

**YANGON UNIVERSITY OF ECONOMICS**  
**DEPARTMENT OF MANAGEMENT STUDIES**  
**MBA PROGRAMME**

**THE EFFECT OF ECONOMIC FACTORS ON TECHNICAL  
EFFICIENCY AND PROFITABILITY OF MAIZE FARMERS  
IN NYAUNG SHWE TOWNSHIP**

**MYO THURA AUNG**

**EMBA II-01**

**EMBA 19<sup>th</sup> BATCH**

**MAY, 2024**

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**ACADEMIC YEAR (2022-2024)**

**Supervised by:**

Dr. Myint Myint Kyi  
Professor & Head  
Department of Management Studies  
Yangon University of Economics

**Submitted by:**

Myo Thura Aung  
EMBA II - 01  
EMBA 19<sup>th</sup> Batch  
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“This thesis is submitted to the Board of Examiners in partial fulfillment of the requirements for the degree of Master of Business Administration (MBA)”

**Supervised by:**

**Submitted by:**

Dr. Myint Myint Kyi

Myo Thura Aung

Professor & Head

EMBA II - 01

Department of Management Studies

EMBA 19<sup>th</sup> Batch

Yangon University of Economics

2022 - 2024

# ACCEPTANCE

This is to certify that the thesis entitled “**The Effect of Economic Factors on Technical Efficiency and Profitability of Maize Farmers in Nyaung Shwe Township**” has been accepted by the Examination Board for awarding of Master of Business Administration (MBA) degree.

## Board of Examiners

-----  
(Chairman)

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**Yangon University of Economics**

-----  
(Supervisor)

-----  
(Examiner)

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(Examiner)

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(Examiner)

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(Examiner)

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(Examiner)

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(Examiner)

**MAY, 2024**

## **ABSTRACT**

The objectives of this study are to analyze the effect of economic factors on technical efficiency, and to analyze the effect of technical efficiency on profitability of maize farmers in Nyaung Shwe Township, Shan State. The descriptive method and regression analysis are used to analyze the collected data. In this study, 83 farmers out of 200 maize farmers are selected by using simple random sampling method. The sample size is calculated using Raosoft sample size calculator. The secondary data are collected from United States Department of Agriculture reports, International Food Policy Research Institute Website, Myanmar Corn Trader Association Reports, Myanmar Corn Industrial Association Reports, local microfinance companies and fertilizer companies, previous papers and relevant text books. For the survey method, personal interview method is applied to collect primary data from 83 selected farmers. According to the regression analysis, it is found that market access has positive significant effect on extension services, farmers' experience and farmers organizational membership. Additionally, the study finds that extension service has the positive and significant effect on gross margin and net profit. Therefore, to promote agricultural development and enhance the livelihoods of maize farmers in Nyaung Shwe Township, policymakers should prioritize initiatives focusing on enhancing market access, customizing extension programs, improving access to affordable credit and financial services, strengthening farmer organizations, and implementing strategies such as diversification of agricultural practices, investments in irrigation infrastructure, adoption of sustainable farming practices, facilitation of access to agricultural inputs and technologies, and promotion of value-adding activities, all aimed at creating a conducive environment for sustainable and inclusive growth.

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**Myo Thura Aung**

**EMBA II – 01**

**EMBA 19<sup>th</sup> Batch**

**2022-2024**

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# CHAPTER 1

## INTRODUCTION

Maize Farmers are in the hopes of getting higher yields and better profits from the cultivations, they believe that it is improving their livelihood for their better future with prosperity. Nowadays, maize farmers also started to notice that their cultivations can be better with modern techniques than with conventional practices. Efficiency in cultivations leading to better income which can be described as indicators such as net profit and gross margin. Maniriho and Bizoza (2015) stated that smallholder farmers need to utilize resources efficiently by embracing production systems that increase yield and guarantee better returns.

The level of farmers' technical efficiency has been tied with country's choice of development strategy (Gebreegziabher et al., 2004). Najjuma et al. (2016) described the measures of efficiency as being economic, allocative and technical. For a farm to be economically efficient it has to attain both allocative and technical efficiencies (Ndirangu et al., 2017). Technical efficiency refers to the effectiveness with which a given set of inputs is used to produce an output (Coelli et al., 2005). It measures the ability of a firm or an entity to maximize output from a given number of inputs or, conversely, to minimize the number of inputs used to produce a given output. The study of Farrell (1957) showed that technical efficiency is achieved when production occurs on the boundary of the production possibility set, meaning that no resources are wasted and the maximum possible output is obtained from the inputs used. Farrell's conceptualization of technical efficiency has been foundational in the field of production economics and has influenced numerous subsequent studies on efficiency measurement and improvement.

Extension service refers to a set of support activities provided by various institutions, including government agencies, universities, and non-governmental organizations, aimed at improving knowledge, skills, and practices in various fields, particularly agriculture and rural development (Swanson et al., 1997). These services facilitate the transfer of research-based information and innovations to farmers and other stakeholders, thereby enhancing productivity and promoting sustainable practices. According to Ban and Hawkins (1996), extension services play a crucial role in bridging the gap between research and practical application, ensuring that advancements in

technology and methodology are effectively disseminated and utilized at the grassroots level. This interaction not only empowers local communities but also fosters economic growth and development in rural areas.

Farmers' experience refers to the practical knowledge and skills acquired through prolonged engagement in farming activities. This includes various competencies such as crop management, livestock care, and the adoption of innovative agricultural practices (FAO, 2013). The experience includes an understanding of local climate patterns, soil conditions, pest management, and effective farming techniques, allowing farmers to make informed decisions to optimize productivity and sustainability. According to Smith et al. (2020), experienced farmers are adept at adapting to environmental changes and market demands, which is crucial for maintaining the viability of agricultural enterprises. Farmers' organizational membership involves their participation in various groups, both formal and informal, which aim to enhance access to resources, improve agricultural techniques, and advocate for their interests (Birner & Resnick, 2010). These groups might be anything from professional associations and community-based organizations to cooperatives and unions. Farmers who belong to these groups get access to financial resources, collective bargaining power, common knowledge, and a more powerful voice in the formulation of policy. The study by Koutsou et al. (2014) claimed that these memberships play an essential part in rural development by encouraging collaboration and innovation within the agricultural sector, in addition to enhancing the social capital among farmers.

Economic factors define various elements within the economy that influence decision-making processes, market behaviors, and resource allocation. These factors encompass but are not limited to inflation rates, interest rates, exchange rates, economic growth, and unemployment levels (Mankiw, 2014). Farmers' technical efficiency is influenced by economic factors such as market access and credit access. Market access means the ability of farmers to sell their products in local, regional, or international markets with minimal restrictions. It is also important for enhancing farmers' income, improving food security, and promoting rural development. Credit access refers to the ability of individuals or businesses to obtain loans or credit lines from financial institutions or other lenders, allowing them to borrow funds for various purposes such as investments, purchases, or operating expenses (Beck & Demirgüç-Kunt, 2008). It is an essential factor in economic development, influencing both personal and entrepreneurial

growth. Stiglitz and Weiss (1981) stated that credit access is often influenced by factors such as the applicant's creditworthiness, the availability of collateral, and the overall economic environment. Limited access to credit can hinder the potential for economic advancement and perpetuate cycles of poverty, as it restricts opportunities for investment and consumption that drive economic activity (Stiglitz & Weiss, 1981).

The technical efficiency of farmers will be resulted to profitability, and the profitability can be measured with gross margin and net profit (Mwangi & Francis, 2020). According to Abdulai and Huffman (2014), profitability is a key indicator of the economic viability and sustainability of agricultural enterprises. It encompasses various factors including crop yields, input costs, market prices, and government policies. Profitability is crucial for farmers to maintain their livelihoods, reinvest in their businesses, and contribute to food security and economic growth. Sustainable profitability ensures the long-term viability of agricultural production systems and supports the livelihoods of farming communities.

Gross margin is the percentage of a company's revenue that it retains after direct expenses, such as labor and materials, have been subtracted. Gross margin is an important profitability measure that looks at a company's gross profit compared to its revenue (Bloomenthal, 2024). As defined by Horngren et al. (2002), gross margin is calculated by subtracting COGS from total revenue and then dividing the result by total revenue, which is then multiplied by 100 to express it as a percentage. This measure provides insights into a company's ability to generate profit before accounting for other expenses such as operating costs and taxes, making it a crucial indicator for investors and analysts evaluating a company's financial health and performance.

Net profit margin, or simply net margin, measures how much net income or profit is generated as a percentage of revenue. It is the ratio of net profits to revenues for a company or business segment (Murphy, 2024). According to Warren et al., (2018), net profit is calculated by subtracting all expenses, such as operating costs, interest, and taxes, from the total revenue generated by a business over a specific period. Essentially, it reflects the amount of money a company has earned after covering all its costs. This metric is essential for investors, as it indicates the efficiency of a company in generating profits from its operations, ultimately influencing investment decisions and financial strategies.

Nyaung Shwe maize farmers demonstrate a strong dedication to their profession, thoughtfully caring for their crops regardless of changes in climate or market conditions, as they are deeply ingrained in the periodic patterns of agricultural life. Every day, they engage in a wide range of tasks, including preparing the land, planting seeds, managing pests, and organizing the harvest. They carry out these duties with great skill and precision, which they have developed through years of experience. Although Nyaung Shwe maize farmers face various complex obstacles related to agriculture, such as unpredictable weather, fluctuating input costs, and intricate marketing processes, their persistence is evident. These folks are deeply connected to their land and are motivated by their family obligations. They demonstrate a strong will to overcome challenges and provide for their households.

This study investigates the effect of economic factors on the technical efficiency and profitability of maize farmers in Nyaung Shwe Township, with a specific focus on market access and credit access as economic factors. Drawing upon insights from agricultural economics, production operations management, and strategic management, the research aims to analyze the relationships between economic factors, technical efficiency, and profitability within the maize farming sector. By examining the roles of extension services, farmers' experience, and farmers' organizational membership as dimensions of technical efficiency, the study seeks to provide a comprehensive understanding of the mechanisms through which economic factors influence technical efficiency and profitability of maize farmers in Nyaung Shwe Township.

## **1.1 Rationale of the Study**

Agriculture, being the backbone of many economies, serves as a dynamic arena where the agriculture serves as a cornerstone of human sustenance and economic development, particularly in regions where it forms the backbone of local economies. Even though in terms of Myanmar's main crop production, it is renowned for its production of rice, sugar cane, and dry beans, among other vegetables, maize constitutes a significant cereal crop in the country. The Myanmar maize seed market size is estimated at USD 18.68 million in 2024, and is expected to reach USD 24.89 million by 2029, growing at The Compound Annual Growth Rate of 5.90% during the forecast period (2024-2029) (Myanmar Maize Seed Market Insights, 2023). Further, the increased

demand from several industries and gained maize production, integrated with rising export potential, drive the market in the country.

Maize cultivation serves as major role of agricultural activity in Nyaung Shwe Township, constituting a fundamental pillar of the local economy and a primary source of livelihood for a substantial portion of the population. Situated in a region characterized by diverse agroecological conditions, Nyaung Shwe Township boasts a rich agricultural heritage, with maize emerging as a staple crop cultivated by smallholder farmers across the landscape. Moreover, maize is the second most exported crop of Myanmar through shipment or border trade.

The economic significance of maize farming extends beyond mere subsistence, as it contributes to food security, income generation, and rural development initiatives within the community. However, the sustainability and resilience of maize farming operations in Nyaung Shwe Township are contingent upon various economic factors, technical considerations, and market dynamics that collectively shape the livelihoods of farmers and the trajectory of agricultural development in the region.

For good financial return (i.e., profitability), the technical efficiency of farmers, especially smallholder farmers (the majority in Nyaung Shwe Region) are crucial. To gain high gross margin and net profit, farmers must have technical efficiency: they have to access extension services. Moreover, farmers need to possess relevant experiences, and the membership of farmers' organizations is also the building block for building technical efficiency. The technical efficiency factors cannot be shaped by farmers alone, the economic factors of the region are dominating their technical efficiency. They must have access to market as well as to credit.

Information gathered from this study will help smallholder maize farmers to utilize resources and support efficiently. Policy makers and private sectors would use this information in amending policies dedicated to improve efficiency, embrace profitable systems and approaches that promote efficient marketing aimed at realizing better prices and returns. This study focuses on effect of economic factors, on technical efficiency of maize farmers, and the effect of technical efficiency on their profitability in Nyaung Shwe Township.

## **1.2 Objectives of the Study**

The objectives of the study are:

- (a) To analyze the effect of economic factors on technical efficiency of maize Farmers in Nyaung Shwe Township
- (b) To analyze the effect of technical efficiency on profitability of maize farmers in Nyaung Shwe Township.

## **1.3 Scope and Method of the Study**

This study focuses only on farmers who owned minimum 10 acres land and cultivating maize in Nyaung Shwe Township. There are 200 farmers who owned more than 10 acres of maize cultivation per each.

In this study, simple random sampling method is applied to select 83 out of 200 maize farmers. Sample size is calculated with Raosoft sample size calculator. Personal interview method is applied to collect primary data from 83 selected farmers. The structured questionnaire is developed for data collection. Both descriptive statistics and regression methods are used for data analysis. The secondary data are collected from United States Department of Agriculture reports, International Food Policy Research Institute Website, Myanmar Corn Trader Association Reports, Myanmar Corn Industrial Association Reports, local microfinance companies and fertilizer companies, previous papers and relevant text books. Data collection period was during February, 2024.

## **1.4 Organization of the Study**

This thesis consists of five chapters. The chapter (1) is introduction chapter including the rationale of the study, objectives of the study, scope and method of the study and organization of the study. Chapter (2) is theoretical chapter explaining the concept and theories relating to economic factors, technical efficiency and profitability, empirical studies and conceptual framework. Chapter (3) is about general overview on technical efficiency of maize farming farmers in Nyaung Shwe township. Chapter (4) is analysis of economic factors, technical efficiency and profitability of maize farmers in Nyaung Shwe township. Chapter (5) is conclusion chapter stating the general findings and discussions, suggestions and recommendation, and needs for further research.



## **CHAPTER 2**

### **THEORETICAL BACKGROUND**

This chapter presents the concepts of economic factors, technical efficiency and business performance accompanying the conceptual influence of economic factors affecting businesses. Then, the empirical studies on two previous researches are presented. The first research explains relationships of socio-economic factors, technical efficiency and profitability are explained. Second research is about relationship between technical efficiency and financial performance (profitability). Finally, the conceptual framework of the study is developed.

#### **2.1 Business Environment**

To fully understand the complex context of maize farming operates, a detailed examination of the outside influences on the business environment is necessary. The PEST analysis framework, which looks at the political, economic, social, and technological aspects of the external environment, is one that is frequently used for this kind of analysis.

##### **2.1.1 Political-Legal Environment**

The legal-political dimension includes government regulations at the local, state, and federal levels, as well as political activities designed to influence company behavior. The political-legal environment encompasses the regulatory framework, government policies, and legal institutions that govern business operations within a given jurisdiction. Political stability, government transparency, and the rule of law are essential determinants of investor confidence and business continuity (North, 1990). Understanding the political-legal environment is crucial for navigating legal complexities, managing regulatory risks, and ensuring compliance with statutory requirements, thereby fostering a conducive business environment for sustainable growth and development.

### **2.1.2 Economic Environment**

The economic dimension represents the general economic health of the country or region in which the organization operates. Consumer purchasing power, the unemployment rate, and interest rates are part of an organization's economic environment. Because organizations today are operating in a complex environment, the economic dimension has become exceedingly complex and creates enormous uncertainty. The economic environment encompasses macroeconomic factors, market conditions, and economic policies that influence business activities, consumer behavior, and industry performance (Mankiw, 2019).

Economic indicators such as Gross Domestic Product (GDP) growth, inflation rates, and unemployment levels provide insights into the overall health and stability of the economy, shaping business investment decisions and market strategies (Blanchard et al., 2019). Moreover, fiscal policies, monetary policies, and trade agreements affect resource allocation, market competition, and business profitability (Dornbusch et al., 2018). Analyzing the economic environment enables businesses to anticipate market trends, identify growth opportunities, and mitigate risks, thereby enhancing their competitiveness and resilience in dynamic economic landscapes. Smith (1759) stated concept of the invisible hand and Keynes (1992) theorized on aggregate demand and fiscal policy offer valuable frameworks for analyzing macroeconomic trends and their impact on business cycles.

As defined by Salvatore (2018), it encompasses elements such as economic policies, fiscal and monetary measures, market conditions, technological advancements, and international trade dynamics. This environment influences the decisions of businesses, consumers, and policymakers, shaping economic outcomes and opportunities within a given society. Understanding the economic environment is crucial for individuals and organizations to navigate effectively within the economy and to anticipate and adapt to changes in economic conditions.

### **2.1.3 Socio-Cultural (Social) Environment**

The sociocultural dimension of the general environment represents the demographic characteristics, norms, customs, and values of the general population. Important socio-cultural characteristics are geographical distribution and population

density, age, and education levels. Today's demographic profiles are the foundation of tomorrow's workforce and consumers. By understanding these profiles and addressing them in the organization's business plans, managers prepare their organizations for long-term success. The socio-cultural environment comprises societal values, cultural norms, and demographic trends that influence consumer preferences, market demand, and organizational behavior (Hofstede, 1980). Social factors such as population demographics, lifestyle changes, and cultural diversity shape market dynamics, product differentiation, and brand positioning strategies (Kotler et al., 2021). Moreover, consumer attitudes, social norms, and ethical considerations influence purchasing decisions, brand loyalty, and corporate reputation (Solomon et al., 2019). Understanding the socio-cultural environment enables businesses to tailor their marketing strategies, product offerings, and corporate social responsibility initiatives to align with societal expectations and market needs, thereby fostering consumer engagement and brand loyalty.

#### **2.1.4 Technological Environment**

The technological dimension of the general environment includes scientific and technological advancements in a specific industry, as well as in society at large. Advances in technology drive competition and help innovative companies gain market share. The technological environment encompasses technological advancements, innovation trends, and digital disruption that impact business operations, industry structures, and market dynamics (Schumpeter, 1939).

Rapid advancements in information technology, artificial intelligence, and digitalization have transformed business models, supply chain management, and customer engagement strategies (Westerman et al., 2014). Moreover, emerging technologies such as blockchain, Internet of Things (IoT), and data analytics offer opportunities for efficiency gains, product innovation, and market expansion (Brynjolfsson & McAfee, 2017).

Adapting to the technological environment requires businesses to embrace digital transformation, invest in technology infrastructure, and cultivate a culture of innovation and agility, thereby enhancing their competitiveness and future readiness in an increasingly digitalized economy.

## **2.2 Economic Factors**

Economic factors are fundamental drivers that shape the functioning and outcomes of economies worldwide. Among the factors, market access and credit access are two important economic factors that truly influence the opportunities and outcomes for individuals, businesses, and economies. Along with other elements such as regulatory frameworks and infrastructure, maintain significant influence on economic activities, market behavior, and overall prosperity. As noted by Krugman and Wells (2015), understanding the intricate interactions between market access, credit access, and other economic factors is essential for policymakers, businesses, and individuals to navigate the economic landscape effectively and foster sustainable economic growth and stability.

### **(a) Market Access**

Market access, a fundamental concept in economics, refers to the ability of businesses to enter, operate within, and compete effectively in a specific market (Jensen, 2006). This concept has garnered significant attention in economic literature, with various theories and definitions highlighting its importance in understanding and participating in domestic economies (Badinger & Nitsch, 2009). One such prominent theory is the market access theory, which emphasizes the necessity of reducing barriers to entry for businesses seeking access to a market (Head & Mayer, 2014). These barriers may include regulatory hurdles, high tariffs, limited infrastructure, or informational asymmetries (Fernandes & Paunov, 2015). Market access enables businesses to reach customers, distribute goods and services, and engage in economic activities efficiently (Clarke, 2013). From a definitional perspective, market access encompasses not only the physical ability to enter a market but also the legal, regulatory, and institutional frameworks that facilitate or hinder business operations (Cernat & Laird, 2002). Facilitating easy market access fosters competition, which, in turn, can drive efficiency and innovation, benefiting consumers through greater choice, lower prices, and improved quality (Melitz, 2003).

### **(b) Market Access**

Credit access, an essential aspect of financial inclusion, refers to the ability of individuals, businesses, and governments to obtain financial resources, such as loans or credit lines, from domestic financial institutions (Beck & Demirgüç-Kunt, 2006). Several

economic theories underscore the significance of credit access in driving economic growth and development. For instance, the Keynesian perspective highlights the role of credit in stimulating aggregate demand and economic expansion through increased consumption and investment spending (Keynes, 1936). Similarly, the financial intermediation theory emphasizes the pivotal role of banks and other financial institutions in intermediating between savers and borrowers, thereby facilitating credit access and resource allocation (Diamond & Dybvig, 1983). In the domestic market context, efficient financial intermediation contributes to economic development by mobilizing savings and directing them towards productive investments (Levine, 2005). Credit access enables households to finance durable goods purchases, businesses to fund capital investments and expansion projects, and governments to finance public infrastructure and social programs (Beck et al., 2007). Moreover, it promotes financial inclusion by providing individuals and businesses, particularly those in underserved segments of the population, with opportunities to participate more fully in the economy (Demirgüç-Kunt & Klapper, 2012).

### **2.3 Concept of Efficiency**

Efficiency in business refers to the ability to achieve maximum output with minimum input, thereby optimizing resource utilization and enhancing productivity (Drucker, 1964). One prominent concept in efficiency management is Lean Management, which focuses on eliminating waste, streamlining processes, and continuously improving operational efficiency (Womack et al., 1990). Additionally, Total Quality Management (TQM) emphasizes the importance of quality improvement initiatives, employee involvement, and customer satisfaction to enhance overall efficiency and effectiveness (Deming, 1986). Efficiency aims at using the minimum resources to produce the best results, it has far-reaching impact on various fields where resources are scarce or even non-existent. Efficiency means economic development: development is an increase in an economy's ability to produce goods and services.

Schumpeter (1912) discussed efficiency as a critical factor in economic growth, highlighting the importance of innovation and entrepreneurship in enhancing productive efficiency. Moreover, in the field of operations management, authors such as Kaplan and

Norton (1996) emphasized the significance of efficiency metrics in assessing organizational performance and competitiveness.

Efficiency can be used as a measure of success in the business world. For example, the introduction of methods such as lean manufacturing in the production process, which emphasizes the reduction of waste from defective products. Therefore, it directly translates to a higher production rate and thus a reduction of unit cost and hence cheaper products. Industrialization depends on how industrial managers are able to align industrial resources in such a way as to minimize waste and realize profits.

## **2.4 Technical Efficiency**

Technical efficiency in business operations pertains to the effectiveness of utilizing technology, equipment, and resources to achieve production goals and maximize output (Porter, 1985). Operations management theories such as Operations Research and Production Management offer methodologies and techniques for optimizing production processes, resource allocation, and capacity utilization to enhance technical efficiency (Schroeder et al., 2010). Moreover, concepts like Six Sigma provide frameworks for reducing defects, minimizing variability, and enhancing process reliability to improve technical efficiency and performance (Pyzdek et al., 2014).

Technical efficiency is fundamental principle in economics and management, representing the ability of firms or organizations to achieve maximum output with given inputs or to produce a specific output with minimum inputs. Smith (2018) investigated the determinants of technical efficiency in smallholder farms, highlighting the role of technology adoption and human capital in enhancing agricultural productivity. Factors such as extensions services, farmers' experience and farmers organizational membership can be influencing technical efficiency in agriculture.

### **(a) Extension Services**

Extension services, also called rural advisory services, refer to the different activities which provide the information, guidance and services that farmers and other rural actors need to develop their knowledge, skills and practices and improve their livelihoods (GFRAS 2012). Extension services play a critical role in agricultural development for food and nutrition security and for improving productivity and livelihoods (FAO 2014). Extension services are service employed in the diffusion of new

innovations to people who live in the remote areas of a community. They have limited access to their information needs in the areas of agriculture, building, trade, healthcare, domestic work and other areas of human activities (Mai-Lafia & Goshit, 2016). The purpose of extension services is to bridge the gaps in communication between producers of all types and researchers with an interest in relevant areas. The bridges that are in place have a main goal of having the industry as a whole operating at optimal performance. For the most part, the communication networks that are in place are sufficient; however, like many things, there are shortcomings associated with different aspects of these networks, such as industry support for university efforts, resource availability and sharing between universities and industry, the prioritization within the extension service, bio-security concerns, and costs associated or recovery with providing services (Pohl et al., 2010)

**(b) Farmers' Experience**

Farmers' experience encompasses the practical knowledge and skills that farmers acquire through continuous involvement in agricultural activities. This experience includes a wide range of competencies such as crop management, livestock care, and the application of innovative farming techniques. According to research, farmers' experience plays a critical role in their ability to make informed decisions, improve productivity, and adapt to changing environmental conditions (Agriculture & Food Security, 2019). Additionally, experience in farming is often linked to higher levels of technical efficiency, as experienced farmers tend to utilize resources more effectively and adopt improved agricultural practices (PLOS Sustainability and Transformation, 2023). These competencies and the ability to innovate are essential for sustaining agricultural productivity and ensuring food security in the face of climate change and other challenges.

### **(c) Farmers Organizational Membership**

Farmers' organizations refer to independent, non-governmental, membership-based rural organizations of part or fulltime self-employed smallholders and family farmers, pastoralists, artisanal fishers, landless people, women, small entrepreneurs and indigenous peoples. They range from formal groups covered by national legislation, such as cooperatives and national farmers unions, to looser self-help groupings and associations (FAO, 2007). These organizations provide a platform for farmers to pool resources, share knowledge, access markets, and engage in collective bargaining. According to research, membership in these organizations can significantly improve farmers' access to inputs like seeds, fertilizers, and credit, and enhance their market reach and negotiating power, thereby increasing their overall productivity and profitability (Ahmed & Mesfin, 2017).

### **2.5 Profitability**

Business performance encompasses various metrics and indicators that assess the success and effectiveness of organizational activities in achieving strategic objectives and delivering value to stakeholders (Kaplan & Norton, 1996). Key performance indicators (KPIs) such as profitability, market share, customer satisfaction, and return on investment (ROI) are commonly used to measure business performance and evaluate organizational effectiveness (Neely et al., 2005). Mwangi (2020) mentioned that the profitability of farming should be measured with gross margin and net profit. The profitability of farming is commonly assessed using both gross margin and net profit measures. By utilizing both gross margin and net profit measures, farmers can gain a holistic understanding of their financial performance, enabling them to make informed decisions regarding resource allocation, production strategies, and investment opportunities in agriculture.



**(a) Gross Margin**

Gross margin, as a measure of profitability has been associated with an enterprise and for a single product (Djokoto & Zigah, 2021). Gross margin represents the difference between total revenue generated from agricultural activities and the variable costs associated with production, such as seeds, fertilizers, and labor (Dastgir et al., 2017). This metric provides insight into the efficiency of production and helps farmers evaluate the profitability of individual crops or livestock enterprises. Moreover, understanding gross margin is crucial for making informed decisions about resource allocation and cost management.

According to Ali and Erenstein (2017), gross margin analysis allows farmers to identify which agricultural activities are most profitable and which ones require improvements. This is particularly important in optimizing the use of limited resources and enhancing overall farm profitability. By focusing on gross margin, farmers can better manage their financial performance and plan for sustainable growth. Additionally, the ability to calculate and interpret gross margin is essential for farmers when seeking financial support or investment. Financial institutions and investors often consider gross margin as an indicator of a farm's economic viability and risk level. Therefore, maintaining a healthy gross margin can improve a farmer's access to credit and investment opportunities (Huffman & Evenson, 2006). This highlights the importance of gross margin as not only a measure of profitability but also a critical factor in financial planning and stability in agriculture.

**(b) Net Profit**

Net profit provides a more comprehensive assessment of farm profitability by accounting for all expenses and income streams. As outlined by Mishra et al. (2018), takes into account all costs incurred in agricultural operations, including fixed costs such as machinery depreciation and land rental expenses, in addition to variable costs. This comprehensive measure helps farmers understand the true financial health of their operations by considering both the revenue generated and the full spectrum of expenses involved. Additionally, net profit is a critical metric for assessing the financial viability of different farming practices and innovations.

Net profit also takes important part in securing financing and investment. Financial institutions and investors often consider net profit as a key indicator of a farm's financial stability and potential for growth. A positive net profit margin can improve a farmer's creditworthiness and access to financial resources, which are essential for scaling operations and achieving long-term success (Barry & Ellinger, 2012). By analyzing net profit, farmers can better understand the return on investment for such initiatives and make decisions that enhance both their profitability and environmental sustainability (Chavas et al., 2010).

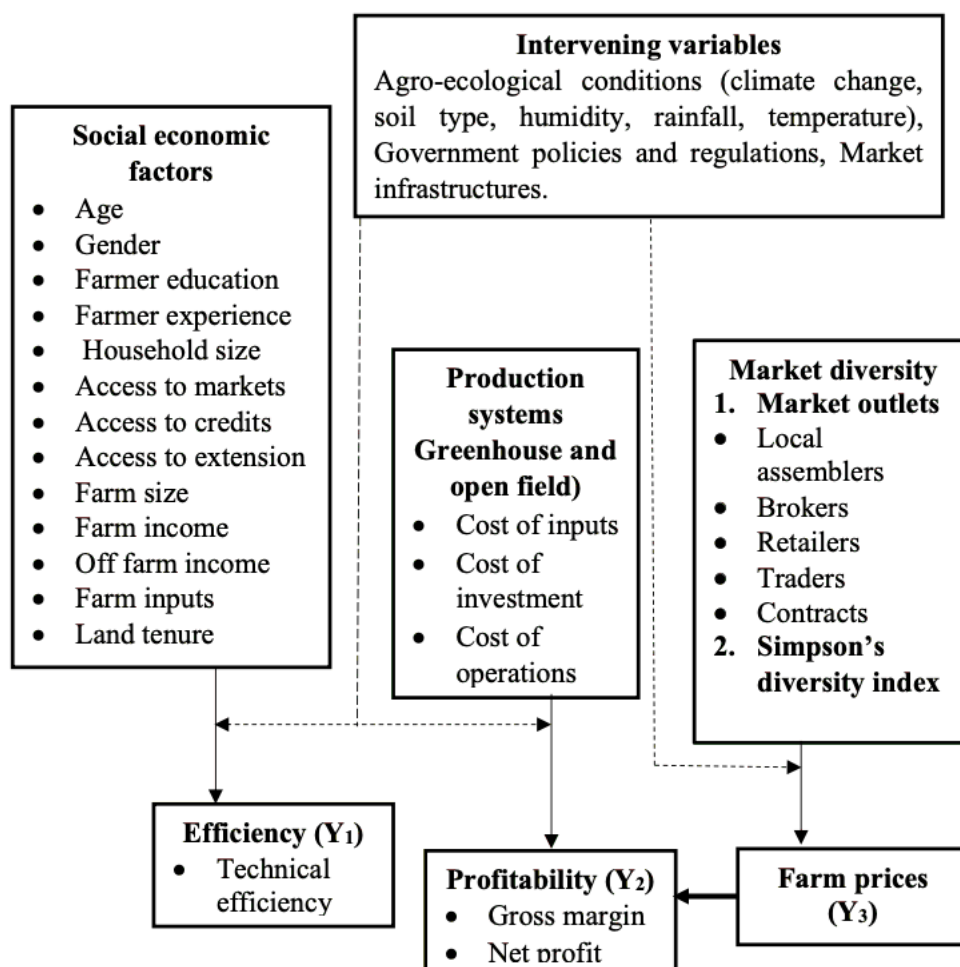
## **2.6 Empirical Studies**

According to Asefa (2012), in terms of measuring technical efficiency, there are several empirical studies and researches (for example: Hassen 2016; Shumet 2011; Musa et al. 2014; Berhan 2015; Getachew & Bamlak 2014).

Similarly, Jones et al. (2020) examined technical efficiency in healthcare delivery, identifying best practices and inefficiencies through data envelopment analysis (DEA) and offering insights for performance improvement strategies. Additionally, Brown and Johnson (2019) conducted a comparative study of technical efficiency in banking, employing stochastic frontier analysis (SFA) to assess efficiency levels among different banks and identifying factors influencing efficiency disparities.

Mwangi (2020) presented the relationships of socio-economic factors, technical efficiency and profitability as shown in Figure (2.1).

**Figure (2.1) Social-Economic Factors, Technical Efficiency and Profitability**



Source: Mwangi (2020)

This study observed that socio-economic factors, especially access to credits and access to markets are important reasons for tomatoes farmers to be able to adapt technical efficiency. The study was carried out in Kirinyaga County where tomato farming was among the major agricultural businesses. The County has been involved in initiatives conducted to promote tomato production in Kenya. The main variables in that study were socioeconomic features among respondents, technical efficiency, profitability of production systems, market diversity among farmers and farm prices. Structured questionnaires were used as tools for data collection and administered to a sample of 384 smallholder tomato households. The sample was selected through multi stage stratified and probability proportionate to size sampling techniques. Moreover, quantitative and qualitative data were collected while descriptive statistics (means, percentages,

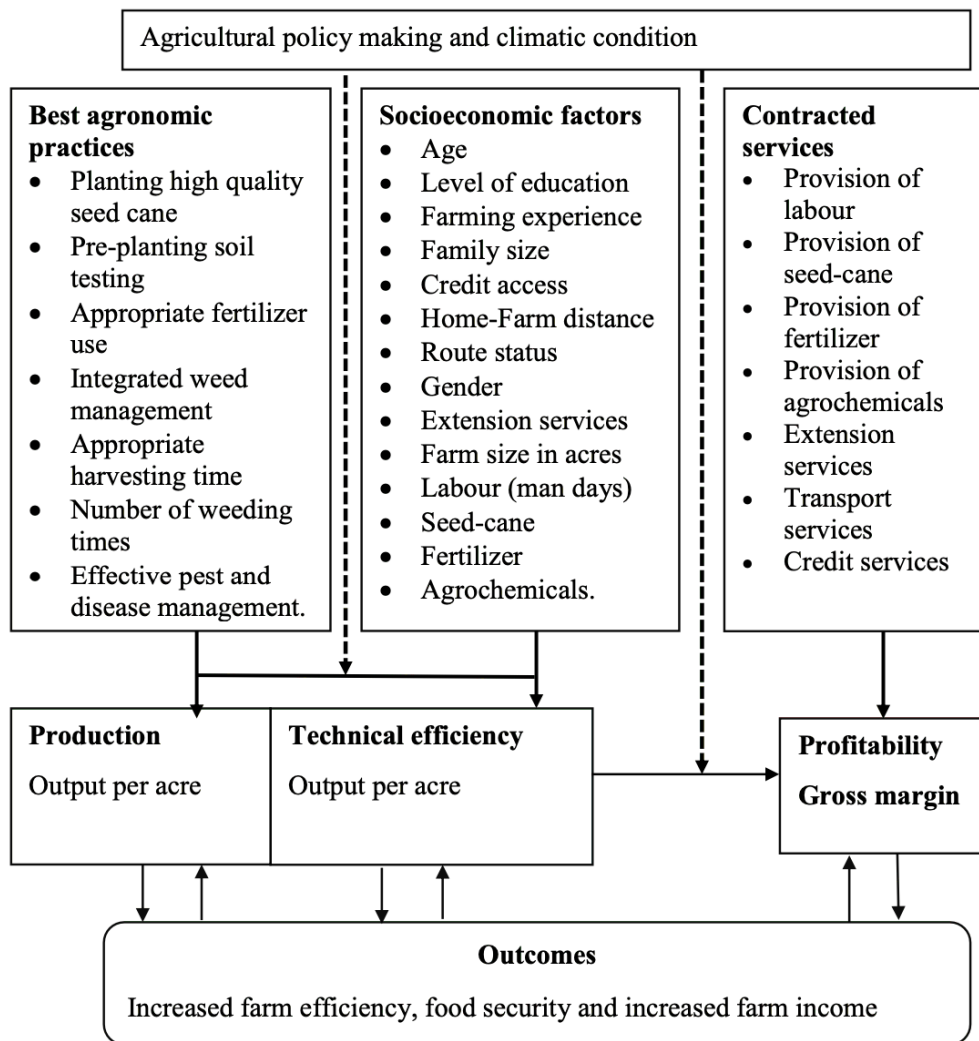
frequencies) and econometric models were used in data analysis. The author of the study relied on primary data from smallholder tomato farmers and focused on a twelve (12) month production period.

The study found that average technical efficiency of 39.55% among respondents, with greenhouse farmers demonstrating higher technical efficiency compared to open field farmers. This highlighted the potential for improving technical efficiency of 60.45% through better resource utilization and technology adoption. Household size, production systems, seed type, fertilizer usage, and land size are also influencing on technical efficiency of farmers.

Lekololi (2020) also presented the relationships between technical efficiency and profitability as shown in Figure (2.2).

The paper by Lekololi (2020) presented a comprehensive investigation into the factors influencing sugarcane production performance in Malava Sub-County, Kenya. The study addressed the critical issue of low productivity in the sugarcane subsector despite significant efforts by the Kenyan government and other stakeholders to boost production. Through a combination of primary data collection and statistical analysis, the authors examined the effects of agronomic practices, socioeconomic factors, and factory contracted services on sugarcane production efficiency and profitability among smallholder farmers.

**Figure 2.2 Technical Efficiency and Profitability**



Source: Lekololi (2020)

This study focused on the relationships of technical efficiency and profitability of sugarcane production among smallholders in Kenya. This research covered Malava sub-county in Kakamega County focusing on smallholder sugarcane farmers. According to author, the target population for this study was 51,083 households. Sampling of the units was conducted in every ward of the Malava Constituency targeting smallholder sugarcane farmers.

The sample size for this study was 384 respondents who were smallholder sugarcane farmers in sub-county area. This study used structured questionnaire to collect primary data from respondents on sugarcane production. Trained enumerators were employed to facilitate the process of data collection under the supervision of the researcher. The study applied descriptive statistics including mean, percentage and

standard deviation to summarize socioeconomic factors of smallholder sugarcane production. Quantitative analysis was then carried out for each objective using econometric models including Cobb- Douglas production model, stochastic model, tobit regression analysis, profit model and linear multiple regression. Detailed information from the selected farm households were collected on demographic and socio-economic factors, farm characteristics, input use, production, institutional, contract farming, agronomic practices, revenues and policy related variables. The author justified that the study contributes significantly in the 5 development of sugarcane subsector by providing key information on best agronomic practices, the efficient resource utilization and effect of farmers' technical efficiency on profitability. The author intended that the information generated from the study is useful to both farmers and policy makers.

Furthermore, the study assessed the technical efficiency of sugarcane farmers and identifies key determinants influencing efficiency levels. Factors such as education, farming experience, family size, credit access, and extension services were found to positively contribute to technical efficiency, while age of the farmer, farm distance from home, and contract engagement had negative impacts. Additionally, the paper highlighted significant differences in profitability between contracted and non-contracted farmers, suggesting the need for a review of existing contract engagement policies in the sugarcane subsector.

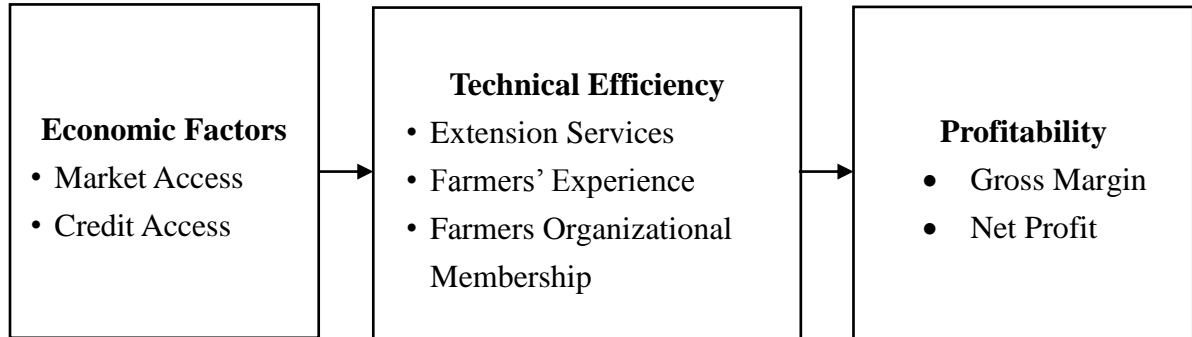
The findings offered practical insights for policymakers, extension services, and other stakeholders to enhance productivity, profitability, and sustainability in the sugarcane subsector. The study recommended for increasing awareness of soil testing, improving access to extension services and credit, and revisiting contract engagement policies are particularly relevant for improving the livelihoods of sugarcane farmers and promoting economic development in rural areas.

## **2.7 Conceptual Framework of the Study**

The conceptual framework of the study is presented in Figure (2.3). This paper aims to study the effect of economic factors on technical efficiency and its effect on profitability of maize farmers in Nyaung Shwe Township. The first main variable is economic factors which has two components, market access and credit access. The second variable is technical efficiency which has extension services, farmers' experience,

farmers organizational membership. The final part is about profitability which has gross margin and net profit.

**Figure (2.3) Conceptual Framework of the Study**



Source: Own compilation based on previous studies (2024)

This study area covers only the connections between economic factors, technical efficiency, and profitability in the context of Nyaung Shwe Township's maize farming. The operational dynamics and financial performance of maize farming operations are influenced by important economic factors, such as market access and credit access among various factors mentioned by previous researchers. It is predicted that these factors will have a major effect on the dependent variable, technical efficiency. The first dependent variable, technical efficiency, is operationalized through farmers' experience, membership in farmers' organizations, and extension services.

Farmers' experience and organizational membership may reflect the acquired knowledge, skills, and social capital within farming communities, while extension services act as a means for providing farmers with access to best practices, agricultural technology, and information. The second dependent variable, profitability, is measured by gross margin and net profit, which capture the financial returns and operational outcomes of maize farming activities. As the second part, technical efficiency is independent variable and profitability is dependent variable as farmers who are equipped with enhanced technical skills and resources may be better positioned to capitalize on market opportunities, optimize resource utilization, and maximize their financial returns.

By examining these interrelated constructs, the conceptual framework provides a comprehensive lens for understanding the complex interactions between economic factors, technical efficiency, and profitability in maize farming, thereby informing policy

interventions, agricultural development strategies, and rural livelihood improvement initiatives in Nyaung Shwe Township.



## **CHAPTER 3**

### **BACKGROUND HISTORY AND TECHNICAL EFFICIENCY OF MAIZE FARMERS AT NYANG SHWE TOWNSHIP, SHAN STATE, MYANMAR**

This chapter is composed of two parts. The first part is about background history of maize farmers in Nyaung Shwe Township, Shan State, Myanmar. The second part is about maize farmers' technical efficiency, describing the extension services, their involvement in farmers' organizational membership and their experiences.

#### **3.1 Background History of Maize Farmers in Nyaung Shwe Township**

Maize, also known as corn, has been a staple crop in Myanmar for centuries, contributing significantly to the agricultural landscape and the socio-economic fabric of the country. Nyaung Shwe Township, located in the Shan State of Myanmar, has a rich history of maize cultivation, deeply intertwined with the region's agricultural heritage and cultural practices. The cultivation of maize in Nyaung Shwe Township can be traced back to ancient times when local communities relied on traditional agricultural methods to sustain themselves. Over generations, maize farming techniques evolved, incorporating innovations such as improved seed varieties, irrigation systems, and cultivation practices passed down through traditions.

During the colonial period, maize farming in Nyaung Shwe Township underwent significant transformations influenced by British colonial policies and market demands. The introduction of modern farming technologies, such as plows and mechanized equipment, revolutionized agricultural practices was leading to increased maize production and commercialization. Following Myanmar's independence in 1948, maize farming in Nyaung Shwe Township continued to play an important role in the region's economy, providing livelihood for countless farming families. However, due to the new environmental trend, sector faced challenges, including fluctuating market prices, limited access to credit, and inadequate infrastructure, hindering the growth and sustainability of maize farming enterprises.

In recent decades, with the introduction of globalization and agricultural modernization initiatives, maize farming in Nyaung Shwe Township has witnessed both opportunities and challenges. Increased access to markets, technological innovations, and government support programs have bolstered maize production and productivity levels, enabling farmers to improve their livelihoods and contribute to food security. However, concerns have also emerged regarding the environmental impact of intensive maize cultivation, such as soil erosion, deforestation, and water pollution. Additionally, socio-economic issues, including difficult access to market and credit, and income inequality, pose significant challenges to the long-term sustainability of maize farming in Nyaung Shwe Township.

Despite these challenges, maize farming remains an integral part of the agricultural landscape in Nyaung Shwe Township, serving as a source of livelihood, food security, and cultural identity for local communities. As Myanmar continues to undergo socio-economic and political transitions, the future of maize farming in Nyaung Shwe Township will depend on sustainable agricultural practices, inclusive policies, and community-based initiatives aimed at creating resilience and prosperity in the region, environmental support (easy to access to markets and credits), and farmers' technical efficiency.

### **3.2 Technical Efficiency of Maize Farmers in Nyaung Shwe Township**

The cultivation of maize in Nyaung Shwe Township encounters with a variety of technical difficulties that can seriously impair farmers' output and efficiency. These challenges include limited access to quality inputs, inadequate infrastructure encompassing irrigation systems, roads, and storage facilities, and a general lack of technical knowledge and skills among farmers. Crucially, extension services provided by government agencies and non-governmental organizations have played a pivotal role in disseminating knowledge, offering training programs, and connecting farmers with resources. Farmer organizational membership, including participation in cooperatives and community-based organizations, has facilitated collective action, knowledge sharing, and access to market information. Farmers' experiences highlight the significance of collaborative initiatives, where sharing best practices and learning from peers have enhanced technical skills and adoption of improved agricultural technologies. To explore

the technical efficiency of maize farmers in Nyaung Shwe Township, the qualitative approach is followed by in-depth interviews with five selected farmers.

### **3.2.1 Extension Services**

Extension services for maize farmers in Nyaung Shwe Township shows its importance in spreading agricultural knowledge, providing technical assistance, and facilitating access to resources and support networks. However, the situation of extension services in the region presents both opportunities and challenges. On one hand, government agencies and non-governmental organizations (NGOs) actively engage in extension activities, offering training programs, workshops, and demonstration plots to educate farmers on best agricultural practices, including seed selection, soil management, pest control, and post-harvest handling. These extension services aim to enhance farmers' technical skills, increase crop yields, and improve overall farm productivity. Moreover, extension workers working at government and NGOs for providing education and training to farmers often serve as intermediaries between farmers and relevant stakeholders, connecting them with market opportunities, input suppliers, and financial institutions.

On the other hand, the effectiveness of extension services in Nyaung Shwe Township is constrained by various factors. Limited funding and resources allocated to extension programs can restrict the scope and reach of services, particularly in remote and underserved areas. Moreover, the lack of trained extension personnel and infrastructure challenges, such as poor road networks and communication facilities, can impede the delivery of timely and relevant information and education to farmers. Additionally, language barriers and cultural differences between extension workers and local communities may hinder effective communication and engagement.

Despite these challenges, efforts are underway to strengthen extension services and make them more responsive to the needs of maize farmers in Nyaung Shwe Township. Collaborative initiatives involving government agencies, NGOs, farmer organizations, and community leaders are being implemented to improve the accessibility, quality, and relevance of extension services. These efforts include the development of context-specific training modules, the recruitment and training of local extension workers, and the establishment of farmer-led extension models that promote peer-to-peer learning

and knowledge exchange. By addressing the existing gaps and building on existing strengths, extension services have the potential to significantly contribute to the sustainable development of maize farming communities in Nyaung Shwe Township.

### **3.2.2 Farmers' Experiences**

The experiences of maize farmers in Nyaung Shwe Township provide valuable insights into the challenges and opportunities associated with achieving technical efficiency in agricultural practices. Farmers' experiences are shaped by a combination of factors, including access to resources, adoption of technologies, environmental conditions, and socio-economic context. Through qualitative research methods such as in-depth interviews, farmers share their perspectives on the effectiveness of various farming techniques, input use, and management practices in optimizing maize production.

Farmers' experiences often highlight the importance of access to quality inputs, including seeds, fertilizers, and pesticides, in enhancing crop yields and productivity. Limited access to inputs, either due to financial constraints or supply chain challenges, can interfere with farmers' ability to achieve desired outcomes. Moreover, farmers' experiences reflect the significance of adopting appropriate agricultural technologies and practices tailored to local conditions. Innovations such as improved seed varieties, mechanization, and conservation agriculture techniques can contribute to improved technical efficiency by minimizing resource use, reducing production costs, and mitigating environmental impacts.

The experiences of farmers also highlight obstacles and limitations that could prevent maize growing from being technically efficient. Among these difficulties include poor infrastructure, such as storage facilities and irrigation systems, which can make it more difficult for farmers to store excess product and manage water resources effectively. Furthermore, environmental issues that require adaptive tactics and resilience-building measures, such as soil degradation, pest and disease pressure, and climate variability, present continuous difficulties to maize producers.

Despite these challenges, farmers' experiences underscore the resilience and innovation exhibited by maize farmers in Nyaung Shwe Township. Farmers demonstrate a willingness to experiment with new technologies, adapt to changing conditions, and collaborate with peers and extension workers to improve their technical skills and farming

practices. By sharing their experiences and learning from each other, maize farmers contribute to a collective knowledge base that informs strategies for enhancing technical efficiency and sustainability in agricultural production.

### **3.2.3 Farmers Organizational Membership**

In Nyaung Shwe Township, farmer organization participation is essential to the agricultural environment because it gives maize farmers access to resources, chances for group action, and information exchange. Cooperatives, producer groups, and community-based organizations are just a few of the farmer organizations in the area that provide an opportunity for farmers to connect, work together, and tackle shared issues. These groups frequently engage in a variety of initiatives geared toward enhancing the socioeconomic well-being of their members, such as cooperative produce marketing, group purchases of inputs, and group negotiations with input suppliers and purchasers.

The situation of farmer organizational membership in Nyaung Shwe Township reflects a diverse and dynamic landscape. While some maize farmers actively participate in formal farmer organizations, others may engage informally through social networks and informal associations. The level of participation and engagement in farmer organizations can be influenced by various factors, including geographical proximity, socio-economic status, and cultural norms. Moreover, the effectiveness of farmer organizations in addressing the needs and priorities of maize farmers depends on factors such as leadership capacity, institutional governance, and external support.

Given the significant potential benefits of farmer organizational membership, challenges exist that may hinder its effectiveness and sustainability. These challenges include limited financial and human resources, weak institutional capacity, and inadequate infrastructure. Additionally, the presence of competing interests and power dynamics within farmer organizations can sometimes lead to conflicts and tensions among members. Furthermore, external factors such as changes in market conditions, government policies, and environmental factors may also impact the functioning of farmer organizations.

Efforts are underway to strengthen farmer organizational membership and enhance its contribution to the well-being of maize farmers in Nyaung Shwe Township. Collaborative initiatives involving government agencies, non-governmental organizations

(NGOs), and other stakeholders aim to provide capacity-building support, technical assistance, and networking opportunities to farmer organizations. By addressing the existing challenges and building on the strengths of farmer organizational membership, maize farmers in Nyaung Shwe Township can harness the collective power of collective action to improve their livelihoods and build more resilient agricultural communities.

### **3.3 Farming Characteristics of Maize Farmers**

In this study, the primary data regarding maize growing experience, total farm-size, maize production, access to extension services, membership in farmers' organization, credit access and income sources. Table (3.1) shows these characteristics in general.

**Table (3.1) Farming Characteristics of Maize Farmers**

<b>Sr. No.</b>	<b>Particular</b>	<b>Number</b>	<b>Percentage</b>
1	<b>Maize Growing Experience (Year)</b>		
	5-10	23	28
	11-15	54	65
	16-20	1	1
	Above 20	5	6
2	<b>Total Farm Size for Growing Maize</b>		
	Small Scale (10-30 acres)	28	34
	Medium Scale (31-60 acres)	40	48
	Large Scale (above 61 acres)	15	18
3	<b>Total Quantity of Maize Production in a Year</b>		
	small production (below 5,000 visses)	3	3.6
	medium production (5,000- 10,000 visses)	44	53
	large production (over 10,000 visses)	36	43.4
4	<b>Access to Extension Services</b>		
	Regular Access	49	59
	Irregular Access	23	27.7
	No Access	11	13.3
5	<b>Membership in Farmers' Organization</b>		
	Member	46	55
	Non-Member	37	45
6	<b>Credit Access</b>		
	Formal Credit (Banks/Microfinance)	33	33
	Informal Credit (Moneylenders/Relatives)	25	25
	No Credit	25	25
7	<b>Income Sources</b>		
	Agriculture as Primary income	71	85
	Agriculture as Secondary income (Small businesses/livestock/daily labor)	12	15
	<b>Total</b>	<b>83</b>	<b>100.0</b>

Source: Survey Data, 2024

The farmers generally possess substantial farming experience, with the majority having between 11 and 15 years of experience (65%). Medium-scale farms, ranging from 31-60 acres, are the most common (48%), followed by small-scale farms (34%) and large-scale farms (18%). Regarding maize production, most farmers produce between 5,000 and 10,000 visses annually (53%), while a significant portion have large production levels exceeding 10,000 visses (43.4%).

Access to extension services varies, with a majority having regular access (59%), while 27.7% have irregular access, and 13.3% have no access. More than half of the farmers are members of a farmers' organization (55%), which suggests a significant level of organizational involvement. However, credit access presents a challenge, with credit sources being evenly distributed among formal credit (33%), informal credit (25%), and no credit access (25%). The primary source of income for the vast majority of farmers (85%) is agriculture, with a smaller proportion (15%) relying on secondary income sources such as small businesses, livestock, and daily labor.

This profile indicates that maize farmers in Nyaung Shwe Township are farming with a focus on medium-scale farming operations and a reliance on agriculture as their main income source. Despite substantial farming experience and significant production levels, issues such as access to credit and extension services remain critical areas for improvement.

### **3.4 Reliability Analysis**

In this study, the structured questionnaire is developed to collect the primary data. The questionnaire consists of five parts: profile of respondent, transaction-specific factors, relationship-dynamic factors, marketing channel choices and revenue of farmers. The question items are in Likert-type 5-point scale format. In this research, transaction-specific factor is analyzed with five questions for price, payment, transportation and channel offer. For relationship-dynamic factor is analyzed with five questions for trust, personal relationship and bargaining power.

To assess the marketing channel choices, the five question items are used for direct marketing channel and five questions items are used for indirect marketing channel. Regarding to analyze the revenue of farmer, respondents are asked to answer five questions. Table (3.2) shows that the reliability test results of all variables including



economic factor, technical efficiency and profitability of maize farmers in Nyaung Shwe Township.

**Table (3.2) Results of Cronbach's Alpha Value**

<b>Scale</b>	<b>No. of Items</b>	<b>Cronbach's Alpha</b>	<b>Reliability Level</b>
Market Access	5	0.920	Excellent
Credit Access	5	0.792	Acceptable
Extension Services	5	0.935	Excellent
Farmers' Experiences	5	0.719	Acceptable
Farmers Organizational Membership	5	0.785	Acceptable
Gross Margin	5	0.801	Good
Net Profit	5	0.873	Good

Source: Survey Data, 2024

The Cronbach's alpha values for all scales exceed 0.7, indicating excellent internal consistency and reliability within the scale. The scales used to measure credit access, farmers' experience and farmers organizational membership in the study have acceptable levels of internal consistency, the scales used to measure gross margin and net profit have a good level of internal consistency and while the scale used to measure market access and extension services have an excellent level of internal consistency.

## **CHAPTER 4**

### **ANANLYSIS ON EFFECT OF ECONOMIC FACTORS ON TECHNICAL EFFICIENCY AND PROFITABILITY OF MAIZE FARMERS IN NYAUNG SHWE TOWNSHIP**

This chapter firstly presents the demographic profile of respondents, research methodology, reliability analysis, maize farmers' perception on economic factors, technical efficiency and profitability, and findings from analysis on the effect of economic factors on technical efficiency, and the effect of technical efficiency on profitability of maize farmers in Nyaung Shwe Township, Shan State.

#### **4.1 Demographic Profile of Respondents**

In this study, the sampled 83 maize farmers who owned minimum 10 acres land and cultivating maize in Nyaung Shwe Township are surveyed. The demographic factors of respondents are shown in Table (4.1).

**Table (4.1) Demographic Profile of Respondents**

<b>Sr. No.</b>	<b>Particular</b>	<b>Number</b>	<b>Percentage</b>
1	<b>Gender</b>		
	Male	58	70
	Female	25	30
2	<b>Age (Years)</b>		
	36-40	1	1.2
	41-45	38	45.8
	46-50	40	48.2
	Above 50-	4	4.8
3	<b>Education (Level)</b>		
	No Formal Education	8	10
	Primary Education	33	40
	Secondary Education	29	35
	Higher Education	13	15
4	<b>Household Size (Members)</b>		
	1-3	2	2.5
	4-6	49	59
	7-9	32	38.5
	Above 9	0	0

Source: Survey Data, 2024

The demographic profile of maize farmers in Nyaung Shwe Township reveals several key insights. The majority of the farmers are male (70%), with females constituting 30% of the farming population. Most farmers fall within the middle age

range, specifically between 41 and 50 years old, with the largest group being 46-50 years (48.2%). In terms of education, a significant portion of the farmers have primary (40%) or secondary (35%) education, while a smaller percentage have higher education (15%) or no formal education (10%). Household sizes predominantly range from 4-6 members (59%), followed by 7-9 members (38.5%), with very few households having 1-3 members (2.5%).

In Nyaung Shwe Township, most of the maize farmers (owner of farming) are male between 46 to 50 age range. It seems that youths are less interesting in maize farming. Mostly are primary and secondary education levels, with 4 to 6 family members.

## **4.2 Research Methodology**

In this study, the structured questionnaire is developed to collect the primary data. The questionnaire consists of four parts: profile of respondent, economic factor, technical efficiency and profitability. The question items are in Likert-type 5-point scale format. In this research, economic factor is analyzed with five questions each for market access and credit access. Technical efficiency is analyzed with five questions extension services, farmers' experience and farmers organizational membership. To assess the profitability, the five question items are used for gross margin and five questions items are used for net profit of maize farmers. The interview survey is conducted to selected 83 maize farmers who owned minimum 10 acres of maize growing land in Nyaung Shwe Township. For data analysis, for descriptive analysis, Best's (1977) identification is based. According to Best (1977), the mean scale of 1.00 – 1.80 is for Strongly Disagree, 1.81 – 2.60 for Disagree, 2.61 – 3.40 for Neutral, 3.41 – 4.20 for Agree and 4.21 – 5.00 for Strongly Agree. For data analysis, the descriptive and regression analysis are applied. For regression analysis, data reliability is tested in advance.

## **4.3 Maize Farmers Perception on Economic Factors**

In this study, the economic factors are approached from two aspects: market access and credit access. The perception of maize farmers towards economic factor is analyzed with descriptive analysis by calculating the mean values for each question items of each variable (market access and credit access).

### (c) Market Access

In this study, referent power includes five items. According to 5-point Likert type scale with respect to market access, the result of mean values is shown in Table (4.2).

**Table (4.2) Market Access**

<b>Sr. No.</b>	<b>Description</b>	<b>Mean</b>	<b>Standard Deviation</b>
1	Easy access to markets where maize farmers can sell their maize outputs	3.96	.723
2	Reliable information about market prices and demand for maize farmers' maize outputs	3.72	.954
3	Available facilities of transportation infrastructure to ship maize farmers' output to market	3.64	.758
4	Proximity to urban centers or distribution hubs	3.96	.706
5	Receiving market information up to date	3.60	.764
	<b>Overall Mean</b>	<b>3.78</b>	

Source: Survey Data, 2024

The Table (4.2) shows that easy access to markets where maize farmers can sell their maize outputs and proximity to urban centers or distribution hubs positively affects their ability to reach potential buyers with a mean of 3.96 falls in the range of agree. This indicates that how easily maize farmers can transport and sell their maize outputs with physical ease. The lowest mean score is 3.6 which is in agree level means maize farmers agree that they received market information up to date and they can make decisions in timely situation. The overall mean score is 3.78, which falls into the range of agree indicating that majority of respondents agree with statements for market access. This means combination of factors such as have good and easy access, reliable and up to date information are helpful for the farmers to connect with the buyers.

In Nyaung Shwe Township, maize farmers have generally reported positive experiences with market access, which is crucial for selling their produce and achieving financial stability. The ease of accessing markets allows farmers to efficiently reach

buyers, reducing the time and costs associated with transportation. The availability of multiple market options provides farmers with the flexibility to choose where to sell their produce, potentially securing better prices and favorable terms. Access to markets also facilitates networking opportunities with buyers, traders, and other farmers, fostering long-term relationships and better contract terms. Overall, the favorable market access in Nyaung Shwe Township allows maize farmers to maximize their production potential, achieve fair pricing, and ensure financial sustainability, thereby improving their livelihoods and supporting the local agricultural economy.

**(d) Credit Access**

Credit access contains five items in this study. The result of mean values is shown in Table (4.3).

**Table (4.3) Credit Access**

<b>Sr. No.</b>	<b>Description</b>	<b>Mean</b>	<b>Standard Deviation</b>
1	The experience of accessing credits during last season	3.84	.757
2	Receiving the credits which are enough for maize farmers' maize production	3.84	.634
3	Access to credit has helped maize farmers invest in farming techniques and equipment	3.98	.563
4	Maize farmers experienced no difficulties in getting the credit	4.11	.989
5	Credit access has improved maize farmers ability to purchase inputs such as quality seeds and fertilizers	3.99	.595
	<b>Overall Mean</b>	<b>3.95</b>	

Source: Survey Data, 2024

According to the Table (4.3), the highest mean score is 4.11 which is in the range of agree level showing that maize farmers experienced no difficulties in getting the credit. The experience of accessing credits during last season and receiving the credits which are enough for maize farmers' maize production with a mean of 3.84 falls into agree level. This indicates that maize farmers agree with the fact that credits amount they received are

sufficient for the maize production needs. The overall mean score of 3.95, maize farmers generally have a favorable experience with accessing credit.

The data reflects a generally positive experience for maize farmers because Access to credit has enabled farmers to invest in better farming techniques, equipment and the investment is significant for increasing productivity and efficiency in maize farming. Improved techniques and equipment can lead to higher yields, better quality produce, and ultimately greater profitability for farmers. The credit access has also positively impacted farmers' ability to purchase high-quality inputs, such as seeds and fertilizers, and quality inputs are fundamental to achieving good crop outcomes, as they directly affect the growth and health of the maize crops. the data paints a picture of an effective credit system that supports maize farmers in several critical areas.

The generally high scores across all aspects suggest that credit access is an important role in enabling farmers to enhance their production capabilities, improve their farming practices, and secure the necessary resources for successful maize cultivation. This positive impact is essential for the sustainability and growth of maize farming, ultimately contributing to better livelihoods for the farmers and potentially increased food security in their communities.

#### **4.6 Technical Efficiency**

The perception on technical efficiency of maize farmers is analyzed with descriptive analysis by calculating the mean values of extension services, farmers' experience and farmers organizational membership. The descriptive analysis results for technical efficiency of extension services, farmers' experience and farmers organizational membership are shown.

##### **(a) Extension Services**

The perception on technical efficiency of maize farmers concerning with extension services on maize farmers in Nyaung Shwe Township contains five items. The result of mean values is described in Table (4.4).

**Table (4.4) Extension Services**

<b>Sr. No.</b>	<b>Description</b>	<b>Mean</b>	<b>Standard Deviation</b>
1	The extension services follow up from local government office for maize farmers	2.24	.790
2	The extension services follow up from private organization (e.g., Fertilizer Company) for maize farmers	3.63	.837
3	Receiving extension services in time by maize farmers	3.49	1.141
4	Maize farmers' satisfaction of the accessibility of extension services in their area	3.33	1.190
5	Extension services have helped increase maize farmers' knowledge and skills in managing harvesting and cultivation	3.43	.990
	<b>Overall Mean</b>	<b>3.22</b>	

Source: Survey Data, 2024

According to above Table (4.4), the highest mean score is 3.63 which falls into agree level indicating that the extension services follow up from private organization (e.g., Fertilizer Company) for maize farmers are helpful. The lowest mean score is 2.24 which is disagree level which means maize farmers tend to disagree that the extension services follow up provided by local government services are effective. The overall mean score is 3.22 which falls into neutral level which states that maize farmers express neutral sentiment towards extension services.

In Nyaung Shwe Township, maize farmers mostly collaborate with private companies to cultivate their farms for more convenient procedures. Private companies operating in the agricultural sector may have a profit incentive to ensure the success and satisfaction of their farmer clients. This could drive them to invest in comprehensive and customer-oriented extension programs that address the specific needs and challenges faced by maize farmers. Local government extension, on the other hand, may be ineffective for maize farmers due to several reasons. Firstly, there could be a lack of sufficient resources allocated to extension programs, resulting in limited outreach and support to farmers. This could lead to inadequate training sessions, demonstrations, and dissemination of relevant information on modern farming practices for maize cultivation.



**(b) Farmers' Experience**

The perception of technical efficiency pertaining to farmers' experience of maize farmers contains five items. The result of mean values is expressed in Table (4.5).

**Table (4.5) Farmers' Experience**

<b>Sr. No.</b>	<b>Description</b>	<b>Mean</b>	<b>Standard Deviation</b>
1	Maize farmers experienced the benefits from technical support and guidance in their farm operations' efficiency	3.33	.977
2	Less Challenges faced by farmers in adopting and integrating new farming technologies	3.01	1.018
3	Confidence of maize farmers in their ability to make decisions, regarding the technical aspects of their farm operations	3.75	.867
4	The technical training can support the maize farmers to the quality of their maize farming	3.78	.870
5	Likeness of maize farmers attending agricultural training workshops or seminars to learn about maize farming techniques	3.69	.923
	<b>Overall Mean</b>	<b>3.51</b>	

Source: Survey Data,2024

Based on the Table (4.5), the highest mean score is 3.78 which reflects a relatively high level of confidence about that the technical training can support the maize farmers to the quality of their maize farming and they feel fairly self-assured in managing the technical aspects of their farming activities. The lowest mean score 3.01 suggests that maize farmers neither agree nor disagree in adopting and integrating new farming technologies. While some challenges remain, they are not overwhelmingly difficult to overcome. The overall mean score of 3.51 indicates that, while there is a generally favorable view of the technical support provided, there is still potential for enhancing these services. Farmers benefit from technical guidance in improving farm operations.

Maize farmers in Nyaung Shwe Township express positive experiences with technical support and training, which are crucial for enhancing their farming practices and decision-making abilities. Farmers benefit from technical guidance in improving farm operations' efficiency, though there may be room for further improvement. Despite facing

some challenges in adopting new farming technologies, farmers exhibit confidence in their ability to make informed decisions regarding the technical aspects of their operations. They also believe that technical training significantly contributes to improving the quality of their maize farming. Furthermore, farmers demonstrate a favorable attitude towards attending agricultural training workshops or seminars, highlighting their proactive approach to skill development and continuous learning. These positive experiences underscore the importance of continued investment in education and skill development initiatives to support the growth and sustainability of maize farming in the region.

**(c) Farmers Organizational Membership**

The perception of technical efficiency concerning with farmers organizational membership of maize farmers contains five items. The result of mean values is expressed in Table (4.6).

**Table (4.6) Farmers Organizational Membership**

<b>Sr. No.</b>	<b>Description</b>	<b>Mean</b>	<b>Standard Deviation</b>
1	Belief of maize farmers being a member of farmer organization has positively impacted their farming practices and outcomes	3.70	.947
2	Satisfaction of maize farmers with the support and benefits they received as a member of their farmer organization	3.86	1.072
3	Being part of a farmer organization has improved maize farmers' capabilities to manage their maize farming businesses	3.77	.831
4	Attending meetings and discussions of farmer organization on farming practices and challenges	3.59	.842
5	Satisfaction of maize farmers with the technical assistance and guidance they received from their farmer organization	3.43	0.829
	<b>Overall Mean</b>	<b>3.67</b>	

Source: Survey Data,2024

According to above Table (4.6), the highest mean score is 3.86 concerning with satisfaction of maize farmers with the support and benefits they received as a member of their farmer organization. It means that maize farmers in Nyaung Shwe Township gained opportunities such as useful information, collective bargaining power, and shared resources and infrastructure by joining as a member of farmer organization. The lowest mean score is 3.43 which falls into agree level. It is because maize farmers in Nyaung Shwe Township are satisfied with the technical assistance and guidance they received from their farmer organization. Moreover, as a member of organization, maize farmers gained benefit as community and social benefits. It encourages knowledge sharing, mutual support, and cooperative problem-solving, which can improve social cohesion and overall well-being of farming community. The overall mean score for farmers organization membership is 3.67, showing agreed that maize farmers are satisfied being part of farmers organization helped them improved their farming business.

#### **4.7 Profitability**

The perception on profitability of maize farmers is approached from two aspects: gross margin and net profit. Both of gross margin and net profit are analyzed with descriptive analysis by calculating the mean values for each question items of each variable (gross margin and net profit).

##### **(a) Gross Margin**

Gross margin of maize farmers concerning with profitability of maize farmers in Nyaung Shwe Township contains five items. The result of mean values is described in Table (4.7).

**Table (4.7) Gross Margin**

<b>Sr. No.</b>	<b>Description</b>	<b>Mean</b>	<b>Standard Deviation</b>
1	Spending relatively low transportation charges to distribute the products of maize farmers	3.80	.880
2	Spending relatively low labor charges for distribution of the products of maize farmers	3.49	.889
3	Spending relatively low cost in value added process (From production to ready to sale) of maize farmers	3.71	1.006
4	Spending relatively low cost for post-production machinery usage of maize farmers	3.75	.778
5	Spending relatively low cost for supplies during post-production without reducing quality of the products of maize farmers	3.78	.682
	<b>Overall Mean</b>	<b>3.71</b>	

Source: Survey Data,2024

In the above Table (4.7), spending relatively low transportation charges to distribute the products of maize farmers with a mean value 3.80 which is a highest mean score in this table and falls into agree level. The majority of respondents agree that they spent less transportation charges to distribute their products which can help them to improve gross margin. The lowest mean value is 3.49 that also falls into range of agree which represents spending relatively low labor charges for distribution of the products of maize farmers. The overall mean score is 3.71, within in an agree level, shows maize farmers agree that reducing the cost of goods sold through their operation can increase the gross margin.

One of the main issues that farmers think about is transportation costs. Most of the respondents agreed that these costs are not too high. A mean score of 3.80 emphasizes this opinion, which highlights farmers' belief that effective transportation strategies have a major positive impact on their bottom line. Farmers that reduce these expenses hope to increase their gross margin since they will receive better prices for their produce. Likewise, labor costs represent an additional aspect of worry for the region's maize

growers. The mean score of 3.49 indicates that farmers view their expenses in this domain as reasonably reasonable, despite the need for labor in many phases of production and distribution. This viewpoint is consistent with their main goal of minimizing operating expenses to improve profitability. This combined knowledge highlights farmers' awareness of the need to reduce costs and streamline operations in order to strengthen their financial position in a market that is becoming more and more competitive.

**(b) Net Profit**

Net profit of maize farmers concerning with profitability of maize farmers in Nyaung Shwe Township contains five items. The result of mean values is described in Table (4.8).

**Table (4.8) Net Profit**

<b>Sr. No.</b>	<b>Description</b>	<b>Mean</b>	<b>Standard Deviation</b>
1	Maize farmers received good price for their maize in market	4.01	.904
2	No difficulties for maize farmers to gain benefits from high demand	3.87	.880
3	Maize farmers can reduce cost for production of their maize outputs	3.77	1.074
4	Maize farmers can reduce scrap maize and return or reject from buyers	3.81	1.006
5	Satisfying gross profit	3.93	1.033
	<b>Overall Mean</b>	<b>3.88</b>	

Source: Survey Data,2024

In the above Table (4.8), maize farmers received good price for their maize in market with 4.01 mean score which is in the range of agree level and it represents that maize farmers perceive they are receiving a favorable price for their maize in the market. The lowest mean score is 3.77 reflects farmers' perceptions regarding their ability to reduce production costs and it suggests that while farmers acknowledge the possibility of reducing costs, there might be some challenges or limitations in achieving significant cost

reductions. The overall mean score is 3.88 reveals a generally positive outlook among maize farmers, with favorable perceptions regarding market prices, demand, and profitability. While there are areas identified for potential improvement, such as cost reduction and waste management, the overall sentiment indicates a satisfactory level of confidence and contentment among respondents regarding their maize farming.

The net profit of maize farmers is influenced by various interconnected factors. Market prices play an important role, with fluctuations impacting farmers' profitability. Production costs, including inputs like seeds and fertilizers, alongside labor and machinery expenses, directly affect net profit margins. Yield and productivity levels also play a significant role. Access to quality inputs and efficient transportation infrastructure are crucial for reaching markets and obtaining competitive prices. Government policies and support programs, climate variability, and environmental factors further shape the net profit landscape. A combination of favorable market conditions, effective cost management, supportive policies, and resilience to environmental challenges is essential for maximizing net profit and ensuring the economic viability of maize farming in the region.

#### **4.8 Analysis on Effect of Economic Factors on Technical Efficiency**

In this section, the regression analysis between economic factors on technical efficiency of extension services, farmers' experiences and farmers organizational membership.

##### **4.8.1 Effect of Economic Factors on Extension Services**

Multiple linear regression analysis is performed to reveal the effect of the independent variable (economic factor of market access and credit access) on dependent variable (technical efficiency or extension services). The result of the linear regression is illustrated in the following Table (4.9).

**Table (4.9) Effect of Economic Factors on Extension Services**

Dependent Variable: Extension Services	Unstandardized Coefficients		β	t	Sig.	VIF
	B	Std. Error				
(Constant)	-0.432	0.787		-0.540	0.585	
Market Access	0.582**	0.226	0.464	2.574	0.012	4.345
Credit Access	0.410	0.399	0.186	1.029	0.307	4.345
R Square	0.401					
Adjusted R Square	0.386					
F Value	26.79***					
Durbin Watson	1.652					

Source: Survey Data, 2024

Statistically significant indicate \*\*\* at 1%, \*\* at 5%, and \* at 10% level

The Table (4.9) shows the effect of economic factors on extension services of maize farmers in Nyaung Shwe Township. It indicates that market access has a significant positive effect on extension services, at 5% significant level. This indicates that maize farmers perception on market access positively affects the extension services they received. On the other hand, credit access does not have a significant effect on extension services, showing that maize farmers perception of credit access does not significantly affects the extension services they received. The model has a relatively high R-squared value of .401 as economic factors variables explain a significant portion of the variability in extension services of maize farmers.

The F-value of 26.79 is statistically significant at a 1% level, further supporting the overall significance of the model. Finally, market access of maize farmers has a positive effect on extension services received by maize farmers in Nyaung Shwe Township as they perceive that having market access supports extension services with market information to provide farmers with advice that is not only agronomically sound but also economically viable. This helps ensure that the farmers' efforts align with market demands, leading to better financial outcomes.

The positive effect of market access on extension services can be attributed to several factors. First, market access provides farmers with crucial information about market demands, prices, and trends. This information is essential for extension agents to tailor their advice and recommendations to help farmers produce what the market requires, thereby increasing the likelihood of profitability and market success. Moreover, market access often comes with better infrastructure, such as roads, storage facilities, and communication networks, which facilitate the delivery and effectiveness of extension services. Improved infrastructure ensures that extension agents can reach farmers more efficiently and that farmers can access extension resources and training without significant barriers. This accessibility enhances the impact of extension programs and helps farmers implement best practices more effectively.

In summary, the positive effect of market access on extension services is driven by the provision of market-relevant information, enhanced farmer engagement and bargaining power, improved infrastructure, and increased farmer investment in new technologies and practices. These factors collectively ensure that extension services are more effective and aligned with market realities, ultimately benefiting farmers through better financial outcomes and sustainable agricultural development.

#### **4.8.2 Effect of Economic Factors on Farmers' Experience**

Multiple linear regression analysis is performed to reveal the effect of the independent variable (market access and credit access) on dependent variable (farmers' experience). The result of the linear regression is illustrated in the following Table (4.10).



**Table (4.10) Effect of Economic Factors on Farmers' Experience**

Dependent Variable: Farmers' Experience	Unstandardized Coefficients		$\beta$	t	Sig.	VIF
	B	Std. Error				
(Constant)	0.916	0.650		1.408	0.163	
Market Access	0.692***	0.187	0.655	3.707	0.000	4.345
Credit Access	-0.006	0.329	-0.003	-0.017	0.986	4.345
R Square	0.425					
Adjusted R Square	0.411					
F Value	29.622***					
Durbin Watson	1.752					

Source: Survey Data, 2024

Statistically significant indicate \*\*\* at 1%, \*\* at 5%, and \* at 10% level

The Table (4.10) shows the results of analyzing the effect of economic factors represented by market access and credit access on technical efficiency, specifically farmers' experience of maize farmers in Nyaung Shwe Township. The coefficient of credit access -0.006 with a p-value of 0.986 indicates that credit access does not have a statistically significant effect on technical efficiency (farmers' experience). It reveals that maize farmers show their disbelief perception of relatedness between credit access and technical efficiency. The coefficient of market access 0.692 with a p-value of .000 indicates that market access statistically significant positive effect on technical efficiency (farmers' experience) since maize farmers feel that market access support the experiences and outcomes of maize farmers by providing them with critical opportunities for growth and sustainability.

Improved market access enables maize farmers to reach a broader customer base, thus increasing their sales potential and profitability. When farmers have better access to markets, they can sell their produce at more competitive prices, often bypassing intermediaries who may otherwise reduce their margins. The model has an R-square value of .425, indicating that economic factors explain 42.5% of the variance in technical efficiency (farmers' experience) of maize farmers. The F-value of 29.622 with a

significance level of .000 confirms that the model is statistically significant. The results highlight that market access positively influences technical efficiency (farmers' experience) of maize farmers in Nyaung Shwe Township.

The analysis reveals a statistically significant positive effect of market access on technical efficiency, reflecting the tangible benefits that improved market access brings to farmers. Firstly, enhanced market access enables maize farmers to reach a wider customer base, thereby expanding their sales potential. By tapping into new markets, farmers can diversify their customer portfolio and reduce dependency on specific buyers or intermediaries. This diversification not only increases sales volume but also mitigates the risk associated with market fluctuations or changes in buyer preferences. Moreover, improved market access empowers farmers to negotiate better prices for their produce, as they can directly engage with buyers and bypass middlemen who may otherwise reduce their margins. The positive impact of market access on farmers' experience underscores its critical role in driving technical efficiency, empowering farmers to optimize their operations, and ultimately, improve their livelihoods in Nyaung Shwe Township.

#### **4.8.3 Effect of Economic Factors on Farmers Organizational Membership**

Multiple linear regression analysis is performed to reveal the effect of the independent variable (market access and credit access) on dependent variable (farmers organizational membership). The result of the linear regression is illustrated in the following Table (4.11)

**Table (4.11) Effect of Economic Factors on Farmers Organizational Membership**

Dependent Variable: Farmers Organizational Membership	Unstandardized Coefficients		$\beta$	t	Sig.	VIF
	B	Std. Error				
(Constant)	-0.316	0.666		-0.474	0.637	
Market Access	1.005***	0.191	0.763	5.260	0.000	4.345
Credit Access	0.053	0.337	0.023	0.518	0.158	4.345
R Square	0.613					
Adjusted R Square	0.603					
F Value	63.317***					
Durbin Watson	1.579					

Source: Survey Data, 2024

Statistically significant indicate \*\*\* at 1%, \*\* at 5%, and \* at 10% level

The Table (4.11) shows the effect of economic factors on farmers organizational membership of maize farmers of Nyaung Shwe Township. It indicates that market access has a significant positive effect on farmers organizational membership, at 1% significant level. However, credit access does not have a significant effect on farmers organizational membership, showing that being able to have access of credit does not necessarily translate into increased participation farmers organization of maize farmers in Nyaung Shwe Township.

The model has a relatively high R-squared value of .613 as economic factors variables shows a significant portion of the variability in farmers organizational membership. The F-value of 63.317 is statistically significant at a 1% level. Hence, market access has a strong positive effect on farmers organizational membership of maize farmers in Nyaung Shwe Township which also states that market access can significantly support the organizational membership of maize farmers by providing them with essential resources, opportunities, and incentives to collaborate. When farmers have improved access to markets, they are more likely to engage in collective actions through farmer organizations, cooperatives, or associations. credit access can improve individual farm

productivity and income, it does not inherently encourage farmers to join or participate more actively in collective organizations.

Extension services can provide essential resources, knowledge, and support, extension services facilitate the formation and sustenance of farmer organizations, cooperatives, or associations. Extension workers serve as catalysts for collective action by fostering collaboration, networking, and community engagement among farmers. Through capacity-building initiatives, training workshops, and awareness campaigns, extension services empower farmers to join and actively participate in these organizations. By doing so, farmers gain access to a range of benefits, including collective bargaining power, shared resources, and enhanced market opportunities.

#### **4.9 Analysis on Effect of Technical Efficiency on Profitability**

In this section, the regression analysis between technical efficiency on gross margin and net profit.

##### **4.9.1 Effect of Technical Efficiency on Gross Margin**

Multiple linear regression analysis is performed to reveal the effect of the independent variables (extension services, farmers' experience and farmers organizational membership) on dependent variable (gross margin). The result of the linear regression is illustrated in the following Table (4.12)

**Table (4.12) Effect of Technical Efficiency on Gross Margin**

Dependent Variable: Gross Margin	Unstandardized Coefficients		β	t	Sig.	VIF
	B	Std. Error				
(Constant)	0.636	0.289		2.200	0.031	
Extension Services	0.723***	0.085	0.700	8.470	0.000	1.695
Farmers' Experience	0.083	0.115	0.068	0.725	0.471	2.190
Farmers Organizational Membership	0.122	0.102	0.124	1.193	0.237	2.701
R Square	0.682					
Adjusted R Square	0.670					
F Value	56.470***					
Durbin Watson	1.727					

Source: Survey Data, 2024

Statistically significant indicate \*\*\* at 1%, \*\* at 5%, and \* at 10% level

The Table (4.12) shows that result of regression analysis examining the relationship between technical efficiency and gross margin of maize farmers in Nyaung Shwe Township. The results indicate that there is positive and statistically significant relationship between extension service and gross margin of maize farmers.

The model has a relatively high R-squared value of .682 and the F-value of 56.470 is statistically significant at a 1% level. This implies that if maize farmers received extension services, it is more likely to have economic gain by receiving higher gross margin. Extension services can indeed support the gross margin of maize farmers by providing them with valuable knowledge, skills, and resources to optimize their farming practices. Through extension services, farmers receive training, information, and technical assistance on various aspects of maize production. By adopting improved farming practices recommended through extension services, farmers can enhance their crop yields, reduce production costs, and ultimately increase their gross margins.

Extension services can indeed support the gross margin of maize farmers by providing them with valuable knowledge, skills, and resources to optimize their farming

practices. Through extension services, farmers receive training, information, and technical assistance on various aspects of maize production. By adopting improved farming practices recommended through extension services, farmers can enhance their crop yields, reduce production costs, and ultimately increase their gross margins.

In addition to providing technical knowledge, extension services also help farmers understand and navigate market dynamics, enabling them to make informed decisions that align with market demands. This market-oriented approach ensures that farmers not only produce efficiently but also target their production towards crops and practices that are financially viable and in demand. The positive impact of extension services on gross margins is thus a result of a comprehensive support system that enhances both production efficiency and market engagement.

#### 4.9.2 Effect of Technical Efficiency on Net Profit

Multiple linear regression analysis is performed to reveal the effect of the independent variables (extension services, farmers' experience and farmers organizational membership) on dependent variable (net profit). The result of the linear regression is illustrated in the following Table (4.13)

**Table (4.13) Effect of Technical Efficiency on Net Profit**

Dependent Variable: Net Profit	Unstandardized Coefficients		$\beta$	t	Sig.	VIF
	B	Std. Error				
(Constant)	0.299	0.301		0.995	0.323	
Extension Services	1.087***	0.089	0.875	12.247	0.000	1.695
Farmers' Experience	0.084	0.120	0.057	0.703	0.484	2.190
Farmers Organizational Membership	-0.060	0.107	-0.051	-0.567	0.572	2.701
R Square	0.762					
Adjusted R Square	0.753					
F Value	84.329***					
Durbin Watson	1.641					

Source: Survey Data, 2024

Statistically significant indicate \*\*\* at 1%, \*\* at 5%, and \* at 10% level

The Table (4.13) shows the effect of technical efficiency on net profit of maize farmers in Nyaung Shwe Township. The coefficient of extension services 1.087 with a p-value of .000 indicates that extension service has statistically significant effect on net profit of maize farmers in Nyaung Shwe Township. This states that there is positively significant impact on net profit ( $p < 0.01$ ). On the other hand, farmers' experience and organizational membership do not have significant effects on net profit, suggesting that other factors might be more influential in determining profitability. The overall model explains a large portion of the variance in net profit and is statistically significant, making it a reliable model for predicting net profit based on the technical efficiency of maize farmers in Nyaung Shwe Township.

The findings highlight the importance of extension services in enhancing the profitability of maize farming endeavors in Nyaung Shwe Township. While experience and organizational membership may not emerge as significant determinants of net profit, the identified relationships pave the way for targeted interventions aimed at optimizing technical efficiency and bolstering the economic resilience of maize farmers in the region. This nuanced understanding serves as a cornerstone for informed decision-making and resource allocation in agricultural development initiatives aimed at fostering sustainable livelihoods and food security.

## **CHAPTER 5**

### **CONCLUSION**

This conclusion chapter presents findings and discussions drawn from the results of data analysis regarding the effect of economic factors on technical efficiency and profitability of maize farmers in Nyaung Shwe Township. Then, the suggestions and recommendations and the needs for further studies are presented

#### **5.1 Findings and Discussions**

The study aims to analyze the effect of economic factor on technical efficiency of maize farmers in Nyaung Shwe Township, and to analyze the effect of technical efficiency on profitability of maize farmers in Nyaung Shwe Township, Shan State. The primary data are collected from randomly selected 83 farmers out of total 200 maize farmers by personal interview method. Sample size is calculated by personal interview method. Sample size is calculated by Raosoft sample size calculator. Both descriptive and regression methods are applied.

Most of the maize farmers are predominantly male, middle-aged, and moderately educated (at primary and secondary levels of education), with a focus on medium-scale farming operations and a reliance on agriculture as their main income source. Despite substantial farming experience and significant production levels, issues such as access to credit and extension services remain critical areas for improvement.

From descriptive analysis, most of the farmers agree that they have easy access to the market of maize products. They received reliable information about market prices and demand trends, also they can success to facilities and infrastructure to transport and ship the products. Farmers can also access to urban centers or distribution hubs, and receiving market information up-to-date. Moreover, descriptive analysis results also shows that maize farmers agree extension services are an essential part of improving the gross margin and net profit by providing them with access to up-to-date agricultural knowledge, innovative farming techniques, and best practices. These services offer guidance on optimizing input use, pest and disease management, and efficient resource allocation, which collectively contribute to higher crop yields and better-quality produce. Through



regular training and support, extension agents help farmers adopt advanced technologies and sustainable farming methods, reducing production costs and increasing productivity.

Extension services facilitate market access by connecting farmers with buyers and advising on effective marketing strategies, thus enabling farmers to secure better prices for their produce. This comprehensive support system not only improves operational efficiency but also strengthens farmers' ability to negotiate and capitalize on market opportunities, ultimately leading to significant improvements in their gross margins and net profits. By equipping farmers with the knowledge and tools needed to enhance their farming practices, extension services serve as a catalyst for economic growth and increased profitability in the agricultural sector.

From regression analysis, it is found that economic factor (market access) has positive significant effect on technical efficiency through extension services. The identification of market access as a key driver of technical efficiency through extension services underscores the critical role that both market connectivity and extension support play in enhancing agricultural productivity and livelihoods. By facilitating access to markets and providing farmers with the necessary knowledge, skills, and resources, extension services serve as a bridge between farmers and economic opportunities. The positive relationship between market access and technical efficiency highlights the importance of integrating market-oriented approaches into extension programs, ensuring that farmers not only have the capacity to produce efficiently but also to effectively navigate market dynamics and capitalize on value-adding opportunities.

Furthermore, the positive significant effect of market access on farmers' experience and organizational membership in Nyaung Shwe Township highlight its pivotal role in shaping both individual and collective outcomes within the farming community. Improved market access not only enhances farmers' technical skills and satisfaction but also fosters collective action, collaboration, and solidarity among maize farmers. By providing opportunities for experiential learning and facilitating participation in farmer organizations, market access serves as a medium for empowerment, resilience, and economic development among maize farmers. This highlights the importance of targeted interventions that strengthen market linkages and support collective initiatives to maximize the positive impact of market access on agricultural livelihoods in the region.

The regression analysis conducted in this study also revealed the positive significant effect of extension services on gross margin and net profit highlight their crucial role in enhancing the economic viability and profitability of maize farming in Nyaung Shwe Township. Extension services provide farmers with essential resources, knowledge, and support to adopt best practices, improve productivity, and optimize their operations. By disseminating information on modern farming techniques, market trends, and financial management strategies, extension services empower farmers to make informed decisions that positively impact their gross margin and net profit. Moreover, extension programs facilitate access to critical resources such as seeds, fertilizers, and machinery, often at subsidized rates, reducing production costs and increasing farm efficiency. Through personalized advice, training, and ongoing support, extension services enable farmers to overcome challenges, adapt to changing circumstances, and capitalize on emerging opportunities in the agricultural sector.

Based on the result, the effect of farmers' experience and farmers' organizational membership have no significant effect on profitability indicators such as gross margin and net profit suggests that while these factors may contribute to overall farmer well-being and community cohesion, they do not directly influence the financial performance of maize farming enterprises in Nyaung Shwe Township. While farmers' experience and organizational membership may play important roles in shaping individual satisfaction, social networks, and collective action within the farming community, they may not necessarily translate into tangible improvements in profitability. Instead, factors such as market access, technical efficiency, input costs, and market prices are likely to exert more direct and measurable impacts on gross margin and net profit.

## **5.2 Suggestions and Recommendations**

Based on the findings and discussions presented, several key recommendations emerge from the findings and discussions to promote the agricultural development and livelihoods of maize farmers in Nyaung Shwe Township. Given the significant positive effect of market access on various aspects of agricultural performance, policymakers should prioritize initiatives that enhance market connectivity, infrastructure, and information systems. This may include investments in rural roads, transportation networks, market information dissemination mechanisms, and market linkages with

buyers and traders. Extension programs should be customized to address the specific needs and priorities of maize farmers, with a focus on market-oriented approaches that empower farmers to capitalize on value-adding opportunities, market trends, and consumer preferences. Extension workers should be equipped with the necessary skills and resources to provide tailored advice, training, and support that directly contribute to improving farmers' profitability and competitiveness in the market. It is suggested that efforts should be made to improve farmers' access to affordable credit and financial services. This may involve initiatives such as microfinance programs, credit cooperatives, and agricultural lending schemes tailored to the needs of smallholder farmers. Additionally, financial literacy training and support mechanisms can help farmers make informed decisions about credit utilization and investment. It also recommends to build on the positive relationship between market access and organizational membership, efforts should be made to strengthen farmer organizations, cooperatives, or associations as vehicles for collective action, resource sharing, and advocacy. This may involve capacity-building initiatives, networking opportunities, and incentives that encourage active participation and collaboration among farmers. By implementing these suggestions and recommendations, stakeholders can work towards developing a conducive environment for agricultural development, enhancing the livelihoods of maize farmers, and promoting inclusive and sustainable growth in Nyaung Shwe Township. Additionally, further strategies can be implemented to promote the agricultural development and livelihoods of maize farmers in Nyaung Shwe Township. Diversification of agricultural practices should be encouraged to mitigate risks associated with market fluctuations and climate variability, while investments in irrigation infrastructure are crucial to ensure reliable access to water for irrigation purposes. The adoption of sustainable farming practices, such as conservation agriculture and integrated pest management, can enhance environmental conservation and long-term productivity. Facilitating access to agricultural inputs, technologies, and training programs can empower farmers to adopt best practices, innovate, and capitalize on emerging opportunities in the agricultural value chain. Moreover, strategies to enhance climate resilience and risk management, strengthen research and extension services, and promote value-adding activities should be prioritized to create a conducive environment for agricultural development, enhance livelihoods, and promote sustainable and inclusive growth in the region.

### **5.3 Needs for Further Research**

Potential areas for further research on the effect of economic factors on the technical efficiency and profitability of maize farmers in Nyaung Shwe Township should be investigated. Conducting longitudinal studies to monitor the performance of farmers over a period of time could offer valuable insights into the lasting effects of economic factors, such as market access, financing availability, and extension services, on their productivity and profitability. Conducting comparative analysis across various geographical locations or agricultural systems within the township might assist in identifying unique elements that influence the economic outcomes of farmers in their respective contexts.

Qualitative research approaches can enhance quantitative analysis by revealing farmers' subjective perspectives, experiences, and decision-making processes about economic concerns. An assessment of the effects of policy interventions or development programs targeting the enhancement of market access, credit access, or extension services could provide valuable insights for evidence-based policy-making. Value chain analysis can provide insights into the dynamics within the maize value chain and how economic factors impact the efficiency and profitability of the value chain. Furthermore, examining the sustainability, resilience, and gender aspects of economic determinants affecting maize farming systems could offer a comprehensive comprehension of the economic welfare of farmers in Nyaung Shwe Township. Tackling these research requirements can help improve the economic resilience and livelihoods of maize farmers in the area.

Conducting additional research on the impact of economic factors on the technical efficiency and profitability of maize farmers in Nyaung Shwe Township could provide a basis for conducting similar studies on other crops grown in the area. Researchers can develop a comprehensive understanding of the wider agricultural landscape and identify common patterns, challenges, and opportunities across different crop value chains by using similar methodologies and conceptual frameworks for various agricultural commodities, such as rice, vegetables, or pulses. Adopting this comparative approach would not only enhance our comprehension of the various economic factors that impact agricultural productivity and profitability, but also provide valuable insights for implementing specific interventions and policy measures to foster sustainable agricultural development and enhance rural livelihoods in Nyaung Shwe Township as well as nationwide.

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**APPENDIX – I**  
**QUESTIONNAIRES**

Dear Respondents,

This questionnaire is an academic survey to examine the effect of economic factors on technical efficiency and profitability of maize farmers in Nyaung Shwe Township. This research paper is to understand the economic factors, technical efficiency of maize farmers and their profitability. All responses will be kept highly confidential and used for academic purposes only. Thank you for your participation and giving precious time.

Yours Faithfully,

.....

Myo Thura Aung

Roll No-01

EMBA-II (19<sup>th</sup> Batch, On Campus)

## Section A:

### Demographic Profile

Please put a tick mark on the racket of the correct answer to the following questions.

Completion of information is voluntary and its confidentiality is assured. No individual dat will be reported.

<b>1) Farmer</b>	
1. Gender	1. Male 2. Female
2. Age (Years)	1. 36-40 2. 41-45 3. 46-50 4. Above 50
3. Education Level	1. No Formal Education 2. Primary Education 3. Secondary Education 4. Higher Education
4. Household Size (Including yourself)	1. 1-3 2. 4-6 3. 7-9 4. Above 9

<b>2) Farming Characteristics of Maize Farmers</b>	
1. Maize growing experience (Years)	1. 5-10 2. 11-15 3. 16-20 4. Above 20
2. Total land size for growing maize?	1. Small Scale (10-30 acres) 2. Medium Scale (31-60 acres) 3. Large Scale (above 61 acres)
3. Total quantity of maize production in a year	1. Small Production (<5,000 visses) 2. Medium Production (5,000-10,000 visses) 3. Large Production (over 10,000 visses)
4. Access to extension services	1. Regular Access 2. Irregular Access 3. No Access
5. Membership in Farmers' Organization	1. Member 2. Non-member
a. Credit Access	1. Formal Credit (Banks/Microfinance) 2. Informal Credit (Money lenders/ Relatives) 3. No Credit
b. Income Sources	1. Agriculture as Primary Income 2. Agriculture as Secondary Income (small business/ livestock/ daily labor)

## Section (B)

### Economic Factors, Technical Efficiency and Profitability

This section of questionnaire is to describe the **economic factors, technical efficiency and profitability** of maize farmers in Nyaung Shwe Township. You are requested to rate yourself against each statement to indicate your level of agreement with what the statement is suggesting. Use the following scale to select the number.

1 = Strongly Disagree    2 = Disagree    3 = Neutral    4 = Agree    5 = Strongly Agree

#### Market Access

No	Market Access	Scale				
		1	2	3	4	5
1	I have easy access to markets where I can sell my maize outputs					
2	I have reliable information about market prices and demand for my maize outputs					
3	Transportation infrastructure in my area facilitates to ship my maize to markets					
4	My proximity to urban centers or distribution hubs positively affects my ability to reach potential buyers					
5	I get the market information update					

#### Credit Access

No	Credit Access	Scale				
		1	2	3	4	5
1	I have the experience of accessing credits during last season					
2	I received the credits which are enough for my maize production					
3	Access to credit has helped me invest in farming techniques and equipment					
4	I experienced difficulties getting the credit (R)					
5	Credit access has improved my ability to purchase inputs such us quality seeds and fertilizers					

### Extension Services

No	Extension Services	Scale				
		1	2	3	4	5
1	I have received the extension services follow up from local government office					
2	I have received the extension services follow up from private organization (e.g., Fertilizer Company)					
3	I have received extension services in time					
4	I am satisfied with the accessibility of extension services in my area					
5	I believe that extension services have helped increase my knowledge and skills in managing harvesting and cultivation					

No	Farmer Experience	Scale				
		1	2	3	4	5
1	I experienced the benefits from technical support and guidance in my farm operations' efficiency					
2	I face challenges in adopting and integrating new farming technologies due to financial constraints. (R)					
3	I am confident in my ability to make decisions regarding the technical aspects of my farm operations					
4	I am sure that the technical training can support to the quality of my maize farming					
5	I like attending agricultural training workshops or seminars to learn about maize farming techniques.					

No	Farmer Organization Membership	Scale				
		1	2	3	4	5
1	I believe that being a member of a farmer organization has positively impacted my farming practices and outcomes.					
2	I am satisfied with the support and benefits I receive as a member of my farmer organization					
3	Being part of a farmer organization has improved my capabilities to manage my maize farming business					
4	I often attend meetings and discussions of farmer organization on farming practices and challenges					
5	I am satisfied with the technical assistance and guidance I receive from my farmer organization					

### Section D: Business Performance

This section of questionnaire is to describe the **business performance** of maize farmers in Nyaung Shwe Township. You are requested to rate yourself against each statement to indicate your level of agreement with what the statement is suggesting. Use the following scale to select the number.

1 = Strongly Disagree    2 = Disagree    3 = Neutral    4 = Agree    5 = Strongly Agree

No	Gross Margin	Scale				
		1	2	3	4	5
1	I received good price for my maize in market					
2	It is not difficult for me to gain benefits from high demand					
3	I can reduce cost for production of my maize					
4	I can reduce scrap maize and return or reject from buyers					
5	All in all, the gross profit I received is satisfying to me					

No	Net Profit	Scale				
		1	2	3	4	5
1	I spend relatively low transportation charges to distribute my products					
2	I spend relatively low labor charges for distribution of my products					
3	I spend relatively low cost in value added process (From production to ready to sale)					
4	I spend relatively low cost for post-production machinery usage					
5	I spend relatively low cost for supplies during post-production without reducing quality					



## APPENDIX – II

### The Effect of Economic Factors on Extension Service

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.633 <sup>a</sup>	0.401	0.386	0.57674	1.652
a. Predictors: (Constant), Credit Access, Market Access					
b. Dependent Variable: ExtService					

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.822	2	8.911	26.790	.000 <sup>b</sup>
	Residual	26.610	80	0.333		
	Total	44.432	82			

a. Dependent Variable: ExtService

b. Predictors: (Constant), Credit Access, Market Access

Coefficients <sup>a</sup>								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-0.432	0.787		-0.549	0.585		
	Market Access	0.582	0.226	0.464	2.574	0.012	0.230	4.345
	Credit Access	0.410	0.399	0.186	1.029	0.307	0.230	4.345

a. Dependent Variable: ExtService

## The Effect of Economic Factors on Farmers' Experience

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.652 <sup>a</sup>	0.425	0.411	0.47653	1.752

a. Predictors: (Constant), Credit Access, Market Access

b. Dependent Variable: FarmerEX

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.453	2	6.727	29.622	.000 <sup>b</sup>
	Residual	18.167	80	0.227		
	Total	31.620	82			

a. Dependent Variable: FarmerEX

b. Predictors: (Constant), Credit Access, Market Access

Coefficients <sup>a</sup>								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.916	0.650		1.408	0.163		
	Market Access	0.692	0.187	0.655	3.707	0.000	0.230	4.345
	Credit Access	-0.006	0.329	-0.003	-0.017	0.986	0.230	4.345

a. Dependent Variable: FarmerEX

## The Effect of Economic Factors on Farmers Organization Membership

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.783 <sup>a</sup>	0.613	0.603	0.48773	1.579

a. Predictors: (Constant), Credit Access, Market Access

b. Dependent Variable: FarmerOrGMembership

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.124	2	15.062	63.317	.000 <sup>b</sup>
	Residual	19.031	80	0.238		
	Total	49.155	82			

a. Dependent Variable: FarmerOrGMembership

b. Predictors: (Constant), Credit Access, Market Access

Coefficients <sup>a</sup>								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-0.316	0.666		-0.474	0.637		
	Market Access	1.005	0.191	0.763	5.260	0.000	0.230	4.345
	Credit Access	0.053	0.337	0.023	0.158	0.875	0.230	4.345

a. Dependent Variable: FarmerOrGMembership

## The Effect of Technical Efficiency on Gross Margin

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.826 <sup>a</sup>	0.682	0.670	0.43676	1.727
a. Predictors: (Constant), FarmerOrGMembership, ExtService, FarmerEX					
b. Dependent Variable: Gross Margin					

ANOVA <sup>a</sup>						
Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	32.317	3	10.772	56.470	.000 <sup>b</sup>
	Residual	15.070	79	0.191		
	Total	47.387	82			

a. Dependent Variable: Gross Margin

b. Predictors: (Constant), FarmerOrGMembership, ExtService, FarmerEX

Coefficients <sup>a</sup>								
Model	Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.	Collinearity Statistics		
						B	Beta	Tolerance
1	(Constant)	0.636	0.289		2.200	0.031		
	ExtService	0.723	0.085	0.700	8.470	0.000	0.590	1.695
	FarmerEX	0.083	0.115	0.068	0.725	0.471	0.457	2.190
	FarmerOrGMembership	0.122	0.102	0.124	1.193	0.237	0.370	2.701

a. Dependent Variable: Gross Margin

### The Effect of Technical Efficiency on Net Profit

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.873 <sup>a</sup>	0.762	0.753	0.45439	1.641

a. Predictors: (Constant), FarmerOrGMembership, ExtService, FarmerEX

b. Dependent Variable: Net Profit

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.235	3	17.412	84.329	.000 <sup>b</sup>
	Residual	16.311	79	0.206		
	Total	68.547	82			

a. Dependent Variable: Net Profit

b. Predictors: (Constant), FarmerOrGMembership, ExtService, FarmerEX

Coefficients <sup>a</sup>								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.299	0.301		0.995	0.323		
	ExtService	1.087	0.089	0.875	12.247	0.000	0.590	1.695
	FarmerEX	0.084	0.120	0.057	0.703	0.484	0.457	2.190
	FarmerOrGMembership	-0.060	0.107	-0.051	-0.567	0.572	0.370	2.701