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Geographic Analysis on Paddy Cultivation as Local Economy in Rural Area:

A Case Study of Maubin Township, Ayeyarwady Region

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Abstract

The paper tries to present Paddy Cultivation affecting Local Economy in rural area. Maubin Township is located Ayeyarwaddy Deltaic area known as Myanmar Granary. In the study area, 269,754 persons (87%) of the total population live in rural area and twenty six percent of total population engages in agriculture. Agriculture land occupies 67 percent of the total township's area and le land is 89 percent of total agriculture land. Extensive le land and physical condition are very suitable for paddy cultivation. Although the paddy cultivation is major economy of the rural area, most of the villages are of medium productivity and its economic return is low due to low productivity and price fluctuation. As the investment is insufficient for paddy cultivation because of small amount of loan, farmers do not follow the instruction and guidance of Agriculture department, they use insufficient inputs in paddy cultivation. The objectives of the paper are to examine monsoon paddy cultivated area of to understand the productivity of monsoon paddy cultivation, to explore cost and economic benefit of monsoon paddy cultivation, to find out strength, weakness, opportunity and threat of monsoon paddy cultivation. To present the paper, productivity method, cost benefit analysis, benefit cost ratio and swot analysis (Strength, Weakness, Opportunity and Threat) were applied.

Key words: productivity, economic return, cost and economic benefit, Strength, Weakness, Opportunity and Threat

Introduction

Myanmar's agricultural sector grew rapidly from the last quarter of the nineteenth century until it became a success story for agricultural commercialization and specialization. At present, agriculture's share of GDP fell from 38.1% to 30.5% (Tin Htoo Naing, 2013). To raise the agriculture's share of GDP, it is necessary to boost agricultural production but productivity of the paddy is lower than set target production.

Agriculture is the backbone of the Myanmar economy: the sector accounts for about 30% of GDP, over 50% of total employment and approximately 20% of exports. Cultivated land, covering 12.8 million hectares, has the potential to be increased by nearly 50%. As in neighbouring countries, small holder paddy production dominates Myanmar's agricultural economy: paddy production accounts for roughly half of all cropped area (Agriculture in Myanmar, 2016).

Rice is a major export crop as well as a staple food both in Myanmar and Asean Countries. Myanmar used to be the world's largest exporter in the 1930s, and its annual exports of milled rice reached around 3 million tons. However, the annual exports have shifted to several hundred thousand tons in the past two decades (Kubo, 2005).

The Ayeyarwady Delta is known as the "rice bowl" of the country because of the vast paddy farms occupying the whole region. Its rich alluvial soil is very suitable for agricultural production (Kan Zaw, 1990). In Myanmar, Monsoon paddy cultivated area was 16 million acre and summer paddy cultivated area 3 million acre in 2010 (Zaw Ye Tun, 2012).

Maubin Township is one of the twenty-six townships in Ayeyarwady Region and monsoon paddy is extensively cultivated due to high cost in summer paddy cultivation. But, productivity of monsoon paddy is lower than set target production and low productivity gives low economic return for the local people. Economic return is low due to low productivity and price fluctuation but low productivity was stressed in the paper.

Therefore, Maubin Township was selected to present paddy cultivation particularly monsoon paddy cultivation and economic return of monsoon paddy cultivation from the geographic point of view.

Objectives of the paper are:

- To examine monsoon paddy cultivated area
- To understand the productivity of monsoon paddy cultivation
- To explore cost and economic benefit of monsoon paddy cultivation
- To find out strength, weakness, opportunity and threat of monsoon paddy cultivation

Material and methods

To collect primary data, 8 village tracts of 76 village tracts were chosen. Then, one paddy farmers who experience more than 20 years in paddy cultivation from sample villages was interviewed and 160 questionnaires were distributed to eight village tracts by using stratified sampling based on paddy cultivated area.

Data collected from field observation, interviews and questionnaire survey such as size of paddy farms, paddy yield, income, and cost of farm inputs including fertilizer, pesticide, herbicide, seeds, labour and capital were applied.

Secondary data were mainly used in presenting the paper and geographical methods are also used to illustrate changes in paddy cultivation. To present low net economic return derived from low productivity, productivity method was applied. To high light, high cost and low net economic return, cost benefit analysis were used.

Benefit Cost Ratio proposed by Hussain, A.H. et al was used for finding based on total cost and net revenue. SWOT analysis that highlights strength, weakness, opportunities and threat was applied in presenting the paper.

Geographical Background of Study Area

Maubin Township is situated between North latitudes 16° 30' and 16° 56' and also between East longitudes 95° 24' and 95° 53' (Khaing Myint Cho, 2007). It is lying in the southern part of Ayeyarwady Region. It has an area of 511.86sq. miles or (1325.73 sq. kilometers). It is compact shape. Maubin Township comprises 12 wards in urban area and 76 village tracts in rural area.

The study area has numerous streams: Panhlaing River, KattiyaYegyaw Stream, Khamon Stream, Thaungtu Stream and U Yin Stream, etc. The Ayeyarwady and Toe rivers are major rivers of Maubin Township.

The optimum temperature for rice cultivation is between 25°C and 35°C (Ghadirnezhad & Fallah, 2014). The mean monthly temperature in Maubin is highest in April with 29.7°C (85.46°F) and lowest in January with 22.6°C (72.68°F). Temperature available in the area support paddy cultivation of the area. Annual rainfall in Maubin is 2,513mm (98.8 inches) of which 94 per cent falls in the rainy season. Paddy cultivation is greatly dependent on rainfall and the availability of water (Kiran, 2016). But, the rain fall in harvesting period causes crop loss.

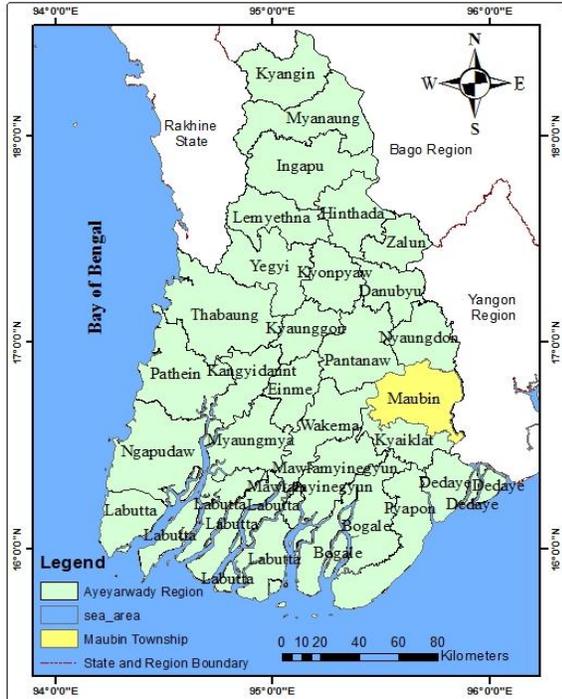


Figure 1: Location of Maubin Township in Ayeyarwady Region
 Source: MIMU (Myanmar Information Management Units)

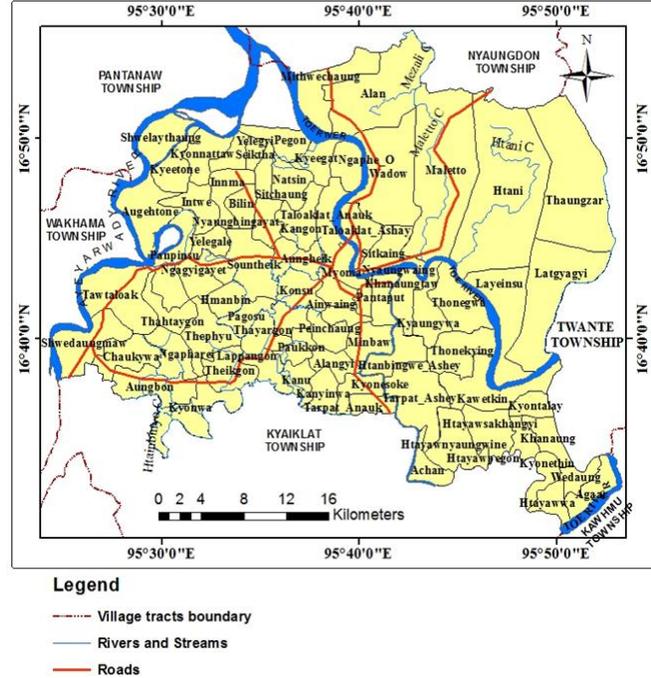


Figure 2: Village Tracts in Maubin Township
 Source: Township and Village Tracts Boundaries are based on Topographic Map (1:50000) (1695-05, 1695-06, 1695-07, 1695-9, 1695-10, 1695-11, 1695-13, 1695-14, 1695-15 and 1795-04, 1795-08, 1795-12, 1795-16)

Young et al, 1998, said that the three main soil groups in the country that are important for paddy cultivation is alluvial soils. As Maubin Township is one of the 26 townships in Ayeyarwady Region and located in deltaic area, alluvial soils cover most of the area and existing soils support for paddy cultivation. Moreover, existing meadow soils are suitable for paddy cultivation.

In 2019, the total population is 310,062 persons of which 159,101 are female and 150,961 male. Therefore, gender ratio is 95. Twenty six percent of total population engages in agriculture. 269,754 persons (87%) of the total population live in rural area and rural population depend on agriculture including paddy cultivation. According to interviews, most farmers are small holders and they possess less than 2 ha (5 acres).

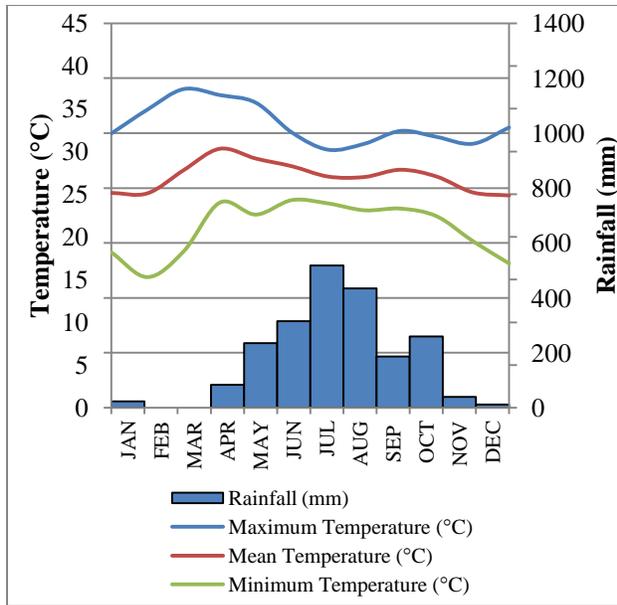


Figure 3: Climograph of Maubin Township
Source: Agriculture Department

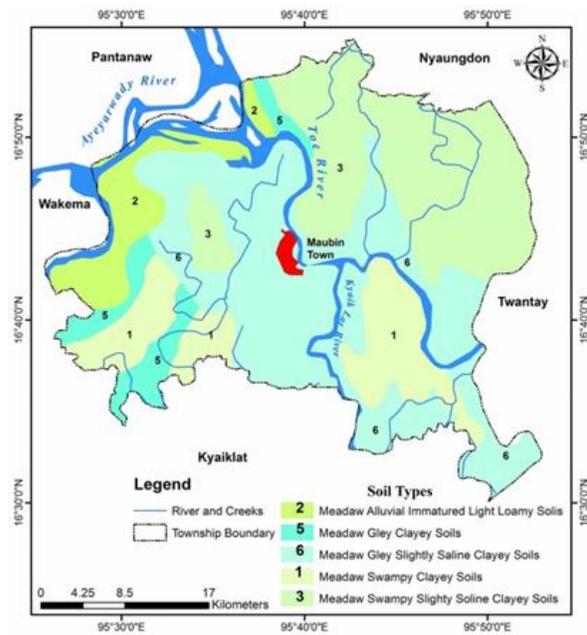


Figure 4: Soils of Maubin Township
Source: Land Use Department, Yangon

Results and Findings

Agricultural land is largest in area among land uses in Maubin Township and it occupies 67 percent of the total township's area including culturable waste land (1 percent) and fallow land (1percent). In area of agriculture land, le land is 89 percent and it ranks first in area. Therefore, major economy of the Maubin Township is agriculture and most rural people engage in agriculture and depend on paddy cultivation.

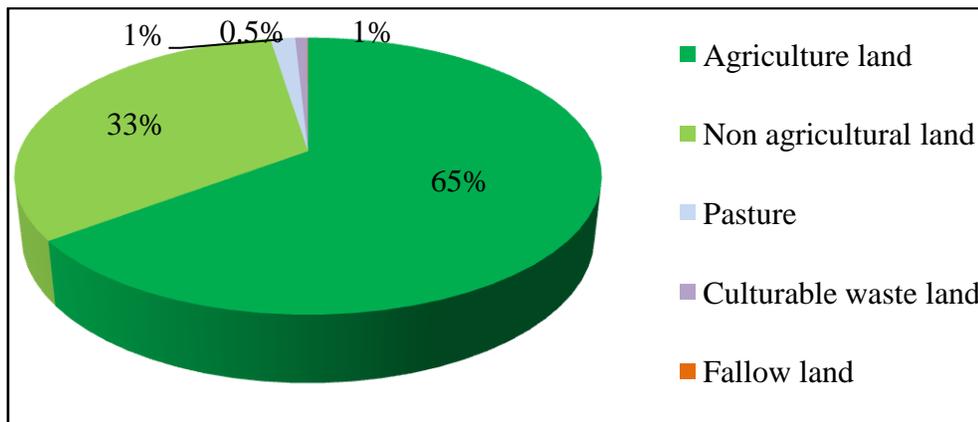


Figure 5: Land Uses of Maubin Township in Ayeyarwady Region

Source: Based on data of Department of Agriculture Land Management Statistics

Major crops grown in the area are paddy, pulses, oilseeds, corn, vegetables and chili but paddy is extensively cultivated because of staple food, major export item and existing physical condition that is very suitable for paddy cultivation.

Monsoon paddy cultivated area

Monsoon paddy is widely grown in Maubin Township but cultivated areas are unevenly distributed in the area.

In Maubin Township, 16 village tracts having cultivated area of less than 500 ha are Sitkaing, Shwelaythaung, Paygon, Letkyargyi, Talokelatashe, Nyaungwine, Weldaung, Htanee, Ahlan, etc, 47 village tracts with the cultivated area of between 501 and 1000 ha are Pantaput, Sitchaung, Kyonthin, Kyeechaung, Htayawpaykone, Htawyawwa, Seikthar, Eiyargyi, Meethwechaung, etc, 10 village tarct with between 1001 and 1500 ha Htanbinkweashe, Inntae, Sakangyi, Thonegwa, Kankon, Nyaungwinegyi, Soonthike, Aungbo, Chaukywa, Shwetaunghmaw, etc and 3 village tracts with more than 1500 ha Tarpartashe, Tawtaloke and Thauzar. Paddy cultivated area are concentrated in the eastern part.

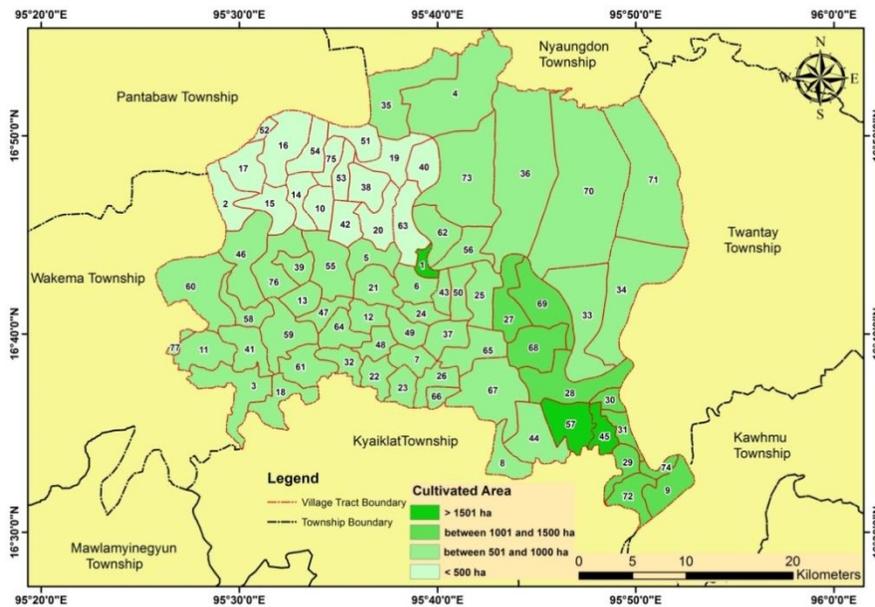


Figure 6: Paddy Cultivated Area of Maubin Township (2019)

Source: Based on data of Department of Agriculture Land Management Statistics

Table1: Paddy Cultivated area of Maubin Township (2018)

Cultivated area	Village Tracts
<500 ha	16
between 501 and 1000 ha	47
between 1001 and 1500 ha	10
> 1501 ha	3
Total Village Tracts	76

Source: Based on data from Department of Agriculture land Management Statistics

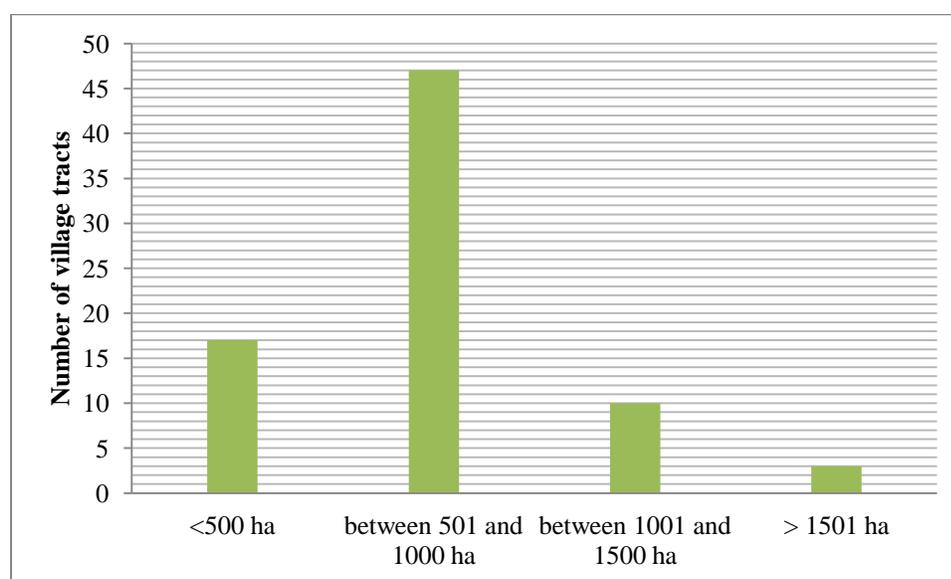


Figure 7: Paddy Cultivated area of Maubin Township (2018)

Source: Based on data from Department of Agriculture land Management Statistics

Monsoon Paddy Productivity

Rice productivity in Myanmar has stagnated in comparison with other rice producers in the region (Denning, et al, 2013). Although government tried to get high yield, the paddy productivity is lower than set target production of 6 ton /ha (120 basket/ acre). The low productivity affects the economic return of the paddy cultivation and income derived from paddy cultivation is small.

To present different productivity level of paddy, productivity of monsoon paddy is grouped as high, medium and low productivity.

High productivity areas are distinctly found in the northern part. The village tracts in the southern part possess medium productivity.

In the area, there was only one village tracts with low productivity, 59 village tracts: Kyontarkalay, Natsin, Chaukywa, Htanbinkweashe, Beelin, Nyaungbingayet, Kankon, Yaylegalay, Thonegwa, Kywedon, Seikthar, Tarpartanauk, Kyeechaung, Khanaungtaw, etc have medium productivity and 17 village tracts: Kyonwar, Ngapie, Meethwechaung, Aungbo, Thonkying, Oughton, Thauzar, Talokelatashe, Paygon, Shwelaythaung, Layeisu, Letkyargyi, Wartaw, etc high productivity.

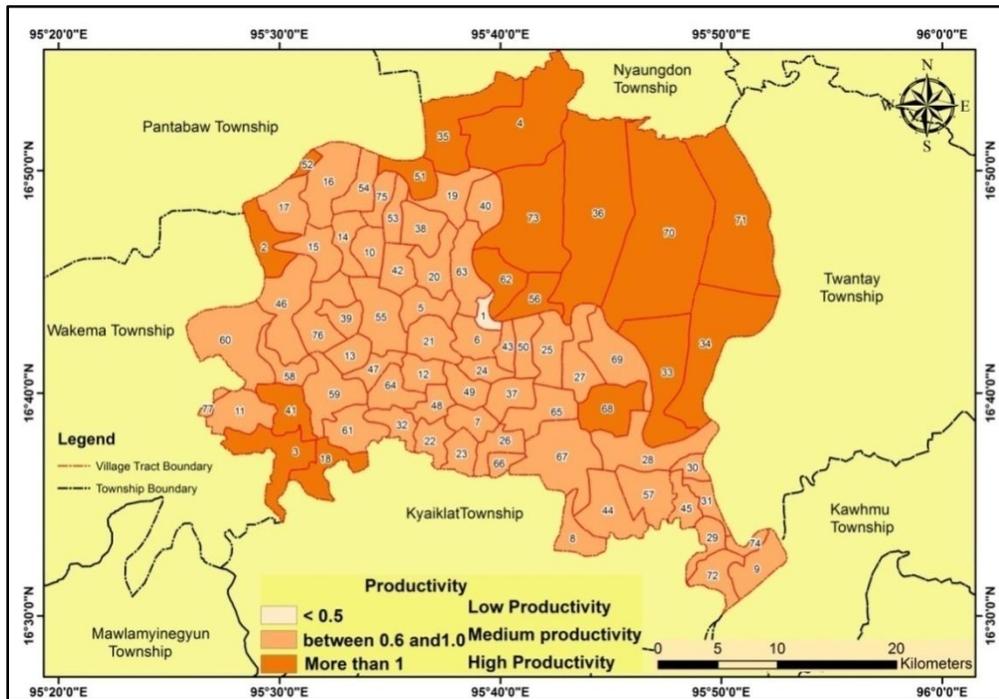


Figure 8: Paddy Productivity of Maubin Township (2018)

Source: Based on data from Department of Agriculture land Management Statistics

Table 2: Paddy Productivity of Maubin Township (2018)

Productivity	Index	Number of Village
Low Productivity	>0.5	0
Medium productivity	between 0.6 and1.0	59
High Productivity	More than 1	17

Source: Based on data from Department of Agriculture land Management Statistics

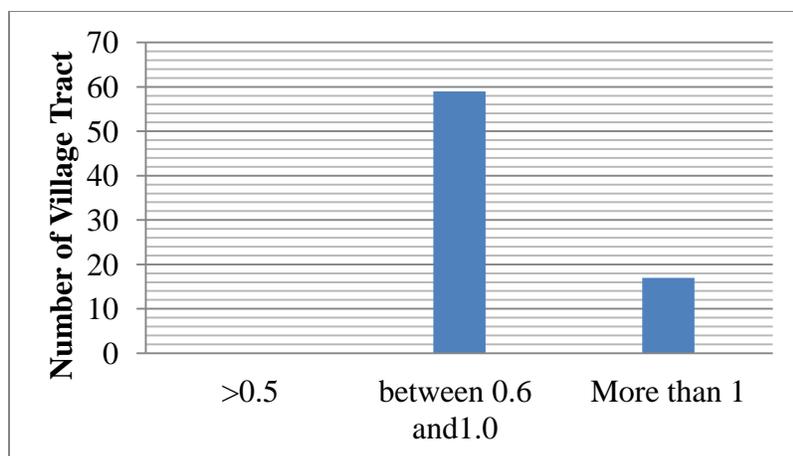


Figure 9: Paddy Productivity of Maubin Township (2018)

Source: Based on data from Department of Agriculture land Management Statistics

Cost- Benefit analysis

To present low net return caused by high investment and low economic return of paddy cultivation, cost- benefit analysis was applied.

Table 3: Cost-benefit Analysis of Monsoon Paddy Cultivation (2018)

Items	Cost/ acre	Cost/ ha	Percent
Tillage	35,000	86,450	12.8
Seed (10000x2)	20,000	49,400	7.3
Planting cost	50,000	123,500	18.3
Urea 1 bag	28,000	69,160	10.2
Potash 0.35 bag	9,500	23,465	3.5
Harvesting	65,000	160,550	23.8
Labour cost	60,000	148,200	21.9
Weedicide and pesticide cost	6,000	14,820	2.2
Total Cost	273,500	675,545	100
Return (56 baskets x7000ks)	392,000	968,240	
Net return	118,500	292,695	

Source: Interviews with farmers (2018)

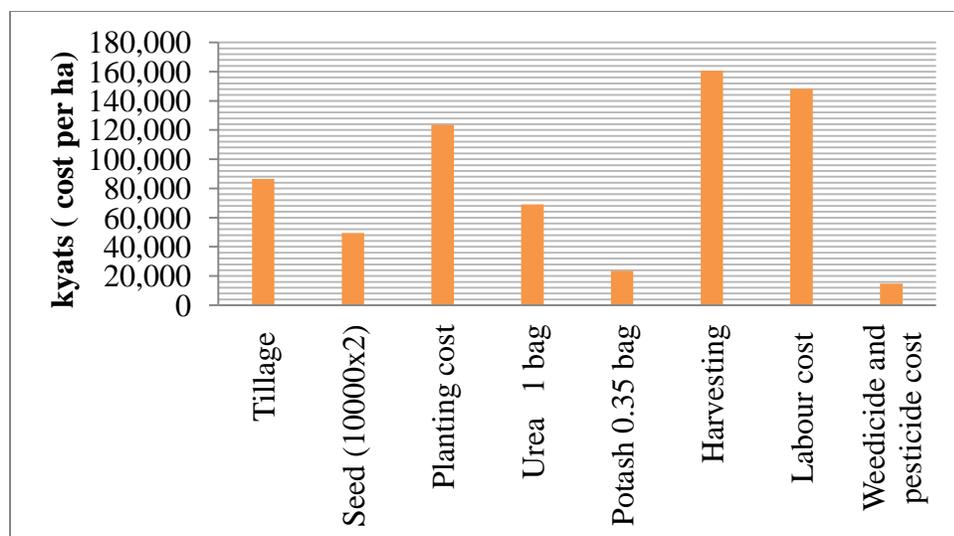


Figure 10: Cost-benefit of Monsoon Paddy Cultivation (2018)

Source: Table 3

According to interviews, they use agriculture machinery in plowing. They mainly use hand-pushed tractors which are made in China. Some farmers lend agriculture machinery from the agricultural company. A hand-pushed tractor takes only 8 hours to plough a farm with an area of a hectare (2.471 acre). Rental cost is 20,000 ks per day. Diesel cost is 3,000 Ks per ha. To drive it, labour cost is 5,000 ks per day. Therefore, total cost of plowing is about 35,000 ks. They tilled their land twice to get high yield in paddy cultivation.

The seeds cultivated are high yield varieties because they have sufficient investment and they intend to get higher yield per unit area. Quality seeds are more expensive and the price is 10,000 ks per basket.

Chemical inputs uses differ from one farmer to another. At the stage of tilling, they use weedicide to kill weeds. They also applied chemical fertilizer according to guidance of agriculture staff. Most farmers use 1 bag of Urea and Potash 0.35 bag per acre of potash in paddy cultivation.

Labour cost includes costs of plowing, harvesting and spraying pesticides. Although machineries are extensively used in plowing, manual labour is still mainly used in harvesting, pumping water and spraying pesticides. Average labour cost is 5,000 ks per day and total labour cost is round about 60,000 ks.

Harvesting is also done by using harvesting machine. The price of harvesting machinery is too high and they cannot afford to agriculture machinery. Most of them rent it and the cost is 135,850 ks per ha (55,000 ks per acre).

Therefore, average economic income derived from paddy cultivation is 968,240 ks per ha (392,000 ks per acre) and farmers get bet benefit and they get 292,695 ks per ha (118,500 ks per acre). Although farmers take nearly 5 months for paddy cultivation, the net benefit is low because of low production and price fluctuation.

SWOT Analysis of Monsoon Paddy Cultivation

To understand strength, weakness, opportunity and threat affecting paddy cultivation and its effect on economic return for local farmers, SWOT analysis was done.

Strength

Suitable physical conditions- existing relief, drainage, climate and soils are suitable for paddy cultivation.

Farm Mechanization-Agriculture machinery use supports paddy cultivation through less labour cost, less risks caused by irregular and untimely rain.

Using high yield varieties- All farmers cultivate high yield varieties to get high return.

Weakness

Insufficient farm machinery use- Small holder farmers cannot afford to buy agriculture machinery.

Unsystematic cultivation method- They practice broadcasting method because of labour shortage.

Small Farm Size- Their farm size is small and mostly rectangular in shape. It is difficult to use machinery in tilling and harvesting. Therefore, work efficiency is low.

Low yield- As a consequence of low input use, their productivity is low.

No external support and Insufficient loan- Amount of loan for paddy cultivation is about 370,500 ks per ha (150,000 ks per acre). It is insufficient for paddy cultivation.

Less awareness on pests- Poor farmers do not have sufficient knowledge on pest and pesticide.

Labour shortage

Poor farmers cannot hire agricultural machinery to plow the land. They depend manual labour and labour cost is high due to labour shortage.

Small holder farmers

According to field observation, most farmers are small holders and possess less than 2 ha (5 acres) of paddy land and it affects mechanized farming as well as systematic paddy cultivation.

Climatic irregularity

Irregular and untimely rain reduces paddy productivity because rain falls in harvesting period destroys the paddy plant and crop loss occurs.

Strength <ul style="list-style-type: none">❖ Suitable physical conditions❖ Farm Mechanization❖ Using high yield varieties	Weakness <ul style="list-style-type: none">❖ insufficient farm machinery use❖ Unsystematic cultivation method❖ Small Farm Size❖ Low yield❖ No external support and Insufficient loan❖ less awareness on pests❖ Labour shortage❖ Small holder farmers❖ Climatic irregularity
Opportunity <ul style="list-style-type: none">❖ Locational advantage❖ Greater rural population❖ strong market demand	Threat <ul style="list-style-type: none">❖ Environmental deterioration❖ Human health problem

Opportunities

Locational advantage- Maubin is situated in deltaic area which is one of the best areas for summer paddy cultivation.

Greater rural population - In the study area, rural population is greater than urban population and most labours are engaged in agriculture. It supports summer paddy cultivation.

Strong market demand- Summer Paddy is extensively cultivated in the area due to staple food and strong market demand.

Threat

Environmental deterioration- Most farmers cultivate paddy twice per year. They use much chemical fertilizers and it affects environment.

Human health problem- Farmers really know the effects of pesticide on paddy cultivation but they use them to protect their plant. It affects not only environment but also health of labours.

Conclusion

Maubin Township is located in deltaic area which is one of the best cultivated lands in Myanmar. Physical conditions: relief, drainage, climate and soils, support paddy cultivation. Topographically, it is located on deltaic low land area and the temperature and rainfall are favourable for paddy cultivation. Most area is covered with meadow soils which are favourable for paddy cultivation.

Although physical conditions are suitable for paddy cultivation, most farmers are small holders and they do not use sufficient amount of inputs due to low investment. Farmers get the loans only 370,500 ks per ha (150,000 ks per acre).

It is necessary to finish harvesting in time to reduce crop loss caused by untimely rain. Therefore the best way is the purchase of machineries by private groups, Agriculture Machinery Department and non-government for the purpose of hiring them to poor farmers.

Some farmers practice unsystematic fertilizer use and it causes such environmental deterioration as soil degradation and pollution. Therefore, education programs on paddy cultivation that causes less environmental impact should be initiated. Moreover, Education programs that enhance the capacity and skills of farmers to understand and solve problems of pests should be undertaken in close collaboration with government organization and nongovernment organizations.

In the future, the importance of paddy cultivation will be higherto meet the need for increasing population. Therefore, it is necessary to extend paddy cultivated area to get high productivity. By cooperating between farmers, local authorities' concerned, governmental and

non-governmental organization, paddy cultivated area and productivity will be increased with less environmental impacts which lead to sustainable bases.

Further researches on seed availability, farmers' perception and awareness on paddy cultivation, price fluctuation etc should be done to get higher income derived by paddy cultivation.

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