

## Changing Agriculture Sector and Cultivation Practices of Zalun Township

Mu Mu Thet<sup>1</sup>, Pan Ei Phyu<sup>2</sup>, Khin Hnin Phyu<sup>3</sup>

### Abstract

The paper tries to present changing agriculture sector and cultivation practices of Zalun Township located in deltaic area of Myanmar. The causes such as effects of climate change, support of agriculture department, loan availability, market price and demand, farmers' attitude, migration and development of agriculture machinery are found as supporting factors and change in cropping system and crop calendar, dominant crops, land preparation, cultivation methods, change in seeds, inputs, change in harvesting and transporting agriculture products are found as effects. The objectives of the paper are to explore the changes in crop cultivation of Zalun Township, to study the root causes affecting change in agriculture and to predict future prospect on agriculture. The paper is presented by using descriptive approach. To present the paper, primary data were collected through interviews, group discussion and open talks which is were mainly used.

**Keywords:** changing agriculture sector, cultivation practices, support of agriculture department, farmers' attitude, cropping system and crop calendar

### INTRODUCTION

Agriculture is still Myanmar's most important sector, providing jobs for more than 60% of the population. The sectors' contribution to the economy has been increasing over the last decade, and now accounts for around 25% of GDP (ASEAN, 2020). Agriculture also contributes significantly to food security, which is critical as the sustainable development goals (SDGs) (Al-Amin et al. 2011).

In Myanmar, many reforms have been done since the late 1988s, and the agricultural sector has evolved from central planning to a more market-based system (Asian Development Bank, 2013). After 1988, farmers have a chance to cultivate the crops that they want to. Then, changes in agriculture are found.

Zalun Township is located on the Ayeyarwady deltaic area so existing fertile soils support agriculture and annual crops cultivation especially paddy which is mainly cultivated in that area. Among annual crops, paddy is most important because of a stable crop. Many analysts agree that the economy of Myanmar mainly based on agriculture with heavy emphasis on rice production (Takahashi 2001, Myat Thein 2004). Among oil seed crops, groundnut and sunflower are dominant because of climatic suitability.

Although its economy has traditionally been based on agriculture, changes have been distinctly found in Zalun Township. Changes in agriculture sector are also related to change in drainage and soils, and other factors such as capital, labour, transport, investment and attitude of the farmer, institutional supports. In the study area, both cultivated area and productivity changed due to farmers' perception, technology used, investment, etc. Therefore, Zalun Township is selected as a study area to study changing agriculture sector and cultivation practices.

---

<sup>1</sup> Tutor, Department of Geography, Hinthada University

<sup>2</sup> Tutor, Department of Geography, Hinthada University

<sup>3</sup> Professor and Head, Department of Geography, Hinthada University

## Study Area

The Zalun Township is situated between 17° 20' and 17° 40' North latitudes and between 95° 15' and 95° 48' East longitudes. The area of Zalun Township is 640.90 square kilometres(158364acres) (Mu Mu Thet, 2016).



Figure 1. Location of Zalun Township in Ayeyarwady Region

Source: Myanmar Information Management Unit



Figure 2. Townships in Ayeyarwady Region

Source: Myanmar Information Management Unit

It is the fourth smallest out of 26 townships of Ayeyarwady Region. It is composed of an urban area and 66 village tracts. Most of the areas are flat alluvial plain below 15.23 metres (50 feet) that is one of the advantages for agriculture.

According to Koppen's system of climate classification, Zalun Township experiences Tropical Monsoon climate (Am) and the average total rainfall is 2252.71 mm. Existing temperature and rainfall support crop cultivation. Being located in Ayeyarwady Region, cereal crops, oil seeds and pulses are mainly cultivated. Agriculture is also major economy of the area and the changes such as input changes, farming practice changes, rent return changes, etc were found in the area.

### Aim

The main aim of this paper-

- To give suggestions causing agriculture that gives high benefit and less risk to local people

### The Objectives of the Paper are:

- To explore the changes in crop cultivation of Zalun Township
- To study the root causes affecting change in agriculture and
- To predict future prospect on agriculture

### Sources of Data and Methodology

To present the paper, primary and secondary data were used. Primary data such as input uses, existing problems and farmers' attitudes were collected by interviewing with local authorities, farmers and authorities concerned of the departments. The necessary secondary data were collected from the department concerned, books, journals and magazines. Secondary

data were acquired from Department of Meteorology and Hydrology, population data from Department of Labour, Immigration and Population, soil types and their characteristics from Land Use Department, Zalun. Types of land use and the data on crop cultivated areas from Land Records Department and Agriculture Department. GIS Techniques were used to portray maps.

## RESULTS AND FINDINGS

### Change in Production of Dominant Crops of Zalun Township

In Zalun Township, although cultivated areas of paddy, oilseed crops and pulses fluctuated in the study period after 1988 onwards, productivity of crop increased due to supporting factors such as loan, investment, etc.

Paddy cultivated area was 21171 hectares (52313.0acre) in 1988 which increased to 30393 hectares (75101.1acre) in 2002 and again increased to 32008 hectares (79091.8 acre). The increase was due to the reduction in summer paddy area as irrigation water was not sufficient for the summer paddy cultivation. Yield per unit area of paddy was fluctuated in the study period. It is 4.2 ton per ha (84 baskets per acre) in 2005-06 and it gradually increased to 5.0 ton per ha (100 baskets per acre). It was due to better climatic conditions of the area and high input uses. Low productivity was caused by untimely rain.

Oilseed crops cultivated area was 7085 hectares (17507.0 acre) in 1988 which decreased to 5519 hectares (13637.4 acre) in 2002 and further decreased to 590 hectares (1457.9 acre). The area occupied by oilseed crops decreased in study period due to higher market demand and practice of pulses. Major oil seed crop is groundnut and cultivated area increased due to higher price of groundnut and climatic suitability. Although yield per unit area is fluctuated, productivity generally increased in the study period due to new varieties that produce high yield and larger cultivated area.

Pulses cultivated area was 9810 hectares (24240.5acre) in 1988 which increased to 10945 hectares (27045.1 acre) in 2002 and again increased to 37308 hectares (92188.1 acre). Black gram (Matpe), at present, ranks first in sown acreage among pulses. It is mostly grown on Le Land as a second crop (double crop), soon after the harvest of paddy in the post-monsoon period. Matpe cultivated areas were found in 50 village tracts in Zalun Township. Black gram (Matpe) cultivated area increased due to high market demand and higher price.

### Change in Cropping System and Crop Calendar

|      | Jan                | Feb | Mar | Apr | May                       | Jun                       | Jul | Aug | Sep | Oct | Nov | Dec |
|------|--------------------|-----|-----|-----|---------------------------|---------------------------|-----|-----|-----|-----|-----|-----|
| 1988 |                    |     |     |     | Monsoon Paddy Cultivation |                           |     |     |     |     |     |     |
| 2017 | Pulses Cultivation |     |     |     |                           | Monsoon Paddy Cultivation |     |     |     |     |     |     |

|  |                                  |
|--|----------------------------------|
|  | Land preparation for cultivation |
|  | Growing period                   |
|  | Harvesting                       |

**Source: Interviews (1.6.2022)**

After 1988, after practicing market oriented economic system, farmers became more interested in cultivation due to freedom in marketing system. They practiced double cropping

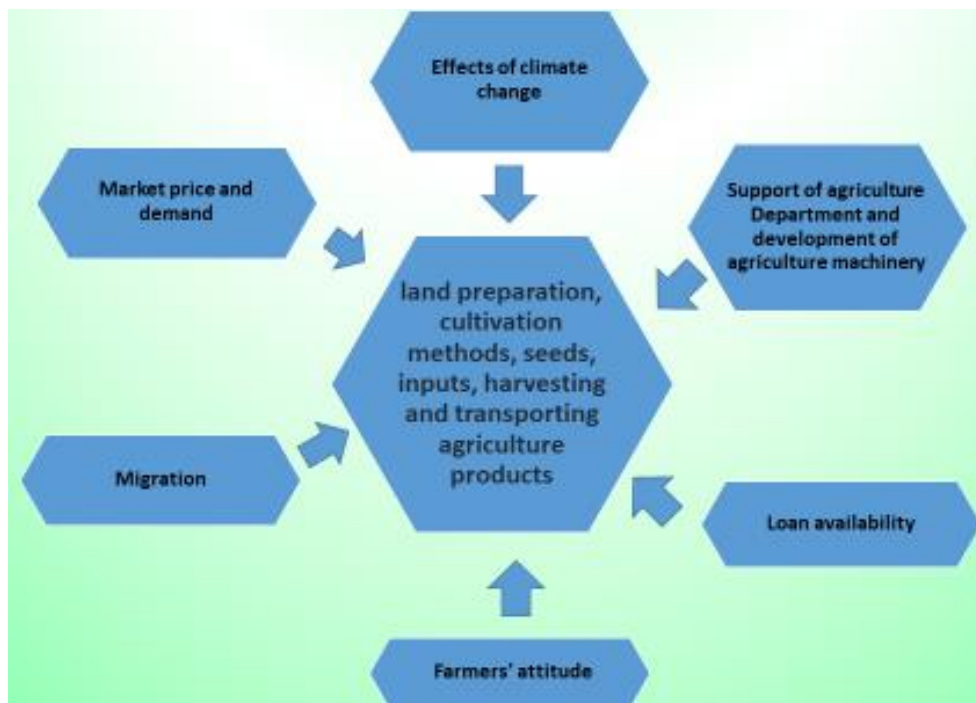
and paddy-pulses cropping system was found. They cultivate paddy in the rainy season and pulses especially black gram in cool dry period.

**Supporting Factors and Changing Agriculture Practices**

Supporting Factors include Effects of climate change, Support of agriculture Department, Loan availability, Farmers’ attitude, Migration, Market price and demand and Development of agriculture machinery.

**Effects of Climate Change**

Climate change affects not only types of crop grown in an area but cropping calendar. Due to late monsoon, paddy is grown in June and paddy growing period was changed.



**Flow Chart: Supporting Factors and Changing Agriculture Practices**

**Table 1: Changes on Agriculture Practices**

|                             | Percentage of the farmers in 1988 | Present |
|-----------------------------|-----------------------------------|---------|
| Draught animals             | 95                                | 3       |
| Transplanting method        | 90                                | 10      |
| Traditional seeds           | 5                                 | 27      |
| Chemical input              | 10                                | 93      |
| Machinery use in harvesting | 0                                 | 90      |

Source: Semi structured questionnaires

**Support of Agriculture Department**

Agriculture Department plays important role for change in agriculture sector. They share modern knowledge on input, pests, growing periods, etc that cause change in crop cultivation and yield.

## Development of Agriculture Machinery

Farmers can avoid untimely and irregular rain by shortening cultivation period including planting and harvesting period. In harvesting period, untimely rain is common because of cyclone of south china sea. Time and cost can be saved by using modern agriculture machinery. But it brings negative consequences that are less job opportunity in agriculture by using machine in land preparation, planting and harvesting.

## Loan Availability

Agriculture loan for paddy gradually increased from 10000 ks per acre to 150000 Ks per acre. Agricultural loans are used as investment that affects amount of inputs use that gives higher crop yield.

## Farmers' Attitude

Farmers' attitude is also an important and they can choose the crops which pay high benefit and need low investment as well as the crop that had higher demand last year due to getting more freedom in choice. It is also a major factor affecting change in crop cultivation.

## Migration

Migration is global phenomena affecting agriculture. Although the farmers know that transplanting method give high yield and high economic income, they cannot practice transplanting method due to labour shortage.

## Market Price and Demand

Choice of crop of the growers mainly depends on market price and demand. Due to high price of black gram and higher market demand, black gram is extensively cultivated and areas of other types of pulses and oil seed crop decreased in Zalun Township.

## Changing Agriculture Practices

In the study area, land preparation, cultivation methods, seeds, inputs, harvesting and transporting agriculture products have been changed in the agriculture sector.

## Change in Land Preparation

Although mechanized agriculture started in 1970s, more than 95 percent of the farmer use draught animals in agriculture because cost of agriculture machinery is high. Draught animals have been mainly used in land preparation since many decades.



Plate 1. Traditional agricultural tool (hte) for land preparation  
Source: Field observation, Zalun,(12.10.17)



Plate 2. Hand tractor for land preparation  
Source: Field observation, Zalun, (21.11.17)



Plate3. Modern agricultural Implement for landpreparation  
Source: Field observation, Zalun,(21.5.22)

Draught animals were reared in the area due to the lack of grazing land. Straw was available because of manual harvesting and it is major requirement for cattle at that time. Land preparation with draught animals took 2 days per acre, with hand tractor a day per acre and with modern machine only 3 hours per acres. At present, only 3 percent of the farmers who are small holders use draught animals in land preparation.

### Change in Cultivation Methods

Like other areas within Myanmar, transplanting method was used in the area before 1988 because of sufficient rain in deltaic area. More than 90 % of the farmers applied transplanting method.

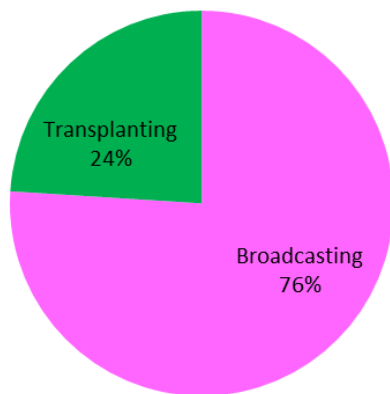


Figure 3. Cultivation Methods practiced Zalun Township  
Source: Field observation, Zalun, (21.11.17)



Plate 4. Traditional Transplanting method  
Source: Field observation, Zalun, (21.11.17)



Plate 5. Broadcasting method in paddy cultivation  
Source: Field observation, Zalun, (21.11.17)

But, then, after 1988, the method locally called Kyo Tan Swe is used in the study area because of guidance of authorities. But the method is not suitable for some areas that have labour shortage problems because of high labour cost. Moreover, the farmers who do not have insufficient investment do not practice this method due to high cost. Thirty-eight of the farmers did not practice this method.

As urbanization has been gaining momentum in Myanmar at the beginning of 21<sup>st</sup> Century and youngest adults moved to urban area, agriculture labour shortage problem occurred. At present, farmers practice broadcasting method for the purpose of reducing labour cost. More than 90 percent of the farmers use broadcasting method.

### Change in Seeds

Before 1988, the seeds produced from the owned farm previous year were cultivated and only 5 percent of the farmers used seed sold from department due to high cost of transport and less accessibility. At that time, local varieties are mainly cultivated. After 2000, seeds were distributed from Agriculture Department but the price is slightly higher. But, quality seeds were mixed with low quality seeds and the quality of seeds also became low. At present, 73 percent of farmer use the seed produced from the farm previous year and people lived in the village due to higher price of seeds sold from Agriculture Department. The average price of seeds is 6500ks per basket from local people and 7500 per basket from Agriculture Department.

### Change in Inputs

Before 1988, fertilizer was slightly used because it is difficult to buy it. Only 10 percent of the respondents used chemical fertilizer. After 1988, Agriculture Department supplied chemical fertilizers and most farmers used Urea (Palei). But, the department stopped selling chemical fertilizer to the farmers and price of fertilizer became high. Farmers cannot afford to buy chemical fertilizer because the price was high. Therefore, amount of fertilizer use decreased.

After 2005, the amount of loan for cultivation increased and farmers use chemical fertilizers particularly Urea and T-super. 93 percent of the farmers used chemical fertilizers to get high yield. But, most farmers use chemicals including N, P and K produced from private companies to increase productivity.

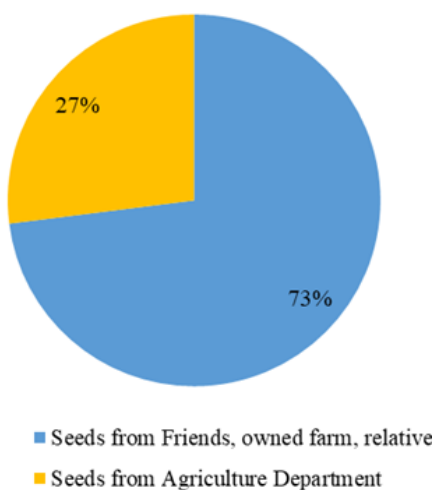


Figure 4. Seeds availability in Zalun Township  
Source: Field observation, Zalun, (21.11.17)

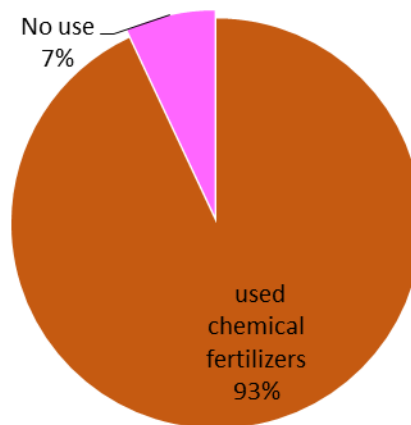


Figure 5. Fertilizer use in Zalun Township  
Source: Field observation, Zalun, (2.6.22)

### Change in Harvesting

Before 1988, paddy was harvested by using manual labour. After practicing market oriented economic system in Myanmar, agriculture machinery was used in harvesting.

Labour shortage caused by migration is a major driving force for using harvesting machine in paddy cultivation. In 2013, combined harvesters introduced in paddy cultivation. At present, 90 percent of the farmer used combine harvesters in Zalun Township because it can reduce time spent for the purpose of escaping untimely rain and can also reduce labour cost in harvesting.

When harvesting is done by manual labour, threshing and winnowing are also done by manual labour. But, when modern agriculture machinery is used, harvesting, threshing and winnowing are done at the same time.



Plate 6. Manual harvesting  
Source: Field observation, Zalun,  
(21.11.17)



Plate7. Harvesting with modern machinery  
Source: Field observation, Zalun,  
(17.11.21)



Plate 8. Threshing after harvesting  
Source: Field observation,  
Zalun,(2.11.19)



Plate 9. Winnowing after threshing  
Source: Field observation, Zalun,  
(2.11.19)

It can save time and money for the local farmers. Most of the farmers cannot afford to buy harvesting machine because it is expensive and these farmers rent these machines from Agriculture Machinery Department and Private sources.

### **Change in Transporting Agriculture Products**

Although paddy and pulses are not perishable agriculture products, transport vehicle is essential to move one area to another because they are heavy and bulky. After harvesting paddy, paddy was carried by bullock carts last thirty years ago.

After 1988, they used trailer jeep in transporting agriculture products. At that time, most are gravel roads that caused difficulty in carry agriculture products from farm to owner's home or from one place to another.

At present, agriculture products are carried by trailer jeeps and private cars. Better accessibility caused by better roads support transporting agriculture products and most farmers afford to buy jeeps and private cars for the purpose of carrying their products although their price is high.





Plate 10. Transporting agricultural products

Source: Field observation, Zalun, (15.11.21)



Plate 11. Transport vehicles used in Zalun Township

Source: Field observation, Zalun, (21.11.17)

## CONCLUSION

Zalun Township is located in the northern most part of Ayeyarwady Region of Myanmar, a developing country and agriculture is main pillar to economy as well as most farmers engage in agriculture. After practicing market oriented economic system in Myanmar, farmers get the opportunity to choose the crop they want to and farmers are more interested in crop cultivation due to higher benefit. Therefore, cultivated areas of crop changed.

Although paddy cultivated area fluctuated, productivity increased due to high yield varieties. Other crops cultivated area also changed and the changes are resulted from market demand and price. But, productivity generally increased due to farmers' attitude and high yield varieties as well as input uses.

Farming methods also changed in the study period. Transplanting and broadcasting are traditional methods in the study area and farming method used in cultivation is depending on investment and labour force. Agriculture Department introduced Systematic Rice Intensive in the area but it is not successful in the area due to high labour cost.

Last decade, farmers in the area did not use chemical fertilizers and pesticides; nowadays they realized the benefits of input use and fertilizer requirement of their soils, they apply suitable chemical fertilizers and pesticides. Moreover, they use plant nutrient sold by private shops and most farmers commonly use Pale, T-super and Compound Fertilizer (NPK) in crops cultivation. Farmers understand the requirement of the soils and micro nutrients are also applied in the crop cultivation in Zalun Township.

Changes in agriculture are related to farmers' perception, investment, support of the government and agriculture department, etc. In summing up, changes in agriculture of Zalun Township show the growth of crop cultivation and production and in the future, rural people particularly crop growers will get the advantages of changes and their socioeconomic condition will be surely better.

Agriculture practice also changed due to encouragement of staff of agriculture that changes farmers' attitude. Farming practice also changed and the changes somehow unfold the change in attitude of farmers and it leads to higher production and high socioeconomic conditions of the local people. The changes are the signs of development that will be gaining momentum as an effect of globalization. Changing agriculture will bring positive and negative impacts on local people and it is needed to do further studies on consequences of changing agriculture including environmental pollution, effects on human health, changing local job

opportunities, migration, etc for the purpose of reducing negative impacts and getting socioeconomic development as well as rural development through agriculture.

#### **Acknowledgements**

Firstly, we would like express our thanks to Dr Theingi Shwe, Rector, Dr Yee Yee Than and Dr Cho Kyi Than, Pro-Rectors, Hinthada University for giving the chance to write this research paper and for their encouragement. We would like to extend our thanks to Professor and Head of the Department Dr Khin Hnin Phyu for her advice and helps in doing this research work.

#### **References**

- Al-Amin, A. Q., W. Leal, J. M. De la Trinxeria, A. H. Jaafar, and A. Z. Ghani. 2011. Assessing the Impacts of Climate Change in the Malaysian Agriculture Sector and its Influences in Investment Decision. *Middle-East Journal of Scientific Research* 7 (2): 225–234.
- Asia Development Bank, 2013, Myanmar: Agriculture, Natural Resources, and Environment Initial Sector, Asia Development Bank
- ASEAN,2020, Agriculture Sector Brief Myanmar ([https:// aseanaccess. com/ images/ pdf/agriculture/ Myanmar AGRUpdate.](https://aseanaccess.com/images/pdf/agriculture/Myanmar_AGRUpdate.pdf))
- Mu Mu Thet, 2016, Geographical Analysis on Land Uses of Zalun Township, Unpublished M.A. Thesis, Department of Geography, Hinthada University
- Myat Thein. 2004. Economic Development of Myanmar Singapore: Institute of Southeast Asian Studies.
- Takahashi, Akio, 2001, “Myanmar- Konnann na Shjyo Keizai he no Iko [Myanmar- Difficult Transition to a Market Economy]” Hara, Yonosuke ed. *Ajia Keizai Ron Shin Pan [Asian Economies New Edition]* Tokyo: NTT Press, pp.295-323.