YANGON UNIVERSITY OF ECONOMICS
DEPARTMENT OF ECONOMICS
MASTER OF ECONOMICS

ANALYSIS ON THE RELATIONSHIP BETWEEN INPUTS AND OUTPUTS OF GROUNDNUT PRODUCTION

(CASE STUDY: AUNG LAN TOWNSHIP, MGWAY REGION)

AUNG THI HA

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A thesis submitted in partial fulfillment of the requirements for the
Master of Economics (M.Econ) Degree

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This is to certify that this thesis entitled "**Analysis on the Relationship between Inputs and Outputs of Groundnut Production (Case Study: Aung Lan Township, Mgway Region)**" submitted as a partial fulfilment towards the requirements for the degree of Master of Economics has been witnessed by the Board of Examiners.

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ABSTRACT

Groundnuts are grown as a source of cooking oil for domestic use and are the primary cash crop for all households. In most of the developing countries, the agricultural sector has been playing a major oil crop in Myanmar. This study analyzes groundnut production and relationship between inputs and outputs of groundnut production in Aung Lan Township. The study uses a descriptive method based on primary survey data and the Cobb-Douglas production function is applied to analyze the survey data. According to the result of the Cobb-Douglas function, the inputs of land, machine-animals, and fertilizer-pesticide are significant and their p-values are positive. However, the p-value of labor and seed is not significant, but they have a positive sign. Based on the result, it is suggested that not only the number of farmers but also the skill, knowledge, and experience of farmers are important. Thus, if farmers are more educated, they can more easily adopted in new technical knowledge. By providing agricultural extension services to respondents, it can be upgraded the knowledge of respondents of groundnut growers in ways of choosing better quality seed, proper utilization of fertilizer and pesticide and controlling and maintaining soil so as to improve their yield and production.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF ABBREVIATIONS

CSO	Central Statistical Organization
DOA	Department of Agriculture
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
H	Household
Ha	Hectare
Kg	Kilogram
MOAI	Ministry of Agriculture and Irrigation
MT	Metric Ton

CHAPTER I
INTRODUCTION

1.1 Rationale of the Study

This research focuses on groundnut production, one of the oilseed crops. Most farmers in groundnut production lack capital investment for purchasing inputs and storage facilities. And they also have credit problems. Labor sources and land resources are the most important factors in increasing productivity when growing groundnuts. Land productivity can be improved to increase yield and profit. Tshering (2002) discovered that influencing factors that influenced profitability were the farmer's characteristics, input use, labor use, costs, whether the farmers produced for sale or for home consumption, and the methods of production.

Groundnut production in the country has enormous potential for agricultural development. Groundnut is one of the most important oilseed crops grown during the monsoon and winter seasons. Many nutrients can be found in groundnut seeds. Groundnuts are a high-quality protein source for both humans and livestock.

Groundnuts are used as cooking oil, snacks, ingredients for other foods, and as an export commodity in Myanmar. As a result, the cultivation of groundnuts for domestic self-sufficiency, as edible oil, and as an appealing high-quality commodity for export has received significant attention. While rice is the basic staple food, edible oil is the second most important commodity in Myanmar's daily diet. The edible oil production of the country is self-sufficient for the domestic requirements due to the increasing demand for edible oil consumption in both rural and urban areas. Groundnut is one of the most important oilseed crops that has been grown in both rained and irrigation areas.

Oilseed crops rank third in terms of sown area in Myanmar. Groundnut, sesame, and sunflower are the three most important oilseed crops. Oilseeds and oilseed products are economically critical to the livelihoods of Myanmar farmers, processors, and consumers. These products' contributions are critical in Myanmar's agricultural sector and agricultural product markets, as well as in international

markets. Increased oilseed crop production in Myanmar is entirely dependent on land expansion. The Ministry of Agriculture and Irrigation set the second of three goals: self-sufficiency in edible oil. Policy reforms in the oilseed crops sub-sector should aim to "increase national welfare" by increasing the profitability of private sector operations along the chain, as opposed to "self-sufficiency" and "price control" policies.

Myanmar's Dry Zone is a large semi-arid region with a monsoonal climate that has many agro-ecological conditions similar to those found in Northeast Thailand (Myanmar National Report, 2004). The majority of agriculture is irrigated, and rice productivity, the staple crop, is generally low and insufficient to meet subsistence farmers' consumption needs (Htoo, 2007). As a result, farmers must cultivate other crops (such as peanuts, pulses, cotton, bananas, and toddy palms) and raise livestock to survive.

Groundnuts are an especially important crop for rain-fed subsistence farmers in the Dry Zone. They provide cooking oil and food for domestic consumption. The oilcake and leftovers are used as livestock feed, and any surplus can be sold for cash (Phyo, 2008). This article describes the various types of production systems used in peanut production in Aung Lan Township, which is located on the southern edge of the Magway Region. For each system, we describe cultivation practices, varieties planted, inputs and outputs, processing, consumption, storage, and sale, as well as the costs and benefits to farmers of the various peanut production systems.

Groundnut is primarily grown in central Myanmar's dry zone, with the Magway Region having the largest area for many years. Informal agreements between groundnut farmers and buyers are common in Aung Lan Township, Magway Region.

Aung Lan Township has the highest groundnut yield and cultivation in the Magway Region. Groundnut is the highest oil-yielding crop per hectare among oilseed crops. Due to the high capital cost, groundnut production is gradually increasing at the current level. As a result, the critical elements (production technologies and operational constraints) must be considered when aiming to increase groundnut productivity, which will ultimately increase farm income for growers.

Furthermore, the expected outcomes of this study will describe the relationship between potential outputs and actual outputs from groundnut production in Aung Lan Township. The study is being conducted because Aung Lan Township is a township that focuses on groundnut farming. Groundnut farming requires the most

basic inputs, such as land, labor, and capital. These inputs determine the yield of groundnut production. Capital input costs include seed costs, animal and machine costs, and fertilizer and pesticide costs. The purpose of this research is to examine the relationship between groundnut production inputs and outputs in Aung Lan Township, Magway region.

1.2 Objectives of the Study

The objectives of the study are to study groundnut production in Aung Lan Township and to analyze the relationship between inputs and outputs of groundnut production in Aung Lan Township.

1.3 Method of Study

The method of the study is a descriptive method based on primary and secondary data. As the primary data, a total of 170 farm households were selected by using purposive random sampling for groundnut cultivation and were interviewed with a structured questionnaire. Secondary data were obtained from the Aung Lan Township General Administrative Department and the Aung Lan Township Agriculture Office. Other information is available on the relevant websites and is available from books and libraries.

1.4 Scope and Limitations of the Study

Aung Lan Township has 246 villages, some of which grow groundnuts commercially and others on their own. Among the 246 villages, six villages produce the most groundnut cultivation. In Aung Lan Township, three villages are described, with the majority of groundnut production concentrated in six villages. The three villages are Ywar Ma Htone, Kyar Thay, and Alaal Ywar. These three villages have the most groundnut cultivation and produce the most groundnuts compared to other groundnut cultivation villages. There are 430 collective households of groundnut growers in the three villages, of which 170 households were surveyed from January to September 2022.

1.5 Organization of the Study

The study is divided into five chapters. The rationale for the study, the objective of the study, the method of the study, the scope and limitations of the study, and the organization of the study are all presented in Chapter 1. Chapter 2 describes literature reviews on definitions and concepts of "production function". Chapter 3 outlines the profile of Aung Lan Township. Chapter 4 shows the empirical analysis of groundnut production in Aung Lan Township. Chapter 5 is a conclusion with findings and suggestions.

CHAPTER II
LITERATURE REVIEW

2.1 The Role of Agriculture

Agriculture is defined as the cultivation of cereals (oilseeds, food, and cotton), cultivation of crops (such as pulses), commercial activity on the soil, wheat, and rice. It is followed by coarse crops (sugarcane), plantation crops (tea, coffee), horticulture (fruits, vegetables, flowers, spices, coconut, and so on), pisciculture, sericulture, and livestock rearing.

Agricultural development is one of the most effective tools for eradicating extreme poverty, increasing shared prosperity, and feeding a projected 9.7 billion people by 2050. Growth in agriculture is two to four times more effective than growth in other sectors in raising incomes among the poorest.

Agriculture is the oldest industry in the world and the largest even today. It is identified as one of the most significant economic activities across all parts of the world because it produces those goods which are essential for the survival of human beings. Its contribution to the economic development of a country is significant. An increase in the net output of agriculture itself represents a rise in the country's GNP. Most developed countries' historical experiences, such as England, the United States, Canada, and Japan, reveals the importance of agriculture in the process of the country’s economic development at the outset of the industrial revolution.

And in most of the developing countries, agriculture is the only major existing industry. Most of these countries must rely heavily on agricultural development for economic development in order to meet food demand, earn foreign exchange for overhead investment, and expand secondary industries to meet the growing demand for employment and raise rural people's income.

Agriculture has been observed to contribute a very large share of the GDP of most economies before industrial development takes place in them. As the process of industrial development accelerates, the share of the nonagricultural sector in GDP tends to increase steadily. Simultaneously, the relative share of agriculture shrinks and

yields place to that of the manufacturing and service sectors. This does not imply that agricultural production does not increase. It only implies that the growth in production of the industrial and service sectors is faster than the growth in the agriculture sector. In some typical African economies, agriculture produces about 50 per cent of their GDP.

Agricultural growth largely contributes to capital formation in the underdeveloped countries. Without adequate capital formation, rapid economic growth cannot attain. There are three ways in which the farm sector contributes to capital formation. First, increased agricultural productivity benefits the nonagricultural sector through lower food prices. It will facilitate increased saving and capital accumulation in urban sector. Second, increased farm output may generate higher levels of farm income, part of which may be saved. These savings may be utilized in financing the growth of the nonagricultural sectors. Thirdly, capital can be derived through a well devised tax system. In China, Russia and Japan, farm tax revenue helped significantly in their economic growth.

Extension of market size: Agricultural efficiency raises rural income levels and creates an effective market for more and new industrial goods. It enlarges the size of the market. If there is surplus production, then it can be exported to other countries in the world. So, the agriculture sector expands the market at a national and international level.

2.2 The Importance of Oil Seed Crops

During the rainy season, several dry land crops are grown, such as pigeon pea, cotton, sesame, and peanut. Peanuts, chick peas, black gram, sunflowers, and pulses can be grown during the dry season. During the rainy season, rice is grown in the wetland area. Rice is grown for domestic consumption, but the land area dedicated to rice production is small, and the yield is insufficient to support a family. If there is enough soil moisture for a second crop, farmers grow peanut, black gram, wheat, and onion as a double crop after rice. They grow bananas on sandy dry land, which is the second most important crop for all households. There are many toddy palm trees that were planted by previous generations. All crops are grown on a small scale and are primarily for consumption, though they are occasionally sold when in surplus.

Cereal crops continue to be Myanmar's most important crop group, accounting for approximately 39% of the total crop sown area. Pulses, the world's second most

important crop after cereals, come next. After essential food grains, oilseed crops are the third most important crop in terms of area. Culinary, industrial, and other crops accounted for 1%, 5%, and 20%, respectively, of the total crop sown area.

Oilseeds, particularly sesame and groundnut, as well as pulse crops, play an important role in ensuring food security and providing cash income for education, health, and other social necessities in many parts of central Myanmar. Oilseed crops are also important due to Myanmar's high consumption of cooking oil in comparison to other neighboring countries.

Oilseed crops play a vital role according to Myanmar’s high consumption of cooking oil. Even though the oilseed production in Myanmar has been increasing, it is still insufficient for domestic consumption as the demand for edible oil has been increasing over time due to the increasing population. Myanmar's annual average production of vegetable oils, mainly groundnut and sesame oils, is estimated at about 500,000 tons. The country also imports an average of 160,000 tons per year of palm oil.

The largest oilseed crop production areas were the Mandalay and Magway Divisions, with 149,639 ha and 120,477 ha in the rainy seasons. Groundnut in this region is predominantly grown under rain-fed conditions with different levels of production across divisions.

There were over ten crops grown in Aung Lan Township. Pulses, groundnuts, cotton, vegetables and culinary crops were cultivated in the winter season. Sesame, groundnut, pulses, sweet corn, and paddy were grown in the monsoon season. Only paddy was grown in the summer season.

This chapter relates the crop's history as revealed in prehistoric art, artifacts, and archaeological remains; it traces early post-Columbian accounts of the plant or fruit in contemporary natural historical narratives of the sixteenth and seventeenth centuries; and it reviews current information concerning the crop's center of origin and geographic dispersion. It also discusses the impact of the European vegetable oil industry on West African production expansion.

2.3 Groundnut

Groundnut is a New World crop. Early explorers discovered it was widely cultivated in both Mesoamerica and South America. Recovered pericarp (fruit hull) tissue from archaeological sites in Peru dates its agricultural use to around 3900-3750 years ago (YBP). No one knows how much earlier domestication occurred, but it most likely began in the valleys of the Parana and Paraguay river systems in South America's Gran Chaco region.

Groundnuts originated in South America. It is unknown when groundnut was introduced into India. "The Flora of Western India includes a large number of specimens of South and Central American origin, introduced by missionaries." The so-called "indigenous" variety in modern India was likely of Brazilian origin. The plant was first introduced into India in the early sixteenth century (John et al., 1995). If this is true, such a useful plant could not have been hibernating in the region for nearly two centuries without becoming popular and widespread.

After flowering, the groundnut goes underground to shell. Gourmet, as a result, requires a medium-hard soil with a low water-holding capacity to grow. In this regard, sandy soil is ideal for growing groundnuts. Sagaing, Magway, and Mandalay are the main groundnut production areas, accounting for 66% of national production in 2009-2010. Groundnut production has steadily increased, more than doubling in the last decade. Groundnut oil is the most popular vegetable oil among Burmese, with an annual consumption of 3.2 kg per person. It is higher than sunflower oil (2.8 kg/capita/year) and sesame oil (2.0 kg/capita/year).

Groundnut is one of Myanmar's most important cash crops, with approximately 0.7 million acres under cultivation. Groundnut is a valuable source of all nutrients and is a marketable crop in the domestic market. Thousands of smallholder farmers in Myanmar grow groundnut as a cash crop and for personal consumption. Because of its high oil content, the grain is classified as an oilseed. The Magway region of Myanmar is known for its potential and fertile crops, with a cropping intensity of 206.1%, and there is sufficient demand for local rice, peas, and beans, as well as edible oil.

Groundnut is now a major oil, food, and forage crop that grows in tropical, subtropical, and warm temperate zones. The precise origin of the main cultigen, Arachis hypogea L., is unknown. The crop was discovered by early Spanish, Portuguese, Dutch, German, and other explorers on many of the Antilles' islands; the

northeast and east coasts of Brazil; all warm regions of the Rio de la Plata basin (Paraguay, Bolivia, northern Argentina, and extreme southwest Brazil); extensively in Peru; and sparingly in Mexico.

Groundnuts are roasted or salted before being ground into peanut butter. Groundnuts are a high-nutritional-value food. Groundnut oil is currently one of the most popular cooking oils; it can be used for frying, sautéing, or simply to add a mild nutty flavor to dishes. Refined groundnut oil has a neutral flavor and will not taint or absorb the flavor of the food that is cooked in it. Aromatherapy can also be done with groundnut oil.

As a result, groundnut is one of the most important oilseed crops grown in both rain-fed and irrigated areas, and more research into technology transfer mechanisms to improve production is required.

Groundnut has the unusual ability to go underground after flowering to form a shell. Gourmet thrives in soil that is moderately hard and has a low water-holding capacity. Sandy soil is ideal for groundnut production in this regard.

The main groundnut production areas are Sagaing, Magway, and Mandalay, which account for 66% of total national output in 2009-2010. Production of groundnuts has steadily increased, more than doubling in recent years. With an annual per capita consumption of 3.2 kg, groundnut oil is the most popular vegetable oil among Burmese.

The Mandalay and Magway Divisions produced the most oilseed crops during the rainy season, with 149,639 ha and 120,477 ha, respectively. Groundnut is primarily grown under rain-fed conditions in this region, with varying levels of production across divisions. The average yield in the Magway division (552.26 kg ha1) in 2004-05 was approximately 36% higher than the average yield in Mandalay (404.84 kg ha1) (CSO, 2006).

2.4 The Methodology of Production Function

As a result of the fact that any given set of inputs might result in a wide range of outputs, economic output is not a (mathematical) function of inputs in general. For a production function to meet the mathematical definition of a function, it is commonly considered that it specifies the maximum output that can be obtained from a given set of inputs. The production function thus defines a frontier or border that denotes the maximum quantity of output that may be produced from each given

combination of inputs. The lowest input requirement necessary to produce a given quantity of output can also be referred to as a production function. In order to concentrate solely on the issue of allocative efficiency, which is related to the economic decision of how much of a factor input to use or the extent to which one factor may be substituted for another, economists must first assume that maximum output is obtained from given inputs. By doing so, they are able to abstract away from the technological and managerial issues associated with achieving such a technical maximum. A production function links physical inputs to physical outputs, but it does not take prices and costs into account. As a result, the relationship between output and inputs in the function is non-monetary.

The production function represents the opportunities presented by an exogenous technology in the context of a firm's decision-making process regarding production—specifically, how much of each input factor to use in order to produce how much output—while also contending with market prices for both inputs and output. Under some circumstances, the marginal product for each ingredient can be determined using the production function. In a situation of perfect competition, the firm that chooses to maximize its profits will prefer to increase input up until the point at which the marginal cost of new input equals the marginal product of new output. This implies dividing output revenue in an ideal way so that each input factor's income is equal to its marginal product.

The production function's inputs, or factors of production, may be stocks or other primary elements. The three main components of production in the past were land, labor, and capital. The manufacturing process neither incorporates nor transforms primary factors into the final output. The secondary factors and intermediate products used in a production process may be abstracted from by the production function as a theoretical construct. The production function is not a complete representation of the production process since it purposefully excludes elements of physical production processes that some consider to be crucial, such as error, entropy, waste, and co-production of pollutants or energy consumption. Additionally, manufacturing functions frequently do not emulate business processes, hence underestimating the significance of strategic and operational business management.

The analysis of how market prices can control the achievement of allocative efficiency in a decentralized economy, the marginalist focus of neoclassical

economics, and an analysis of the distribution of income that links factor income to the marginal product of factor input, all revolve around the production function.

The functional form of a production function is;

$$\mathbf{Q = f\ (X1, X2, X3\ldots, Xn)}$$

The Cobb-Douglas production function is a specific functional form of the production function that is frequently used in economics and econometrics to represent the technological relationship between the amounts of two or more inputs (particularly physical capital and labor) and the amount of output that can be produced by those inputs.

In its most standard form for production of a single good with two factors, the function is-

$$\mathbf{Y = AL^{\beta}K^{\alpha}}$$

- Y = total output (the real value of all goods produced in a year, or 365.25 days).
- L = Labor input (person-hours worked in a year or 365.25 days)
- K = capital input (a measure of all machinery, equipment, and buildings; the value of capital input divided by the price of capital).
- A = total factor productivity
- α and β are the output elasticities of capital and labor, respectively. These values are constants determined by available technology.

The long-transform this model is-

$$\boldsymbol{In}\ \mathbf{Y = A + \beta}\ \boldsymbol{In}\ \mathbf{L + \alpha}\ \boldsymbol{In}\ \mathbf{K}$$

A Cobb-Douglas production function is the long-transform. The study focuses on groundnut production in the Magway Region's Aung Lan Township. The data analysis is based on the Cobb-Douglas production function of groundnut production results.

2.5 Reviews on Previous Studies

Moe Swe Yee (2008) investigated "rain-fed subsistence famers' peanut production systems in a riverine village in Myanmar's dry zone." This paper describes the peanut production systems in a typical Dry Zone riverine village. The village of Naung Pin Win was purposefully chosen as a study site, and a stratified random sampling method was used to select a sample of 30 households representing various types of landholdings. Group interviews of village committee members and farmers; semi-structured interviews; direct observation; and participation were used to collect both quantitative and qualitative data. The village's agriculture is irrigated by seasonal flooding. Only a few households grow rice, but all households grow peanuts during the wet and dry seasons. Peanuts are grown as a source of cooking oil for domestic use and are the primary cash crop for all households. Peanut residues are also a major source of feed for cattle and a source of cash income for households without large livestock. Dry season production on alluvial lands yields the highest yields at the lowest input cost and is especially important for landless households' livelihoods.

Soe Soe Win (2008) investigated the "technical efficiency of groundnut production in Myanmar's central region." This study focuses on the technical efficiency of groundnut production across farmer sections and among farmers classified by social characteristics and other relevant characteristics in Myanmar's main groundnut production areas. The quantitative method used to answer the question and identify factors influencing groundnut production would have policy implications. The results of the maximum likelihood parameter estimate of the stochastic production frontier from Cobb-Douglas frontier functions for both Mandalay and Magway divisions indicate that quality of soil was the significant factor that affected the yield per hectare in both regions. Good quality of soil for groundnut production can increase groundnut yield in both areas. In addition, government should establish the rural credit program with extension service for groundnut farmers to improve better access to external inputs.

Raphy and Kyaw (2009), typically, groundnut oil is the most expensive edible oil on the market, while palm oil is the least expensive. However, the prices of edible oils in general vary greatly. This is closely related to the level of domestic production of oilseed crops and the volume of palm oil imported. Myanmar is currently a net importer of edible oil and oilcake, and large amounts of palm oil are imported to meet domestic demand. Import and export bans cannot be fully implemented. Informal

imports of oil and oilcake allow the country to meet domestic demand, while informal exports of groundnuts for the snack market allow groundnut prices to remain stable in the domestic market.

Abdelaziz (2010), the most important factors influencing groundnut production were total cultivated area, crop rotation, and cropping period. The study recommended that farmers be supplied with agricultural inputs, particularly seeds, through repayment in kind after harvesting and that agricultural extension be more efficient and effective in transferring the recommended improved technologies. The resolution of Darfur security issues, as well as other agricultural production issues such as pests, marketing, desertification, drinking water, grazing, and so on, was also critical.

Htet Htet Htun (2013) investigated "groundnut supply chain management in Magway Township." To identify the major constraints of groundnut production and marketing in Magway Township and to analyze the factors affecting groundnut supply and profit at the farm level. In the influencing factor analysis, groundnut yield was positively and significantly influenced by seed rate, price of groundnut, total labor and access to credit. Groundnut profit was positively and significantly influenced by yield and negatively influenced by total material cost.

Win Win Htet (2018) conducted research on "A Study on Groundnut and Sesame Production in the Magway Region." The history of sesame and groundnut was discovered. The descriptive method is used in this study, which is based on secondary data. And about the region's historical background, location, area, and boundaries; topography, drainage, and elevation above sea level; climate and natural vegetation; population, nationality, and religion. land utilization, machine power, chemical fertilizer and pesticide application, agricultural implements, and draught animals. The sown area and production of groundnut and sesame are dominating the agriculture of Magway Region. Groundnut and sesame become popular food items in the market. Currently, Magway is leading Division of Myanmar in the production of groundnut and sesame.

Khant Phoo Wai (2018) investigated "A Study on Groundnut Production in the Bago Region." The descriptive method relied on secondary official data from statistical year books. The study's goal is to investigate groundnut cultivation and production in the Bago Region. Groundnut price has increased twice of that previous period in 2016-2017. Both sown acres and production of groundnut has increased

from 2007-2008 to 2015-2016 and decreased in 2016-2017. Groundnut is important for domestic consumption and it has the possibility to be a vital export so that groundnut production should be promoted by supporting technology, infrastructure and financing to peasants.

CHAPTER III
PROFILE OF AUNG LAN TOWNSHIP

3.1 Historical Background of Groundnut Production in Magway Region

Myanmar is typically an agriculture country, with agriculture playing a critical role in economic development. The country has a large cultural land potential area. Agriculture was previously thought to play a supporting role in industrialization. However, it is seen as a source of income at both the individual and national levels, as well as a means of supporting global food security and poverty alleviation.

Myanmar is an agricultural country, and agriculture is the backbone of the country's economy. Agriculture accounts for 37.8% of GDP, 25-30% of total export earnings, and 70% of labor force employment. Rural areas generate economic growth because of agricultural opportunities that provide food production and job creation. Farmers' access to modern agricultural inputs is the backbone of any agricultural revolution. Improved seeds, fertilizers, and crop protection chemicals are among the agricultural inputs available, as are machinery, irrigation, and knowledge.

Agriculture is the main industry in Myanmar (also known as Burma), accounting for 60% of GDP and employing approximately 65% of the labor force. Burma was once Asia's largest rice exporter, and rice remains the country's most important agricultural commodity. Other important crops include pulses, beans, sesame, groundnuts, sugarcane, lumber, and fish. Furthermore, livestock are raised for both food and labor.

The agricultural sector will continue to play an important role in reducing poverty in Myanmar for many years to come because it provides basic necessities for human life, basic inputs for industries, and goods for export and other purposes.

Agriculture Rice, maize, black gram, green gram, pigeon pea, chick pea, sesame, onion, tamarind, raw rubber, vegetables, and fruits are among Myanmar's most important agricultural exports. According to the World Bank, the agricultural sector in the country accounts for 38% of national GDP and 23% of exports in fiscal year 2016-2017. The two critical issues currently afflicting Myanmar's agriculture

sector are a knowledge deficit and an infrastructure deficit, particularly in rural areas. Market infrastructure and transportation infrastructure issues add significant costs to farmer operations.

Agriculture is the backbone of the Myanmar economy, not only contributing to overall economic growth but also sustaining a standard of living for more than 60% of the Myanmar population. An estimated 26% of Myanmar's population lives in poverty. Poverty in Myanmar is concentrated in rural areas, where the poor rely on agriculture and casual labor for a living. Many people live near the poverty line and are vulnerable to economic shocks. The agricultural sector will play an important role in reducing poverty in Myanmar for many years to come because it provides basic necessities for human life, basic inputs for industries, and goods for export and other purposes. It is critical to Myanmar's economy and long-term growth prospects. If Myanmar's agricultural production contributes significantly to overall economic development, it can not only provide employment opportunities but also lead to job diversification, particularly in rural areas. It is one of the preconditions that must be met before a transition to self-sustaining economic growth is possible.

The country's groundnut production has enormous potential for agricultural development. Groundnut is one of the most important oil crops grown during the monsoon and winter seasons. Many nutrients can be found in groundnut seeds. Groundnuts are a high-quality protein source for both humans and livestock.

Groundnut is used as a cooking oil, a snack, an ingredient in other foods, and an export commodity in Myanmar. As a result, groundnut cultivation for domestic self-sufficiency, particularly as edible oil and an appealing high-quality commodity for export, has received significant attention. While rice is the basic staple food, edible oil is the second most important commodity in the Myanmar people's daily diet. Due to the increasing demand for edible oil consumption in both rural and urban areas, the country's edible oil production is fortunate to be self-sufficient for domestic requirements.

Myanmar is divided into three agricultural zones: (1) the delta zone, where rice cultivation predominates; (2) the dry zone, where rice and a variety of other crops are grown; and (3) the hill and plateau regions, where forestry and shifting agriculture are most important. The central region of Myanmar is classified as a "dry zone," with three divisions, namely: Magway, Mandalay, and Sagaing. Groundnut is primarily produced in the Mandalay and Magway divisions.

The Magway division shares a border with the Mandalay and Bago divisions, as well as Rakhine and Chin states. The Magway division has an area of 44820 km2 and is located between North Latitude 18° 50' and 22° 47' and East Longitude 93° 47' and 95° 55'. The Magway division has a population of 4,218,699. It has a total area of 459218.67 km2. Farmland accounts for 0.65 million hectares of the division's total arable land, with the remainder consisting of paddy land, silt land (Kaing-kyunmyar), hill-side cultivated land (taungya-myay), and vegetable land. Paddy land and farmland are used for multiple crops. Paddy is planted on 0.203 million hectares in the Magway division. Sesame is the most important oilseed crop, accounting for over 0.405 million hectares. Because the Magway division produces a large amount of groundnut and sesame edible oil, it is also known as Myanmar's oil pot.

According to the country, groundnut production has reached its productivity potential in growing oilseed crops. India had the world's largest harvested area, accounting for 22.84% of the total groundnut harvested area, while China had 18.36%. Myanmar had the third-largest harvested groundnut area, accounting for 3.66% of the total. In 2009, global groundnut production was 36,457 thousand MT, while Asian groundnut production was 23,351 thousand MT, accounting for 64.05% of total global groundnut production and yielding 1,966 kg/ha. In 2010–2011, Myanmar had Asia's third highest groundnut production (1,392 thousand MT), with a groundnut yield of 1,587 kilograms per hectare.

Myanmar produced 3.81% of the world's groundnuts and 5.96% of Asian groundnuts. Argentina, Australia, Brazil, Canada, Paraguay, Ukraine, and the United States are among the countries that export oil seeds. The majority of exporters are from developed Western countries. China, Egypt, Indonesia, South Korea, Taiwan, Thailand, the EU-27, and Mexico are the top oil seed importers. The vast majority of imports comes from low- and middle-income countries (Kyaw and Raphy 2009).

Myanmar's groundnut industry was significant. Approximately 75% of production comes from central Myanmar, primarily from the divisions of Sagaing, Magway, and Mandalay (Aye Aye Mon, 2004). Groundnut is grown all year in Myanmar, but the Mandalay and Magway divisions are the most productive.

In the cropping seasons, Mandalay Division and Magway Division had the most groundnut crop production areas, with 149,639 and 120,648 hectares respectively. This region's groundnut production is primarily rain-fed, with varying levels of output across divisions (CSO, 2006).

The Magway region is a rural agricultural area known for its groundnut production. Groundnut production in the Magway Region is increasing year after year. Because Magway Region produces the most groundnuts in Myanmar, this study will examine the relationships between inputs and outputs of groundnut production in Aung Lan Township, Magway Region.

3.2 Overview of Groundnut Production in Aung Lan Township

This section highlights the background information of Aung Lan Township which includes location, population, ethic group, climate, land utilization and the socioeconomic condition.

3.2.1 Location

Aung Lan Township is an Aung Lan District township in Burma's Magway Region (Myanmar). Aung Lan is its administrative center. It is the most southern township in the Magway Region.

Aung Lan (formerly known as Allanmyo & Myede) is the biggest city in Aung Lan District of the Magway Region of Myanmar. It is a port on the left (eastern) bank of the Irrawaddy, across and just north of Thayetmyo, between the cities of Pyay, Taungdwingyi and Magway. It is the administrative seat for Aung Lan Township. According to the 2022 census, the population was estimated at over 24,5294. The rural population is over 18,8101 and urban population is 57,193. 47.5% of total population is male and 52.5% is female. Aung Lan was a new city formed moving from Myede. After the second Anglo-Burmese war, the south of Myede Township was annexed by the British and the north was ruled by the Myanmar King.

Aung Lan Township is situated between North Latitude 18˚58′ and 19˚29′ and East Longitude 90˚07′ and 95˚96′. According to population census in 2022, total population of Aung Lan Township was 24,5294 and population density was 51-100 persons per km2, rural residents of the township were about 78% (Aung Lan Township) of total population and mainly depend on monsoon sesame production. The major crops produced in this township are monsoon sesame, groundnut, green gram and paddy. It is situated on the eastern bank of the Ayeyarwady River. It is bordered by Sinpaungwe Township to the north, Yedashe Township of Bago Region to the east, Paukkaung Township and Pyay Township of Bago Region to the south, and Kamma Township and Thayet Township to the west. Aung Lan Township is

made up of 12 quarters, 91 village tracts and 246 villages and possesses a tropical climatic condition and produces a large quantity of sesame and groundnut for edible oil, it is also known as a major oilseed producing region of Myanmar (General Administration Department [GAD], 2022).

3.2.2 Population

Aung Lan Township is made up of 12 quarters, 91 village tracts and 246 villages and possesses a tropical climatic condition and produces a large quantity of sesame and groundnut for edible oil, it is also known as a major oilseed producing region of Myanmar (General Administration Department [GAD], 2022).

The number of households and population of Aung Lan in 2021-2022 are shown in the following tables (3.1) and (3.2). There are the 12 wards, 91 village tract, 246 villages, 60943 houses and 63718 households in Aung Lan Township. Most of the households from 246 villages are located in rural area and a few households are in urban area.

Table (3.1) House, Household in Aung Lan Township (2021)

No	Place	House	Household	Ward	Village tract	Village
1	Urban	13118	14442	12	-	-
2	Rural	47825	49276	-	91	246
Total		60943	63718	12	91	246

Source: Report of General Administrative Department of Aung Lan Township (2021)

With respect to population, Aung Lan Township has the total population 245294 in which male are 117860 while females are 127434. There are 57193 urban populations while rural population is 188101 and 189265 are over 18 years and 56029 are under 18 years. Rural population is more than urban population and the number of females both over and less than 18 years old are more than the number of males.

Table (3.2) Population in Aung Lan Township (2021-2022)

No	Place	Over 18 year			Under 18year			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
1	Urban	20332	23762	44094	6507	6592	13099	26839	30354	57193
2	Rural	69511	75660	145171	21510	21420	42930	91021	97080	188101
Total		89843	99422	189265	280017	28012	56029	117860	127434	245294

Source: Report of General Administrative Department of Aung Lan Township (2021)

3.2.3 Ethnic Group

There are seven types of ethnic group in Aung Lan Township namely in Kachin, Kayah, Kayin, Chin, Burma, Rakhine, and Shan. Most of the population is Burma with 93% and Chin with 6.9% but the rest of other ethnic groups are a very few percentages.

Table (3.3) Ethic Group in Aung Lan Township (2021-2022)

No	Ethic	No of Population	Percent
1	Kachin	5	0.0021
2	Kayah	2	0.0008
3	Kayin	21	0.0087
4	Chin	16828	6.9420
5	Burma	225483	93.0184
6	Rakhine	34	0.0140
7	Shan	34	0.0140
Total		242407	100.00

Source: Report of General Administrative Department of Aung Lan Township (2021)

3.2.4 Climate

Aung Lan Township has hot and dry climate and the highest temperature is 44.7˚C and the lowest temperature is 08.0˚C. The following table (3.4) shows annual climate condition of Aung Lan Township (2012-2021).

Table (3.4) Rainfall and Temperature of Aung Lan Township (2012-2021)

No	Year	Rainfall		Temperature	
		Rainfall Day	Total Rainfall (Inches)	Summer Maximum C	Winter Minimum C
1	2012	70	31.98	44.5	08.9
2	2013	79	40.43	44.0	08.0
3	2014	75	31.81	43.2	11.8
4	2015	66	37.64	43.4	10.1
5	2016	80	40.67	44.7	08.9
6	2017	87	55.08	42.1	11.4
7	2018	78	41.02	41.9	09.3
8	2019	70	36..38	44.1	11.4
9	2020	71	36.54	43.9	09.4
10	2021	68	32.64	44.6	09.7

Source: Report of General Administrative Department of Aung Lan Township (2021)

In table (3.4), Aung Lan Township, Magway Region is the tropical Zone in Myanmar. Aung Lan Township has the most rainfall days about 87days in 2017 and the least rainfall days is 66 days in 2015. During the study period, 2017 is the year when the most rainfall inches were received with 55.08 inches and 2014 was the period that the least rainfall inches attained with 31.81 inches. In 2016, Aung Lan Township suffered from the highest temperature with 44.7˚C and the lowest temperature 08.9 C. In 2021, the rainfall day was higher again but the obtained rainfall inches were lower at 32.64 inches with a rather high at 44.6˚C.

3.2.5 Land Utilization

Farm land is principal source for food and agricultural production. Cultivated land means paddy land, farm land, slit land, hill-side cultivation land and vegetable land. The land utilization of Aung Lan Township in 2021-22 is expressed in the following table (3.5).

Table (3.5) Land Utilization of Aung Lan Township (2021-2022)

No	Type of Land	Acres
1	Net Cultivation land	210305
	(i)Le	41268
	(ii)Yar	163752
	(iii)Kaing/Kyun	4964
	(iv)Gardening	77
	Vacant land	244
2	Waste Land area	84
3	Forest land	113513
4	Wild land	283472
5	Other Land	54161
	Total	661535

Source: Report of General Administrative Department of Aung Lan Township (2021)

According to the above table (3.5), there are four types of land used in Aung Lan Township. The most used land is wild land which is 283472 acres in 2021-2022.The second most used land is net cultivated land which is 210305 acres. Third most used land is forest land which is 113513 acres. Aung Lan Township's net cultivation land was 210305, among them total arable acre was (232742) acres in which monsoon groundnut (33527) acres of groundnut cultivation in Aung Lan Township.

3.3 Sectorial Development of Aung Lan Township

Agricultural, industry and services are three main economic sectors that contribute to economic growth. The following table (3.6) shows sectorial development in term of GDP contribution in Aung Lan Township from 2012-13 to 2021-22.

Table (3.6) GDP Contributions by Sectors in Aung Lan Township (2012-2013 to 2021-2022)

Years	Agriculture (%)	Industry (%)	Service (%)
2012-2013	43.2	23.4	33.4
2013-2014	41.8	23.1	35.1
2014-2015	40.6	22.2	37.2
2015-2016	36.7	25.6	37.7
2016-2017	34.9	26.7	38.4
2017-2018	28.4	28.0	43.6
2018-2019	22.0	31.4	46.6
2019-2020	21.8	34.1	44.1
2020-2021	24.5	36.7	38.8
2021-2022	24.7	35.5	39.8

Source: Aung Lan Township, Planning Office (2021)

In the above table (3.6), it is found that the contribution of agriculture sector to GDP has been decreasing by yearly from 43.2% in 2012-13 to 24.7% in 2021-22 while the share of industry sector to GDP has been increasing year by year from 23.4 % in 2012-13 to 32.5 % in 2021-22, respectively. The contribution of industrial sector to GDP, however, has declined to 36.7% in 2020-21 and 32.5 % in 2021-22, respectively. On the other hand, the share of services sector to GDP has been gradually increasing from 2012-13 to 2018-2019. Due to the COVID-19 disease and political instability, Aung Lan township's services have been reduced by 44.1% to 39.8% from 2019-2020 to 2021-2022.Thus, among the three sectors, agricultural sector is the most contributed sector to GDP. Even though the share of agricultural sector to GDP has been declining, it is still a leading sector to economic growth of Aung Lan Township.

3.4 Major Crops of Agricultural Production in Aung Lan Township

Table (3.7) mentioned 10 major cultivated crops in 2021-22 of Aung Lan Township. There are ten major corps such as rice, groundnut, sunflower, green gram, sesame sugarcane, cotton, black gram, pigeon pea, and maize are cultivated in Aung Lan Township.

Table (3.7) 10 Major Crops Growing Status in Aung Lan Township (2021-2022)

No	Crops	Cultivated Areas	Percent
1	Rice	47114	16.1105
2	Groundnut	78462	26.8230
3	Sunflower	572	0.1956
4	Green gram	77878	26.6302
5	Sesame	58809	20.1096
6	Sugarcane	7364	2.5181
7	Cotton	18952	6.4806
8	Black gram	58	0.0198
9	Pigeon Pea	3233	1.1055
10	Maize	21	0.0071
Total		**292442**	**100.00**

Source: Report of General Administrative Department of Aung Lan Township (2021)

As shown in table, among ten major crops, only two type of crops such as groundnut and green gram play the most important role in agricultural production in this township. In term of cultivated areas, groundnut takes the first place at 26.6% and green gram takes the second place at 20.1% out of the total cultivated area of crops. Therefore, the majority of agriculture lands are usually employed as green gram and groundnut production in Aung Lan Township.

3.5 Groundnut Productions in Aung Lan Township

Winter Groundnut is grown in September and harvested in the late of December and January after harvesting the monsoon paddy. The winter groundnut is grown in late of raining season. For growing this kind of groundnut, use the method by plotting on the land with the animals and labor. Winter groundnut is more valuable

than monsoon groundnut but it can have the better condition in yield. Its duration is from three half and four month and it has rather more production per acre.

Monsoon Groundnut is grown in May and harvested in the late of July. The monsoon groundnut is grown in early of raining season. For growing this kind of groundnut, use the method by plotting on the land with the animals and labor. Monsoon groundnut is mainly based on rain water and less expense than the winter groundnut and the yield also less than the yield of the winter groundnut. Its duration is 100 days and it has rather less production per acre. Table (3.8) shows the yearly production of groundnut in Aung Lan Township from 2012-2013 to 2021-2022.

Table (3.8) Groundnut Production in Aung Lan Township
(2012-2013 to 2021-2022)

	Winter Groundnut			Monsoon Groundnut			Total		
Years	Cultivated-ed acre	Yield per acre	Total Production	Cultivateded acre	Yield per acre	Total Production	Cultivated-ed acre	Yield per acre	Total Production
2012-13	17437	71.05	1238899	52316	63.29	3311080	69753	65.23	4549979
2013-14	17445	71.15	1241212	52917	63.10	3349646	70362	65.25	4590858
2014-15	17457	71.15	1242065	53247	63.43	3377457	70704	65.34	4919522
2015-16	17482	71.15	1243844	54869	63.43	3480616	72351	65.90	4724460
2016-17	17479	71.54	1250448	53973	63.36	3419472	75452	65.36	4666920
2017-18	14639	46.99	687689	54072	45.41	2454772	68689	45.75	3142455
2018-19	9064	30.71	278393	54137	39.41	2133539	64041	38.06	2437691
2019-20	13779	30.17	429491	56552	41.06	2321537	70331	39.12	2751028
2020-21	10899	31.16	339613	65580	41.07	2658050	76479	39.64	2997663
2021-22	15933	51.69	1131950	49151	63.51	3103886	65084	61.08	4235836

Source: Department of Agricultural Land Myanmar and Statistics, Aung Lan Township (2021)

According to the Table (3.8), it is found that the cultivated acre of winter groundnut is the most in 2015-2016, but average yield per acre (with 71.15% per acre) still normal compare with the other years. In 2012-2013,2013-2014,2014-2015,2015-2016 and 2016-2017, despite their cultivated acre were decreased their average yield per acre (with 69753% and 75452% per acre) still normal compare to the other years. In the monsoon groundnut production, the yield per acres increased by yearly from about (63.29% to 63.51% acres) during the (2011-2012 to 2021-2022). The total

sown acre of winter and monsoon groundnut is the most in 2020-2021 with its total yield per acre is 61.08%.

3.6 Comparison of Sown Acre, Harvested Acres and Production of Groundnut in Magway Division

In Magway Division had 7 districts. They are Magway district, Thayet district, Pakokku district, Minbuu district, Gant Gaw district, and Chauk district and Aung Lan District. Aung lan district had two Township namely, Aung Lan Township, and Sinpaungwe Township. The following table shows the sown acres, harvested acres and production of groundnut in Magway division.

Table (3.9) Comparison of Sown Acre, Harvested Acres and Production of Groundnut in Magway Division (2012-13) to (2021-22)

Year	Monsoon Groundnut			Winter Groundnut		
	Sown	Harvested	Production	Sown	Harvested	Production
2012-2013	307366	307366	206536	149291	149291	117725
2013-2014	315995	315995	212699	152141	152141	120734
2014-2015	348809	348293	235602	155001	155001	123144
2015-2016	348809	348293	235602	156438	156438	124382
2016-2017	388880	388745	254679	157208	157115	124084
2017-2018	482684	482535	290532	126454	126409	81576
2018-2019	473807	473556	246915	111179	111158	69628
2019-2020	552411	551881	289025	116975	116975	69451
2020-2021	775434	775434	296498	168643	168643	75835
2021-2022	796425	796425	276428	178190	178190	79480

Source: Department of Agricultural Land Myanmar and Statistics, Magway Division (2021)

According to Table (3.9), it is found that the total sown acre for monsoon and winter groundnut is the most in Magway division with 974615 acres in 2021-2022.Magway division is the most sown acres for monsoon groundnut with 796425 acres and the winter groundnut with 178190 acres in 2021-2022.The most production of Magway division is 355908 baskets in 2021-2022.

CHAPTER IV
EMPIRICAL ANALYSIS

4.1 Survey Profile

Aung Lan township has 246 villages tracts that are involved in groundnut cultivation. Many villages in Aung Lan township grow peanuts, but some do so commercially and others do so for personal consumption. Among the 246 villages, 6 villages produce the most groundnut cultivation. Six villages near Aung Lan township are primarily known for growing peanuts.

In Aung Lan township, three villages are described, with the majority of groundnut production concentrated in six villages. The three villages are Ywar Ma Htone, Kyar Thay, and Alaal Ywar. These three villages have the most groundnut cultivation and produce the most groundnuts compared to other groundnut cultivation villages.

The villages of Ywar Ma Htone, Kyar Thay, and Alaal Rwar were chosen to represent groundnut growers in this study. Another reason is that Ywar Ma Htone, Kyar Thay, and Alaal Ywar villages are located upstream and receive more water from this stream during the rainy season. Because of their advantageous location, farmers in three villages can cultivate and produce more groundnuts than farmers in other villages.

Table (4.1) List of Sample Villages and Sample Size

No	Villages	Total Households Number	Selected Sample Households Number	Percentage
1	Ywar Ma Htone	230	90	52.94
2	Kyar Thay	60	25	14.71
3	Alaal Ywar	140	55	32.35
	Total	**430**	**170**	**100.00**

Source: Survey Data (July,2022)

According to table (4.1), a total of 230 households were found in Ywar Ma Htone village, with 90 households selected as sample households for groundnut cultivation. In Kyar Thay village, 60 total households with 25 sample households were interviewed, and in Alaal Ywar village, 140 total households with 55 sample households were interviewed.

4.2 Survey Design

In order to conduct the groundnut production function for Ywar Ma Htone, Kyar Thay, and Alaal Ywar villages, 40% of respondents, or 170 households, were chosen as a sample in this survey.

First, a survey questionnaire is created in a systematic manner and is divided into three parts. The first section focuses on respondents' socio-demographic characteristics such as age, gender, education level, income, farming experience, and sown acres. The second section contains data on groundnut cultivation areas, market prices, and production. The final section contains detailed information on the various inputs used, such as labor, seed, fertilizers, animals, and machines, as well as their respective costs per acre, in order to analyze input factors affecting sunflower production. An appendix contains detailed questionnaire information.

4.3 Demographic Characteristics of Groundnut Grower

First, this section provides general socioeconomic characteristics of 170 groundnut farmers. These include age, gender, education, income, family size, household labor, and farming experience.

4.3.1 Age Group of Groundnut Growers

The age of the respondents is one of the important factors to determine the groundnut production of farming. The results of age condition are categorized into five groups such as from age 30 to 40, from 41 to 50, from 51 to 60, from 61 to 70 and over 70 years. The survey results are shown in the following table below.

Table (4.2) Age Group of Groundnut Growers

Sr. No	Age Group	Frequency	Percentage
1	30-40	37	21.76
2	41-50	38	22.35
3	51-60	56	32.94
4	61-70	30	17.65
5	Over70	9	5.3
	Total	**170**	**100.00**

Source: Survey Data (July, 2022)

According to the above table (4.3), it is found that the largest age group of respondents is age from 51 to 60 years at (32.94 %) of the respondents. The next largest age group of growers is 41-50 years which is (22.35 %) of the respondents. The third largest age group of the growers is 30-40 years which is (21.76 %) of the respondents. The fourth age group of growers is 61-70 years which is (17.65 %) of the respondents. The last age group of growers is over 70 years which is (5.3 %) of the respondents. Therefore, it is found that most of the growers are older age level.

The Gender status of groundnut growers of male is 156 respondents and female are 14 respondents. The total gender status of groundnut growers is 170 respondents. The majority of groundnut growers is (91.76%) of the respondents are male who produce the groundnut while (8.24%) of the respondent are female in the study area.

4.3.2 Education Level of Groundnut Growers

The education level of groundnut growers is divided into five group such as literate, monastery education, primary school, middle school, and high school level. Education level of groundnut growers in Ywar Ma Htone, Kyar Thay, and Alaal Ywar village is shown in Table (4.3).

Table (4.3) Education Level of Groundnut Growers

Sr. No	Education Level	Frequency	Percent
1	Literate level	3	1.76
2	Monastery Education	36	21.18
3	Primary School	99	58.24
4	Middle School	20	11.76
5	High School	12	7.06
	Total	**170**	**100.00**

Source: Survey Data (July, 2022)

In table (4.3) show the educational level of the respondents that majority (58.24%) of the respondents had primary education and monastery education was (21.18 %) of the respondents, middle school education was (11.76 %) of the respondents, literate level was (4.17%) of the respondents and high school education (7.06%) and literate level was (1.76%) of the respondents. The majority of farmers have completed the basic monthly level.

4.3.3 Income from Groundnut Farming

The incomes that yielded from winter groundnut growing of the respondents were observed. The following results are shown in table below.

Table (4.4) Income from Groundnut Farming

Sr. No	Income (Kyats)	Frequency	Percent
1	50000-150000	85	50
2	150001-300000	60	35.29
3	300001-500000	14	8.24
4	Over500000	11	6.47
	Total	**170**	**100.00**

Source: Survey Data (July, 2022)

According to above table (4.4), in groundnut farming, most of the respondents (50%) earn between 50001-150000 kyats, (35.29 %) of the respondents earn between 150001-300000 kyats, (8.24%) of the respondents earn between 300001-500000 kyats and only (6.47%) of the respondents earn over 500000kyats. Therefore, it is seen that the income from groundnut farming was earn at least 50000 kyats by the growers.

4.3.4 Family Size of Groundnut Growers

The family size of the respondents is classified into three groups namely 1-4 members, 5-8 members, 9-12 members. The following table (4.5) shows the family size of the respondents.

Table (4.5) Family Size of Groundnut Growers

Sr. No	Family Size	Frequency	Percent
1	1-4	90	52.94
2	5-8	75	44.12
3	9-12	5	2.94
	Total	**170**	**100.00**

Source: Survey Data (July, 2022)

According to the above table (4.5), the highest proportions of family size was (52.94%) of the respondents that have from 1 to 4 members, (44.12%) of the respondents have from 5 to 8 members, (2.94%) of the respondents have 9 to 12 members respectively.

4.3.5 Household Labor of Groundnut Growers

The household labor is supported in groundnut farming. This study is also related to household labor. The results of household labors are list in following table.

Table (4.6) Household Labor of Groundnut Growers

Sr. No	Household Labor	Frequency	Percent
1	1-2	125	73.53
2	3-4	37	21.76
3	5-8	8	4.71
	Total	**170**	**100.00**

Source: Survey Data (July, 2022)

It is found that (73.53%) of households are participated about 1-2 labors in groundnut farming, (21.76%) of household are participated about 3-4 labors and (4.71%) of households are participated about 5-8 labors. Therefore, most of households are participated about 1-2 labors in groundnut farming.

4.3.6 Family Experiences of Groundnut Growers

Growers' experience in groundnut farming is also one of the main important factors to determine the groundnut production. The results on experience condition of farmers are categorized by four groups from 1 to 15 years, 16 to 30 years, and 31 to 45 years, and over 45 years.

Table (4.7) Family Experience of Groundnut Growers

Sr. No	Farming Experience (years)	Frequency	Percent
1	1-15	85	50
2	16-30	70	41.18
3	31-45	12	7.06
4	Over45	3	1.76
	Total	**170**	**100.00**

Source: Survey Data (July, 2022)

According to the table (4.7), it is found that the largest experience group in groundnut farming of growers is 1-15 years which is (50%) of the growers. The next largest experience group of growers is 16-30 years which is (41.18%) of the

respondents. The next largest experience range of growers is 31-45 years which is (7.06%) of the respondents. The least experience group of growers is over 45 years which is (1.76%) of the respondents. Since, it is found that most of the farming experiences are moderately good in groundnut production as the range of groundnut farming experiences 1-15 years.

4.4 Farm Size of Groundnut Growers

Land is the main input of agricultural cultivation. In this study, there are two types of land owned by respondents which are Le Mya and Yar Myay. Most of the respondents in this study own both types of land therefore there is no land rent in this case.

The firm sizes (Le) and (Yar) acres of the respondents are categorized as; 1-4 acres, 4-8 acres, 8-12 acres, and over 12 acres.

Table (4.8) Le and Yar Acres of Groundnut Growers

Sr. No	Le Acres	Yar Acres	Frequency		Percent	
			Le	Yar	Le	Yar
1	1-4		150	13	88.23	7.65
2	4-8		16	69	9.41	40.59
3	8-12		2	57	1.18	33.53
4	Over12		2	31	1.18	18.23
	Total		**`170**	**170**	**100.00**	**100.00**

Source: Survey Data (July, 2022)

It is found that (88.23%) of the respondents own about 1-4 acres, (9.41%) of the respondents own about 4-8 acres, (1.18%) of the respondents own about 8-12 acres and 1.18% of the respondents own about over 12 acres.

It is found that (7.65%) of the respondents own about 1-4 acres, (40.59%) of the respondents own about 4-8 acres, and (33.53%) of the respondents own about 8-12 acres and (18.23%) 0f the respondents own about over 12 acres.

Land types have an impact on agricultural production output overall. If the soil is good, the output of cultivated land will increase. The output of cultivated land will suffer if the soil is poor. As a result, the soil of the land is one of the most important aspects of agricultural production that growers must consider. Respondents cultivate

Thae Myay land. The majority of respondents in the study area chose Thae Myay as the best soil for groundnut growers, with approximately (100%). Thae Myay produces the most groundnuts for farmers and produces high-quality groundnuts.

4.5 Yields per Acre and Price per Basket of Groundnut

Yield is depended on various inputs such as seeds, machine, fertilizer, pesticide etc. that the farmers used in groundnut cultivation. These are the factors that affect the yield of groundnut.

Table (4.9) Yield per Acre and Price Per Basket of Groundnut

Sr. No	Yield Per Acres (Basket)	Frequency	Percent	Price per Basket
1	10-20	11	6.47	12000
2	20-30	90	52.94	12000
3	30-40	50	29.41	12000
4	Over40	19	11.18	12000
	Total	**170**	**100.00**	

Source: Survey Data (July, 2022)

In table (4.9), yield per acre of (52.94%) respondents are between 20-30 baskets, (29.41.5%) of the respondents are yield between 30-40 baskets per acre, (11.18%) of the respondents are yield between over 40% per acre and (6.47%) of the respondents yield 10-20 baskets per acre. The price per basket of output in groundnut production is 12000 kyats for all respondents because most of the respondents use their output in oil production. The average yield per acre is between 20 and 30 baskets. The respondents are the most numerous. Farmers who produce 10–20 baskets of groundnuts are few and far between, whereas farmers who produce more than 40 baskets per acre are rare.

4.6 Information about Other Inputs in Groundnut Production

Other inputs are used in groundnut cultivation and production. Land, seed, animals, machinery, fertilizer, pesticides, and labor are the primary inputs used in groundnut production. These inputs have an impact on the average cost and output of groundnuts.

4.6.1 Land Costs Per Acre of Groundnut Production

Most of the respondents use land in groundnut production when they cannot rent for land. The cost of rent for groundnut production per acre was 70000 kyats for all the respondents.

4.6.2 Seed Cost per Acre of Groundnut Production

One of the most important inputs in groundnut cultivation is seed. Because higher quality seed can produce more yields per acre, Similarly, the price per basket varies depending on the quality of output and the market situation. Pinn Thaung seed was used in this study for groundnut cultivation. However, in this study, many of the respondents do not directly sell their output to the market; instead, they use their output in oil production because groundnut oil is one of their most important cash crops, and they use cooking oil in their daily lives. The seed used in cultivation is derived from previous groundnut production practices. The cost of seeds per acre of groundnut production.

Table (4.10) Seed Cost Per Acre of Groundnut Production

Sr. No	Seed Costs (Kyats)	Frequency	Percent
1	Under 30000	2	1.18
2	30001-50000	32	18.82
3	50001-70000	112	65.88
4	Over 70000	24	14.12
	Total	**170**	**100.00**

Source: Survey Data (July, 2022)

According to the table (4.10), most of the respondents (65.88%) expend expenditure on animals within 50001-70000 kyats per acre, (18.82%) of the respondents expend within 30001-50000 kyats per acre, (14.12%) of the respondents expend within over 70000 kyats per acre, and (1.18%) of the respondents expend under 30000 kyats per acre.

The majority of farmers use high-quality seeds to increase groundnut yields. The groundnut yield is determined by the groundnut seed. According to the table, 112 respondents use the most expensive groundnut seeds, ranging from 50,000 to 70,000 kyats per acre.

4.6.3 Animals Cost Per Acre of Groundnut Production

The expenditure of animals on groundnut production was analyzed. The survey results on Animals cost per acre is shown in table below.

Table (4.11) Animals Cost Per Acre of Groundnut Production

Sr. No	Animals Costs (Kyats)	Frequency	Percent
1	Under 10000	7	4.12
2	10001-20000	55	32.35
3	20001-30000	82	48.24
4	Over 30000	26	15.29
	Total	**170**	**100.00**

Source: Survey Data (July, 2022)

According to the table (4.11), most of the respondents (48.24 %) expend expenditure on animals within 20001-30000 kyats per acre, (32.35%) of the respondents expend within 10001-20000 kyats per acre, (15.29%) of the respondents expend within over 30000 kyats per acre, and (4.12%) of the respondents expend under 10000 kyats per acre.

Farmers grow peanuts with their traditional animals. They reduce their cultivation costs by using animals, allowing them to earn a higher profit from peanut farming.

4.6.4 Machine Costs Per Acre of Groundnut Production

The expenditure of machine on groundnut production was analyzed. The survey results on machine cost per acre are shown in table below.

Table (4.12) Machine Cost per Acre of Groundnut Production

Sr. No	Machine Costs (Kyats)	Frequency	Percent
1	Under 20000	1	0.59
2	20001-30000	55	32.35
3	30001-40000	102	60
4	Over 40000	12	7.06
	Total	**170**	**100.00**

Source: Survey Data (July, 2022)

According to the table (4.12), most of the respondents (60%) expend expenditure on animals within 30001-40000 kyats per acre, (32.35%) of the respondents expend within 20001-30000 kyats per acre, (7.06%) of the respondents expend within over 40000 kyats per acre, and (0.59%) of the respondents expend under 20000 kyats per acre.

Machines used in peanut cultivation save time. Most farmers now use machines instead of animals. Machines are slightly more expensive than animals, but they save a significant amount of time.

4.6.5 Fertilizer Cost per Acre of Groundnut Production

The expenditure of fertilizer on groundnut production was analyzed. The survey results on fertilizer cost per acre are shown in table below.

Table (4.13) Fertilizer Cost per Acre of Groundnut Production

Sr. No	Fertilizer Costs (Kyats)	Frequency	Percent
1	Under 10000	20	11.76
2	10001-30000	33	19.41
3	30001-50000	73	42.94
4	Over 50000	44	25.88
	Total	**170**	**100.00**

Source: Survey Data (July, 2022)

According to the table (4.13), most of the respondents (42.94%) used expenditure on fertilizer within 30001-50000 kyats per acre, (25.88%) of the respondents used over 50000 kyats per acre, (19.41%) of the respondents used within 10001-30000 kyats per acre and (11.77%) of the respondents used under 10000 kyats per acre. The use of fertilizer effectively increases peanut yield.

4.6.6 Pesticides Cost Per Acre of Groundnut

The expenditure of pesticides on groundnut production is analyzed. The survey results on pesticides cost per acre are shown in table below.

Table (4.14) Pesticides Cost Per Acre of Groundnut Production

Sr. No	Pesticide Costs (Kyats)	Frequency	Percent
1	Under 10000	21	12.35
2	10001-20000	101	59.41
3	20001-30000	34	20
4	Over 30000	14	8.24
	Total	**170**	**100.00**

Source: Survey Data (July, 2022)

According to the table (4.14) most of the respondents (59.41%) used expenditure on pesticide within 10001-20000 kyats per acre, (20%) of the respondents used within 20001-30000 kyats per acre, (12.35%) of the respondents used under 10000 kyats per acre, and (8.24%) of the respondents used over 30000 kyats per acre. Pesticides should only be used in the quantities required. Pesticides used in excess can have negative consequences.

4.6.7 Labor Cost Per Acre of Groundnut Production

The expenditure of labor on groundnut production was analyzed. The survey results on labor costs per acre are shown in table below.

Table (4.15) Labor Costs Per Acre of Groundnut

Sr. No	Labor Costs (Kyats)	Frequency	Percent
1	Under 100000	24	14.12
2	100001-200000	80	47.06
3	200001-300000	30	17.65
4	Over 300000	36	21.17
	Total	**170**	**100.00**

Source: Survey Data (July, 2022)

According to the table (4.15) most of the respondents (47.06%) are used expenditure for labor between 100001-200000 kyats per acre, (21.17%) of the

respondents used over 300000 kyats per acre, (17.65%) of the respondents used between 200001-300000 kyats per acre and (14.12%) of the respondents used under 100000.Labor costs are proportional to the amount of land owned. The labor cost is higher if the land is owned. Less labor is used when the acreage is smaller.

4.7 Cobb-Douglas Production Function for Groundnut Production

The Cobb-Douglas production function model is used in this study to investigate the relationship between output and inputs of groundnut production based on a sample of 170 respondents.

In constructing the model, the variables are noted as

Prod = groundnut production

Land = land cost

Seed = seed cost

Lab = labor cost

Mac & Ani = machine and animals' cost

Fer & Pest = fertilizer and pesticides cost

The multiple regression model takes the following form,

$y = \beta_{0+}\beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k + u_i$

The long-transform this model is

$$In\,Yi = In\,\beta_1 + \beta_2 In\,X_{2i} + \beta_3\,In\,X_{3i} + \beta_4 In\,X_{4i} + + \beta_5 In\,X_{5i} + \beta_6 In\,X_{6i} + u_i$$

$$= \beta_o + \beta_2 In\,X_{2i} + \beta_3\,In\,X_{3i} + \beta_4 In\,X_{4i} + \beta_5 In\,X_{5i} + \beta_6 In\,X_{6i} + u_i$$

Where, $\beta_o = In\beta_1$

The Cobb-Douglas production function is given as;

$$InProd = \beta_1 + \beta_2 Inlan + \beta_3 Inseed + \beta_4 Inlabor + \beta_5 Imac\&ani + \beta_6 Infer\&pest + u_i$$

Where, u is disturbance term and unknown parameters $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5\ and\ \beta_6$ in the Cobb-Douglas production function are estimated by using the Statistical Packages for Social Science (SPSS). The calculated results are described in the Cobb-Douglas production function of groundnut production in the following table (4.16).

The calculated results of the Cobb-Douglas production function of groundnut production are expressed in the following equation (3) and in Table (4.16).

$$\boldsymbol{InProd = 3.687 + 0.675 Inlan + 0.051 Inseed + 0.062 Inlab + 0.208 Inmac\&ani + 0.66 Infer\&pesti}$$

Table (4.16) Results for Cobb-Douglas Function of Groundnut Production

Variables	Coefficient	Standard Error	t-Values	Sig
Constant	3.687	0.675	5.466	0.000
LnLAND	0.675	0.155	4.360	0.000***
LnSEED	0.051	0.096	0.531	0.596
LnLABOR	0.062	0.043	1.462	0.146
LnMACH&ANIMALS	0.208	0.100	2.082	0.039***
LnFERTI&PESTICIDE	0.66	0.035	1.862	0.064***
R^2	0.837			
Adjusted R	0.832			

Source: Survey Data (July, 2022)

Note - ***, ** are statistically significant at 1%, 5% and level respectively.

The data in Table (4.16) shows the outcomes of the relationship between groundnut production and inputs. All independent variables, including land, seed, labor, machine, animals, fertilizer, and pesticide, explained approximately (83.7) percent of the variation in the log of groundnut production, according to the adjusted R^2 value (0.832).

According to the log linear regression results, land, labor, seed, machine-animals, and fertilizer-pesticide are all positively related to groundnut production output. because the estimated coefficients for land, machine-animals, and fertilizer-pesticide all have a positive sign and their p-values are significant at the 1% level.

Labor and seed are insignificant. Because groundnut production is primarily labor-intensive in these three villages, it has been discovered that an increase in skilled labor leads to an increase in production. It has also been discovered that seed cost is one of the factors influencing groundnut production. Thus, using not only more but also higher-quality seeds tend to increase groundnut production.

In terms of land, the result indicates that the sign of the estimated coefficient of land is positive, and the p -value is significant at the 1% level. As a result, it is implied that land has a positive impact on output. In this case, a 1% increase in land results in a 0.675% increase in output. The lands in these villages are fertile, but there are different types of land, such as Thae Myay. Furthermore, the soil in Thae Myay is more fertile than other types of land. It can produce more output per acre than others.

In this case, it is possible that the quality of land, rather than the quantity of land, is one of the factors influencing groundnut production.

Machine and animal inputs are also considered as capital in this production function. The results show that the estimated capital coefficient is positive and the p-value is significant. A 1% increase in seed cost results in a 0.208% increase in groundnut production in the case of animal-machine cost. Thus, it implies that capital and output have a positive relationship and that output has been affected by capital. In reality, using machines in agriculture is more efficient and productive than using animals. However, in these villages, the majority of respondents adequately breed animals, namely cows and buffalo, and they are used as the primary capital in agricultural activities. Thus, most respondents use animals in groundnut production, while a few uses machines. As a result, in order for capital to affect output, it is necessary to substitute machine for more animals in groundnut production. The capital substitution effect between machines and animals can benefit groundnut production.

A 1% increase in seed costs results in a 0.66% increase in groundnut production in the case of fertilizer-pesticide costs. The final input is the cost of fertilizer and pesticide, both of which are important in ground production. The estimated coefficient of fertilizer-pesticide is found to be positive, and the p-value is significant. It implies that the use of fertilizer and pesticides has an impact on groundnut production output. In this case, the quality of fertilizer and pesticide, as well as the proper and systematic application of fertilizer and pesticide, are important factors to consider in groundnut production.

CHAPTER V

CONCLUSION

5.1 Findings

Farmers in the villages of Ywar Ma Htone, Kyar Thay, and Alaal Ywar primarily cultivate paddy and groundnut during the monsoon and winter seasons. The primary costs of growing groundnuts, however, are farming costs such as land, seeds, fertilizers, labor, and machinery. As a result, some growers face rising production costs as well as declining productivity. Because production costs influence profits and output, this study looks into the costs of groundnut production in one of these three villages.

According to the findings of this study, the majority of respondents (29.1%) are between the ages of 51 and 60. 91.76% of the time, males outnumber females. The most common educational level is primary school, which accounts for approximately 58.24 percent of all respondents. The majority of respondents (50%) earn between $50,000 and $100,000 per year from groundnut production. The majority of respondents' families (52.94%) have 5-8 members. In terms of household labor, 73.53% of households with 1-2 laborers work in groundnut cultivation. The majority of growers (50%) have between 1 and 15 years of farming experience. 88.23% of those polled own between 1–4 acres of groundnut production. As for the cost of land, all respondents use around 70000 kyats per acre. The respondents' output (52.94%) yields between 20 and 30 baskets per acre, and the average price is $12,000 for all respondents. Respondents paid between 50,001 and 70,001 kyats per acre of groundnut production for seed (48.24 %). The majority of respondents (48.24%) use animals that cost between 20000 and 30000 kyats per acre. The majority of respondents (60%) use a machine that costs between 30000 and 40000 kyats per acre of groundnut production. 42.94 % of respondents said that fertilizer costs between 30000 and 50000 kyats per acre. In terms of pesticide costs, 59.41% of respondents

spend between 10,000 and 20,000 kyats per acre. In this study, 47.06% of respondents reported labor costs ranging from 100,000 to 200,000 kyats per acre.

Seed costs 68282 kyats per acre on average; land preparation costs 23658 kyats per acre on average; machine costs 36230 kyats per acre on average; animal costs 27642 kyats per acre on average; fertilizer costs 37777 kyats per acre on average; pesticide costs 26802 kyats per acre on average; and labor costs 155041 kyats per acre on average. The average yield per acre in groundnut cultivation is 30 baskets, and the price per basket is 12,000 kyats. As a result, the average return is 414871 kyats per acre.

The log linear regression result of the Cobb-Douglas production function shows that among the input variables, land, labor, seed, animal-machine, and fertilizer-pesticide are positively affected by the output of groundnut. Because the estimated coefficients of land, animals-machine, and fertilizer-pesticide are all positive, and their p-values are all significant at the 1% level, the estimated coefficients of labor and seed have a positive sign, and each of their p-values is not significant at the 1% level.

In terms of land, the result indicates that the sign of the estimated coefficient of land is positive, and the p-value is significant at the 1% level. As a result, it is implied that land has a positive impact on output. In this case, a 1% increase in land results in a 0.675% increase in output.

Machine and animal inputs are also considered as capital in this production function. The estimated coefficient of capital is positive, and the p-value is significant at the 1% level. As a result, it implies that capital and output have a positive relationship and that output is affected by capital. In this case, a 1% increase in machine-animal results in a 0.208% increase in output.

The final inputs are fertilizer and pesticides, which are also important in ground production. The estimated coefficient of fertilizer-pesticide is found to be positive, and the p-value is significant at the 1% level. Thus, a 1% increase in fertilizer-pesticide results in a 0.66% increase in output. Cow dung is the primary source of fertilizer for wetland and dryland fields, with farmers using only trace amounts of chemical fertilizers like phosphorus. It implies that the use of fertilizer and pesticides has an impact on groundnut production output.

5.2 Suggestions

Even though labor has a positive impact on groundnut production, it is possible that skilled labor and agricultural knowledge are also having an impact. According to this study, the majority of farmers in these three villages have a primary school education. As a result, one of the factors considered in this study is farmer education. Farmers who are better educated are more likely to adopt new technological knowledge. It can improve groundnut growers' yield and production by providing agricultural extension services to them. Thus, if local agricultural departments pay attention and take action, it will help to improve and upgrade the livelihoods of groundnut growers.

Groundnut production has a positive impact on land; in this case, it is possible that the quality of land, rather than the quantity of land, is one of the influencing factors for groundnut production.

A seed has a positive impact on groundnut production. The dry season has a higher seeding rate than the rainy season. As a result, farmers use a lower seeding rate and wider plant spacing to accommodate the use of this weeding implement. The majority of farmers grow groundnuts using traditional seeds. Farmers should use better seeds instead of traditional seeds.

Because machine and animal capital have a positive relationship in this production function, output is affected. Thus, in order for capital to be affected by output, it is necessary to substitute machines instead of using more animals in groundnut production. Groundnut production can benefit from the capital substitution effect between machines and animals.

Fertilizer and pesticides both have a positive relationship with output and are affected by it. In this case, the quality of fertilizer and pesticide, as well as the proper and systematic application of fertilizer and pesticide, are important factors to consider in groundnut production.

Even through the farmers' continued use of traditional agricultural practices, their land, natural resources, and peanut varieties yield quite high productivity.

REFERENCES

Barro, Robert J.; Sala-i-Martin, Xavier (2004). Economic Growth (Second ed.). The MIT Press. p. 29, fn. 7. ISBN 0-262-02553-1.

Chan, A. E. (2013). incorporating quliaqtuavut (our stories): Bering Strait Voices in Recent Exhibitions. *Museum Anthropology*, *36*(1), 18-32.

Chhipa, H. (2017). Nanofertilizers and nanopesticides for agriculture. *Environmental chemistry letters*, *15*(1), 15-22.

Hammons, R. O. (1994). The origin and history of the groundnut. In *the Groundnut Crop* (pp. 24-42). Springer, Dordrecht.

Htun, H. H. (2013). *Supply chain management of groundnut production in Magway Township* (M. Agr. Sc. Thesis, Yezin Agricultural University).

Khant Phyo Wai, May 2018, A study on groundnut production in Bago Region (2007-2017), Master of Economics, Yangon University of Economics.

Khin, A. A. (2002). Analysis of Technical, Allocative and Economic Efficiencies of the Selected Sugarcane Farmers at the Three Different Townships in Myanmar. M. Agr. Sc. Thesis. Yezin Agricultural University (YAU), Yezin. Myanmar.

Ministry of Agriculture and Irrigation, The Republic of the Union of Myanmar, AUGUST 2013, Japan international cooperation agency (JICA) sanyu consolation.

Myint, D., Gilani, S. A., Kawase, M., & Watanabe, K. N. (2020). Sustainable sesame (Sesamum indicum L.) production through improved technology: An overview of production, challenges, and opportunities in Myanmar. *Sustainability*, *12*(9), 3515.

Myint, T., & Aung, Y. M. (2019). Assessment of Value Chain Management of Sesame in Pwint Phyu Township, Magway Region, Myanmar. *Assessment*, *10*(12).

Oo, K. K. (2019). *SUPPLY CHAIN MANAGEMENT OF SESAME UNDER INFORMAL CONTRACT SCHEME IN AUNGLAN TOWNSHIP, MAGWAY REGION,* M. Agr. Sc. Thesis, Yezin Agriculture University.

Win, S. S. (2008). *Technical Efficiency of Groundnut Production in Central Region of Myanmar*, Unpublished thesis for Master of Agriculture, Chiang Mai University, Thailand.

Win, S. S., Kitchaicharoen, J., & Chaovanapoonpho, Y. (2007). *An empirical study of the efficiency of groundnut production in central of Myanmar:* A stochastic frontier analysis. Department of Agricultural Economics, Faculty of Agriculture, Chiang Mai University, Thailand.

YEE, M. S., Rambo, A. T., & Simaraks, S. Peanut Production Systems of Rain-fed Subsistence Farmers in a Riverine Village in the Dry Zone of Myanmar.

Websites

1. https://www.google.com/search?client=firefox-b-d&q=Groundnut+in+Myanmar
2. https://www.google.com/search?client=firefox-b-d&q=groundnut+cultivation
3. https://en.wikipedia.org/wiki/Cobb%E2%80%93Douglas_production_function
4. https://en.wikipedia.org/wiki/Magway_Region#:~:text=The%20ancient%20name%20of%20Magway,Yenangyaung%20District%20from%20Myingyan%20District.
5. https://en.wikipedia.org/wiki/Aunglan_Township
6. https://en.wikipedia.org/wiki/Agriculture_in_Myanmar

APPENDIX

List of Conversion Factors

1 Basket of groundnut will shell	11.34 kilograms
1 Ton	1000 kilograms
1 Ton of cow dung	2 cartloads of cow dung
1 Hectare	2.471 acres

A Study on effect of inputs and Groundnut Production in Aung Lan Township

Section (A)

Background of respondents

Please check your answer immediately. Please fill in the required fields.

1. Interview farmer no……
2. Name - ……
3. Age- ……
4. Gender-……
5. Educational level

☐ Monastic education ☐ Can read and write ☐ Primary school
☐ Secondary ☐ High school ☐ University

6. Occupation - …….
7. Your annual income - …….
8. Number of family members - …….....
9. Number of people in the family engaged in groundnut cultivation-
   ……persons
10. Groundnut cultivation - ……years

Section (B)

Land ownership and land type information

Please check your answer immediately. Please fill in the required fields.

11. How many acres of land do you own?
    (i) Farmland-( )acres
    (ii) Kaing land/ Island land-( )acres
12. How many acres of land can you grow on your land?
    (i) Winter groundnut-……...
    (ii) Rainy groundnut-…….....
13. From where the seed come
    (i) Own……baskets (ii) Purchase……..baskets
14. Water source

☐ Rain ☐ Irrigation ☐ Other

15. What type of soil is your groundnut farm?

Winter groundnut	Rainy groundnut
(i) Myay war nu	(i) Myay war nu

(ii) Land	(ii) Land
(iii) Sandy soil	(iii) Sandy soil

Section (C)

Information on land yield and yield price

16. What is the yield per acre of groundnut?
    (i) Winter groundnut-……...
    (ii) Rainy groundnut-……....
17. What was the price of a basket of groundnut last season?
    (i) Winter groundnut-……...
    (ii) Rainy groundnut-……....

Section (D)

Information on the main inputs used in growing groundnut

18. Land ownership

Winter groundnut	Rainy groundnut
(i) Own	(i) Own
(ii) Rent in	(ii) Rent in

19. How much will the rent be per acre for growing groundnut?
    (i) Winter groundnut-……...
    (ii) Rainy groundnut-……....
20. How much does seed cost per acre for growing groundnut?
    (i) Winter groundnut-……...
    (ii) Rainy groundnut-……....
21. What is used for land preparation?
    (i) Machine (ii) Animals (iii) Both
22. Plow the ox; If used for plowing, how many cows are used per acre?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-……
23. How much does it cost per cow?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-……

24. What type of machine is used for growing groundnut?

Winter groundnut	Rainy groundnut
(i) Machine (90 horsepower)	(i) Machine (90 horsepower)
(ii) Small machine (50 horsepower)	(ii) Small machine (50 horsepower)
(iii) Both	(iii) Both

25. When cultivating peanuts, a machine (90 horsepower) per acre of groundnut How many times do you have to drive with a gondola (dollar) and a plow?

Machine (90 horsepower)	Gondola (dollar)	Plow
Per acre	Number of times	Number of times
Winter groundnut		
Rainy groundnut		

26. How long it takes for an acre of peanut to be harvested once with this machine (90 horsepower)?

Machine (90horsepower)	Gondola (dollar)	Plow
Per acre	Number of hours	Number of hours
Winter groundnut		
Rainy groundnut		

27. How much does it cost to drive an hour (90 hp) with this machine?

Machine (90horsepower)	Gondola (dollar)	Plow
Per acre	kyats	kyats
Winter groundnut		
Rainy groundnut		

28. When cultivating peanuts, a small machine (50 horsepower) per acre of groundnut How many times do you have to drive with a gondola (dollar) and a plow?

Small machine (50 horsepower)	Gondola (dollar)	Plow
Per acre	Number of times	Number of times
Winter groundnut		
Rainy groundnut		

29. How long it takes for an acre of peanut to be harvested once with this small machine (50 horsepower)?

Small machine (50 horsepower)	Gondola (dollar)	Plow
Per acre	Number of hours	Number of hours
Winter groundnut		
Rainy groundnut		

30. How much does it cost to drive an hour (50 hp) with this machine?

Small machine (50horsepower)	Gondola (dollar)	Plow
Per acre	kyats	kyats
Winter groundnut		
Rainy groundnut		

31. Do you use fertilizer when growing peanuts?

Winter groundnut	Rainy groundnut
(i) Yes	(i) Yes
(ii) No	(ii) No

32. How many bags of fertilizer are used per acre for growing peanuts?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-…….
33. How much does a bag of fertilizer cost to grow peanuts?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-……
34. How many workers apply fertilizer per acre when growing peanuts?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-……
35. How much does it cost per worker to apply fertilizer?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-……
36. How much does it cost to cultivate one acre of peanuts (labor and animal use)?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-…….

37. How much labor is used per acre for growing peanuts?

(i) Winter groundnut-……

(ii) Rainy groundnut-…….

38. How much does it cost per worker to grow peanuts?

(i) Winter groundnut-……

(ii) Rainy groundnut-…….

39. Are used Peanuts with herbicides, pesticides, and chemicals?

Winter groundnut	Rainy groundnut
(i) Yes	(i) Yes
(ii) No	(ii) No

40. How often use for Peanuts with Herbicides, Pesticides and Plant tonic per acre.

Per Acre	Herbicides	Pesticides	Plant tonic
	Number of times	Number of times	Number of times
Winter groundnut			
Rainy groundnut			

41. How many use (4 gallons) for per acre buckets of Herbicides, Pesticides and Plant tonic?

Per Acre	Herbicides	Pesticides	Plant tonic
	Buckets	Buckets	Buckets
Winter groundnut			
Rainy groundnut			

42. How much cost (4 gallons) for per acre buckets of Herbicides, pesticides and plant tonic?

Per Acre	Herbicides	Pesticides	Plant tonic
	kyats	kyats	kyats
Winter groundnut			
Rainy groundnut			

43. How much (4 gallons of water) per acre rental cost does for Herbicides, Pesticides and Plant tonic?

(i) Winter groundnut-……

(ii) Rainy groundnut-…….

44. In Peanut Butter,

Winter groundnut	Rainy groundnut
(i) Myself	(i) Myself
(ii) Rent	(ii) Rent

45. How many times per acre of groundnut?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-…….
46. How much does peanut butter cost?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-…….
47. Do weeds grow peanuts?

Winter groundnut	Rainy groundnut
(i) Yes	(i) Yes
(ii) No	(ii) No

48. How many workers are used per acre after weeding peanuts?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-…….
49. How much does it cost per worker to subtract peanuts?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-…….
50. How many workers are used per acre after peanuts?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-…….
51. How much does it cost per worker to extract peanuts?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-…….
52. How much does a basket of peanuts cost?
    (i) Winter groundnut-……
    (ii) Rainy groundnut-…….