# VALUE ADDED PROCESSING OPPORTUNITIES AND PROFIT FUNCTION OF GROUNDNUT FARMERS IN MYINMU TOWNSHIP, SAGAING REGION

**SAN SINT WAI**

**NOVEMBER 2019**

# VALUE ADDED PROCESSING OPPORTUNITIES AND PROFIT FUNCTION OF GROUNDNUT FARMERS IN MYINMU TOWNSHIP, SAGAING REGION

**A thesis presented by**

**SAN SINT WAI**

**to**

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The thesis attached here to, entitled "**Value Added Processing Opportunities and Profit Function of Groundnut Farmers in Myinmu Township, Sagaing Region**" was prepared under the direction of the supervisor of the candidate supervisory committee and has been approved by all members of that committee as a requirement for the degree of **Master of Agricultural Science (Agricultural Economics).**

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**Thida Than**
Chairperson
Supervisory Committee
Lecturer
Department of Agricultural Economics
Yezin Agricultural University

---

**Dr. Amy Soe**
External Examiner
Assistant Director
ASEAN Division
Department of Planning
Nay Pyi Taw

---

**Dr. Theingi Myint**
Member
Supervisory Committee
Professor
Department of Agricultural Economics
Yezin Agricultural University

---

**Dr. Htay Htay Oo**
Member
Supervisory Committee
Associate Professor
Department of Agronomy
Yezin Agricultural University

---

**Dr. Cho Cho San**
Professor and Head
Department of Agricultural Economics
Yezin Agricultural University
Yezin, Nay Pyi Taw

Date ……

This thesis was submitted to the Rector of the **Yezin Agricultural University** and was accepted as a requirement for the degree of **Master of Agricultural Science (Agricultural Economics)**.

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**Dr. Nang Hseng Hom**
Rector
Yezin Agricultural University
Yezin, Nay Pyi Taw

Date ……

## DECLARATION OF ORIGINALITY

This thesis represents the original works of the author, except where otherwise stated. It has not been submitted previously for a degree at any other University.

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**San Sint Wai**

Date ……

**DEDICATED TO MY BELOVED PARENTS,**

**U THAN SOE AND DAW KHIN SAW WIN**

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## ABSTRACT

This study attempted to analyze value added processing opportunities and profit function of groundnut farmers. A total of 150 sample groundnut farmers from three villages were selected by using purposive random sampling method in Myinmu Township, Sagaing Region. The objectives are to explore the opportunities on value added processing of groundnut products, to analyze the marketing margin for each groundnut product of sample farmers and to identify the determinant factors on profitability of groundnut selling types of farmers. Descriptive, cost and return, marketing margin and regression analyses were used. According to the cost and return analysis, in winter season, the highest benefit cost ratio (BCR) was observed in selling seed (1.64) and the lowest in selling pods (0.96). In rainy season, the largest BCR and the smallest BCR were 2.30 and 1.24 of selling seed and pod respectively. In marketing margin analysis, selling seed was the highest profit share (87.16%) followed by high purified grain (39.19%), edible oil and oilcake (36.44%), low purified grain (29.26%) and pod (8.26%). Moreover, the profit per cost price of seed was the higher profit share than the other types of groundnut product. In the regression results, the groundnut profit was positively and significantly influenced by groundnut yield, while family labor cost, hired labor cost and total material cost were negatively and significantly influenced on profit of groundnut production. The profit of high purified grain, total material cost, family labor cost and hired labor cost were negatively and significantly influenced, and price and processing cost were positively and significantly influenced. The profit of low purified grain, total material cost and family labor cost were negatively and significantly influenced, and price and processing cost were positively and significantly influenced. Based on the findings, seed and high purified grain production were economically more attractive for farmers than other groundnut products. It would be concluded that, sample groundnut farmers can earn more profit by selling of value added groundnut products. Therefore, groundnut value added enterprise would be required to encourage for improving the socio-economic conditions of farmers.

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| BCR | = Benefit - Cost Ratio |
| FAO | = Food and Agriculture Organization |
| DOA | = Department of Agriculture |
| MOALI | = Ministry of Agriculture, Livestock and Irrigation |
| USA | = United States of America |
| GAD | = General Administrative Department |
| MADB | = Myanmar Agricultural Development Bank |
| UNDP | = United Nation Development Program |
| ha | = Hectare |
| kg | = Kilogram |
| MMK | = Myanmar Kyat |
| MT | = Metric Ton |
| SPSS | = Statistical Packages for Social Science |
| FCR | = Feed Conversion Rate |
| RTE | = Ready to Eat |
| RUTF | = Ready-to-Use Therapeutic Foods |
| MUFA | = Mono Unsaturated Fatty Acids |
| PUFA | = Poly Unsaturated Fatty Acids |

## LIST OF CONVERSION FACTORS

| | |
|---|---|
| 1 basket of groundnut with shell (pod) | = 11.34 kilograms |
| 1 basket of groundnut without shell (grain) | = 23 kilograms |
| 1 metric ton | = 1,000 kilograms |
| 1 hectare | = 2.471 acres |
| 1 viss | = 1.63 kilograms |

# CHAPTER I
# INTRODUCTION

## 1.1 Groundnut Production in the World

Groundnut or peanut is commonly called the poor man's nut. It is an important oilseed and food crop. It is originated in South America. The botanical name for groundnut, *Arachis hypogaea Linn*., is derived from two Greek words, *Arachis* meaning a legume and *hypogaea* meaning below ground, referring to the formation of pod in the soil. Groundnut is an upright annual plant. It is generally distributed in the tropical, sub-tropical and warm temperate zones. Later, the groundnut is grown in Asia and Africa now between the latitudes 40˚ N and 40˚S (Nautiyal, 2002).

Groundnut was cultivated in more than 60 countries in the world and occupied an area of about 246 million hectares with the production of 400 million tons in the world during 2011. In Asia, China was the largest producer, accounting for 40% of total world production followed by India (17.40%). During 2011, China and India, Nigeria (7.40%), United States of America (4.14%), Myanmar (3.49%) and Sudan (2.96%) were the other major groundnut producing countries. India ranked number one in the world with regard to area under this crop. However, in case of production, it ranked second because of lower productivity. Productivity of groundnut in India was only 1.32 metric tons per hectare as against productivity of 3.50 metric tons per hectare in neighboring China (Thornton, 2016).

Developing countries in Asia, Africa and South America accounted for about 97% of world groundnut area and 95% of total production. Production was concentrated in Asia (50% of global area and 64% of global production) and Africa (46% of global area and 28% of global production), where the crop was grown mostly by smallholder farmers under rain-fed conditions with limited inputs. The USA was one of the world’s leading groundnut exporters, with average annual exports of between 200,000 and 250,000 metric tons in 2013. Argentina (460,037 metric tons) and China (65,000 metric tons) were other significant exporters (Mugisha, Lwasa & Mausch, 2014).

Asia had the largest area of groundnut cultivation in the world contributing to 67% of the total production in 2007. India held the largest acreage (6.7 million hectares) in 2007 followed by China (4.7 million hectares), Indonesia, Myanmar, Pakistan and Thailand. There has been an important increase in harvested area in Asia

in the last two decades, mainly in China, Hong Kong, Japan, Korea and Taiwan. The average productivity of groundnut in Asia was 1,739 kilograms per hectare.

In Africa, groundnut was grown mainly in Nigeria, Sudan, Senegal, Chad, Ghana, Congo, and Niger. In 2007, the total harvested area in Africa was 9.04 million hectares with a total production of 8.7 million metric tons. The average productivity in this region was 964 kilograms per hectare, which was poor when compared to the US and other developed countries where it was close to 3,500 kilograms per hectare. In 2007, average productivity was 1,720 kilograms per hectare in Nigeria, 500 kilograms per hectare in Sudan, and close to 700 kilograms per hectare in Senegal. For a long time groundnut was the main export product of Senegal and the Gambia (Prasad , Kakani & Upadhyaya, 2010).

## 1.2 Background Information

In the world, Myanmar was fourth producer for groundnut oil and sixth producer for groundnut production in 2013 (Wijnands, Biersteker, Hagedoorn & Louisse, 2014). According to secondary data from Department of Agriculture [DOA], Myanmar is one of the agricultural countries with more than 60 different growing crops. Because of diverse agro-ecological conditions, Myanmar is suitable for growing many different kinds of crop. These different crops can be grouped into eight categories. They are cereal crops, pulses, oilseed crops, industrial crops, culinary crops, vegetables, fruits and other crops. Among them, oilseed crops stand the third most important one after cereal crops and pulses. The secondary data from DOA presented groundnut exists the second most important one after sesame among the oilseed crops group in Myanmar.

Dhanesh and Kochhar (2015) stated that groundnut is one of the most edible oil and protein producing crops in the world. Most of the groundnut is grown in the world to produce oil, groundnut butter, confectionaries, roasted groundnuts and snack products, extenders in meat product formulations, soups and desserts. The groundnut is directly consumed as raw nut or in processed form based on the different value chains (Govindaraj and Jain, 2011).

Groundnut seed contains 40 – 50% oil, 20 – 50% protein and 10 – 20% carbohydrates depending on the variety. Groundnut seeds are also rich in Vitamin E, niacin, folacin, calcium, phosphorus, magnesium, zinc, iron, riboflavin, thiamin and potassium. Groundnut is consumed as raw, blanched, peanut butter, crushed and mixed with traditional dishes or as a cooked paste (Kiryowa et al., 2013).

Among all the nuts, groundnut contains an excellent nutritional profile due to which it is widely used in the diets for weight management and meeting appropriate protein levels in the body. Groundnut includes a desirable fatty acid profile for which it is used for weight management diets and is rich in vitamins, minerals and several bioactive compounds. They contain several known heart healthy nutrients including mono unsaturated fatty acids (MUFA) and poly unsaturated fatty acids (PUFA), potassium, magnesium, copper, niacin, arginine, fiber, alpha-tocopherol, folates, phytosterols and flavonoids. Important bioactive compounds like catechins and procyanidins are found in peanut skins which are known for anti-inflammatory effect on pro-inflammatory enzymes and nitrous oxide levels. Groundnut consists mainly of two globulins namely arachin (93% of defatted seed protein) and co-arachin (Dhanesh and Kochhar, 2015).

### 1.3 Land Utilization in Myanmar

According to secondary data from Ministry of Agriculture, Livestock and Irrigation [MOALI], the total area was 67,659 ('000 ha) and net sown area possessed 12,057 ('000 ha) in 2017-18. Fallow land was 465 ('000 ha), cultivable waste land possessed 5,542 ('000 ha), reserved forests covered 18,878 ('000 ha) and other land possessed 16,207('000 ha) in total land utilization respectively in 2017-18 as presented in Table (1.1). In Myanmar, net sown area was gradually increased from 2010-11 to 2017-18. About 28% of the total land area was occupied by reserved forests, other land (24%), other forest areas (21%), net sown area (18%), cultivable land (8%) and fallow land (1%) respectively in 2017-18 (Figure 1.1).

### 1.4 Role of Major Crops in Myanmar

In Myanmar, major crops include cereal crops, oilseed crops, pulses, industrial crops and culinary crops. Among these crops, a cereal crop was the largest sown area and a culinary crop was the smallest one. According to secondary data from MOALI, total sown area was 20,448 ('000 ha) and sown area of cereal crops possessed 8,398 ('000 ha) in 2017-18. And, pulses sown area occupied 4,439 ('000 ha) and oilseed crops covered 3,315 ('000 ha) in 2017-18. Then, sown areas of other crops, industrial crops and culinary crops were 2,779 ('000 ha), 1,179 ('000 ha) and 338 ('000 ha) respectively in 2017-18 as presented in Table (1.2). The secondary data from MOALI presented, among the major crops, share of sown area for cereal crops possessed by

41% of the total sown area and followed by 22% and 16% were share of sown area of pulses and oilseed crops. And, 13%, 6% and 2% were share of sown area of other crops, industrial crops and culinary crops respectively in 2017-18 are showed in Figure (1.2).

## 1.5 Role of Oilseed Crops in Myanmar

In Myanmar, major oilseed crops include groundnut, sesame, sunflower, mustard, niger and oil palm. They also play a vital role due to a high consumption of cooking oil compared to neighboring countries. As the amount of edible oil produced is not sufficient for local consumption, approximately 200,000 metric tons of palm oil is being imported annually to meet local requirement. In order to reduce the imported palm oil, efforts to increase yield and production of oilseed crops such as use of high yielding varieties and hybrid seed, modern cultural practices and practicing an appropriate cropping pattern are being implemented. In upland farming system, hybrid sunflower seed has been introduced in appropriate areas to double the existing average yield. In Myanmar, sesame was the largest sown area and mustard was the smallest one among the oilseed crops (MOALI, 2018). The total sown area of sesame possessed 1,590 ('000 ha), groundnut sown area covered 1,035 ('000 ha), and sown area of sunflower occupied 275 ('000 ha) in 2017-18. According to secondary data from MOALI, total sown area of mustard, niger and oil palm were 48 ('000 ha), 146 ('000 ha) and 162 ('000 ha) respectively in 2017-18 as shown in Table (1.3). Among the oilseed crops, sesame (49%) was the largest share of sown area and groundnut (32%) was the second one. About 8% of sown area of oilseed crops was occupied by sunflower, oil palm (5%), Niger (5%) and Mustard (1%) respectively as presented in Figure (1.3).

**Table 1.1 Total land utilization in Myanmar from 2010-2011 to 2017-2018 ('000 ha)**

| Year | Net sown area | Fallow land | Cultivable waste land | Reserved forests | Other forest area | Other land | Total area |
|---|---|---|---|---|---|---|---|
| 2010-11 | 12,021 | 230 | 5,396 | 17,916 | 15,630 | 16,467 | 67,659 |
| 2011-12 | 11,920 | 322 | 5,374 | 18,235 | 15,348 | 16,461 | 67,659 |
| 2012-13 | 11,841 | 439 | 5,361 | 18,305 | 14,207 | 16,506 | 67,659 |
| 2013-14 | 11,869 | 457 | 5,285 | 18,596 | 14,842 | 16,611 | 67,659 |
| 2014-15 | 11,986 | 443 | 5,267 | 18,574 | 14,734 | 16,656 | 67,659 |
| 2015-16 | 12,008 | 450 | 5,246 | 18,554 | 14,742 | 16,659 | 67,659 |
| 2016-17 | 12,038 | 472 | 5,239 | 18,656 | 14,612 | 16,642 | 67,659 |
| 2017-18 | 12,057 | 465 | 5,542 | 18,878 | 14,509 | 16,207 | 67,659 |

Source: MOALI, 2018

**Table 1.2 Total sown area of major crops in Myanmar from 2010-2011 to 2017-2018 ('000 ha)**

| Year | Cereal crops | Pulses | Oilseed crops | Other crops | Industrial crops | Culinary crops | Total sown area |
|---|---|---|---|---|---|---|---|
| 2010-11 | 9,138 | 4,501 | 3,814 | 4,741 | 1,025 | 347 | 23,567 |
| 2011-12 | 8,686 | 4,417 | 3,487 | 4,525 | 1,037 | 343 | 22,497 |
| 2012-13 | 8,360 | 4,449 | 3,414 | 3,465 | 1,018 | 341 | 21,047 |
| 2013-14 | 8,414 | 4,534 | 3,479 | 3,380 | 1,228 | 333 | 21,368 |
| 2014-15 | 8,357 | 4,554 | 3,461 | 3,379 | 1,269 | 350 | 21,370 |
| 2015-16 | 8,401 | 4,656 | 3,511 | 3,162 | 1,244 | 349 | 21,323 |
| 2016-17 | 8,356 | 4,661 | 3,477 | 2,811 | 1,211 | 345 | 20,861 |
| 2017-18 | 8,398 | 4,439 | 3,315 | 2,779 | 1,179 | 338 | 20,448 |

Source: MOALI, 2018

**Table 1.3 Oilseed crops cultivation in Myanmar from 2010-2011 to 2017-2018 ('000 ha)**

| Year | Groundnut | Sesame | Sunflower | Mustard | Niger | Oil Palm |
|---|---|---|---|---|---|---|
| 2010-11 | 877 | 1,585 | 859 | 101 | 158 | 125 |
| 2011-12 | 887 | 1,595 | 543 | 72 | 156 | 134 |
| 2012-13 | 914 | 1,553 | 624 | 63 | 156 | 144 |
| 2013-14 | 931 | 1,622 | 481 | 61 | 155 | 148 |
| 2014-15 | 949 | 1,581 | 484 | 59 | 157 | 153 |
| 2015-16 | 955 | 1,640 | 466 | 59 | 157 | 158 |
| 2016-17 | 989 | 1,636 | 408 | 57 | 155 | 161 |
| 2017-18 | 1,035 | 1,590 | 275 | 48 | 146 | 162 |

Source: MOALI, 2018

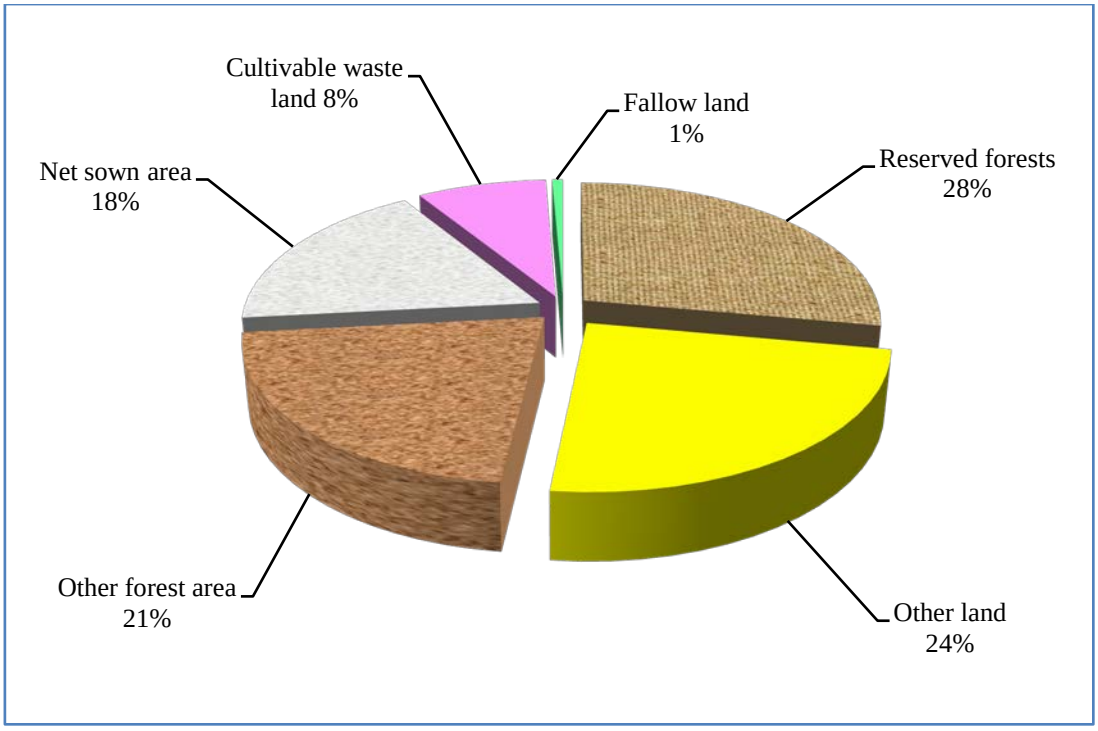



**Figure 1.1 Total land utilization in Myanmar (2017-2018)**

Source: MOALI, 2018

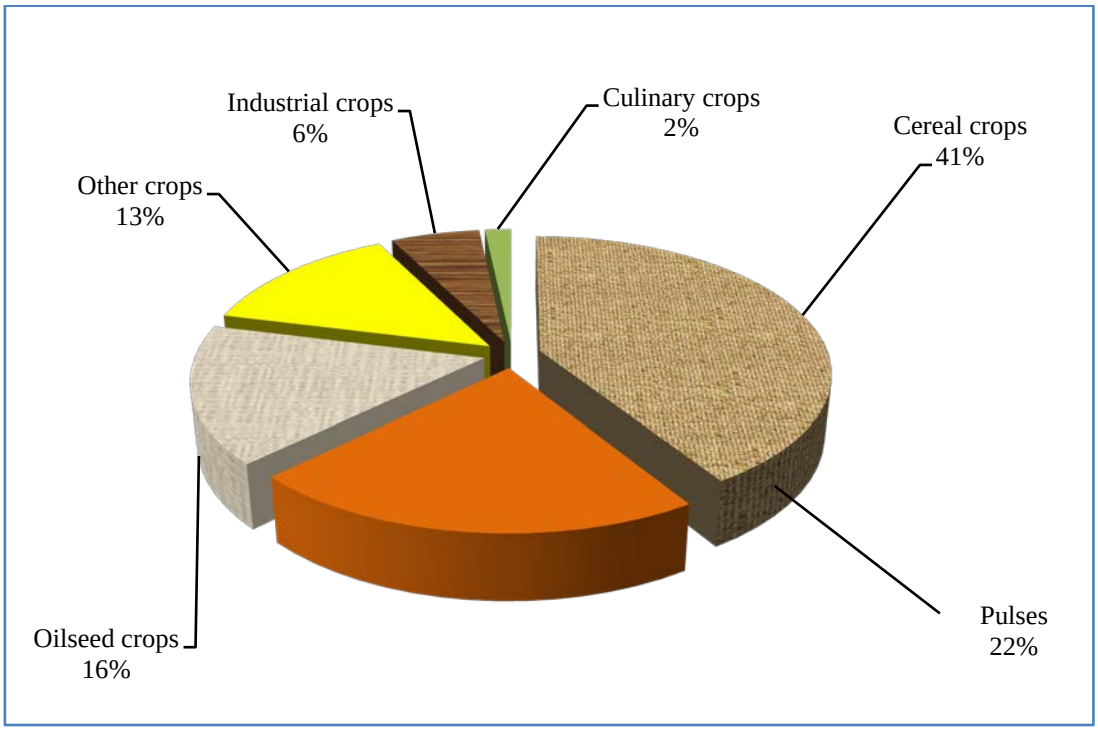



**Figure 1.2 Sown areas of major crops in Myanmar (2017-2018)**

Source: MOALI, 2018

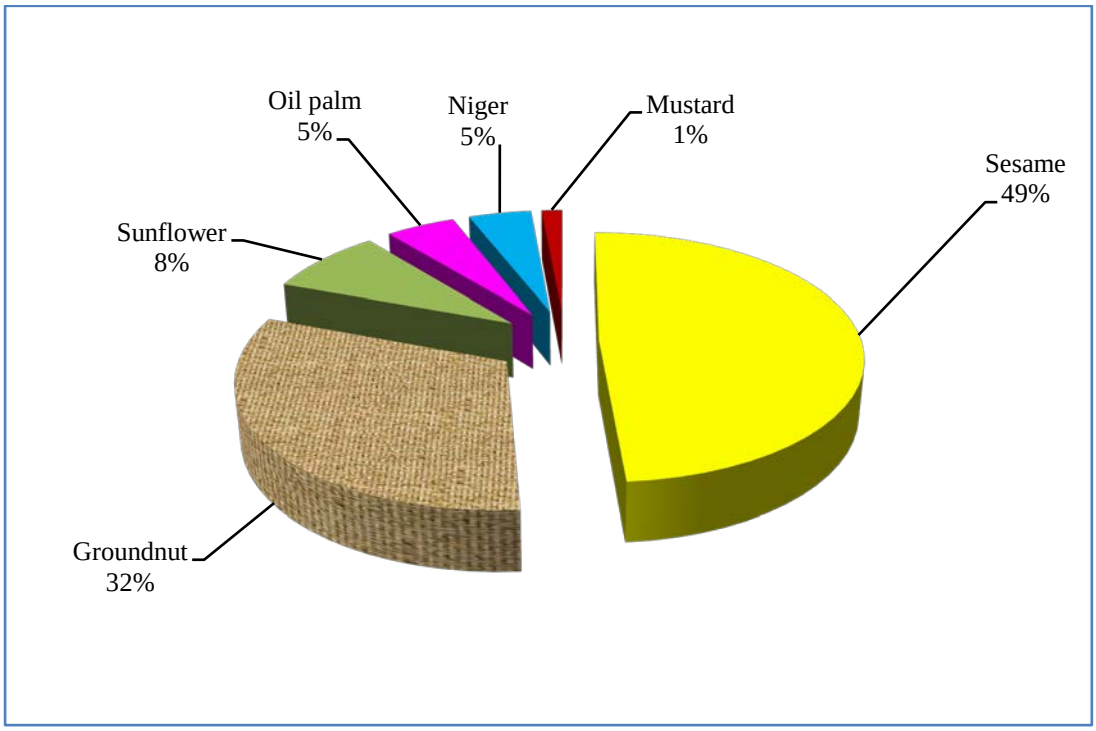



**Figure 1.3 Sown areas of major oilseed crops in Myanmar (2017-2018)**

Source: MOALI, 2018

## 1.6 Groundnut Cultivation and Production in Myanmar

The groundnut is consumed roasted, boiled or as confectionary, snack nuts, in cookies and also used as a source of oil. In addition, the by-product, meal (oilcake) is used for both human and livestock consumption in Myanmar. Moreover, it is also used for a direct consumption which forms an important part of the diet. Groundnut is marketed for two different purposes: (1) to be consumed as groundnut oil and (2) to be used as traditional snack. Groundnuts are mainly sold as edible groundnuts, crushed groundnuts, seeds, and oilcake for the animal feed industry.

Food processing constitutes as a major economic sector in developing countries, especially in urban areas where low income families are not equipped to carry out the basic processing of agricultural and animal products. Food processing also allows the consumption of seasonal agricultural products over the whole year (Favre and Myint, 2009).

Groundnut is important as an edible oil and food crop in the country. Thousands of smallholder farmers in Myanmar grow groundnut for household food consumption. In Myanmar, the groundnut is classified as an oilseed crop because of the high oil content in the grain. According to secondary data from DOA in Myanmar, groundnut cultivation and production was gradually increased from 2010-11 to 2018-19 as shown in Figure (1.4).

### 1.6.1 Groundnut cultivation and production in Regions and States

In Myanmar, every States and Regions cultivated the groundnut. However, 85% of groundnut is grown in Sagaing, Magway and Mandalay Regions and the last (15%) are others such as Bago Region, Ayeyawady Region, Rakhine State, Shan State (South), Nay Pyi Taw Council, Shan State (North), Kayin State, Kachin State, Mon State, Shan State (East), Kayah State, Chin State, Yangon Region and Tanintharyi State. The major top three Regions of groundnut cultivation and production in Myanmar are Sagaing Region, Magway Region and Mandalay Region. The groundnut sown area and production of Sagaing Region are 351.23 ('000 ha) and 574.75 ('000 MT) and it is followed by 236.74 ('000 ha) and 321.63 ('000 MT) in Magway Region and 214.16 ('000 ha) and 273.58 ('000 MT) in Mandalay Region (DOA, 2019). Sown area, harvested area, yield and production of groundnut in Regions and States in 2018-19 are presented in Table (1.4).

### 1.6.2 Groundnut cultivation and production trend in Sagaing Region

The secondary data from DOA presented Sagaing Region is the largest sown area of groundnut production in Myanmar. Groundnut sown area and production were gradually increased from 2010-11 to 2018-19 in Sagaing Region. Groundnut sown area, harvested area, yield and production of Sagaing Region from 2010-11 to 2018-19 are indicated in Table (1.5).

According to secondary data from DOA, Kambalu Township has the largest sown area of groundnut production in Sagaing Region. And also, Khin U, Tasei and Myinmu Townships have second, third and fourth largest sown area of groundnut, respectively in 2018-19. However, in Sagaing District, Myinmu Township is the largest one (Figure 1.5). In 2018-19, groundnut cultivation of Kambalu, Khin U, Tasei and Myinmu Townships are 58,857.55 hectares, 27,425.74 hectares, 25,756.78 and 22,500.20 hectares respectively in Sagaing Region. Groundnut sown area, harvested area, yield and production of each Township in Sagaing Region in 2018-19 are presented in Appendix (1).

## 1.7 Rationale of the Study

Oilseed crops stand third position in term of sown area in Myanmar. Oilseeds and oilseed products are economically crucial for livelihood of Myanmar farmers, processors and consumers. The contribution of oilseed products plays a vital role in Myanmar agricultural sector and agricultural product markets as well as on international markets. In Myanmar, increase in oilseed crops production depends totally on area expansion (Favre and Myint, 2009).

Agricultural development policies and programmes have been developed to lay emphasis on improving farm productivity, but with less attention on the processing and storage of the output. Market forces have initiated greater opportunities for product differentiation and value addition in some expect (Boland, 2009). These include i) increased consumer demand regarding health, nutrition, and convenience food; ii) efforts by food processors to improve their productivity; and iii) technological advances that enable producers to produce what consumers and processors/manufacturers desire (Food and Agriculture Organization [FAO], 2011). Therefore, this study explored the opportunities on value added processing of groundnut products in the study area.

Ojowu (2006) explained that using improvement initiating activities in processing and market expansion from the market end of the commodity value chain, to provide demand pull benefits raw material producers, especially small holder farmers, is necessary for sustainable agricultural development. Importantly, improvement of efficiency in the value chain fosters more equitable, transparent and sustainable distribution of benefits to the various stakeholders (FAO, 2011). Therefore, this study analyzed marketing margin for each groundnut product of sample farmers in the study area.

Tschering (2002) reported that influencing factors on profitability were the farmer's characteristics, input use, labor use, costs, whether the farmers produced for sale or for home consumption as well as the methods of production. Therefore, this study identified the determinant factors on profitability of groundnut selling types of farmers in the study area.

Groundnut cultivation occupies the second largest areas with the highest production among the oilseed crops in Myanmar. Sagaing Region has the largest sown area of groundnut in Myanmar. And also, Myinmu Township is the largest sown area of groundnut in Sagaing District. It is seen that most of farmers selling raw products of groundnut received considerable low level of income. It is required to analyze value added processing opportunities for groundnut farmers to improve income level of groundnut production. Therefore, this study will point out value added processing opportunities and profit function of groundnut farmers in Myinmu Township, Sagaing Region.

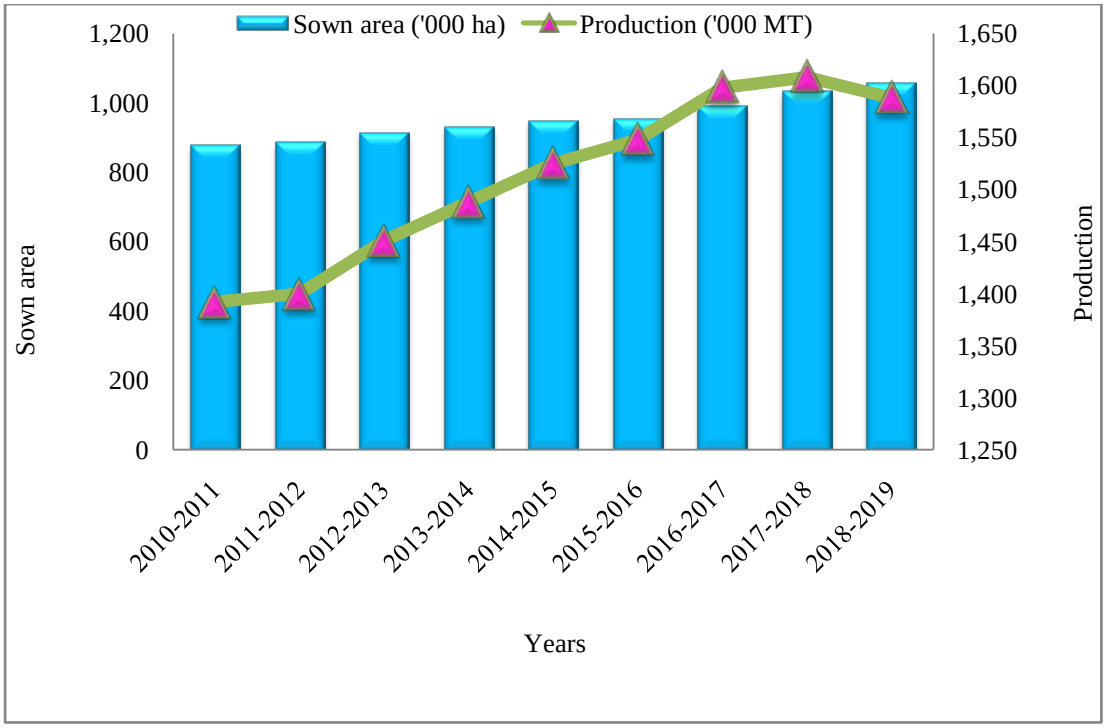



**Figure 1.4 Groundnut sown area and production in Myanmar from 2010-2011 to 2018-2019**

Source: DOA, 2019

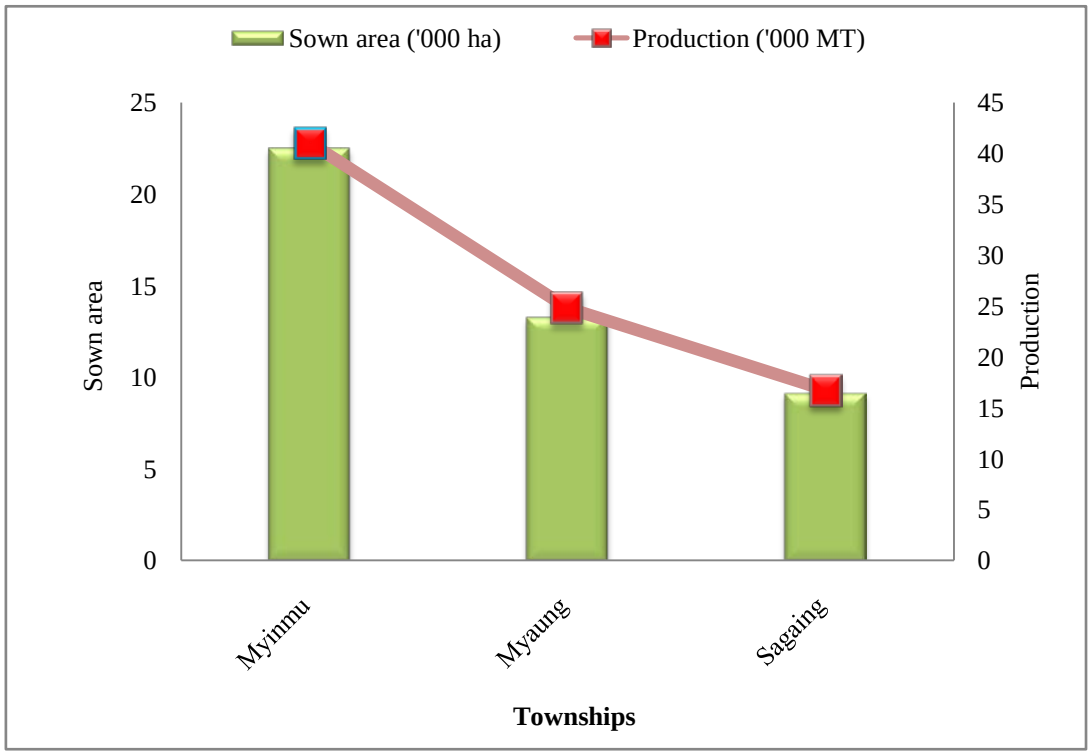



**Figure 1.5 Sown area and production of groundnut in Sagaing District in 2018-2019**

Source: DOA, 2019

**Table 1.4 Sown area, harvested area, yield and production of groundnut in Regions and States in 2018-2019**

| Regions/States | Sown area ('000 ha) | Harvested area ('000 ha) | Yield (MT/ha) | Production ('000 MT) |
|---|---|---|---|---|
| Sagaing | 351.23 | 351.22 | 1.64 | 574.75 |
| Magway | 236.74 | 236.63 | 1.36 | 321.63 |
| Mandalay | 214.16 | 214.16 | 1.28 | 273.58 |
| Bago | 74.90 | 74.90 | 1.78 | 133.08 |
| Ayeyawady | 40.05 | 40.03 | 1.70 | 67.95 |
| Rakhine | 30.61 | 30.61 | 1.51 | 46.11 |
| Shan (South) | 27.06 | 27.02 | 1.34 | 36.25 |
| Nay Pyi Taw | 20.67 | 20.67 | 1.42 | 29.42 |
| Kayin | 14.68 | 14.68 | 2.04 | 29.91 |
| Shan (North) | 14.20 | 14.20 | 1.68 | 23.87 |
| Kachin | 11.05 | 11.05 | 2.68 | 29.64 |
| Mon | 7.68 | 7.68 | 1.77 | 13.56 |
| Shan (East) | 7.41 | 7.41 | 1.45 | 10.73 |
| Kayah | 4.24 | 4.24 | 1.29 | 5.48 |
| Chin | 1.59 | 1.59 | 3.79 | 6.03 |
| Yangon | 1.48 | 1.48 | 1.42 | 2.11 |
| Tanintharyi | 0.0008 | 0.0008 | 0.88 | 0.0007 |

Source: DOA, 2019

**Table 1.5 Groundnut sown area, harvested area, yield and production of Sagaing Region from 2010-2011 to 2018-2019**

| Year | Sown area (ha) | Harvested area (ha) | Yield (MT/ha) | Production (MT) |
|---|---|---|---|---|
| 2010-11 | 274,078.10 | 273,867.70 | 1.60 | 438,464.40 |
| 2011-12 | 284,855.50 | 284,855.50 | 1.61 | 459,712.60 |
| 2012-13 | 299,475.50 | 299,471.50 | 1.63 | 487,303.90 |
| 2013-14 | 299,904.50 | 299,890.30 | 1.64 | 491,843.40 |
| 2014-15 | 304,557.70 | 304,557.70 | 1.65 | 503,393.60 |
| 2015-16 | 308,394.60 | 307,741.80 | 1.69 | 520,304.50 |
| 2016-17 | 317,268.30 | 317,239.20 | 1.69 | 537,428.90 |
| 2017-18 | 331,011.30 | 330,941.70 | 1.65 | 547,063.20 |
| 2018-19 | 351,234.30 | 351,220.20 | 1.64 | 574,746.46 |

Source: DOA, 2019

## 1.8 Objectives of the Study

The general objective of this study is to observe the different profitabilities of groundnut selling types of farmers for exploring value added opportunity in farmer level. The specific objectives of the study are

1) To explore the socio-economic characteristics of sample groundnut farmers and their opportunities on value added processing of groundnut products in Myinmu Township
2) To analyze the marketing margin for each groundnut product of sample farmers in the study area
3) To identify the determinant factors on profitability of groundnut selling types of farmers

# CHAPTER II
# LITERATURE REVIEW

## 2.1 Concept of Value Adding and Processing

Gittinger (1982) noted that gross value added, the value of inputs is not subtracted, and the net value added where deductions is made for inputs including depreciation, labor, management, and cost. In this case value added could be positive or negative. Olayide and Heady (1985) pointed out that processing is an important component of agribusiness development, because a large portion of farm production underwent some degree of change between harvesting and final use.

Achaya (1990) reported that processing converts the raw materials and brings the produce nearer to human consumption. It is concerned with value addition to the produce by changing its form. Processing of groundnut have been done for in-shell consumption and shelling peanuts for other uses. In shell processing begins precleaning which involves separation of foreign materials from groundnut pods using a series of screens and blowers. The pods are then washed in wet, coarse sand that removes stains and discoloration. The sand is then screened from the groundnut for reuse. The nuts are then dried and powered with talc or kaolin to whiten the shells. Groundnuts can be processed into many products, including cooking oil, groundnut flour, groundnut butter, biodiesel, boiled and salted, roasted nuts, and animal feeds. Groundnuts are also used as ingredients in chocolate, energy bars and cakes, and can be coated with flour to make deep fried products.

Olukosi and Isitor (1990) described processors and manufacturers activities as increasing the quality and value of farm produce. The value adding process however runs in the entire food marketing channel from production through processors, the traders to the final consumer.

Austin (1992) and Brown (1994) explained that the difference between cost of ingredients (including farm produce), and the ex-factory or post-processing price of the finished products is the value added through processing in agricultural processing. Value added is to economically add value to a product by changing its current place, time and form characteristics to characteristics more preferred in the market-place (Coltrain, Barton & Boland, 2000).

Agricultural marketing provides form, place, time and possession utilities to consumers. Agricultural processing changes the form of the farm produce to a state

required by consumers or next stage in a manufacturing scheme, hence creating form utility (Kohls and Uhls, 2002). Black (2002) defined that the difference in values of raw agricultural product before processing and after processing is the added value. Value adding as the total value of a firm's output less the value of inputs purchased from other firms. Value added is what is left to be shared between wages of the employees and profits for owners of the business.

Chait (2019) stated that any product or action that helps raise the value of products or business can add to a product enables to increase profit margin. Value added is the difference between the price of product or service and the cost of producing it. The price is determined by what customers are willing to pay based on their perceived value. Value is added or created in different ways (Kenton, 2019).

## 2.2 Utilization of Groundnut

Duke (1981) mentioned that groundnut oil was the most important product of the crop. At present about 40% of the world crop was processed into oil, which has a multitude of domestic and industrial applications. It may be used for cooking, for margarines and vegetable ghee, for shortening in pastries and bread, for pharmaceutical and cosmetic products, as a lubricant and emulsion for insecticides, and as a fuel for diesel engines. Groundnut butter was a comminuted food product prepared from dry-roasted, clean, sound, mature groundnuts from which the seed coat and germs (hearts) are removed, and to which salt, hydrogenated fat and sometimes sugars, antioxidants and flavors are added (Zamula, 1985).

Asiedu (1994) stated that the kernels may be eaten raw, roasted or boiled, sometimes salted or made into a paste popularly known as groundnut butter. The tender leaves of the plant were used in certain parts of West Africa as a vegetable in soups. The press cake containing 40-50% protein was used mainly as poultry feed. Groundnut flour, produced from the cake, can be used for enhancing or enriching the nutritive value of tuber flours that are low in protein, such as cassava flour.

Groundnut was an important subsistence food crop throughout the tropics. It is mainly grown for the kernels and the edible oil and meal derived from them, and the vegetative residue. Groundnut kernels typically contain 47-53% oil and 25-36% protein; they also contain about 10-15% carbohydrate and they are also a good source of vitamins B, E and rich in P (Prasad, Kakani & Upadhyaya, 2010).

Groundnut was used in various forms, which include groundnut oil, roasted, and salted groundnut, boiled or raw groundnut or as paste popularly known as groundnut butter. The tender leaves were used in certain parts of West Africa as a vegetable in soups. Groundnut oil is the most important product of the crop, which is used for both domestic and industrial purposes. About 75% of the world groundnut production was used in extraction of edible oil (Prasad, Kakani & Upadhyaya, 2010).

Groundnut oil was the cheapest price and most extensively used vegetable oil in India. It is used mainly for cooking, for margarine and vegetable ghee, salads, for deep-frying, for shortening in pastries and bread, for pharmaceutical and cosmetic products, as a lubricant and emulsion for insecticides and as a fuel for diesel engines (Prasad, Kakani & Upadhyaya, 2010).

The dry pericarp of the mature pods (known as shells or husks) was used for fuel, as a soil conditioner, filler in fertilizers and feeds, or is processed as substitute for cork or hardboard or composting with the aid of lignin decomposing bacteria. The foliage of the crop also serves as silage and forage. With the recent thrust on bio energy, possibilities are being tested for using groundnut as a bio-diesel crop, because groundnut produces more oil per hectare than any other food crop (Prasad, Kakani & Upadhyaya, 2010).

The oil cake left after the extraction of the oil was used as an animal feed or as a source of manure since it contains 7 to 8% of N, 1.5% of $P_2O_5$ and 1.2% of $K_2O$ making it useful as a fertilizer. It is an important protein supplement in cattle and poultry feeds as well. The groundnut cake can also be used for manufacturing artificial fiber. The haulms (plant stalks) are fed to the livestock (Prasad, Kakani & Upadhyaya, 2010).

Groundnut was used to make products like peanut butter, variety breads including white and whole peanut bread, cookies, cakes and brownies, doughnuts and yeast products, pies & desserts, peanut milk, and cheese type products, non-milk beverages, soups, peanuts with meats, ready to eat (RTE) cereals, peanut paste and noodles/fermented peanut pastes, coated nuts and read-to-use therapeutic foods (RUTF). Groundnut oil is used primarily as a cooking and salad oil. Groundnut oil is excellent fat for pan-frying or deep fat frying. Groundnut cake flour was used to improve protein content and quality of several cereal products in India, Kenya, Malawi, Nigeria, Senegal and Zimbabwe. The addition of defatted groundnut flour results in an improvement of baking ease, color and texture of the final product.

Groundnut cake or meal can be used for human consumption after partial hydrolysis of protein by fermentation using certain moulds. Such products are racially digestible and nutritious (Dhanesh and Kochhar, 2015).

In Myanmar, roasted and pounded groundnuts were used for salads of blanched spinach, pennywort leaves and tomatoes. They sprinkle groundnuts on top of noodles and add them to soups. Groundnut was also eaten roasted and served as a snack and, most often, the groundnut was pressed into oil. They also ate the groundnut boiled in the water, which has a very sweet taste (Shwe and Kyu, 2017).

## 2.3 Reviews on Cost and Return Analysis

Greaser and Harper (1994) explained that enterprise budget represents estimates of receipts (income), costs, and profits associated with the production of agricultural products. The information contained in the enterprise budgets can be used by agricultural producers, extension specialists, financial institutions, governmental agencies, and other advisers making decisions in the food and fiber industry. Enterprise budgets contained several cost components. Determining the costs of production practices can be difficult. Individuals often disagreed over which costs to include and how they should be measured. Understandably, these differences arise because production costs are unique to each resource situation. An important financial distinction was the concept of variable and fixed costs.

Olson (2003) stated that enterprise budget analysis is important decision making tool. They can help individual producer determines the most profitable crops to grow, develop marketing strategies, obtain financing necessary to implement production plans, and make other farm business decisions.

Smith, McCorkle, Outlaw & Hanselka (2013) mentioned that enterprise budgets estimate profitability for agricultural enterprises while documenting management practices and the resources and technology used. An enterprise budget is an estimate of the cost and return associated with the production of a product or products-referred to as an enterprise. An enterprise, or profit center one, is a distinct part of the farm or ranch business that can be analyzed separately. An enterprise is usually based on some production input unit an acre of land for most crop enterprise budgets, or an individual animal unit for livestock enterprise budgets. In some cases, two enterprises may be merged into one, such as grazing wheat pasture and growing wheat for harvest. Enterprise budgets estimate costs and returns based on a specific

complement of machinery, land, labor and technology. Enterprise budgets require less data than the whole farm budget, and when realistic and accurate cost allocations can be made by enterprise, the comparative profitability of enterprises can be measured. Enterprise budgets also can be used to derive breakeven prices and break-even yields.

Afeworki, Polasub, Chiu & Mullinix (2015) explained that an enterprise budget of growing and selling a particular crop or livestock over a period of time. It comprises of a simple listing of income and expenses, based on a set of assumptions. Chase (2017) stated that enterprise budgets help to allocate land, labor and capital, which are limited, to the most appropriate use in economic terms.

## 2.4 Marketing Cost and Marketing Margin Analysis

Cramers and Jensen (1982) mentioned that a marketing margin is the percentage of the final weighted average selling price taken by each of the marketing chain. The total marketing margin is the difference between what the consumer pays and what the producer/farmer receives for his product. In other words, it is the difference between retail price and farm price. Marketing margin was studied to measure efficiency of markets. It was attempted to evaluate economic or price efficiency. Generally, it refers to the difference between the retail price and the producer price. The marketing margin showed the fraction of the consumer expenditure on a commodity that is received by the producer and each of the marketing agents (Olukosi and Isitor, 1990).

Tomek and Robinson (1990) reported that a marketing margin is defined alternatively as (1) the difference between the price paid by consumers and that obtained by producers (2) the price of a collection of marketing services that is the outcome of the demand for and the supply of such services. Marketing margin is defined as a difference between price paid by consumers and that obtained by producers or the price of collection of marketing services. One way of defining costs is that they are all of the expenses incurred in organizing and carrying out marketing process. Another definition is the charge which should be made for any marketing activities. Assembling transport, storage, grading, processing, wholesaling and retailing which can all be stages in the marketing chain, involves expenses (Smith, 1992).

Kinnucan and Nelson (1993) defined that wider margins mean that growers obtain a smaller share of the retail dollar. During periods when retailers are unable to raise their prices, this means lower grower revenue. The extent to which margin growth is not due to higher marketing costs can suggest inefficiencies somewhere in the marketing channel.

Mendoza (1995) also explained that marketing margin measures the share of the final selling price that is capturing by particular agent in the marketing chain. It includes costs and typically, though not necessarily, some additional income. Agriculture researchers and economists use the term “marketing margin” to summarize the aggregated costs of moving agricultural goods forward along the successive levels of the farm to retail marketing margin chain. The marketing margin or the farm to retail price spread is the difference between farm value and retail price. It represents payment for all assembling, processing, transporting and retailing charges added to farm product (Elitzak, 1996).

Guvheya (1998) defined that marketing margin is examined for a common means of measuring market efficiency. This is an attempt to evaluate economic or price efficiency. Marketing margins are differences between different levels of marketing channels. They capture the proportion of final selling price that marketing agents provides services for getting the added value in the various levels. Response of marketing margins to price changes at any levels is also indicative of the efficiency of the channel.

Gardner and Rausser (2001) mentioned that the concept of marketing margin or farm-to-retail price spread was developed to measure the costs of providing a bundle of marketing services. Although there were many ways to characterize the marketing margin, it was best viewed like price as an equilibrium entity, defined as some function of the difference between equilibrium retail price and equilibrium farm price of a given arm product. The relationship between retail and farm price can be influenced by a myriad of factors, not just from changes in marketing input prices. Since the nature and cause of many of these changes were not easy to identify, there was clearly room for additional empirical analysis of margins.

FAO (2007) conducted that the harvesting of the crop and movement of that produce to the farm gate was part of the production cost. The first marketing cost was produced preparation including cleaning, sorting and grading. The second cost usually faced by the farmers or traders was packaging. Types of the packaging may be

different depending on the product types and market condition. Transportation cost would be different with distance between the farmers and depend on the quality of roads and mode of transport.

Hassanpour, Hassanshahi & Younesi (2013) revealed that marketing margin is obtained from subtracting the retail price and in farm price; therefore, the retail price has a positive relationship with the marketing margin. In the way that increasing retail price causes to increase in total margin. On the other hand, transportation cost has a direct and significant relationship with marketing margin.

## 2.5 Determinant Factors on Profitability

In economic theory, profit is maximized at output level where marginal cost equals marginal revenue (Koutsiyianis, 1983). Profit is determined by comparing total revenue with total cost or by comparing average price and average total cost. Multiplying the difference by the total output gives the total profit or loss (Nellis and Parker, 2006). Jayne, Shaffer, Staatz & Reardon (1997) revealed that yield, education level of the household head, age of household head, gender of household head, household size, off-farm income received, extension services, and distance to market were influenced on profitability of agricultural production at the farm level.

Bagamba, Senyonga, Tushamereirwe & Gold (1998) studied that the total farm size, total farm income, off-farm income, age of the farmer, weevil damage, interaction with government extension agents, gender of the farmer, distance from the farm to the tarmac, years spent in school and number of cattle owned had a significant effect on the profitability of banana production.

Warr (1999) reported that increasing the area planted was expected to increase yield which should lead to increased gross margin. However, this negative relationship between area and gross margin may be attributed to the fact that the area was not used efficiently thus increasing area of cowpeas planted would not actually lead to increased production. Quantity harvested also has a positive influence on gross margin at 95% confidence. An increase in yield had a positive relationship to gross margin because increasing the quantity harvested increases the number of kilograms that can be valued.

Kay and Edwards (2000) stated that the accounting profits that measurable cost is subtracted from the income. The economists however determine profits by examining alternative uses of resources within the firm. Hence, economic profit is

defined as accounting profit less opportunity cost. It forces an examination of alternative uses of resources and helps in analyzing alternative courses of action by the firm.

Cevger and Yalcin (2003) examined the impact of several factors affecting the profitability of broiler production by using a linear profit function model. The dependent variable was profit per kilogram live-weight of broiler and the independent variables were sale price of broiler, price of purchased chick, price of feed, cost of labor, cost of veterinary service and medicine, other costs including building and machinery depreciation, repairs and maintenance and miscellaneous, cost of heating and lighting, mortality rate, feed conversion rate - FCR, length of production cycle and quadratic term in this study. The study found that profit per live-weight of broiler production was positively and significantly influenced by sale price of broiler and labor cost on profit was not statistically significant. And then, profit of broiler production was inversely significant by price of purchased chick, price of feed, cost of veterinary service and medicine, other costs including building and machinery depreciation, repairs and maintenance and miscellaneous, cost of heating and lighting, mortality rate and feed conversion rate.

Profit is defined as total revenue minus total cost. They outlined four perspectives of profit; (i) profit is a reward for taking risks in business; (ii) profit results from the control of scarce resources; when a citizen owns a resource that others want, the others will bid up the price which will then generate profit for the owner; (iii) profits exist because some people have access to information others do not have. This special knowledge include secret formulas or processes, exclusive right to inventions, property rights and patents, etc., ensuring profit for the creator; and (iv) profits could exist simply because some businesses are managed better than others; their managers are often creative planners and thinkers with efficient organizational abilities (Erickson, Akridge, Bernard & Downey, 2004).

The profitability of small scale broiler farming depends on several factors such as sale price of broiler, price of purchased chick, price of feed, cost of veterinary service and medicine, Feed Conversion Rate (FCR) (Bandara and Dassanayake, 2006).

Erbaugh (2008) found that the profitability of sorghum in Tanzania depends on the farm size; production costs, farm location, interaction between production costs and farm gate price as well as the interaction between the varieties used and fertilizer

applied were significant. Surprisingly, farm size was negatively influencing the gross margin. However, the interaction between production cost and farm gate price was positive and significant while farm gate price alone was not significant. In addition, the variety used, application of fertilizer and tillage method were not significant but the interaction between variety used and fertilizer application was positive and significant.

Htet Htet Htun (2013) analyzed the factors affecting on groundnut profit of the selected farm households of groundnut production in Magway Township. The study employed a log linear regression function with 7 independent variables; farm experience, sown area, yield, total labor cost on the farm, total material cost on the farm, price of groundnut and access to credit. The study found that groundnut profit was positively and significantly influenced by yield at 1% level and negatively influenced by total material cost at 5% level.

Karane (2016) conducted the factors influencing on-farm common bean profitability: the case of smallholder bean farmers in Babati district, Tanzania. The study employed a linear profit function model with 12 independent variables; age, gender, farm experience, household size, bean yield, land size, most visited market, farm-gate price, access to market information, access to credit, access to extension and off-farm income. The study found that common bean profit was positively and significantly influenced by bean yield and price at 1% level. And, common bean production was positively and significantly influenced by access to credit at 10% level and negatively influenced by off-farm income at 10% level.

Chan Myae Lwin (2017) examined the determinant factors on paddy profit of the selected farm households in Maubin and Daik U Townships by using a log linear regression function. In this study, the dependent variable was profit of groundnut farmers and independent variables were yield, total labor used, total fertilizer cost, sown area of paddy, age of household head, schooling year of household head, seed source, crop establishment method, harvesting practice and income source. The study found that yield, total labor used (no.), age of household's head and seed source (dummy variable) were statistically significant in explaining the profitability of Hnan Kar rice production in Maubin Township. According to the profit regression for Sin Thu Kha rice production estimates, paddy profit of the sample farm households was positively and significantly influenced by yield at 1% level and crop establishment method at 5% level in Daik U Township. And, income source and total labor used of

the sample farm households was negatively and significantly influenced on profit at 1% and 5% levels respectively.

Khin Nwe Nwe Oo (2018) studied the factors affecting on the mungbean profit of the selected farm household of mungbean production in the Tatkon and Pyinmana Townships, Nay Pyi Taw. The study employed a log linear regression function with 8 independent variables were yield, sown area, total material cost on the farm, family labor cost on the farm, hired labor cost on the farm, schooling year of household head, farm experience of household head and number of harvesting time. The study found that mungbean profit of the sample farm households was positively and significantly influenced by yield of mungbean, schooling year of sample farmers and selling practices of mungbean growers at 1%, 1% and 5% levels respectively.

# CHAPTER III
# RESEARCH METHODOLOGY

## 3.1 Study Area

### 3.1.1 Description of the Sagaing Region

Sagaing Region is located in the central part of Myanmar. Its major parts fall in the central dry zone. It is situated in the north-western part of Myanmar between latitude 21˚ 30' north and longitude 94˚ 97' east. It shares border with India in the north, Kachin State and Shan State in the east, Mandalay and Magway Regions in the south and Chin State and India in the west and has 36,535 sq. miles. This Region is formed with 198 wards and villages, 38 townships and eight districts - Sagaing, Shwebo, Monywa, Katha, Kale, Tamu, Mawlaik and Hkamti. Sagaing is the capital of the Region. This Region has a total cultivated area of over three million acres. Paddy is cultivated on 1.4 million acres and other crops on 1.5 million acres. Others are alluvial-land cultivation, garden farms and hillside cultivation. Water is supplied from canals, lakes, tube-wells and pumped-water stations. Major crops of the Region are rice, wheat, corn, maize and edible oil crops such as sesame, groundnut, sunflower, cotton, sugarcane, beans and pulses. Over one million acres are being put under paddy in the Region annually. Eighty percent of the nation's wheat comes from Sagaing Region. Tobacco, tomato, toddy palm, and vegetables are also grown in this Region. Small amount of land is put under green tea at mountain regions in the north (https://www.embassyofmyanmar.be/ABOUT/SAGAING.HTM).

In Sagaing Region, Myinmu Township was selected as the study area for this observe. The total population was about 115,621 in which 15,371 in city and 100,250 in rural population in 2018. In Myinmu Township, the production and cultivation of the major ten crops were rice, groundnut, sesame, sunflower, black gram, green gram, pigeon pea, cotton, sugarcane and corn in 2016-17 as shown in Table (3.1) (General Administrative Department, Myinmu [GAD], 2017).

### 3.1.2 Location of the study area

Myinmu Township is located 21˚ 56'N 95˚ 35'E. The township is also situated between 200 feet and 250 feet above sea level. It is the principal town and the town lies on the northern bank of the Ayeyawady River. Mu River flows about 7.5 kilometres (4.7 miles) away from the town. The total area of Myinmu Township is 5.58 sq. miles. The neighbor areas of Township are Sagaing, Chaung Oo, Monywa, Ngazun and Ayadaw Townships. Sagaing Township is located to the east, Chaung Oo and Monywa Townships are also situated to the west, Ngazun Township is located to

the south and Ayadaw Township is situated to the north from Myinmu Township. The map of Myinmu Township is presented in Appendix (2) (GAD (Myinmu), 2017).

### 3.1.3 Climatic conditions of the study area

In Myinmu Township, annual rainfall decreased in 2018. A maximum precipitation of 169.93 mm was found in May and minimum precipitation was 2.03 mm in November, 2018 (Figure 3.1). There was no precipitation in February and March (DOA, 2019). In summer season, the maximum temperature was 41.4˚ C and the minimum temperature was 0.91˚ C in cool season, 2018 (GAD (Myinmu), 2018). Annual rainfall of Myinmu Township from 2009 to 2018 is indicated in Figure (3.1).

### 3.1.4 Land utilization of the study area

The township total area was 77,561.31 hectares and agricultural land possessed the largest share as 75% of the total sown area as shown in Figure (3.2). About 16% was fallowed land and 9% was others land (Figure 3.2). Upland occupied 67% of the agricultural land (77,561.13 ha) while lowland (14%), fallowed land (9%), alluvial soil (kaing/kyun) (8%) and orchard (2%) as shown in Figure (3.3) (GAD (Myinmu), 2017).

### 3.1.5 Sown area and crop production in the study area

In Myanmar, 33.00% of groundnut is cultivated by Sagaing Region. And also, Myinmu Township cultivated the groundnut about 6.41% of Sagaing Region. In Myinmu Township, the total sown area of groundnut occupied by 10,318.86 hectares and production was 14,920.00 metric tons in rainy season and 12,181.30 hectares and 22,127.91 metric tons in winter season in 2018-19 (DOA, 2019). Groundnut sown area, yield and production of rainy and winter seasons in Myinmu Township from 2012-13 to 2018-19 are indicated in Table (3.2 and 3.3).

### 3.1.6 General description of the study area

Myinmu Township is made up of 4 quarters, 48 village tracts and 84 villages. Among the villages, Ahr Lar Kat Pa, Pe Ku and Pa Dat Taing were selected for this study. The total population and total number of households of Ahr Lar Kat Pa, Pe Ku and Pa Dat Taing villages were about 6,244 and 1,422, 3,105 and 706 and 4,914 and 998. And, 43 farm households and 54 farm households were collected in Ahr Lar Kat Pa and Pe Ku villages and 53 farm households were selected in Pa Dat Taing village. Among the sample villages, Ahr Lar Kat Pa and Pe Ku villages are located about 6 miles from Myinmu Township, while Pa Dat Taing village is situated about 14 miles from it. General information of the study area is showed in Table (3.4).

**Table 3.1 Top ten cultivated crops in Myinmu Township in 2016-2017**

| No. | Name of Crops | Season | Sown area (ha) | Harvested area (ha) | Yield (MT/ha) | Total Production (MT) |
|---|---|---|---|---|---|---|
| 1. | Rice | Summer | 699.72 | - | - | - |
| | | Rainy | 14,558.88 | 14,558.88 | 0.81 | 11,864.63 |
| 2. | Groundnut | Rainy | 15,677.05 | 15,677.05 | 1.42 | 22,192.88 |
| | | Winter | 11944.56 | 11,944.56 | 1.94 | 23,154.55 |
| 3. | Sesame | Rainy | 8,375.96 | 8,375.96 | 0.40 | 3,336.56 |
| | | Winter | 14,558.88 | 14,558.88 | 0.96 | 13,908.29 |
| 4. | Sunflower | Rainy | 799.27 | 799.27 | 0.61 | 489.51 |
| | | Winter | 6,760.02 | 6,760.02 | 0.90 | 6,059.19 |
| 5. | Black gram | Pre-monsoon | 699.67 | 699.67 | 1.02 | 712.76 |
| 6. | Green gram | Rainy | 11,791.18 | 11,791.18 | 1.38 | 16,225.28 |
| | | Winter | 485.23 | 485.23 | 1.41 | 686.13 |
| 7. | Pigeon pea | Rainy | 14,074.87 | 14,074.87 | 1.43 | 20,129.70 |
| 8. | Cotton | Pre-monsoon | 789.96 | 789.96 | 2.19 | 1,732.15 |
| 9. | Sugarcane | - | - | - | - | - |
| 10. | Corn | Rainy | 341.56 | 341.56 | 2.60 | 954.78 |
| | | Winter | 935.25 | 935.25 | 3.09 | 2,888.75 |

Source: GAD (Myinmu), 2017

**Table 3.2 Groundnut sown area, yield and production of Myinmu Township in rainy season from 2012-2013 to 2018-2019**

| Years | Rainy season | | | |
|---|---|---|---|---|
| | Sown Area (ha) | Harvested area (ha) | Yield (MT/ha) | Production (MT) |
| 2012-13 | 14,938.89 | 14,938.89 | 1.36 | 20,302.33 |
| 2013-14 | 15,197.09 | 15,197.09 | 1.36 | 20,677.37 |
| 2014-15 | 15,674.63 | 15,674.63 | 1.39 | 21,785.93 |
| 2015-16 | 15,680.29 | 15,680.29 | 1.41 | 22,070.04 |
| 2016-17 | 15,677.05 | 15,677.05 | 1.42 | 22,192.88 |
| 2017-18 | 15,677.86 | 15,677.86 | 1.42 | 22,185.24 |
| 2018-19 | 10,318.90 | 10,318.90 | 1.45 | 14,920.00 |

Source: DOA, 2019

**Table 3.3 Groundnut sown area, yield and production of Myinmu Township in winter season from 2012-2013 to 2018-2019**

| Years | Winter season | | | |
|---|---|---|---|---|
| | Sown Area (ha) | Harvested area (ha) | Yield (MT/ha) | Production (MT) |
| 2012-13 | 11,557.26 | 11,557.26 | 1.78 | 20,564.33 |
| 2013-14 | 11,539.46 | 11,539.46 | 1.93 | 22,311.06 |
| 2014-15 | 11,787.94 | 11,787.94 | 2.03 | 23,881.52 |
| 2015-16 | 11,983.00 | 11,983.00 | 2.03 | 24,283.42 |
| 2016-17 | 11,944.56 | 11,944.56 | 1.94 | 23,154.56 |
| 2017-18 | 12,182.11 | 8,539.46 | 2.70 | 23,091.04 |
| 2018-19 | 12,181.30 | 10,325.37 | 2.14 | 22,127.91 |

Source: DOA, 2019

**Table 3.4 General information of the study area**

(n=150)

| Item | Unit | Villages | | |
|---|---|---|---|---|
| | | Ahr Lar Kat Pa | Pe Ku | Pa Dat Taing |
| Population | No. | 6,244 | 3,105 | 4,914 |
| Total households | No. | 1,422 | 706 | 998 |
| Total selected farm households | No. | 43 | 54 | 53 |
| Percentage of total households | Percent | 3.02 | 7.65 | 5.31 |

Source: GAD (Myinmu), 2017

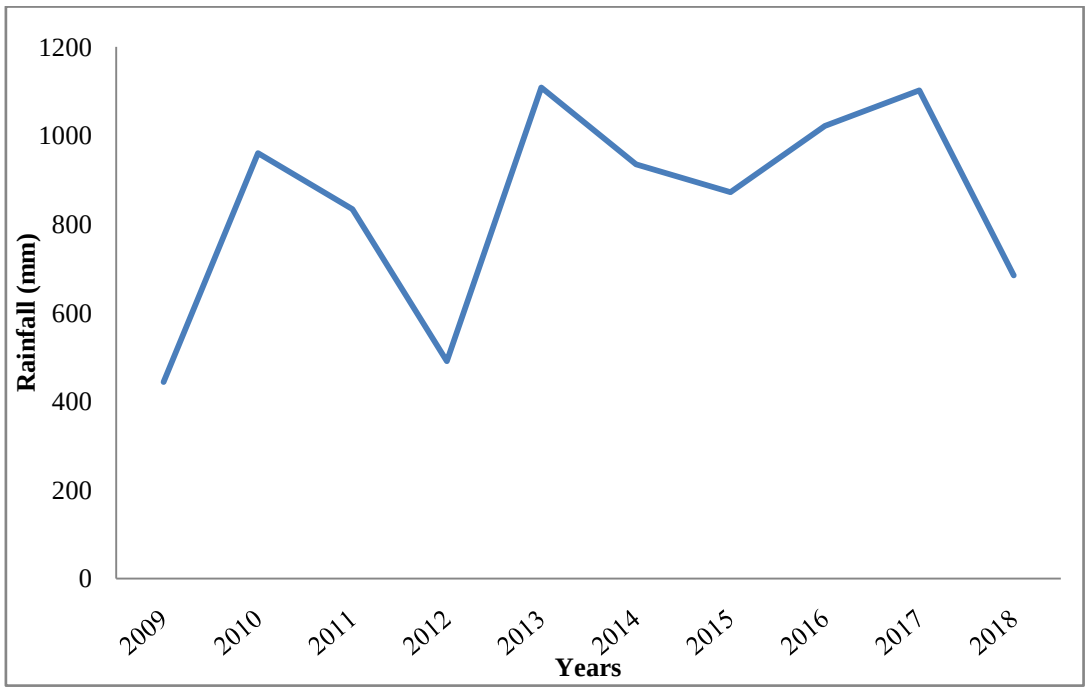



**Figure 3.1 Annual rainfall of Myinmu Township from 2009 to 2018**

Source: DOA, 2019

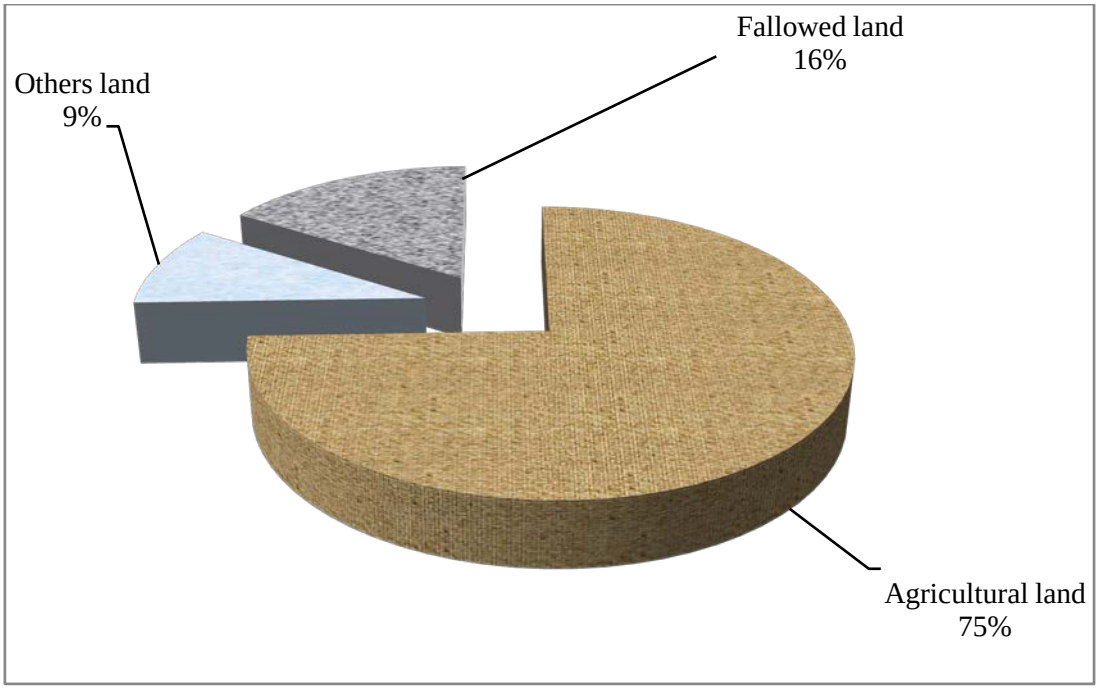



**Figure 3.2 Land utilization in Myinmu Township (2017)**

Source: GAD (Myinmu), 2017

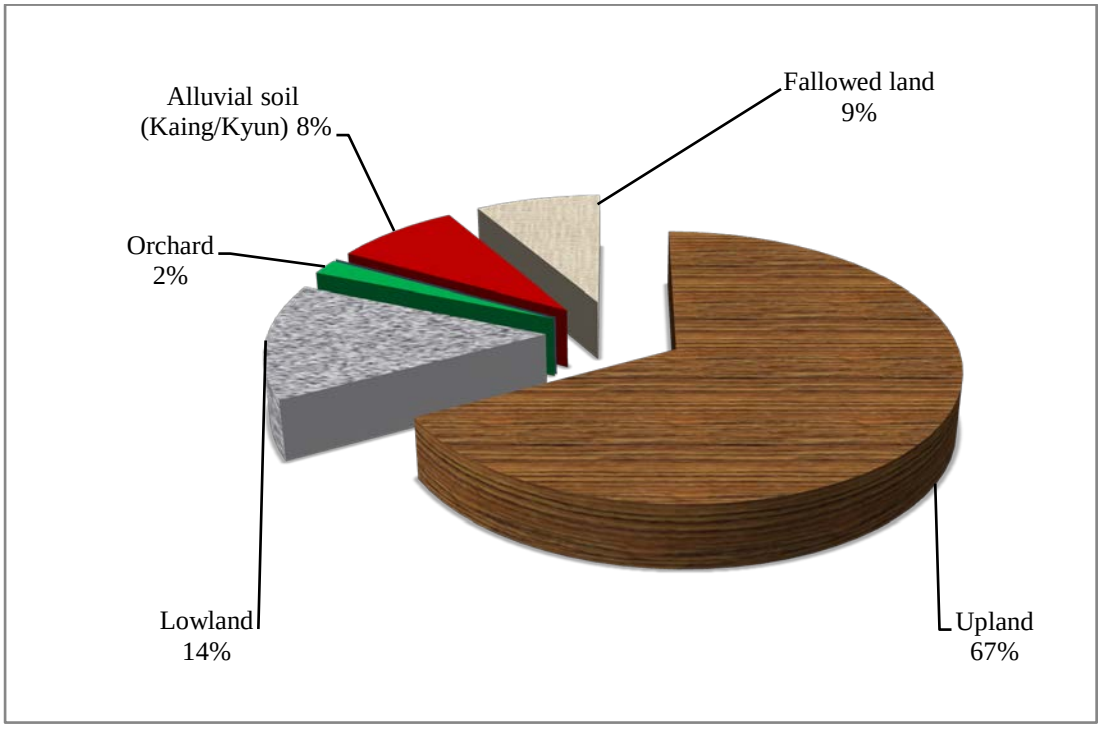



**Figure 3.3 Agricultural land utilization in Myinmu Township (2017)**

Source: GAD (Myinmu), 2017

## 3.2 Data Collection and Sampling Methods

Both primary and secondary data were used. This study was carried out during the crop season of 2017-18 for the investigation of production and marketing activities for groundnut.

### 3.2.1 Primary data collection

Primary data was collected from individual households by using structured questionnaires. Field survey was carried out from November last week to December second week in 2018, winter season in 2017 and rainy season in 2018. A total of 150 sample farmers were selected from three sample villages. These villages were Ahr Lar Kat Pa, Pe Ku and Pa Dat Taing. The selection of the sample groundnut farmers is described in Figure (3.4).

### 3.2.2 Secondary data collection

Secondary data was taken from published and official records of Ministry of Agriculture, Livestock and Irrigation (MOALI), Department of Agriculture (DOA), Food and Agriculture Organization (FAO), YAU library, General Administrative Department (GAD, Myinmu) and the other related publications.

### 3.2.3 Sampling method

Sample farm households were selected by using purposive random sampling method in this study.

## 3.3 Data Analysis Methods

Both qualitative and quantitative data were used in this study. Descriptive analysis, cost and return analysis, marketing cost and margin analysis and regression analysis were employed in this study.

### 3.3.1 Descriptive Analysis

Both qualitative and quantitative data were firstly compiled in the Microsoft Excel program. The study employed with descriptive method and econometric models by using statistical software packages, SPSS Version 25.0. The descriptive statistics were computed by using diagrams, charts, percentages, means, frequencies and standard deviations in observing the groundnut value added processing opportunities as well as farmer’s socio-economic characteristics. The profit per cost price was used to analyze the characteristics of farmers.

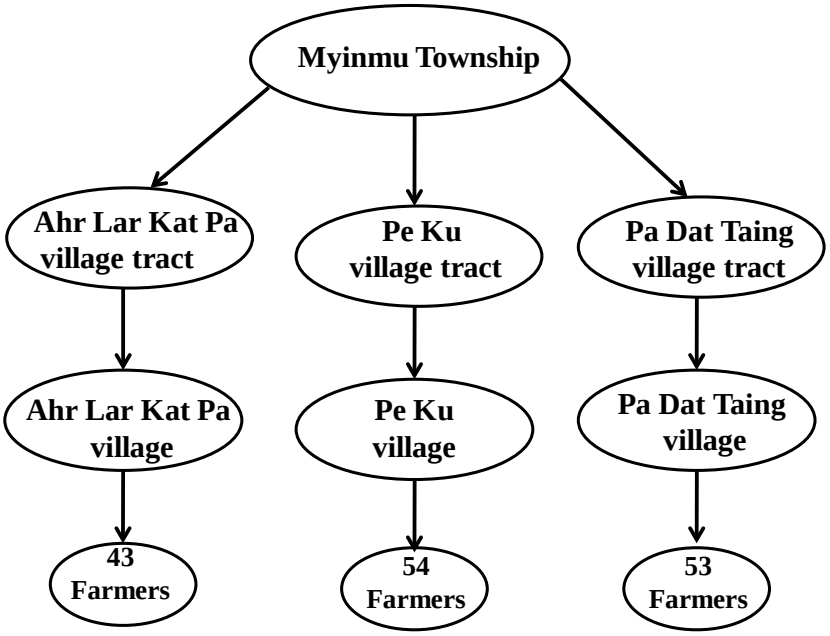



**Figure 3.4 Selection of sample groundnut farmers**

### 3.3.2 Cost and Return Analysis

The cost and return analysis was applied to determine the profitability of the groundnut farmers in the study area. Variable costs were taken into account; (1) Material input cost, (2) Hired labor cost, (3) Family labor cost and (4) Interest on cash cost. Both cash and non-cash items were included in the estimation of material cost and labor cost. Non-cash items for material cost included seeds, family labor, owned working animals and farm yard manure. Cash payment for labor included hired labor and payment for land preparation.

The first measurement was the difference between total gross benefits or total returns and total variable cash cost, excluding opportunity cost. This value was referred to as return above variable cash cost. The second measurement was the deduction of the opportunity cost and total variable cash costs from gross benefit. This return was referred to as return above variable cost or gross margin. The return per unit of capital invested could be calculated by total gross benefits per total variable cost. The return per unit of cash cost could be calculated by total gross benefits per total cash costs. Benefit cost ratio was used as profitability measures for each value added groundnut product enterprise computing total gross margin or return above variable cost and return above cash cost (Olson, 2003).

This study was calculated cost and return of each groundnut product as follow:

- Low purified grain (si san) which was obtained after hulling groundnut with shell (pod).
- Low purified grain was cleaned by manual (labors) that it is called high purified grain (lone san).
- Seed was obtained likely to processing of high purified grain; however, it was sold at the sowing time after storage.
- Edible oil was obtained from milling the low purified grain (si san) or hulled groundnut.

The following measurements could be expressed with equations as:

1. Return above variable cash cost = Total gross benefit - Total variable cash cost
2. Return above variable cost = Total gross benefit - Total variable cost
3. Return per unit of capital invested = Total gross benefit/Total variable cost
4. Return per unit cash cost = Total gross benefit/Total variable cash cost
5. Benefit cost ratio = Gross benefit/Total variable cost

### 3.3.3 Method of Marketing Cost and Marketing Margin Analysis

Marketing margins reflect both the cost of marketing and the profits of marketing agents. Thus, marketing margins are differences between prices at different events in the marketing channel. Marketing cost is the cost involved in the marketing and will directly influence the profit or losses suffered by sellers. Most marketing costs are influenced by general economic forces outside of the food economy, especially labor, transportation, packaging and energy costs (Lokesha, 2016).

Different between price paid by consumer (retail price) and price received by producer (farm price) is a marketing margin. The percentage share of the final price that is taken up by the marketing function is known as the marketing margin. The term ‘selling price’ is the price at which a good or service is sold by the seller to the buyer. And, the ‘buying price’ is the price at the amount of money is paid to acquire a product by the buyer to the seller.

As the theoretical concept of marketing margin, it may be defined in two ways: (1) as the differences between consumer retail price and what farmers receive and (2) as the price of marketing services provided. The difference between what the consumer pays for food and what the farmer receives i.e. a marketing margin. It is simply the difference between the primary and derived demand curves for a particular product.

The following indicators were used in the analysis.

1. Marketing margin = Average selling price – Average buying price
2. Profit = Gross marketing margin – Total marketing cost
3. Cost price = Buying price + Total marketing cost
4. Percentage of profit = Profit / Cost price x 100

## 3.4 The Determinant Factors on Profitability of Groundnut Selling Types

### 3.4.1 Determinants of the profitability of groundnut production of the sample farmers

The following model was used to examine the determinant factors on profitability of groundnut production of the sample farmers in Myinmu Township. To identify the determinant factors on profitability of groundnut production at farm level in the study areas, a linear regression function was used. The dependent variable was profit of groundnut by sample farmers and independent variables were yield (pod), total material cost, family labor cost, hired labor cost, climate change awareness, market distance and access to credit. The regression function was as follow;

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + b_1 D_{1i} + b_2 D_{2i} + b_3 D_{3i} + \mu_i$$

Where;

$Y_i$ = Groundnut profit ('000 MMK/ha)

$X_{1i}$ = Yield of groundnut (kg/ha)

$X_{2i}$ = Total material cost ('000 MMK/ha)

$X_{3i}$ = Family labor cost ('000 MMK/ha)

$X_{4i}$ = Hired labor cost ('000 MMK/ha)

$D_{1i}$ = Climate change awareness (dummy variables, yes = 1, no = 0)

$D_{2i}$ = Access to credit (dummy variables, yes = 1, no = 0)

$D_{3i}$ = Market distance (dummy variables, Monywa and Mandalay wholesalers = 1, Myinmu wholesalers = 0)

$\beta_i, b_i$ = Regression coefficients

$u_i$ = Disturbance term

i = 1….n

The study expected from the independent variables which affected the factors influencing for groundnut profit. In this study, the selected variables included yield (pod), total material cost, family labor cost, hired labor cost, access to credit, climate change and market distance. The expected signs of the independent variables of groundnut production were presented in Table (3.5).

### 3.4.2 Determinants of the profitability of value added groundnut product (high purified grain)

To analyze the determinant factors on profitability of value added groundnut product at farm level in the study areas, a log linear regression function was used. The dependent variable was profit of high purified grain and independent variables were sown areas of groundnut, price of high purified grain, total material cost, family labor cost, hired labor cost, age of sample farmer, schooling years of sample farmer, market distance, processing cost and access to credit. The regression function was as follow;

$$LnY_i = \beta_0+Ln\beta_1X_{1i}+Ln\beta_2X_{2i}+Ln\beta_3X_{3i}+Ln\beta_4X_{4i}+Ln\beta_5X_{5i}+Ln\beta_6X_{6i} + Ln\beta_7X_{7i}+ Ln\beta_8X_{8i} +b_1D_{1i}+b_2D_{2i}+ \mu_i$$

Where;

$LnY_i$ = Log of groundnut profit (high purified grain)

$LnX_{1i}$ = Log of price of high purified grain

$LnX_{2i}$ = Log of sown areas of groundnut

$LnX_{3i}$ = Log of total material cost

$LnX_{4i}$ = Log of family labor cost

$LnX_{5i}$ = Log of hired labor cost

$LnX_{6i}$ = Log of schooling years of sample farmer

$LnX_{7i}$ = Log of age of sample farmer

$LnX_{8i}$ = Log of processing cost

$D_{1i}$ = Access to credit (dummy variables, yes = 1, no = 0)

$D_{2i}$ = Market distance (dummy variables, Monywa and Mandalay wholesalers = 1, Myinmu wholesalers = 0)

$\beta_i, b_i$ = Regression coefficients

$u_i$ = Disturbance term

i = 1….n

The independent variables were expected from this study which affected the determinant factors for groundnut profit (high purified grain) in the study area. The selected variables included sown areas of groundnut, price of high purified grain, total material cost, family labor cost, hired labor cost, age of sample farmer, schooling years of sample farmer, market distance, processing cost and access to credit. Table (3.6) presents the expected signs of the independent variables of high purified grain.

### 3.4.3 Determinants of the profitability of value added groundnut product (low purified grain)

To examine the determinant factors on profitability of value added groundnut product at farm level in the study areas, a log linear regression function was used. The dependent variable was profit of low purified grain and independent variables were sown areas of groundnut, price of low purified grain, total material cost, family labor cost, hired labor cost, age of sample farmer, schooling years of sample farmer, market distance, processing cost and access to credit. The regression function was as follow;

$$LnY_i = \beta_0+Ln\beta_1X_{1i}+Ln\beta_2X_{2i}+Ln\beta_3X_{3i}+Ln\beta_4X_{4i}+Ln\beta_5X_{5i}+ Ln\beta_6X_{6i}+Ln\beta_7X_{7i}+Ln\beta_8X_{8i}+b_1D_{1i}+b_2D_{2i}+ \mu_i$$

Where;

$LnY_i$ = Log of groundnut profit (low purified grain)
$LnX_{1i}$ = Log of price of low purified grain
$LnX_{2i}$ = Log of sown areas of groundnut
$LnX_{3i}$ = Log of total material cost
$LnX_{4i}$ = Log of family labor cost
$LnX_{5i}$ = Log of hired labor cost
$LnX_{6i}$ = Log of schooling years of sample farmer
$LnX_{7i}$ = Log of age of sample farmer
$LnX_{8i}$ = Log of processing cost
$D_{1i}$ = Access to credit (dummy variables, yes = 1, no = 0)
$D_{2i}$ = Market distance (dummy variables, Monywa and Mandalay wholesalers = 1, Myinmu wholesalers = 0)
$\beta_i, b_i$ = Regression coefficients
$u_i$ = Disturbance term
i = 1….n

The determinant factors affected for low purified grain which expected from the independent variables. In this study, the selected variables included sown areas of groundnut, price of low purified grain, total material cost, family labor cost, hired labor cost, age of sample farmer, schooling years of sample farmer, market distance, processing cost and access to credit. The expected signs of the independent variables of low purified grain were indicated in Table (3.7).

**Table 3.5 Expected signs of the independent variables in groundnut profit**

| Independent variables | Unit | Expected sign |
|---|---|---|
| Yield of groundnut (pod) | Kg/ha | (+) |
| Total material cost | MMK/ha | (-) |
| Family labor cost | MMK/ha | (-) |
| Hired labor cost | MMK/ha | (-) |
| Access to credit | Dummy | (+) |
| Climate change awareness | Dummy | (+) |
| Market distance | Dummy | (-) |

**Table 3.6 Expected signs of the independent variables in groundnut profit (high purified grain)**

| Independent variables | Unit | Expected sign |
|---|---|---|
| Price of high purified grain | MMK/kg | (+) |
| Total material cost | MMK/ha | (-) |
| Family labor cost | MMK/ha | (-) |
| Hired labor cost | MMK/ha | (-) |
| Processing cost | MMK/ha | (-) |
| Sown areas of groundnut | ha | (+) |
| Schooling years of sample farmer | Year | (+) |
| Age of sample farmer | Year | (+) |
| Access to credit | Dummy | (+) |
| Market distance | Dummy | (-) |

**Table 3.7 Expected signs of the independent variables in groundnut profit (low purified grain)**

| Independent variables | Unit | Expected sign |
|---|---|---|
| Price of low purified grain | MMK/kg | (+) |
| Total material cost | MMK/ha | (-) |
| Family labor cost | MMK/ha | (-) |
| Hired labor cost | MMK/ha | (-) |
| Processing cost | MMK/ha | (+) |
| Sown areas of groundnut | ha | (+) |
| Schooling years of sample farmer | Year | (+) |
| Age of sample farmer | Year | (+) |
| Access to credit | Dummy | (+) |
| Market distance | Dummy | (-) |

# CHAPTER IV
# RESULTS AND DISCUSSION

## 4.1 Description of the Sample Groundnut Farmers

### 4.1.1 Socio-economic characteristics of sample groundnut farmers

Socio-economic characteristics of sample groundnut farmers were presented in Table (4.1). In the study area, the average age of sample farmers was 56 years, 7 years of schooling years and 33 years of farming experience on average.

The production of groundnut mainly depends on the land holding size. In the study area, the average land holding size was 7.90 hectares. The maximum and minimum of total land holding size were 30.35 hectares and 0.40 hectare. The average groundnut sown area of sample farmers was 1.40 hectares. And, the maximum and minimum of total groundnut sown areas were 8.09 hectares and 0.32 hectare. The average yield with shell (pod) of total groundnut sown areas was about 1.58 metric tons. The maximum and minimum yields with shell (pod) of total groundnut sown areas were about 11.34 metric tons and 0.23 metric ton (Table 4.2).

All of the sample farmers owned upland farm with the average area about 6.90 hectares. Moreover, 44.60% of sample farmers possessed 1.90 hectares as lowland, few sample farmers (5.30%) occupied 1.10 hectares as garden land, while 4.60% of sample farmers owned 2.20 hectares as alluvial soil (kaing/kyun) (Table 4.3).

### 4.1.2 Farm and household assets of sample groundnut farmers in the study area

Farm assets of sample groundnut farmers were presented in Table (4.4). Most of the farmers possessed hoe, spade, plough, harrow, cart, cattle/bullock, sickle and sprayer. In the study area, 96.67% and 92.00% of sample farmers owned hoe and spade. The farm assets such as harrow and plough were possessed by 89.33% and 88.67% of sample farmers. And, 85.33% and 84.00% of sample farmers owned cart and cattle/bullock for transportation of crops from groundnut field to drying field. In addition, sickle, sprayer and ware house were owned by 82.67%, 80.00% and 69.33% of sample farmers respectively. Moreover, 42.00% and 41.33% of sample farmers owned water pump and seeder. Then, 13.33% each of sample farmers possessed power tiller and tractor. Eight percent, 6.67% and 3.33% of sample farmers possessed chicken, thresher and feed cutting machine. And, the minimum possessed pig (2.67%).

Household assets of sample groundnut farmers were indicated in Table (4.5). The sample farmers in maximum that owned motorcycle, mobile phone and TV were 93.33%, 92.67% and 72.00% respectively. The bicycle, radio and refrigerator were owned by 50.00%, 42.67% and 32.00% of sample farmers respectively. Moreover, 18.00%, 12.67% and 8.67% of sample farmers owned sewing machine, PSI and sky net. Then, the sample farmers in minimum possessed laptop, car and generator accounted for 4.00% of each and 2.67% respectively.

### 4.1.3 Different groundnut varieties grown by sample groundnut farmers in the study area

Myanmar has many varieties of groundnut; the nomenclature varies from region to region. In the study area, there are many varieties of groundnut were grown by sample groundnut farmers which are Sinpadaythar 11, Magway 11, local varieties, Magway 10 and Sinpadaythar 7. Among these varieties, most farmers cultivated Sinpadaythar 11. The number and percentage of sample farmers cultivated the different varieties are presented in Table (4.6). Among 150 sample groundnut farmers, 26.67% of sample farmers cultivated local variety and there were 3.33% of sample groundnut farmers who cultivated Magway 10. And, Magway 11 was grown by 30.00% of sample groundnut farmers. Therefore, Sinpadaythar 11 was the highest used variety by 39.33% of sample groundnut farmers while Sinpadaythar 7 was the lowest planted variety with 0.67% of sample farmers in the study area.

**Table 4.1 Socio-economic characteristics of sample groundnut farmers in Myinmu Township**

(n=150)

| Items | Unit | Mean | Range |
|---|---|---|---|
| Age | Year | 56 | 31-87 |
| Farm experience | Year | 33 | 5-64 |
| Schooling years | Year | 7 | 0-16 |

**Table 4.2 Land holding size, groundnut sown area and groundnut yield of sample groundnut farmers in the study area**

(n=150)

| Items | Unit | Mean | Max. | Min. | SD |
|---|---|---|---|---|---|
| Land holding size | ha | 7.90 | 30.35 | 0.40 | 6.11 |
| Sown area | ha | 1.40 | 8.09 | 0.32 | 1.02 |
| Groundnut yield | MT | 1.58 | 11.34 | 0.23 | 1.55 |

Note. Groundnut yield was calculated by using pod yield of total sown areas.

**Table 4.3 Land holding assets of sample groundnut farmers**

(n=150)

| Farm size (ha) | Mean | Range | Respondents | |
|---|---|---|---|---|
| | | | Frequency | Percent |
| Upland (Yar) | 6.90 | 0.40-28.3 | 150 | 100.00 |
| Lowland (Le) | 1.90 | 0.40-8.10 | 67 | 44.60 |
| Garden land | 1.10 | 0.20-4.50 | 8 | 5.30 |
| Alluvial soil (Kaing/Kyun) | 2.20 | 1.20-4.10 | 7 | 4.60 |

**Table 4.4 Farm assets of sample groundnut farmers in the study area**

(n=150)

| Items | Mean | Range | Percent of total respondents |
|---|---|---|---|
| Hoe | 2.25 | 0-7 | 96.67 |
| Spade | 1.93 | 0-10 | 92.00 |
| Harrow | 2.63 | 0-15 | 89.33 |
| Plough | 1.39 | 0-4 | 88.67 |
| Cart | 1.44 | 0-5 | 85.33 |
| Cattle/Bullock | 3.33 | 0-35 | 84.00 |
| Sickle | 2.30 | 0-15 | 82.67 |
| Sprayer | 1.27 | 0-6 | 80.00 |
| Ware house | 0.58 | 0-4 | 69.33 |
| Water pump | 0.58 | 0-4 | 42.00 |
| Seeder | 0.63 | 0-13 | 41.33 |
| Power tiller | 0.27 | 0-1 | 13.33 |
| Tractor | 0.13 | 0-2 | 13.33 |
| Chicken | 1.61 | 0-60 | 8.00 |
| Thresher | 0.05 | 0-1 | 6.67 |
| Feed cutting machine | 0.03 | 0-1 | 3.33 |
| Pig | 0.87 | 0-7 | 2.67 |

**Table 4.5 Household assets of sample groundnut farmers in the study area**

(n=150)

| Items | Mean | Range | Percent of total respondents |
|---|---|---|---|
| Motorcycle | 1.41 | 0-4 | 93.33 |
| Mobile phone | 2.16 | 0-8 | 92.67 |
| TV | 0.73 | 0-2 | 72.00 |
| Bicycle | 0.60 | 0-2 | 50.00 |
| Radio | 0.43 | 0-3 | 42.67 |
| Refrigerator | 0.31 | 0-1 | 32.00 |
| Sewing machine | 0.20 | 0-3 | 18.00 |
| PSI | 0.13 | 0-1 | 12.67 |
| Sky Net | 0.08 | 0-1 | 8.67 |
| Laptop | 0.05 | 0-2 | 4.00 |
| Car | 0.05 | 0-2 | 4.00 |
| Generator | 0.03 | 0-1 | 2.67 |

**Table 4.6 Different groundnut varieties grown by sample groundnut farmers in the study area**

(n=150)

| Variety Name | Respondents | |
|---|---|---|
| | Frequency | Percent |
| Sinpadaythar 11 | 59 | 39.33 |
| Magway 11 | 45 | 30.00 |
| Local variety | 40 | 26.67 |
| Magway 10 | 5 | 3.33 |
| Sinpadaythar 7 | 1 | 0.67 |
| **Total** | **150** | **100.00** |

### 4.1.4 Application of fertilizer, insecticide, fungicide and foliar in groundnut production

All of sample farmers used seed that the average used of seed was 118.17 (kg/ha). The maximum and minimum used of seed rate were 177.10 (kg/ha) and 44.63 (kg/ha) (Table 4.7). In the study area, majority of sample groundnut farmers applied farm yard manure (FYM) such as cow dung as the organic fertilizer while they mainly used compound fertilizer, urea fertilizer and gypsum as the inorganic fertilizer.

Farm yard manure (FYM) was used by 63.33% of sample groundnut farmers. The average rate of FYM application was 2.40 (MT/ha), and maximum rate was 9.78 (MT/ha). Moreover, compound and urea fertilizers were applied by 76.67% and 10.00% of sample groundnut farmers in the study area. The average used of compound fertilizer rate was 60.07 (kg/ha). And, the maximum rate of compound fertilizer was 129.04 (kg/ha). Moreover, the average used of urea fertilizer rate was 7.07 (kg/ha) and the maximum was 123.55 (kg/ha). Then, 62.00% and 34.67% of sample groundnut farmers used foliar fertilizer and gypsum as inorganic fertilizer for crop production. The average used of foliar and gypsum fertilizers rate were 1.57 (kg/ha), and 28.77 (kg/ha). And, the maximum were 7.41 (kg/ha) and 237.60 (kg/ha). In the study area, FYM, compound, urea, foliar and gypsum were not used absolutely by 36.67%, 23.33%, 90.00%, 38.00% and 65.33% of sample groundnut farmers respectively.

Moreover, 91.33% of sample groundnut farmers applied insecticide that the average rates of insecticide was 2.15 (L/ha), and the maximum was 7.41 (L/ha). Then, 9.33% of sample groundnut farmers used fungicide for crop protection in the study area. The average rates of fungicide was 0.15 (kg/ha) and the maximum was 3.50 (kg/ha). However, it was discovered that only a few of sample groundnut farmers applied herbicide. The average use of herbicide was 0.12 (L/ha), and the maximum was 5.93 (L/ha) for crop protection. However, 8.67%, 90.67% and 96.67% of sample groundnut farmers did not apply completely insecticides, fungicide and herbicide for crop protection.

**Table 4.7 Use of inputs for groundnut production of sample groundnut farmers**

(n=150)

| Items | Unit | Mean | Max. | Min. | Percent of total respondents |
|---|---|---|---|---|---|
| Seed | kg/ha | 118.17 | 177.10 | 44.63 | 100.00 |
| Insecticide | L/ha | 2.15 | 7.41 | 0.00 | 91.33 |
| Compound | kg/ha | 60.07 | 129.04 | 0.00 | 76.67 |
| FYM | MT/ha | 2.40 | 9.78 | 0.00 | 63.33 |
| Foliar | kg/ha | 1.57 | 7.41 | 0.00 | 62.00 |
| Gypsum | kg/ha | 28.77 | 237.60 | 0.00 | 34.67 |
| Urea | kg/ha | 7.07 | 123.55 | 0.00 | 10.00 |
| Fungicide | kg/ha | 0.15 | 3.50 | 0.00 | 9.33 |
| Herbicide | L/ha | 0.12 | 5.93 | 0.00 | 3.33 |

Note: Seed (1 bsk) = 23kg, FYM (2 carts) = 1 MT

### 4.1.5 Total groundnut production, reserved seed, home consumption and marketed surplus of groundnut

The average production of groundnut per household was 1.04 MT with the highest production of 7.59 MT to the lowest 0.17 MT. The average reserved seed of total cultivated areas per household was 0.15 MT and the maximum reserved seed was 2.76 MT. Some households sold total groundnut products without reserving the seed for next season. The average amount of total cultivated areas for home consumption was 0.12 MT and the maximum was 1.38 MT. However, some households could not reserve part of their production for home consumption. The average marketed surplus of total cultivated areas per household was 0.77 MT and the maximum was 6.64 MT. In the case of marketed surplus, there was also no surplus for some sample farmers as they consumed and reserved their total products (Table 4.8).

### 4.1.6 Different types of groundnut consumed by sample groundnut farmers

In the study area, 80.00% of farmers consumed for edible oil. About 27.33% of farmers consumed fried groundnut and 20.00% of farmers consumed roasted groundnut (Table 4.9).

### 4.1.7 Credit sources and average credit amount of sample groundnut farmers

Sources of credit availability among sample groundnut farmers were shown in Table (4.10). Most of sample groundnut farmers (79.33%) received credit only from Myanmar Agricultural Development Bank (MADB) and 8.67% of sample groundnut farmers received credit from Cooperative. And, 4.67% of sample groundnut farmers received credit from local money lenders. Then, each of 0.67% of sample groundnut farmers received credit from United Nation Development Program (UNDP) and World Vision.

Credit amount and interest rate of sample farmers were described in Table (4.10). The sample groundnut farmers borrowed the average credit amount, 489,076 MMK/year from MADB by the interest rate 0.08% per year and 250,000 MMK/year from Cooperative by the interest rate of 0.18% per year, respectively. The average credit amount 285,714 MMK/year from local money lenders by the interest rate of 0.38% per year, 500,000 MMK/year from UNDP by the interest rate of 0.24% per year and 300,000 MMK/year from World vision by the interest rate of 0.18% per year, respectively.

### 4.1.8 Constraints of groundnut production and marketing of sample groundnut farmers

Constraints in groundnut production and marketing faced by sample groundnut farmers were shown in Figure (4.1). There are 11 questions as the constraints concerning with lack of improved variety, climate change awareness, unstable price of output, incidence of disease and pest, lack of sufficient capital, lack of extension service, high transportation cost, high input cost, labor scarcity, water scarcity and higher production cost. Among them, 1% and 8% of sample groundnut farmers answered that they faced high production cost and high transportation cost for crop production. Then, 22% of sample groundnut farmers expressed that they did not receive extension service for groundnut production. The problem of lack of improved variety, water scarcity and lack of sufficient capital were faced by 27%, 33% and 42% of sample groundnut farmers respectively. In addition, 47%, 52% and 56% of sample groundnut farmers answered that they faced unstable price of output, high input cost, and incidence of disease and pest. Moreover, about 85% of sample groundnut farmers expressed that they did not have an adequate labor force for crop production. Finally, 94% of sample farmers answered that they faced climate change for crop production. Therefore, the average yield of groundnut was lower than the national target yield (1.68 MT/ha) because most sample groundnut farmers have faced climate change such as lower precipitation and others constraint in 2017-18.

**Table 4.8 Total groundnut production, reserved seed, home consumption and marketed surplus of groundnut**

(n=150) (Unit = MT)

| Items | Mean | Min. | Max. | SD |
|---|---|---|---|---|
| Total groundnut production | 1.04 | 0.17 | 7.59 | 1.08 |
| Reserved seed | 0.15 | 0 | 2.76 | 0.29 |
| Home consumption | 0.12 | 0 | 1.38 | 0.18 |
| Marketed surplus | 0.77 | 0 | 6.64 | 0.86 |

Note. Data were calculated by using grain yield of total sown areas.

**Table 4.9 Different types of groundnut consumed by sample groundnut farmers**

(n=150)

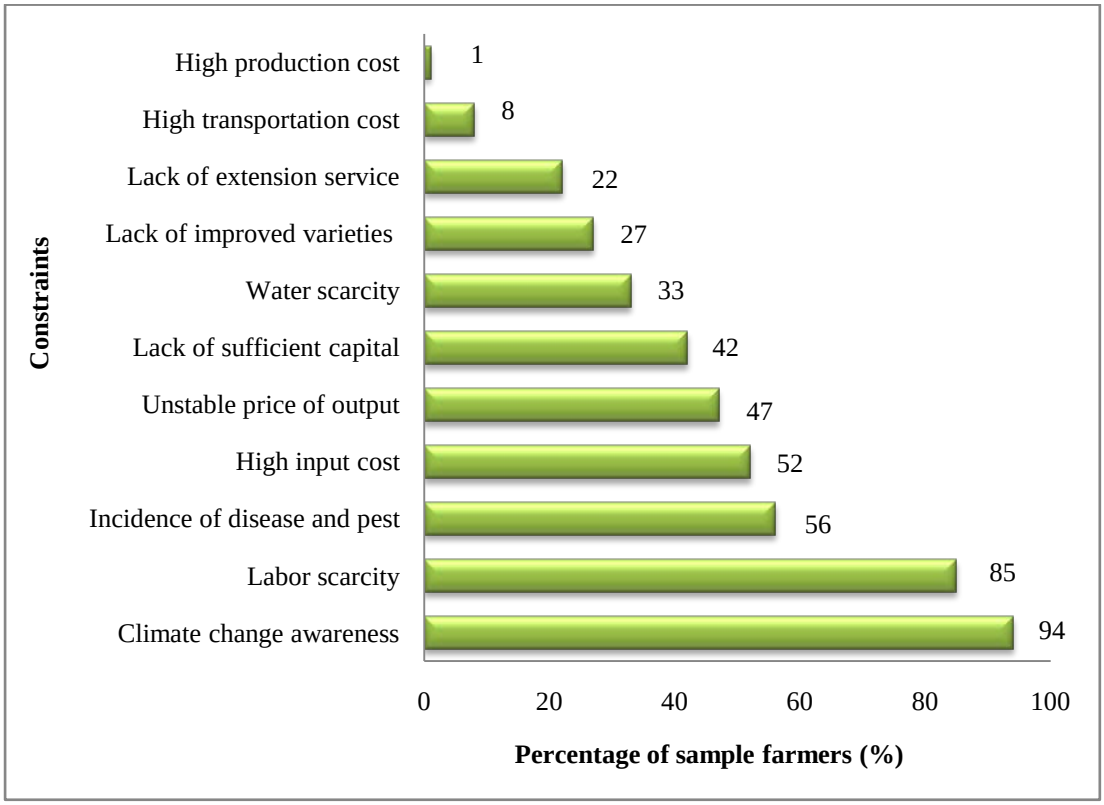
| Patterns | Respondents | |
|---|---|---|
| | Frequency | Percent |
| Edible oil | 120 | 80.00 |
| Fried groundnut | 41 | 27.33 |
| Roasted groundnut | 30 | 20.00 |

**Table 4.10 Average credit amount and interest rate of sample groundnut farmers**

(n=150)

| Items | Respondents | | Amount (MMK/yr) | Interest rate (percent/yr) |
|---|---|---|---|---|
| | Frequency | Percent | | |
| MADB | 119 | 79.33 | 489,076 | 0.08 |
| Cooperative | 13 | 8.67 | 250,000 | 0.18 |
| Local money lenders | 7 | 4.67 | 285,714 | 0.38 |
| UNDP | 1 | 0.67 | 500,000 | 0.24 |
| World vision | 1 | 0.67 | 300,000 | 0.18 |
| **Total** | **141** | **94.01** | | |

Note. Nine respondents did not accept the credit.




(n=150)

**Figure 4.1 Constraints of groundnut production and marketing by percentage of sample groundnut farmers**

## 4.2 General Characteristics and Marketing Activities of Sample Groundnut Farmers

### 4.2.1 Groundnut based value added opportunities and marketing channel

In the study area, groundnut based value added opportunities could be seen as low purified grain (si san), high purified grain (lone san), edible oil and oilcake, and seed. In all sample farmers, 40.00% of farmers sold groundnut product as high purified grain, and low purified grain and edible oil were sold by 35.33% and 5.33% of sample groundnut farmers. Then, oilcake, and high purified grain and seed were sold by each 3.33% of sample farmers respectively. Moreover, 2.00% and 0.67% of sample farmers sold edible oil plus oilcake, and seed (Figure 4.2). Especially, sample farmers did not sell their products as pod in this study area. In the study area, sample farmers sold the groundnut by season as presented in Appendix (3).

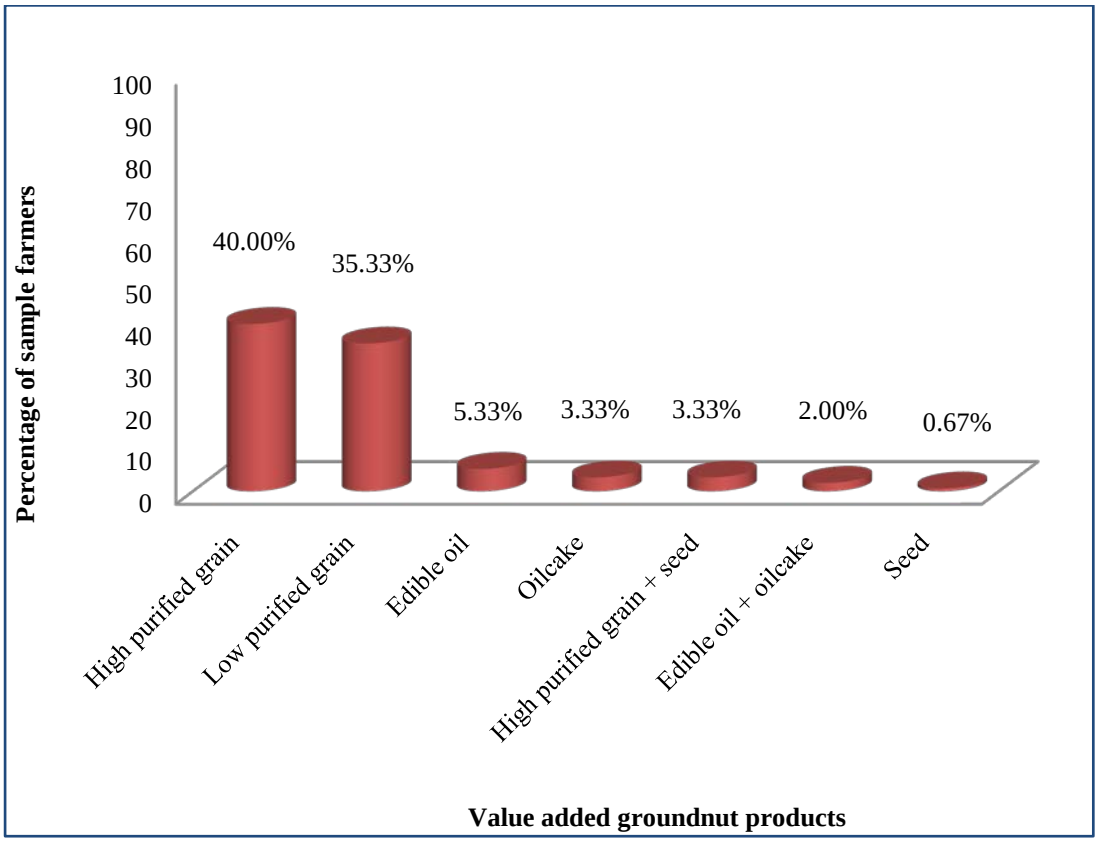
While 73.81% of total groundnut production was sold by sample groundnut farmers, 26.19% of total groundnut production was excluded for home consumption and reserved seed for next season. The marketed surplus of groundnut production consisted of 62.58% as high purified grain, 27.68% as low purified grain, 5.77% as edible oil and oilcake and 3.97% as seed. These products were sold to village collectors, consumers, farmers and wholesalers in Myinmu, Monywa, and Mandalay Townships (Figure 4.3).

### 4.2.2 Utilization of grading method by sample groundnut farmers

In the study area, all sample groundnut farmers used different grading methods. However, 55.33% of sample groundnut farmers cleaned and 44.67% of sample groundnut farmers dried their products before selling (Table 4.11).

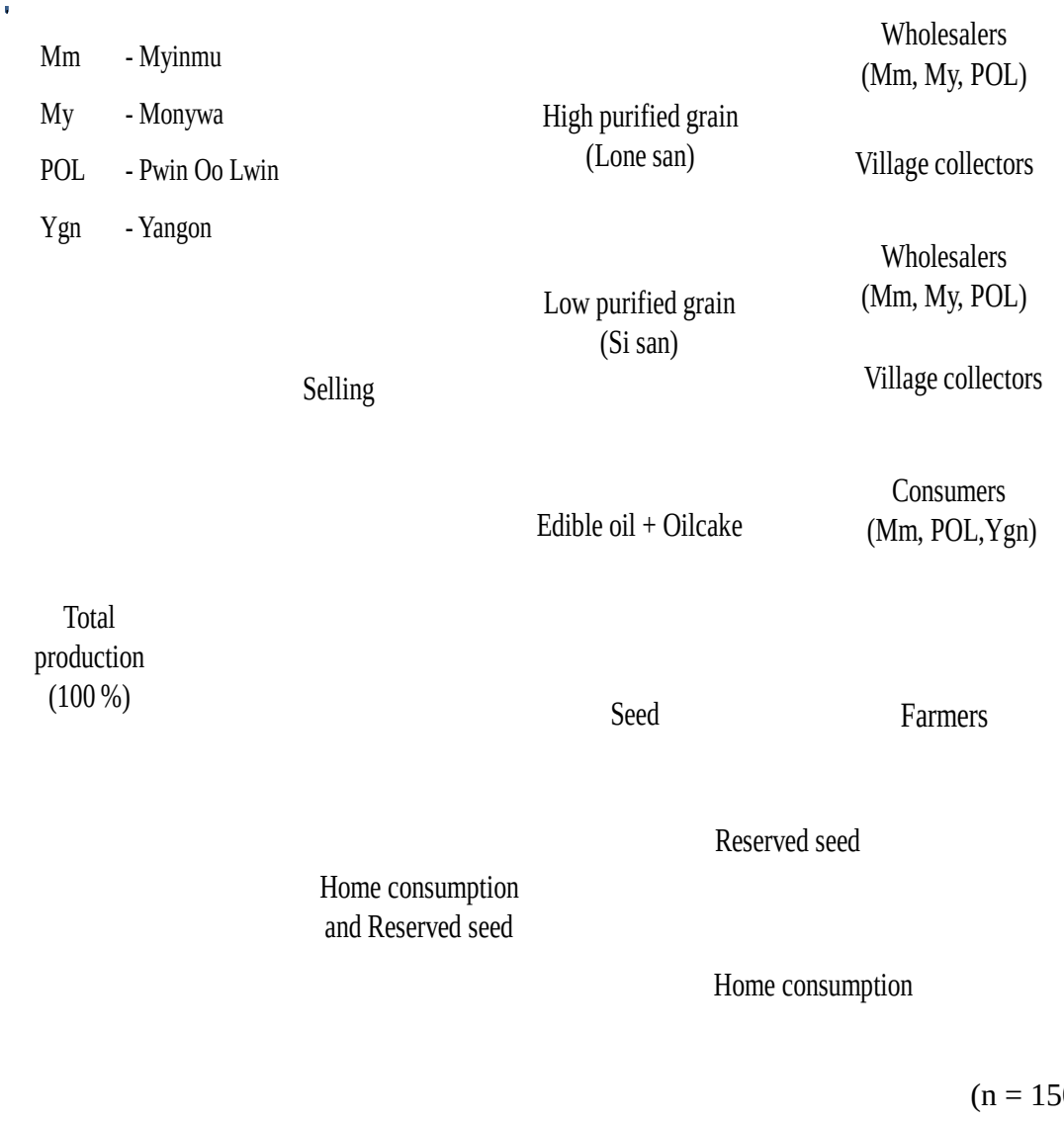
### 4.2.3 Weighting measurements in selling of sample groundnut farmers

In all sample groundnut farmers, 57.33% of sample groundnut farmers used weighting unit with viss in selling and 42.67 % of sample groundnut farmers employed weighting unit with basket in selling (Table 4.12).




(n = 150)

**Figure 4.2 Selling types of groundnut products by percentage of sample farmers**




(n = 150)

**Figure 4.3 Marketing channel of value added groundnut products for sample groundnut farmers in Myinmu Township**

Note. Percentages are calculated by product amount of total groundnut production.

**Table 4.11 Use of grading methods before selling by sample groundnut farmers**

(n=150)

| Grading method | Respondents | |
|---|---|---|
| | Frequency | Percent |
| Clean | 83 | 55.33 |
| Dry | 67 | 44.67 |

**Table 4.12 Weighting measurements in selling of sample groundnut farmers**

(n=150)

| Weighting scale | Respondents | |
|---|---|---|
| | Frequency | Percent |
| Viss | 86 | 57.33 |
| Basket | 64 | 42.67 |

### 4.2.4 Markets destination of groundnut in the study area

In the study area, 54.00% and 15.33% of sample groundnut farmers sold high purified grain or low purified grain to wholesalers in Monywa and Mandalay Townships (Table 4.13). In addition, 16.00% of sample groundnut farmers sold seed or edible oil or oilcake to consumers in village. Then, high purified grain or low purified grain was sold to wholesalers in Myinmu Township by 6.67% of sample groundnut farmers. Moreover, each 0.67% of sample groundnut farmers sold edible oil to consumers in Yangon and Pyin Oo Lwin.

### 4.2.5 Payment types between groundnut buyers and sellers

All sample groundnut farmers applied cash down payment in selling of their groundnut or products. The study found that they didn't sell their products with the payment system of credit and advanced payment (Table 4.14).

### 4.2.6 Sources of price information of sample groundnut farmers

Price information were received by 54.67% of sample groundnut farmers from friends and neighbors and 43.33% of sample groundnut farmers received the price information for their products from township wholesalers. In addition, 14.67% and 6.00% of sample groundnut farmers used the price sources from media and village collectors. Moreover, 2.67% and 1.33% of sample groundnut farmers used the price sources provided by extension officers and input dealers (Table 4.15).

**Table 4.13 Markets destination of groundnut by sample groundnut farmers**

(n=150)

| Items | Respondents | |
|---|---|---|
| | Frequency | Percent |
| Mandalay market | 81 | 54.00 |
| Village market | 24 | 16.00 |
| Monywa market | 23 | 15.33 |
| Myinmu market | 10 | 6.67 |
| PyinOoLwin market | 1 | 0.67 |
| Yangon market | 1 | 0.67 |
| **Total** | **140** | **93.34** |

Note. Ten respondents used their products for home consumption and reserved seed.

**Table 4.14 Payment types between groundnut buyers and sellers**

(n=150)

| Types | Respondents | |
|---|---|---|
| | Frequency | Percent |
| Cash down | 150 | 100.00 |
| Credit | 0 | 0.00 |
| Advanced payment | 0 | 0.00 |

**Table 4.15 Sources of price information of sample groundnut farmers**

(n=150)

| Sources | Farmers | |
|---|---|---|
| | Frequency | Percent |
| Friends/Neighbors | 82 | 54.67 |
| Township wholesalers | 65 | 43.33 |
| Media | 22 | 14.67 |
| Village collectors | 9 | 6.00 |
| Extension officers | 4 | 2.67 |
| Input dealers | 2 | 1.33 |

## 4.3 Cost and Return Analysis of Groundnut Production of Sample Groundnut Farmers

### 4.3.1 Cost and return analysis of groundnut production in winter season

In this study, enterprise budget was calculated to analyze cost and return of groundnut production in Myinmu Township. Cost and return analysis of groundnut production for raw product and value added groundnut products in winter season was presented in Appendix (4).

The enterprise budget of sample groundnut farmers was calculated by using conversion factor (Figure 4.4). In this case, the weight of groundnut (low purified grain or grain) was 30 baskets per 100 baskets of groundnut with shell (pod). Accordingly, the conversion rate of high purified grain (grain) and seed were each 28 baskets per 30 baskets of groundnut without shell (low purified grain). Moreover, the weight of edible oil and oilcake were 180 viss and 285 viss per 30 baskets of groundnut without shell (low purified grain).

Benefit Cost Ratio (BCR) indicated how much was the gross returns from a given crop by investing one kyat in growing that crop. The amount of benefit cost ratio of greater than one is profitable. The bigger the BCR values, the more profit received by farmers. Total variable cost of production included material input costs, hired labor costs, opportunities costs for family labor, interest on cash cost and marketing cost. Material input costs included the costs for seed, insecticide, fungicide, herbicide, compound, urea, gypsum, farm yard manure (FYM) and foliar fertilizers. Family labor costs and hired labor costs included the costs for ploughing, harrowing, sowing, thinning, intercultivation, insecticide application, fertilizer application, harvesting, transportation and drying. Return of groundnut production included the yield per hectare, return from sale with average current price of groundnut during that period.

In this calculation, the benefit cost ratio of pod, low purified grain and high purified grain were 0.96, 1.20 and 1.31 respectively. And, the BCRs of edible oil and oilcake, and seed were 1.15 and 1.64. Among them, the smallest BCR was 0.96 from selling as pod (Figure 4.5). It indicated that the return per unit capital invested was minus 0.04 in winter season. It can be concluded that total variable cost of groundnut production of farmers was not covered by return above variable cost of pod, because it was sold as a raw product without transaction to value added product and lower yield in the study period than other period. In addition, it was seen that seed obtained the largest BCR (1.64). It pointed out that return per unit capital invested was 0.64 after all.

### 4.3.2 Cost and return analysis of groundnut production in rainy season

Cost and return analysis of groundnut production for raw product and value added groundnut products in rainy season was presented in Appendix (5). According to cost and return analysis, the BCRs of pod, low purified grain and high purified grain were 1.24, 1.39 and 1.55 respectively. The BCRs of edible oil and oilcake, and seed were 1.89 and 2.30 (Figure 4.6). In comparison, the lowest BCR was observed in pod (1.24). It indicated that the return per unit capital invested was 0.24 in pod. As a result of cost and return analysis, the highest BCR was 2.30 of selling seed. It can be concluded that farmers could earn profit about one unit from groundnut production if one kyat was invested on variable cash cost. It indicated that net return for capital invested was 1.30. Therefore, seed production was economical for sample groundnut farmers.

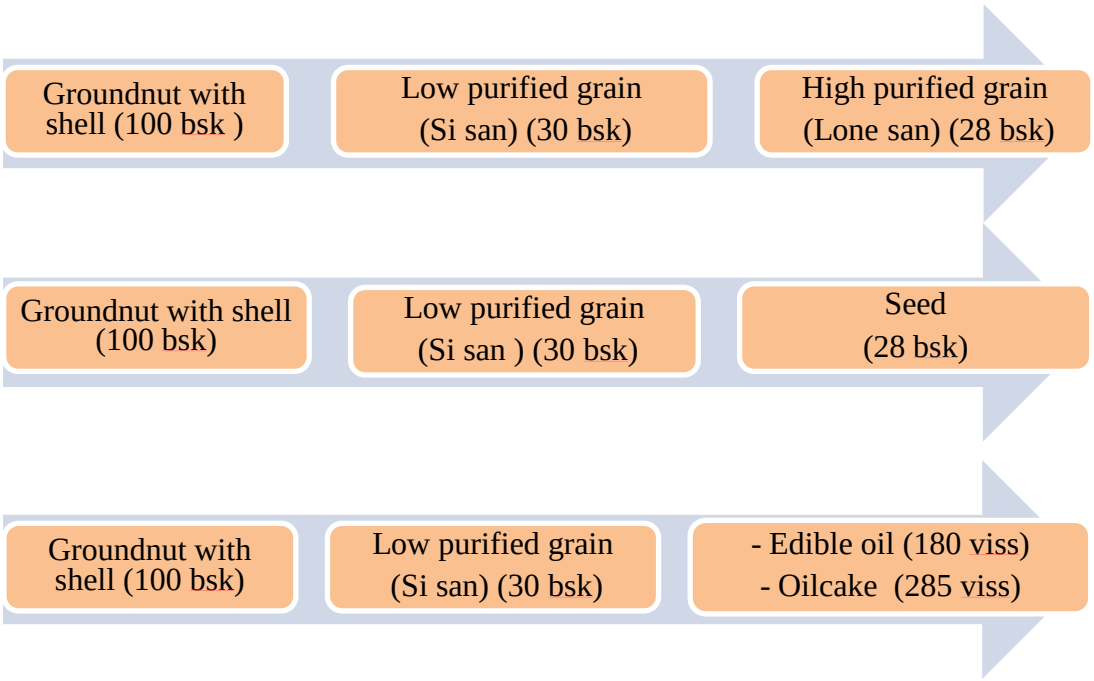
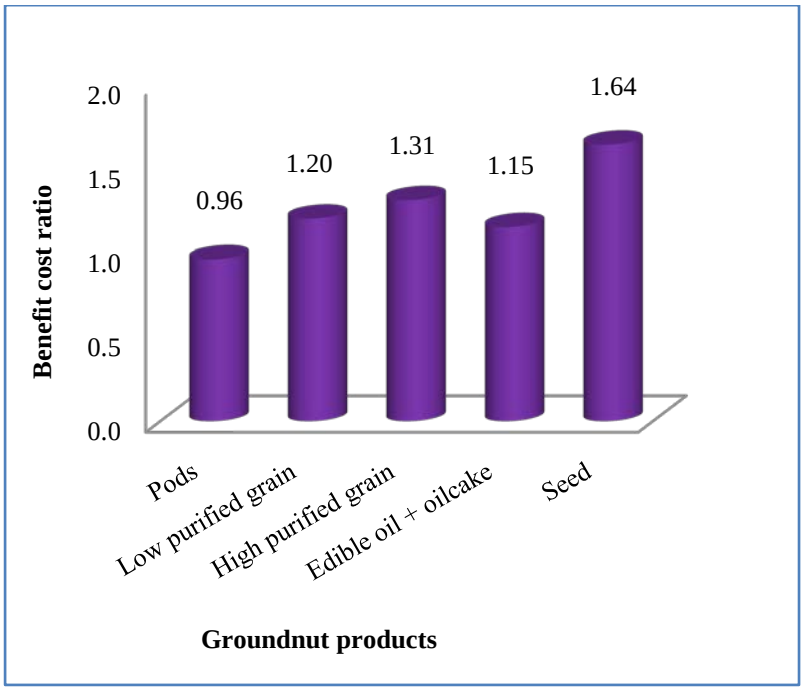
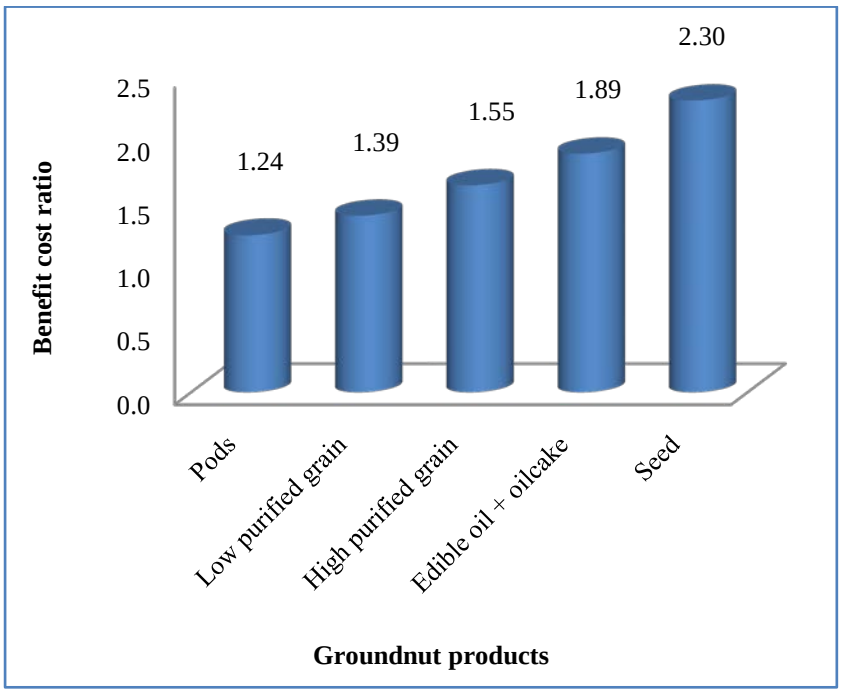



**Figure 4.4 Conversion factors from groundnut with shell (pod) to value added groundnut products**




| Items | n |
|---|---|
| Pod | 147 |
| Low purified grain | 50 |
| High purified grain | 65 |
| Edible oil and oilcake | 15 |
| Seed | 5 |

**Figure 4.5 Benefit cost ratio of groundnut products in winter season**




| Items | n |
|---|---|
| Pod | 28 |
| Low purified grain | 15 |
| High purified grain | 9 |
| Edible oil and oilcake | 1 |

**Figure 4.6 Benefit cost ratio of groundnut products in rainy season**

## 4.4 Marketing Margin, Marketing Cost and Profit of Sample Groundnut Farmers

In this section, the marketing margins of groundnut were examined. The marketing costs and marketing margins were calculated for sample groundnut farmers in the groundnut such as pod, low purified grain and high purified grain, edible oil and oilcake, and seed.

In the marketing channel, the commodity types handled by the stakeholders are different. For example, the wholesalers handled the commodity as the groundnut with shell (pod) and without shell (seed), and the farmers handled the commodity as edible oil and oilcake, and seed. Groundnut seed was differentiated into two types such as high purified grain and low purified grain. Therefore, the percentage of profit per cost price was used in this study to analyze the marketing margin for each kind of value added groundnut product of sample farmers.

The marketing cost and marketing margins were calculated for sample groundnut farmers based on conversion factor (Figure 4.4). In calculating the different margins, the price, cost and profit of groundnut and each value added groundnut product were presented in Figure (4.7). The production cost and the price received from selling as pod were 774 MMK/kg and 838 MMK/kg. So, the net return was 64 MMK/kg. And, the price received from selling as low purified grain was 1,714 MMK/kg while production cost was 1,326 MMK/kg. Therefore, the net return was 388 MMK/kg. The production cost and price received from selling of high purified grain were 1,398 MMK/kg and 1,946 MMK/kg while the net return was 548 MMK/kg. Then, a farmer received from selling price of edible oil was 3,834 MMK/kg while the production cost was 2,810 MMK/kg and the net return was 1,024 MMK/kg. Moreover, the transaction cost and the price received from selling as seed were 1,192 MMK/kg and 2,231 MMK/kg. Therefore, the net return was 1,039 MMK/kg.

The farmers received 8.26 percent of profit per cost price by selling as pod (Table 4.16); about 29.26% for selling as low purified grain (Table 4.17), and 36.44% was received from selling as edible oil (Table 4.18). And then, the farmers by selling as high purified grain and seed got the percent of profit per cost price were 39.19% and 87.16% (Table 4.19 and 4.20). According to the marketing cost and marketing margin analysis, farmers earned the higher profit share by selling as seed than others.

**Groundnut with shell (pods)**

Price - 838 MMK/kg

Cost - 774 MMK/kg

Profit - 64 MMK/kg

**Low purified grain (Si san)**

Price - 1,714 MMK/kg

Cost - 1,326 MMK/kg

Profit - 388 MMK/kg

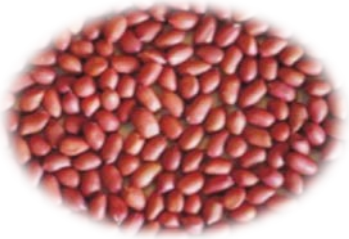
**Groundnut without shell (seed)**

Price - 2,231 MMK/kg

Cost - 1,192 MMK/kg

Profit - 1,039 MMK/kg

**High purified grain (Lone san)**



Price - 1,946 MMK/kg

Cost - 1,398 MMK/kg

Profit - 548 MMK/kg

**Groundnut edible oil and oilcake**

Price - 3,834 MMK/kg

Cost - 2,810 MMK/kg

Profit - 1,024 MMK/kg

**Figure 4.7 Price, cost and profit of groundnut and value added groundnut products**

**Table 4.16 Cost and profit of groundnut production (pod) in both seasons**

(n = 150)

| Items | MMK/kg |
|---|---|
| (1) Selling price of groundnut with shell (pod) | 838 |
| (2) Unit cost of groundnut with shell (pod) | 774 |
| -Total variable cost | 756 |
| -Transportation cost | 18 |
| (3) Average profit of the farmers (1-2) | 64 |
| (4) Profit per cost price (3/2)*100 | 8.26% |

Note. Groundnut with shell (pod) 1 bsk = 11.34 kg

**Table 4.17 Cost and profit of low purified grain in both seasons**

(n = 53)

| Items | MMK/kg |
|---|---|
| (1) Selling price of low purified grain | 1,714 |
| (2) Unit cost of low purified grain | 1,326 |
| -Total variable cost | 1,240 |
| -Hulling cost | 36 |
| -Transportation cost | 37 |
| -Packaging cost | 13 |
| (3) Average profit of the farmers (1-2) | 388 |
| (4) Profit per cost price (3/2)* 100 | 29.26% |

Note. Groundnut without shell (low purified grain or grain) 1 bsk = 23kg

**Table 4.18 Cost and profit of edible oil in both seasons**

(n=16)

| Items | MMK/kg |
|---|---|
| (1) Selling price of edible oil | 3,834 |
| (2) Unit cost of edible oil | 2,810 |
| -Total variable cost | 2,350 |
| -Milling cost +hulling cost | 215 |
| -Packaging cost | 92 |
| -Transportation cost | 153 |
| (3) Average profit of the farmers (1-2) | 1,024 |
| (4) Profit per cost price (3/2)*100 | 36.44% |

**Table 4.19 Cost and profit of high purified grain in both seasons**

(n = 65)

| Items | MMK/kg |
|---|---|
| (1) Selling price of high purified grain | 1,946 |
| (2) Unit cost of high purified grain | 1,398 |
| -Total variable cost | 1,299 |
| -Hulling cost | 20 |
| -Labor cost | 57 |
| -Transportation cost | 15 |
| -Packaging cost | 7 |
| (3) Average profit of the farmers (1-2) | 548 |
| (4) Profit per cost price (3/2)*100 | 39.19% |

**Table 4.20 Cost and profit of seed in both seasons**

(n = 6)

| Items | MMK/kg |
|---|---|
| (1) Selling price of seed | 2,231 |
| (2) Unit cost of seed | 1,192 |
| -Total variable cost | 1,047 |
| -Hulling cost | 69 |
| -Labor cost | 51 |
| -Packaging cost | 25 |
| (3) Average profit of the farmers (1-2) | 1,039 |
| (4) Profit per cost price (3/2)*100 | 87.16% |

## 4.5 Determinant Factors on Profitability of Groundnut Selling Types

### 4.5.1 Determinants of the profitability of groundnut production of the sample farmers

This section indicated that the estimate results of factors affecting on the groundnut profit of the selected sample groundnut farmers of groundnut production in the study area. To identify the determinant factors on profitability of groundnut production, a linear regression function was used. The specific profit function of sample groundnut farmers was estimated by using 7 independent variables; yield (pod), total material cost, family labor cost, hired labor cost, climate change awareness, market distance and access to credit. The descriptive statistics of dependent and independent variables of groundnut profit function were shown in Table (4.21). Dummy variables of climate change awareness (1 = yes, 0 = no), access to credit (1 = yes, 0 = no) and market distance (1 = Monywa and Mandalay wholesalers, 0 = Myinmu wholesalers) were also included.

According to the groundnut profit regression estimates, groundnut profit of the sample farmers was positively and significantly influenced by yield at 1%. It indicated that the groundnut profit would be increased by 0.78 (‘000 MMK) if one kilogram was increased in yield (pod) of groundnut. The results showed that the farmers who had got the highest yield can receive more profit because yield greatly affected on profit. The groundnut profit was negatively and significantly influenced by hired labor costs, family labor cost and total material cost on groundnut production at 1% level respectively. It can be concluded that the groundnut profit would be decreased 957 MMK, 981 MMK and 923 MMK respectively if one thousand kyat was increased in hired labor cost, family labor cost and total material cost. It pointed out that the farmers who had suffered high cost of hired labor cost, family labor cost and total material cost on the farm in groundnut production can receive low profit. The F-value pointed out that the model is highly significant as shown in Table (4.22).

### 4.5.2 Determinants of the profitability of value added groundnut product (high purified grain) of sample farmers

The regression results on factors influencing the profitability of value added groundnut product (high purified grain) in Myinmu Township was shown in Table (4.23). To identify the determinant factors on profitability of high purified grain, a log linear regression function was used. The specific profit function of high

purified grain was estimated by using 10 independent variables; price of high purified grain, total material cost, family labor cost, hired labor cost, sown areas of groundnut, age sample farmer, schooling years of sample farmer, processing cost, market distance and access to credit. The descriptive statistics of dependent and independent variables of profit function for value added groundnut product were shown in Table (4.23). Dummy variables of access to credit (1 = yes, 0 = no), and market distance (1 = Monywa and Mandalay wholesalers, 0 = Myinmu wholesalers) were also included.

The regression results for high purified grain estimates; profit of high purified grain was positively and significantly influenced by price and processing cost at 1% level. According to the regression estimates, if one percent was increased in price and processing cost of high purified grain, the profit would be increased by 1.59% and 1.63%. The results showed that the farmers who had invested the highest cost and increased the price can earn more the profit because processing cost and price greatly affected on profit. In regression analysis, the groundnut profit was negatively and significantly influenced by family labor cost, total material cost and hired labor cost on high purified grain production at 1% level. The results showed that the profit would be decreased by 0.32%, 0.38% and 0.36% respectively if one percent was increased in family labor cost, total material cost and hired labor cost on groundnut production. It indicated that the farmers who had used highest cost of family labor cost, hired labor cost and total material cost on the farm in high purified grain production could decrease the profit. The F-value pointed out that the model is highly significant as indicated in Table (4.24).

### 4.5.3 Determinants of the profitability of value added groundnut product (low purified grain) of sample farmers

To identify the determinant factors on profitability of low purified grain, a log linear regression function was used. The specific profit function of low purified grain was estimated by using 10 independent variables; price, total material cost, family labor cost, hired labor cost, sown areas of groundnut, age of sample farmer, schooling years of sample farmer, processing cost, market distance and access to credit. The descriptive statistics of dependent and independent variables of profit function for value added groundnut product (low purified grain) were shown in Table (4.25). Dummy variables of access to credit (1 = yes, 0 = no) and market distance (1= yes, 0 = no) were also included.

According to profit regression for value added groundnut product (low purified grain) estimates, profitability of low purified grain was positively and significantly influenced by price and processing cost for value added product at 5% and 1% levels, respectively. It means that farmers could receive the profit 5.86% and 3.99% if one percent was increased in price and processing cost on value added groundnut product (low purified grain).The farmers who had received high price and invested high cost which obviously dominated on profit. And, total material cost and family labor cost were negatively and significantly influenced on profitability of value added groundnut product (low purified grain) at 5% level. The results showed that the farmers could decrease the profit 2.24% and 0.90% if one percent was invested in total material cost and family labor cost on value added groundnut product (low purified grain). The F-value pointed out that the model is significant as presented in Table (4.26).

**Table 4.21 Descriptive statistics of dependent and independent variables of groundnut production profit function**

(n=150)

| Description of variables | Unit | Mean | Standard Deviations |
|---|---|---|---|
| Groundnut profit | MMK/ha | 865,847 | 237,265 |
| Yield of groundnut pod | Kg/ha | 1,071 | 228 |
| Family labor cost | MMK/ha | 227,586 | 107,590 |
| Hired labor cost | MMK/ha | 282,190 | 110,159 |
| Total material cost | MMK/ha | 337,503 | 60,478 |

**Table 4.22 Determinants of the profitability of groundnut production of the sample groundnut farmers**

(n=150)

| Independent variables | Unstandardized Coefficients | | t value | Sig. |
|---|---|---|---|---|
| | B | Std. Error | | |
| (Constant) | -17.746$^{ns}$ | 18.140 | -0.978 | 0.330 |
| Yield (pod) | 0.777$^{***}$ | 0.020 | 38.835 | 0.000 |
| Family labor cost | -0.981$^{***}$ | 0.062 | -15.900 | 0.000 |
| Hired labor cost | -0.957$^{***}$ | 0.061 | -15.740 | 0.000 |
| Total material cost | -0.923$^{***}$ | 0.093 | -9.875 | 0.000 |
| Market distance (dummy) | -0.978$^{ns}$ | 5.284 | -0.185 | 0.853 |
| Access to credit (dummy) | 0.233$^{ns}$ | 5.812 | 0.040 | 0.968 |
| Climate change (dummy) | -7.342$^{ns}$ | 4.784 | -1.535 | 0.127 |
| $R^2$ | | 0.761 | | |
| Adjusted $R^2$ | | 0.724 | | |
| F-value | | 352.22$^{***}$ | | |

Note. *** is significant at 1% level and ns is not significant.

**Table 4.23 Descriptive statistics of dependent and independent variables of profit function of high purified grain**

(n=65)

| Description of variables | Unit | Mean | Standard Deviations |
|---|---|---|---|
| Groundnut profit | MMK/ha | 1,459,889 | 389,801 |
| Price of high purified grain | MMK/kg | 1,957 | 150 |
| Family labor cost | MMK/ha | 253,234 | 115,746 |
| Hired labor cost | MMK/ha | 297,975 | 124,881 |
| Total material cost | MMK/ha | 336,352 | 65,143 |
| Processing cost | MMK/ha | 126,761 | 34,639 |
| Sown areas of groundnut | ha | 2.2 | 0.9 |
| Schooling years of sample farmer | Year | 7 | 4 |
| Age of sample farmer | Year | 56 | 12 |

**Table 4.24 Determinants of the profitability of high purified grain**

(n=65)

| Independent variables | Unstandardized Coefficients | | t value | Sig. |
|---|---|---|---|---|
| | B | Std. Error | | |
| (Constant) | 1.941$^{ns}$ | 2.792 | 0.695 | 0.490 |
| Ln price of high purified grain | 1.586$^{***}$ | 0.195 | 8.145 | 0.000 |
| Ln total material cost | -0.378$^{***}$ | 0.111 | -3.420 | 0.001 |
| Ln family labor cost | -0.315$^{***}$ | 0.053 | -5.914 | 0.000 |
| Ln hired labor cost | -0.359$^{***}$ | 0.062 | -5.810 | 0.000 |
| Ln processing cost | 1.630$^{***}$ | 0.081 | 20.001 | 0.000 |
| Ln age of sample farmer | -0.015$^{ns}$ | 0.116 | -0.127 | 0.900 |
| Ln schooling years of sample farmer | 0.004$^{ns}$ | 0.048 | 0.094 | 0.926 |
| Ln sown areas of groundnut | 0.024$^{ns}$ | 0.039 | 0.621 | 0.537 |
| Market distance (dummy) | 0.057$^{ns}$ | 0.060 | 0.941 | 0.351 |
| Access to credit (dummy) | -0.032$^{ns}$ | 0.054 | -0.590 | 0.558 |
| $R^2$ | 0.730 | | | |
| Adjusted $R^2$ | 0.717 | | | |
| F-value | 16.70$^{***}$ | | | |

Note. *** is significant at 1% level and ns is not significant.

**Table 4.25 Descriptive statistics of dependent and independent variables of profit function of low purified grain**

(n=53)

| Description of variables | Unit | Mean | Standard Deviations |
|---|---|---|---|
| Groundnut profit | MMK/ha | 1,110,444 | 300,016 |
| Price of low purified grain | MMK/kg | 1,726 | 180 |
| Family labor cost | MMK/ha | 199,018 | 90,006 |
| Hired labor cost | MMK/ha | 270,644 | 105,832 |
| Total material cost | MMK/ha | 330,782 | 68,304 |
| Processing cost | MMK/ha | 39,880 | 9,184 |
| Sown areas of groundnut | ha | 1.29 | 0.83 |
| Schooling years of sample farmer | Year | 7 | 4 |
| Age of sample farmer | Year | 54 | 12 |

**Table 4.26 Determinants of the profitability of low purified grain**

(n=53)

| Independent variables | Unstandardized coefficients | | t value | Sig. |
|---|---|---|---|---|
| | B | Std. Error | | |
| (Constant) | -49.246* | 26.579 | -1.853 | 0.071 |
| Ln price of low purified grain | 5.862** | 2.229 | 2.630 | 0.012 |
| Ln total material cost | -2.238** | 0.991 | -2.259 | 0.029 |
| Ln family labor cost | -0.900** | 0.378 | -2.380 | 0.022 |
| Ln hired labor cost | -0.568ns | 0.583 | -0.974 | 0.336 |
| Ln processing cost | 3.999*** | 0.995 | 4.020 | 0.000 |
| Ln age of sample farmer | 0.677ns | 1.118 | 0.606 | 0.548 |
| Ln schooling years of sample farmer | 0.441ns | 0.391 | 1.128 | 0.266 |
| Ln sown areas of groundnut | 0.354ns | 0.460 | 0.770 | 0.445 |
| Market distance (dummy) | -1.083ns | 0.700 | -1.547 | 0.129 |
| Access to credit (dummy) | -0.216ns | 0.613 | -0.353 | 0.726 |
| $R^2$ | | 0.485 | | |
| Adjusted $R^2$ | | 0.362 | | |
| F-value | | 2.46** | | |

Note. *, ** and *** are significant at 1%, 5% and 10% levels respectively and ns is not significant.

# CHAPTER V
# SUMMARY, CONCLUSION AND RECOMMENDATION

## 5.1 Summary and Conclusion of the Study

This study was an attempt to analyze value added processing opportunities and profit function of sample groundnut farmers. In the study area, most sample groundnut farmers were aged ones and they had a lot of farming experience in groundnut production. Majority of sample groundnut farmers had received secondary education. This indicated that they had more productive experiences and better potential for decision making in groundnut production. The majority of cultivated land types of sample groundnut farmers were upland ones. In the study area, there are many varieties of groundnut grown by sample farmers such as local varieties, Magway 10, Magway 11, Sinpadaythar 7 and Sinpadaythar 11. Among these varieties, most sample groundnut farmers cultivated Sinpadaythar 11.

In the survey area, the average land holding capacity was a larger size in sample groundnut farmers. The average groundnut sown area was one fourth of their total land holding size. The average yield of groundnut (1.58 MT/ha) was lower than the national target yield (1.68 MT/ha) because sample groundnut farmers faced unfavorable climate change such as lower precipitation in 2017-18. In total production of groundnut, the marketed surplus was the larger amount than reserved seed and home consumption. As a result, majority of sample groundnut farmers sold their products after keeping a required amount of reserved seed and home consumption. Most of sample groundnut farmers consumed the groundnut as fried groundnut, roasted groundnut and edible oil.

In the study area, value added processing opportunities were found in sample groundnut farmers with the products of low purified grain, high purified grain, edible oil and oilcake, and seed. Especially, sample groundnut farmers did not sell their products as raw product (pod). Grading methods of drying and cleaning were used before selling by sample groundnut farmers. Most of sample groundnut farmers mainly sold to wholesalers in Myinmu, Monywa and Mandalay Townships, by applying weighting scale of viss and basket with the cash down payment system. Sample groundnut farmers received credit from Myanmar Agricultural Development Bank (MADB), Cooperative, local money lenders, United Nation Development Program (UNDP) and World vision. Among them, most of sample groundnut farmers mainly obtained credit from MADB.

According to the cost and return analysis, total variable cost of high purified grain was higher than others groundnut product in winter season. Additionally, gross benefit of seed was higher than others due to the higher price received. In winter season, the benefit cost ratio of pod, low purified grain and high purified grain were 0.96, 1.20 and 1.23 respectively. The benefit cost ratio of edible oil and oilcake, and seed were 1.37 and 1.45. Among them, the BCR of seed was the highest (1.45). It indicated that return per unit capital invested was 0.45. This means that farmers could earn profit about one unit from groundnut production if one kyat was invested on variable cash cost and net return for capital invested was 0.45 kyat. In rainy season, total variable cost of edible oil and oilcake was higher than others. Furthermore, gross benefit of seed was higher than others groundnut product due to the higher price received. The BCRs of pod and low purified grain were 1.24 and 1.39. And then, the BCRs of high purified grain, edible oil and oilcake, and seed were 1.55, 1.89 and 2.30 respectively. In comparison, seed was the highest BCR (2.30). It pointed out that return per unit capital invested was 1.30. It can be concluded that farmers would earn profit about one unit from groundnut production if one kyat was invested on variable cash cost, net return for capital invested was 1.30 kyats. Therefore, the results showed that seed production was economically more attractive for farmers than others groundnut product during the study period.

As a result of the marketing cost and marketing margin analysis of the raw product (pod), and value added groundnut product, seed got the higher percent of profit per cost price (87.16%) others than farmers by selling of pod (8.26%), low purified grain (29.26%), edible oil and oilcake (36.44%), and high purified grain (39.19%).

According to regression estimate for groundnut production, groundnut profit was positively and significantly influenced by yield of groundnut. The result showed that the farmers who got the highest yield could receive more profit because yield greatly affected on profit. Groundnut profit was negatively and significantly influenced by hired labor cost, family labor cost and total material cost. It means that the farmers who had suffered high cost of hired labor cost, family labor cost and total material cost on groundnut production could receive low profit.

Among the determinants of the profitability of value added groundnut product (high purified grain), price and processing cost of high purified grain were positively and significantly influenced on profit of value added groundnut product (high purified

grain). It can be concluded that farmers could increase the profit if they invested high cost of processing and increased the price on value added groundnut product (high purified grain). Total material cost, family labor cost and hired labor cost were negatively and significantly influenced on profit of value added groundnut product. The results showed that the farmers who faced high cost in total material cost, family labor cost and hired labor cost on value added groundnut product could decrease the profit.

According to regression for value added groundnut product (low purified grain) estimate, profitability of low purified grain was positively and significantly influenced by processing cost and price. It means that, farmers could increase the profit if high processing cost invested on value added groundnut product (low purified grain) and the farmers who had received the highest price which obviously dominated on profit. And, total material cost and family labor cost were negatively and significantly influenced on profitability of value added groundnut product (low purified grain). The results showed that the farmers could decrease the profit if higher cost was used in total material cost and family labor cost concerning with value added groundnut product (low purified grain).

In the study area, there were twelve major constraints of groundnut production and marketing of sample groundnut farmers. The most serious constraints faced by sample groundnut farmers were climate change, labor scarcity, incidence of diseases and pests, and high input cost in groundnut production. Some sample groundnut farmers suffered higher costs for crop production by facing serious pests and diseases and they did not receive the fair inputs price. And, they did not have an adequate amount of labor force for crop production due to migration. Most of sample groundnut farmers faced climate change as lower precipitation and other constraints. Therefore, the average yield of groundnut was lower than the national target yield (1.68 MT/ha) during this study period.

## 5.2 Recommendation of the Study

In the study area, low purified grain, high purified grain, edible oil and oilcake, and seed were mainly sold by sample groundnut farmers as value added groundnut products. Therefore, effective extension program should be scaling up for agro-processing to improve processing opportunities at farm level.

According to the cost and return analysis, benefit cost ratio of seed was the higher than others groundnut product in both seasons. Therefore**,** seed production was economically more attractive to farmers in the study area. As a result of the marketing cost and marketing margin analysis of the raw product (pod), and value added groundnut product, seed got the higher percent of profit per cost price than the others. The results showed that groundnut farmers should consider on value added products of groundnut instead of selling raw product to earn more profit.

The results of regression analysis pointed out that groundnut yield were the most effective variable for groundnut profit. So, improved high yield variety is a necessary condition for the development in yield per unit area of groundnut production. Nowadays, sample groundnut farmers are still using local varieties because they easily received the seeds by reserving from their farm using traditional method. It means that the poor quality of the seeds decreased the yield and consequently, it reduces the income and return of the sample groundnut farmers. It can be concluded that it is immediately needed to develop seed industry through public private partnership and farmers' effort themselves to meet the increasing demand for quality seed.

As the groundnut yield was the most effective variables for groundnut profit which can increase farm income. The results showed that groundnut price was the most effective variable for yield, better macro environment is necessary to increase crop price which can increase farm income. As the total material cost, family labor and hired labor cost negatively influenced on profit of groundnut production, favorable policy environment for production and marketing of groundnut sector will be appreciated for the development of small farmers. In regression analysis, price and processing cost were the most effective variables for value added groundnut products which can increase farm income. As price and processing cost positively influenced on profit of value added groundnut products, value adding is potential business for better income and profit of groundnut farmers. Therefore, groundnut value added enterprise would be required to encourage for improving the socio-economic conditions of farmers.

The constraint analysis pointed out that most of sample groundnut farmers faced with high production cost including high input prices and higher labor wages due to labor scarcity. There were capital constraints in crop production, and inputs especially pesticides and fertilizers. The decision makers should pay attention to

decrease inputs price in the agrochemical market. By doing this, farmer can use more fertilizers for earning higher crop yield and income of their crop production. In addition, farm mechanization should be supported to farmers who were faced with labor scarcity in groundnut production. To obtain the maximum profit and income for the sample farmers, it was required to reduce the total production cost by using farm machinery in the study area.

Then, some sample groundnut farmers did not received extension services for groundnut production. Therefore, effective extension services as likely to farmer field school should be encouraged for promoting the cultivation and production of crops of farmers.

Moreover, sample groundnut farmers faced climate change awareness such as lower precipitation and water scarcity. According to the insufficient water for cultivation, farmers cannot grow the crops in every season and face with limited cultivation. The availability of adequate water resources for agriculture is essential for increased production. Myinmu Township depends mainly on rainfall for crop production. Therefore, adequate water should be supported in time.

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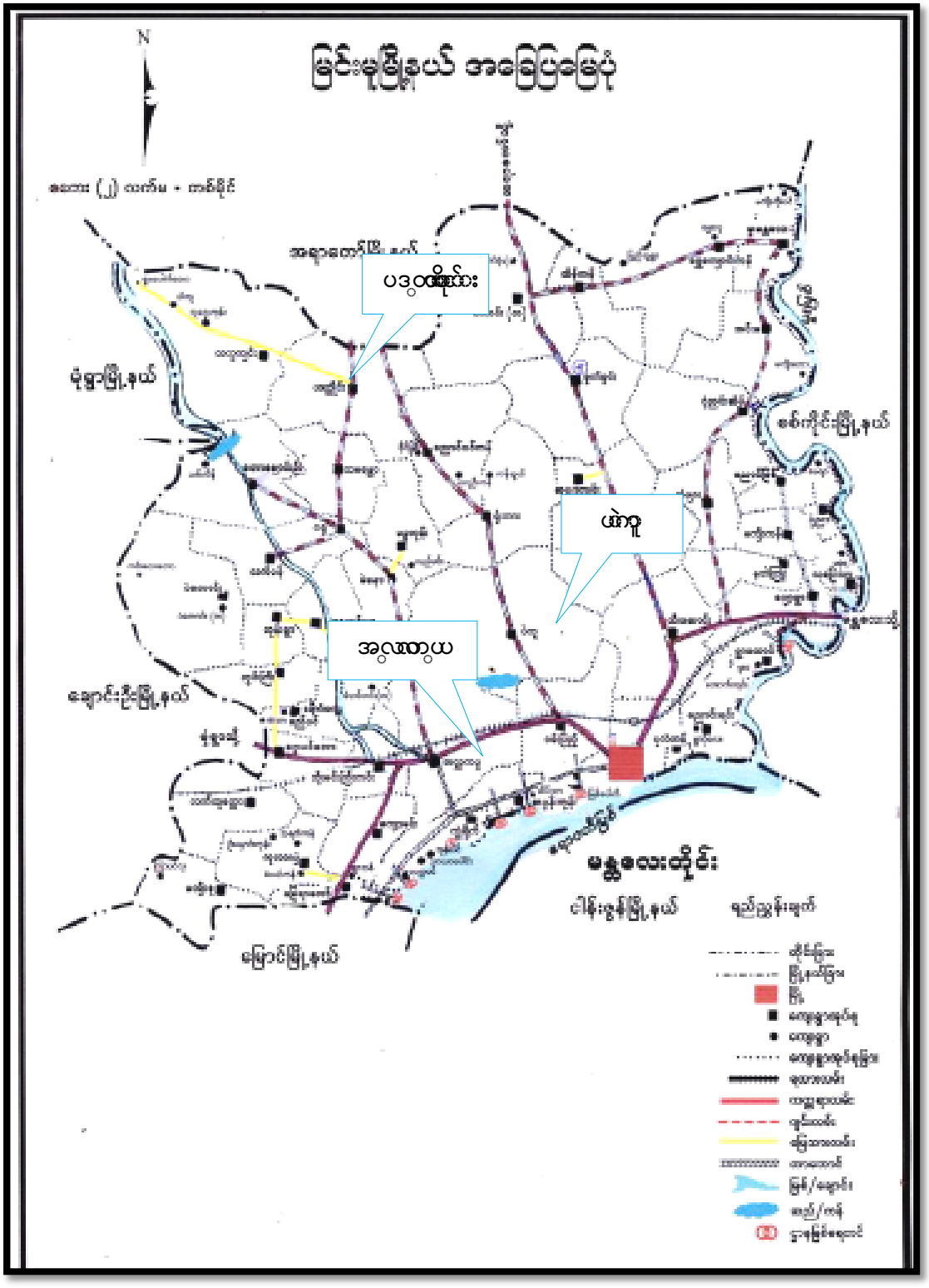
## APPENDICES

**Appendix 1. Groundnut sown area, harvested area, yield and production of Sagaing Region by Townships (2018-2019)**

| Townships | Sown area (ha) | Harvested area (ha) | Yield (MT/ha) | Production (MT) |
|---|---|---|---|---|
| Sagaing | 9,183.73 | 9,183.73 | 1.82 | 16,755.00 |
| Myinmu | 22,500.20 | 22,500.20 | 1.82 | 41,025.23 |
| Myaung | 13,294.21 | 13,294.21 | 1.87 | 24,809.04 |
| Monywa | 3,273.57 | 3,273.57 | 1.74 | 5,701.55 |
| Chaung Oo | 5,312.83 | 5,312.83 | 1.62 | 8,608.06 |
| Butalin | 21,155.40 | 21,155.40 | 1.39 | 29,478.21 |
| Ayartaw | 11,935.65 | 11,935.65 | 1.45 | 17,334.96 |
| Yinmarpin | 1,856.74 | 1,856.74 | 1.66 | 3,087.64 |
| Palae | 594.50 | 594.50 | 1.70 | 1,007.92 |
| Salingyi | 4,386.48 | 5,596.92 | 1.32 | 7,405.62 |
| Kani | 19,201.13 | 19,200.32 | 1.53 | 29,295.00 |
| Shwebo | 14,118.58 | 14,118.58 | 1.39 | 19,605.66 |
| Wetlet | 7,760.42 | 7,760.42 | 1.68 | 13,035.26 |
| Khin U | 27,425.74 | 27,425.74 | 1.31 | 35,930.63 |
| Ye U | 3,915.42 | 3,910.97 | 1.75 | 6,837.02 |
| Depayin | 21,133.55 | 21,133.55 | 1.43 | 30,243.19 |
| Tasei | 25,756.78 | 25,756.78 | 1.48 | 38,195.23 |
| Kambalu | 58,857.55 | 58,855.93 | 1.56 | 91,716.46 |
| Kyunhla | 8,534.20 | 8,534.20 | 1.56 | 13,343.57 |
| Katha | 12,665.72 | 12,665.72 | 1.83 | 23,209.91 |
| Indaw | 8,880.62 | 8,880.62 | 1.98 | 17,618.22 |
| Banmauk | 3,295.83 | 3,295.83 | 1.98 | 6,534.87 |
| Pinlebu | 1,885.88 | 1,883.04 | 2.03 | 3,814.75 |
| Wuntho | 969.24 | 969.24 | 1.96 | 1,901.15 |
| Kawlin | 1,789.15 | 1,789.15 | 2.11 | 3,772.59 |
| Tigyaing | 9,016.19 | 9,016.19 | 1.89 | 17,037.13 |
| Kalay | 7,883.85 | 7,883.85 | 2.31 | 18,242.10 |
| Kalewa | 1,407.93 | 1,407.93 | 2.03 | 2,857.42 |
| Mingin | 9,741.80 | 9,741.80 | 1.89 | 18,384.96 |
| Mawlaik | 1,668.15 | 1,668.15 | 2.12 | 3,529.13 |
| Phaungpyin | 4,206.39 | 4,206.39 | 2.54 | 10,696.93 |
| Tamu | 360.58 | 360.58 | 1.81 | 654.23 |
| Khampat | 656.01 | 656.01 | 1.81 | 1,190.25 |
| Myothit | 107.24 | 107.24 | 1.81 | 193.83 |
| Hkamti | 645.49 | 645.49 | 1.81 | 1,166.64 |
| Homalin | 5,807.37 | 5,807.37 | 1.80 | 10,471.61 |
| Leshi | 21.45 | 21.45 | 1.39 | 29.74 |
| Mobaingluk | 13.76 | 13.76 | 1.46 | 20.09 |
| Lahe | 0.81 | 0.81 | 1.40 | 1.13 |

Source: DOA, 2019

**Appendix 2. Map of Myinmu Township**




Source: GAD (Myinmu), 2017

**Appendix 3. Number of respondents sold the groundnut by seasons**

| Types | Winter | Rainy | Winter + Rainy | Total |
|---|---|---|---|---|
| High purified grain (lone san) | 56 | - | 9 | 65 |
| Low purified grain (si san) | 38 | 3 | 12 | 53 |
| Seed | 5 | 1 | - | 6 |
| Edible oil + oilcake | 15 | - | 1 | 16 |

**Appendix 4. Cost and return analysis for groundnut (pod) and value added groundnut products in winter season**

| Items | Unit | Pod | Low purified grain | High purified grain | Chaff from purified grain | Edible oil | Oilcake | Seed | Chaff seed |
|---|---|---|---|---|---|---|---|---|---|
| | | (n= 147) | (n = 50) | (n = 65) | | (n = 15) | | (n = 5) | |
| Average yield | kg/ha | 1,069 | 637 | 660 | 46 | 242 | 383 | 716 | 54 |
| Average price | MMK/kg | 794 | 1,688 | 1,935 | 1,688 | 3,804 | 675 | 2,179 | 1,688 |
| Gross benefit | MMK/ha | 848,786 | 1,075,256 | 1,277,100 | 77,648 | 920,568 | 258,525 | 1,560,164 | 91,152 |
| (a)Total material cost | MMK/ha | 338,276 | 332,652 | 320,255 | - | 362,405 | - | 351,191 | - |
| (b)Total family labor cost | MMK/ha | 228,900 | 201,169 | 253,235 | - | 235,161 | - | 261,995 | - |
| (c)Total hired labor cost | MMK/ha | 283,133 | 272,722 | 297,975 | - | 281,721 | - | 316,517 | - |
| (d)Total interest on cash cost | MMK/ha | 37,285 | 36,332 | 37,094 | - | 38,648 | - | 40,062 | - |
| (1)Total production cost | MMK/ha | 887,594 | 842,875 | 908,559 | - | 917,935 | - | 969,765 | - |
| -Hulling cost | MMK/ha | - | 28,031 | 25,494 | - | - | - | 10,604 | - |
| -Labor cost | MMK/ha | - | - | 72,941 | - | - | - | 22,143 | - |
| -Milling cost | MMK/ha | - | - | - | - | 51,821 | - | - | - |
| -Packaging cost | MMK/ha | - | 8,282 | 9,206 | - | 22,209 | - | 4,054 | - |
| -Transportation cost | MMK/ha | - | 18,475 | 19,120 | - | 37,015 | - | - | - |
| (2)Total marketing cost | MMK/ha | - | 54,778 | 126,761 | | 111,045 | - | 36,801 | - |
| Total variable cost (1+2) | MMK/ha | 887,594 | 897,663 | 1,035,320 | - | 1,028,980 | - | 1,006,566 | - |
| Total variable cash cost (a+c+d+2) | MMK/ha | 658,694 | 696,484 | 782,085 | - | 793,819 | - | 744,571 | - |
| Return above variable cost | MMK/ha | -38,808 | 177,593 | 319,428 | - | 150,113 | - | 644,750 | - |
| Return above variable cash cost | MMK/ha | 190,092 | 378,772 | 572,663 | - | 385,274 | - | 906,745 | - |
| Benefit cost ratio (GB/TVC) | | 0.96 | 1.20 | 1.31 | - | 1.15 | - | 1.64 | - |

**Appendix 5. Cost and return analysis for groundnut (pod) and value added groundnut products in rainy season**

| Items | Unit | Pod | Low purified grain | High purified grain | Chaff from purified grain | Edible oil | Oilcake | Seed | Chaff seed |
|---|---|---|---|---|---|---|---|---|---|
| | | (n = 28) | (n = 15) | (n = 9) | | (n = 1) | | (n = 1) | |
| Average yield | kg/ha | 1,198 | 712 | 685 | 52 | 361 | 573 | 792 | 3 |
| Average price | MMK/kg | 882 | 1,739 | 1,957 | 1,739 | 3,865 | 675 | 2,282 | 1,739 |
| Gross benefit | MMK/ha | 1,056,636 | 1,238,168 | 1,340,545 | 90,428 | 1,395,265 | 386,775 | 1,807,344 | 5,217 |
| (a)Total material cost | MMK/ha | 298,579 | 309,191 | 322,122 | - | 277,986 | - | 285,400 | - |
| (b)Total family labor cost | MMK/ha | 218,492 | 211,868 | 204,553 | - | 49,420 | - | 176,265 | - |
| (c)Total hired labor cost | MMK/ha | 297,480 | 274,389 | 306,938 | - | 405,244 | - | 123,550 | - |
| (d)Total interest on cash cost | MMK/ha | 36,050 | 35,014 | 37,744 | - | 43,959 | - | 24,537 | - |
| (1)Total production cost | MMK/ha | 850,601 | 830,462 | 871,357 | - | 776,609 | - | 609,752 | - |
| -Hulling cost | MMK/ha | - | 20,614 | 10,372 | - | - | - | 92,921 | - |
| -Labor cost | MMK/ha | - | - | 29,676 | - | - | - | 55,412 | - |
| -Milling cost | MMK/ha | - | - | - | - | 77,577 | - | - | - |
| -Packaging cost | MMK/ha | - | 9,241 | 3,475 | - | 33,247 | - | 33,247 | - |
| -Transportation cost | MMK/ha | - | 31,276 | 7,779 | - | 55,412 | - | - | - |
| (2)Total marketing cost | MMK/ha | - | 61,131 | 51,302 | - | 166,236 | - | 181,580 | - |
| Total variable cost (1+2) | MMK/ha | 850,601 | 891,593 | 922,659 | - | 942,845 | - | 791,332 | - |
| Total variable cash cost (a+c+d+2) | MMK/ha | 632,109 | 679,725 | 710,263 | - | 893,425 | - | 615,067 | - |
| Return above variable cost | MMK/ha | 206,035 | 346,575 | 508,314 | - | 839,195 | - | 1,021,229 | - |
| Return above variable cash cost | MMK/ha | 424,527 | 555,443 | 720,710 | - | 888,615 | - | 1,197,494 | - |
| Benefit cost ratio (GB/TVC) | | 1.24 | 1.39 | 1.55 | - | 1.89 | - | 2.30 | - |