raw materials per day. In Mandalay[1], 75% of all oil mills stopped functioning due to lower demand and insufficient raw materials, leading to an underutilization of the mills. Even in the peak season, the mills work 8 hours a day compared with rice mills, which run 24 hours in peak season due to the abovementioned constraints.

(vi) ***"Crop Exchange Centers (CEXCs)***": In 2006/2007, 7 crop exchange centers (CEXCs) were active in the central dry zone. Most (CEXCs) are open in the morning, and the trading is done on basis of samples that are physical available in the exchange center. The market price set-up is only between seller and buyers by negotiations. In this exchange center, most of the buyers buy products of different qualities and prices from different sellers in different regions, but they receive market information services, which are the weekly prices of all commodities, by using mobile phones and digital communication technologies between different regions from this center. According to the abovementioned study, the oilseed markets in the long run are integrated if the improvements in the short run are possible.

(vii) **Exporters:** Currently, 33 private companies trade Myanmar sesame seeds as exporters, mainly to China, Japan, Singapore, Korea and Malaysia yearly through normal trade, except China because sesame seed have been exported to China through Myanmar-China border trade. Myanmar sesame seeds are very popular around the world, and farmers have tried to increase yearly production for export because of its good quality and because it is free from dust, sand, pesticide residue and other admixtures (Myanmar Pulses, Beans and Sesame Seed Merchants Association).

3. Research Design and Methodology

3.1 Study Area, Data Collection and Sample Size

To assess the current performance of the sesame market, a survey was conducted using different questionnaires

[1] Mandalay is the second largest city, located in the central part of the country, bordered to the north and east by China.

for different stakeholders in the sesame value chain. The preliminary and main data collection for farmers was conducted in Pwint Phyu, one of the major sesame-growing areas of Magway. Preliminary and main market surveys were conducted in Magway, Mandalay and Yangon in 2016-17. These surveys targeted 72 sesame farmers, 10 wholesalers at crop exchange centers, 8 sesame oil millers, 2 food/snack processors, 4 Mandalay wholesalers and 4 Yangon exporters to collect the data about production, trading, transporting, value addition and related constraints and information. In addition, focus group discussions with key informants were conducted to obtain details and additional information into the sector. In the secondary data collection, a desk review was conducted to develop the information that needed to be collected during the primary research, and data were collected from various sources, e.g., published books of the Ministry of Agricultural, Livestock and Irrigation (MOAI), various government organizations related to agriculture, the Food and Agricultural Organization (FAO), and the Central Statistical Organization (CSO).

3.2 Methods and Techniques of Data Analysis

The data collected from various stakeholders were analyzed using a descriptive statistics method with the statistical software package SPSS Version 16. Enterprise budget analysis was used for the evaluation of the economic and technical performance of an individual farm enterprise. The marketing costs and margins were calculated at different levels along the value chain.

4. Results of the Study

Step 1: Mapping the sesame value chain
Step 2: Identifying the main actors, their activities, and the major processing steps and analysis of the marketing costs and margins
Step 3: Determining the knowledge and information flow of stakeholders
Step 4: Analyzing the major challenges and constraints

4.1 Step 1: Mapping the Sesame Value Chain

The core process of the sesame value chain in the study areas is shown in Appendix **1**. Sesame farmers directly sold all of their raw sesame products to wholesalers, traders and millers in Magway immediately after harvest during the sesame growing season because of inexpensive transportation costs and convenient road infrastructure. Most of the traders and wholesalers sold the raw sesame products directly to wholesalers and Chinese commission agents in the Mandalay central wholesale market and some portion of the raw sesame products to exporters in the Yangon wholesale market and food processors and oil millers in Magway.

Raw sesame products were bought by oil millers and sent to the mills for milling. After processing, the sesame oil was transacted back to the wholesalers, retailers and consumers in different areas. In the study area, the wholesalers had a key role in the distribution of sesame from producers to millers, processors and exporters. Moreover, the raw sesame from the wholesalers and the Chinese commission agents in the Mandalay central wholesale center flowed directly to the Muse Exchange Center (cross-border export to China) where the raw sesame was exported to Japan and Taiwan. The roasted sesame powder was sold to Korea. Food processors processed the sesame seeds into sesame brittle as a snack and as a roasted sesame powder.

4.2 Step 2: Identifying the Main Actors, Their Activities, and The Major Processing Steps and Analysis of the Marketing Costs and Margins

4.2.1 Farmers and Their Specific Activities

Socioeconomic characteristics of the sampled farmers in the study areas are shown **in Table 1.** The average age of the sample farm household's head was 49 years old. The oldest age of the sampled farmers was 79 years of age, and the youngest was 28 years of age. The farmers had an average of 7 years of schooling years (secondary school level). The maximum number of years of schooling was 14, and the minimum was 1 year. The average farming experience of the sample farm household heads was 26 years. The maximum experience was 60 years, and the minimum was 4 years. In the study area, 93% of the sampled farmers owned a mobile phone as part of the household assets. Therefore, they could easily communicate with each other and obtain knowledge and information related to production and marketing. Approximately 64% of the sample farmers owned two-wheel tractors as part of the farm assets. Most of the farmers had changed their traditional faming system into a mechanized farming system. In sesame production, 86% of the sample farmers used their own seed for production, and the rest of the farmers bought the seed. Therefore, the farmers who bought seed faced seed impurity and low quality of seed.

The costs and benefits for sesame production can be found in **Table 2.** Most of sesame farmers in the study areas grew only the Sahmon Nat variety because of the higher price and the market demand. It was found that the average yield and price were 10.4 baskets per acre and 58340 MMK per basket. The average total variable cost for sesame was 400471.73 MMK per acre. Therefore, the average total gross return for the sample farmers was 607319.40 MMK per acre. The return above variable cost (RAVC) was 206847.67 MMK per acre, and the benefit-

cost ration for sesame production was 1.52 which means if the famers invest one MMK in sesame seed production, they will gain 0.52 MMK.

The key market functions of the sampled farmers in the Pwint Phyu Township are shown in Appendix 2. Most of the farmers sold their products to wholesalers and millers in Magway by cash down and payment systems. Their price was determined depending on variety and demand.

Table 1. Demographic Characteristics of the Sampled Farmers in the Pwint Phyu Township

Items	Unit	Av.	Max	Min.
Household head's age	Year	49	79	28
Household head's education	Year	7	14	1
Household head's farming experience	Year	26	60	4
Household's family size	No.	5	10	2
Farm size				
Le	Acre	7	17	1
Yar	Acre	5	15	0.5
Total land area	Acre	8	24	1

Authors' calculation based on field survey (2016-17).

Table 2. The Cost and Return Analysis of SaMontNat (Black sesame) Production

Items	Unit	Total Value
Yield	Bsk/ac	10.41
Average price	MMK/bsk	58340.00
Gross return	MMK/ac	607319.40
Material cost	MMK/ac	158754.46
Family labor cost	MMK/ac	60367.80
Hired labor cost	MMK/ac	150430.93
Interest rate	MMK/ac	30918.54
Total variable cash cost	MMK/ac	340103.93
Total variable cost	MMK/ac	400471.73
Gross margin	MMK/ac	206847.67
Benefit and cost ratio		1.52

Authors' calculation based on field survey (2016-17).

4.2.2 Wholesaler/Traders and Their Specific Activities in Magway

In the sesame marketing channel in Magway Township, the wholesalers have key roles in the distribution of sesame from producers to wholesalers, traders, millers, processors and exporters. The town wholesalers and traders at commodity exchange centers are the main intermediaries from whom the farmers can obtain price information, which is set up based on the variety, demand and quality. They also have connections with other township wholesalers and millers around the Magway Region.

In general, the average age of the selected wholesalers was approximately 52 years old; their ages ranged from 34 to 69 years old. The selected wholesalers had work experience of 20 years on average, ranging from 10 to 30 years. Most of them were graduate level. The key market functions of the wholesalers in Magway are shown in **Appendix 2.** According to the survey responses, wholesalers/traders purchased mostly raw material from the farmers in Magway, Pwint Phyu, Salin, Saku, and Minbu by cash down, credit commission fee and advance payment. All wholesalers selected the varieties based on market demands and prices. The destinations of the wholesaling were to wholesalers and Chinese commission agents in Mandalay and the Muse Exchange Center, oil millers, exporters and food processors, and the products were marketed by using cash down and credit systems.

The majority of the wholesalers graded the product by their own experiences in buying and selling into three standards as high, medium and low quality. These wholesalers set the price depending on criteria such as variety, moisture, quality, dryness, cleanness and purity. They stored their products 1-2 weeks or 3-4 weeks before trading. They transported their products by 12-wheeltruck. The weighting system was by viss (traditional measurement); there would be 15 visses in 1 basket, and one bag would be loaded with 3 baskets. It was found that international demand and prices, especially in the Chinese market, could significantly affect both legal export price and producer price. The producer price depended on the price received by the town wholesalers in Magway. The price received by wholesalers depended on the price received by Yangon and Mandalay wholesalers. The marketing margin, cost and profit of wholesalers in Magway is shown in **Figure 2.** Wholesalers transacted the different varieties of sesame such as Sahmon Nat, white, red and brown. Among these varieties, the marketing margins and profits of wholesalers were the highest for the Sahmon Nat variety, followed by the red sesame.

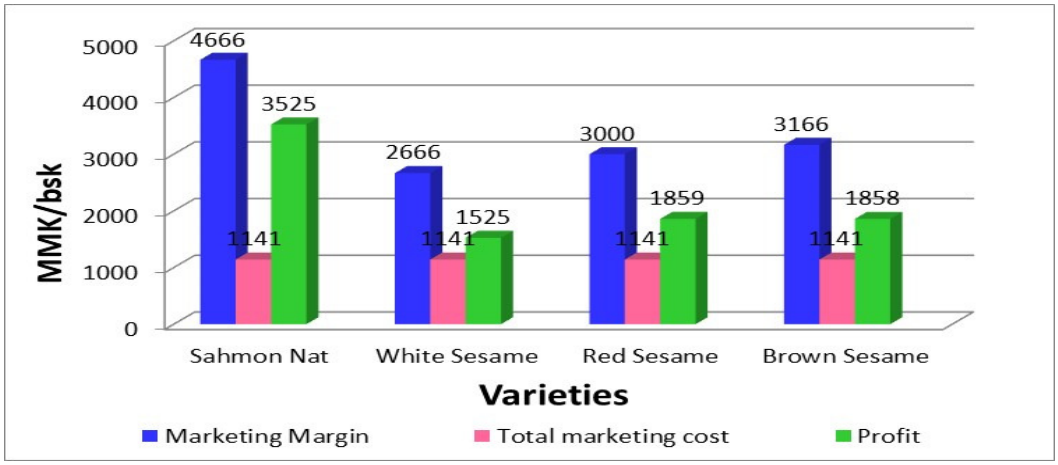


Figure 2 Marketing margin, cost and profit of wholesalers in Magway.
Authors' calculation based on field survey (2016-17).

4.2.3 Oil Millers and Their Specific Activities in Magway

Sesame oil is very useful for the Myanmar people, especially as an edible oil and traditional medicinal oil. The oil millers have an important role in the oilseed crop marketing chain, as they transform the raw oilseed crop to edible oil.

The average age of the oil millers was 59 years old, and their average experience was 15 years, ranging from 3-40 years. The education level of oil millers was secondary school level. Oil millers ran their mills for the whole year. Most of the selected oil mills used electricity, and the working hours of the mills depended on the availability of electricity, which ranged from 5 hours to 24 hours per day. Larger millers ran their mills on a 24-hour basis because they had their own generators to provide the necessary power in the peak season. When one basket of raw sesame materials was milled, the mill produced 7.12 viss of sesame oil on average, which ranged from 7 to 7.5 visses per basket and 7.9 visses of sesame oil cake; the average ranged from 7.5 to 8 viss per basket of sesame.

The key market functions of oil millers in Magway are shown **in Appendix 2.** According to the selected oil millers' responses, most oil millers primarily bought raw material from farmers, traders and wholesalers in Magway. When they bought the commodities, the miller graded the commodity based on experience into low, medium and large grading. There is a weakness in the grading system, and it leads to the production of lower quality sesame oil because it is not an absolutely accurate grading system. The millers then sold the sesame oil to the wholesalers, retailers and consumers in Yangon, Bago, Naypyitaw, TaungTwinGyi, Yaenanchaung, Chauk, Meikhtilar, WanTwin and Muse by using cash down and credit systems. The weighting system in buying and selling sesame was by viss and by oil basket. There were two kinds of transportation, as most of the oil millers used trucks to collect the raw material from farmers, traders and wholesalers, and then they used cars to sell the sesame oil to consumers, retailers and wholesalers in Magway and other places.

The marketing margins, costs and profits of the oil millers in Magway are shown **in Figure 3.** In the study areas, most oil millers bought only red and brown sesame for milling. Among these varieties, the marketing margins and profits of brown sesame oil was higher than those of red sesame oil because the average price of raw brown sesame is lower than that of red sesame, but the average sesame oil price of these two varieties was not very different.

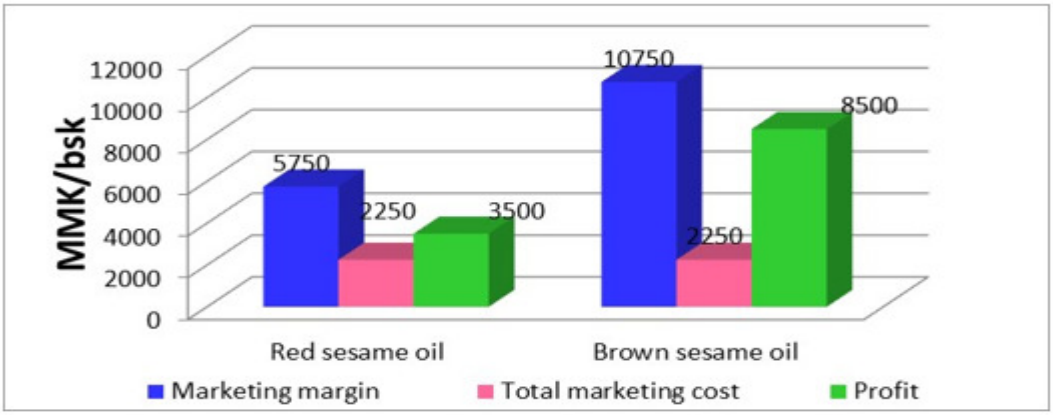


Figure 3 Marketing margins, costs and profits of oil millers in Magway.
Authors' calculation based on field survey (2016-17).

4. 2.4 Wholesalers and Their Specific Activities in Mandalay

In general, the average age of the selected wholesalers was approximately 34 years old, with ages ranging from 29 to 48 years old. The respondents had approximately 17 years of experience working on average, ranging from 10 to 31 years. All of the wholesalers in Mandalay were educated .

The key market functions of the wholesalers in Mandalay are shown **in Appendix 2.** According to the survey responses, the wholesalers in Mandalay bought mostly raw material from farmers, wholesalers and traders in Magway, Aung Lan, Taungtwingyi, ShweBo, Monywa, Tharsi and Meikhtila by using cash down and credit (late payment after collecting the product) systems. All of the wholesalers in Mandalay hired commission agents to collect the sesame from the farmers and wholesalers from other locations. They traded the commodity to the Chinese buyer's agent, other wholesalers in Mandalay, and sometimes directly to the Muse Exchange Center.

Most of the sesame products from the Mandalay Exchange Center flowed to the border trade, especially to the China market, which has a major role in the value chain of sesame in Myanmar. When wholesalers sold the product directly to the Muse Exchange Center, they negotiated prices with commission agents of Chinese buyers at Muse. They paid 40000 ks/yr for permission to sell directly to the Muse Exchange Center. The wholesalers graded the commodity based on their own experience into low, medium and large standards. They set the market price depending on the variety, quality, purity, cleanness and moisture. The price difference was 1000-1500 ks/bsk, depending on the grade. They stored the commodity approximately 1-2 weeks before trading. The weighting scale for the Mandalay wholesale market was viss (1 bag=45 visses), but for the Chinese export market, it was viss (1 bag=30.75 visses). The major mode of transportation was by car. The marketing margins, costs and profits of wholesalers in Mandalay are shown **in Figure 4.** They also traded different varieties of sesame, such as Sahmon Nat, science black, white, red and brown. They received the highest marketing margins and profits from trading the Sahmon Nat variety.

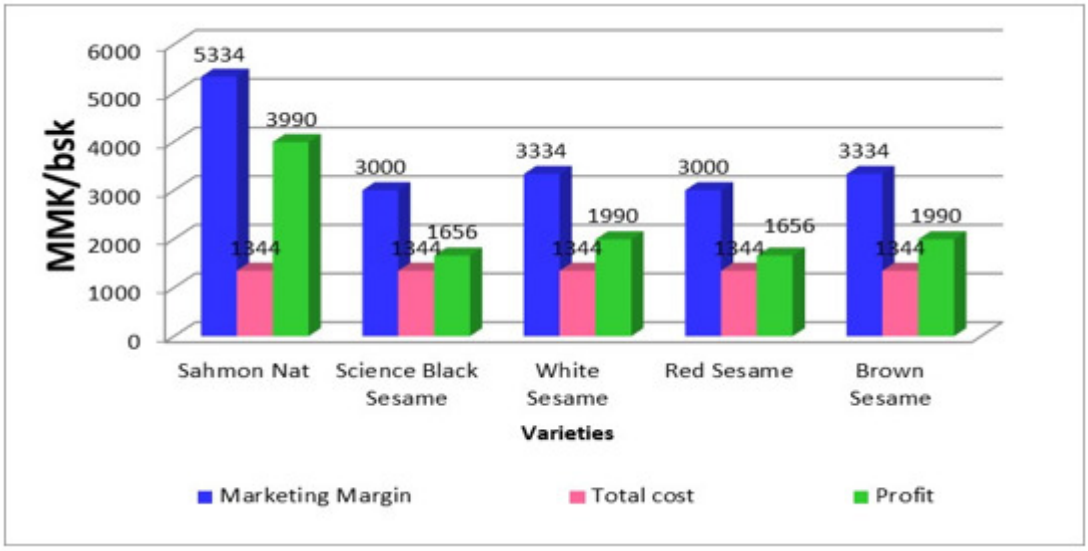


Figure 4 Marketing margins, costs and profits of wholesalers in Mandalay.
Authors' calculation based on field survey (2016-17).

4.2.5 Food Processors and Their Marketing Activities in Magway

Sesame processors joined with the wholesalers in nearby Magway and bought the raw sesame, especially the black and white sesame. In this study, two food processors were interviewed. The age of the first processor was 41 years old and had 25 years of market experience. The sesame processing capacity was 10 hours per day throughout the entire year. This processing mill produced sesame brittle: 1500 packages/day and 90 packages of roasted sesame/day. The age of the second processor was 32 years old and had 3 years of market experience. The sesame processing capacity was 6 hours per day for the entire year. This processing mill produced 500 packages of sesame brittle/day and 30 packages of roasted sesame/day.

The key market functions of these food processors in Magway are shown **in Appendix 2.** The sesame processors bought the black and white sesame using the cash down system from the wholesalers in Magway. They prices were paid depending on dryness, cleanness and quality of the sesame. The price of the white sesame was 30000 ks/bsk, and the price of the black sesame was 53000 ks/bsk. They sold the value-added products not only to retailers and consumers in Magway but also in Yangon, Pyay, Mandalay, NyaungOo, Nay Pyi Taw, Monywa, Pokokku, Taungtwingyi, Minhla and Salin. The price of the white sesame brittle was 1000 ks/package, the price of the black sesame brittle was 1100 ks/package and the price of the roasted sesame was 400 ks/package. In selling the sesame brittle, the processors used both the cash down and credit systems.

4.2.6 Exporters and Their Marketing Activities in Yangon

The key market functions of exporters in Yangon are shown **in Appendix 2.** Exporters in Yangon handled only the normal trade. The average company establishment year was 17 years. They bought good-grade sesame, especially black sesame (Sahmon Nat and black sesame (science), that was purified and contained less moisture content than the raw sesame by using the cash down system from wholesalers and collectors in Magway and Aunglan. The products were graded using both manual labor and machines. The monsoon sesame quality is better than the winter sesame because it contains reduced acid. The average price of the black sesame was more expensive than the science black sesame. After buying the raw sesame products, they were cleaned by both filter and machine. The raw sesame was graded to export good quality seed with international standards based on FFA=2%, chemical residue =0.005, moisture content=7% -8% and color=5%-10%. The raw products were ground to eight pieces per sesame seed using a grinding machine to produce sesame powder. They exported the raw sesame to Japan and Taiwan and the roasted sesame powder to Korea in order to reduce the import tax. Exporters set the price depending on buying prices, lag prices, China market prices, world prices and exchange rates. In this year, the current price is less than the lag price because of the reduced demand in China.

4.3 Step 3: Determining the Knowledge and Information Flow of Stakeholders in the Sesame Value Chain

The agricultural extension division has an important role in transferring knowledge to farmers by offering training on crop management and conducting agricultural development programs to produce high quality seed. According to the survey results, very few farmers have been provided the extension services. They received knowledge and information from private agro-chemical marketing agents and neighboring farmers. Other market participants, such as wholesalers/traders, oil millers, exporters and processors, obtained market and price information from friends, wholesale association websites, television, the internet and the commodity exchange center.

4.4 Step 4: Analyzing the Major challenges and Constraints of Stakeholders in the Sesame Value Chain

4.4.1 Challenges and Constraints of Farmers in Production and Marketing Activities

The major constraints of farmers in the sesame value chain are shown in **Appendix 3.** The sampled farmers in the study area wanted to use good quality chemical fertilizers and pesticides at reasonable prices. However, the farmers in the study areas were faced with uncertainty or low quality of inputs in the sesame production and state that the enforcement of fertilizers and pesticides laws are essential. They also had limited access to high quality seeds. Sesame crops are not resistant to pest and disease and needs to be harvested in a timely manner. In addition, labor scarcity and an insufficient amount of credit produces a lower yield of sesame. Although they wanted to use machinery for solving labor shortages and the high cost of labor, they had limited access to loans to purchase machinery. They also suffered from high postharvest losses due limited access to post-harvest technology. The major constraints affecting farmers were unstable prices and markets because of the low quality of the sesame.

4.4.2 Challenges and Constraints of Wholesalers/Traders in Sesame Marketing in Magway

The major constraints of wholesalers in the sesame value chain are shown in **Appendix 3**. The supply of sesame crops has increased considerably because of the potential demand of the international market. However, the sampled wholesalers need more capital to invest in marketing, improved storage facilities to store large amounts of sesame and advanced machine and facilities to produce good quality seed. The quality of sesame is very important for wholesalers to export to other countries.

4.4.3 Challenges and Constraints of Oil Millers in Sesame Marketing in Magway

Sesame oil is suitable for health. Therefore, people with higher incomes can purchase sesame oil regardless of its higher price. The major constraints of oil millers in the sesame value chain are shown in **Appendix 3**. Millers preferred sesame oil because sesame seeds contain high oil content compared with other oil seed crops. The major challenge in selling the sesame oil was competing with imported palm oil. Some uncompetitive millers have shut down their oil mills. In addition, when raw sesame products are poor quality, they are faced with difficulty in milling. Currently, most of the oil millers mix sesame oil with palm oil. While this has a positive effect on consumer demand, it has a negative effect on the health of consumers. Insufficient raw materials hamper the optimal utilization of mills. Unlike rice mills, oil mills run poorly with low quality oil. Therefore, it is necessary to upgrade the oil mills to meet international standards.

4.4.4 Challenges and Constraints of Wholesalers/Traders and Chinese Commission Agent in Sesame Marketing in Mandalay

The major constraints of wholesalers/traders and Chinese commission agents in Mandalay in the sesame value chain are shown in **Appendix 3**. The wholesalers and Chinese commission agents in Mandalay were interviewed about the constraints of sesame marketing activities and they responded that the major constraints were a lack of capital, low quality, seed impurity, lack of improved storage facilities, labor scarcity, lack of demand and high tax rate. They also need improved storage facilities to store large amounts of sesame to trade to China.

4.4.5 Challenges and Constraints of Food Processors in Sesame Marketing in Magway

The demand for sesame brittle becomes high because of its good flavor and high consumer preference and demand.

Women can also participate in the processing of sesame brittle, which makes it important for job creation. The sampled processors need improved technologies because of the high demand of labor (and labor scarcity) and improved storage facilities to reduce rat destruction. The major constraints of food processors in the sesame value chain are shown in **Appendix 3**.

4.4.6 Challenges and Constraints of Exporters in Sesame Marketing in Yangon

The quality of Myanmar sesame seed is still relatively low. Therefore, the price received is also low compared to other sesame exporting countries. The major constraints of exporters in the sesame value chain are shown in **Appendix 3**. The major constraints for sesame exporter included low quality sesame, a lack of advanced facilities, a lack of postharvest technologies to measure sanitary and phytosanitary (SPS) and no access to test for imidacloprid (chemical residue) to 0.005 ppm in Myanmar. The pesticide residue in sesame seed must be tested primarily in Bangkok because of the lack of technology in testing for the residue in Myanmar.

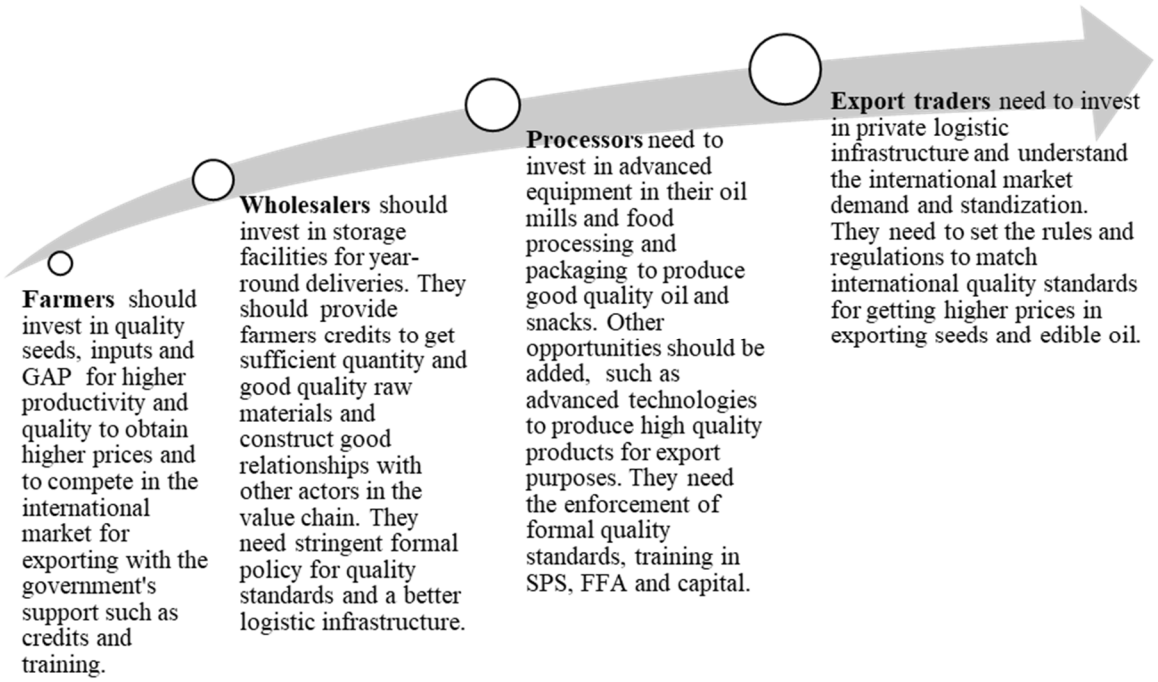
5. Conclusion and Policy Implications

Sesame is one of the major food crops not only for Myanmar's economy but also for generating income for the smallholder households. Regarding the findings of this study, there were many actors in the sesame value chain. Most of the sesame farmers in the study areas only grew the Sahmon Nat variety because of its higher price and market demand. All of the sample farmers directly sold to wholesalers/traders in Magway by cash down, credit and advance payment systems where transportation costs are fair due to convenient road infrastructure. The net benefit of the Sahmon Nat sesame variety was 206847.67 MMK/ac, and the cost-benefit ratio was 1.52. During the peak season, wholesalers/traders from Magway sold the sesame by cash down, commission and credit systems to wholesalers and Chinese commission agents in Mandalay, food processors in Magway and exporters in Yangon. Oil millers bought the sesame not only from farmers but also from wholesalers/traders.

Wholesalers and Chinese commission agents in Mandalay traded raw sesame products directly to the Muse Exchange center (cross-border export to China). Exporters in Yangon traded raw sesame products to Japan and Taiwan and roasted sesame powder to Korea via Yangon port. The marketing margins and profits of wholesalers/traders in Magway and Mandalay were the highest for the Sahmon Nat variety. The sesame value chain was very weak in the study areas because wholesalers received much of the profit by transacting the sesame without value-adding and the individual farmers marketed their sesame directly to wholesalers without any negotiating power. Moreover, the constraints highlighted that good quality seed, stable market prices and demand and advanced facilities and technologies are needed for market participants along the value chain in the study area. Many stakeholders mentioned that imported palm oil is a major threat for the oilseed sector development because it is inexpensive and, even in the world market, this palm oil price is far below the prices of other oilseed crops, especially groundnut and sesame. In contrast, for most purposes such as cooking or frying, palm oil is an excellent oil and economically beneficial for consumers, particularly low- and medium-income consumers, but less so for health-conscious and high-income consumers. Furthermore, oil imports are not in line with the government policies of self-sufficiency in groundnut or sesame oil and are a threat for oil millers. This imported palm oil will deteriorate the economic returns of all stakeholders in the sector.

6. Policy Implications

To become a world market player at all levels of the value chain from producers to exporters, a boost is needed. Public and private investment should be raised in the seed industry by adopting advanced facilities and investing in technology to produce good quality seed. Public institutions must consider such factors as domestic and international trade, guaranteed minimum prices, contract farming, seed and fertilizer distribution, infrastructure, agricultural bank and other investment projects. Extension programs for smallholder farmers should be supported by public institution and the private sector to develop more effective marketing strategies and to negotiate more effectively with traders. The government should urgently set the standards for marketing activities along the value chain, which should conform to international standards. Investments are needed on all levels from quality seeds and inputs at the farm level to food safety and quality seed at the exporter level. These developments will enhance business with international standards and controls at an international level. The developments are depicted in below figure.



7. Proposed Interventions for the Sesame Marketing Sector

- Ensure the adoption of good quality seeds, appropriate fertilizers and pest management alternatives and other integrated crop management practices by farmers.
- Strengthen technology and weather information delivery and extension services.
- Encourage inspection and establish laboratories and services for testing marketed agrochemicals in the local market for export quality products.
- Establish a credit facility with loan equity to enable the private sector to buy postharvest and marketing machinery and facilities by all participants.
- Upgrade existing oil mills or acquire new units to bolster efficiency, lower unit cost and improve milled output.
- Conduct relevant market research in different areas.
- Encourage the establishment of a weight scale and standards for sesame (for international standards).
- Develop educational programs about collective action in marketing activities.
- Encourage public and private sector partnership to invest in infrastructure.

8. Acknowledgements

The authors would like to express their deep gratitude and appreciation for the financial support of the sponsoring organization JICA (Japan International Cooperation Agency) for this study. Special thanks go to all the sesame farmers, traders, wholesalers, oil millers, processors and exporters who provided data for the study.

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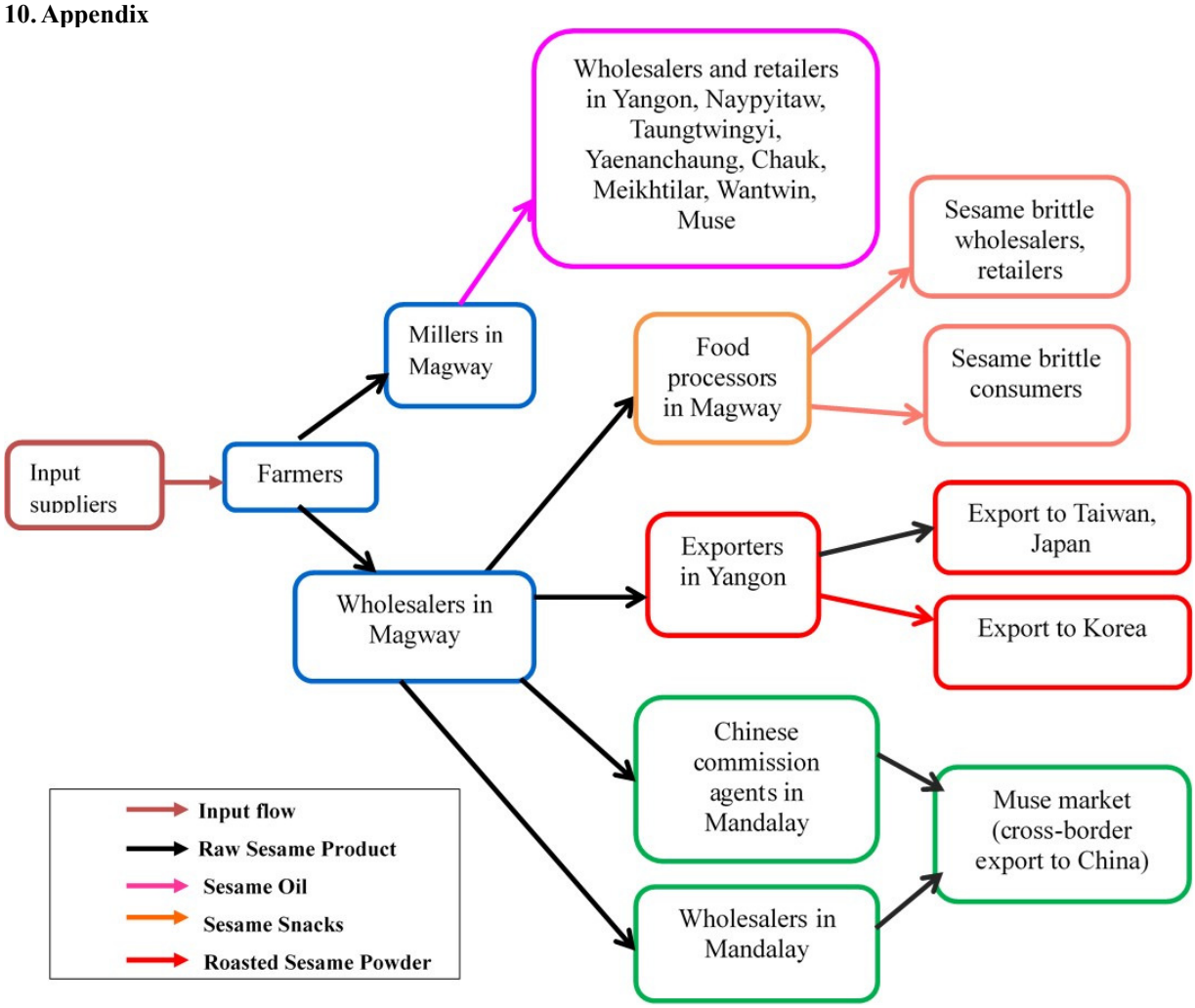
Notes

Note 1. Authors confirm that the article are original

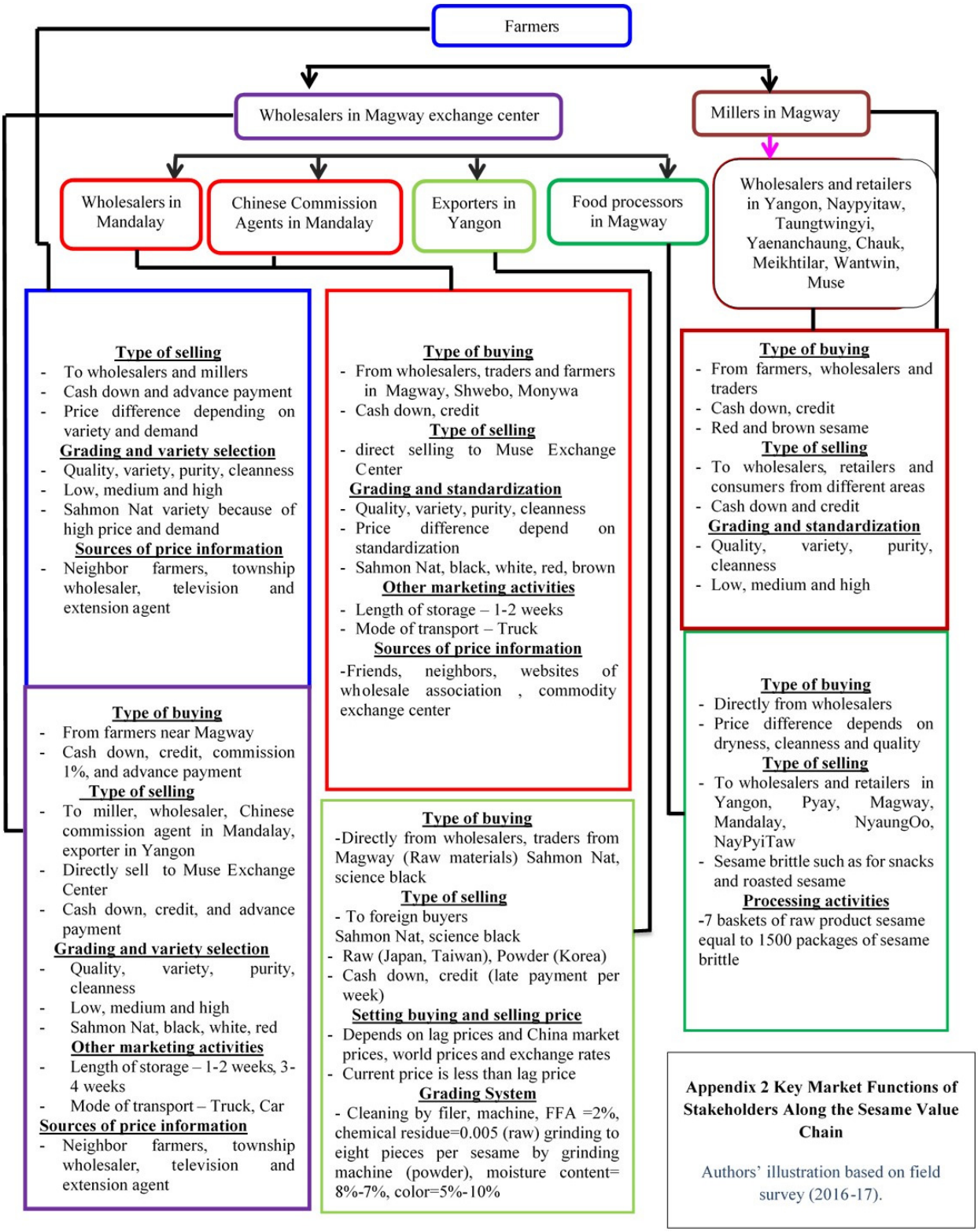
Note 2. There is no any plagiarism issues

Note 3. The article is not being considered elsewhere
Note 4.The authors are willing to transfer the first publishing right to the publisher if the article is accepted after review.

10. Appendix

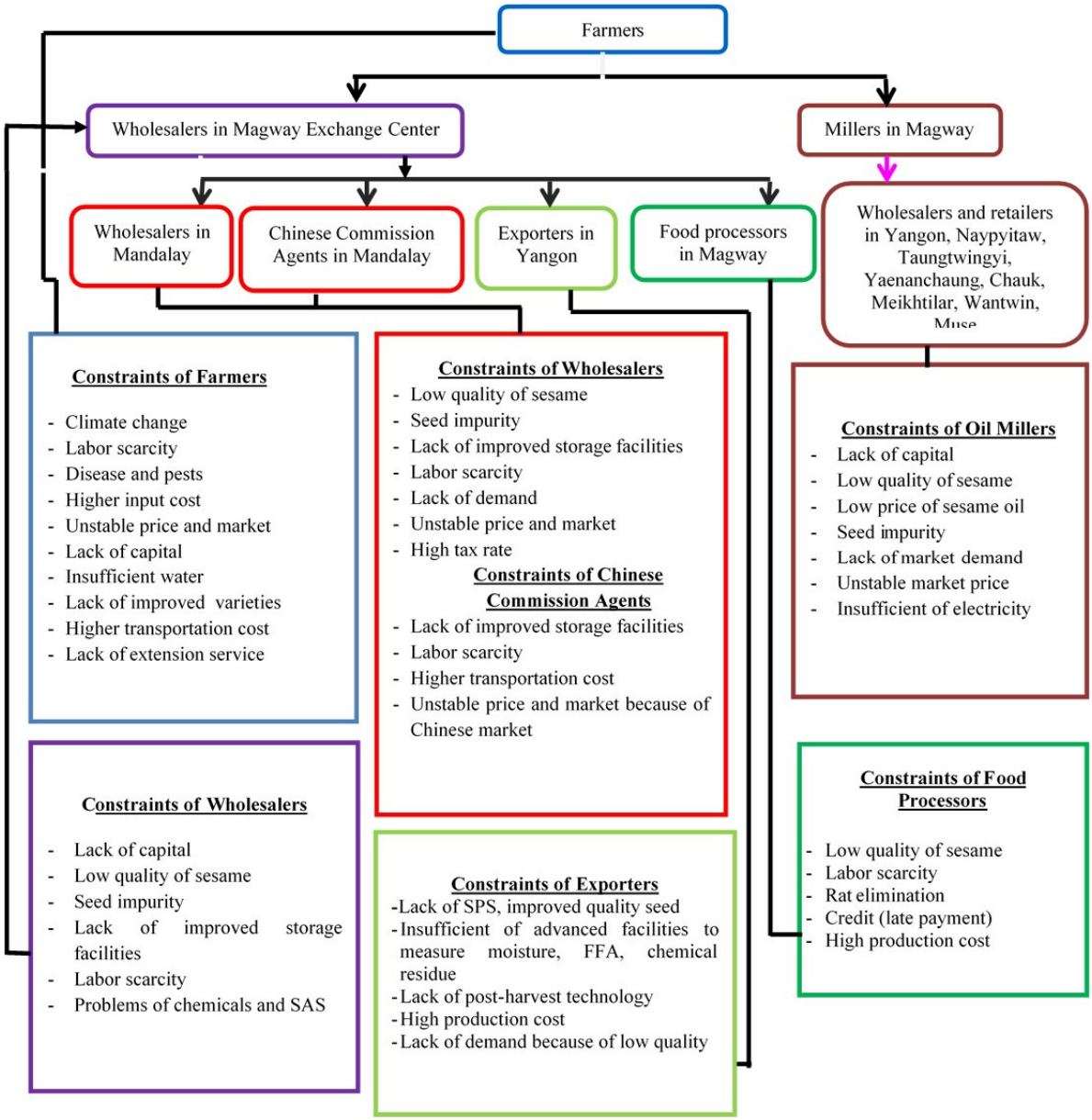


Appendix 1 Core process for the sesame value chain in the study areas.
Authors' illustration based on field survey (2016-17).



Appendix 2 Key Market Functions of Stakeholders Along the Sesame Value Chain

Authors' illustration based on field survey (2016-17).



Appendix 3. Major Constraints of Stakeholders in the Sesame Market
Authors' illustration based on field survey (2016-17)