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ECONOMIC EFFICIENCY OF RAIN-FED RICE PRODUCTION IN KAYIN STATE, MYANMAR

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ECONOMIC EFFICIENCY OF RAIN-FED RICE PRODUCTION IN KAYIN STATE, MYANMAR

By

NAN WUTYI SAN

Thesis submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of Requirements for the Degree of Master of Science

November, 2013

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(To My Beloved Parents)
U Saw Thein Hti and Daw Nan Htwe Shin
I have always been proud to be your daughter

Abstract of thesis presented to the Senate of Universiti Putra Malaysia
in fulfillment of the requirement for the degree of Master Science

ECONOMIC EFFICIENCY OF RAIN-FED RICE PRODUCTION IN KAYIN STATE, MYANMAR

By

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November, 2013

Chairman: Ismail Abd Latif, PhD

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The rice sector in Myanmar is predominantly for local consumption, maintaining national food security and uplifting the rural economy. The objectives of this study are to calculate the gross margin, examine the economic efficiency and then determine factors affecting efficiency of rice production in Kayin State.

Data from a total sample of 400 rice farm households were collected using random sampling technique from two main growing areas in Kayin State. Results indicated that majority of farmers averaging 51 years old and had an average of 4 schooling years which treated agriculture as part time jobs. Farm experiences in paddy production were on average 22 years and average household' family sizes were 6 members. However, family labors involved in farming were only 2 members while 86.5 % grew paddy on their own fields. In the study area, three kinds of paddy varieties were planted, on which, 17.75 % used traditional varieties, 60.25 % used HYV and the balance 22 % used new improved seeds.

Out of the whole sample, 25% of farmers were access to extension services while 15.25 % obtained farm loans from the credit institutions. With regard to fertilizer application, 3.25% of samples had applied fertilizer in frequently. Average farm size were 3.01 ha and the observed average output was 2,205.72 kg/ha. Production costs were USD 376.47/ha and total revenue was USD 485.26/ha; therefore, the mean value of gross margin was USD 108.79/ha.

Empirical results of efficiency analysis revealed that the mean pure technical efficiency, allocative efficiency, economic efficiency, overall technical efficiency and scale efficiency were 80.9 %, 66.8 %, 54.4 %, 50.6 % and 62.7%, respectively. About 2.25 % of samples achieved the highest efficient level under constant returns to scale, another 97% operated under increasing returns to scale while 0.75 % operated under decreasing returns to scale.

Efficiency analysis results showed that 38 DMUs or 9.50 % were the technically best practiced farms while 7 DMUs or 1.75 % were the allocatively and economically best practiced farms, thus they all were the benchmarks for other producers. The benefits from potential efficiency improvement revealed that total production costs would save by about USD 68.91/ha at fully pure technical efficiency, USD 125/ha at fully allocative efficiency and USD 167.90/ha at fully economic efficiency; therefore, the value of gross margin would increase to USD 177.70/ha at fully pure technical efficiency, USD 233.79/ha at fully allocative efficiency and USD 276.69/ha at fully economic efficiency. Major determinants on efficiency scores were age of farmers, education level, family sizes, access to extension services, farm sizes, frequency of fertilizer application and new improved seeds (seeds replacement). Thus, policies leading to improving farmers' informal education levels, providing workshops and training programs are very important in order to sustain farm output. These will enhance the achievement of farms economic goals and increase farm efficiency in the area.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

KECEKAPAN ECONOMI PENGELUARAN BERAS DI KAWASAN LUAR PENGAIRAN DI KAYIN STATE, MYANMAR

Oleh

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November, 2013

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Sektor beras di Myanmar adalah tertumpu untuk penggunaan sendiri, memastikan keselamatan makanan negara dan meningkatkan ekonomi luar bandar. Objektif kajian ini ialah mengira pulangan kasar, menilai kecekapan ekonomi dan menentukan faktor yang mempengaruhi kecekapan teknikal dan ekonomo pengeluaran beras di Kayin State.

Sejumlah 400 sampel isirumah petani padi dipilh melalui kaedah persampelan rawk stratified dari dua kawasan padi utama di Kayin state.Dari kajian lapangan, petani secara purata berumur 51 tahun dan kebanyakannya hanya menghadir persekolahan selama 4 tahun. Purata pengalaman menanam padi lebh kurang 22 tahu, bilangan ahli keluarga 6 orang tetapi hanya 2 orang yang membantu dalam penanaman padi. Lebih kurang 86.5 % petani menanam padi di tanah sendiri. Tiga jenis varieti padi ditanam yang iaitu 17.75 % varieti tradisional, 60.25 % HYV dan bakinya benih yang telah di pertingkatkan hasilnya melalui penyelidikan.

Sejumlah 25% petani telah mendapati khidmat pengembangan manakala 15.25% telah menikmati pinjaman bank. Saiz purata ladang ialah 3.01 ha dengan purata pengeluaran sebanyak 2205.72 kg/ha. Kos pengeluaran ialah USD 376.47/ha dan jumlah hasil pula ialah USD 485.26/ha. Jadi nilai untung kasar adalah USD 108.79/ha.

Analisis kecekapan menunjukkan *pure technical efficiency*, *allocative efficiency*, *economic efficiency*, *overall technical efficiency* dan *scale efficiency* yang masing masing bernilai 80.9 %, 66.8 %, 54.4 %, 50.6 % dan 62.7%. Kajian skala ladang mendapati 2.25% sampel mencapai tahap kecekapan maksima di bawah CRTS dengan 97% beroperasi di bawah IRTS dan 0.75% beroperasi dibawah DRTS.

Analisis kecekapan juga menunjukkan 38 UPK atau 9.5% sampel merupakan ladang yang beroperasi terbaik secara teknikal, 7 UPK atau 1.75% terbaik secara kecekapan

agihan dan ekonomi. Faedah dari peningkatan kecekapan ini akan dapat mengurangkan kos pengeluaran sebanyak USD 68.91/ha di tahap *pure technical efficiency*, USD 125/ha pada *allocative efficiency* dan USD 167.90/ha pada *economic efficiency*. Nilai untung kasar boleh ditingkatkan ke USD 177.70/ha di tahap *pure technical efficiency*, USD 233.79/ha pada *allocative efficiency* dan USD 276.69/ha pada *economic efficiency*. Faktor yang akan mempangaruhi skor kecekapan ialah umur, pendidikan, saiz keluarga, khidmat pengembangan, saiz ladang, aplikasi baja dan penggunaan benih baru. Hasil kajian meyarankan polisi yang dapat meningkatkan tahap pengetahuan petani, meyediakan bwngkel dan program latihan untuk pengeluaran ditingkatkan supaya sasaran ekonomi mengurangkan tahap kemiskinan dapat di capai di kawasan kajian.

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Lastly, I would like to express my sincere gratitude to my parents, my brother and my sister who have always encouragement and moral support and always give power and sharing problems during this study and far away from home. Without their help and support, this study would not be carried out in completing my master degree.

I certify that a Thesis Examination Committee has met on 28th, November, 2013 to conduct the final examination of Nan Wutyi San on her Master of Science thesis entitled "Economic Efficiency of Rain-fed Rice Production in Kayin State, Myanmar" in accordance with Universiti and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The committee recommends that the student be awarded the Master of Degree.

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LIST OF ABBREVIATIONS

ABPFs	: Allocative Best Practiced Farms
AE	: Allocative Efficiency
ASEAN	: Association of South East Asia Nations
CE	: Cost Efficiency
CRS	: Constant return to scale
CSO	: Central Statistical Organization
DEA	: Data Envelopment Analysis
DMUs	: Decision Making Unit's
EBPFs	: Economic Best Practiced Farms
EE	: Economic Efficiency
FYM	: Farm Yard Manure
GDP	: Gross Domestic Product
MADB	: Myanmar Agricultural Development Bank
MOAI	: Ministry of Agriculture and Irrigation
N	: number of observations
NGOs	: Non-Government Organizations
NIRS	: Non increasing return to scale
OTE	: Overall Technical Efficiency
PTE	: Pure Technical Efficiency
SD	: Standard Deviation
SE	: Scale Efficiency
SFA	: Stochastic Frontier Approach
TBPFs	: Technical Best Practiced Farms
TC	: Total Costs
TVC	: Total Variables Cost
USD	: United State of America Dollar
VRS	: Variables return to scale

CHAPTER I

INTRODUCTION

1.1 Introduction

Myanmar has been known as one of the traditionally biggest rice exporting countries in Southeast Asia. Rice is a staple food crop as well as exportable item. The paddy and rice industry started to produce for local consumption and for exports since pre-World War (Win, 1995); therefore, it is of great importance. In 1940, it produced 6.894 million metrics tons from a total area of 5 million ha and more than 3 million metrics tons were exported. Myanmar, therefore, was ranked as one the largest rice exporting country under British Colony (Young, et al., 1998). In 2010, it produced 33 million metric tons from 8.1 million hectare and exported 0.8 million metrics tons (CSO, 2012) and is ranked seventh largest rice producer in Asian Countries.

Myanmar experienced four distinct periods of rice production growth from the latter of 1880s to 2011. The first major period of growth between 1885 and 1910 involved rapid expansions of rice areas in Lower Myanmar under British Colonization. The second growth period occurred between 1955 and 1962 when rice land abandoned during World War II was returned to production. The third period occurred from 1975 to 1985 as a result of applying new technology in rice production. The fourth period; since 1988, witnessed the increased acreage of rice production because of an expansion of irrigation areas in the dry season. However, there has been no perceptible improvement in yield since 1985 (Kin and Win, 1990), in fact the long terms trend of per capita rice production was adverse (Dapice et al., 2010).

After the green revolution, there was no significant improvement in productivity so yield per unit area was stagnant and growth in the rice economy was generally low. During the last two decades, imposing fertilizer law created many business tycoons through the granting of material licenses of several companies for exports and imports. High tax rates, in the name in liberation for domestic and export rice markets induced higher inflation problems in the country's economy and that created many black markets. The effect of government removal of subsidies on agricultural materials caused prices to increase much higher than government prices.

Unstable price condition would incure higher production cost and reduce farm input delivery by producers; therefore, causing a fall in paddy output and low farm profits if compared to neighboring countries. The lack of foreign exchange and previous isolationist policies was one of the serious constraints to procure improved technology; therefore, it may lead to hardship in socioeconomic situations of farmers (Aung, 2011).

Under recent policies, rice productions in Myanmar are still faced with many constraints. Socio demographic constraints such as low educated farmers, production constraints such as high production costs, biophysical constraints such as flooding, technology constraints such as poor seed quality and institution constraint such as

limited farm loans (Kyi and Oppen, 1999). In addition, majority of famers are poor, using scare resources and mostly are landless agricultural laborers on small farms (Okamoto, 2004).

Farm economic or profits are not mainly concern with physical production but also concerns with households' opinion on farming, household characteristics and production practices (Kiatpathomchai, 2008). Parameters such as biophysical, economic bottlenecks and technology factors are important ones to ultimately determine farms' efficiency level which includes institutional, social, physical, economic and environmental factors. In biophysical, it consists of irregular pattern of rainfall, frequently floods, water shortage, low soil fertility and pest management. Economic constraints consists high production cost, low productivity, instability of paddy prices, agricultural labor shortage and higher wages. Technology constraints consists of seed qualities and adaptable farming practices. Moreover, government contribution to farms input deliveries are also very important to improve farm efficiency. Aung, (2011) suggested that farm efficiency is still very low and it needs further study to measure the existing farm efficiency in Myanmar. In developing countries, it is important to ensure the efficient utilization of scarce agricultural resources (Kiatpathomchai, 2008).

1.2 Background of agricultural sector in Myanmar

The republic of Union of Myanmar, one of the ASEAN member countries is located on the main land of Southeast Asian (Figure 1.1). The population is approximately 55 million and its economy is based on agriculture. Agriculture sector contributed 30% of total GDP in 2010 where livestock and fishery sector was 7.4 %, forestry was 0.45%, other goods were 24.3%, services were 16.65% and trade value was 21.10% of GDP (Figure 1.2). Agriculture sector provides total labor force employment of 56.14% (CSO, 2012) and it exported to 41,289 metric tons which was 17.2% of total exports.

The cultivated agriculture land is 9.6 million ha on which cereal, industrial crops, horticultural crops, fruits and vegetables are grown. Among them, the main exportable crops are rice, pulses and raw rubber. In 2010, it exported rice by about of 0.8 million metric tons while pulse and raw rubber also exported 1.2 million metrics tons and 0.041 million metrics tons, respectively (CSO, 2012).

Figure 1.1.The Republic of Union of Myanmar
(Source:http://dfat.gov.au/copyright.html)

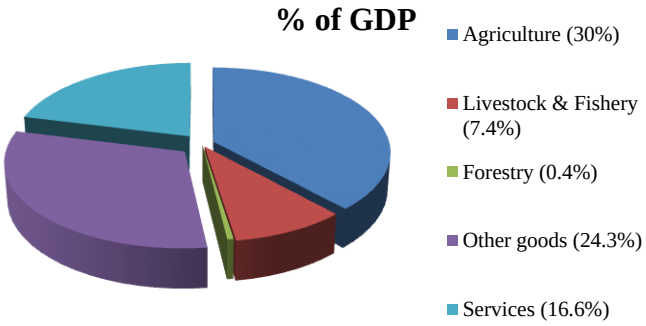

Figure 1.2. Gross domestic products for each sector in Myanmar (2010)
(Source: CSO, 2012)

1.3 Paddy and rice industry under different Agriculture policies

Rice commercial followed under different policies effect. Rice policies in Myanmar can be divided into five parts: the policies before independent (1885-1948), after independent (1948-1962), Socialist Republic Government (1962-1988), State Law and Order Restoration Council's period (1988-2011) and the Republic of union of Myanmar (2011-present).

1.3.1 British Colonial policies (1885-1948)

Under the British Colonial periods (1885-1948), government introduced a liberal rice policy for rice enterprises to encourage production. The Major policies used to help develop the rice sector included the following:

- Setting specific grades and standards for rice to facilitate trade;
- Assisting in the transmigration of setters from Upper Myanmar to Lower Myanmar and in the immigration of Indians to settle in Lower Myanmar to develop the Ayeyarwady Delta for rice;
- Improving river and rail transport to facilitate north-south movement between Upper Myanmar and the delta;
- Providing tax exemption for 12 years on newly clearly land;
- Providing government loans for development in the rice industry;
- Providing legal protection for private money lenders and other investors to support development of the rice sector;
- Constructing embankments at government expense in tidal swamp areas to prevent flooding and encroachment of saline water;
- Proving improved rice seed to farmers, particularly to improve milling out turn;
- Encouraging the rice milling industry and trade, both internal and external, by helping many commercial firms and private enterprises;
- Providing a secure ownership title to property owners; and
- Providing a "laissez faire" competitive environment with minimal government intervention in production or trade except for maintaining basic law and order.

Under these policies, paddy growing area were largely expanded from 1.255 ha in 1880 to 5.006 ha in 1940, therefore, total production increased from 1.989 million metric tons in 1880 to 6.894 million metric tons in 1940. Therefore, rice export had increased from 0.8 million metric tons in 1880 to 3.1 million metric tons in 1940. Due to the effects of World War II, 50% of total paddy fields were destroyed (Young, et.al., 1998); however, they maintained productivity and export quantities. During this period, major criticism for government policies were political instability and pressure for land reform and there were no laws to prevent socio-economic problems. For these instances, it became adverse condition for small tenant farmers because of highest interest rate which was taking total amount of 84% of output till to independent period. Historical data of rice industry under British Colony policies are summarized in Appendix B 1.

1.3.2 The policies after independent (1948-1962)

Under the period of independent day, the policies were focused on the country's food security and self-sufficiency. Food grains policies included as follows:

- Maintaining food self-sufficiency and food security;
- Improving consumers welfare by subsidized sale of basic food grains, particularly rice;
- Expanding food grain production for promoting of export and raising government foreign exchange (FE) via implicit export laws for food grains;
- Keeping domestic food grain prices low to maintain a low cost of living to contribute to socioeconomic stability;
- Giving farmers a guaranteed minimum price to maintain stability of farm production and income; and
- Stockpiling rice to stabilize market and domestic price.

Therefore, it promoted food self-sufficiency and food security. However, rapid increase in population growth rate and decreased in growing areas due to effect of World War reduced annual exports up to 1.7 million metric tons in 1960, although there were a little improvement in production technology and new modern varieties in terms of yields. Historical data of rice industry under independent period are showed Appendix B 2.

1.3.3 Socialist Government policies (1962-1988)

Under the Socialist Government Policies, government followed the previous policies or laws to sustain local demands. They were adding free provision of extension services and credits with low interest rates. The main objective was to be raised paddy yield and total production by introducing new technology and HYV from International Rice Research Institute (IRRI) in 1970. In addition, it encouraged and relatively contributed more fertilizer application from 5 kg in 1970 to 49 kg in 1983; therefore, paddy output and yield were more increased to 80% and 43% than in 1970's period. Moreover, it also established experiment stations for specific researches in all administrative regions.

Despite 80% increase in paddy production, high expense in agricultural development programs and government subsidizes would induced the moderate inflation problems till 1986. However, high inflation rate was accelerated in 1987 and demand-supply of food grains were upset, thus, country economy deteriorated and it became chronic food shortage. It was begun to develop Black-Markets in the country and it collapse as less developed-country. Historical data of rice industry under Socialist Government policies are stated in Appendix B 3.

1.3.4 State Law and Order Restoration Council policies (1988-2011)

Under the State Law and Order Restoration Council (1988-2011), the military government organization adopted free market oriented economy. It contributed food policy such as producing surplus paddy and promoting exports. In addition, policy focused on growing other crops such as vegetable oils to be reached sufficient level. Continuously, it was expanded production of pulses and beans for export by transformation waste land into crop land, by improving in irrigation technology and other suitable practices and by increasing the use of high yields varieties.

In 1992, the government introduced summer paddy production program (irrigation system) to increase rice production. It provided farmers opportunities to grow paddy on their own fields twice within a year especially for farmers who previously relied only on one season. It distributed irrigation system in 2003 and introduced summer paddy production programs by constructing 32 news irrigation dams in 1994. Consequently, paddy fields expanded and increased to a total of 8.1 million ha where rain-fed areas was 6.8 million ha and irrigated areas was 1.3 million ha in 2010. Therefore; total production increased dramatically to 33 million metric tons. Under this period, historical data of rice industry are showed in Appendix B 4.

During decades, the costs of raw materials for agriculture are relatively high and increase by years. Due to the effect of market reforms and government removal of subsidies for agricultural commodities production, fertilizer price in private markets was steeply higher than government markets (Figure 1.2).

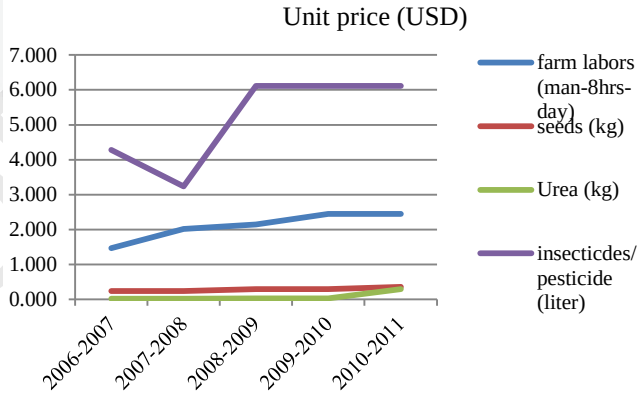

Figure 1.3.Price trends for farm input variables (2006-2011)
(Source: Union data, MAS, MOAI)

For these circumstances, producers reduced the amount of fertilizer used which were far from recommended amount of fertilizer (150kg/ha). Dapice et al., (2009) concluded that if every 100,000 tons of reduce in fertilizer used; it may likely to drop 600,000 to 800,000 tons of paddy in Myanmar. Thus, paddy yield is considerable lower comparing other Asian countries, for example, Vietnam (FAOSTAT Data).

With regard to output prices, farm gate price received by producers is quite low which was only one-third of export price; however, Vietnam' farmers can sell their outputs with reasonable price that existed 50-60% of those of export price. In 2010, 25% broken rice exports prices is USD 360/metric tons in Myanmar while Vietnam' export price is USD 400/mt (FAOSTAT). Comparison of rice exports price between some Asian countries are shown in Figure 1.4.

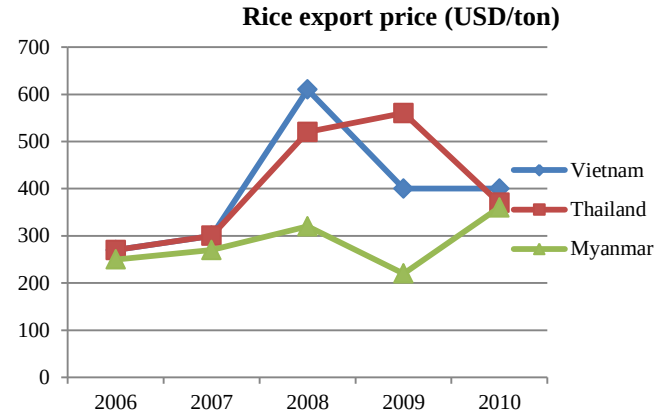

Figure 1.4. Comparison of rice export prices between some Asian countries (Source: FAOSTAT DATA)

1.3.5 Present policies (The Republic of Union of Myanmar, 2011-present)

New government drives to focus on economic profit for farmers and to reduce poverty alleviation by increasing agricultural productivity and employment especially in local areas. Its tries to introduce new improved paddy seeds accompany with new technology to increase production. In 2011, it produced 29 million metric tons from total paddy land of 7.6 million ha which average yield was 3.83t/ha (FAOSTAT Data, MOAI, 2012). Historical data for paddy and rice industry under different policies is summarized in Table 1.1.

Table 1.1. Historical data of rice production and export in Myanmar (1990-2010)

Year	Acreage (million ha)	Yield (kg/ha)	Production (million metric ton)	Export	(%) of total export
1990-1991	4.94	2.93	13.97	0.13	4.52
1995-1996	6.13	2.98	17.95	0.44	8.72
2000-2001	6.35	3.38	21.32	0.25	1.97
2003-2004	6.54	3.54	23.14	0.17	1.19
2004-2005	6.85	3.64	24.75	0.18	1.09
2005-2006	7.38	3.75	27.68	0.18	0.87
2006-2007	8.12	3.83	30.92	0.02	0.05
2007-2008	8.09	3.93	31.45	0.36	1.01
2008-2009	8.09	4.03	32.57	0.67	1.80
2009-2010	8.06	4.06	32.68	0.82	1.98

(Source: Win, 1991, CSO, 2012)

1.4 Problem Statement

Rice is one of the important crop and source of income for rural farmers in Myanmar. Therefore, it is a major crop comparing with other agricultural food crops. In Asian countries, there is still exists a wide difference in agricultural productivity across farms and regions. This may due to the gap between farm outputs because of some farmers are more efficient than others. For instance, the average paddy yield in Vietnam was 5.1t/ha, however, it was 3.0 t/ha in Thailand in 2012 (FAOSTAT data).

In Myanmar; according to MOAI statistical data, actual average paddy yield was 4.06 t/ha in 2012; however, some areas produced only 1.9 t/ha, thus, there was a variation in yields under same conditions (Table 1.2). That is a question to ask for the differences in paddy yields giving under the same environmental conditions. The considerable research studies (Ahmed, 2006, Abd Latif, 2008, and Al-hassan, 2012) have been investigated to find main impacts of farms productivity, although there are so many constraints, socioeconomic factors is one of determinants variables on farm productivity.

Previous studies (Myint and Kyi, 2005 and Vu, 2007) on paddy and rice indicated that Asian countries were relatively weak in agricultural efficiency. There are many important aspects which determine the cause and effect of differences in agricultural output where socioeconomic factors were one of the determinants factors; for example,

educated farmers with multiple abilities can produce profitable outcomes than those of uneducated farmers.

Agriculture sector is also important for Kayin State and its economy is based on agriculture. Rice industry was started since pre-World War and HYV varieties were also introduced in 1970s. Currently, 85% of total growing areas are using HYV varieties in Kayin State. Out of the agricultural land, more than 50% of total land is for paddy growing areas which was a total lands area of 671,000 ha; therefore, rice farming in Kayin State is one of the significant in region's food security, rural employment and income generating activity. Farm profits were relatively low and farmers in the study area are poor, thus it is needed to achieve accelerant growth of farm productivity to increase farm profits for rural farmers. Therefore, efficiency measurement is very important to identify problem encountered in farm productivity.

Table 1.2. Average paddy yields of differences growing areas in Myanmar (2005-2010)

Region/State	2005	2006	2007	2008	2009	2010
Kachin	2.93	3.03	3.06	3.09	3.20	3.22
Kayah	2.81	2.86	2.91	2.95	3.01	3.07
Kayin	2.63	2.71	2.76	2.84	2.96	3.13
Chin	1.78	1.79	1.80	1.88	1.90	1.94
Sagaing	3.23	3.43	3.56	3.67	3.91	3.95
Tanintharyi	3.01	3.05	3.07	3.08	2.94	3.16
Bago	3.23	3.29	3.32	3.43	3.53	3.56
Magway	3.31	3.49	3.40	3.60	3.80	3.84
Mandalay	3.38	3.39	3.86	3.91	4.11	4.00
Mon	3.12	3.14	3.23	3.27	3.35	3.31
Rachine	3.11	3.14	3.22	3.23	3.28	3.36
Yangon	3.03	3.12	3.14	3.15	3.18	3.28
Shan	3.19	3.42	3.53	3.73	3.75	3.74
Ayeyarwaddy	3.49	3.62	3.66	3.75	3.81	3.81

(Source: CSO, 2012)

1.5 Objectives of the study

The general objective is to examine economic efficiency of rain-fed rice production with respect to socioeconomic characteristics in the selected areas in Myanmar.
The specific objectives are:

1. To determine the gross marginal analysis of paddy farms income in rain-fed rice production area
2. To estimate technical, allocative and economic efficiency of rain-fed rice production area
3. To analyze the determinants of efficiency on rain-fed rice production area

1.6 Significant of the study

This study will analyze farm technical, allocative and economic efficiency of paddy production in Kayin State. It sought to provide information about the existing level of farm efficiency and its determinant factors using DEAP program. Previous studies (kyi and Oppen, 1999, Myint and Kyi, 2005 and Aung, 2011) has been revealed farm efficiency using SFA approach and they indicated low productivity due to effect of socio-economic resources which were exited in farm production; for example, the effect of fertilizer and farmers educated level; therefore, farm profit was quite low.

There is regionally or locally a wide variation in paddy yield; therefore, this study will examine those of differences among the producers. The study will also investigate farmers' abilities such as they could access the efficient level or not. To be efficient utilization of scare resources and in order to maximize farm profits, this study will prove the optimal combination of input level such as input saving or cost saving under the same environmental conditions which are very important for poor producers. Therefore, these analyze would help the scope of reasonable input combination to improve rice farm economy and it will be useful for rice producers as well as policy makers to draw reforms and revitalization policies for agriculture sector.

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