

PADDY CULTIVATION AND ITS ECONOMIC RETURN OF TAUNGOO TOWNSHIP

Thida Naing¹, Moe Ommar Lwin², Moe Moe³, Aye Mya Lwin⁴, Thandar Thaw⁵

Abstract

Paddy is the staple food of the people in Myanmar. Paddy is cultivated throughout the study area which is situated in the Sittaung Valley at Taungoo District of Bago Region. The objectives are to examine factors affecting on temporal changes of paddy cultivation and production, to analyze paddy cultivation of Taungoo Township and to investigate the favourable conditions for the spatial distribution of paddy cultivated areas and its economic return. Temporal changes of monsoon paddy and summer paddy cultivation and production were found and summer paddy was mostly cultivated as double cropping with irrigation system in this study area. In this paper, to present the paddy cultivation and production and its economic return condition of the study area, interviews, informal talks and focus group discussion were done with the responsible persons of the department concerned and local farmers as well as head of the village tracts. Secondary data were obtained from Department of Agricultural Land Management and Statistics, Taungoo Township. Cost benefit analysis was also applied to present the effects of economic return on paddy cultivation in Taungoo Township. SWOT analysis used to analysis the advantages and disadvantages of paddy cultivation in this paper.

Keywords: Monsoon paddy, summer paddy, cost benefit analysis, SWOT analysis

Introduction

Paddy is the staple food for three billion people, 90 per cent of whom live in Asia. For centuries, paddy has been the most important source of food, employment and income for the rural people in Asia. Increase in paddy cultivated area and paddy production over the last 50 years has played in achieving food security and alleviation malnutrition and poverty. Paddy grows in a wide range of environmental conditions and is productive in many situations (Thida Lwin, May, 2014).

Agriculture has been and will continue to be the life line of the Myanmar economy. Paddy is the most important food grain in Myanmar. Therefore, paddy cultivation is one of the highest priority tasks of the country. Myanmar's climate, land, natural resources and readily available work force are contributing factors to agriculture development.

Taungoo Township is situated in the Sittaung valley at the Taungoo District of Bago Region. Its main economic activity is agriculture especially paddy cultivation. It is surrounded by rivers and separated with neighbouring townships. The monsoon climate with its heavy rainfall and constant high temperature is ideal for paddy growth. Moreover, its extensive plains, rivers and streams are water logged in the rainy season and are suited therefore, only for the growth of paddy. Climate directly influences on the growth, development and grain formation of paddy plant. In the study area, all kinds of soils can be used for rice cultivation if water conditions are favourable. The best type of soils for paddy is meadow alluvial soil (Gleysols (dystric) and Fluvisols) and brown meadow soils both soils can give good paddy yield.

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In the area, rural population depends on income derived from paddy cultivation. To present input uses, production and profitability obtained from paddy cultivation from geographical point of view, the area was selected as study area.

Objectives

Objectives of the paper are:

- to examine factors affecting on temporal changes of paddy cultivation and production,
- to analyze the cost and benefit of paddy cultivation in Taungoo Township
- to investigate its economic return for local people
- to analyze advantages and disadvantages of paddy cultivation of Taungoo Township

Data and Method

In this paper, primary data such as investment, input cost, seeds, marketing were collected by using interviews and informal talks to present the paddy cultivation and production as well as its economic return in the study area. Interviews were done with 10 farmers from 5 village tracts and focus group discussions in 5 village tracts with the experienced persons in paddy cultivation, authorities of the agriculture department and head of the village tracts. Secondary data were obtained from Department of Agricultural Land Management and Statistics, Taungoo Township. Cost benefit analysis was also applied to present the economic return on paddy cultivation in Taungoo Township. SWOT analysis used to analysis the advantages and disadvantages of paddy cultivation.

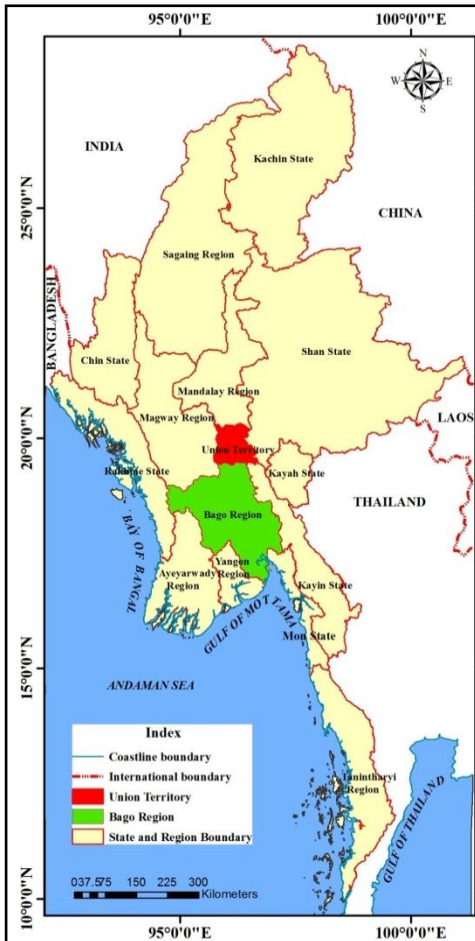
Geographical Background of the Study Area

Taungoo Township is situated in the Sittaung valley at the Taungoo District of Bago Division. It lies between North latitudes 18°56' and 19°10', and East longitudes 95°51' and 96°41' (Figure 1.1). Total area of township is 663.152 square miles. There are 38 village tracts in which 253 villages and 11211 farmers are included in Taungoo Township (Figure 1.2).

Generally the relief of Taungoo Township can be divided into three parts and the middle lowland or flat plain is suitable for paddy cultivation. The minimum average temperature is 21.43°C (70.57°F) and maximum average temperature is 32.99°C (91.38°F). The annual mean temperature is 27.21°C (80.98°F). Average annual rainfall is about 2023.74mm (79.68inches) (2001-02 to 2017-18).

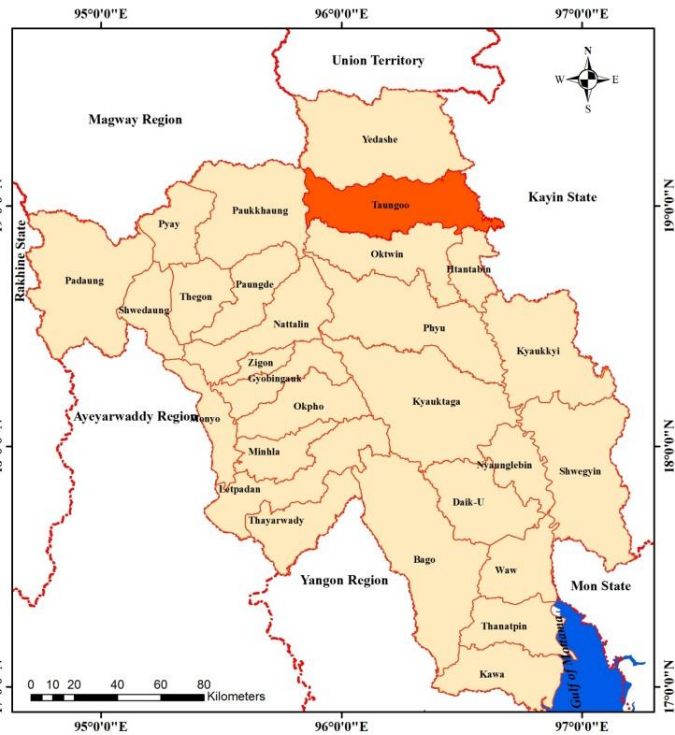
There are eight types of soil in Taungoo Township. Among them, meadow alluvial soil (Gleysols (dystric) and Fluvisols) is fertile and it is suitable for paddy, maize, sugarcane, groundnut, sesamum and various kinds of pulses. Existing physical conditions are suitable for paddy cultivation in the study area.

Since Yangon-Mandalay Highway and Yangon-Mandalay Rail road is passing through the Taungoo, the town itself has good transportation accessibility. There are two latitudinal roads radiating through Taungoo in the eastern part of Taungoo: Taungoo-Thandaunggyi Road and Taungoo- Leiktho- Yado Raod. In the western part, Yangon-Mandalay High-speed Road is upgraded and extended. The rest are connecting Taungoo and its hinterland villages (Figure.1.3).



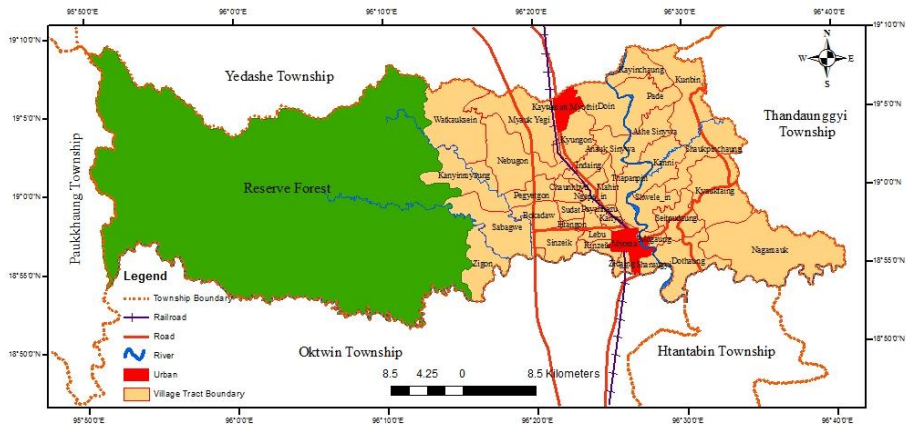
Source: Land Use Department of Yangon

Figure 1.1 Location of Bago Region in Myanmar



Source: Land Use Department of Yangon

Figure 1.2 Location of Taungoo Township in Bago Region



Source: Department of Agricultural Land Management and Statistics, Taungoo Township.

Figure 1.3 Urban Area and Village Tracts in Taungoo Township

Spatial and Temporal Variations of Paddy Cultivation in the Study Area

Spatial and Temporal Variations of Monsoon Paddy Cultivation

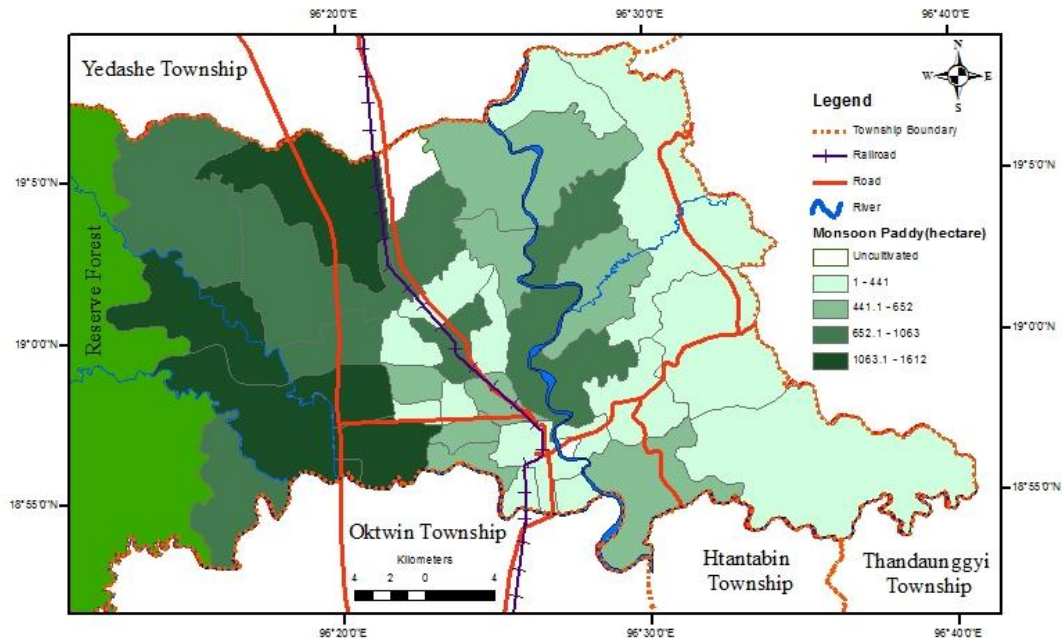
Monsoon paddy is extensively grown in the whole township of *le* land and the chief growing crop land in the rainy season. It is sown in mid-June and harvested in October or November. The sown area, mature area, yield per hectare and paddy production during the period from 2007-08 to 2017-18 are presented in Table and Figure. Paddy Production Program for the highest yield was initiated in 1982-83 for the whole Township. The program consisted of four major components (1) Proven new technology, (2) Government support and leadership, (3) Selectivity and concentration and (4) Demonstration and competition (Thida Lwin, May, 2014). However, the yield declined in the subsequent years due to various reasons in which the main factor was the shortage of agricultural inputs such as fertilizer, seed, and farm tool and so on.

The area of cultivated and matured, yield and paddy production from 2007-08 to 2017-18 are presented in Table 1 and Figure 1.4. The area was high in starting year of 2007-08 with only 28783 hectares (71124.06 acres), and it dropped gradually and lowest in 2017-18 with 23605 hectares (58328.99 acres) due to high price of diesel oil for driving pumps and high cost of labour. In 2017-18, Monsoon paddy was mostly grown in Sinneik, Sabakywe, Kanyinmyaung and Myaukyeiky village tracts, as they are located near the Khabaung Creek and Pabe Creek.

Table 1 Net Sown Areas, Matured Area, Yield and Production of Monsoon Paddy in Taungoo Township (2007-08to 2017-2018)

Year	Net Sown (Hectare)	Matured Area (Hectare)	Yield (Ton/hectare)	Production(tons)
2007-08	28783	28783	32.49	2310690
2008-09	29785	29785	32.51	2392918
2009-10	29786	29786	32.52	2393313
2010-11	29793	29793	32.67	2404857
2011-12	28952	28487	31.86	2243158
2012-13	26460	26426	32.25	2106142
2013-14	23943	20952	32.00	1656869
2014-15	23662	23662	32.10	1876605
2015-16	23747	23631	32.18	1878887
2016-17	23635	23417	32.22	1864484
2017-18	23605	22535	32.17	1791349

Source: Department of Agricultural Land Management and Statistics, Taungoo Township



Source: Department of Agricultural Land Management and Statistics, Taungoo.

Figure 1.4 Monsoon Paddy Cultivated Areas in Taungoo Township (2017-18)

Spatial and Temporal Variations of Summer Paddy Cultivation

Within the study area, summer paddy has been grown since 1993-94 in Seikphutaung, Mokaung and Doethaung village tracts with the irrigation water from Pathi Reservoir. Some villages in Kanni and Shwelayinn village tracts have grown summer paddy with the irrigation water released from Kanni Diversion Weir since 2000-01. In the same year Swa chaung Reservoir irrigated the farmlands of some villages in Myaukyekyi village tract for the cultivation of summer paddy. Some villages in Anauksin, Thaphanpin and Mahin village tracts introduced summer paddy in 2009-10 with the irrigation water acquired from the Sittaung River lifted by using electric power. Kayinchaung Diversion Weir began supplying water in 2005-06 to the villages of Kauinchaung village tract. (Kyi Kyi Mya, May 2013)

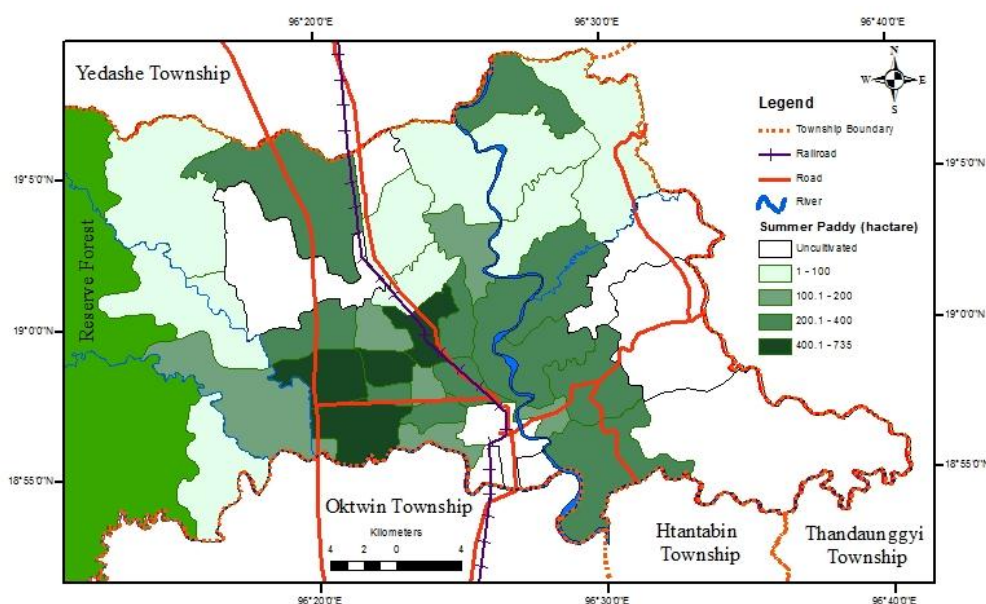
The area of cultivated and matured, yield and paddy production from 2007-08 to 2017-18 are presented in Table 2 and Figure 1.5. The area was low in starting year of 2007-08 with only 2672.55 hectares (6603.988 acres), and it increased gradually and peaked in 2017-18 with 7151.21 hectares (17670.95 acres). However, the area dropped sharply to 2513.50 hectares (6210.969 acres) in 2011-12 due to high price of diesel oil for driving pumps and high cost of labour. In 2017-18, summer paddy was mostly grown in Sinneik, Bokadaw, Sudat village tracts, as they are located near the Khabaung Creek and Pabe Creek from which water is pumped into the paddy fields.

For the eastern part of the township, summer paddy is not cultivated owing to lack of canals, permanent streams and other water available conditions. The total production of paddy in 2017-18 was 658484 tons. At an average rate of 0.3 ton (15 baskets) per person (Kyaw Myint, 2004, p-97), the paddy necessary for the entire population (244360) of the township was 73308 tons (244360x0.3). Thus the township is self- sufficient in paddy production.

Table 2 Net Sown Area, Matured Area, Yield and Production of Summer Paddy in Taungoo Township (2007-08 to 2017-2018)

Year	Net Sown (Hectare)	Matured Area (Hectare)	Yield (Ton/hectare)	Production(ton)
2007-08	2672.55	2672.55	34.93	230667
2008-09	2832.80	2832.80	35.15	246049
2009-10	2926.28	2926.28	34.96	252802
2010-11	2908.88	2908.88	35.07	252055
2011-12	2513.50	2513.50	35.14	218248
2012-13	4012.06	4012.06	36.08	357665
2013-14	5933.51	5933.51	36.11	529506
2014-15	6353.17	6353.17	36.16	567719
2015-16	6217.19	6217.19	35.49	545176
2016-17	6319.58	6319.58	35.37	552417
2017-18	7151.21	7151.21	37.26	658484

Source: Department of Agricultural Land Management and Statistics, Taungoo Township.



Source: Department of Agricultural Land Management and Statistics, Taungoo.

Figure 1.5 Summer Paddy Cultivated Areas in Taungoo Township (2017-18)

Cost- Benefit Analysis on Paddy Cultivation

Cost- benefit in Monsoon Paddy Cultivation

In the study area, power tiller are used. Now a day, Farmers in the Taungoo Township usually use agriculture machinery in plowing. Some farmers lend agriculture machinery from the rich man and Agriculture Company. A tractor only takes 1 hour to plough a farm having an area of per acre. The total cost of plowing is about 42000 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 6000 kyats per basket. Normally, agriculture department encourages to practice systematic cultivation to get 247 baskets per ha (100 baskets per acre). Farmers use 4.94 baskets per ha (2 baskets per acre) of seed to get higher yield. Therefore total costs of seeds are about 12000ks.

Chemical inputs uses differ from one farmer to another. At the stage of tilling, they use weedicide to kill weeds. Pale weedicide is most popular in that area and they use 2.47 bags per ha (one bag per acre) to protect the field from weeds. Price of a bag of Pale weedicide is 20000 ks. They also applied chemical fertilizer according to guidance of agriculture staff. They use 1 bag of compound fertilizer per acre in paddy cultivation. Price of a bag of compound fertilizer is 34000 ks. Therefore total costs of fertilizer are about 54000ks. Labour cost includes costs on plowing, sowing or planting of seeds/seedlings, weeding, harvesting, carrying, drying, cleaning and application of fertilizer, etc. Although machineries are extensively used in plowing, manual labour is still mainly used in sowing harvesting, and application of fertilizer. Average labour cost is 6000 ks per day and total labour cost is round about 68000ks.

Harvesting is also done in harvesting. The price of harvesting machinery is too high and they do not buy the machinery. Most of the rent it and the cost is 123500 ks per ha (50000 ks per acre). Therefore, farmers get high benefit and they get 1079872ks per ha (437195 ks per acre) due to high productivity which is resulted from high investment see Table 3.

Cost- benefit in Summer Paddy Cultivation

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Chemical inputs uses differ from one farmer to another. At the stage of tilling, they use weedicide to kill weeds. Urea weedicide is most popular in that area and they use 2.47 bags per ha (one bag per acre) to protect the field from weeds. Price of a bag of urea weedicide is 20000 ks. They also applied chemical fertilizer according to guidance of agriculture staff. They use 1 bag of compound fertilizer per acre in paddy cultivation. Price of a bag of compound fertilizer is 34000 ks. Therefore total costs of fertilizer are about 54000ks. Labour cost includes costs on plowing, sowing or planting of seeds/seedlings, weeding, harvesting, carrying, drying, cleaning and application of fertilizer, etc. Although machineries are extensively used in plowing, manual labour is still mainly used in sowing harvesting, and application of fertilizer. Average labour cost is 5000 ks per day and total labour cost is round about 68000 ks.

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According to Table 3, summer paddy profit is more higher than monsoon paddy in the study area because of farmers choice. The price also varies depending in the quality of paddy seeds. The change of market price for the crops produced within the case study areas has, to some extent, affected the farmers. Thus, market price is one of the most significant determining factors for the economic return of paddy cultivation in Taungoo Township.

Table 3 Cost- benefit in Paddy Cultivation

	Monsoon Paddy	Summer Paddy
Items	Cost/ ha	Cost/ ha
Tillage (machine)	103740	103740
seed (6000x2)	29640	29640
Urea 1bag	49400	49400
Compound 1bag	83980	83980
Pestisite	30875	30875
labour cost	167960	167960
Harvesting	123500	123500
Others	19637	19637
Total cost	608732	608732
return (79.49basketsx5500ks)	1079872	1182676
Net benefit	471140	573944

Source: field survey (2017-18)

SWOT Analysis of Paddy Cultivation

SWOT analysis is a strategic planning method used to evaluate the Strengths, Weakness, Opportunities and Threats involved in any venture (Kumar and Nain, 2013). To analyze advantages and disadvantages points of paddy cultivation of Taungoo Township between 2007-08 and 2017-18, SWOT analysis is applied. In the study on paddy cultivation and its economic return in 2017-18, monsoon paddy is the most common crop in the study area. SWOT analysis was carried out with respect to existing paddy cultivation. Therefore SWOT analysis is used to identify strategies for higher income for local people, especially in the monsoon paddy and summer paddy.

Strengths - characteristics of an enterprise that give it an advantage over the others.

Weaknesses - the characteristics that place it at a disadvantage relative to others.

Opportunities - the external characteristics that can be exploited to get maximum advantage for the enterprise.

Threats - the external elements in the environment that could cause trouble for the enterprise.

Table 4 SWOT Analysis of Paddy Cultivation

Strengths	Weaknesses	Opportunities	Threats
-adequate water availability -knowledge on crops cultivation -guidance of agricultural staff -use agricultural machinery -sufficient inputs -easily available seeds -using high yield varieties -less risk -large number of farmers	-soil deterioration -human health -high cost on labour -less investment -expensive inputs -insufficient loan -traditional cultivation methods -less contact to staff	-locational advantage -greater rural population -strong market demand -high yield varieties	-ineffective training -environmental deterioration -human health problem -less investment -fluctuation in market prices -labour shortage -high interest rate

Sources: (Open Interview, 2018)

Strength

The study area is located in Sittaung River valley in which many stream exist as stream network due to *adequate water availability* for paddy cultivation in Taungoo Township. They frequently discuss on paddy cultivation with *staff* for the purpose of realizing the new methods, new varieties, pest etc. Under the *guidance of agricultural staff*, some farmers read papers and journals to get systematic cultivation and modern inputs.

Farmers *use agricultural machinery* in paddy cultivation. Although it cost more, it takes shorter period of time than traditional cultivation. Farmers use *sufficient inputs* in paddy cultivation and their production and return are also high.

In the study area, some farmers cultivated seed as seed farms. Therefore, *seeds* are *easily available* for intensive farmers. Productivity of paddy is high due to *less risks* and sufficient rain and suitable soils for paddy cultivation.

Paddy cultivations are the most important economic activity of the township, being carried out by *large number of farmers*.

Weakness

Overusing of *soil deterioration* and productivity of soils is low when they do not use chemical fertilizer in paddy cultivation. Excessive use of chemical fertilizers and pesticides affect physical and chemical properties of soils.

While farmers are spraying pesticides, they do not use masks and body protection. Pesticide is also harmful to *human health*.

In systematic broadcasting method, labor requirement and *labour cost increase*. To finish broadcasting and harvesting in time, 25 labours are needed for an acre of paddy.

Some farmers have *less amount of investment* and they cannot afford to buy agriculture machinery. Most farmers rent and use agricultural machineries in paddy cultivation due to lack of

draught animals. They do not have cow dung and they use insufficient amount of chemical inputs because of *low investment*.

Cost fertilizer and pesticides *increased* and government have stopped the fertilizer support since 1990s. As chemical *inputs are expensive* and they have less investment, they use insufficient amount of input. As a consequence of low input use, their productivity is low.

Agriculture Bank lends the *loan* to farmers for paddy cultivation. Loan for paddy cultivation is about 150,000 ks per acre. It is *insufficient* for paddy cultivation.

Some farmers practice *traditional cultivation method*. It produces low yield. Some farmers do not usually go to Agricultural Department and they *do not take guidance from the staff*. Some farmers do *not have sufficient knowledge on pest and pesticide*.

Opportunity

Taungoo Township is *situated in Sittaung River Valley* which is one of the *best areas* for paddy cultivation.

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

Paddy is extensively cultivated in the area due to staple food and *strong market demand*. All farmers cultivate *high yield varieties* for the purpose of getting high return.

Threat

Farmers do *not have* much *knowledge on paddy cultivation* and using pesticide. It causes environmental deterioration and health problem. Some farmers are poor and do not have much knowledge on paddy cultivation. Although they are farmers, they are uninterested in paddy cultivation and *do not* usually go to *training* on paddy cultivation.

In the area, most farmers cultivate monsoon paddy in the rainy season. Therefore, they use much chemical fertilizers and its *effects on environment*.

Farmers really know that effects of pesticide on paddy cultivation and use them to protect their plant. But it effects not only environment but also *health of labours*.

They do *not have sufficient investment* and they do not use sufficient amount of inputs. The farmers depend on income from paddy cultivation for the survival. When the *price* is *low*, they get *less profit* and they are in *debt*.

Higher diesel price reduces the return and net benefit of paddy cultivation.

Poor farmers do not have agricultural machinery to plow the land. They depends manual labour and labour cost is high due to *labour shortage*.

Agricultural loan from Agricultural Bank is insufficient for paddy cultivation and they lend the loan from private money lender. But, *high interest rate* is one of the factors that decrease the return from the paddy cultivation.

Overall, SWOT analysis indicates a framework for helping the planners to identify the strategies of achieving goals. It is a technique used to analyze the strengths, weaknesses, opportunities and threats of paddy cultivation. In Taungoo Township, especially market prices play a vital role in paddy cultivation. Market price is the major reason for increased market demands and it puts additional pressure on the paddy cultivation.

Conclusion

The development of paddy cultivation depends not only on the physical conditions of the farmland, but also on necessary inputs such as high yield seeds, fertilizers and pesticides, farm preparation, better farming techniques, farm machines and high market demand. Paddy is the most suitable crop to the existing conditions and thus the inhabitants concentrate on commercial production of the crop.

Farmers in the study area get less profit due to highest investments and low return. The net return is low in paddy cultivation because of low production caused by less input and lack of advance farming knowledge on paddy cultivation. Sharing farming knowledge on paddy cultivation is very limited and practices support by agricultural department is not affected carried out in practice. Therefore, if paddy production is low in the area and farmers in the area cannot escape from vicious cycle of debt.

If the farmers in Taungoo Township receive the necessary supports and paddy seeds suitable to the physical conditions, adequate inputs, modern farming techniques and agricultural machines, price stability and systematic delivery of irrigated water, the socio-economic status of the peasant families would be somewhat uplifted. This study emphasizes only on the spatial and temporal variations of paddy cultivation and production of the area concerned and researches should be carried out on market and price of paddy from the another point of view to gain complete and in-depth knowledge of paddy cultivation in Taungoo Township.

To analyze advantages and disadvantages of paddy cultivation of Taungoo Township between 2007-08 and 2017-18": SWOT analysis is applied. The advantages of paddy cultivation in the study area are as follows: Farmers *use agricultural machinery* in paddy cultivation. Although it cost more, it takes shorter period of time than traditional cultivation. Farmers use *sufficient inputs* in paddy cultivation and their production and return are also high. The study area is located in Sittaung River valley in which many stream exist as stream network due to adequate *water availability* for paddy cultivation in Taungoo Township. All farmers cultivate *high yield varieties* for the purpose of getting high return. Paddy cultivations are the most important economic activity of the township, being carried out by *large number of farmers*.

The disadvantages of paddy cultivation are as follows: the farmers depend on income from crops cultivation for the survival. When the *price is low*, they get *less profit* and they are in *debt*. Agriculture Bank lends the *loan* to farmers for paddy cultivation. Loan for paddy cultivation is about 150,000 ks per acre. It is *insufficient* for paddy cultivation. Poor farmers do not have agricultural machinery to plow the land. They depend on manual labour and labour cost is high due to *labour shortage*.

Thus, for the development of local market opportunities, storage infrastructure should be served in planting of crops with high economic values, development of governmental supports, considering the quality of crops, considering farm sustainability indexes, using sustainable water resources management and development of extension programs based on farmer' needs.

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