MINISTRY OF AGRICULTURE AND IRRIGATION
MINISTRY OF LIVESTOCK AND FISHERIES
MINISTRY OF COOPERATIVES

THE DEVELOPMENT STUDY ON SUSTAINABLE AGRICULTURAL AND RURAL DEVELOPMENT FOR POVERTY REDUCTION PROGRAMME IN THE CENTRAL DRY ZONE OF THE UNION OF MYANMAR

FINAL REPORT

AUGUST 2010

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
SANYU CONSULTANTS INC., TOKYO, JAPAN

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PREFACE

In response to a request from the Government of Myanmar, the Government of Japan decided to conduct a study, the Development Study on Sustainable Agricultural and Rural Development for Poverty Reduction Programme in the Central Dry Zone of the Union of Myanmar, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Kosei HASHIGUCHI of Sanyu Consultants Inc. and composed of members from the said consultancy company between May 2006 and August 2010.

The team held discussions with the officials concerned of the Government of Myanmar and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of the development programmes identified therein and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Myanmar for their close cooperation extended to the study.

August 2010

TAKASHIMA Izumi
Vice-President
Japan International Cooperation Agency

August 2010

Mr. TAKASHIMA Izumi
Vice-President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

Dear Mr. TAHASHIMA,

We are pleased to submit herewith the Final Report on the Development Study on Sustainable Agricultural and Rural Development for Poverty Reduction Programme in the Central Dry Zone of the Union of Myanmar. This Report presents the development programmes of the target Central Dry Zone (CDZ) area formulated with the advices and suggestions of the authorities concerned of the Government of Japan and your Agency. Also incorporated were comments made by the national steering committee members chaired by the Ministry of Agriculture and Irrigation during the technical discussions on the draft final report, which were held at Nay Pyi Taw in June 2010.

The overall goal of this Study lies in providing a design for action plans for the purpose of comprehensively promoting poverty reduction and regional development targeting the CDZ of the Union of Myanmar. The Study has been conducted in partnership with and by guidance from the concerned three ministries of Agriculture and Irrigation, Livestock and Fisheries, and Cooperatives. The process of this Study centered on the following which themselves are the objectives of the Study:

1) To formulate Action Plans with practically applicable measures to the CDZ for reducing poverty, focusing on the livelihood of those who live in the area, and

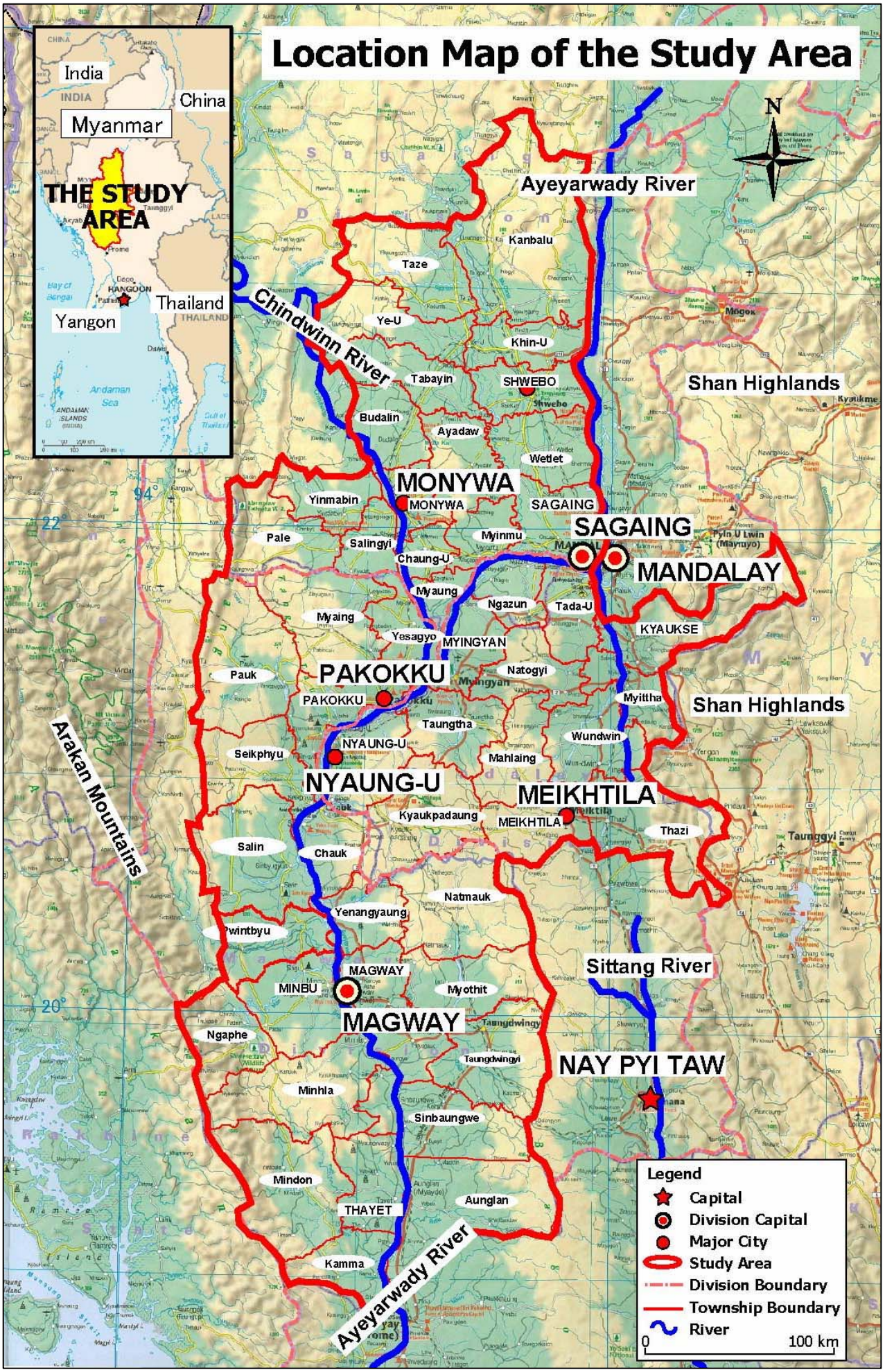
2) To develop capacity of formulating plans and implementing projects for counterparts, extension workers, farmers and targeted communities in the target area.

To attain the above objectives, this Study was carried out in a phasing manner divided into two; namely, Phase I dealt mainly with situation analysis, participatory workshops, formulation of the draft Development Programme and identification of some potential pilot projects, and Phase 2 undertook the preparation and mobilization of the pilot projects and its implementation, and presented the final version of the Development Programme upon feed-backing all the lessons therein. The Phase I study was commenced in May 2006 and completed at the mid of March 2007, and the Phase II study started in June 2007 and ended with the presentation of this final report.

We wish to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs and relevant authorities of the Government of Japan. We also wish to express our deep gratitude to the Ministry of Agriculture and Irrigation, Ministry of Livestock and Fisheries and Ministry of Cooperatives in the Union of Myanmar for the close cooperation and assistances extended to us during our surveys and study.

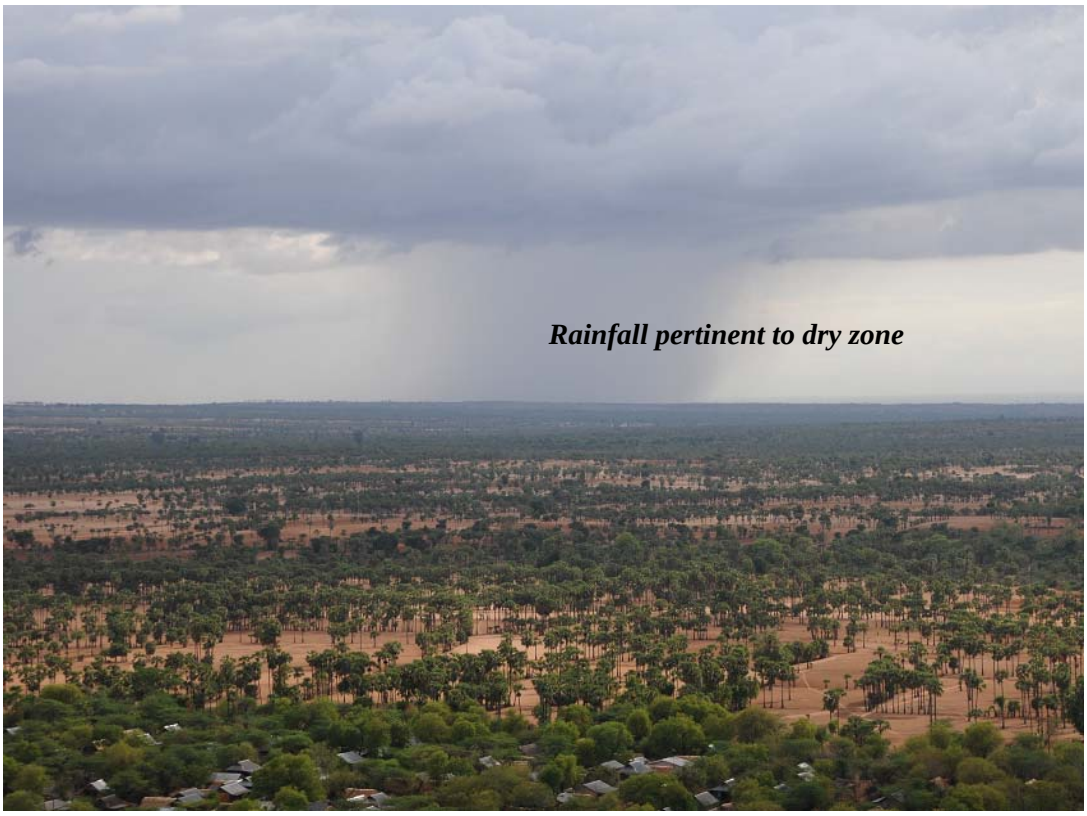
Very truly yours,

HASHIGUCHI Kosei
Team Leader of the Study Team


Location Map of the Study Area
India
China
Myanmar
THE STUDY AREA
Thailand
Yangon
N
Ayeyarwady River
Chindwinn River
Shan Highlands
Kanbalu
Taze
Ye-U
Khin-U
Tabayin
SHWEBO
Budalin
Ayadaw
Wetlet
MONYWA
Yinmabin
SAGAING
Pale
Salingyi
Myinmu
Chaung-U
MANDALAY
Myaung
Ngazun
Tada-U
Myaing
KYAUKSE
Yesagyo
MYINGYAN
Natogyi
PAKOKKU
Pauk
Myittha
Taungtha
Wundwin
Arakan Mountains
Seikphyu
NYAUNG-U
Mahlaing
MEIKHTILA
Kyaukpadaung
Thazi
Salin
Chauk
Natmauk
Yenangyaung
Pwintbyu
Sittang River
MAGWAY
MINBU
Myothit
Ngaphe
Taungdwingyi
NAY PYI TAW
Minhla
Sinbaungwe
Mindon
Aunglan
THAYET
Kamma
Ayeyarwady River
Legend
Capital
Division Capital
Major City
Study Area
Division Boundary
Township Boundary
River
0
100 km

PHOTOS OF THE STUDY AREA

The Study Area holds a vast area, extending latitudinally about 560km, longitudinally about 130km. Though most of the areas extend in plains, there are hills as shown in the photo, heights of which range often over 100m or so. In this vast space, natural conditions like precipitation, topography, soils etc. diversely vary, so do inhabitants' livelihoods.



Climatic character of arid and semi-arid areas lies not only in the scarcity of rainfall but its pattern is also highly variable with sites in an area giving serious impact on spot crop yields. Instability of rainfall is not confined on time sequence but it occurs on horizontal space. Under this situation, straight forward investment may result in vain and here risk-hedged activities should be pursued as development strategy.

Upland farmlands are called Ya in Myanmar where pulses and beans, and oil crops have long been cultivated by the CDZ population, which can not grow well in wet areas. The Central Dry Zone produces as much as 40 - 90% of whole pulses and beans produced in Myanmar except for black gram (this is cultivated in Delta area), and about 70 – 90 % of whole oil crops also produced in Myanmar.

Except for Bago Hills and its surrounding areas, most of the lands in Central Dry Zone are quite plain where one can see relatively intensive agriculture. A typical intensive agriculture can be seen in paddy cultivation areas, some of which are even equipped with irrigation facilities. Such very intensive paddy cultivation is found along the Ayeyarwady Rive and its tributaries.

PHOTOS FOR PILOT PROJECTS

A Demonstration Plot with Crop Calendar: This is one of demonstration plots of Integrated Crop Management (ICM). The chart was produced by Magway divisional MAS office.

A Paddy dryer (Legaing Village): Using rice husk, they are now drying pre-monsoon paddy which is usually harvested during the onset of rainy season, thereby needing drying.

Chick Pea Seed Regeneration with An Improved Seeder (Magyi Village): With the seeder they can try line planting and save seed by about two thirds.

Extension Materials produced by Kyaukse Township: Crop calendar on the back and leaflets, photos, manual, one-point illustration (folded), and even MP-4 player.

Goat Raising (Mingan Villlage): 5 she-goats are provided to each beneficiary of a group, and they have to revolve same 5 she-goats to the second generation beneficiaries.

Pig Revolving (Legaing Village): 2 pigs are provided to the 1st generation beneficiaries, and they are required to hand over same 2 pigs to the 2nd generation beneficiaries.

Knitting Production (Ma Gyi Sauk Village): Altogether 50 members come up to the 5 knitting machines, and skilled members transfer the technology to their peers besides.

Embroidery Promotion (Ma Gyi Sauk Village): 10 persons were trained on this embroidery, fetching added value on, e.g. longyi, shirt, pillow, etc.

A Children's Nutrition Improvement Center (North Pabe village): Children are provided nutritious food at this centre and at the same time washing-hand, etc. are taught.

A Paddy Husk Bio-gas Power Generation (Mon Taw Gyi Village): Bio-gas from charcoaled husk can run diesel engine, thereby generating electricity for the 380 households there.

A Kick-off Workshop for Launching Pilot Project (at Mandalay): Over 80 concerned officers were invited to this workshop for arriving consensus between the Team and them.

A Stakeholder M&E Tour: Over 40 donor/government stakeholders participated in the M&E tour, to whom one of village representatives presents their achievement.

EXECUTIVE SUMMARY

1. INTRODUCTION

1.1 The CDZ is located in the central part of the Union. The Zone has merely 700 - 1,000mm of annual precipitation since south-westerly monsoon blown from Bengal Bay is intercepted by the mountain range of Rakhine that runs nearly south to northward at the western border of the Union. Rainfall is concentrated in a few months of rainy season with erratic duration and with wide annual deviation in annual precipitation. This meteorological character not only very often brings about droughts with crop failure but casual intense showers during mid rainy season also result in floods in the watershed of Ayeyarwady River. Such climatic casualty makes environment of agricultural production as major means of livelihood of the population unfavorable as compared to that of other parts of the Union.

1.2 What's more, such state has further been exacerbated by other unfavorable factors such as pressure of increasing population versus migration of labor population in the form of seasonal outflow of workforce for piecemeal and deterioration of natural resources. Further increase of poverty-prone population is threatened unless relevant countermeasures are taken. With a view to ameliorating such undesirable state, the Government of the Union of Myanmar requested the Government of Japan to conduct a study on comprehensive agricultural and rural development in the CDZ. Upon this request from the Government of the Union of Myanmar, JICA dispatched a preliminary and appraisal mission in February 2005, and the Scope of Works (SW) was agreed and signed on November 16, 2005 between the two governments. The Study commenced in May 2006 and completed in August 2010.

1.3 The overall goal of this Study lies, as stated in the Scope of Works (SW), in providing a design for action plans for the purpose of comprehensively promoting poverty reduction and regional development targeting the CDZ of the Union of Myanmar. The whole process of this Study therefore centers on the following, which themselves are the objectives of the Study:

1) To formulate Action Plans with practically applicable measures to the CDZ for reducing poverty, focusing on the livelihood of those who live in the area, and

2) To develop capacity of formulating plans and implementing projects for counterparts, extension workers, farmers and targeted communities in the target area.

1.4 In early 2006, SANYU Consultants Inc. of Japan was contracted by JICA to carry out the Study. The Study Team first arrived at Yangon on May 14, 2006 and began phase 1 field surveys. The Team has conducted necessary surveys and studies agreed in the SW during the first year's survey period, and presented a draft version of the action plan, a sort of master development plan of the CDZ. Then, from phase 2 survey onward, pilot projects had been commenced centering on poverty reduction by dealing mainly with 4 sectors of agriculture, livestock, cottage industry and living environment improvement. All the planned activities under the pilot projects had been completed by the end of February 2010, and lessons were fed-back in refining the action plan of the CDZ. With these works having been successfully completed, this Final Report is presented.

2. DEVELOPMENT AND POVERTY OF THE UNION

2.1 Although economic growth in early 1990s had been weak, it achieved high rates of growth, 6 - about 10% per annum, during the period from around 1992/93 to mid 1990s. In 1997 the Country joined ASEAN anticipating much foreign investment by this occasion, however, it ended up in overall failure as affected by Asian economic crisis occurred in the same year. The GDP growth rate resulted in 5.7% in 1997/98 followed by 5.8% in 1998/99. Then the GDP growth rate showed a sudden surge in 1999/2000 at 10.9%, and has been marking high growth ratio over 10% to date. The average

growth rate from 1999/00 to 2007/08 is 12.66%, at which rate total GDP could be doubled in just 6 years. Sources such as Economic Intelligent Unit, Asia, now raise some concerns in its interpretation.

2.2 As regards GDP composition of the Union of Myanmar by rate, since mid-1990s a tendency of gradual dwindling in the share of agricultural sector coupled with gradual replacement by the share of trade and services (transport, communication, social and administrative services are included) has been observed. With regard to the share of agricultural sector in GDP, the contribution reached 55% in 1994/95 owing very much to exports of pulses initiated in early 1990s. Later, it has turned into a gradual decrease affected by tapping of natural gas that was launched since 2001. Notwithstanding, even in 2007/08 the share of agricultural sector to GDP accounted for 35% suggesting that the mainstay of the Union of Myanmar is still agriculture.

2.3 At any rate, typical profiles observed in GDP composition of the Union reside firstly in large share of the primary industries, inter alia agricultural sector, secondly in the sustained state of sluggish decline in the GDP share of the primary sector (agricultural sector). The fact that the rate of contribution of agricultural sector to GDP has not been sharply declining suggests us that agriculture sector has achieved some growth in keeping pace with the growth of GDP itself. Long term trend shows continuous high rate of growth in agricultural sector since 1999/00 except for that in 2002/03 recording 4.7% only. The growth rates are for example 10.5% (1999/00), 11.1% (2000/01), 8.1% (2001/02), 4.7% (2002/03), 9.3% (2003/04), 10.2% (2004/05), 10.7% (2005/06), and 9.2% (2006/07).

2.4 In 1970s, the Union stood at the leading rice exporting country in the world. The highest share on the basis of export value was in fact from rice, and 42% in overall exports of the Union was recorded in 1980/81. However, later rapid dwindling of the share of rice on foreign currency earning took place to the level of only a few percent, with the largest 9% in 1995/96. In place of rice, pulses expanded their shares on export earnings until they have reached the top of share composition during the period from mid 1990s to 1998/99. Their shares recorded 27% in 1995/96, 23% in 1996/97, 22% in 1997/98 and 18% in 1998/99. Later, garment industry expanded the exports in 1999/00 and 2000/01, followed by export of natural gas to Thailand that has gained the regular delivery since 2001 accounting for the share of as much as 40% in overall export earnings as of 2007/08.

2.5 The Union of Myanmar also accelerated the pace of stepping up its rank in HDI reaching 0.549 in 2001, 0.551 in 2002, 0.578 in 2003, 0.581 in 2004, and 0.582 in 2005 but it still remains at considerably low position of HDI ranking, i.e., 138th out of 182 countries in the world in which HDI data is available. Cambodia (ranked at 137th) and Laos (133rd) have similar positions to that of the Union among ASEAN members. With regard to per capita GDP mentioned above, the Union produced 465$, less than two third of that of Cambodia with 756$ and that of Laos with 918$ (all the products were measured as of 2008). Under these situations, the reason why HDI of the Union is ranked almost same as those of Laos and Cambodia could lie in an indication that health and educational indicators of the Union have higher values than those of the two countries.

3. THE STUDY AREA

3.1 DEMOGRAPHY AND NATURAL CONDITION

3.1 The total Study Area, the CDZ, covers around 75,169km^2 equivalent to 11% of the total national territory, extending over 150 km or so to the east - west axis and about 500 km to the south - north axis. The Area is located in such three divisions of Mandalay, Sagaing, and Magway wherein there are 11 districts and 51 townships. Average areas of a district and a TS are 25,000km^2 and 1,480km^2 (about 38kmx38km). Population in the Study Area counts at 9,841,620 as of 2003, accounting for about

18% of the total national population. Demographic density in the Study Area is estimated at 131 persons/km^2, or 1.7 times as much as the mean national population density, implying that the Study Area is fairly densely populated.

3.2 Rainy season in the CDZ ranges from late May to October. One of the characteristics of the rainfall pattern is intermediate decline in July in the course of the rainy season. The annual rainfall is between 700mm to as much as 1,000mm according to area where it stands. Dry season covers the duration from November to early May and it is classified into two periods; namely 1) summer or pre-monsoon period during March - first half of May, and 2) winter period during November - February that is to follow rainy season. Mean maximum temperature which appears in May is around 32 Celsius degrees while it goes down to around 20 Celsius degrees during winter.

3.3 Rainfall pattern in semi-arid zone like the Study Area is characterized by firstly low annual precipitation and also instable distribution pattern with capricious or erratic occurrence. Instability of the rainfall is not confined on time sequence but it occurs on horizontal space. Despite that scarce rainfall has caused large yield decrease in an area, timely rainfall may have been received resulting in ordinary crop harvest in its neighboring township areas or districts in the same year. As far as such cases actually happen, occurrence of crop failure in a village is not readily visible in the statistical data covering broader areas. The fact that annual precipitation is not stable is interpreted as that farming has a dimension of uncertainty or a kind of gamble.

3.2 AGRICULTURE

3.4 Although the Study Area is called “dry zone”, it has already created its position as a key agricultural production area of the Union. The total population in the 3 divisions, wherein the Study Area lies, accounts for 34% of the national total. It is evident that many crops show by far higher share as compared with demographic ratio. Also, it is really amazing that paddy production, that is first priority in Myanmar, in terms of total of rainy season crop and dry season crop in this area has share of 22%, and that in terms of only dry season crop (irrigated one) has share of 29% on the national total. In addition, this area is known as a production area of oil-crops and pulses, where production share reaches 70 - 90% in the case of oil-crops and around 40 to over 90% in terms of pulses except black gram that is produced in the delta.

3.5 In CDZ, ratio of lowland farm and upland farm is 28% : 72%, implying as much as about 30% of the whole farm lands could be planted with rice if rainfall allows. This Study estimated per-capita rice production based on milled weight by using a conversion factor of 0.6 from paddy to white rice. Here, annual per capita consumption of milled rice in the Union is supposedly around 150 - 180kg though differed by data sources. When this amount of consumption is superimposed onto the production of milled rice in the CDZ area, one can see about a half of the level of self-sufficiency in Mandalay, around 70% in Magway and more than two times as much as the self-supplying level in Sagaing.

3.6 As a vast paddy tract develops from its center, Shwebo, to the area of Sagaing Division that is equipped with irrigation facilities constructed in the dynasty era, it has the third rank of per capita rice production in the Country after Ayeyarwady Division and Bago Division. It is likely that from this Division rice marketing to Mandalay has been evolved. Magway is also a rice deficit area, and it is said that rice transported from the delta offsets the shortage of rice in Magway in addition to rice delivered from Sagaing Division. With such variation by area, the Study Area as a whole is anyhow producing rice nearly at the level of self-sufficiency. The fact that such an amount of rice is produced in what is called a dry area is very much noteworthy though data of 1999 and onward may have concern of credibility.

3.7 Oil crops have the second priority in the agriculture of the Union. As it is often referred to that the nation of Myanmar consumes large amount of edible oils, oil-seeds are considered as one of the most important crops. Traditional edible oils consumed in the Union mainly consist of sesame oil and groundnut oil, to which sunflower oil may be added. Sesame production in 3 Divisions in the CDZ accounts for 89% of the total production in the Union, groundnut production does 69% and sunflower production has share of 70% as of 2004/05.

3.8 However, the Union is importing great deal of palm oil, ranging from 80 thousand MT to 160 thousand MT every year. The equivalent of domestic sesame seed quantity required for the import substitution of 160 thousand MT could be about 400 thousand MT. Production of sesame seed has been at most around 500 thousand MT even in the record crop in 2004/05. This is to say how large the imported palm oil volume is. Palm oil is in fact cheaper than domestically produced oils. So far as food constitutes a culture, it may be hardly possible to change people's preference in short time by the grade of prices only. However, under the current situation where palm oil has enormously been imported, one may say that oil-crops' future prospect would not be so rosy judging from their comparative advantages.

3.9 The third priority in the agricultural sector production in the Union is placed on pulses. The reason of high priority may reside in intake of protein from these pulses, but more convincing reason exists in the significance of earning foreign currency with their major export destination targeted to India. India has driven its policy toward economic liberalization in 1991. Pulses produced in the Union have stronger international competitiveness from the view point of international trading prices. Therefore, most of the current pulses produced in the CDZ are of export-oriented with the principal destination to India. MAS has also promoted pulse production by means of provision of high quality seeds of green gram and chick pea for distribution among farmer producers oriented to the exports during the period 1990s - early 2000s.

3.3 LIVESTOCK

3.10 The Study Area has been known as livestock producing area in the Union. Draft cattle, indigenous cows, hybrid dairy cows, sheep and goats suitable for dry zone climate, and also some fowls are reared in the CDZ. Cattle share in the CDZ as against whole Union is 49 % that is more than the population composition of 34%. In this Country little farm mechanization has taken place so far. Cattle are therefore prerequisite for tillage and transport in upland as well as in paddy land for those who do agriculture as their mainstay. Sheep and goats are much more existing in the CDZ as posed at 77 % share against the population percentage of 34. This is simply because of their nature adjustable to dry land climate. Agricultural productivity as major means of livelihood is always unstable in the CDZ with scarce and unreliable rainfall. By this reason domestic animals serve literally as "live bank (=livestock)" that can quickly be cashed whenever need arises.

3.4 COTTAGE INDUSTRY

3.11 Cottage industry, with their markets targeted within villages or nearby townships, such as weaving oriented more to self-supply or sewing by the use of few sewing machines is run in almost all villages in the CDZ. They include wide variety of business activities such as manual weaving with its historic background origin of dynasty era, stoneware, lacquer ware and jaggery. Expansion of scale in these industries is taking place in the outskirts of larger townships – for example nearby Mandalay City – where access to materials is easier. Some villagers try to establish new type of small-scale industries like rice milling by investing the surplus gained in agricultural activities, or others try to enlarge the scale of existing industries that has so far been confined in the scale of cottage

industry.

3.5 RURAL SOCIETY : LANDLESS PEOPLE

3.12 Not all the people in rural area are farmers. They are divided into farm households to which land cultivation right is vested by the Union and off-farm ones without its right. The landless is categorized into the latter. The rates of off-farm households in the 51 TSs of the Study Area vary considerably. The lowest rate of off-farm households is found in Ayadaw TS (5%) in Sagaing Division, whereas the highest is recorded in Pakokku TS (80%) in Magway Division. The large differences in the rate of farm/ off-farm households by TS are said to have bearing on whether land reform has been executed in the past or not.

3.13 Based on the data given from concerned TS PDC offices, those who are categorized as off-farm households constitute of 42% of the rural population in the Study Area. Another survey done at 6 pilot project villages in the CDZ showed that 46% of the 419 sampled HHs were off-farm households. Taking into these account, one may say about 40% to 50% of rural population in CDZ are landless. The landless are engaged in several livelihoods such as farm labour, cottage industry, livestock rearing, etc. to make their life sustained. Among the landless, those who earn most of the income from farm labour are regarded as the poorest of the poor. They constitute of about 60% of the total landless, namely 20 – 30% of total rural population.

3.14 Among the society of Bamar race, there found almost no difference between male and female in educational level for younger generations (in elder generations, gap exists). Daily household affairs including financial management are delegated to mother and household account is around 100% managed by the wife. As to contents of works, women are engaged not only in simple wage labour, but also many of them have broader activities including management of businesses. Thus, it can be said that women's status is not lower than male status. High status of women enables them to do many things including access and control, to a great extent, of resources and opportunities; for example they can put resources on their children's health as well as children's education, also reducing gender gap between boy and girl.

3.6 HEALTH AND EDUCATION

3.15 Infant and under-5 year child mortalities in the Study Area are lower than those of the Union. Looking at the under-5 year child mortality, for example, the mortality in the Study Area ranges from 31 – 44 by division with the average of 38 amongst 1000 live births while that of the Union is 106 (UNICEF) or 62 (Myanmar Statistical Yearbook 2008). This low rate may be because; 1) immunization has been widely done with a background of high status of women, giving cares to their children well, and 2) of its nature as dry area for the CDZ where not much endemic and epidemic diseases prevail as against tropical humid areas. In relation to the 1st statement, Myanmar has put an emphasis on mother and child health since socialist era, leading to nowadays high immunization ratios as 80 to 100% in the 6 villages where pilot projects were carried out.

3.16 Literacy ratio in the Study Area is higher than that of the Union and also higher than those of ASEAN countries. The ratio of the Study Area has reached as high as 96% (average between male and female adults, not available by gender), while the ratios in Thailand and Singapore that are economically very much progressing are 93% and that of the Union is 90%. This high literacy ratio in the Study Area is attributable to nowadays' 80 - 100% primary enrollment and even elder generation once used to attend monastic school where they learned how to read and write. There are 264 monasteries in the Study Area as of 2006, all of which provide education, contributing to raising literacy ratio of those who cannot go to school or who dropped out of school due mainly to economic

difficulties.

4. DEVELOPMENT PLAN FORMULATION

4.1 DEVELOPMENT OPPORTUNITIES & CONSTRAINTS

4.1 A host of development potential can be identified in the Study Area. Here, available potentials in promoting development of the CDZ can be amongst others; 1) farming system and animal husbandry in conformity with environmental characteristics in the CDZ, 2) high status of women and high social indicators, and 3) cottage industries with high technical level. On the other hand major development constraints in the Study Area could be; 1) low staffing and insufficient logistics arrangement for stationing agricultural extension staff and livestock extension staff belonging to TS who contact with villagers at the frontline, 2) fruit-figure-the-principle of fulfilling norm for norm sake, and 3) the recognition of livestock by livestock extension staff in its context of 'livestock' but as animal for veterinarian doctor.

4.2 POVERTY LINES AND RATIOS

4.2 This Study estimates poverty line with referring to Cost of Basic Needs method based upon baseline survey result, which sampled 419 households in the 6 pilot villages undertaken in FY 2007/08. The poverty line is generally composed of 2 basis; 1) food poverty line and 2) non-food poverty line. The former poverty line, food poverty line, is estimated as necessary expenditure to purchase a food basket which can ensure 2,300 kcal for per-adult equivalent per day. This is estimated at 163,903 Kyats per adult equivalent per annum (130$ referring to a market rate of 1,260 Kyats per dollar).

4.3 The non-food poverty line, on the other hand, is estimated as necessary expenditure required for those items as education, health care, medicine, clothing, housing, etc. The non-food expenditure shows big difference between farm households and non-farm households. For the former households, what comes first is the payment of wage to farm casual labors and the 2nd biggest expenditure is on purchasing of agriculture input e.g. chemical fertilizer, seeds, etc. These 2 expenditures, payment to farm casual labors and purchasing of agriculture input, do not take place in non-farm households, thereby non-food poverty line shall be set separately. The non-food poverty line for farm household is estimated at 98,044 Kyats (78$) while that of the latter household estimated at 67,147 Kyats (53$).

4.4 The Poverty Line as aforementioned is the sum of Food Poverty Line and Non-food Poverty Line. The lines estimated are 261,947 Kyats (US$ 208) per adult equivalent per annum for farm household, 231,050 Kyats (US$ 183) per adult equivalent per annum for non-farm household. The shares of the food poverty line out of the poverty line are 63% and 71 % for farm household and non-farm household respectively. By multiplying number of typical family members into the poverty line per adult equivalent per annum gives us a typical poverty line now estimated per household per annum. The poverty lines per household per annum are worked out at 1.2 million Kyats (US$ 973) and about 1.1 million Kyats (US$ 858) for farm household and non-farm household respectively.

4.5 Poverty ratio by all the sampled households is 43%, and the ratio for farm household only is 33% whereas the one for non-farm household is 55%. This clearly shows poverty for non-farm household is deeper than that of farm-household. Further, the poverty ratio for farm casual labor is as high as 75%. This result clearly shows where the poorest people are; that is in the category of farm casual labors. Poverty ratio by gender shows deference as expected; namely, the ratio for male-headed household is 43% while the one for female-headed household is 49%. Though the sample number for female-headed household is not enough, say only 34 samples (only 8% out of

whole 419 sample households), yet we can see the tendency for female-headed household suffering more in poverty.

4.6 Poverty gap ratio indicates the depth of the poverty; corresponding to the distance between the poverty line and the average of expenditures for those who fall below the poverty line. In other words, adding the monetary value calculated by multiplying the poverty gap ratio into the poverty line, the person can be lifted up to the poverty line. The poverty gap ratios are; 11%, 8%, 14%, and 20% for whole sampled households, farm household, non-farm household, and farm casual labor household. It is indicated that the depth of the poverty for non-farm household is deeper than that of farm household, and again that of farm casual labor household is further deeper than that of non-farm household. The poverty for farm casual labor household is more than 2 times deeper than that of farm household (20% vs. 8%).

4.3 INCOME AND ITS DISPARITY

4.7 Gini Index was also estimated to know about income inequality. Gini Index ranges from 0.197 for Mingan village being the lowest to 0.411 for Legaing village being the highest with an average of 0.387 for the 6 villages where pilot projects were carried out in FY 2007/08. Average household income in Mingan village is 817,317 Kyats per year which is the lowest amongst the 6 villages. People in Mingan village can be said equitably poor. Legaing village is, on the other hand, blessed with irrigated paddy fields, whereby big income gap between the farmer and the landless. Average annual income for farm households is 2.2 million Kyats while that of farm casual labor households is only 748,000 Kyats, about one-third.

4.8 Taking into account above results, one may suggest that income for the poor should be increased. In fact, even in case that both husband and wife have been engaged in farm casual labor work throughout year, they cannot get out of the poverty, as indicated by their annual income 648,000 Kyats (1,800 x 360 days) vs. 1,081,314 Kyats that is the poverty line for non-farm household. They need to find additional means of income, or they cannot get out of the poverty. Assistances of increasing their income or diversifying their income should be provided. In addition, a distribution policy from the rich, mostly farmers, to the poor may have to be put in place by modifying land tax system wherein it is only 5 Kyats per acre for a productive land and as little as 1 Kyats per acre for non-fertile lands.

4.4 DEVELOPMENT VISION AND TYPOLOGY

4.9 A variety of livelihood and life are sustained adapting to various natural environment in the CDZ. In view of these situations, it has been agreed in the Scope of Works prior to the commencement of this Study to elaborate development programmes including 4 major scopes consisting of 1) agricultural development, 2) creation of off-farm income sources, 3) living improvement and 4) supporting activities, focusing on the inhabitants livelihood. Taken these scopes into account, development vision in the CDZ – future scope of development – is proposed as "*Area Wherein People Enjoy Well-beings Based Primarily Upon Agriculture and Livestock Production Suitable to the CDZ Environment, Off-farm Incomes from Cottage Industry, Good Living Environment and also Better Supporting Systems*".

4.10 In formulating development plan of the CDZ, typology is established for the vast area based on relevant indicators. Typology is tried at TS level, for which 51 TSs are included in the Study Area. TS is a frontline where many government offices are placed, and data required for the basis of typology are available at this level. Five types are proposed as typology that are positioned in between two extremes, one representing TS located mostly along Bago Hills where the most extensive

upland farming takes place and the other representing that with irrigated paddy land where the most intensive paddy farming is engaged. Thus, the nature of farming shifts from extensive to intensive as the Type proceeds from I towards V. Likewise, annual rainfall progressively augments from Type I to Type V. Coinciding with this shift of precipitation, high rate of goat/sheep observed in Type I or Type II shifts to high rate of cattle in Type V.

4.11 Since TSs falling into Type I - II are susceptible to drought damages it is not so easy to step up themselves with the accumulated surplus from farm production. On the contrary, TSs falling into Type IV and Type V are possible to practice highly productive farming under stabilized environment. From inhabitant's extent of poverty point of view, Type I has the highest poverty rate, and the rate becomes lower as the type proceeds to Type V. Type V, however, in which farmers are engaged in the most intensive irrigated paddy farming has wider disparity between irrigated landholders and the landless. Namely, though TSs falling into Type I are poor but the villagers are uniformly poor, whereas those falling into Type V has higher average income but with larger economic disparity.

4.12 Precarious rainfall typically in the CDZ tends to occur in the area under Type I where livelihood tends to be unstable. In contrast, TSs under Type V with high irrigation rate have capability of yielding stable and high level outputs. Reflecting these conditions, TSs under Type I require measures to stabilize currently unstable livelihood, or development based on risk-hedging as the development strategy. Whereas, TSs under Type V have tools, e.g. irrigation facilities, that can control natural vagary, enabling to follow straightforward process of growth that entails increased outputs. A kind of linear growth oriented development can therefore be applied in this Type V as the development strategy. Two bipolarized strategies should be pursued in those extremes of the Study Area, and practically somewhat combined strategy with one or the other more prioritized as to which extreme the concerned TS is nearer should be applied.

4.5 DEVELOPMENT FRAMEWORK (MACRO LEVEL)

4.13 The development planning is based on a series of participatory workshop inviting villagers as well as government officers from the concerned 3 ministries as agriculture, livestock and cooperatives. Summing up all the works done in the workshops together with contributions by the JICA Study Team, a prioritized macro level CDZ framework is presented together with project/ programme description in a simplified project design matrix (PDM). Development framework can be a guide when the concerned 3 ministries try to carry out development activities in the CDZ because the framework provides with concrete development components, those priorities by sector and by area (TS) at which what projects should be carried out.

4.14 This Study had carried out a series of participatory workshops inviting villagers engaged in 6 target villages for the pilot projects done in 2007/08, TS level government officers, district, divisional and also headquarters' level officers. The participatory workshop for the purpose of development planning was done 2 times in 2007 at the same time when mid-term and final evaluation workshops for the pilot project were held. It was observed that villagers prioritized agriculture, cottage and livestock in its order, and then followed by education, infrastructure and health, and by environment. The government officers prioritized agriculture, infrastructure, education in its order, and followed by livestock. Cottage industry was ranked at 2nd last next to environment.

4.15 The results implies that the villagers think of such 3 sectors as agriculture, livestock and cottage industry being most important while TS government officers give more priority to infrastructure and education after agriculture. This tendency can be seen commonly; namely, common people tend to put priority on such sectors in which they can make livelihood while government side tends to give priority to public service provisions which in this case appeared in infrastructure and education.

Though health was given 2nd last priority, it may not necessarily mean they think so less important but it might be a sign that people feel health condition is not much poor.

4.16 Following the sector prioritization, villagers and TS government officers went to a problem analysis session, in which PCM problem analysis was employed as the tool. The problem analysis dealt with only 3 sectors of agriculture, livestock and cottage industry which are the major sectors aimed to improve under the Study's scope. Next step was to identify the priority development purposes taking into consideration the problem statement and those priorities. Basically those focus problem statements were converted into positive statements, now called development purposes here. Development purposes were also prioritized during the workshop by such 3 levels as; villagers, TS officers and higher government cadres' officers, and then aggregated.

4.17 Development framework is a kind of guiding that shows us the tangible way of reaching the development vision aforementioned. It shows development sectors (approaches) and development purposes sought to achieve the development vision, as well as intervention activities that are usually called development project or development programme. The framework should also have the priority at different levels of, e.g. sector, purpose, project/ programme, with which we can consider which development interventions should be put in implementation given limited resources.

4.18 Development framework is now established (as shown in Figure 4.5.6, see main text), by taking into consideration what was practiced through the workshops as well as Study Team's findings. The sectors are identified as in improving or promoting of 'Agriculture', 'Livestock', 'Cottage Industry', 'Education', 'Health', 'Infrastructure' and 'Environment' with those priorities from top side to down side according to the Study scope and also taking into account the priorities ranked by villagers and TS government officers (though TS government officers prioritized education and infrastructure higher than livestock and cottage sectors, the top 3 sectors are aligned according to the Scope of Work of this Study, that are 'Agriculture', 'Livestock', and 'Cottage'). Purposes are also placed under each of the sectors according the priority, and accordingly projects/ programmes which were identified by the JICA Study Team together with the counterpart personnel.

4.19 The Study area is categorized in 5 types, and therefore if the framework can relate those projects/ programmes with the typology, it could be great help for those who are participating in developing the central dry zone area. This means that given the relationship we can know which project/ programme should be implemented in which type of the area, making development intervention easier according to the characters of the types categorized and increasing the efficiency in fund allocation as well. Matrix having such symbols of ●, ◎, ○ shows the guidance of which projects/ programmes should be carried out in which typology with how much of priority. The prioritization in the matrix was done by cross cutting from top to bottom by the typology.

4.20 The macro development framework is planned to be used by current government offices. To utilize the development framework, the entry point is the Budget Estimation Meeting held in September every year by respective department heads under each ministry. The departmental heads will discuss the next year's activities during the meeting with reference to the programmes and projects shown in the development framework. When they find a specific programme or project in the framework, which have not been undertaken so far, they should try to include them into their budget estimation. In so doing, programmes and projects presented in the framework are to be incorporated in the government budget estimation, becoming a part of the government programme. With regard to areas (TS) at which a programme/ project is to be implemented, priority matrix by typology shown in the development framework should also be referred.

4.21 Utilization of the framework should be pursued not only along above-mentioned technical line but also by involving PDCs. For example, divisional managers bring back the development

framework from the headquarters and then explain what the development framework shows to the chairman of divisional PDC during a divisional meeting held at least once in a month. Divisional PDC chairman can also become familiar what programmes / projects should be required in his area with what priorities and also the relationship between the programmes / projects and TSs where those programmes / projects should be implemented. In fact, PDC has its own operation budget mostly coming from registration fee, license fee, market fee, etc. Therefore, if the divisional PDC agrees what is presented in the year's activities well linked up with the framework but with little financial endorsement, the PDC may consider to provide some supplemental budget.

4.22 To implement the programmes and projects presented in the framework, government fund should be utilized as much as possible including PDC fund. Included in the government funds are loan provision by e.g. Myanma Agricultural Development Bank and Myanma Livestock & Fisheries Development Bank. The loan provide by the Agricultural Bank ranges US$ 35 – 40 per farmer and thus it is not big enough. However, when looking into the total disbursed amount in the 3 divisions of CDZ, it reaches as much as US$ 19.5 million as of 2007. As for livestock sector, Myanma Livestock & Fisheries Development Bank now provides considerable amount of loan even to small scale livestock farmers. In Magway division for example, as much as 418 million Kyats (equivalent to about US$ 418,000) loan is available in FY 2009/10, which can help the small scale livestock farmer purchase the initial stock and then s/he can enlarge the stock.

4.23 Besides, there are some INGOs and international donors which are operating in the CDZ with whom there may be a possibility to collaborate. For agriculture sector, OISCA has been active in CDZ already over 10 years. The INGO promotes organic farming and in fact a pilot project under this Study linked up with the OISCA, training over 40 MAS staff in FY 2008/09. OFID may have a possibility of proving certified and good oil seeds. In addition, livelihood improvement is undertaken by such INGOs as PACT Myanmar, AMDA and Save the Children. In fact, PACT has been engaged in rural credit sector, and covered as many as 1,736 villages with 212,008 customers in total as of 2009. The total disbursed amount in 2009 reached about US$ 11.21 million, considerably big coverage. With this loan, credit beneficiaries can start mushroom culture, vegetable cultivation, native chicken rearing, etc.

4.24 As for rural water supply, BAJ (Bridge Asia Japan) has been operating over 10 years based at Kyaukpadaung TS. This INGO has covered 10 townships near Kyaukpadaung TS. In and around these areas, groundwater is deep often more than 150 m. The depth of a tube-well in this area therefore reaches as deep as over 200m. One tube-well may cost about US$ 40,000 or more. The INGO has sunk about 10 tube-wells per year over the 10 years operation. To construct a deep well, collaboration with BAJ should firstly be pursued. Furthermore, KOICA is now operating in forestation sector. Though the project is not much big, covering about 150ha in Nyaung-U TS, forestation programme presented in the development framework should seek a collaboration with KOICA.

4.6 DEVELOPMENT FRAMEWORK (MICRO, VILLAGE LEVEL)

4.25 Aforementioned 'Development Framework (Macro Level) is the core of a sort of master plan targeting whole CDZ area taking into account typology by township. With the development framework and accompanied project descriptions, concerned ministries can know what activities are required to develop CDZ with priorities. The projects/ programmes specified in the development framework are designed able to be implemented by current government institutional setting-up. As a result of what each government organization has played their roles, several activities would be brought into a village, thereby comprehensive intervention covering plural sectors could be achieved.

4.26 On the other hand, there is different approach in development intervention, which is to directory undertake comprehensive intervention at village level. In this approach, what comes first is a village at which several development interventions are planned taking into different livelihoods we can see even in a village. In most cases, there are agriculture, livestock and cottage related livelihoods even in a village. Here development intervention is planned to undertake all these livelihoods from the very village level. In putting this approach into implementation, there should be a coordinating team as JICA study team undertook in implementing pilot projects covering different sectors. This kind of team may be set up by concerted efforts by the concerned ministries, or otherwise with a help of external organization.

4.27 To realize above-mentioned approach, there should be another development framework established based on village, so called micro development framework or village level development framework. This framework should refer to the livelihood of the villagers. There are by definition farm households and non-farm households in the CDZ rural area. Farmers who cultivated farmlands in Type IV and Type V are blessed with better natural resources. Whereas, in Type I and Type II areas, farmers are suffering from erratic and marginal rainfall and even soils there are not fertile in most cases. As one moves towards Typology V, the more resource rich farmers the one can meet while towards Typology I the more resource poor farmers the one will see.

4.28 As for non-farm households, there are different livelihoods they are engaged in but amongst them the livelihoods are livestock rearing, cottage industry employed, and farm casual labor work. Goat and sheep can be seen in dryer areas and therefore as one moves to Type I area, more goats can be found. Cottage industry can be found in almost all villages in CDZ though the scale becomes small in Type I and Type II where severe climatic condition prevails. Concerning farm casual labors, they are more found in better environmental areas like Type IV and Type V. This is simply because farmers in these areas are rich enough to employ the farm casual labors.

4.29 With those above taking into account, Development Framework for Village Level was established (see Figure 4.6.2 in the main text). Development intervention (component) is demarcated by 2 categories at first, namely, a group of interventions, which benefit specific target villagers and the other benefiting whole villagers. Then, upper part of the framework demarcates the intervention by the category of farmer households and non-farmer households, and further elaborates by category of farmers and also by category of livelihood such as cottage industry, livestock, etc. In case of macro development framework discussed above, those interventions placed at upper part of the framework were given higher priority. However, the village level framework established here does not give any priority by the location wherever it is placed but just according to the category of the livelihoods.

4.30 Cost shown in the village development framework is an indication of how much should be required in carrying out such components at a village. Therefore as number of villages to be undertaken increases, the cost will automatically multiply. Not all the projects (components) are required in just one village of course. Therefore, those project costs should not be simply summated to know the total investment in a village. At first, project components should be carefully selected according to the typology where the village is situated, and then the villagers' needs should also be confirmed. Components only met with the villagers' needs should be put into implementation.

4.31 There are now two development frameworks presented. Since resources are always limited in terms of not only human resources but also financial resources, there should always be strategic collaboration wherever more than one approach are tried in the same area. Aforementioned macro framework intends to carry out wide coverage activities, basically based on extension, except for such projects as irrigation facility construction, ring levee construction, etc. which require huge investment at a place. Then, another framework, village level or micro level framework is for a village. In

carrying out both approaches, there should be of course strategic collaboration. In this case, as an example, we can say the village development based on the micro framework can work as a model or as a demonstration village to all those ones undertaken by macro level development framework.

4.32 Very simple example can be given in Certified Seeds Dissemination Programme, Paddy Cultivation Improvement Programme, etc. Project carried out based on village level framework may establish demonstration farms to which other villagers can also be invited to see specific technologies. In this way, those programmes carried out under macro framework can be benefited. In sum, demonstration farms should be not only for those benefited by latter approach, micro frame based approach, but also for those covered by macro frame based programme. Another simple example can be given in livestock project. If micro frame based project has established an improved mode livestock house, e.g. floor-elevated goat house, those benefited by macro frame based programme should also see the improved animal house.

5. THE PILOT PROJECT

5.1 DESIGN OF THE PILOT PROJECT

5.1 Pilot projects have been carried out over 2 financial years of 2007/08 and 2008/09. The pilot projects in FY 2007/08 were carried out in 6 villages in 6 TSs identified referring to typology of the Study area aforementioned. Adding further 6 TSs, total 12 TSs were undertaken in FY 2008/09 pilot projects. In FY 2007/08, pilot components were identified at village level workshop wherein problems were identified in sectors of agriculture, livestock, cottage industry, living environment improvement, etc., and projects were designed to tackle those problems. In this regards, one may say the designing of the pilot projects in FY 2007/08 is of integrated rural development approach.

5.2 The pilot projects in FY 2008/09, on the other hand, extended the activities further by including new components, by implanting in TS recurrent extension works, by inviting extension officers to training courses, etc. The last implementation approach is new in FY 2008/09 pilot projects where participated TS officers formulated their own action plans based upon what they have learned during the training courses administered by the pilot projects, and thereafter they implemented their own plans in the course of discharging their extension activities. In any case of both years pilot projects, such 4 sectors were covered as agriculture, livestock, cottage industry and living improvement.

5.2 EVALUATION RESULTS OF THE PILOT PROJECT

5.3 The project evaluation was carried out from the 5 aspects and ranked in a range of 1 – 5 with the 1 being the least and 5 being the highest while evaluation 3 means the project has performed as designed. Evaluation itself was done by all the project members engaged in February 2010, e.g. 3 JICA members, 4 counterparts and 3 national staff having been engaged in the monitoring of pilot projects. Evaluation results for the FY 2007/08 pilot projects are briefed below by sector:

1) Agriculture related pilot projects such as raised-bed cultivation, improved seeding practice and chick pea seed regeneration have in general marked relatively high mark. In fact, chick pea seed regeneration was evaluated higher than others because harvested seeds were revolved to the succeeding 2nd and 3rd generation beneficiaries. On the other hand, Bokashi compost making was evaluated low. Though beneficiaries recognized the effectiveness of Bokashi, it is a sort of tiresome work to prepare for and thereby not much extension from farmer to farmer was made. This current status resulted in lower mark. As for mushroom cultivation, it has been smoothly carried out in Legaing village while in Ar La Ka Pa village mushroom was

competed by natural sprout mushroom. Therefore the evaluation for mushroom cultivation in Ar La Ka Pa village stayed low.

2) As for livestock sector, goat revolving pilot project marked very high evaluation. Local cattle improvement was also evaluated high with the background that most of the farmers in the CDZ depend on draught cattle. Sheep was recognized to have high relevance. However, reproduction ratio of sheep was lower than that of goat, thereby giving lower mark than that of goat. Pig raising had been performing very well till end of December 2008, and then it was faced with swine influenza. The price of pig in fact nose-dived at that time. However, since late 2009, the price has been recovering and this situation lead to good evaluation result. As for improved feeding system and intercropping sorghum and rice bean were recognized important but the farmers did not like such tiresome activities, which contributed to lower marks. Animal house improvement cannot go well alone since most of the villagers do not want to spend on such construction.

3) In the sector of cottage, the evaluation varies by component very much. Tinsmith strengthening and guitar-key strengthening were rated lowest. There was big hike in material cost and also since late 2008, cheap Chinese made products started flowing into Myanmar. The beneficiaries had lost competitive power against Chinese made products. On the other hand, embroidery, knitting and weaving for which beneficiaries are female members, have performed better. Sandstone ware production tried in Mingan village also marked good evaluation result, and paddy dryer did the same. Paddy dryer together with improvement of milling has created a lot of added values, which contributed to high evaluation result. Fruit processing was not extended to business level except 2 – 3 women during paddy transplanting period when it is in big demand.

4) Living improvement projects have marked relatively high evaluation. Those projects undertook basic infrastructure, which were met with villagers' need. Also, the benefit has extended to almost all the villagers. This resulted in high evaluation results. Those projects earned the highest result especially in terms of relevance, which means the projects were really met in their needs. In addition, skilled technicians can be found even in rural areas of Myanmar. With this background, the sustainability was also rated high.

5.4 The evaluation for FY 2008/09 was made in the same way as FY 2007/08, namely in a range of 1 – 5 from the view point of 5-aspect. Evaluation results for the FY 2008/09 pilot projects are summarized as below by sector:

1) For agriculture pilot projects, improved paddy cultivation was given higher evaluation result and also improved seed regeneration project earned high marks. Organic farming promotion with the introduction of IMO culture, on the other hand, was not evaluated so high since extension from farmer to farmer did not take place so much. Besides, storage and minimum tillage did not receive higher marks either. In most of the CDZ villages, farmers' production is not so much and therefore the usage of storage at village level was limited but at the household level. This status contributed in lower marks. For the minimum tillage cultivation, unfortunately perennial leguminous crops had withered due to hot and dry weather which prolonged in 2009.

2) Livestock pilot project shows more or less same results as those in FY 2007/08. Goat revolving was given higher evaluation result. Goats are adjustable to the CDZ weather and can be reared by landless poor people on grazing ground. This situation contributed to higher marks. Pig revolving was once evaluated very low due to swine flu affect. However, pig raising can be a good income opportunity for landless people especially in paddy areas,

therefore giving high mark in relevance. Also pig price started coming back in late 2009, and therefore good marks were given to the final evaluation results. Livestock feeding improvement is very important, leading to relatively high mark in terms of relevance. However, since it requires a cumbersome step in making UMMBs and also villagers are poor to buy necessary materials, it was not extended.

3) In cottage sector, establishment of revolving fund has been tried either at group level or at village level. The evaluation result varies from village to village or by component. In Magyi village, the evaluation is relatively low because they lost market in Thailand due to world wide financial crisis. In Ma Gyi Sauk village, member-to-member technical transfer had taken place, and also the main committee lent about 600,000 Kyats to weaving group out of rental fees of the machines. These activities gave high marks to that of Ma Gyi Sauk village. In Ar La Ka Pa village, amortization fee which came from tractor rental fee contributed to village development, e.g. repair of motor for water drinking facility and also lent 300,000 Kyats to renew breeding bull. These performances contributed to high evaluation results.

4) For living improvement, most of the pilot projects were given higher evaluation results except firewood substituting bio-fuel promotion project and improved cooking stove in some villages. In this pilot project, an extractor for *Jetropha* oil was fabricated and it worked. However, since the availability of seeds in rural areas is not yet enough, it has resulted in less usage of the extractor. For improved cooking stove, it was not needed in village where there are still a lot of firewood while in North Pabe village, it was required due to high risk of fire in that village and also shortage of firewood. Paddy husk power generation was given high evaluation result since it has contributed to raise the villagers' living standard and also it is well maintained. Rural development centre, started as children's nutrition improvement centre, was also given good marks in evaluation.

5.3 LESSONS LEARNT FROM PILOT PROJECT IMPLEMENTATION

5.5 Through the experiences from the pilot project implementation over 3 years period, there are lots of lessons and issues which have been referred to in the design of the relevant projects presented in the development frameworks. Following are some specific lessons that development practitioners should refer to whenever they are to embark on similar projects:

1) Mushroom culture can provide beneficial income source for the landless because it doesn't require arable land. Yet, it seems to be rather high-hurdled income generating activity for the poorest, farm laborers' households to begin with. Namely, they have to overcome a host of conditions such as access to telephone, procedures for paying inputs, provision of initial cost, yield character with great variability and access to markets etc. This may have resulted in the fact that among 15 culturists who were respondents of an interview survey conducted in Legaing Village in 2008, only 2 households engaged in farm labor service were included.

2) Lessons learnt in goat rearing include the method of procuring stock goats, selection of livestock breed to rear and their mortality etc. The beneficiary villagers have made a few devices as to the investment to an improved goat hut. One of them is to build the hut with readily available materials within their place, and another is to build it for joint use to save the cost per member. In Myanmar, sheep and goats are thought to have equal value with the same price per live weight. However, when it comes to the reproduction of offspring, twining ratio is higher in the case of goats, leading to more advantageous herd expansion as compared with the case of sheep. In this context, goat rearing should have priority in the planning.

3) Timely period of piglet's delivery or measures of keeping suitable temperature within pig hut during wintertime is a key issue for piggery project. Piglets were delivered in around November under the Pilot Project in 2007. Atmospheric temperature happens to lower around this period, causing death toll of 6 heads out of 30 piglets delivered (20% of mortality). This suggests the necessity of recognition on timely delivery within the period of high atmospheric temperature, and awareness of the beneficiary villagers to take measures for keeping ambient temperature of piglets warm.

4) Pig raising project was affected by a external factor since March 2009 very much; that is swine flu. The price was about 150,000 – 170,000 Kyats per adult-head in 2008, but nosedived to 50,000 – 70,000 Kyats due to the swine flu. If they try to keep the pigs, they have to bear feed expenditure. Many of the beneficiries could hardly feed them and started selling out at cheaper price. For example, there were 40 beneficiaries in FY 2008/09 pig revolving project, but as of August 2009, there were only 12 beneficiaries who still keep the pigs, and others sold out. This is a typical external project risk, which can be hardly expecetd at the project commencement. To cope with this kind of project risk, maybe one of the measures could be to minimize the investment, say 1 piglet to provide instead of 2 piglets in order to mitigate the shock.

5) There are a lot of farm casual labor households in CDZ as aforementioned. According to a sample survey under this Study, it is learnt that ordinary upland crops require farm labor of about 40 - 70 man-days/ ac. /crop, while vegetables such as onions and cabbage do about 140 - 150 man-days/ ac. /crop. Namely, vegetable cultivation creates more labor opportunities, by 20 - at maximum 40% than labor required for ordinary upland crops. Thus, vgetable cultivation can contribute to creating job opportunities for landless households.

6) According to the result of a trial in Ya (upland farm), the yield performance for Chick pea was as low as 4.8 basket/ ac with considerable input of chemical fertilizer, 30kg/ ac. This example suggests difficulty in applying chemical fertilizers in the (semi) dry land, above all in Ya where the ground gets severely dry. In Ya, it may be necessary to improve soil physical property so that soil layers can retain sufficient moisture, as well to make device on manuring such as application of liquid fertilizers (for example foliar fertilizer) in place of applying granular type ones.

7) Knitting (production of sweaters etc) is one of the women group activities in Ma Gyi Sauk Village. Only 5 trainees participated in the training, who mastered the knitting techniques using Double Decker knitting machines. Initial members in the knitting group counted 52, and other members except for the trained people have received technical transfer of knitting techniques by sitting at the side of trained ladies or the first generation and by practicing knitting work together with them. It is worthwhile to remind that in Myanmar there are lots of landless people in rural areas. Given such circumstances, it should acutely be necessary to provide project designs in which technical transfer is made to as many member-participants as possible to ensure their means of livelihood.

8) As an example of a good synergy effect, both introduction of paddy drier and improvement of milling techniques evolve benefits as separate projects, but they bring increased benefit to the farmer's side, as well. In this case, if farmers use the paddy drier and the improved milling machine with improved milling techniques, they can enjoy with both of these activities. Besides, operation and management committee of the paddy drier has provided low-interest loan service. Taking all these into account, this value-added chain system evolves not only synergetic effect of the project, but also does real outcome (positive impact) covering the overall

participants.

9) An improved cooking stove was introduced in 4 villages. Of the 4 villages, 2 villages of Pabe North in Chauk TS and Magyi in Ngazum TS showed very positive impact, but in the remaining 2 villages did not succeed. Villagers who live in firewood scarce areas and also in fire-risky areas accepted the improved stove. For example, the villagers in Pabe North are really delighted with the fact they can use the stems of pigeon peas as firewood substitute. However, villagers in Nga Zin Yine and Kan Pyuu do not like the introduced stove because they have other means to cook or are not worried about firewood. In future, they may accept the improved stove, but at this moment they would go simple pre-fabricated stove or even with conventional stoves. Thus even if technology itself is good, whether or not it works depends on the context where people make living.

10) Under cottage sector, there are 2 projects which are very dormant in operation or almost have ceased the operation. These are 07C1 Tinsmith Strengthening Project and 07C2 Guitar key Strengthening Project in Khaungkawe village. The reason why they are not well operational are; 1) at first the beneficiaries in tinsmith and guitar key production were hit by fuel price hike having taken place in year 2008, 2) though the fuel cost became cheap, unfortunately material costs have not become cheap, and 3) guitar key had difficulties of competing with Chinese made cheap and good-looking keys. Though it is very difficult to predict these outside factors, there may be a lesson; If there is competition to be expected with products which can be produced cheaply, e.g. Chinese made guitar key, there should be well-thought consideration.

11) A series of training courses were arranged under pilot projects inviting MAS and LBVD officers. Agricultural extension officers came from 12 TSs and livestock officers from 6 TSs. The training courses undertook not only lectures and practices but also peer-peer learning. There were sessions wherein they listed problems and constraints they have faced in their jurisdictional areas and exchanged how they have solved or why these have not yet been solved. Their achievements were also discussed. Through these sessions they exchanged their experiences, which we believe enriched their capability as extension worker. In any opportunities of trainings, we should think of arranging such opportunities of peer-peer learning aside from lecturings.

6. EXTENSION MATERIALS

6.1 This Study produced some extension materials. The extension materials consist of technical manuals, one-point illustrations, and promotion videos. Technical manuals were once drafted in FY 2007/08 and FY 2008/09, and have been utilized through the pilot project implementation. One-point illustrations were prepared by TS officers who participated in a series of trainings administered in FY 2008/09. The promotion videos portray actual success stories covering 3 sectors of agriculture, livestock, and cottage industry.

6.2 The Technical Manuals are composed of 2 parts; namely Part I and Part II. Part I briefly discusses the salient features of the Central Dry Zone (CDZ) by which the readers will be familiarized with the contexts wherein the people make their livelihood. Part II elaborates technologies based on the experiences of the Study, which were included in the implementation of pilot projects to examine the best ones appropriate in the context of the rural areas in the CDZ. The Technical Manual shows the practical process of various technologies to help frontline extension workers of concerning ministries with extension services to be provided. Process description method was employed in producing this Manual, with which a step-wise detailed explanation is made together with illustrations.

6.3 One-point illustrations were prepared by TS extension officers (both MAS and LBVD) who participated in the relevant trainings held on October 2008. They chose activities to be illustrated by themselves, and presented them after completion, and then some modifications were conducted according to suggestions by other participants. In addition, some MAS TS offices have made some additional illustration-based extension materials. An example is Kyaukse TS, which portrayed the process of how to make rice husk charcoal on a big vinyl sheet. Aside from the example, Magway divisional office ordered a computer shop to print out an summarized ICM (integrated crop management) technology on a paddy growing calendar. The divisional office distributed such big extension material to all the TS MAS offices in the division. Such technologies were the ones undertaken during the training, and extended to farmers with their own creative extension materials.

6.4 Technical videos were prepared to extend success stories to common villagers. It is generally observed even in rural areas that people enjoy watching TV/Video at video house or teashop even from early morning. Therefore, the technical videos were made taking into consideration those village's behaviors to extend technologies and activities and to show them some advanced technologies. The video covers three sectors of agriculture, livestock and cottage industry, all of which are based on real success stories of villagers. The agriculture video shows improved paddy cultivation, the livestock video shows how the poor can improve his livelihood by raising goat, and the cottage one suggests keys of how to succeed in business as exampled by a slipper maker.

7. CONCLUSION AND RECOMMENDATIONS

7.1 CONCLUSION

Taking into account the points outlined below, this Study concludes that the implementation of the Development Plan presented in this Report would be the most appropriate comprehensive approach in reducing the poverty in the Central Dry Zone (CDZ). This is because the Plan according to the priorities made by all the concerned stakeholders would coordinate actions/ projects at a sectoral as well as area levels and make balance each other amongst all the 51 townships in the CDZ. The Government should therefore embark on the CDZ development guided by the Development Plan. Other divisions/states in the Union would also benefit from this Study by introducing the new approach of formulating the area and sector-wise development programmes centering on poverty reduction.

1) The Development Plan has incorporated voices of all cadres of stakeholders; divisional officers, district officers and township officers, all of whom are from the relevant 3 ministries, and village members and leaders, local authorities e.g. TS PDC, etc. The stakeholders have worked not only in analyzing CDZ situation but also throughout the process of planning, exercising consensus making all the time. Situation analysis was also carried out mainly from quantitative point of view wherever data were available. Then, the results facilitated the stakeholders to well understand where the CDZ stood and how it looked like in comparison with other parts of the Union as well as with other countries, e.g. ASEAN countries. Exercising the participatory approach has contributed to making the Development Plan comprehensive and also responsive to the needs from the different cadres of stakeholders.

2) Development framework presented in this Report can be a very guide when the concerned 3 ministries try to carry out development activities in the CDZ because the framework provides with concrete development components, those priorities by sector and by area (township) at which what projects should be carried out. In addition, any organizations which work in CDZ can refer to the framework from which they can know where to carry out their development intervention

with what priority. In this way, the frameworks can also work as a development platform where all the concerned development partners can make concerted efforts. The framework guides the development stakeholders to the most needy people as prioritized and leads to avoidance of misallocation of funds to activities that are not a priority, thereby accelerating CDZ development as a whole.

7.2 RECOMMENDATIONS

During the process of undertaking this development study and implementation of the pilot projects, the Study Team encountered a number of issues that led to the recommendations presented below. However, as is the case with continuous processes, these recommendations are by no means exhaustive and may need to be changed or modified, depending upon the prevailing condition. Nevertheless, it is believed that the ones covered here constitute a broader spectrum on which the implementation of the Development Plan will have to be pursued:

For the Government:

1) The agriculture practiced in the CDZ is in fact somewhat bipolarized. Along Ayeyarwady river, there are lots of Le (lowland) which enable paddy cultivation and also irrigated paddy fields wherein the farmers can enjoy good harvest as expected. On the other hand, agriculture practiced in Ya (upland), especially along Bago Hills side, is affected by its unstable rainfall both in terms of volume and pattern. Under the former condition, straight-forward growth could be achieved corresponding to how much s/he has invested if one desires so. Under the latter condition, farming practices should automatically center on low-input agriculture. On top of this, the government officers, especially TS MAS officers, should be able to provide with the extension services which can pursue risk hedged development apart from what has been practiced that is for the straight-forward increase of product.

2) If a farmland is blessed with irrigation system, there is a proportional relationship between input and harvest until it reaches a threshold. However, upland agriculture totally depends on natural rainfall which does not behave as expected by human beings. For example, in areas along the Bago Hills, farmers cannot expect normal harvest over 3 years according to interviews. Here, under this condition, inputting of chemical fertilizer automatically entails risks, very often making them insolvent debtor. In upland areas dependent on rainfall, people should exercise risk-hedged livelihood activities and also try to diversify their livelihood. Diversifying of their livelihood is due required apart from their mainstay of agriculture; e.g. combined with livestock rearing, cottage activities. MAS extension staff at TS level should therefore be linked up with other TS level government offices of LBVD, Cooperative, etc.

3) From an angle of rural development aspect, many measures in Myanmar have centered almost all on the improvement of agriculture, especially of rice. This in turn resulted in not centering on landless people, leaving them out of the sight of development. Poorer people can be found in the landless. There are rarely institutional or project measures to improve the welfare of the landless people, especially farm casual labors. Some projects targeting landless people should therefore be put in place. Through the experiences from pilot projects, we recommend for the landless people such projects as mushroom cultivation which can be practiced in house yard, goat revolving, pig revolving, promotion of vegetable cultivation which can create a lot of farm casual labor works, and cottage activities for example weaving, knitting, embroidery, etc.

4) Aside from the above measures to raise the livelihood of the landless people, in any case, however, one may say that there comes already a time of introducing institutional measures, e.g.

distribution of welfare through progressive taxation system, reform of land taxation system, etc. It is recommended that the government revise the land tax rate which is not consequential as it is only 5 Kyats/ac for good farmlands and as little as 1 Kyats/ac for infertile farmlands. Though it is not always the case, wealthier people can be found in farmers while the poorer people in landless as is shown by poverty ratios; 33% for the former and 55% for the latter and 75% for farm casual labors (the poorest). Therefore, upon the institutional arrangement of land tax revision, re-distribution of wealth from the farmers to the landless people can be tried.

5) In the Union, instruction from the top to the bottom, that is village level, is very much efficiently done through the line of PDCs established at all the levels of state, division, district, township, and village tract. There is a regular monthly meeting at each level of the PDCs including technical officers as well as village chairmen in case of TS PDC where instructions are straight forwardly delivered to the bottom. Turning to the ground where extension activities take place, there is a difficulty of getting feedback from the ground and therefore forwarding it to the upper authorities. What is required for the extension officers is to report if the pre-set numerical targets have been achieved or not and not to report the process itself of how the targets have been achieved (or not achieved). The closer we go to the ground, the more important the process of achieving the targets becomes. Officers should try to get as much as feedback from the ground.

6) The role of women in the Study Area is so important that they engage in domestic financial management for daily life, small animal rearing, fodder management for large animals. For the distribution of property left (farmland as major one), women have equal share to men, so that sometimes farmland given to a woman from her parents when she marries is bigger than the one the husband receives from his parents. This point indicates that rural development cannot go without women's involvement or consent. However, it is frequently observed that women do not like discussion and they stand behind men (normally their husband) and outside. Therefore, it needs to take into consideration: 1) do not make decision immediately in the meeting and take the issue back home first, 2) do not let them hurry in decision making even when the opinions differed, and 3) ask both husband and wife to participate in development activities.

7) Under cottage sector pilot project as well village electrification project, there was a trial to establish village revolving fund. The logic is that necessary equipment is supplied to the system of cottage industry promotion, but the involved members are supposed to amortize the amount of capital fund or have to pay user rental fee to the main committee established at the village level. Also, the electricity charge paid by the villagers are collected at the committee in charge which is established at the village level, whereby it can work as village fund. This trial has been tried in 7 villages under pilot project, and several outcomes were observed; 1) low-interest loan provided to mushroom cultivation beneficiaries, 2) replacement of old breeding bull by proving top up fund, 3) repair of a motor for domestic water facility, etc. This kind of village fund in fact works as safety net in the village, and therefore project which is to provide certain investment should always try to establish such system.

For Donors:

1) This Study presented 2 development frameworks; 1) one for development from macro point of view and 2) the other for development from village level point of view (micro). In putting the latter approach into implementation, there should be a coordinating team as JICA study team undertook in implementing pilot projects covering different sectors. This kind of team may be set up by concerted efforts by the concerned ministries, or otherwise with a help of external organization. Given this kind of task team, comprehensive development intervention at village level dealing with different livelihoods can be realized. For this purpose, donors may consider to

undertake the development with the latter development framework. The frame starts with people's different livelihoods to which workable development components are presented. Donors especially engaged in rural development can accelerate their activities with the framework reflecting the people's livelihoods.

2) When carrying out development interventions based upon above village level development framework, there should be of course strategic collaboration with the activities conducted under the macro development framework. Very simple example can be given in Certified Seeds Dissemination Programme, Paddy Cultivation Improvement Programme, etc. Project carried out based on village level framework may establish demonstration farms to which other villagers can also be invited to see specific technologies. In this way, those programmes carried out under macro framework can be benefited. In sum, demonstration farms should be not only for those benefited by latter approach, micro frame based approach, but also for those covered by macro frame based programme.

3) Under pilot projects, a series of training courses were arranged inviting MAS and LBVD officers. The training courses undertook not only lectures and practices but also peer-peer learning. There were sessions wherein they listed problems and constraints they have faced in their jurisdictional areas and exchanged how they have solved or why these have not yet been solved. Through these sessions they exchanged their experiences, which we believe enriched their capability as extension worker. When we carry out workshop, we very often can find similar situation. In workshop there is no chairman but only facilitator. Facilitator does not govern the floor but just facilitates exchange of opinions, exchange of views, on which participants themselves try to find a way by learning each other. Teaching is in fact important in a training session, but at the same time donors can arrange a venue wherein the participants can learn each other whereby themselves. Learning peer-peer is a crucial reciprocal opportunity to develop the capacity of officers, for which donors can contribute to arrange.

CONTENTS

ACRONYMS AND ABBREVIATIONS

AED	Agricultural Extension Division
AMD	Agriculture Mechanization Department
AMDA	Association of Medical Doctors of Asia
ARCPCA	Applied Research Center for Perennial Crops
BMI	Body Mass Index
CARI	Central Agriculture Research Institute
CARTC	Central Agriculture Research and Training Centre
CBM	Central Bank of Myanmar
CBO	Community Based Organization
CD	Cooperative Department
CID	Cottage Industry Department
CRDI	Credit for Rural Development Institution
CSD	Cotton and Sericulture Department
CSO	Central Statistical Organization
DAP	Department of Agricultural Planning
DAR	Department of Agriculture Research
DOF	Department of Fisheries
DZMO	Dry Zone Micro-finance Organization
FAO	Food and Agriculture Organization
FMD	Foot and Mouth Disease
GDP	Gross Domestic Product
GOJ	Government of Japan
GOM	Government of Myanmar
GRDP	Gross Regional Domestic Product
HDI	Human Development Index
ICDP	Integrated Community Development Project
ICM	Integrated Crop Management
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
ID	Irrigation Department
IMO	Indigenous Micro Organism (In Myanmar, it is called dochakukin as in Japanese)
IRRI	International Rice Research Institute
JFAD	Jute and Fiber Allied Division
JICA	Japan International Cooperation Agency
LBVD	Livestock Breeding and Veterinary Department
LFDB	Livestock and Fisheries Development Bank
LUD	Land Use Division
MADB	Myanma Agricultural Development Bank
MAPT	Myanma Agricultural Produce Trading
MAS	Myanma Agriculture Service
MC	Ministry of Cooperatives
MCSE	Myanma Cotton and Sericulture Enterprise
MDG	Millennium Development Goal
MEIS	Myanmar Export and Import Service
MFI	Micro Finance Institution

MFR	Ministry of Finance and Revenue
MFTB	Myanma Foreign Trade Bank
MICB	Myanma Investment and Commercial Bank
MICDE	Myanmar Industrials Crops Development Enterprise
MJI	Myanma Jute Industries
MOLF	Ministry of Livestock and Fisheries
MLFDB	Myanma Livestock and Fisheries Development Bank
MOAI	Ministry of Agriculture and Irrigation
MOF	Ministry of Forestry
MRTLC	Myanma Rice Trading Leading Committee
MRTSC	Myanma Rice Trading Sub-Committee
NCD	Newcastle Disease
NGO	Non-Government Organization
NPD	National Project Director (the Chief Counterpart to the JICA Study)
NPK	Nitrogen, Phosphate, Potassium
ODA	Official Development Assistance
OISCA	Organization for Industrial, Spiritual and Cultural Advancement-International
PCFD	Perennial Crops and Farm Division
PDC	Peace and Development Council
PPD	Plant Protection Division
PPP	Purchasing Power Parity
PRA	Participatory Rural Appraisal
SAMB	State Agricultural Marketing Board
SD	Seed Division (under MAS)
SD	Sugarcane Department (under MICDE)
SLRD	Settlement and Land Records Department
SPDC	State Peace and Development Council
TS	Township (the smallest administrative unit where government institutions are placed)
UMMB	Urea Molasses and Mineral Block
UNDP	United Nations Development Programme
VICO	Village Credit Organization
WFP	World Food Programme
WRUD	Water Resources Utilization Department
YAU	Yezin Agriculture University

FARMLAND TERMS IN MYANMAR

Le	Paddy land or wet land which can be used as paddy land
Yar	Upland
Kaing	Farmlands which appear in the flood lands in Ayeyarwady River as the water recedes
Kyun	Farmlands which appear on the alluvial sandbars in Ayeyarwady River as the water recedes

UNIT CONVERSION

1 basket	Paddy	20.9 kg
1 basket	Wheat	32.7 kg

1 basket	Maize (seed)	24.9 kg
1 basket	Sorghum	28.1 kg
1 basket	Sesame	24.5 kg
1 basket	Mustard	26.1 kg
1 basket	Sunflower	14.5 kg
1 basket	Groundnut	11.4 kg
1 basket	Butter Bean	31.3 kg
1 basket	Sultani	31.3 kg
1 basket	Sultapya	31.3 kg
1 basket	Chickpea	31.3 kg
1 basket	Pebyugalay	31.3 kg
1 basket	Pegyi	31.3 kg
1 basket	Pegyar	31.3 kg
1 basket	Pigeon Pea	32.7 kg
1 basket	Black Gram	32.7 kg
1 basket	Green Gram	32.7 kg
1 basket	Bocate	32.7 kg
1 basket	Soybean	32.7 kg
1 basket	Cowpea	32.7 kg
1 basket	Peyin	32.7 kg
1 basket	Sadawpea	32.7 kg
1 basket	Payazar	32.7 kg
1 basket	Pe-nauk	32.7 kg
1 basket	Other Pulses	31.7 kg

1 pyi	8 nohzibu
1 basket	16 pyi
1 viss	1.64 kg
1 lb (pound)	0.453 592 kg

1 inch (in.)	2.54 cm
1 feet (ft.)	30.5 cm
1 acre (ac)	0.405 ha
1 hectare (ha)	2.47 ac
1 ac-ft	1233.4 cum

CURRENCY EQUIVALENTS (AS AT JUNE 2010)

1 US$	=	450.99 Myanmar Kyats (TTB)
1 US$	=	91.10 Japanese Yen (TTB)
1 Kyat	=	0.202 yen
1 US$	=	980 Myanmar Kyats (Market Rate)
1 lakh	=	100,000 Kyats

MYANMAR FINANCIAL YEAR

April 1 to March 31

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MAIN REPORT

CHAPTER 1 RATIONALE AND GOALS OF THE STUDY

1.1 Rationale of the Study

The Union of Myanmar, located at the north-western edge of the South-East Asia, holds 677,000 km^2 of the total territory accounting for about 1.8 times as much as that of Japan with the population of 57,500,000[1] (as of 2007/08). The mainstay of the Union, bestowed with abundant water resources and fertile land resources that are mainly distributed in the delta of streams, is primary industries represented by the sector of agriculture where 66% of the total labor population are engaged and 43% of GDP as well as 35% of the export earnings are produced[2]. The fact that no occurrence but only one time in 1800s of famine[3] has ever been recorded in the Union since the historical era implies its high potential of agricultural productivity. Notwithstanding, from the economic and social indicators points of view, the Union has been ranked as an LLDC with a nominal per capita GDP of only 333 US$ as of 2007[4], also with a low rank, 138 out of 182 nations in the world, of human development index (Human Development Report, 2009).

The CDZ is located in the central part of the Union, situated at about 500 km north from the old capital Yangon. The Zone has merely 700 - 1,000 mm of annual precipitation since south-westerly monsoon blown from Bengal Bay is intercepted by the mountain range of Rakhine that runs nearly south to northward at the western border of the Union. Rainfall is concentrated in a few months of rainy season with erratic duration and with wide annual deviation in annual precipitation. This meteorological character not only very often brings about droughts with crop failure but casual intense showers during mid rainy season also result in floods in the watershed of Ayeyarwady River. Such climatic casualty makes environment of agricultural production as major means of livelihood of the population unfavorable as compared to that of other parts of the Union.

Livestock is also engaged in the Study Area where draught cattle and goat acclimatized to dry zones are mainly reared. Particularly, as it is literally called as “live-stock”, goats and sheep play a role of live risk-hedge for emergency use coping at unstable livelihood in the Dry Zone. Rearing goat is especially important in the CDZ where credit infrastructure is not fully developed since they can readily be sold for cash whenever needy cases arise. Even though the Ministry of Livestock and Fisheries provides extension services mainly comprising vaccination of livestock, basic feeding techniques practicable to villagers have hardly been disseminated at the village level because livestock herds have mostly been kept as small-scaled farmyard feeding.

In the Study Area, such small-sized cottage industries as weaving, spinning, dying, masonry, carpentry, tapestry and their expertise have been developed as the dynasty emerged. Small-scaled as it may be, these cottage industries have been rooted in almost all villages, providing precious cash-earning means for smallholder farmers and also landless villagers in rural areas. In most cases, these industrial activities have been developed as cottage industries and the products have been marketed within the villages or at nearby townships, though in some cases the scale has partly been escalated by the investment of surplus gained from agricultural production by lead-farmers. There is high potential of value addition by installing co-managed stores or introducing new techniques, but it has not been realized due to very limited assistance from administrative sources and other reasons.

Thus, various livelihood means including agriculture, livestock and small-scaled industries have been employed singly or at times in a combined way in this area. However, instability of agricultural

[1] Statistical Yearbook 2008, Central Statistical Organization, Nay Pyi Taw, Myanmar, 2009
[2] Statistical Yearbook 2004, Central Statistical Organization, Yangon, Myanmar, 2005
[3] The Moral Economy of the Peasant – Rebellion and Subsistence in South-east Asia, 1976, James C. Scott
[4] ASEAN Finance and Macroeconomic Surveillance Unit (FMSU) Database, 2009

production owing to erratic rainfall characterized by the climate of dry zones – character of rainfall in dry zones is not merely scarce but its pattern is highly variable – becomes chronic whereas livestock and cottage industries as supplemental means of livelihood have not yet been enough developed to materialize their potentiality. Such physical environment has been making people's life unstable, and the area has been impoverished. The state of poverty in this area is chronic where instable livelihood limits access to education, health care and other public services allegedly making take-off from poverty difficult.

What's more, such state has further been exacerbated by other unfavorable factors such as pressure of increasing population versus migration of labor population in the form of seasonal outflow of workforce for piecemeal and deterioration of natural resources. Further increase of poverty-prone population is threatened unless relevant countermeasures are taken. With a view to ameliorating such undesirable state, the Government of the Union of Myanmar requested the Government of Japan to conduct a study on comprehensive agricultural and rural development in the CDZ. Upon this request, JICA dispatched a preliminary and appraisal mission in February 2005, and decided to carry out "the Development Study on Sustainable Agricultural and Rural Development for Poverty Reduction Programme in the CDZ of the Union of Myanmar."

1.2 Objectives and the Scope of the Study

The overall goal of this Study lies in providing a design for action plans for the purpose of comprehensively promoting poverty reduction and regional development targeting the CDZ of the Union of Myanmar. The process of the Study centers on the following which themselves are the objectives of the Study:

1) To formulate Action Plans with practically applicable measures to the CDZ for reducing poverty, focusing on the livelihood of those who live in the area, and

2) To develop capacity of formulating plans and implementing projects for counterparts, extension workers, farmers and targeted communities in the target area.

The action plan to be formulated in this Study comprises of those undertaken by the counterpart organizations including the Ministry of Agriculture and Irrigation, Ministry of Livestock and Fisheries, Ministry of Cooperatives that are involved in this Study in order to solve compound issues/ constraints impeding the poverty reduction in the CDZ. Above all, the plan should be elaborated from the aspects of agriculture, livestock, off-farm income sources (for example cottage industries) and living environmental improvement relating to the life of those who live in the CDZ. At the same time, the Study designs a framework of promoting the action plans by the related organizations proposing as an assisting framework of development activities where possibility of participation by other stakeholders such as donors and NGOs is expected.

Selecting and adopting some of the action plans with high priority, some projects are actually implemented during the Study period as pilot. Then, making use of the findings obtained from the implemented Pilot Project, action plans with higher efficiency/ sustainability will be elaborated as final proposals. Also, a technical manual is provided through the implementation of the Pilot Project in which useful techniques for improving the livelihood of the people in the CDZ are summarized for users. This manual envisages being applied to daily extension activities through handy use by extension workers of the counterpart Ministries.

To attain the objectives above, this Study is divided into two phases; namely, Phase I from the first quarter of year 2006 to the first quarter of year 2007 and Phase II from the second quarter of year 2007 to the third quarter of year 2010. A Poverty Profile (draft version), Action Plans (draft version), and

the preliminary plan of Pilot Projects were prepared during Phase I study. The Pilot Project(s) are implemented in the Phase II study, during latter part of which final version of the poverty profile, action plans as well as technical manuals were finalized. Following are the scope of the Study by phase and the overall schedule, which were agreed upon in the S/W;

1.2.1 Scope of the Phase I Study

1) To collect and analyze existing data and information and conduct field surveys including interviews with relevant authorities as well as with local communities. These activities will be carried out in the above-mentioned Study Area,
2) To review projects and programmes which have been implemented in the Central Dry Zone,
3) To compile information and data about present situation, development constraint(s) and potential(s) of the Central Dry Zone,
4) To propose Development Components of the Central Dry Zone in the following four areas with potential issues, 1) Agricultural development (e.g. Agricultural Crops, Livestock, Water utilization), 2) Non-agricultural Income Generation (e.g. Agricultural Product Processing, Handicrafts, etc.), 3) Livelihood Improvement (e.g. Household Management), 4) Supporting System of Development Activities (e.g. Microfinance, Training, Community Empowerment),
5) To develop a set of criteria to categorize project area,
6) To prepare draft Action Plan that includes above item 4 and 5 and implementation strategies, and
7) To formulate the plan of pilot project(s) based on the Action Plan, considering 1) to select priority development component(s), 2) to set criteria for the selection of the model villages, and 3) to select the model villages where pilot project(s) will be implemented.

1.2.2 Scope of the Phase II Study

1) To implement pilot project(s) in model villages with following purposes: 1) to verify the respective validity of the Development Components, 2) to verify implementation strategy of the pilot projects that is proposed in the draft Action Plan, 3) to enhance capacities of Myanmar counterpart personnel, extension officers and key farmers as well as concerned communities,
2) To monitor and evaluate the pilot project(s),
3) To prepare Technical Handbook for the use in the Central Dry Zone, and
4) To finalize the Action Plan(s) on the basis of findings of pilot project(s).

Table 1.2.1 Overall Study Schedule

Year	2006				2007				2008				2009				2010		
Quarter	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd
Phase I																			
Phase II																			
Report	Ic/R		P/R1		P/Prof It/R1		P/R2		It/R2		P/R3		**It/R3**		P/R4		It/R4 Tech/HB	**DF/R**	**FR**

Note : P/Prof means Poverty Profile

1.3 The Study Area

The target area of the Study agreed in the S/W includes 12 Districts and 54 Townships (TS) in the Divisions of Mandalay, Sagaing and Magway. Out of these, however, 3 TSs (Yamethin, Pyewbe, Tatkon) in the District of Yamethin are located within the newly established metropolitan zone of Nay Pyi Taw to which Capital functions are now relocated according to the announcement by the Government in November 2005. By this reason, these 3 TSs, identified as a part of target area for

capital sphere development programme, were excluded from the Study Area in the Steering Committee meeting held on 22 May 2006.

Accordingly, the newly determined Study Area encompasses 11 Districts and 51 TSs within the same 3 Divisions. The total Study Area covers around 75,169 km^2 equivalent to 11% of the total national territory, extending over 150 km or so to the east - west axis and about 500 km to the south - north axis, comparable to the area of Hokkaido Island of Japan. Average areas of district and TS are 25,000 km^2 (equivalent to about 160x160km) and 1,480km^2 (equivalent to about 38kmx38km), respectively. Population in the Study Area counts at 9,841,620 as of 2003[5], accounting for about 18% of the total national population (approximately 53,224,000 as of 2003). Demographic density in the Study Area is estimated at 131 persons/km^2, or 1.7 times as much as the mean national population density, implying that the Study Area is fairly densely populated.

Population in the Union of Myanmar:

The Population Census in 1983 is the latest one in the Union. In this Country, population up until 1993 was estimated based on this census by applying the rate of increment at about 2%. Later, it has been estimated from the same census but referring also to the results of Myanmar Population Changes and Fertility Survey conducted in 1991 in addition to the census. In these demographic estimations the rate of growth has been fixed at around 2%. The demographic estimation was made up to 2007/08 as of March 2010.

On the other hand, more detailed demographic data at TS level happen to occasionally be available but there are lots of inconformity amongst the data. For instance, population up till 2004 has been available for TSs in the Study Area as of 2006, where sudden leap from 9,841,620 in 2003 to 12,261,898 in 2004, or an increment of around 25% during this just one-year period. For this reason, demographic data in 2004 is deemed invalid and actually the data as of 2003 kept by TS has been referred to. The latest statistical yearbook, Yearbook 2004, also posts the population in year 2003 as the latest figure.

As aforementioned, this Study has carried out pilot projects since fiscal year 2007/8. In year 2007/08, all the townships were categorized in 5 types, from which representative villages were selected for the implementation of the pilot projects. Basically the selection of the villages was done each per every type, but 2 villages from type-3 TSs, thus a total of 6 villages, one each from 6 TSs, were chosen for the pilot project in 2007/08.

In fiscal year 2008/09, original plan was that new additional pilot projects were to be added in the same 6 TSs. However given such request from the Government saying pilot project, especially centering on agriculture extension, should be extended to other TSs as well. Responding to this request, 2 pilot projects, dealing with paddy improvement and organic agriculture promotion were extended to 12 TSs including the original 6 TSs (see Figure 1.3.1 for TSs for pilot project implementation).

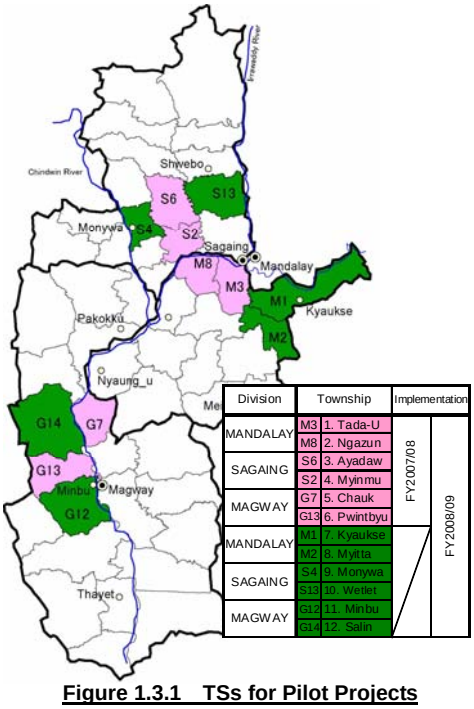


Figure 1.3.1 TSs for Pilot Projects

1.4 The Study Approach

The CDZ development plan this Study produces should be a comprehensive development plan at the broadest level of economic and social planning and a plan which could be actually practiced in the relevant villages of the CDZ as well. The development programme should coordinate actions/ plans at a sectoral as well as area, say division, wide levels, and has to balance each other at the divisional level, making itself comprehensive. The development plan should also fit into the higher level plans

[5] Combined data from township PDC offices, for this population see the Box.

such as national development plan which is statutory policy document prepared by the central relevant offices of the Government.

Learning from past experiences in planning an area-wide development programme, this Study contains two new elements apart from conventional plan formulation: which are 1) poverty profiling involving not only the community people on the ground but also frontline government offices mainly at township level where most frontline data are available, and 2) implementation of pilot projects before the finalization of the development plan. The Development Plan is, therefore, characterized by the active involvement of the people and also frontline officers in the CDZ through poverty profiling as well as pilot project implementation. Also, before the development plan is finalized, several of the most important hypotheses of the draft development plan are to be verified from which workable implementation arrangement for the development of all the CDZ area is to be proposed.

This process of formulating the Development Plan is shown in Figure 1.4.1. As shown in the figure, the approach to formulating the plan may be called a hybrid type, composed of both conventional sector approach, which may be called top-down approach, and a participatory approach which entails bottom-up movement from the people on the ground and also from the frontline government offices. In order to gain a clear overview of the Study Area, understand overall resource availability and maintain a balance with other alternative plans, a certain degree of top-down approach needs to be adopted. On the other hand, a bottom-up approach is also required.

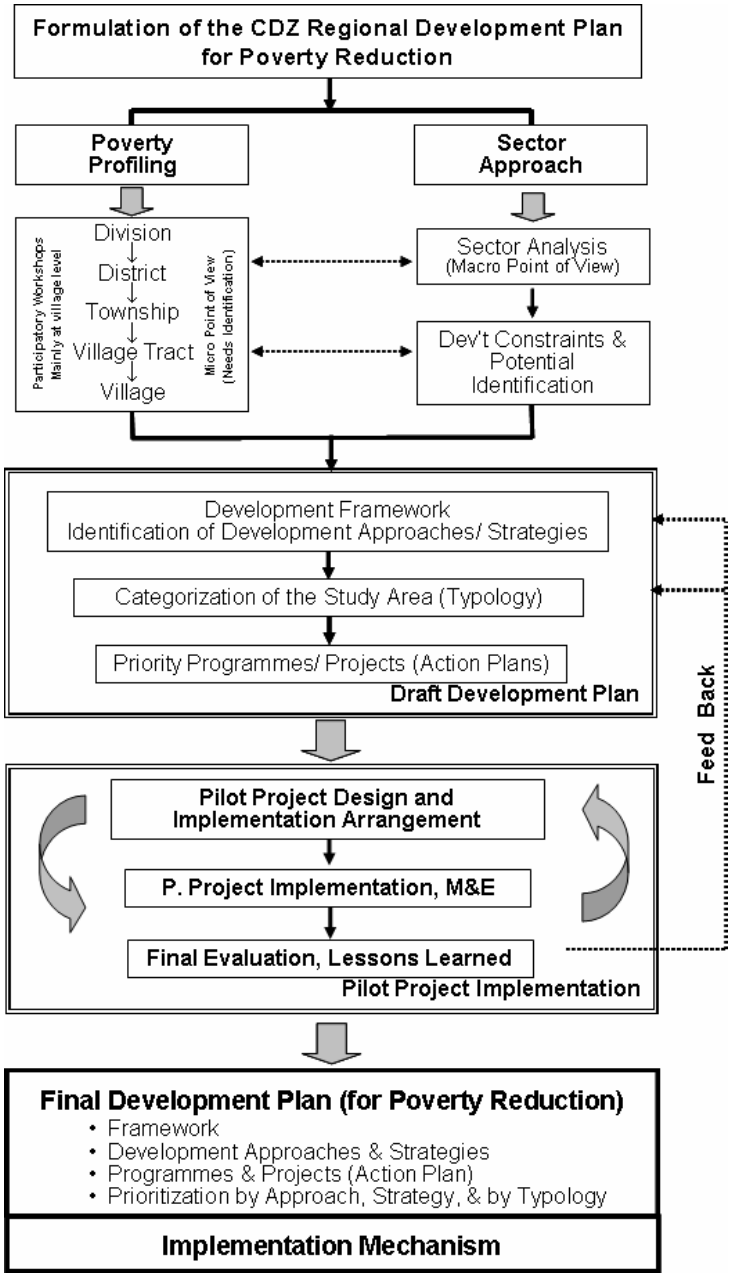


Figure 1.4.1 Overall Study Framework and Flow

Implementation of the pilot projects is another key to formulating the development plan that could really work on the ground. As mentioned, this Study is composed of two phases, Phase I and Phase II. During Phase I, a draft development plan is prepared and a number of pilot projects are to be identified. Phase II of the Study puts some of the identified projects into practice, and converts the draft plan into the final CDZ Development Plan for poverty reduction of the inhabitant by feeding back into it the experience and lessons coming up through the implementation of the pilot projects. Also the pilot practice will identify a soundest mechanism with which the CDZ development plan is to

be put into real implementation.

1.5 Implementation Arrangement of the Study

The counterpart organizations of this Study are the Ministry of Agriculture and Irrigation, Ministry of Livestock and Fisheries, Ministry of Cooperatives. Out of these, Department of Agricultural Planning (DAP) of the Ministry of Agriculture and Irrigation is responsible for superintending the Study at the central level, while Myanma Agricultural Service (MAS) that has local offices in 17 divisions and states (see Box right) as well as in 63 districts and around 370 TSs takes charge of the implementation of the Study as main counterpart organization at the local level. This is why the chief counterpart (CP) is appointed from the MAS while as need arises relevant CPs are appointed and sent from the Ministry of Agriculture and Irrigation, for example from the Department of Irrigation, from the Ministry of Livestock and Fisheries as well as from the Ministry of Cooperatives as the Study proceeds on.

Divisions & States of the Union of Myanmar

The Union of Myanmar is administratively divided into 8 divisions and 9 states. The 8 divisions cover catchment of the main stream as well as tributaries of Ayeyarwady River and the large alluvial area situated in the central part of the Country where Sittoung River flows. The latter 9 states surrounding these 8 divisions consist of plateaus and mountain ranges. CDZ that is the Study Area of this Study and Ayeyarwady delta are located in the divisions where Burma race inhabit. Current divisions stem from Burmese State that English colonial administrators put under the direct control. On the other hand, current states mainly comprise the area of indirect jurisdiction under the mandate of indigenous chieftains who had existed before colonial control where ethnic minorities inhabit. Distinction between division and state can be defined as the difference between the inhabitance of the majority of Myanmar, the Burma race, and that of other ethnic minorities historically originated from

At the central level, a Steering Committee is established comprising of directors and managers of the related three ministries, which is chaired by the Director General of DAP. The Study Team and CPs report, together with various reports produced in the process of the Study, what has been studied to the Steering Committee where representative of JICA office in Myanmar is also to attend. Thus the Study is implemented in line with the consultations made in the Committee. Likewise, at the local level, a Pilot Project Implementation Unit composed of regular staff of division, district and TS under the related MAS as well as of the staff of the related local offices of the Ministry of Livestock and Fisheries and the Ministry of Cooperatives is established that functions as a joint promoter in implementing the Pilot Project.

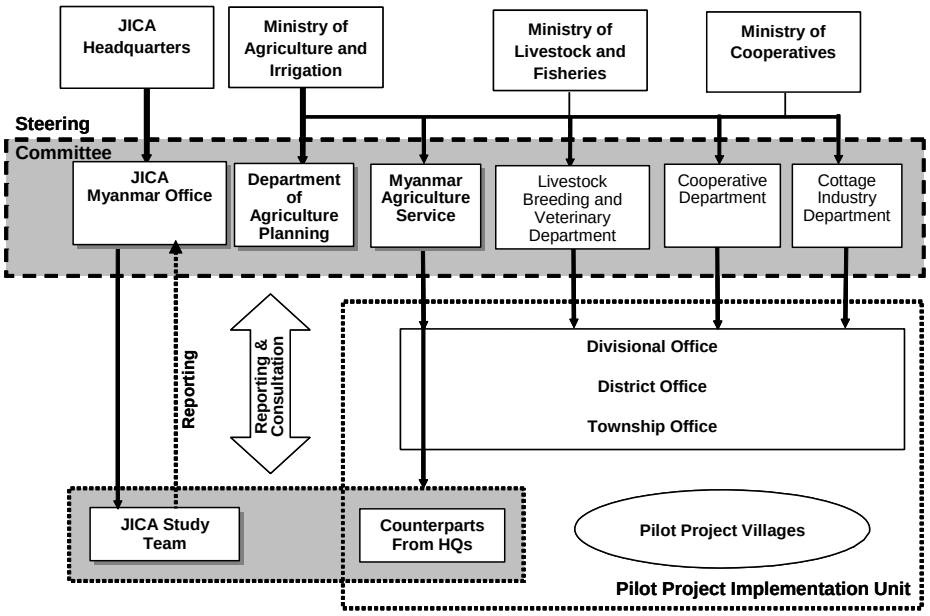


Figure 1.5.1 Implementation Arrangement of the Study

CHAPTER 2 PHYSICAL FEATURES, MACRO-ECONOMY, DEVELOPMENT AND POVERTY IN THE UNION OF MYANMAR

This chapter deals with physiography, macro-economy, the state of development and poverty referring to the existing references, publications and the limited results of interviews to the people in the Study Area. The Union of Myanmar followed a typical policy and economic strategies called Burmese Socialism during the period of post military coup back on March 2, 1962 until the democratic movement in 1988. Current regime that emerged in 1988 has concluded that redundant Burmese Socialism induced a lingering economic stagnation and since 1989 the regime renounced it switching the policy into so-called market-oriented economy.

In the course of this change in its policy, the regime attained a formal leap of the rate of economic growth by escalating trade with its neighbors including China, India and Thailand. Nevertheless, it might be said that some inconformity arises as to a host of statistical data in this Country[1]. For instance, the average rate of GDP growth during 1999/2000 – 2007/08 has formally been estimated at 12.7%[2] in spite of the actual period suffering from economic sanction. On the other hand, financial indicators related to the basis of such a high growth rate have not been made public so far. Though statistical indicators may not be in conformity to some extents, it is also likely that the actual state economy of the Union of Myanmar surpasses the publicized level of per capita GDP US$333 (ASEAN FMSU, 2007) taking advantages from border trade, etc.

At any rate, the fact that no famine but only one time in 1800s has ever been experienced by the nation in the past suggests us high potentiality at least in its agricultural sector. Similarly, it is well known that Burmese women in particular have high status in their families. Under this circumstance, they tend to have high-level health indicators mainly in the category of maternity - infantry health because of thorough catering for infantry health by the mothers. Further in the field of education, monasteries are fairly functional where many people including aged population once learned how to write and read. These facts imply that the Country is surely an LLDC on the basis of formal per capita GDP, but it is unlikely that degree if poverty in the people's real life actually matches with this GDP per Capita. Following discussion deals with these issues and current status of the Union.

2.1 Geo-political Features of the Union of Myanmar：focused on Relationship with Thailand, China and India

The Union of Myanmar is neighboring with anticlockwise Thailand and Laos at the east, with China (Yunnan Province) at northeastern to north also with India and Bangladesh at its western side. The total length of continuous frontier amounts to around 6,000 km. Beginning with the boundary with Thailand located at a part of Malayan Peninsula at around South Latitude 10°, the border extends to the north via North Latitude 16° (Yangon is located at North Latitude 16°40´) until it reaches North Latitude 28° and the total length of this part of the border comes to approximately 1,400 km excluding the part of Malayan Peninsula. In longitudinal direction, the territory extends between East Longitude 92° - 101° from east to west, length of which is about 900 km.

The total land area of the Union of Myanmar is 677,000 km^2, the largest amongst Southeast Asian countries, where 57.5 million is populated, equivalent to over 80% of the population of Thailand that is not small as compared to neighbors. The Union has potential for developing agricultural, forestry and mineral resources, natural gas etc, and it is deepening relationship with its neighbor countries.

[1] For example, About Sustainability of Macro-economy in Myanmar, Japanese version, Asian Economy, LVIII-2 (2007.2), Koji KUBO, and Burma's Economic Prospects, Testimony before Senate Foreign Relations Subcommittee on East Asian and Pacific Affairs, March 2006, Dr. Sean Turnell

[2] Statistical Yearbook 2008, Central Statistical Organization, Nay Pyi Taw Myanmar, 2009、ASEAN Statistical Yearbook 2009

Referring to major trade partners in 2005, Singapore had the largest share, that is 28%, as single import destination represented by the import of machinery etc, whereas 3 directly bordering countries, namely China, Thailand and India accounted for 62% of export share and 40% of import share[3] (refer to Figure 2.1.1). Apart from the economic blockage imposed by the western countries affecting the national economy, neighboring nations including Thailand, China and India occupy crucial position as far as trade of the Union is concerned.

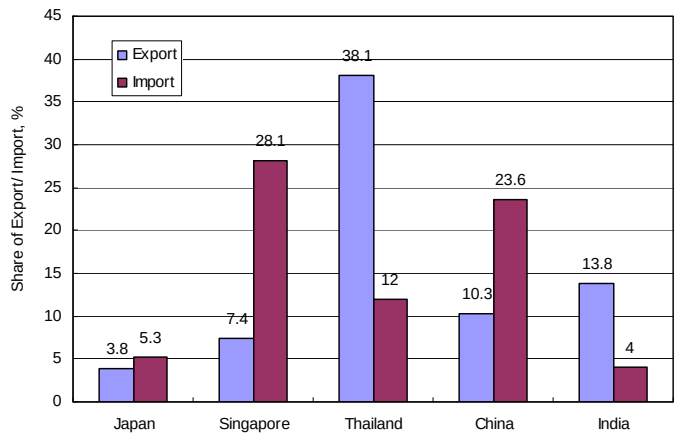


Figure 2.1.1 Trade Share with Major Trade Partners in 2005, %

2.1.1 Relationship with Thailand

The largest source of foreign currency earning for the Union is Thailand. As export destination, Thailand accounted for 38% of the total exports from the Union as of 2005 (refer to above Figure 2.1.1). This is mainly attributable to the export of natural gas through the pipeline that has been launched to the orbit since 2001. In fact, the overall export share to Thailand was 14.4% in 2000 but it marked a great leap to 31.5% in 2001. From the side of Thailand, natural gas accounts for over 80% of the total amounts of imports from the Union of Myanmar. Besides, Thailand continues a policy of relocating its core of labor-intensive industries to the border front of the Union or even into the Union where cheap labor force entailing very big benefit to Thailand is available.

Given a sample of relocating the core sites of labor-intensive industry in Thailand, we can see Mae Sot Town at the Thai side of the border with the Union where many garment factories have been established. It is said that about 30 thousand Myanmar employees are employed in these factories as of year 2006[4]. Those who were engaged in garment industry in the Union had counted at around 60 thousand as of 1997 and it was said to have swollen up to about 300 thousand at the peak in 2000. Nowadays, however, under the economic sanction the number of employees hired by garment industries within Myanmar is said to have become around 50 - 60 thousand[5].

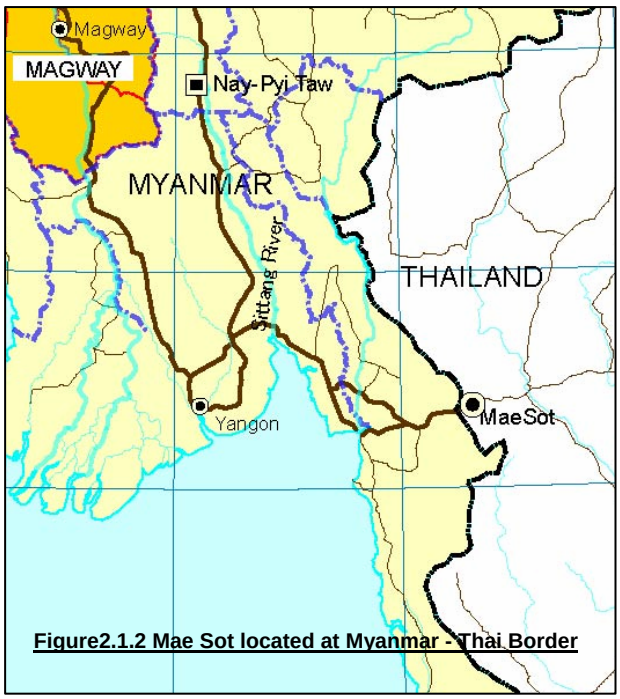


Figure2.1.2 Mae Sot located at Myanmar - Thai Border

Above example tells us how large the scale of mobilizing cheap labor force by the neighboring country of Thailand is. Since sewing industries can hardly get along with escalated wage level prevailing in Thailand, they established their factories nearer to the boundary in search of cheap and better quality labor force offered by people of the Union. From the reference

[3] ARC Report 2006, World Economic Information Services
[4] World Trend, No.134, Asia Research Institute, Japanese Version
[5] Labor Immigration to the Capital Yangon and Employment Situation – a Survey of Garment Factory -, March 2004, Nang Mya Kay Khaing, Japanese Version

comparison of monthly wages for general factory workers in urban areas shown in Table 2.1.1, it is obvious that cheapness of wage level in Yangon is outstanding.

From the CDZ, among others from Magway Division, many seasonal workers have been flown out to garment factories in the outskirts of Yangon. According to the result of survey on garment factories by Nang Mya Kay Khing in 2000, seasonal workers from local homelands other than Yangon area accounted for 2,136 (34.8%) out of the sampled 6,141, where the maximum was about 33% from Ayeyarwady Division followed by the second 21% from Magway Division and the 5th was 9% from Mandalay Division. From this fact it is anticipated that not a few seasonal laborers are engaged in the garment industry works in the above-cited Mae Sot in Thailand.

Table 2.1.1 Comparison of Wages by Major Cities

City	Wage of Factory Worker（$）	Year
Yangon	**20 – 48 $/month**	**2003**
Dacca	29 – 60	2003
Beijing	79 – 139	2003
New Delhi	124 – 146	2003
Hanoi	78 – 143	2003
Ho Chi Min	122 - 135	2003
Bangkok	196 – 354	2006

Source：JETRO 2003, & Data of Ministry of Labor for Bangkok

Weaving industry is kept viable in CDZ that can trace the origin of this industry to the era of dynasty, where people are engaged in weaving in many villages along with small-scaled cottage sewing of the woven cloth. In fact, over 90% of about 25 villages visited directly by the Study Team until June 2007 engage some villagers in weaving and sewing at cottage scale. It is therefore believed that under the influence of traditional vocation garment factories have been placed as a destination of seasonal workers from poverty prone strata of the CDZ[6]. Currently, the Union cannot use US- and Euro-markets as an outlet of sewing products from the Union due to the economic sanction imposed by the US and other countries. Yet, there remains still high possibility of restoring export-oriented garment industries taking advantage of inexpensive and better quality labor supply, whereby labor force from the CDZ among others can be absorbed.

2.1.2 Relationship with China

Territorial relationship between the Union of Myanmar and China is very unique and importantly interpreted in the development of Mekong watershed areas. Figure 2.1.3 shows the related countries to the Greater Mekong Sub-regional Development and economic corridors passing through them from east to west and from south to north where the development area includes Yunnan Province of China. The South – North corridor can connect Bangkok area to Yunnan Province and further to inner areas of China, but for the access to the ocean route to Middle East and Europe it is easier to use the route leading to Shan State of the Union of Myanmar, and then via Mandalay and the new capital Nay Pyi Taw and finally to Yangon, rather than from Yunnan Province through south - north corridor via Thailand. Moreover, as shown in Figure 2.1.4, the marine route for Middle East and Europe from Yunnan Province via Viet Nam or

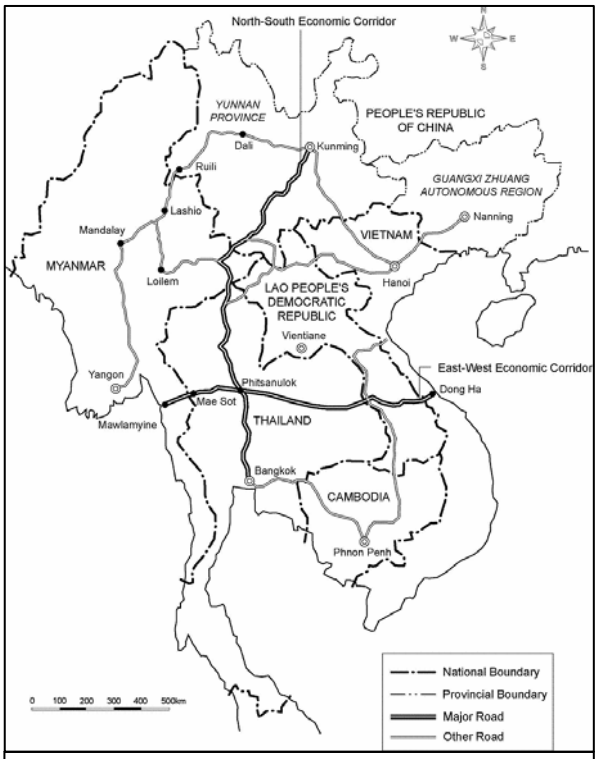


Fig 2.1.3 Greater Mekong Sub-regional Development Area and Economic Corridors

[6] In fact the works in the garment factories are so called CMP; namely, cutting, making and packing, which is quite different from the traditional hand weaving works in nature. However, though the process is different from each other; there is a similarity in which they are dependent much on manual work. From this point of view, villagers who are at present engaged in cottage weaving industry can also be engaged in CMP industry without much difficulty in terms of technical gap.

Thailand needs to pass Malacca Strait at the offshore of Malaysia. The alternative route, i.e., from Yunnan Province via Shan State - Mandalay - new capital Nay Pyi Taw and then Yangon in the Union of Myanmar can secure the access to the Middle East and Europe in shortest distance. In addition, an agreement on the construction of a pipeline was made in 2006 to transport petrol and natural gas from Sittwe Township in Rakhine State facing to Bengal Bay situated in southeastern part of the Union to Kunming City of Yunnan Province in China[7]. This enables China to carry petrol and natural gas of Middle Eastern and African origin without passing Malacca Strait into inland part of China.

As such, great significance in physiographical term is found in securing marine route to connect inland China with the Middle East, Europe and Africa via the Union of Myanmar. Even at present, commodities are flowing very vigorously from Yunnan Province in China through Mandalay and Nay Pyi Taw to Yangon and in this case Mandalay City serves as a relay point. From now onward, it can be predicted that the route passing the east side of the Study Area from north to south through Mandalay City and Nay Pyi Taw City to Yangon City will become an economic corridor of the Union. That is to say, this economic corridor would possibly stimulate the eastern area of Mandalay Division within the Study Area to undergo change into peri-urban villages.

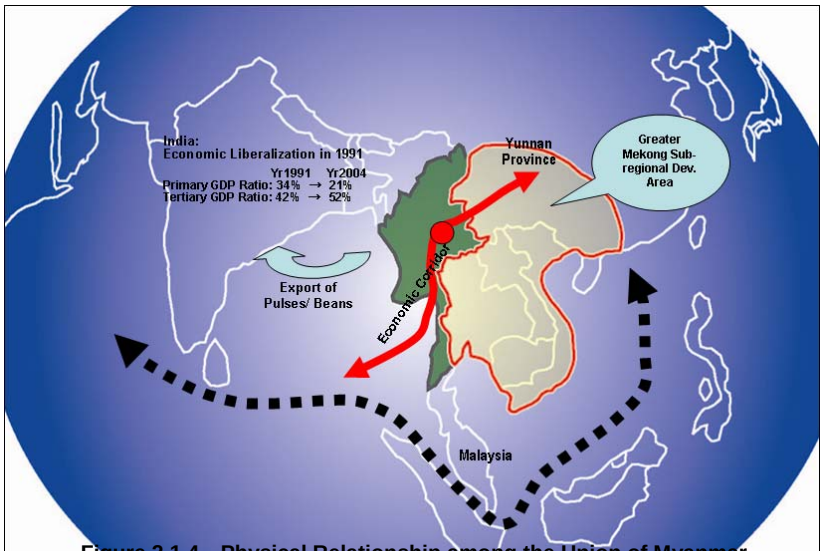


Figure 2.1.4 Physical Relationship among the Union of Myanmar, China and Greater Mekong Sub-regional Development Area

2.1.3 Relationship with India

India is the second export destination of the Union of Myanmar after Thailand. Commodities for India are mainly composed of timber and pulses. In particular, the exports of pulses have recorded a great growth since early 1990s. India herself has pursued economic liberalization since 1991 transforming hitherto closed type economic policy to open market economy policy. Simultaneously with this economic reform India allowed rapid increase in the imports of agricultural commodities into herself where the Union of Myanmar, supported by competitive farm labor cost, played a big role of supplying *dahl* that is an important food in India.

Rate composition of GDP of India in 1991 shows the relative contribution from primary industries of 34%, secondary ones of 24% and tertiary ones of 42%, respectively. In 2008, the rate composition moved to 17%, 26%, and 57% respectively, indicating that principal industry is shifting from agriculture to

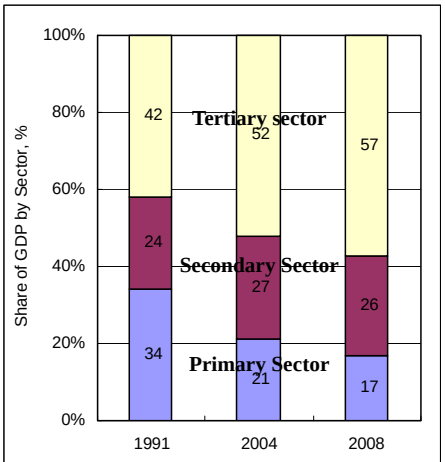


Figure 2.1.5 Change in GDP Share of India

[7] Asia Times (November 1, 2006): Chinese engineers are preparing to begin a $2 billion gas pipeline from Sittwe, which supports oil and gas platforms in the Andaman Sea, to Kunming this year for completion in 2009, according to an April China Daily report. Industry analysts speculate that those Myanmar-situated pipelines will be designed to transport oil and gas arriving by tanker from the Middle East and Africa to inland China, potentially saving Beijing time and money now spent sailing through the choked, pirate-infested and vulnerable Malacca Strait to China's east-coast ports.

service industries (see Figure 2.1.5). In other words, transformation of industrial structure has already taken place in India. In the near future, it is highly probable that shift to the industrial structure of developed country type firmly proceeds on in India wherein foods are imported in exchange of the surplus from secondary and tertiary industries rather than enhancing level of self sufficiency of agricultural products. It follows that exports of pulses from the Union to India possibly continue or even increase.

Peasants in the Union of Myanmar have long suffered from the compulsory cropping and compulsory delivery regimes of rice and other agricultural products throughout the era of Burmese Socialism. For example, before 1988 compulsory delivery of rice had been imposed at the price level of around 1/4 as cheap as market price, and later at the level of about 1/2. The compulsory delivery quota of rice was completely abolished only in year 2003, but the compulsory on cotton and sugar cane is still effective. However, pulses exportable to India have almost been free of centrally planned economic intervention. What's more, MAS positively diffused high quality seed of these pulses for producing exportable pulses.

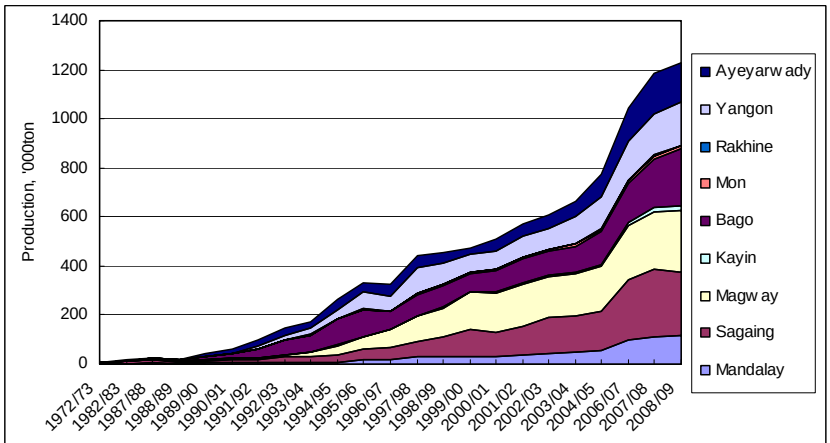


Figure 2.1.6 Production of Green gram by Division and State

Under such circumstances, farmers expanded cropping of pulses that had already been popularized in the CDZ because of its adaptability to dry climate, in response to market demand in accompany with the emergence of gigantic Indian market. In the CDZ, farmers have also increased year after year area under chickpea (Cicer arietinum L.) as a catch crop of paddy field that can grow with only residual soil moisture in addition to hitherto pigeon-pea (Cajanus cajan Millsp), and also increased acreage under green gram (Vigna radiata L.) as a pre-monsoon or monsoon crop. Cropping of black gram (Vigna mungo L.) is also expanded as a catch crop after paddy in the Ayeyarwady Delta area with higher atmospheric temperature but it is not much cropped in the CDZ.

A long-term trend of production of green gram is illustrated in Figure 2.1.6 where accelerated production since early 1990s is markedly recorded coincided with India's policy change into open economy. Indian market surely played the role of driving force though some reservation remains in its increment rates as to the data of 2000 and onward.

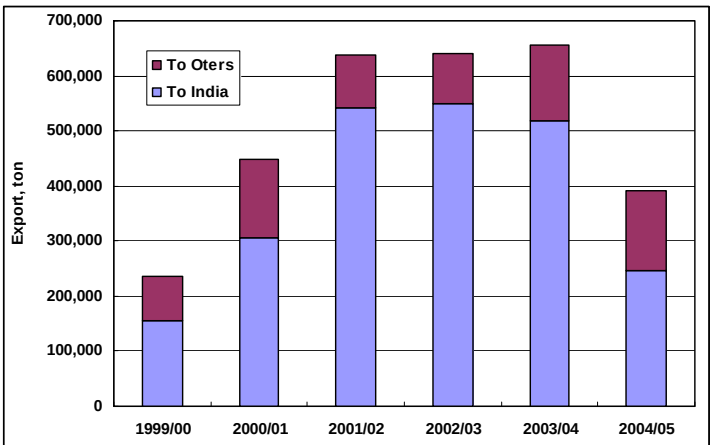


Fig. 2.1.7 Total Exports of Green gram, Chick pea, Pigeon pea

Figure 2.1.7 shows the total amounts of exports of chickpea, green gram and pigeon pea since 1999/00 to India and others separately[8]. From this Figure it can easily be understood that about 60 -

[8] Myanmar Agricultural Statistics 2006 Yangon, Myanmar

85% of exports of pulses that are mainly cropped in the CDZ is oriented to India. CDZ, as shown in Figure 2.1.6 as one example of green gram, has by far large share of pulse production in the Country, namely, 51% of green gram, 93% of pigeon pea and 97% of chickpea[9], implying that the "Indian pulse market" has great economic significance for the people of CDZ.

2.2 Macro-economy in the Union of Myanmar

Immediately after the establishment in September 1988, the current regime actively deployed its tactics towards market-oriented economy. Although economic growth in early 1990s had been weak, it achieved high rate of growth during the period from around 1992/93 to mid 1990s. With a success in getting rid of economic stagnation that had triggered the democratization movement in 1988, the national economy seemed to quickly recover and to maintain a high growth of GDP, but eventually economic growth experienced somewhat stunt in the latter half of 1990s. The GDP growth rate was curtailed from 6.9% in 1995/96 to 6.4% in 1996/97. In 1997 the Country joined ASEAN anticipating much foreign investment by this occasion, however, it ended up in overall failure as affected by Asian economic crisis occurred in the same year. The GDP growth rate resulted in 5.7% in 1997/98 followed by 5.8% in 1998/99 (see Figure 2.2.1).

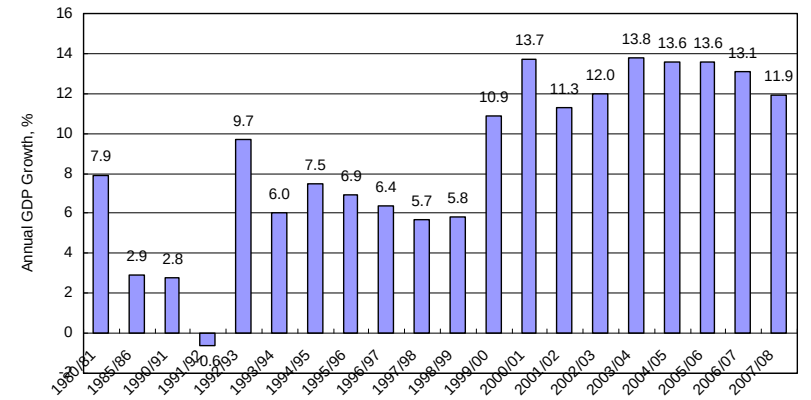


Fig 2.2.1 Trend in GDP Growth Rate in the Union of Myanmar

Later, since the latest edition in 1998/99, publishing of "Review of the Financial, Economic and Social Conditions" has been suspended, which used to publicize up-dated economic indicators of the Union annually. Whereas, the annual growth of GDP has continued high rates over 10% with sudden surge in 1999/2000, and the most recent edition of "Statistical Yearbook 2008" gives as high as 11.9% as the rate of GDP growth in 2007/08. The average growth rate from 1999/00 to 2007/08 is 12.66%, at which rate total GDP could be doubled in just 6 years. Sources such as Economic Intelligent Unit, Asia, now raise some concern in its interpretation.

In so far as the Study Team engaged in this Study has interviewed in the target villages of the Pilot Project, farmers felt improvement in their livelihood owing to escalated producer prices of pulses and rice brought about by market liberalization since 1988 though the extent thereof is still limited. In addition, in Mandalay Division among others, cheap Chinese products have recently become available in markets that enabled those who are engaged in small-scale industries to purchase industrial materials, eventually leading to positive contribution to income betterment. In other words, it is quite confident that throughout 1990s and even after 2000 local economy in CDZ has continued its growth. However, whether the rate of growth with over 10% has been achieved or not is still uncertain.

As regards GDP composition of the Union of Myanmar by rate, Figure 2.2.2 shows rate of GDP composition since 1980/81 (the rate of GDP is calculated on nominal price basis). Since mid-1990s a tendency of gradual dwindling in the share of agricultural sector coupled with gradual replacement by the share of trade and services (transport, communication, social and administrative services are included) has been observed. Likewise, manufacturing shows certain rising trend since mid 1990s

[9] Based on production in 2004/05 recorded in Myanmar Agricultural Statistics 2006 Yangon, Myanmar

but still remains at 15% even in 2007/08. Even though extremely competitive labor force with high literacy is found in the Union as compared with its neighbors, the Figure 2.2.2 implies that such a potential is not yet put into function due to economic sanctions and various trade restrictions.

With regard to share of agricultural sector in GDP, Figure 2.2.3 indicates its long-term trend since 1980/81 with livestock, fisheries and forestry sectors. Contribution to GDP by agricultural sector reached 55% in 1994/95 owing very much to exports of pulses initiated in early 1990s (here the rate of share is expressed in the rate of current prices). Later, it has turned into a gradual decrease affected by tapping of natural gas that was launched on an orbit since 2001 and by other reasons. Notwithstanding, even in 2007/08 the share of agricultural sector to GDP accounted for 35% suggesting that the mainstay of the Union of Myanmar is still agriculture.

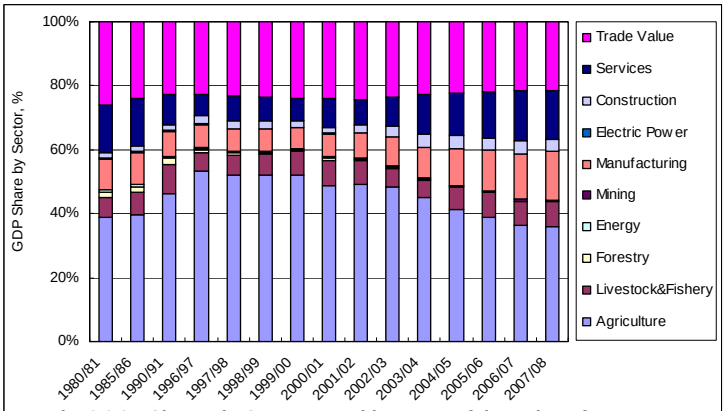


Fig. 2.2.2 Change in GDP composition rates of the Union of Myanmar expressed as the rate of current prices

Also, the share of livestock/ fisheries sector lately comes to about 8% only of GDP. At any rate, typical profiles observed in GDP composition of the Union reside firstly in large share of the primary industries, inter alia agricultural sector, secondly in the sustained state of sluggish decline in the GDP share of the primary sector (agricultural sector) despite the fact that state policy pursues market oriented economy (under market oriented economy, secondary industry is gaining share instead of agriculture industry declining, however this situation has hardly taken place yet in Myanmar).

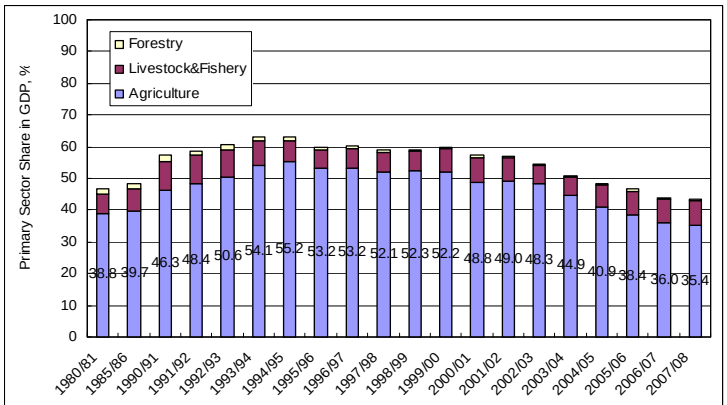


Figure 2.2.3 Long-term Trend in GDP share of Agricultural Sector of the Union of Myanmar as Expressed by Current Prices

The fact that the rate of contribution of agricultural sector to GDP has not been sharply declining suggests us that agriculture sector has achieved some growth in keeping pace with the growth of GDP itself though the rate of agriculture sector growth must be lower than that of national GDP. Figure 2.2.4 indicates growth rate of agricultural growth in the Union of Myanmar. It shows continuous high rate of growth since 1999/00 except for that in 2002/03 recording 4.7% only, though the growth rates in agriculture sector are not evenly comparable to the overall GDP growth rate always over 10%.

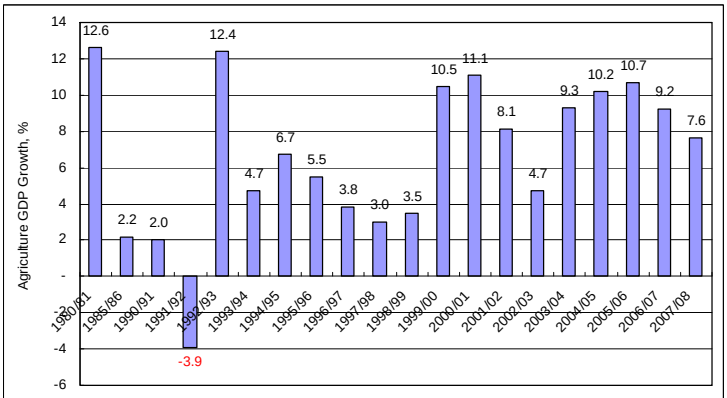


Figure 2.2.4 Growth Rate of Myanmar Agricultural Sector

2.3 Role of Agricultural Sector in National Trade of the Union of Myanmar

Figure 2.3.1 gives export shares by commodity of the Union[10]. In 1970s, the Union stood at the leading rice exporting country in the world. At that time, over one million MT of rice had annually been exported. As shown in Figure 2.3.1, the highest share on the basis of export value was in fact from rice, and 42% in overall exports of the Union was recorded in 1980/81.

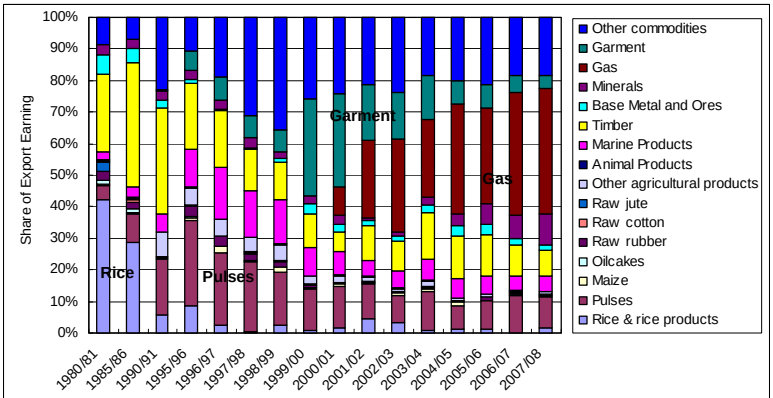


Figure 2.3.1 Shares of Export Value by Commodity in the Union of Myanmar

However, later rapid dwindling of the share of rice on foreign currency earning took place to the level of only a few percent, with the largest 9% in 1995/96. In place of rice, pulses expanded their shares on export earnings until they have reached the top of share composition during the period from mid 1990s to 1998/99. In the meantime, their shares recorded 27% in 1995/96, 23% in 1996/97, 22% in 1997/98 and 18% in 1998/99. Later, garment industry expanded the exports in 1999/00 and 2000/01, followed by export of natural gas to Thailand that has gained the regular delivery since 2001 accounting for the share of as much as 40% in overall export earnings as of 2007/08. Currently the value of export of natural gas to Thailand is ranked top of exports earnings.

Though yielding the position of export share to newly developed sources of export earnings including natural gas, relative decline of agricultural commodities - in particular pulses - in the share of the total export value is not at all means decline in the export amount. Figure 2.3.2 shows the export quantities of rice (inclusive of broken rice and rice bran), pulses and traditional timber including teak and other species. It is seen from the Figure 2.3.2 that till 2001 pulses had firmly been expanding export amount in spite of casual stagnancy experienced in late 1990s and in 2000s it has been marking over 800,000 tons.

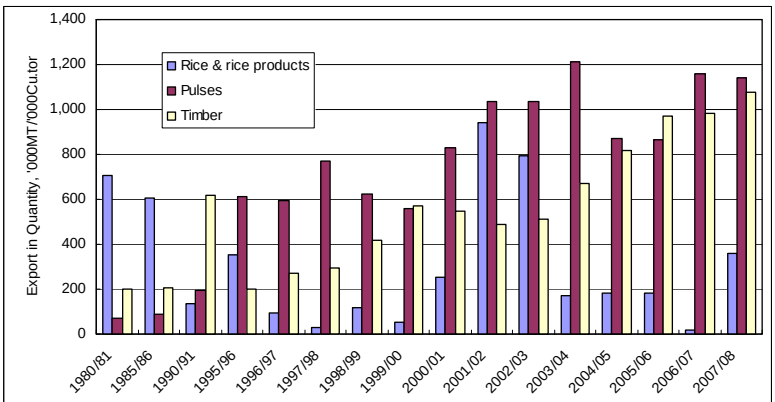


Figure 2.3.2 Trend of Export Quantities of Rice, Pulses and Timber

Export potential of rice likely remains even nowadays, but it is imperative to offer national staples at very affordable price for the sake of well-beings of the population as well as administrative stability. Supply of cheap rice can secure welfare for the poor who have to purchase rice in markets. It also enables laborers to save cost for procuring staples, leading eventually to stable supply of competitive (cheap) labor force to the labor market holding comparative advantage in international competitiveness.

In consequence, export of rice in large quantity requires considerate judgment under the current regime (rice export itself is not banned as of January 2010, but only large scaled cultivators who own

[10] Statistical Year Book 2002 '& 2004, Myanmar Agricultural Statistics 2006

over 3,000 acres and the Government can deal with rice export). On the other hand, pulses still keep share of around 10% on the entire foreign currency earnings for the Union, though its share itself has been declining. Major exportable species of pulses include black gram, green gram, chick pea, pigeon pea, cowpea (Vigna unguiculata L.) etc, and these are all chief products in the CDZ except for black gram that is cropped in delta region. Hence, the CDZ plays an important role in earning foreign currency to the Union.

2.4 Functionality of Markets in the Agricultural Sector of the Union of Myanmar

During the socialistic era in the Union, compulsory delivery of various crops, especially of rice had been imposed to farmers by which they had to sell crops to the Government at the prices equivalent to around 1/4 as cheap as the prevailed market prices[11]. Such system however was eased to a large extent since 1989 and finally completely abolished in 2003 except for compulsory cropping of rice in irrigated farm land, and compulsory cropping and delivery of sugar cane and cotton (rice can be sold at the farmers' will). As for pulses, private exports to India were made from the beginning without any government intervention. Therefore it can be said that paddy and pulses that are major crops of the CDZ can be traded through market mechanism.

Fujita and Okamoto[12] illustrated an example of rapidly rectified market functions by the economic liberalization since 1989 through the comparison between the GDPs labeled by 1985/86 fixed prices and those labeled by current prices[13], even though there are still a host of constraints. Figure 2.4.1 indicates the result of both price levels where gradual divergence develops between GDP share of agricultural sector calculated by 1985/86 price and that given by current prices towards 1994/95 and thereafter the difference is converged into a constant of about 17%. This can be interpreted as rapidly rectified market functions towards around 1994/95 from various market biases including compulsory delivery of rice at very cheap prices equivalent to a fourth of then prevalent market prices.

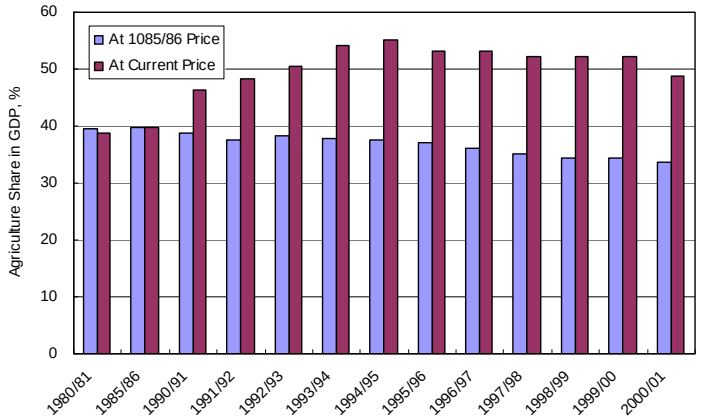


Figure 2.4.1 GDP Share of Agricultural Sector by 1985/86 and Current Prices

They further analyzed the process of rectifying price biases caused by too much depressed price levels of farm produce during socialist regime relatively to non-agricultural commodities by means of the changes in price indices of agricultural products. Figure 2.4.2 shows retail price indices of agricultural products against consumer price indices in Yangon from similar viewpoint to what was reported by Fujita and Okamoto, though confined to those which were cropped in the CDZ and data available in the Statistical Yearbook. In this Figure 2.4.2, 1985/86 price is defined as 100, that is to

[11] Under the regime where the Government hold land ownership it was competent for the Government to confiscate farmland from those who did not obey food procurement system. Even today land belongs to the government, however fear of confiscation of land, in essence transfer of cultivation right to others, is not as much as it used to be since nowadays farmers can cultivate at their own will except for rice in irrigated land, sugar cane and cotton. Farmers are obliged to cultivate rice in irrigated farmland but can sell to anyone according to the market. For the sugar cane and cotton, farmers who are around government operated factory are obliged to plant and also sell to the government, namely compulsory delivery still in effective, at the fixed price by the government.

[12] Change of Transitional Economy in Myanmar (Japanese version), Chapter 5 Myanmar Agriculture under Transitional Economy, PP174, Koichi Fujita and Ikuko Okamoto, The Institute of Developing Economies, Japan External Trade Organization

[13] In Statistical Yearbook 2004, GDPs at constant price after 2001/02 are based on 2001/02 price, whereby constant price based GDP before 2001/02 cannot be comparable to those of after 2001/02. Therefore the Figure shows the GDP share in agriculture only until 2000/01.

say, consumer price index of 100 becomes 5,217 in 2003/04. Meanwhile, the price of rice, pigeon pea and chickpea recorded hike at higher rate outweighing consumer price indices. Taking year 2003/04 for instance, pigeon pea has 8,526, chick pea has 6,495 and rice has 7,240 as against consumer price index of 5,217.

According to Figure 2.4.2, price hike of rice and mainly export oriented pigeon pea and chickpea occurred simultaneously with the introduction of market economy. This was basically considered attributable to rectified price that had once been greatly biased by compulsory delivery of quota as of 1885/86 as far as rice is concerned (namely market correction concerning rice), and for pulses attributable to domestic price escalation relative to consumer price indices affected by internationally traded prices. In this connection, the rates of rise for prices of sesame and groundnut have been lower than escalation rate of consumer price indices, but Fujita and Okamoto interpreted it as affected by cheap import-competing crops. Edible oils have high priority next to rice in the Union but domestically produced sesame and groundnut do not have competitiveness with cheap palm oil imported from Malaysia etc, thus the hike of domestic prices of these crops have been limited.

Since Figure 2.4.2 shows only the retail prices in Yangon, it is not known whether the price escalation rate given in the figure is directly reflected into farm-gate prices. However, as far as exportable pulses are concerned, it has been identified under full competition according to the field survey conducted by Okamoto et al. Similarly as to rice, though intervention exists in such a way that price hike has been controlled through export restriction (that is to say, by realizing domestically the state of oversupply of rice), no intervention like state commodity board etc. exists in so far as domestic trade is concerned. As regards rice processing, abundant village rice millers, many of which are side business of lead-farmers in the villages, are processing paddy and private dealer purchase polished rice after the processing. Of course, compulsory delivery system still exists in sugarcane and cotton, but market functions in the field of rice and in the case of pulses for which no marketing restriction has ever been imposed can be judged as normal.

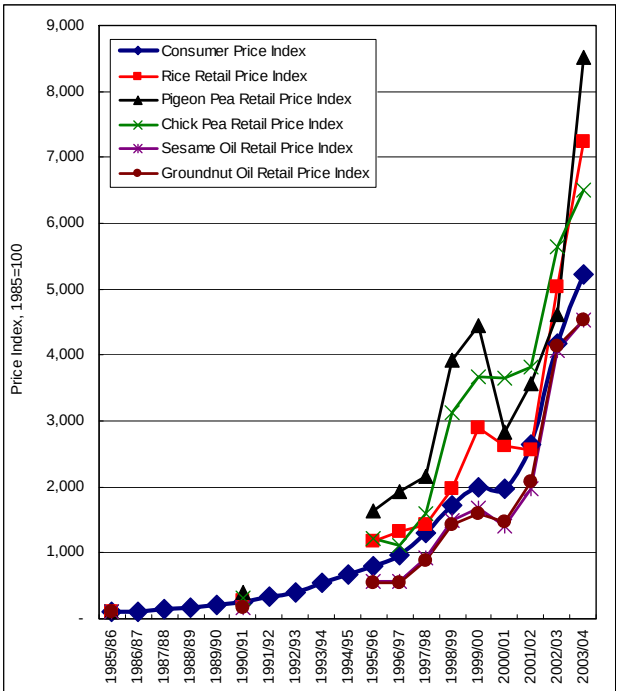


Figure 2.4.2 Consumer Prices versus Crop Prices
1985/86-Price taken as 100

2.5 Trends of Rice Prices in Myanmar and their Comparison with Prices of Rice in Thailand

The top-priority crop in Myanmar is rice. As stated above, rice is currently freely traded in free markets though its exports are controlled. It follows that the Government applies a policy to keep domestic prices of rice at low level. The following describes the long-term trends of farm-gate prices of paddy since 1840s in Myanmar and compares with those of Thai rice for the period of 1995 and later. Thereby how rice prices of Myanmar have behaved towards international rice market is sought.

2.5.1 Long-term Trends of Paddy Prices in Myanmar

Figure 2.5.1 indicates the trend of farm-gate paddy prices per 100 baskets during the period from 1840 to 2007 where the graph is presented in logarithmic unit for price level. From this figure some features can be observed as to the long-term trend of paddy prices in Myanmar, which are summarized

as follows:

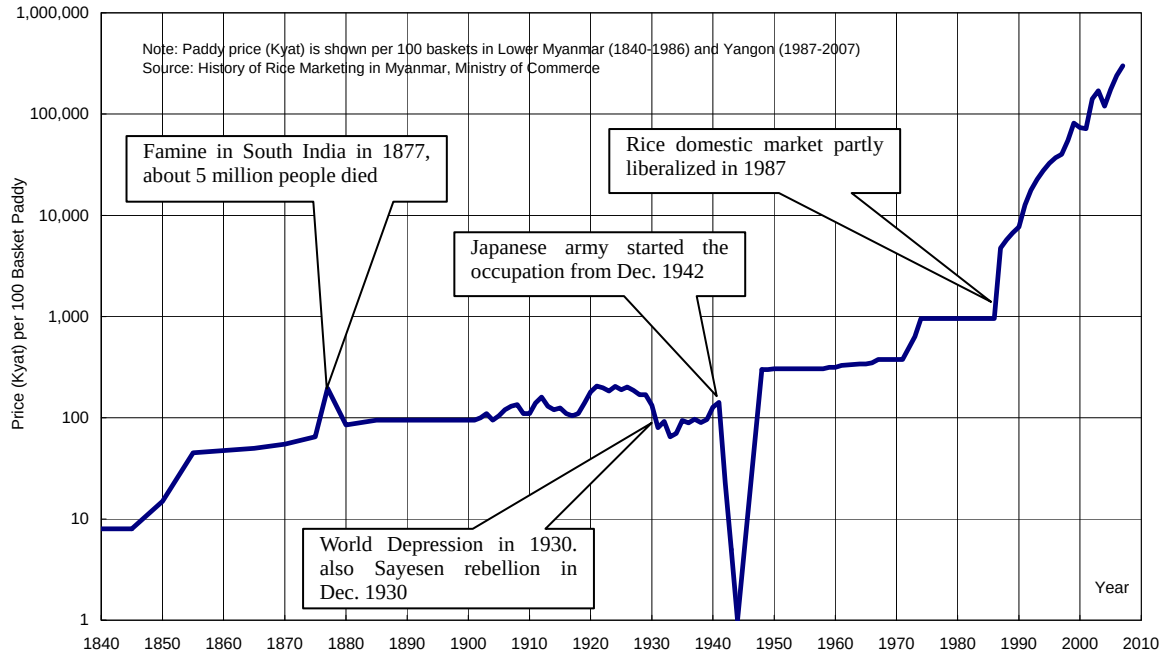


Fig. 2.5.1 Long-term Trend of Farm-gate Paddy Prices per 100 Baskets in Myanmar

1) In 1877, conspicuous price escalation suddenly took place. Such a boosting was brought about by an stimulated rice exports from Myanmar attributed to a great famine occurred in the area centered by South India (about 5 million people were sacrificed by the famine [11]). The price recorded in 2 years before the famine, or in year 1875, had been 65 Kyats/100basket (data of antecedent year is not available), but the boost was later in 1877 tripled to 195 Kyats/100basket.

2) A lingered price fall was observed since 1920. At that period, Myanmar was under the control of Indian Government that was then a British territory, and in 1921 then 4 major enterprises associated a union (Bullinger Pool) and it succeeded in monopolizing rice markets and establishing a cheap fixed price therein. It consequently served as a food-supplying base exporting cheap rice to India, thus contributing to keep lower consumer prices in India.

3) For years since the end of 1920s a big-scale collapse of rice price was experienced. It occurred prior to the global financial depression caused in 1930, eventually inducing the large-scale price fall of rice and giving catastrophic damage to rice export markets. It led to subsequent large surplus of rice in Lower Myanmar, dropping price of rice to a large extent. Paddy farmers were heavily indebted, while farm laborers lost their chances of employment, resulting in peasant riots. The largest-scale rebellion took place in December 1930 known as Sayesen's insurrection. Such negative impact in the form of global panic, so to speak negative globalization effect, had already taken place so early.

4) From 1942 the largest price fall of paddy prices ever experienced evolved. It was attributable to the start of occupation by Japanese army since 1941 in Myanmar and this resulted in almost complete lift of rice exports to Europe. Due to this market loss, large amount of rice produced in lower Myanmar lost its outlets entailing in a great break of prices. Also, the fact that many rice mills were crashed in riots fostered recession of rice industries (in this connection, it was most likely that a form of paying wage in paddy to farm laborers arose around this period as the result

[1] By the way, the famous Bengalese famine evolved in 1943 with death toll of around 3 million people.

of large surplus happened in Lower Myanmar).

5) Gen. Ne Win came into power by a coup taken place in 1962 and Burmese socialism regime continued until 1987. Trend of price hike during this period was exceedingly sluggish. The price level once rose up in 1874 from 634 Kyats to 955 Kyats, but later this level at 955 Kyats had been maintained for 13 years. During this period, government personnel and farm laborers enjoyed availability of cheap rice. Although this had a positive social welfare implication, but to paddy producers it gave hardship due to imposition of compulsory rice delivery at the prices fixed by the government.

6) The government liberalized domestic rice markets once in 1987 but this triggered 5-fold price hike from 955 Kyats in 1986 to 4,751 Kyats in 1987. Later, a high pace of rice price hike has been resumed with incessant domestic inflation. In this context, a level of 170,000 Kyats / 100 baskets was recorded in 2003 followed by a temporal recovery to 120,000 Kyats / 100 baskets but again showed a big surge up till 2007, for example price recorded in 2005 at 175,000 Kyats / 100 baskets and 240,000 Kyats / 100 baskets in 2006 (1.37 times as compared to the previous year level), also in 2007 to 300,000 Kyats (1.25 times as compared to the previous year level).

2.5.2 Comparison of Rice Prices in Myanmar with Those of Rice Produced in Thailand

In Myanmar, priority in agricultural production was attached to paddy cultivation oriented to rice exports at the stage of British regime of colonization. Rice exports were initiated at Sittwe in Rakhine area in 1830 - 31, since then export-oriented paddy cultivation became popular and popular. Later, up till 1970 sandwitched with the World War II Myanmar was the largest or leading rice exporter. Later on, exported quantities decreased year after year but nowadays large post-consumption surplus has evolved in the statistical figures, leading to positive capacity of rice exports as far as publicated figures are referred. Yet, under a firm policy aiming at serving cheap staple to the nation, exports have not been exercised except for petty amount.

Under the condition that large surplus of rice is domestically deposited, rice price level of Myanmar is relatively inexpensive to those prevailing in neighboring countries. It has brought export competitiveness at international rice market to Myanmar. Here, how much extent the rice produced in Myanmar is competitive against that produced in other countries is assessed. Namely, rice retail prices in Yangon , converted into US$ applying market ratio, is compared with export FOB prices of rice produced in Thailand.

Thailand has been the world largest exporter of rice. It follows that FOB prices of Thai rice determine international rice prices. In this regard, retail prices and FOB prices that give shipping price at the ports of shipment are different, but these two prices are ultimately not so much different because the latter are based on the rice price purchased in bulk (that is to say, purchased at cheaper price than retail prices) and cost of shipment.

The bar graphs shown below indicate price rates of Myanmar rice and Thai rice (the unit is given at the left edge). In these graphs, it is shown that the prices of Myanmar rice are equivalent to ranging about 30 - 60% during the period 1995 - 2001, and it approached once to Thai price in 2003, but again indicating a stabilized level of around 30% in 2004. In other words, except for the year 2003, Myanmar rice has considerably been cheaper than Thai rice, resulting in an implication of export potential as far as price is concerned.

Meanwhile, accompanying with price hike of Myanmar rice since 2005, difference in the price level has been narrowed. The most recent price of Myanmar rice recorded in 2007 already reached about 70% of that of Thai rice. It implies that though Myanmaer rice is cheaper by about 30% than Thai rice, the quality of the former is inferior to the latter, and it can be said that export competitiveness of

Myanmar rice is no more effective if current trend of price level continues.

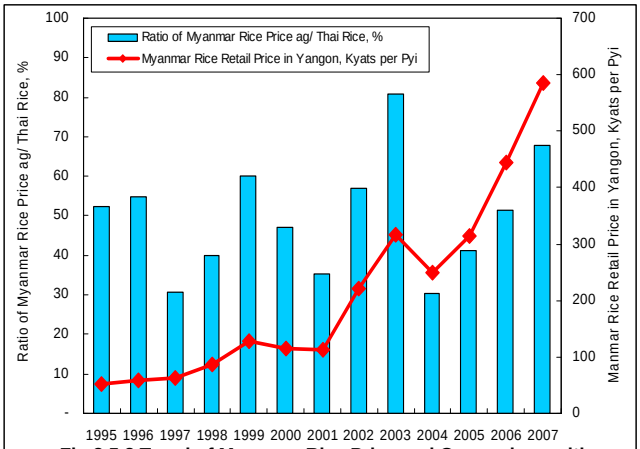


Fig.2.5.2 Trend of Myanmar Rice Price and Comparison with That of Thai Rice, in Kyats

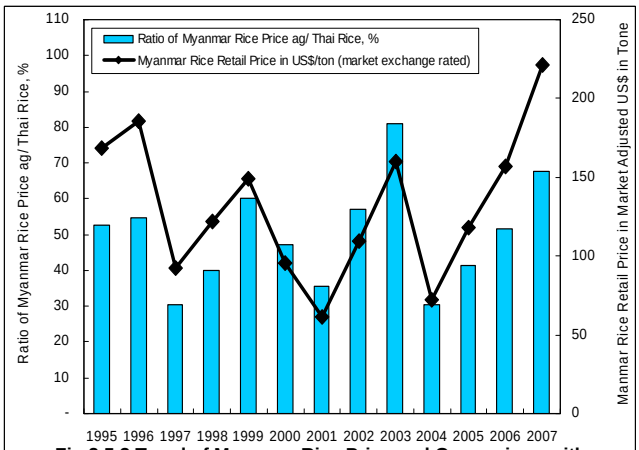


Fig.2.5.3 Trend of Myanmar Rice Price and Comparison with That of Thai Rice, in US dollar

In these graphs, retail price of Myanmar rice istelf is plotted with lines (the unit is given at the right edge). The polygonal line at the left side graph represents the trend of retail price of Myanmar rice expressed in Kyats. It is observed that it shows a sharp rise since 2004. As inflation proceeds on, the nominal price, or rice price expressed by Kyats inevitably and considerably rises on and on. Here, whenever inflation takes place, value of local currencies are being decreased in terms of US$, i.e., world-wide basal currency. It follows that if the values expressed in local currencies are converted into the values expressed by US$ with market currency exchange rates, it is possible to convert into the price at the referred countries in which inflation effect therein is adjusted allowing some time-lag of the exchange rates between these two currencies.

The polygonal line in the right side graph represents price of Myanmar rice equivalent to US$ at market exchange rate. It shows almost no significant change during the period 1995 - 2004 though it fluctuates. That is to say, assuming that the converted price is considered as conventionally adjusted one for eliminating distortion by inflation, Myanmar rice hasn't marked substantial price upsurge during the period 1995 - 2004 though some fluctuation is observed. However, later, since 2004 toward 2007 it recorded a sharp rise. This is interpreted as a provision of environment for paddy farmers in which incentive for paddy production is given to them but on the other hand degraded environment with eroded welfare for the social strata that have to purchase rice for their consumption.

The real reason why sudden price hike has recently emerged in Myanmar rice is not known at moment. In the statistics there has been surplus of rice but actually its production might have been reduced due to climatic vagary, and it has likely led to consequent price hike of rice in domestic rice markets. Alternatively, it might be possibly brought about by stagnation in the growth of paddy production under pump irrigation during dry season attributed to large price rise of fuel in 2007. Real facts can hardly be grasped because of some ambiguous points around statistical issues, especially on the quantities of internationally traded Myanmar rice and market rates of exchange, but it should be carefully followed up.

2.6 Relationship between the Determination of GDP Growth Rate of the Union and That of Targets in the Agricultural Sector

Mentioned here is how to determine the targets of cropping area and crop production in the Union of Myanmar and also how these are adjusted during the process of establishing goal of GDP of the entire Union. As mentioned above, agricultural sector has still considerable share, as high as 35 - 40% in the GDP even in recent years. This is equal to say that growth rate of agricultural sector should be

achieved with topmost priority in order to fulfill the goal of GDP growth of the entire Union. Likewise, it would also be true that state intervention is more readily practiced in the primary industrial sector (above all agricultural sector) as compared to secondary and tertiary sectors since the state owns land proprietorship.

"From top to down" is often heard in the Union of Myanmar. In agricultural sector, the Central Government fixes such targets figures as cropping areas, unit yield and production quantities and they are allocated to divisions and states, then what are allocated is further allotted to such subunits as districts and townships. Such a method had actually been practiced under planned economy regime before 1988. However, as far as formulation of "plans" in agricultural sector is concerned (in this case "plans" basically mean crop production), what is practiced now is not so rigid "from top to down".

Nowadays, in the Union, cropping area, production by crop and yield by crop in the Union are compiled from township level. What is compiled in townships is brought to districts, and they are handed over to divisions/ states until they are summarized in the headquarters of MAS. These compiled results are sent to the Ministry of National Planning and Economic Development together with plans, for example, formulated in Irrigation Department under the same Ministry of Agriculture and Irrigation. As a matter of course, planning reports from all the sectors – in short planned production – are collected to the Ministry.

Given the planned GDP growth rate is fixed at 10%, all the target production data submitted from all ministries and state agencies are examined in this Ministry. If the summed up result doesn't reach the goal of GDP growth rate at 10%, the revised target of production quantity (and cropping area) is specified for example in the agricultural sector where the share of GDP composition is very high and the administrative intervention is easier with the leasehold right used as warrant. Then, the revised target is sent back to the MAS and MAS distributes the break down of the revised target to the level of division/ state, the level of district and township.

The cropping area by crop revised in the central government is thus reallocated to township level, where MAS staff working in the township formally deliver to the related attendants at the regular meeting of TS PDC (TS Peace and Development Council) established at each township. PDC meeting is held as a rule once in a month where participation of such delegates from technical ministries/ agencies as staff of MAS, village tract chairman (as representative of villagers) is liable. Target cropping area, target production quantities etc. are specified in this meeting and the attended village tract chairmen inform village leaders under him/her these targets.

Here, the priority crops specified by the government of the Union include firstly paddy, secondly oil crops and thirdly pulses. The basis of this priority stems from the following purposes; i.e., rice paddy for supplying staple at cheap prices to the nation, oil crops for saving foreign currency expenditure because of imports of edible oils and pulses for inversely earning of foreign currency. How strongly these policy frameworks can impose compulsory cropping to farmers is not accurately known to outsiders all right, but at least cropping of paddy in irrigated farmland is a "must".

However, compulsory rice delivery at very low procurement price that lasted up till 2003 was already terminated and escalation of farm-gate prices of rice has now already taken place. Thus incentive for cultivating paddy is functioning through market mechanism for farmers. With this, environment of paddy cultivation for farmers in response to the incentive has been well provided except for the plots where irrigation water is not enough to cover paddy water requirement or sandy soils develop.

It may be plausible that some farmers prefer planting of pulses than oil crops, given easier cash earning through exports. Despite, actually pigeon pea that is typically cultivated among farmers for

example is often observed as cropped mixing with sesame that is an oil crop. From this observation sharp decline in planting oil crops is unlikely. In this connection, according to a result of interview with MAS, currently there is no case of ordering compulsory cropping of oil crops with warrant of leasehold right even if a farmer crops pulses in place of quota of oil crop (before 1988 message of leasehold transfer to a third person was informed to those who did not follow crop quota). When cropping of oil crops does not reach the target in rainy season, MAS gives advice and instruction so that oil crops are cultivated in pre-monsoon or winter seasons, and accordingly the target is "almost attainable" in any case throughout the year.

As cited above, the deeply rooted concept of cropping area and production quantity based on planned economy in the era of socialism still remains but farmers have tried their best to maximize their income by timely reacting to available markets within such limitations. Current issues under a state of functioning domestic markets might lie in the concept towards "market" and "fulfillment of the given targets" radically different from the way of thinking of those who live in "liberalized market sphere under open economy" rather than "top - down" system as mentioned earlier.

In sum, the way of formulating plans (in the agricultural sector) in this Country is not so typically "top - down" as one may consider, though in the process of implementing the decided plans a "top - down" system may still be put in place. Here, the essential difference between Myanmar officers and those who live in liberalized market economy may be found in "the intention of directly controlling" means of fulfillment, which is not sought by the latter.

The term "market" in the sense of "liberalized market sphere under open economy" is so to speak extremely excellent amongst what have been artificially created by human beings. However, the salient feature of this "market" resides in the fact that it is never directly controllable. In other words, in liberal world for example, in achieving the target we take actions to the environment, or design a system or mechanism to fulfill it. Here we don't have any concept of designing the market itself, but only designing and streamlining systems such as subsidies for particular activities, or legislations with limited duration to protect domestic production, or establishment of information media to stimulate marketing functions, or improvement of infrastructure to promote commodity flow.

That is to say, when individual actors in the market economy make effort of maximizing their own utility given favorable environment, their aimed goals of agricultural production or rate of growth will be achieved in the course as eventual outcome of their actions. Whereas, in the Union of Myanmar, officers tend to directly take actions to the production means and objects, or at least tend to think they should discharge direct actions on them instead of exerting influence on environment – namely instead of designing institutional framework. This is what is different the most between the systems of two economic spheres.

2.7 Households, Families and Women in the Union of Myanmar (Bamar Race)

According to the Census of 1983 (latest census in the Union), the racial composition rates stand at Bamar race accounting for 69%, indigenous races for 25.7% (ethnic minorities are included here, with the largest minority of Shan race accounts for 8.5%, followed by Kayin race accounting for 6.2%, the third ranked Rakhine race for 4.5%), Indians and Pakistanis for 1.3%, Chinese for 0.7%, European and other races accounting for 3.3%. Out of these, the majority living in three Divisions in the Study Area comprises Bamar race. The following give outline of households, families and women of Bamar race[14].

Bamar race doesn't have family name. It may imply that the race has little concept of keeping "a

[14] Based on interviews conducted by JICA Study Team and also referred to 'Society and Education in Burma (Japanese Version)', Yasuko KAWANAMI, 1994

house" beyond generation as prevailed in Japan, but fundamentally forming a nuclear family just after marriage. As often referred to as patri-matrimonial, there is no particular succession priority in the Bamar race. It follows that no gender preference exists as to social status although gender difference is present in labor division and area of activities and range of management.

Such an equity can be recognized in the way of calling kindred and family members. Burmese word "Mi Thar Zu" means "mother, son, gathering", and here the usage signifies assembly of a mother and her children, without any conception of "house" which Japanese generally have. They call parents "Mi Ba" that means "mother, father" where mother comes before father. As to the way of calling a married couple, sometimes husband comes first, like "Lin Mayar: husband, wife", and "Zanee Maung Hnan: wife, husband, couple", and in any way it can be said that husband and wife in a family create a complementary relationship.

In the case of inheritance, there is no definite rule to prefer sons to daughters. In some cases priority of succession is given to the eldest child, but also gender has no bearing on this matter. Land ownership is attributed to the Union, but leasehold right is legitimately inherited from the former cultivators to the successors. In this occasion, it is often observed that the bride is married with leasehold right inherited from her father, and leasehold right of farmland is inherited to any children irrespective of gender. Also, in inheriting property including leasehold right no particular traditional rule exists and in many cases more property is allotted to poorer children, thus a tendency is recognized to treat equitably children regardless of gender and regardless of seniority.

Table 2.7.1 indicates number of landholders by gender holding leasehold (legally tillage) right in the entire Union. Because leasehold right is to be registered as a rule as the property of the family after the marriage, 95% of the landholders of married households are male and only 5% are female. However, it can be seen in this table that in the cases of unmarried status 41% of females and also in the cases of divorce 58% of them hold farmland. Hence, it is interpreted that access to land is also secured for women. This system is quite different from that of the neighbors, like India that is situated in the west of the Union and Bangladesh.

Table 2.7.1 Land Holding Rate by Gender in the Union of Myanmar

Marital Status	Male		Female	
	Nr.	%	Nr.	%
Total	2,945,100	85	519,669	15
Never married or single	183,625	59	128,761	41
Married	2,627,756	95	131,136	5
Widowed	124,357	34	246,835	67
Divorced/separated	9,362	42	12,937	58

Source：Advanced Report Myanmar Census of Agriculture 2003

During our interviews in the Study Area, in all cases respondents reply that the president is the husband but financial minister or home affairs minister is the wife in a family. That is to say, father is deemed as leader mainly by reason for which he is the bread earner of the household. In addition, a salient feature of Bamar race is found in the fact that women's status has traditionally been high as proved by the example cited above and also by "Bamar as I Saw It"[15] written by Brown R.G. of England in 1926.

Daily household affairs including financial management are delegated to mother and household account is around 100% managed by the wife. Even in the case of double-income married couples mostly living in urban areas income of the husband is in most cases handed over to the wife, and the spouse receives necessary expenses from his wife when need arises. Examples of separate account among families are interpreted as married couples in which either one of them is of other race than Bamar.

Among the society of Bamar race, decision-making on the treatment of property or purchase of assets

[15] In the literature, he wrote that Burmese women are much liberalized than British women in spite of her being unmarried or married.

is jointly made. There found almost no difference in educational level between male and female. As to contents of works, women are engaged not only in simple wage labor, but also many of them have broader activities including management of business. Thus, it can be said that women's status is not low than male status. High status of women enables them to do many things, for example they tend to care for their children's health as well as children's education, also reducing gender gap between boy and girl. This is quite unique point for Bamar race as compared to the neighbors in its western side and also north eastern side.

2.8 Social Indicators of the Union of Myanmar as Compared with Those of ASEAN

The Union of Myanmar joined ASEAN on 23rd July 1997. ASEAN aims at development of economic as well as social base of Southeast Asia. Partly affected by economic blockade from Western nations, most of external trade of the Union is with Asian countries. In addition to China and India, the Union has traded with ASEAN countries including Thailand, Malaysia and Singapore. In this section, various indicators of the Union are compared with those of other ASEAN members to elucidate the position of the Union among ASEAN members.

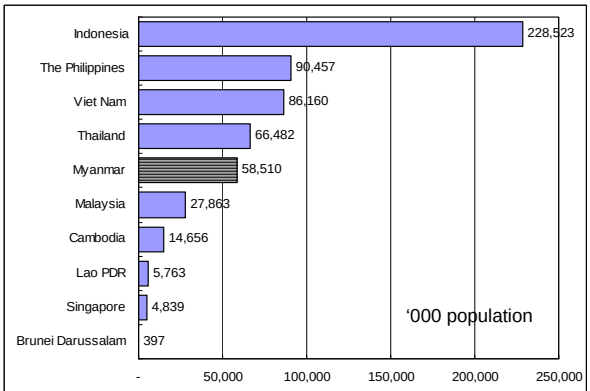


Figure 2.8.1 Scale of Population in ASEAN Countries, estimated as of 2008

2.8.1 Comparison on the Scale of Population and Economy among ASEAN Countries

According to the basal data on the Statistics of ASEAN Economy[16], Indonesia has the largest population among ASEAN members (about 230 million estimated as of 2008), while the Union has the scale of population following the Philippines, Vietnam and Thailand (refer to Figure 2.8.1).

Figure 2.8.2 shows GDP of ASEAN members estimated as of 2004, in which the Union has larger economic scale than that of Laos, Cambodia and Brunei, but fairly smaller than those of other 6 countries. GDP of the Union is equivalent to 1/3 of Vietnam, and to about 1/19 of that of Indonesia with the largest GDP among ASEAN member countries.

As a result, as shown in Figure 2.8.3, GDP per capita in the Union becomes much smaller, ranked at the lowest level among ASEAN members with per capita GDP estimated at only 465$ as of 2008. In this regard, though it is argued that border trades are not precisely reflected in the statistics in the economy of the Union, limited economic scale is self-evident

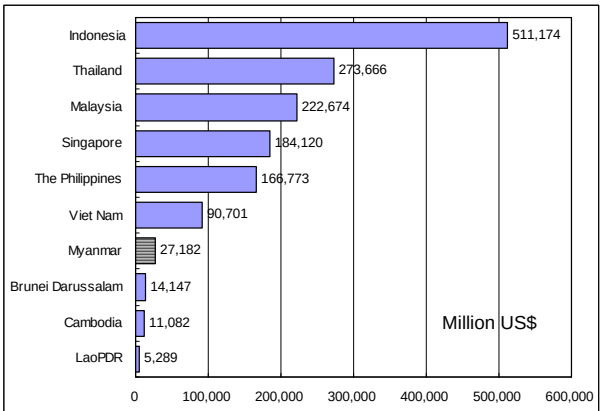


Figure 2.8.2 GDP in ASEAN Countries in 2008, MUS$

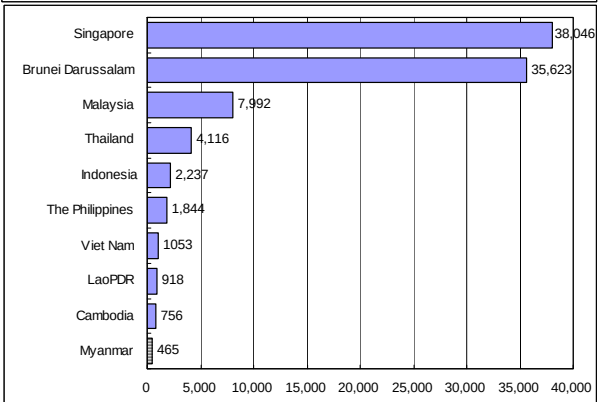


Figure 2.8.3 Per Capita GDP in ASEAN Countries, US$

[16] ASEAN Finance and Macroeconomic Surveillance Unit (FMSU) Database、ASEAN Statistical Yearbook 2005, etc.

taking into account the big scale of population against rather smaller GDP irrespective of the size of border trade.

The Union of Myanmar and Thailand, the former being adjacent to the latter at its eastern border, had been alike in population and GDP until late 1950s. Whereas, at present wider disparity has grown between these two countries in the economic scale though scale of population is still comparable each other. Thailand has larger population than the Union by 14% only while it has GDP of 10 times as much as that of Union, thus large disparity in GDP of the both countries is resulted as shown by 9 times difference in terms of per capita GDP. Although extent of poverty cannot be measured by economy scale alone, the way of disparity emergence may radically be related to economic policies of both countries.

2.8.2 Contribution Share among 3 Major Sectors to GDP in ASEAN Countries

Figure 2.8.4 indicates share of GDP among 3 major sectors (service sector, industry and agriculture) in ASEAN countries in 2000[17]. Among ASEAN members, Laos has highest share of agricultural contribution to GDP, followed by Myanmar. Cambodia has also high share of agriculture on its GDP. These three countries are in fact typical agricultural countries as shown in the figure, in contrast to other ASEAN countries where industrialization has fairly been progressed. Even in Viet Nam that followed market oriented economy relatively later than other ASEAN countries, share of agriculture on GDP has been declined to 23% as of 2000. Thailand, one of neighboring countries of the Union, has only 10% of agricultural sector contribution to GDP.

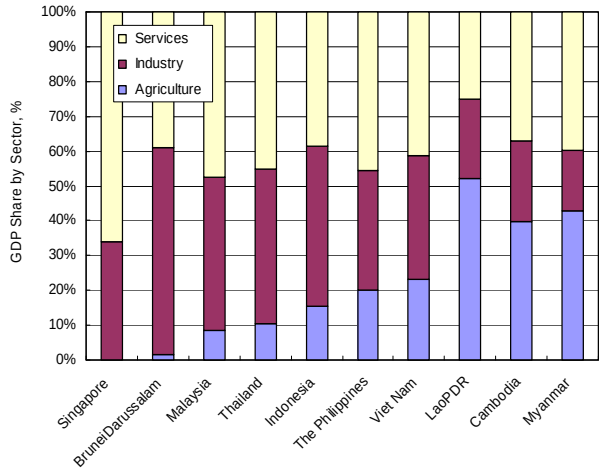


Figure 2.8.4 GDP Share of 3 Sectors in ASEAN Countries as of 2000

2.8.3 Human Development Index of ASEAN Countries

Human Development Index (HDI) is the indicator measured by 3 different human development domains, namely 1) long-lived and healthy life, 2) knowledge and 3) human living standard, calculated from such indicators as those of average life expectancy, school-enrollment and literacy as well as income etc. HDI can indicate the extent of development of a country from broader aspect rather than judging by income - namely economic dimension - alone. Figure 2.8.5 displays trend of HDI in ASEAN members during 2001 - 2004[18]. The figure shows that all ASEAN countries mostly have gradually elevated their ranks[19].

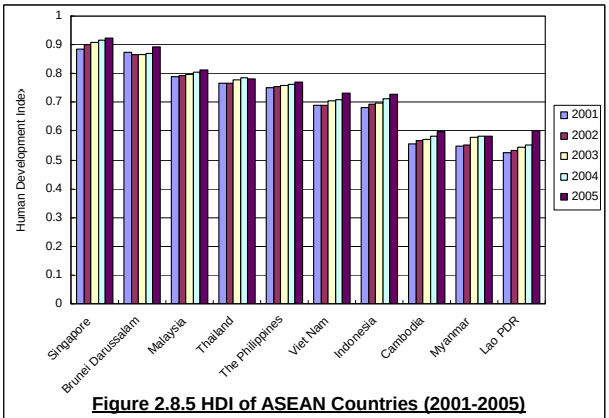


Figure 2.8.5 HDI of ASEAN Countries (2001-2005)

[17] Statistics of ASEAN Economy base data, 2005
[18] Human Development Report 2001-2004, UNDP
[19] HDI ranks countries by using an index raging between 0 at its minimum and 1 at its maximum. This means that even if a country's average life expectancy, enrollment and literacy rate and also income have increased from previous year, that country's index may fall if other countries' development in these 3 aspects have progressed more than the country.

The Union of Myanmar also has accelerated the pace of stepping up its rank reaching 0.549 in 2001, 0.551 in 2002, 0.578 in 2003, 0.581 in 2004, and 0.582 in 2005 but it still remains at considerably low position of HDI ranking, i.e., 138th out of 182 countries in the world in which HDI data is available. Cambodia (ranked at 137th) and Laos (133rd) have similar positions to that of the Union among ASEAN members. With regard to per capita GDP mentioned above, the Union produced 465$, less than two third of that of Cambodia with 756$ and that of Laos with 918$ (all the product were measured as of 2008). Under these situations, the reason why HDI of the Union is ranked almost same as those of Laos and Cambodia may lie in an assumption that health and educational indicators of the Union have higher values than those of the two countries.

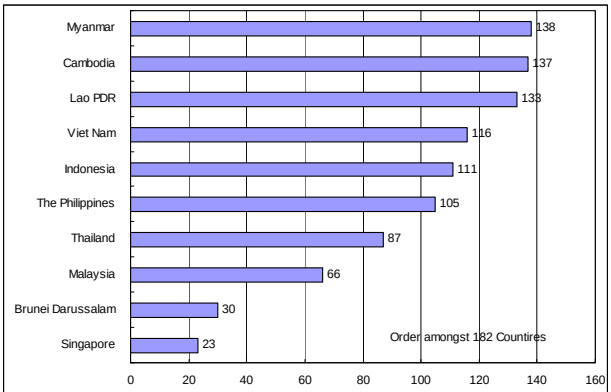


Figure 2.8.6 HDI order of ASEAN Countries (out of 182 countries)

2.8.4 Health Indices and Average Life in ASEAN Countries

The values of health indices in the Union - mainly infant mortality and under-5 year mortality - greatly differ depending on their data sources. When referring to the data of UNICEF "MDG Estimate" and that of UNDP "Human Development Report", higher (worse) values are given to both of infant mortality and under 5-year mortality than those reported in the "Statistical Yearbook" of the Union. For example, UNICEF and UNDP reported that the under-5 year mortality in the Union is 106 out of 1,000 live births (as of 2004) whereas the Statistical Yearbook of the Union made it public as 70 out of 1,000 as of 2004 (or 62 in 2007 according to the latest Statistical Yearbook 2008). Also, as to infant mortality, the sources of UNICEF/UNDP gave the value as 76 (as of 2004) against 45 as of 2004 made public in the Statistical Yearbook 2004 of the Union (or 43 in 2007 by the latest Yearbook).

Health indices given in Statistical Yearbook 2004 of the Union are summary of data reported from townships. About 360 - 370 townships are said to exist throughout the Country as of 2009, while 189 townships made report of health indices for year 2004 to the central government as shown in the report of Statistical Yearbook 2004. It follows that the health indices in the statistical report in the Union are based on those reported from around a half of the total townships existing in the Country. In this regard, it is most probable that 189 townships that reported in year 2004 are mainly belonging to divisions where Bamar race predominates as observed in the Study Area.

Confining to the townships in the Study Area, relatively higher (better) values of health indices are anticipated considering density of established health centers, rate of the vaccinated population etc. It means that possibility of having favorable values of health indices is higher for Divisions than for States and such favorable values may be reflected in the statistical publications of the Union. Focusing on the limited Divisions populated by Bamar race within the Study Area, they most probably show higher health indices than the average level of the Union, but this matter will separately be discussed and here, comparison between the Union and other ASEAN members is made by employing the indices given by UNICEF/UNDP. In this context, handling data for the comparison are in conformity with the basic data for estimating HDI since these values basically consit of HDI.

Figure 2.8.7 shows number of death of under-5 year child per 1000 live births, and Figure 2.8.8 does number of death of under 1 year old infant per 1000 live births. Mortalities of under-5 year child and under-1 year infant are both high in the Union, ranking at the worst 2 among ASEAN members. Mortality of under-5 year child per 1000 live births counts 106, meaning one out of nine infants would die before reaching 5 years old, and that per 1000 under-1 year infant counts 73, equivalent to that one

out of 13 infants would die before their first birthday. Though causes of high infant mortality are not mentioned in the statistical publications of the Union, it is thought that water-borne diseases and malnutrition etc. give negative impact (Health in Myanmar, 2006, Ministry of Health).

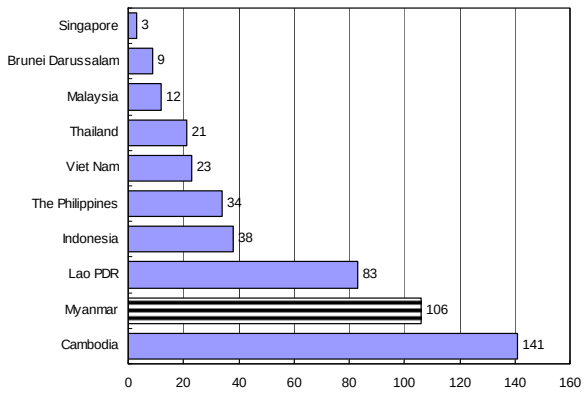


Figure 2.8.7 Under-5 Year Mortality in ASEAN Countries (2004)

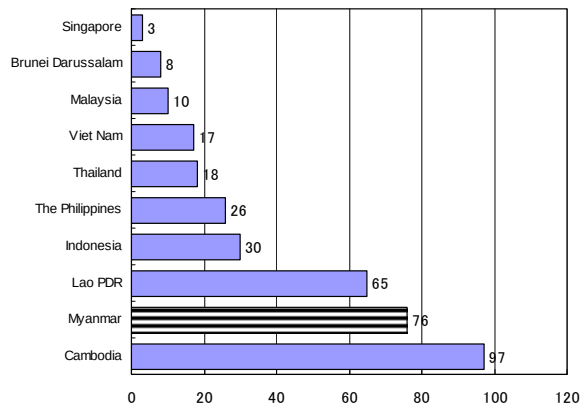


Figure 2.8.8 Infant Mortality in ASEAN Countries (as of 2004)

Mortality of under-1 year infant gives deep impact on average life expectancies. Of course, life is also affected by diseases and accidents even infants survive beyond 5 years old, but in Asian region where HIV doesn't prevail much, there is a strong tendency that the value of under-1 year infant mortality straightforwardly influences the length of average life (in the areas where impact of HIV is high, mortality of sexually active generations, that is to say, that of generations ranging from economically active youth to quasi-aged stratum is elevated which in turn shortens average length of life). Figure 2.8.9 shows average life by gender in ASEAN countries, where it is observed that that of the Union is the second shortest after Laos. Estimated average life as of 2006 in the Union was 58 for male and 64 for female.

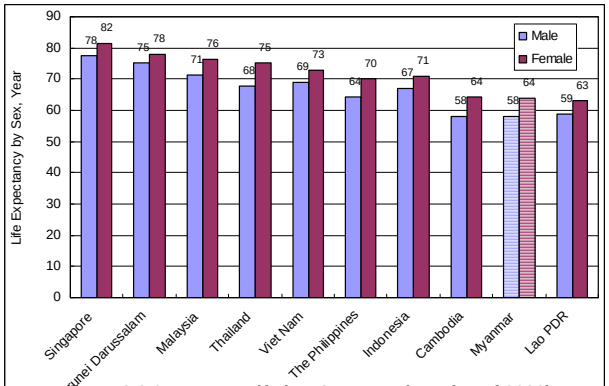


Figure 2.8.9 Average Life in ASEAN Nations (as of 2006)

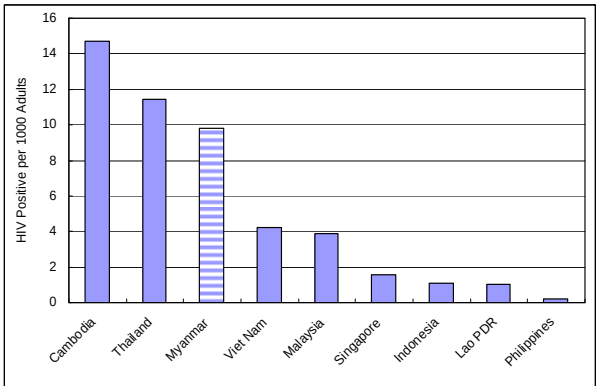


Figure 2.8.10 HIV Morbidity per 1000 (as of 2005)

Number of adult patients infected by HIV older than 15 years old per 1000 population in ASEAN countries is estimated based on the morbidity under HIV by country as of 2005[20]. The result is given in Figure 2.8.10, where the largest number is recorded in Cambodia at 15 out of 1000, followed by 11 in Thailand, and then 10 in the Union follows. The Union was kept under substantial confined social system until 1988 and even now immigration of foreigners into the Union is very much limited. It is therefore considered that development of sex industries is not much as compared with that of neighbor countries. 3rd ranked HIV positive rate among ASEAN countries may imply possibility of being infected by HIV on the occasion of illegal employment and staying in neighboring countries.

[20] USAIDS and WHO reports, posted in their homepages

2.8.5 Water Supply and Hygiene in ASEAN Countries

Figure 2.8.11 gives rate of hygienic access to water in rural areas of ASEAN countries where data are available[21]. The rate of hygienic access to water in rural areas of the Union as of 2004 is estimated at 77% and it is better than Cambodia with 35%, Laos with 43% and Indonesia with 69%. Also, Figure 2.8.11 gives the rate of access in 1990 along with that in 2004, suggesting that the Union improved to the significant extent hygienic access to water in the rural areas since 1990.

Figure 2.8.12 shows access to sanitary facility (latrine) in rural areas of the ASEAN countries. In concrete, the access is approximated by the rate of households established with latrine in rural areas, where the cases of jointly utilizing latrine of the neighbors are possibly included (though not mentioned in the UNDP Human Development Report 2006). Households facing difficulty in erecting latrines due to poverty are also found, but generally in many cases in the Union new houses are built side by side with those of relatives/ kindred (brothers) and parents, postponing the construction of latrines (result of the observation in the villages of the Central Dry Zone).

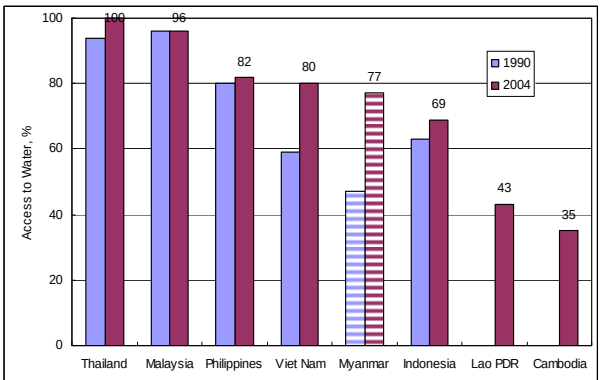


Figure 2.8.11 Access to Hygienic Water Supply

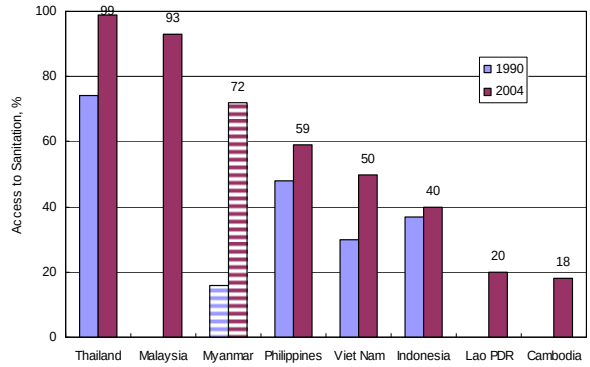


Figure 2.8.12 Access to established Sanitation (Latrine)

According to this figure, it is found that the rate of access to latrine in the Union is not only evidently higher than that in Cambodia and Laos, but also even higher than that in Indonesia, Vietnam and the Philippines. Though concern on data accuracy remains to some extent, it can be at least said that indices on water supply/ hygiene in the rural areas in the Union are more favorable than other indices.

2.8.6 Education Indices in ASEAN Nations

Figure 2.8.13 shows the mean adult literacy rate (elder than 15 years old) in ASEAN nations during the period 2000 - 2004. Southeast Asian countries tend to have high literacy rates, where that in 7 of them inclusive of the Union exceeds 90% as total literacy rate of male and female. Literacy rate in the Union standing at 90% (86% for female and 94% for male) is comparable to that in Indonesia and Vietnam, and a little better than that in Malaysia.

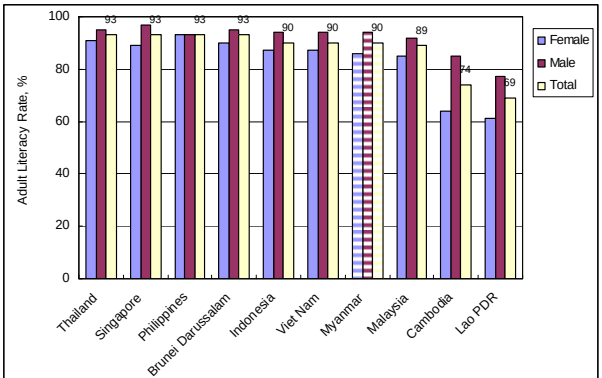


Figure 2.8.13 Rate of Adult Literacy in ASEAN Nations (2000-04)

Literacy rates in Cambodia and Laos is in lower level than that in other ASEAN nations as shown in Figure 2.8.13. In other words, the Union has achieved comparable level to other ASEAN members as far as literacy rate is concerned though the Union, Cambodia and Laos are always ranked at lower level in per capita economy scale or per capita health indices. According to UNDP Human

[21] UNDP Human Development Report 2006, WHO Database, UNICEF Database & Country Profile

Development Report 2006, literacy rate of the Union is ranked at 58th out of 128 countries in the world. Also, literacy rate of youth (15 - 24 years old) as of 2004 is estimated at 95%.

Figure 2.8.14 shows rate of primary school net enrollment (giving only 6 countries where data is available[22]), in which primary school net enrollment of the Union is 81.6% for girls, 80.8% for boys and 81% for the mean of the total (as of 2002). This rate remains lower by 10% than that of Cambodia and lower by 2% than that of Laos. However, it may be noteworthy that girl's enrollment in the Union is slightly higher than that of boys. In Cambodia and Laos, on the contrary, primary school enrollment of girls is lower than that of boys by around 6 - 7%. It is very much interesting that girl's enrollment rate is inversed in the Union as compared with neighbors, though the difference by sex is meager 1%.

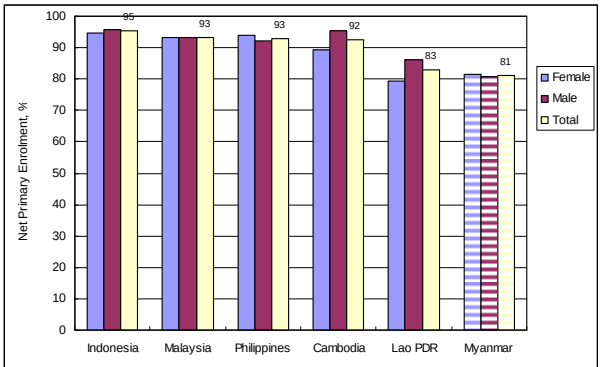


Figure 2.8.14 Primary School Enrollment in 6 Countries (2002)

Above all, the status of women in a Bamar race's family is positioned fairly high. This situation must contribute to serving as the background of girl's higher school enrollment but another plausible cause in the Union is that boys in many cases enter into priesthood in their younger ages. At this occasion they commute to monastic schools belonging to temples. For this reason, boys with lower primary school enrollment rate are not necessarily fail access to education including reading and writing. Also, because of this opportunity of monastic learning, literacy rate (in particular boy's literacy) is believed greatly enhanced in spite of not so higher primary school enrollment.

2.9 Achievement in Millennium Development Goals

Myanmar has been implementing the National Development Plan aiming to accelerate growth, achieve equitable and balanced development and reduce socio-economic development gap between rural and the urban areas in the Country. The major aspects of the Millennium Development Goals (MDGs) are thus covered in the National Development Plan. With the implementation of the National Development Plan, it is reported that certain progress has been achieved in various sectors, such as health, education, infrastructure and agriculture though more efforts be required to attain some of the MDG targets by the year 2015. Table 2.9.1 is the excerpt from Myanmar Millennium Development Goals Report 2005, and following are the points to note:

1) For the poverty reduction quoted in Goal No.l, no specific statement is done in the Myanmar Millennium Development Goals Report 2005. Therefore, it is unknown to what extend the poverty in Myanmar exists and how the trend of the poverty reduction has been. This is due to non-availability of poverty profile in Myanmar as at 2005. However, a nationwide Poverty Profile was published by UNDP in June 2007, making it possible in future to follow up the reduction of poverty.

2) Another target under the Goal No.1 is to reduce the extreme hunger. In connection to the hunger, the Myanmar MDG Report cited the under-nutrition-rate and under-weight rate for children. A declining trend is seen for the both indicator, suggesting Myanmar would achieve the target by 2015 though there may be argument what the extreme hunger means all about.

3) For the universal primary education cited in Goal No.2, there may be a difficulty to achieve the target saying "boys and girls will be able to complete a full course of primary schooling by 2015"

[22] UNDP Human Development Report 2006, and UNESCO' homepage

by judging from the present net enrollment ratio of 84.5% in 2005. However, the tendency of increase from 65.7 % in 1990 to 84.5 % in 2005 is a good sign towards achieving the goal.

4) For the Goal No.3 that is gender equality and women empowerment, no specific statement is made in the Report in terms of enrollment of school. However, literacy ratio between male and female was cited and almost no difference is seen. Since Bamar race, the majority in Myanmar, enjoys high women's status in comparison to some neighboring countries in its western side, one may see not much difficulty to achieve this goal.

5) On Goal No.4 referring to child mortality, both infant and under-5 year child mortalities are on a declining trend; 130 in year 1990 to 67 in year 2003 and 98 in year 1990 to 50 in year 2003 respectively per 1,000 live births. The targets are 39 and 28 respectively by 2015, and with utmost effort Myanmar may achieve them.

Table 2.9.1 Achievement of MDGs in Myanmar

Goal	Target	Excerpt from Myanmar MDG Report 2005
1. Eradicate extreme poverty and hunger	Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day.	NA
	Halve, between 1990 and 2015, the proportion of who suffer from extreme hunger.	Myanmar has declining figures in under-nutrition-rate among under-3 children from 42 % in 1988 to 31 % in 1994 and the rate of under-weight among under-5 children also declined from 38.6 % in 1997 to 31.8 % in 2003.
2. Achieve universal primary education	Ensure that by 2015, children everywhere, boys and girls, will be able to complete a full course of primary schooling.	Net enrolment rate in primary education stood at 65.7 % in 1990 and has increased to 84.5 % in 2005. Likewise, youth (15-24 years old) literacy rate increased to 96.5 % from 80.9 % in 1990.
3. Promote gender equality and empower women	Eliminate gender disparity in primary and secondary education preferably by 2005 and in all levels of education no later than 2015.	Literacy rates in the country were 91.4% of the population in 2001, while males were slightly better (91.7%) compared to women of 91.0%.
4. Reduce child mortality	Reduce by two-thirds between 1990 and 2015, the under five mortality rate.	Under-5 mortality rate is on the descending trend – declining from 130 per 1,000 live births in 1990 to 66.6 in 2003, and the target is 38.5 in 2015 to reach the MDG. With regard to infant mortality rate, it was 98 per 1,000 live births in 1990 but reduced to 49.7 in 2003 with the aim of reaching 28.3 by 2015.
5. Improve maternal health	Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio.	NA
6. Combat HIV/AIDS and other diseases	Have halted by 2015, and begun to reverse the spread of HIV/AIDS.	Under the National Health Plan, health programmes are being implemented to promote the health status of the entire nation.
	Have halted by 2015, and begun to reverse the incidence of malaria and other major diseases.	
7. Ensure environmental sustainability	Integrate the principles of sustainable development into country policies and reverse the loss of environmental resources.	Myanmar Agenda 21 was adapted in 1997. Also, Myanmar signed the UN Framework Convention on Climate Change in 1992 and ratified the Convention in 1994. The Kyoto Protocol was acceded in 2003. A nation-wide tree planting programme has been launched since 1993 and millions of seedlings are being planted annually.
	Halve, by 2015, the proportion of people without sustainable access to safe drinking water.	Access to safe drinking water shows an increased percentage- from 32 % in 1990 to 72 % in 2000. Proportion of people with access to improved sanitation has also increased from 36 % in 1990 to 83 % in 2000.
	Have achieved, by 2020, significant improvement in the lives of at least 100 million slum dwellers.	NA
8. Develop global partnership for development		New lending from the multilateral financial institutions has been suspended since 1988-89 and has few bilateral ODAs to Myanmar in the wake of the economic sanctions.

Source: Myanmar Millennium Development Goals Report 2005

CHAPTER 3 THE STUDY AREA

This chapter states outline of the Study Area covering physiography, topography, population, agriculture as mainstay as well as livestock and small-scale industries that supplement farm-based livelihood under unstable climate. In addition, livelihood of rural inhabitants is summarized based on the results of interviews to key-informants in the target villages of the Pilot Project conducted during May - August 2007 and also on the baseline survey etc. As various statistical data exist at divisional level, but are not available at the level of townships and districts, the overall examination on agriculture and livestock is based on the data at divisional level, covering Divisions of Mandalay, Sagaing and Magway that encompass the whole Study Area (the land area of the Study Area accounts for 43% of that of the related three divisions and the population thereof occupies 54%).

3.1 Physiography and Topography of the Study Area

Topography of the Union can roughly be divided into 3 blocks, namely, western mountainous zone sharing border with India and Bangladesh, Shan State highland zone extending along the eastern borders of China, Laos and Thailand and the central plain zone sandwiched by these two zones. The CDZ where the Study Area is located extends in the central plain zone. The central plain zone is composed of deposit layers with relatively recent geological era. Two large streams – Ayeyarwady River and Sittang River – flow through the plain to the south. These two streams flow down at the western side and the eastern side of the CDZ, out of which Ayeyarwady River flowing in the west is a large stream with larger annual discharge than that of Mekong River (See the right box).

Comparison in the size of 3 Rivers:

Dimension of Ayeyarwady River
Annual Discharge : 524BCM (UNESCAP)
Total River Length : 2,170km (Wikipedia)
Catchment Area : 411,000km^2 (Wikipedia)

Dimension of Sittang River
Annual Discharge : 81BCM (UNESCAP)
Total River Length : 420km (Scale 1:1,500,000)
Catchment Area : 48,000km^2 (UNESCAP)

Dimension of Mekong River
Annual Discharge : 493BCM (UNESCAP)
Total River Length : 4,123km (Wikipedia)
Catchment Area : 810,000km^2 (Wikipedia)

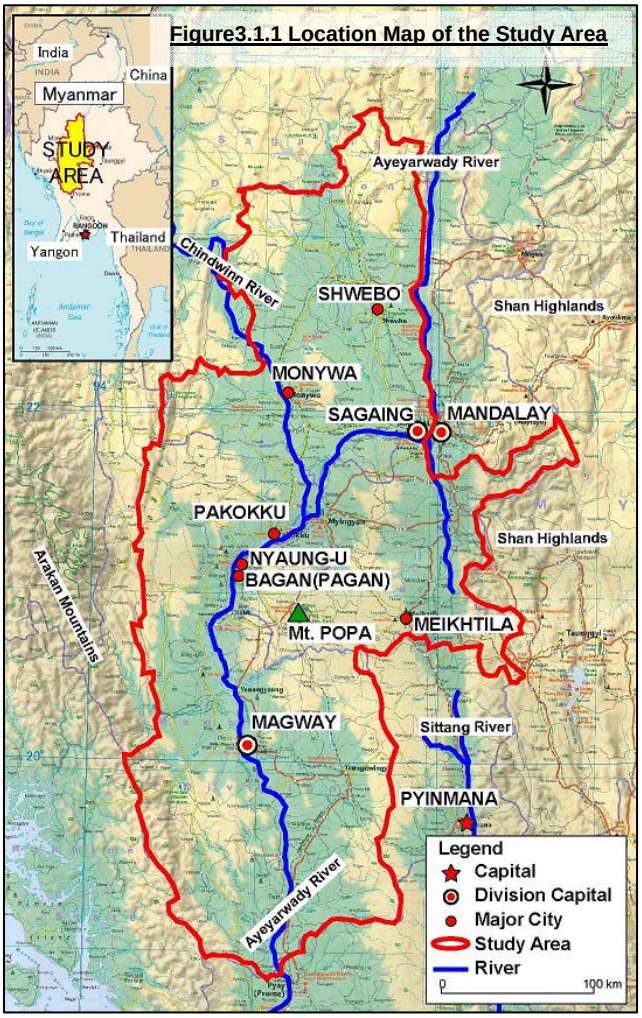


Figure3.1.1 Location Map of the Study Area

The topography of the CDZ composed of relatively recent geologic era can be briefed in a way that deposits zone developing along these two rivers is very flat, while in between these layers Bago Hills - a gentle hill zone composed of soft sandstone layers - runs from north to south in parallel with the rivers with the shape like a convex cone coming out of the plain. The southern end of Bago Hills emerges from the outskirt of Yangon, gradually increasing the altitude as it runs to the north until it reaches the summit of Mount Popa situated in the southeastward at about 40 km distant from Pagan where ruins of Pagan Dynasty established in 11th century are located.

The elevation of Mount Popa is measured at 1,518m from which mountainous topography develops though it looks not so widely extending. Thus, overall relief of Bago Hills shows a gently inclined topography - a plateau with gentle slope like a rolling hill. Bago Hills

range further extends beyond Ayeyarwady River its part of plateau north-westward, and the soils developed over the plateau are futile sandy soils derived from the weathered sandstones.

As such, the overall relief of the CDZ can be classified into river basin with fertile diluvial soils and fluvial deposits derived soils, alluvial plain extending along these rivers, and then plateau zone with infertile soils over Bago Hills situated in between two streams. From land area point of view plain occupies by far large portion, and an intensive farming is practiced making use of fertile soils along the grand Ayeyarwady River but the farming is subject to flood damages. As the topography shifts away from the streams to the alluvial plain, agricultural activities tends to become extensive, but when it is compared with rain-fed upland farming engaged over the plateau it may still be bestowed with favorable conditions. In the plateau area, goats that are quite resistant to arid conditions are more raised as supplemental means of offsetting erratic farming.

3.2 Land Area, Population and Population Density

The Study Area is located within 3 divisions - Mandalay, Sagaing, Magway - that consist of the CDZ. Table 3.2.1 shows the land area and population of these 3 divisions and the Study Area in contrast with the Union. These three divisions account for 26% of the total area of the Union and 34% of the national population. The Study Area within these 3 divisions accounts for 43% as to land area and 54% as to population, while its share to the Union is 11% of the land area and 18% of the population:

Table 3.2.1 Land Area, Population and Population Density of the Study Area and 3 Divisions

Division/ State	Area, sq.km	Area ag/ Union, %	Population '000 in 2003	Pop. Ag/ Union, %	Pop. Density per sq.km	Remarks
Sagaing Division	94,582	14	5,777	11	61	
Mandalay Division	37,008	5	7,407	14	200	
Magway Division	44,801	7	4,976	9	111	
Total of Above 3 Divisions	**176,391**	**26**	**18,160**	**34**	**103**	
Kachin State	89,003	13	1,393	3	16	
Kayah State	11,728	2	301	1	26	
Kayin State	30,370	4	1,607	3	53	
Chin State	36,004	5	502	1	14	
Tanintharyi Division	43,328	6	1,490	3	34	
Bago Division	39,387	6	5,420	10	138	
Mon State	12,292	2	2,735	5	223	
Rakhine State	36,762	5	2,968	6	81	
Yangon Division	10,167	2	6,188	12	609	
Shan State	155,734	23	5,142	10	33	
Ayeyarwady Division	35,123	5	7,318	14	208	
Union	**676,288**	**100**	**53,224**	**100**	**79**	
Study Area only						
Sagaing Division	21,352	3	3,071	6	144	
Mandalay Division	17,398	3	2,882	5	166	
Magway Division	36,419	5	3,889	7	107	
Total of Study Area	**75,169**	**11**	**9,842**	**18**	**131**	
Ratio b/t SA and 3 Divisions						
Sagaing, %	23		53		2.35	
Mandalay, %	47		39		0.83	
Magway, %	81		78		0.96	
Whole Study Area, %	**43**		**54**		**1.27**	

Source: Myanmar Agricultural Statistics, 2006, Statistical Yearbook, 2004

From these figures it is found that both 3 divisions and the Study Area have larger share of population rather than share of land area against whole Union. Hence it can be said that the concerned 3 divisions and the Study Area belong to an area of higher population density in the Union. As shown in Figure 3.2.1, population density of the Study Area stands at 131 persons/km^2 as compared to that of the whole Union; 79

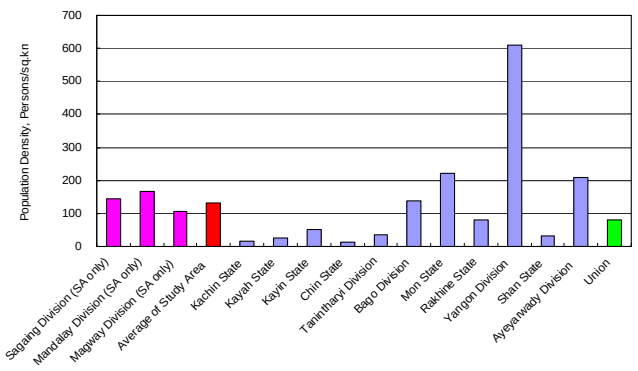


Figure 3.2.1 Population Density of the Study Area and Other Areas

persons/km^2, also in comparison with the concerned entire 3 divisions of 103 person/km^2. One of the reasons of relatively high population density may lie in the favorable living environment of the Study Area with larger portion of flat alluvial zone as compared to western, northern and eastern areas that accompany with mountainous areas. Besides, the density of the Study Area, 131 person/km^2 is found to be extremely high among so-called dry zones in the world. For instance, average population density of 47 Sub-Saharan countries in Africa with vast area of semi-arid zone is only about 31 persons/km^2 (http://ddp-ext.worldbank.org/ext/DDPQQ). Also, population density of Mongol with dry highland zone is as low as 2 persons/km^2 (from Data-book of the World 2006).

From these facts, even though it is called Central "Dry" Zone, the Study Area should be interpreted as a drier area in its comparison with other areas in the Union where monsoon type climate predominates. Of course, at the very end of lingering dry season during November - next May, soils are dried up and wind erosion severely takes place. In this period typical scenery in so-called semi-arid zone appears in the Study Area, but in contrast, in the rainy season falling in the period of June - October, paddy cropping, typical activity under monsoon climate, has repeatedly been practiced since prehistoric era in climatically favorable areas within the Study Area.

3.3 Characteristics of Climate and Rainfall in the Study Area

In the Union, two climatic periods exist, namely rainy season and dry season, by rough classification. On the other hand, one year is classified into 3 periods from daily life point of view. Namely, dry season is further divided into two sub-periods, in which part of dry season beginning soon after the end of rainfall is called winter period because atmospheric temperature is low, and later part thereof that lasts until the onset of the next rainy season is called summer period because the highest atmospheric temperature is experienced in this period. The following explain climate in the Study Area and characteristic of rainfall in the CDZ.

3.3.1 Rainfall and Atmospheric Temperature in the Study Area

Figure 3.3.1 shows monthly rainfall measured at major townships within the CDZ where rainy season ranges from late May to October. One of the characteristics of the rainfall pattern in the CDZ is intermediate decline in July in the course of the rainy season. Dry season covers the duration except late May to October and it is classified into two periods. One of them, namely summer with high atmospheric temperatures just before the onset of next rainy season (refer to Figure 3.3.2) is called pre-monsoon period in the term of cropping calendar.

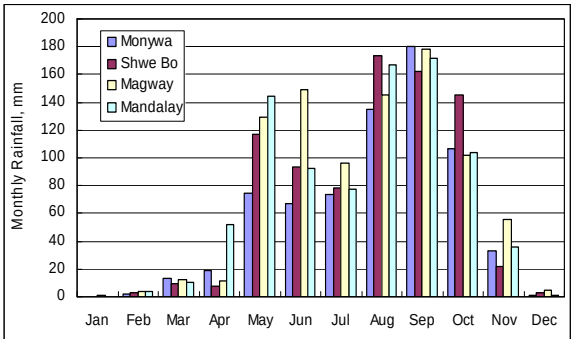


Figure 3.3.1 Monthly Rainfall in CDZ (1994-2003 avr)

Thus, climate of the CDZ is divided into summer or pre-monsoon period during March - first half of May, and winter period during November - next February that is to follow monsoon period of late May - October. Namely, the period of November - next May including winter and summer is equivalent to dry season. In farming area with irrigation facilities, paddy can be cropped even in pre-monsoon period or summer in addition to monsoon period.

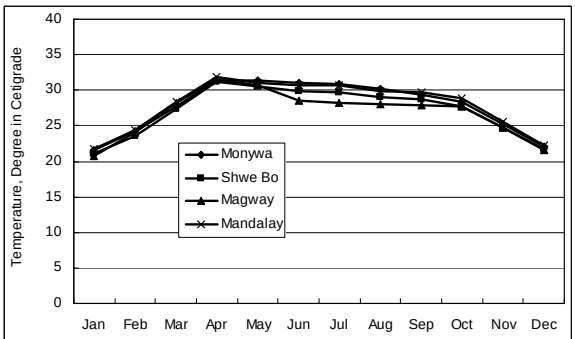


Figure 3.3.2 Monthly Mean Temperature (1994-2003 avr)

Onset of rainy season is attributable to southwesterly monsoon blowing from Bengal Bay. This monsoon wind blows towards mountain ranges of Rakhine and Tanintharyi extending western edge of the Union, consequently bringing about heavy precipitation over Rakhine region and Tanintharyi region. Whereas, because the monsoon wind is intercepted by these mountain ranges, a hinterland of these mountain ranges - the CDZ - receives much less rainfall, entailing to occurrence of a semi-arid zone. As mountainous zone running along the western edge of the territory of the Union elevates its altitude as it orients to the north, the less rainfall is received by the hinterland area of the mountain range the further to the north it is located.

Reduction of rainfall is significant at the area of further north from Magway Township, thus an aridest area forms amongst the CDZ, reaching Shwebo Township area within the areas around and near Bagan, Mandalay and Sagaing (refer to Figure 3.3.3). Annual rainfall in this area ranges only 800 mm or so. In this connection, since steep mountainous zone again appears in the north of Shwebo Township, air stream blowing through the CDZ from south to north and ascending along the rocky wall of this mountainous zone, gets rapidly cooled during its rise, bringing about heavy shower over the slope. Chindwinn River, one of the largest tributary of the great Ayeyarwady River, flows in that watershed. Heavy rainfall received by this tributary and by the uppermost watershed of the mainstream of Ayeyarwady River most significantly contributes to the recharge to the annual discharge of Ayeyarwady River outweighing even that of Mekong River.

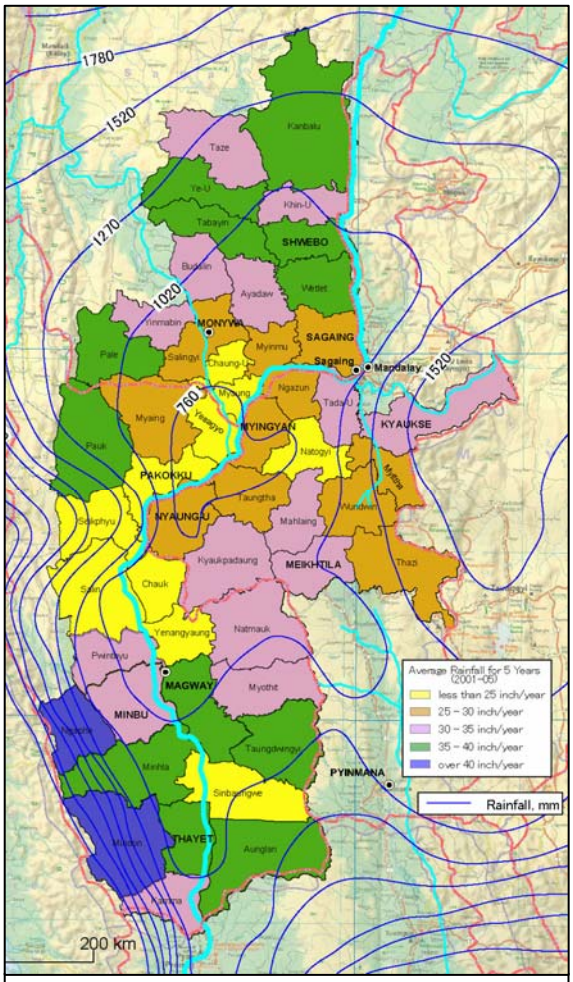


Figure 3.3.3 Annual Iso-hyet in the CDZ

During the period of November - next May northeasterly monsoon, blowing the opposite direction to southwesterly one during rainy season, blows deep away from the Continent. Since northeasterly monsoon is so dry that almost all part of the territory of the Union uniformly receives scanty rainfall during this period. In the CDZ that receives less rainfall during rainy season and dominated by sandy soils, desiccation of soil moisture proceeds on as dry season proceeds until soil dust is stirring in the air. Looking down from the mountainous ranges positioned in both eastern and western sides, főhn phenomena takes place by dry wind blown from the mountains to the basin, namely the CDZ, making atmospheric temperatures higher, living conditions severer.

3.3.2 Characteristics of Rainfall in the Study Area - a Semi-arid Zone

Rainfall pattern in semi-arid zone like the Study Area is characterized by firstly low annual precipitation and also instable distribution pattern with capricious or erratic occurrence. From a different view, because rainfall amount is basically scarce, such rainfall variability consequently gives detrimental effect on crop production, even if amplitude of variance were smaller than that of normal monsoon area. Such instability can hardly be visible from the averaged annual rainfall amount, yet as shown in Figure 3.3.4, drought years consecutively occurred twice in 1997 and 1998 during the

period 1996 - 2005 (data were collected from the observatories located in each township). A marked decline of rainfall amount can be identified from the collected records even in the period from 1999 to 2001 except Meikhtila Township.

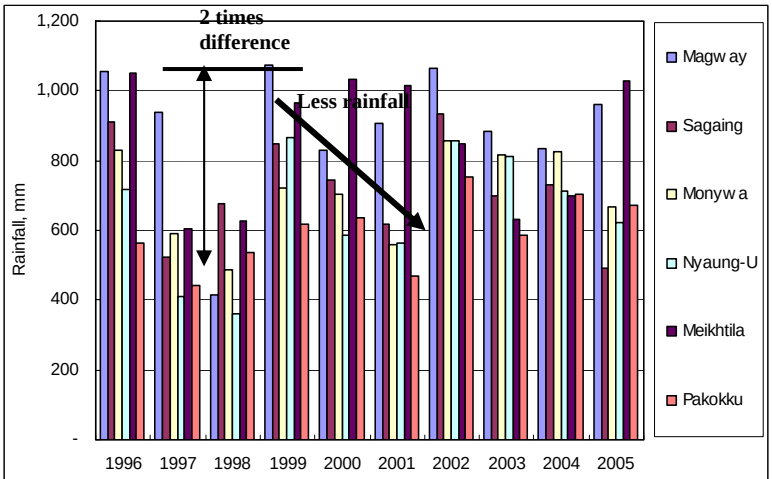


Figure 3.3.4 Annual Rainfall Amount at the Representative Observatories in the CDZ (1996-2005)

Instability of rainfall is especially outstanding at the onset of rainy season. Initial date of rainy season varies from year to year, and as an example Figure 3.3.5 shows monthly precipitation in May, the starting month of rainy season. As to two average years, 1996 and 2005, recorded with normal annual rainfall (see Figure 3.3.4), monthly rainfall of less than 50mm recorded in May identified at the level of only 1/5-1/6 as against around 300mm recorded in earlier/ later 2000. Amplitude of the variance by more than 2 times as much as the mean is also found in annual rainfall ranging around 400 - 1,000mm, but the monthly one in May is identified as 5 - 6 times as much as the mean monthly rainfall.

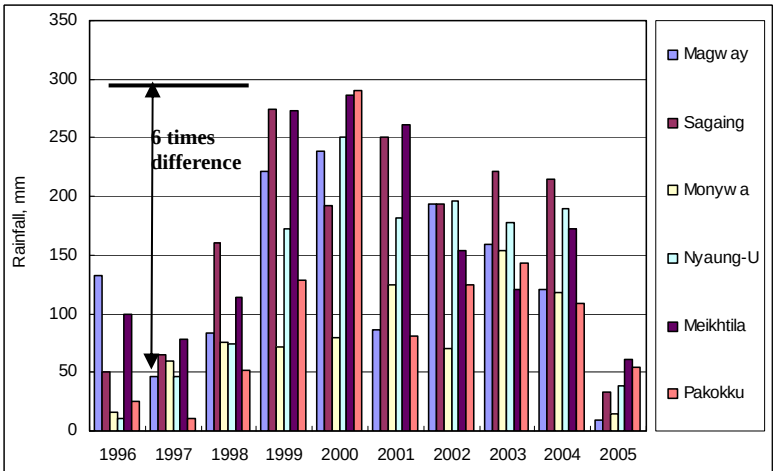


Figure 3.3.5 Rainfall Amount in May at the Representative Observatories in the CDZ (1996-2005)

In this way, climatic character of arid and semi-arid areas lies not only in the scarcity of rainfall but its pattern is also highly variable with sites in an area giving serious impact on spot crop yields. Figure3.3.6 indicates an old data of about a century ago referring to 1901 - 1921 as to cropping indicator of paddy, sesame, sorghum and cotton in Monywa area (located facing to Magyi Village, a target village of Pilot Project in the opposite side of Ayeyarwady River)[1]. During the period from 1901 to 1911, periodical 3-year cycles of bumper, ordinary and crop failure were repeated. Harvest indices at that time varied with a range of around 50 - 150 when the average year was taken as 100. That is to say, minimum and maximum harvests with around 3-year cycle accompanied with the amplitude of variable of 3 times from the lowest to highest harvests.

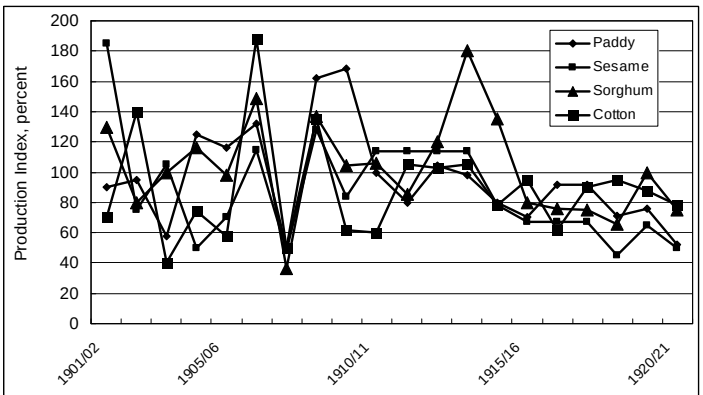


Figure 3.3.6 Fluctuation of Crop Production in Early 1900s, BGLCDB

[1] Referred to a figure posted in Page 60 of "Myanmar wanted to know more", Tuneo AYABE, Yoneo ISHII,which original data from BGLCDB

Though the amplitude of variable became less in the period 1915 – 1921, the indices lowered as low as 50 in some years. Thus the range of variable is still identified as around 2 times from the lowest to highest harvests.

Villagers feel that rainfall pattern has recently become more erratic year after year, or particularly instable onset of monsoon has been becoming further erratic (according to the result of the interview by the Study Team). For instance, it has been reported that sesame sown at the onset of monsoon was harvested null in 2006 in Ar La Ka Pa Village, a target village of the Pilot Project. Similarly, damage on nursery paddy seedlings took place for the preparation of rain-fed transplanting since rainfall amount had been less than expected during July 2007 in Magyi Village, one of the target villages of the Pilot Project (refer to photo).

Instability of rainfall is not confined on time sequence but it occurs on horizontal space. Despite that scarce rainfall has caused large yield decrease in an area, timely rainfall was received resulting in ordinary crop harvest in its neighboring township areas or districts in the same year. As far as such cases actually happen, occurrence of crop failure in a village is not readily visible in the statistical data covering broader areas. Figure 3.3.7 indicates the trend of sesame harvest by division.

In this figure, production quantities in the Divisions of Mandalay, Sagaing and Magway located in the CDZ are given in 3 columns at the bottom, where it can be identified that the yields in 1997 with annual rainfall less than half of that of ordinary years are not particularly different from the previous yield levels. Following 1998 was also a drought year, but the yield level did not show a big drop as compared to those recorded before 1993/94 even though some yield decline evidently took place. Later, since 2000/01, significant yield increase has been fulfilled except for 2001/02 and 2005/06 although the statistical data in this period may lack credibility.

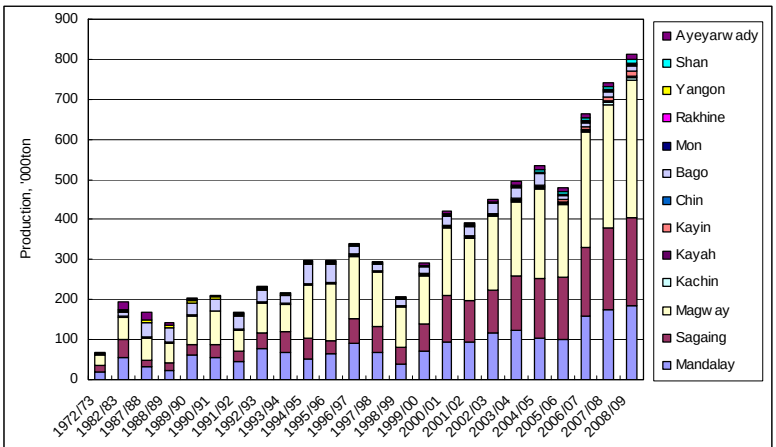


Figure 3.3.7 Division-wise Production of Sesame

In brief, the fact that rainfall irregularity takes place not only along time-scale but also on the space leads to a state that even if certain areas suffered from poor harvests they tend not to definitely appear in the production quantities in wider term, for example at divisional level. Such irregularity may serve as a radical cause of making policy makers and others commit a mistake of uniformly applying the same development strategies as those applied to the stable monsoon areas in a lump to the dry areas under instable rainfall conditions.

Thus, the character of semi-arid area lies in instable rainfall pattern that randomly evolves both in terms of time and space. The fact that annual precipitation is not stable is interpreted as that farming has a dimension of uncertainty or a kind of gamble. Likewise, the fact that uncertain rainfall at the beginning of rainy season leads to requirement of enhancing capacity of rightly predicting rainfall and this requirement would lead to a conclusion that agriculture as a livelihood means needs an instinctive

sense like a sense of hunting or gambling.

3.4 Administrative Hierarchy and Coverage in the Study Area

3.4.1 Administrative Hierarchy and Information / Communication of Decisions

State Law and Order Restoration Council (SLORC) was established in the Union of Myanmar in September 1988. Later, SLORC has been reformed into State Peace and Development Council (SPDC) in November 1997. This reform has intention to expand role of military administrative power from keeping public order to develop nation. At the occasion of this reform innovation of personnel was simultaneously executed reshuffling 15 veteran cadres out of 19 members of SLORC. SPDC is a council at the Union level but Peace and Development Councils (PDC) have been established at the level of division, state, district, township (TS), and village tract (VT).

SPDC at the Union level consist of military personnel. Chairpersons of PDC at divisional and state level are Area Commanders, and their members comprise personnel of the Ministry of Home Affairs (MOHA) and the Ministry of National Planning and Economic Development (NPED) who take charge of divisions and states. Under these divisional and state levels, similar PDC have also been established at district, township, and village tract that is the smallest administrative unit in the Union. The table below shows the composition of PDC including chairperson, secretary and members etc in the PDC below division and state level:

Table 3.4.1 Composition of PDC Established at Each Administrative Level

Administrative Level	Chairperson	Secretary	Member
Division/ State	Area Commander	General Administration staff under MOHA	Planning officer under NPED, Police officer under MOHA
District	General Administration staff under MOHA	Planning officer under MOPND	Police officer under MOHA
TS and Township	General Administration staff under MOHA	Planning officer under MOPND	Police officer under MOHA
Village Tract Min. administ' unit in the Union	Nominated from village leaders by PDC at TS level	MOHA personnel as clerk (usually employed from the area concerned)	A few of village leaders consist of the member
Village (=natural village)	PDC not established	-	Leaders are from representative of 10 households each within a village, or representative of 100 households each within a village

Source: interview result by the Study Team

As evident from the table above, a PDC up to the TS level consists of staff of ministries who should play important roles on keeping public order and development. No technical administrative staff has been appointed in the PDCs, for example staff of the Ministry of Agriculture and Irrigation, or that of the Ministry of Livestock and Fisheries, or that of the Ministry of Cooperative. Though they are not members of PDC, they are responsible for attending regular meeting held in each level of PDC once a month as a rule.

Similarly, attendance of VT chairman under TS is also ordered to the meeting of PDC held once a month at TS level. Target of cropping area and of production quantities of the current year, for example, are informed to the VT chairmen in this meeting. Later the decisions at the central level are step-wise informed through the message delivery from VT chairman to villages through village leaders selected at the village level as 10 HHs leader and also 100 HHs leader.

3.4.2 Coverage of Each Administrative Unit in the Study Area

As stated above, administrative unit of the Union consists of division, state, district, TS, and VT. In order to identify physical coverage of the administrative unit, scale of each hierarchy and population are briefed in the table below. The Study Area covers 11 districts in total, the size of which is the

smallest in Nyaung-U district with 1,485km^2, and the largest in Shwebo District with 12,202km^2, thus a wide range is observed in their size (in which Nyaung-U District is composed by single TS). Government related offices including extension offices of MAS are established up to TS level only, and the TS has land area of about 800km^2 - 2,000km^2, on average around 1,500km^2 (physical size is equivalent to about 38 × 38 km).

TS is further classified into rural area and township areas, the former consists of village tracts (VTs), and a VT is composed of villages where people get together to live naturally. In total, 3,209 VTs and 10,358 villages exist in the Study Area. A TS of average size has 203 villages and 63 VTs. Ratio of urban and rural population stands at 16% : 84% as of 2003, and mean population in a village, the quotient of rural population divided by the number of villages, is 801. Though number of households as of 2003 in the Study Area is not known[2], if the mean number of family members in rural areas in the Union as of 2001, 5.39 persons/ family (Statistical Yearbook 2004), is employed, the average number of households is estimated at 149.

Table 3.4.2 Physical Coverage of District, TS, VT and Village Population in the Study Area

Division	District	District/ Division sq.km	Nr. of TS	TS Average sq.km	TS KmxKm	Number of Administration, 2003		Ratio			Population, 2003			Rural Pop/Village	Estimated HH/ Village
						VT	Village	Village/VT	Village/TS	VT/TS	Urban	Rural	Total		
Sagaing	Sagaing	2,477	3	826	29	185	364	2.0	121	62	59,284	454,473	513,757	1,249	232
	Monywa	6,674	7	953	31	322	1,154	3.6	165	46	202,514	951,559	1,154,073	825	153
	Shwebo	12,202	7	1,743	42	466	1,468	3.2	210	67	193,756	1,209,562	1,403,318	824	153
	Total	21,352	17	1,256	35	973	2,986	3.1	176	57	455,554	2,615,594	3,071,148	876	163
Mandalay	Kyaukse	3,707	3	1,236	35	238	578	2.4	193	79	103,731	457,388	561,119	791	147
	Myingyan	6,419	5	1,284	36	360	1,113	3.1	223	72	153,203	988,739	1,141,942	888	165
	Meikhtila	5,787	4	1,447	38	227	1,094	4.8	274	57	207,080	720,486	927,566	659	122
	Nyaung- U	1,485	1	1,485	39	76	218	2.9	218	76	27,141	223,931	251,072	1,027	191
	Total	17,398	13	1,338	37	901	3,003	3.3	231	69	491,155	2,390,544	2,881,699	796	148
Magway	Pakokku	8,300	5	1,660	41	334	1,198	3.6	240	67	178,094	920,244	1,098,338	768	143
	Magway	9,624	6	1,604	40	358	1,302	3.6	217	60	234,060	1,139,961	1,374,021	876	162
	Minbu	6,504	4	1,626	40	257	869	3.4	217	64	47,781	559,671	607,452	644	119
	Thayet	11,991	6	1,999	45	386	1,000	2.6	167	64	141,777	667,185	808,962	667	124
	Total	36,419	21	1,734	42	1,335	4,369	3.3	208	64	601,712	3,287,061	3,888,773	752	140
Study Area	11	75,169	51	1,474	38	3,209	10,358	3.2	203	63	1,548,421	8,293,199	9,841,620	801	149
											16	84			

Source: Various Materials at TS level, Statistical Year Book 2004

[2] No. of households in the Study Area in 2004/05 is 1,840,907 according to data collected at TS PDC office. However No. of HHs in 2003 which is the base year for population in this report is not known to us.

3.5 Agriculture in the Study Area

The mainstay of the inhabitants in the Study Area is agriculture. Though in many cases goats/ sheep are raised in the areas, such livestock rearing is placed as complementary means to the mainstay, cropping activities. Agriculture in the Study Area is roughly divided into two categories if overviewed from the aspect of natural conditions. One of them is an extensive upland farming mostly seen in Bago Hills. Here, relatively drought resistant crops such as pigeon pea, sesame, sunflower, groundnut etc are cropped on infertile sandy soils developing over gently undulating, or rolling hill relief. The Study Area is almost flat except the part of Bago Hills. In this area, different types of agriculture can be observed ranging from intensive farming developed on fertile soils distributed along Ayeyarwady River to extensive one engaged around Bago Hills.

3.5.1 Crop Production in 3 Divisions as against that in the Union

Although the Study Area is called "dry zone", it has already created its position as a key upland agricultural production area of the Union. As it is difficult to obtain specific data confined to the Study Area for crop production, share of crop production between the total of 3 divisions including Mandalay, Sagaing as well as Magway and that of the Union are summarized as shown in Figure 3.5.1 based on Myanmar Agricultural Statistics, 2006.

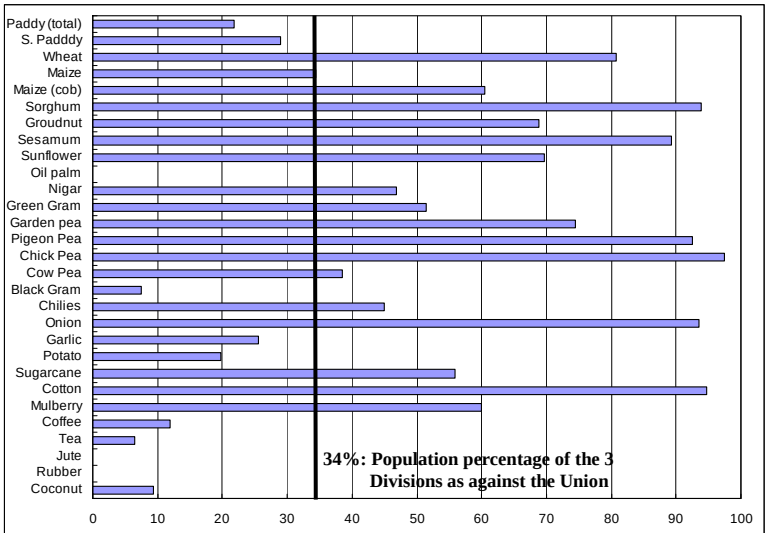


Figure 3.5.1 Share of Crop Production in 3 Divisions on National Total

The total population in these 3 divisions accounts for 34% of national total. From this Figure 3.5.1, it is evident that such crops as oil palm, black gram, coffee, tea, jute, rubber, coconut have inferior production share to the population ratio on account of climatic conditions, but many other crops show by far higher share as compared with demographic ratio. Also, it is really amazing that paddy production in terms of total of rainy season crop and dry season crop in this area has share of 22%, and that in terms of only dry season crop (irrigated one) has share of 29% on the national total. In addition, this area is known as a production area of oil-crops and pulses, where production share reaches 70 - 90% in the case of oil-crops and around 40 to over 90% in terms of pulses except black gram that is produced in the delta.

"Dry area" as it may be called, a lot of paddy parcels can be observed in swampy lands and along streams in the Study Area. Paddy tracts equipped with irrigation facilities also widely develop along the tributaries that are flown into Ayeyarwady River, where intensive paddy farming is practiced. Further, such cash crops as pulses, oil-crops, onions (94% share), and cotton (95% share) as one of important industry crops, that are not physiologically apt to humid climate are widely cultivated in the CDZ. As such, the CDZ forms a large agricultural zone in the Union. The following give a detailed profile of major crops in the CDZ or in the 3 divisions.

3.5.2 Rice Produced in the Study Area

The top-priority in national agricultural development is attached to rice production/ promotion (this policy implication is not confined to agricultural field but also applicable to the activities of the entire

Union). Figure 3.5.2 indicates trend of paddy production in 3 Divisions in contrast with the rest of the Union (data are given as the total crop in both rainy and dry seasons). Paddy production that recorded some decline at the end of 1990s has later recovered with favorable rising trend. In addition, rising trend in paddy output is also identified in 3 Divisions where the Study Area is located keeping its share to the national total at over 20% as a whole though share of Sagaing Division is larger than other two divisions.

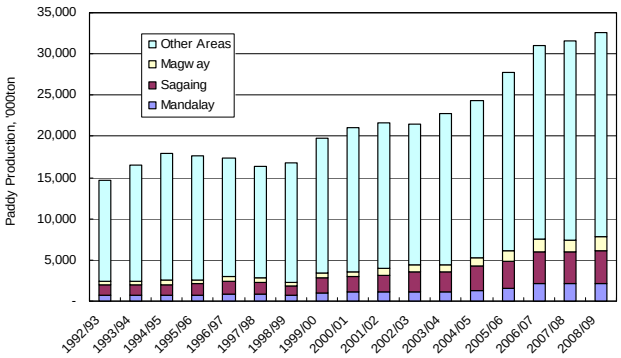


Figure 3.5.2 Trend of Paddy Production in 3 Divisions and the Rest

As regards paddy produced within the Study Area, data of 2005/06 could be collected from MAS at TS level. Based thereon, the amount of production equivalent to milled rice per capita in the Study Area is calculated to compare with those in other divisions/ states where 60% is employed as the conversion rate from paddy to rice on weight basis. Population of the Study Area in 2005/06 is estimated from that reported in 2003 assuming annual increment rate at 2%. Likewise, as available up-dated data of paddy production for other divisions and states is that in 2004/05, the estimation for these areas is also based on the population reported in 2003 and to obtain 2004/05, 2% for annual increase rate is applied, thus rice production per capita is calculated.

Figure 3.5.3 is the result of the estimation, showing that rice production per capita is low in Mandalay and Magway, while that in Sagaing Division is exceedingly high. Also, in terms of the average in the whole Study Area, it shows that the area has achieved fairly high production though the production per capita is by far inferior to that in such granary areas as Bago and Ayeyarwady Divisions. Here, annual per capita consumption of milled rice in the Union is supposedly around 150 - 180kg though differed by data sources (for example, a survey in 2001 by CSO gives 148kg and according to the World Bank data it is 180kg). When this amount of consumption is superimposed onto Figure 3.5.3, about a half of the level of self-sufficiency in Mandalay, around 70% in Magway and more than two times as much as the self-supplying level in Sagaing are annually produced, respectively.

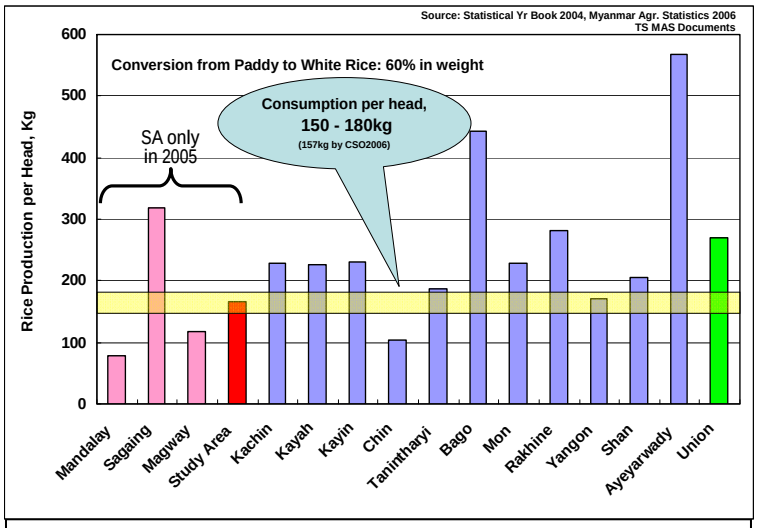


Figure 3.5.3 Comparison of Per Capita Production of Milled Rice between the Study Area and Other Areas

As a vast paddy tract develops from its center, Shwebo, to the area of Sagaing Division that is equipped with irrigation facilities constructed in the dynasty era, it has the third rank of per capita rice production in the Country after Ayeyarwady Division and Bago Division. It is likely that from this Division rice marketing to Mandalay has been evolved. Magway is also a rice deficit area, and it is said that rice transported from the delta offsets the shortage of rice in Magway in addition to rice delivered from Sagaing Division. With such variation by area, the Study Area as a whole is anyhow

producing rice nearly at the level of self-sufficiency. The fact that such an amount of rice is produced in what is called a dry area is very much noteworthy though data of 1999 and onward may have concern of credibility (see box).

Statistics on Rice Production and Consumption:

Per capita annual production of milled rice shown in Fig. 3.6.3 stands at 269kg for the nation. However, the whole amount, 269kg is not appropriated for national consumption only due to procurement of seed paddy for coming seasons and post-harvest losses. In Myanmar Agricultural Statistics, 3% of the total production is counted for seed paddy and 4% of that is counted as loss. Other than these, how much rice is consumed for cakes or noodles is not known. Assuming that 10% of the total rice production is appropriated for these manufacturing disposable annual milled rice production comes to 223 kg, or subtracting 17% equivalent to 269kg on the basis without any rice export.

Rice export has been put under the government control, and recent annual export amount is nominal, for example that in 2004/05 is equivalent to only 3.4kg per capita. That is to say, about 220kg or the difference deducting 3.4 kg from 223 kg is estimated for disposable milled rice quantity per capita.

How strong preference for rice people of the Union may have, it is not likely that they annually consume over 180 kg of rice per capita where breast-fed infants are included. It follows that 220-180＝40kg annually disappears from the statistics. This difference, 40 kg is equivalent to 15% of 269 kg. If this amount is not illegally traded in the border transactions, it is in fact not conformity with the statistics. In a similar way, on the assumption that 150 kg is taken as the minimum line of annual per capita rice consumption, 220-150＝70kg per capita is missing from the statistics. This amount is equivalent to 26 % of the above calculated 269kg.

Figure 3.5.4 and Figure 3.5.5 present per capita rice production on milled rice basis by TS within the Study Area and the rate between paddy land and upland field by TS. Priority is always given to paddy in farmland of the Union that is classified into lowland, but it is not necessarily cropped with paddy every year on account of floods, not enough water, etc. Therefore, paddy land shown in the Figure 3.5.4 means lowland area where paddy cropping is possible but doesn't mean that all the area of lowland is always cultivated under paddy. Thus, the term "lowland" is used in contrast to upland.

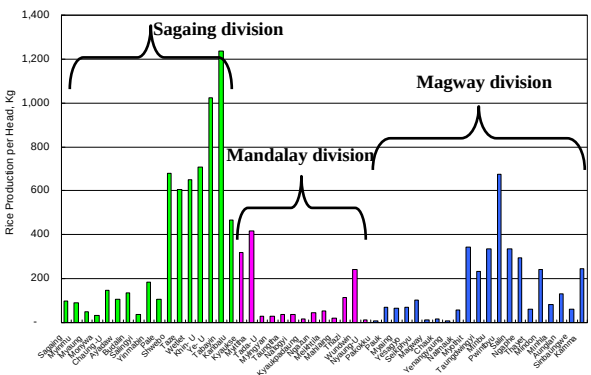


Figure 3.5.4 Per Capita Rice Production on Milled Rice

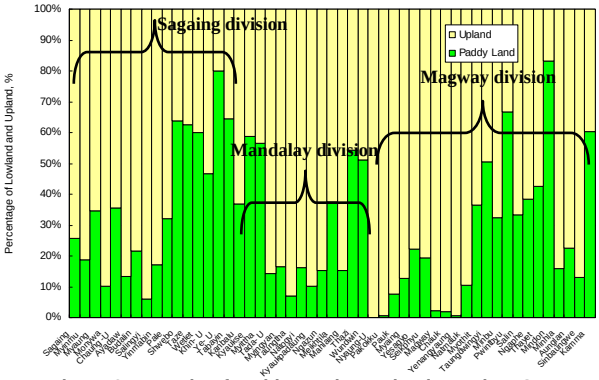


Figure 3.5.5 Ratio of Paddy Land to Upland Area by TS

TSs falling within Sagaing Division, above all those located near the outskirt of Shwebo, have higher rice production with some TSs famous for their production level of over 1,000 kg on the basis of per capita production of milled rice. Whereas, overall rice production in Mandalay Division remains at a low level except for Kyaukse and Myittha TSs where irrigated paddy has been practiced from ancient times. Paddy cultivation is popular also in Magway Division that is centered in Pwintbyu area where Legaing Village, one of the target villages of the Pilot Project is located. As for rate of between paddy land area and upland field area, many TSs in Sagaing and Magway Divisions are observed where area under paddy (area of lowland where paddy cropping is possible) is larger than upland area.

3.5.3 Pulses Produced in the Study Area

The second priority in the agricultural sector production in the Union is placed on pulses. The reason of high priority may reside in intake of protein from these pulses, but more convincing reason exists in the significance of earning foreign currency with their major export destination targeted to India. The Union of Myanmar has oriented its policy into market-oriented economy since 1989, and in the meantime India has also driven its policy toward economic liberalization in 1991 a few years after the

policy change in the Union. Pulses produced in the Union with cheap labor cost have stronger international competitiveness, and most of them are exported with the principal destination to India. MAS has promoted pulse production by means of the provision of high quality seeds of green gram and chick pea for distribution among farmer producers oriented to the exports during the period 1990s - early 2000s.

New varieties of pulses have shorter cropping duration (however, susceptible to drought because of their earlier maturity). For example, new varieties can be harvested in 90 – 110 days comparing with hitherto chickpea varieties that require maturity period of around 125 days from sowing to harvest. Also in the case of green gram, as against traditional varieties with growing period of 120 days, newly exploited ones are harvestable in only 75 days. In the case of chickpea, since it has hitherto been cropped during winter season as catch crop in paddy land, emergence of export markets is considered to be the maximal driving force to expand production. However, the decisive reason that enabled the introduction of green gram into pre-monsoon season that comes just before main paddy crop in rainy season was the success in breeding of new varieties with shorter growing period. Namely, it is notable that expanded production of these pulses was enabled not by the expansion of cultivated area but by the intensive cultivation.

As to pigeon pea, new variety has not yet exploited. By this reason, traditional varieties that require as long as about 7 months from sowing to harvest are still cultivated. In other words, the fact that growing period of pigeon pea is very long - occupying plots for longer period - makes it difficult to be chosen as cultivated crop lists in very developing - developed countries where intensive farming is practiced. Nevertheless, this serves as a background of why the Union of Myanmar has viable international competitiveness on pigeon pea. Later, since 2000 MAS has eagerly recommended farmers to practice mixed cropping of pigeon pea with groundnut/ sesame etc. Also, sorghum with marginal cost effectiveness is sometimes replaced by pigeon pea, but in the case also increased production has been achieved in similar way to the case of other pulses without any expansion of cropping acreage.

Figures 3.5.6 to 3.5.8 shows trend in the production of chickpea, green gram and pigeon pea by division and state, arranged with the beginning year of 1972/73 where 3 colored portion of each column at the bottom give the production in the 3 Divisions - Mandalay, Sagaing and Magway - in which the Study Area is located. As evident from the figures, annual production of chickpea remained at the level of 60 - 100 thousand MT up till 2000/01, but it

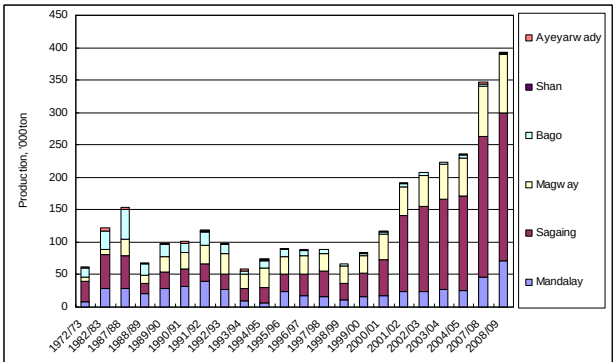


Figure3.5.6 Trend of the Production of Chickpea by Division

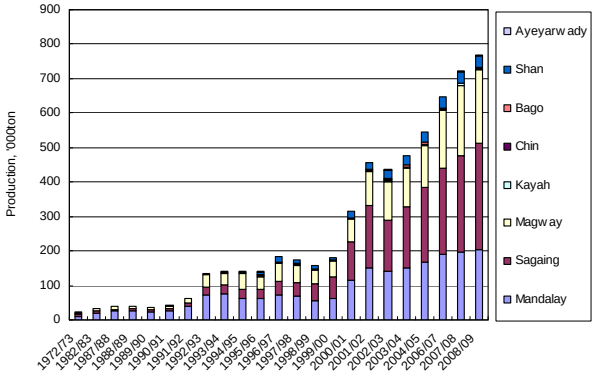


Figure3.5.7 Trend of the Production of Pigeon Pea by Division

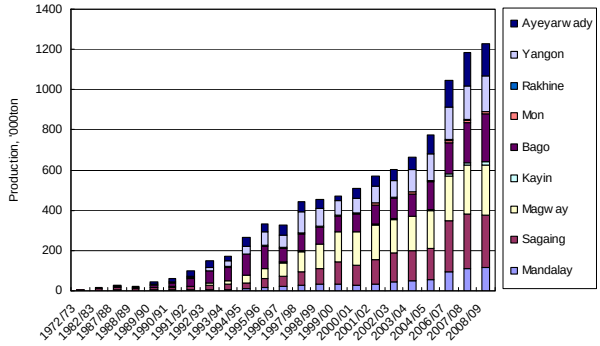


Figure3.5.8 Trend of the Production of Green Gram by Division

recorded a sharp rise since 2001/02. As to exports of pulses, Figure 3.5.9 provides trends in the exports of total pulses since 1980/81 and Figure 3.5.10 gives exports of chickpea, pigeon pea and green gram that are mainly produced in the CDZ during the limited period since 1999/00.

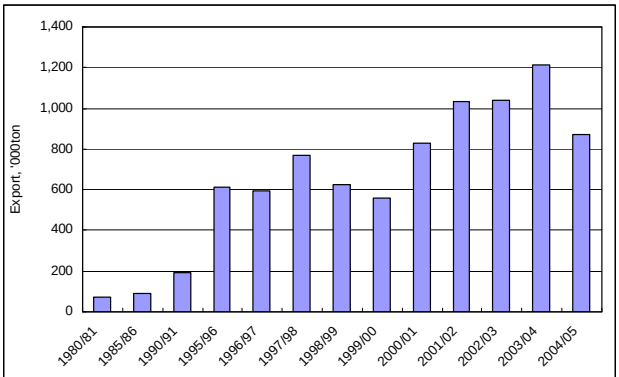


Figure3.5.9 Trend in Exports of Total Pulses

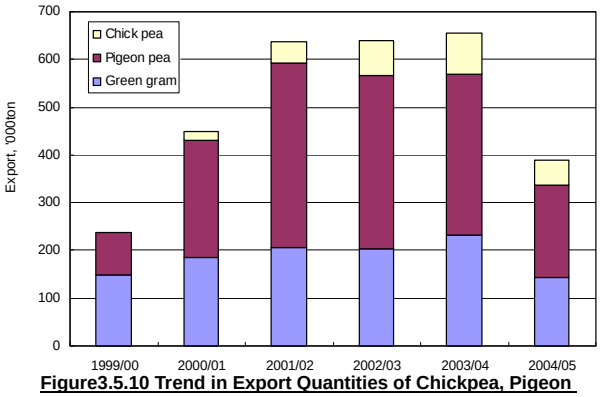


Figure3.5.10 Trend in Export Quantities of Chickpea, Pigeon pea and Green gram

As evident in the figures, chickpea was not probably exported much before 2000. However, it is likely that addition of chickpea to the export list would have led to rapid expansion in its production since 2001/02 as shown in Figure 3.5.6. Likewise, once recording augmentation of production in 1990s, the production of pigeon pea has again rapidly been expanded simultaneously with the sharp increase in exports since 2001/02. Similar pattern is also observed in the case of green gram, but character of green gram is found in its consistent growth in its production since 1990s (this trend is the same as the black gram produced in the delta).

In brief, the production of green gram has grown in sensitive response to Indian market emerged suddenly in early 1990s. Later, pigeon pea was added to green gram, further chickpea was added to the export-oriented commodities since 2000s. Farmers have thus rapidly expanded their production in quick response to the international market by intensively utilizing their land through the introduction of new varieties with short growing period also with the practice of mixed cropping.

Fast increase in pulse production in the Union of Myanmar, centered in the CDZ, could be a case without example throughout the world even if it were attributable to an exogenous factor, namely absurd emergence of the mass export destination. Besides, the fact that production of pulses least suffered from such detrimental impact as compulsory delivery to the government also has brought a good luck (see the box). Of course, the export market has instable side as well, such as contraband measures that were taken by the government of India against purchase of a part of brokers just recently in 2007/8 inside India. Nevertheless, it is no doubt that India serves as a huge export market for the

Government Intervention and Promotion in the Development of Pulse Production:

According to "Liberalization of agro-product marketing and farm economy - from an example of green gram - by Okamoto, 2003, the government introduced a system of compulsory delivery of export-oriented pulses, but failed delivery collection. After all, this institution was eventually abandoned after 2 years' test application.

The result of interview in target villages of the Pilot Project reveals that there found a lot of farmers who did not know the actual application of compulsory delivery system for pulses. Anyway, the fact that such compulsory delivery quota system was tried (in the case of rice, farmers were responsible to deliver their quota at the price of only 1/4-1/2 of market prices), but failed may be considered as a fortunate outcome for farmers and marketing agents.

MAS of the Ministry of Agriculture and Irrigation has played a key role in diffusing seeds of such export-oriented pulses as chickpea and green gram. Of course, similar to paddy, seed recycling is possible at farm level, hence seed business on the basis of private enterprises does not emerge. It is also true that for this reason there is no other means than extending seeds among producers by the government initiatives.

The Union therefore imported pulse seeds from ICRISAT, and then they are put under trial in research centers under the Ministry of Agriculture and Irrigation so that seeds of the varieties adaptable for the climates/soils in the Union can be multiplied for extension. Thereafter, the improved seeds for export oriented pulses were distributed to the farmers from MAS.

Union both at present and in future, and pulses are in an important position as cash crops for the farmers in the CDZ where they are much cropped and produced, also as a precious source of foreign currency earnings for the Union itself.

3.5.4 Oil-crops Produced in the Study Area

Oil-crops have the third priority in the agriculture of the Union. As it is often referred to that the nation of Myanmar consume large amount of edible oils, oil-seeds are considered as one of the most important crops (By the way, it is said that cerebral infarction and hypertension are representative lethal causes of the nation of the Union, and this may have a bearing to excessive intake of edible oil). Traditional edible oils consumed in the Union mainly consist of sesame oil and groundnut oil, to which sunflower oil may be added. Sesame production in 3 Divisions in the CDZ accounts for 89% of the total production in the Union, groundnut production does 69% and sunflower production has share of 70% (as of 2004/05, Myanmar Agricultural Statistics, 2006).

Production quantities of sesame, groundnut and sunflower by division and state are given in Figures 3.5.11 to 3.5.13. Almost no increase in production has been observed except sesame during the period from 1980 to end 1990s. In contrast, they have shown sharp rise since 2000. Because the Union has imported large amount of edible oil (palm oil), such an increase in production quantities is not attributable to export driving force as observed in the case of pulses. As an illustration, quantities of sesame exports by destination in 2004/05 given in Figure 3.5.14 show that the exports have been barely 10 thousand MT or so, and this is a negligible size as compared with the output of sesame in

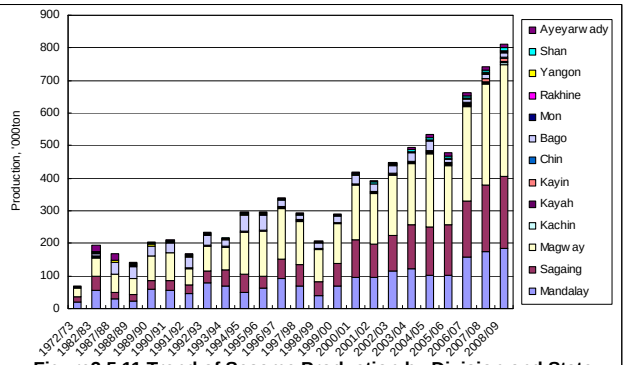


Figure3.5.11 Trend of Sesame Production by Division and State

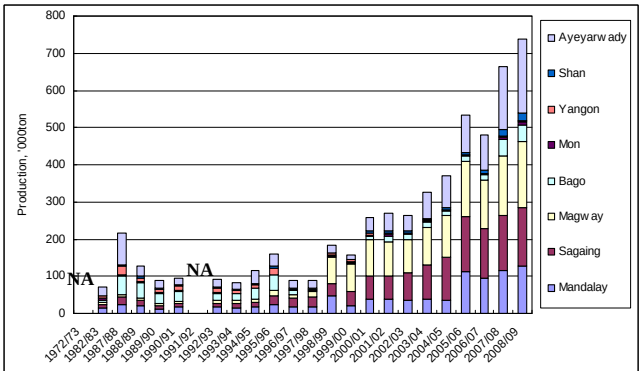


Figure 3.5.12 Trend of Sunflower Production by Division and State

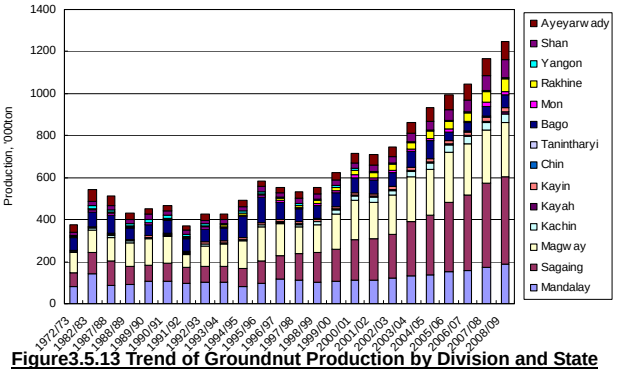


Figure3.5.13 Trend of Groundnut Production by Division and State

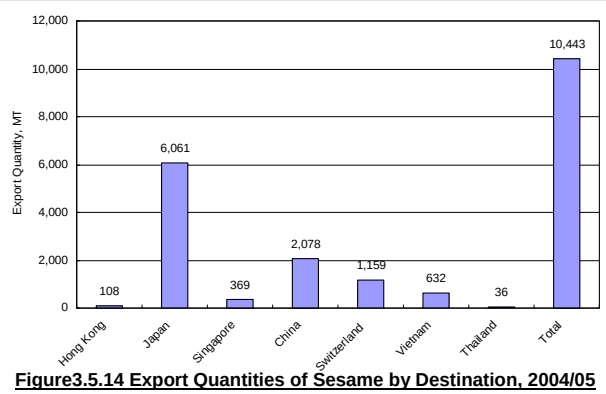


Figure3.5.14 Export Quantities of Sesame by Destination, 2004/05

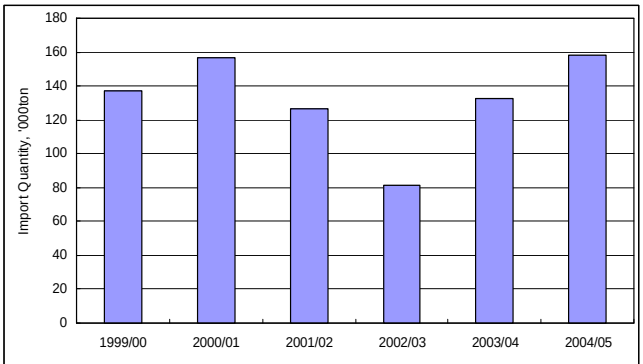


Figure3.5.15 Trend in Import Quantities of Palm Oil into the Union

2004/05, around 500 thousand MT. In this connection, imports of palm oil, representing imported edible oils, since 1999/00 has annually amounted from 80 thousand MT to 160 thousand MT as shown in Figure 3.5.15.

About 40% on weight basis of crude edible oil can be extracted from sesame seed (utilization data of sesame in 2002/2003 are referred to from Myanmar Agricultural Statistics, 2006). The equivalent of sesame seed quantity estimated by applying this extraction rate required for the import substitution of 160 thousand MT is about 400 thousand MT of domestic production. Production of sesame seed has been at most around 500 thousand MT even in the record crop in 2004/05. This is to say that if imported palm oil of 160 thousand MT is to be substituted by domestic production drive, it is required to raise the output of sesame seed nearly double. This implies how large amount of palm oil is imported by the Union.

Palm oil, imported in large quantity, is cheaper than domestically produced sesame oil, groundnut oils and sunflower oil. For instance, the retail price of sesame oil and groundnut oil per 1viss (1.65kg) in Yangon City in 2003 were 1,751Kyats and 1,821Kyats respectively, whereas that of palm oil was sold at only 1,356Kyats (0.77 times as much as sesame oil). Above all, inhabitants of the CDZ are said to prefer sesame oil because of its favor, but as far as the prices are concerned, no comparative advantage is found among oil-crops produced in the Union, among others those produced in the CDZ.

So far as food constitutes a culture, it is hardly possible to change people's preference in short time by the grade of prices only. By this reason, poor strata likely covert their edible oil consumption into inexpensive palm oil, but medium - well-off strata have higher possibility of continuously utilizing sesame oil. Though the landless poor is inclined to purchase cheap palm oil and mixed oil also in the target villages of the Pilot Project, farm households usually use expensive sesame oil. However, under the current situation where palm oil has enormously been imported, little growth potential remains to expand production of costly edible oil domestically.

Even under such circumstances substantial growth of oil-crop production took place particularly since 2000. Official instruction seems to have been issued from the government through MAS to expand domestic production of oil-seeds aiming at curtailing imports of edible oil (palm oil), in other words saving foreign currency. However, since sesame and groundnut, typical species of oil-crops, have traditionally been cropped, it is uncertain if the augmented output as shown in the figures has been fulfilled on the real ground. In any case, though oil-crops no doubt constitute representative crop commodities in the CDZ, its future prospect would not be rosy judging from their comparative advantages.

3.5.5 Vegetables Produced in the Study Area (Onions as an Example)

The Study Area produces a few vegetable species (In this context, onions and garlic are called vegetables in the Union. What foreigners define as vegetables is called "green leaves" in the Union). Onion is a representative vegetable, and the Study Area accounted for 94% of onions produced in the Union. According to the result of interview in the target villages in the Study Area, many farmers are found who desire to crop onions as cash crop in the villages in Mandalay Division and Sagaing Division that are located near Mandalay City.

Figure 3.5.16 gives trend in the production of onion since 1992/93 by division and state showing fast increase since 1998/99, or earlier by 1-2 years than the increase of oilseeds shown above (Referred to Myanmar Agricultural Statistics 2006, Yangon). Since paddy, pulses and oil-crops are priority crops specified by the Union, they have been incorporated into current extension program, for example "High Yield Promotion Programme". Under this programme, target areas for extension are delineated in which extension wing pays such efforts towards production drive as preference

distribution of fertilizers and seeds in especially for paddy within the target areas.

However, there is so far no information on the priority promotion measures for onions by the government though they are traded in more or less small-scaled markets. In the list of export quantities in 1999/00 and later the annual export amounts of onions have been limited ranging only 1,000 MT (2003/04 and 2004/05) and at maximum around 5,800 MT in 2000/01). This amount is negligible in terms of annual production of 800 thousand MT in 2004/05. Onion is an excellent cash crop suitable to sandy soils and has high priority for the farmers in the CDZ, however, same concern on the incremental rate appears as far as data are concerned.

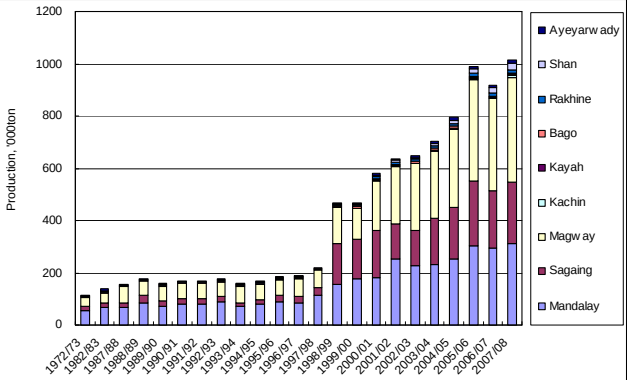


Figure3.5.16 Trend of Onion Production by Division and State

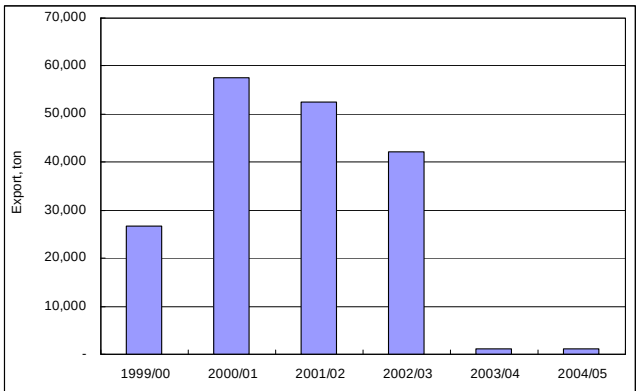


Figure 3.5.17 Trend of Onion Export

3.6 Livestock in the Study Area

The Study Area has been known as livestock production area in the Union. Draft cattle, indigenous cows, hybrid dairy cows, sheep and goats suitable for dry zone climate, and also some fowls are reared in the CDZ. The following mentions current status of livestock activities in the Study Area.

3.6.1 Livestock Holding Rate of 3 Divisions against that of Union

In the Study Area, indigenous cows for producing regenerated draft cattle, hybrid dairy cows for milking are also fed in addition to draft (castrated) cattle. Besides, as minor species, pigs, fowls, chicken, ducks and quails for producing meat and eggs are also observed. Figure 3.6.1 shows the percentage of livestock in the 3 divisions against those of the Union. Population in the 3 divisions consists of 34% of the total population of the Union. Those livestock more than the percentage of the population are cattle, and sheep and goats while pigs and poultries are more or less same as the percentage of the population.

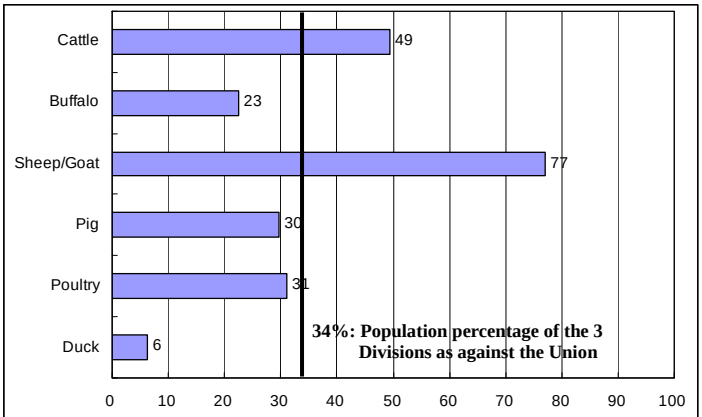


Figure 3.6.1 Livestock Percentage of the 3 Divisions against the Union

Cattle rate in the CDZ is 49 % that is more the population composition of 34%. This is mainly because draft cattle are prerequisite for tillage and transport in upland as well as in paddy land for those who do agriculture as their mainstay because in this Country little farm mechanization has taken place so far. Sheep and goats are much more existing in the CDZ as posed at 77 % against the population percentage of 34. This is simply because of their nature adjustable to dry land climate.

3.6.2 Economic Status of Livestock in the Study Area

Following Table 3.6.1 shows the composition of GRDP (Gross Regional Domestic Products) by economic activities. Viewing rate composition of livestock sub-sector by division, Mandalay Division gives the highest rate, 5.2% in the related 3 divisions, followed by Sagaing Division representing 4.5%, and Magway Division shows the lowest, 1.6% only. In so far as the composition rate of GRDP is concerned, share of livestock in it is not at all significant. It accounts for only 3.3% in the whole Study Area as compared with agriculture repesenting 50.1%, manufacturing giving 19.8% and construction sub-sector accounting for 14.9%.

Above status is comparable to the fact that livestock share in total national GDP remains in a few percent (5% as the total of livestock and fisheries in 2003/04). Notwithstanding, cattle is indispensable animal in farming, while goat plays a pivotal role of complemental income source for livelihood sustenence of smallholders and the landless households. Taking these into consideration, it can be deduced that livestock plays a role more than its appearance in the regional GDP economy in the Study Area.

Table 3.6.1 RGDP Composition Rate by Economic Sub-Sector in 3 Divisions in the Study Area (2006), Unit: %

Division	Agriculture	**Livestock**	Manufacturing	Construction	Service	Others	Total
Sagaing	58.0	**4.5**	15.6	1.9	5.3	14.7	100
Mandalay	43.5	**5.2**	31.5	4.1	9.2	6.5	100
Magway	52.9	**1.6**	13.1	25.2	1.3	5.9	100
Total	50.1	**3.3**	19.8	14.9	4.6	7.3	100

Source: Department of National Planning, Data collected by JICA Study Team

3.6.3 Livestock Holders and Sizes of Herds

Livestock species kept in the Study Area ranges draft cattle necessary for tillage, indigenous cows, hybrid dairy cows, goats, pigs and fowls. Draft cattle are used for cultivation in a pair, both of them are castrated cattle (see photo right). Usually, calves of the age 3 - 4 years are utilized for draught after taming them with necessary training. Farm households keep them for cultivation, but some smallholders cannot aford to keep them since a large amount of sorghum harvested from 3 acre would be required for feeding a pair of draft cattle for a year.


A Pair of Drafting Cattle

On the contrary, even some of the landless keep them for the purpose of lease on rental basis though the number of herds is quite limited. As slaughtering of cattle under the age of 16 years is banned, it doesn't bring any cash income before reaching culling age (despite, cash earning is possible by rental lease and sale). It is not until the cattle reaches culling age that it can be used as the source of beef. Live weight of a draft cattle reaches as much as 500 kg though it varies by region.

Indigenous cows are kept for the purpose of delivering draft cattle for regeneration. However, since it produces milk after the delivery, a part of milk is processed into condensed milk. Other than farm households, some landless households also own them. Also, slaughtering of cows before they reach 16 years is banned. Live weight reaches 400 kg though this has regional variance. Lactation for indigenous cows amounts to 1.5-2 viss/day (2.5-3.3 litre/day).

For milking purpose, hybrid dairy cows are also fed, particularly in Mandalay Division that serves as a center of dairy production where number of farm households living in the outskirts and selling milk has rapidly been increased as market-oriented economy developed since 1988. In such sub-urban villages, milking industry with hybrid cows such as those crossed with Friesian strains (Horstein) are run as almost exclusively full-time enterprise. Since hybrid cows are traded with higher market price, their owning is confined to large landholder farmers and better-off off-farm households. No restriction has been set on the slaughtering age of hybrid cows. Their live weight ranges 450 - 500kg. The amount of lactation is higher than that of indigenous cows, reaching 4-5 viss/day (6.5-8.2 litre/day).


Goats Reared in CDZ Widely

The CDZ is renowned as the producing area of goats. As known to all, goats, above all goats, are resistant to dry climate. They also don't need much tending for feeding and they are easily multiplied by extensive grazing only if the land for grazing is available. Live weight of goats observed in the CDZ stands at about 25kg for female and around 40 kg for male. Twin bearing rate of goats is approximately 40% (according to an interview at LBVD).

Major herd keepers for the goats are relatively poor strata consisting of smallholders and the landless and the herds are rearing by gazing. Though varieties of goats are variable with area within the CDZ, major purpose of rearing is meat production and no custom of drinking goat milk has been observed. Wool is utilized in processing carpets, but middlemen hardly visit remote area for collecting it. In some cases, it has been wasted in the areas without wool processing unit (according to an interview at LBVD).

Piggery is also run in the Study Area. A part of the piggery is of commercial scale or specialized in stock-breeding production, but it is mostly kept by relatively poor strata who raise 1 - 2 heads for fattening in their homestead. Most of them do not have barn keeping pigs loosely in yards without any concern on quarantine. Some villages have been advised from monks to refrain from keeping pigs by religious reason. However, there is not so rigorous prohibition as ruled in Islamic definition. Even in the villages where people refrain from keeping pigs observing the instruction by priests, there observed many villagers who eat pork meat.

For fowls, chicken and ducks are commonly raised and quails for egg production are partly kept. Chicken are freely kept in homestead yards in every village. They are kept for home consumption except for partial poultry of commercial scale. Distribution of ducks is limited to wetland along creeks etc in the CDZ, where they are kept mainly for meat and egg production. In the areas with year-round water surface, even those who do not have paddy land can raise ducks. Duck rearing is several times as profitable as chicken, leading to a sizable income source. Quails are also raised for egg production, but the scale of their production is small and the production area is also confined. Lately, some villages suffered from damages of bird-influenza where some farm household withdrew its feeding completely.

Following Table 3.6.2 summarizes population of sheep, goats, cattle, pigs and chicken in the Study Area by division. Heads of goats are less in Sagaing Division where annual rainfall is comparatively abundant, vice versa, those of cattle are more observed. Buffaloes have been kept in Shwebo area under Sagaing Division with irrigated paddy land where annual rainfall totals at 1,000 - 1,500mm. Goats are preponderantly kept in Magway Division because of extreme dryness prevailing over the Bago Hills range in the east side of Ayeyarwady River. Oppositely, paddy is commonly cropped in the mountain foot of the mountain range in the west side thereof owing to heavy precipitation where cattle are commmonly kept. The CDZ is well known for higher share of goats and of milk cows on national basis, among others characterized by predomonance of goats amidst the area called “heart of dry zone” in Mandalay and Magway Divisions where dry area vastly extends.

Table 3.6.2 Livestock Herds in 3 Divisions in the Study Area (2005)

Division	Sheep/Goats (head)	Cattle (head)	Pig (head)	Chicken (birds)	HHs	Average Number per HH			
						Sheep/Goat	Cattle	Pig	Chicken
Sagaing	340,543	1,334,503	263,616	3,531,485	564,582	0.60	2.36	0.47	6.26
Mandalay	616,745	1,169,314	193,061	2,655,410	606,844	1.02	1.93	0.32	4.38
Magway	579,607	1,782,645	467,443	6,427,592	669,481	0.87	2.66	0.70	9.60
Total	1,536,895	4,286,462	924,120	12,614,487	1,840,907	0.83	2.33	0.50	6.85

Source: Livestock Breeding and Veterinary Department, Data collected by JICA Study Team

3.6.4 Relationship among Farming Type, Landholding Size and Livestock Composition

As a rule, goat herds are predominant in the areas with leading share of upland, whereas cattle tend to be major species where paddy land area accounts for about 30% or more. The main reason of this general tendency may stem from higher needs for draft cattle in paddy areas to do timely farmig practices such as ploughing where intensive farming with double cropping or even triple cropping in irrigated perimeter is practiced.

Likewise, farm households in paddy area is as a whole better-off than those in upland areas and this entails in higher rate of the households that can afford to keep draft cattle. In contrast to this richer area, land use intensity is lower in the upland areas in the CDZ where most commonly observed rain-fed farming is practiced. Even if cattle were used for tillage in this upland, goats characterized with suitability to cash earning tend to be kept for the purpose of supplementing short income.

Large tracts of irrigated paddy land accompanied by rain-fed paddy land are observed in Shwebo TS

in Sagaing Division, Minbu TS in Magway Division and Kyaukse TS in Mandalay Division located around the CDZ areas with annual rainfall ranging 1,000 - 1,500mm. Draft cattle keeping has served as major livestock activities in these areas in contrast to other dry areas. Further, power tillers are utilized in such leading paddy producing areas as Pwintbyu TS and Minbu TS in Magway Division under the favorable livelihood of farmers because farm production with irrigated paddy as major component has been stable.

In those advanced paddy producing areas, there tends to find less farmers who have to sustain their life with supplemental income from goats rearing and this is quite different from the areas where upland farming, a reprentative form of unstable agriculture, predominantly prevails. Also, agricultural land has for the most part been exploited in these intensive paddy areas, and consequent less room for grazing small ruminants may serve as a reason of less goats herds kept there.

Following Table 3.6.3 below roughly summarizes interrelation between livelihood means of households and livestock holding observed in the CDZ. Viewing this table, while cases of keeping draft cattle for tillage purpose and in addition feeding cows for delivering regenerating draft cattle are observed in large - medium scale farmers, many other cases without draft cattle but with sheep, goats, piggery and poultry for meeting insufficient farm income are also observed in smallholders with 5 acre (2ha) or less.

Table 3.6.3 Household Categorization and Livestock Species

Income ↓

Household Category	Landholding	Means of Livelihood	Livestock Species
Large-scale farmer	Above 10 ac	Full-time farming or farming＋subsidiary (rice milling, retail)	Draft cattle (indigenous/ hybrid cows)
Middle-scale farmers	5 to 10 ac	Farming＋Livestock rearing	Draft cattle, (Goats)
Small-scale farmer	Less than 5 ac	Farming＋Livestock rearing＋Farm labor service	(Draft cattle), Goats, pigs & fowls
Landless	None	Farm labor service, General labor, Livestock	(Goats and fowls)

Sources: As observed by the Study Team, Note: Brackets in the right-most culumn indicates presense of not holding cases

In other words, livestock feeding is placed in a position as measures coping with low income for the farmers belonging to smallholding strata. Likewise, the landless are most frequently constituting the poorest stratum in rural areas, sustaining their livelihood by wage earning from farming labor services and working in the employed small-scale industries, and in some cases they keep goats as means of risk hedge against ephemeral livelihood.

In the CDZ, especially in upland susceptible to drought spells and short rains, even if a household had held farmland it is difficult to sustain livelihood of a household by only cropping unless it has 8 - 10 acre (3 - 4ha) at least. It follows that it is difficult to hold draft cattle that require 3 acre per pair according to a simple estimation of feeeding them by only self-supplied sorghum. In such a case, alternative means are practiced with lease tillage instead of holding draft cattle by himself. Many examples of resorting to lease draft cattle because of lack of feeding a pair of draft cattle are observed in Myingyan TS in Mandalay Division and Pakokku TS in Magway Division in the Study Area where smallholders with 5 acre or less are dominant. In this context, charge of draft cattle leasing costs around 1,500kyat - 2,000 kyat/ half-day as of 2006.

Since livestock feeding is an important income source for landless households engaged in farm labor that constitute the poorest stratum, cases are observed in which goats are raised, either by herd management contract or by owning herds himself to earn household income. Similarly, in addition to goats herds, some households keep pigs and chicken for a risk-hedging to guarantee livelihood sustenence, and this is another form of poverty coping measures the poor strata themselves can apply. In this regard there might exist many households that cannot buy stocks due to lack of fund, and the result of a PRA survey with 170 sample households conducted in 2006 confirmed that only 17% of the landless held small ruminants.

3.6.5 Positioning of Livestock in Livelihood

Agricultural productivity as major means of livelihood is always unstable in the CDZ with scarce and unreliable rainfall. By this reason domestic animals serve literally as "live bank (=livestock)" that can quickly be cashed whenever need arises. As a farm household needs a pair of draft cattle for such farm practices as ploughing, many of middle to large-scale farmers hold them. However, these draft cattle are sold once crop income becomes null or greatly reduced on acount of droughts to tide over the pressing need. Draft cattle are not necessarily owned by all farmers but those without draft cattle (usually small-scale farmers with 5 acre or less) plough their land by borrowing draft cattle from those who own them. Here, the draft cattle can bring cash income in the form of rental cattle to their owners.

Milk production with indigenous cows/ hybrid ones enables holders to earn constant daily cash (400kyat/viss as of September 2007) for about 250 days though the amount of lactation is quite limited, leading to many households who wish to hold them. According to an interview by the Study Team, villagers give a rank of middle to the status of livelihood of households that hold dairy cattle. Whereas, livestock held by the landless is mostly goats, but those who hold goats are ranked below those who hold cattle, and villagers often deem them on the whole "worse-off". A type of contracted management of goat herds by herd holders exists. Entrustees are mostly the landless, who can get 50% of offspring born during his/her entrusted management, and can multiply the herds and in some cases they become owners of a large herd.

Table 3.6.4 below processes the result of a questionaire survey on household balance of 170 sample households conducted in 2006 into the dependency on livestock income by livelihood type form. Comparing the farmers of different farming type, upland farmers have the highest dependency on livestock income (mostly goats), evidently higher than upland + paddy farmers representing 11% or than farmers specialized in paddy with 9%, implying that supplementing rain-fed instability with livestock. On the other hand, viewing the landless, their income from livestock constitutes 34% of all income, suggesting their heavy dependency on livestock.

Table 3.6.4 Status of Livestock Income in Major Livelihood Means

Items	Gross Household Income (kyat/HH/year)							
	Agriculture		Livestock		Others(wage etc)		Total	
	Amount	%	Amount	%	Amount	%	Amount	%
Upland only	216,902	50.5	74,903	17.4	137,871	32.1	429,676	100
Upland + paddy field	572,100	75.6	82,038	10.8	102,200	13.5	756,338	100
Paddy field only	1,170,600	82.2	124,480	8.7	129,200	9.1	1,424,280	100
Landless	0	0.0	122,957	34.3	235,978	65.7	358,935	100

Sources: questionnaire survey in 2006, sample of total 170 households in 17 villages by the JICA Study Team

3.6.6 Actual Holding of Draft Cattle and Utilization Thereof

Table 3.6.5 below summarizes the result of 90 sampled households holding draft cattle extracted from the questionnaire survey to the villagers conducted by the Study Team in 2006. By this result the following general outlined can be extracted: 1) All the farm households with 10 acre or more own draft cattle, where average cattleholding is calculated at around 8 (4 pairs), 2) About 3/4 (accounting for 73% of the total sample) of middle-sized ones hold them where mean herd comes to about 6 (3 pairs), 3) About half of smallholders with less than 5 acre hold them with their mean, 3.5 head, 4) even small portion of the landless hold draft cattle (about 9%).

Table 3.6.5 Status of Draft Cattle Holding by Scale of Landholding

Farm Size	No. of HHs Interviewed	HHs owning Draft Cattle				HHs without Draft Cattle	
		No. of HHs	%	Number (head)	Average (head/HH)	No. of HHs	%
Above 10 ac	25	25	100	203	8.1	0	0
5ac<, =<10ac	11	8	73	47	5.9	3	27
below 5 ac	31	15	48	52	3.5	16	52
Landless	23	2	9	17	8.5	21	91
Total	90	50	56	319	6.4	40	44

Source: questionnaire survey by the JICA Study Team in 2006

It is found that the average number of draft cattle by a farm household is 8.1 head for large farm, 5.9 for middle farm, 3.5 for small farm, indicating decrease of cattle heads in parallel with land holding size. From the viewpoint of farm households without draft cattle, even 27% of middle farm households or around 1 out of 4, and 52% of smallholder farm households or about 1 out of 2 do not have them and cultivate field by rental draft. In this connection, 2 households of the landless hold draft cattle for the purpose of rental service out of 23 where the mean heads per household stands at as many as 8.5 almost equal to that held by large-scale farmers with 10 acre.

The table right shows input of draft cattle to representative cropping. Working hours of draft cattle in a day is at maximum 3 - 4 hours in cool morning hours, while the unit used here terms drafting practice during 7 AM to 11 AM as 1 shin. As the input to sorghum production for a feeding material of cattle does not bring any cash income, it is only 2 shin/acre the lowest and the most extensive of all. Whereas, that to the staple paddy comes to 8 - 9 shin/acre, and that to profitable chili ranges 3 - 8 shin/acre though highly variable. The input of draft cattle to sesame also varies from 3 - 6 shin/acre and the variance is considered attributable to the difference in crop management intensity including weeding with site by site variation depending upon topographic conditions and farmers' intensity of farming.

Table 3.6.6 Input of Draft Labor

Crop	Draft Cattle (shin/ac)
Paddy	8-9
Chili	3-8
Sesame	3-6
Sorghum	2
Onion	14

Source: interview survey by the JICA Study Team in 2006

3.7 Small-Scale Industries in the Study Area

3.7.1 Historical Background in the Development of Small-Scale Industries

Bamar race is said to have immigrated from inland part of China to the south around 7th Century and have settled in Kyaukse region located at about 40km south of Mandalay City. Kyaukse region is situated within the CDZ, and there irrigated paddy cropping is told to have been practiced from ancient times since the region has alluvial fans and terraces ascending up to Shan Plateau.

Later, Bamar race is said to have left Kyaukse region as population pressure had risen immigrating towards down-stream through Ayeyarwady River. Thus, Bamar race maintained and expanded a united organization composed of localities under in reign of each chieftain, developing until it formed the united Pagan Dynasty in the middle of 11th Century. Bamar Kingdom that established a united dynasty in Pagan continued its expansion policies until the beginning of 19th Century.

In the meantime, industries including handloom weaving for paying tribute to dynasty court had developed. In addition to this weaving, some villages held such vocational groups of plasterers and carpenters. These traditional industries can be observed almost all villages in the CDZ even nowadays, but among others they have been popular in the villages along the route from Mandalay to Bagan. In short, such historic evolution suggests us that the traditional cottage industries have been developed in line with the developing process of the dynasty.

The Pilot Project is under-way in 6 villages in 2007, and all these villages are engaged in small-scale industries that are so-called cottage industry. They range from handloom weaving with a consistent process starting from manual cotton ginning (a work to separate cotton yarn from its seed) through thread spinning to final weaving, to stonework providing stoneware that was originated more than 100 years ago (see the photo above), making us sense of historical time-span of local small-scale industries. Observing manual spinning, thread is spun with pure cotton lint (therefore susceptible to get cut away) that is not

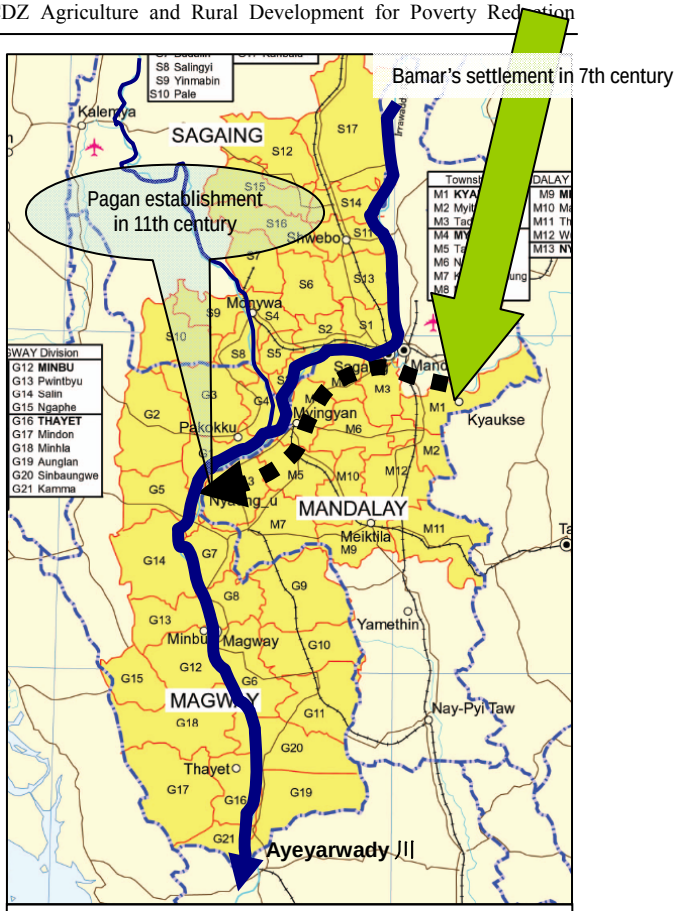


Figure 3.7.1 Establishment of Dynasty and the Route of Transfer of Traditional Industries

Manufacturing of Mortars Using Quarried-out Sandstone

Thread Spinning with self-Harvested Cotton Lint

woven along leading thread (industrial thread), implying that the process needs fairly skilled/ refined expertise (see the photo below). The thread is dyed with pigment (nowadays using in many cases with industrial dye) and finally woven into longyi (a kind of waistcloth) and shoulder-bags, etc. Their markets are located in the villages and outskirts of nearby townships.

3.7.2 Recent Development of Small-Scale Industries

In these years, machinery and various indusrial materials have been flown into the Country particularly from China, fostering the growth of such small-scale industries that require purchased materials as sewing and hardware processing in addition to old-fashioned handloom weaving from ancient times at least in the villages around Mandalay City.

Besides, a lot of small-scale industries have been developed including woodcarving, masonry carving, wooden furniture processing, ratan furniture processing, bamboo products processing, basket weaving with palm leaves, copperware processing, porcelain pottery ceramics, jaggery production, lacquer ware processing etc, according to the result of interviews in the office of Department of Small Industry under the Ministry of Cooperative located in Mandalay City. As an example, situations of small-scale industries in Mon Yway Kyee Mon Village in Monywa TS are summarized in the right box, from which it is understood that routine devices such as recycling of waste materials are conveniently applied to their small-scale industries.

Small-scale Industries in Mon Yway Kyee Mon Village in Monywa TS:

1) Scissor making by grinding waste reinforced iron: Out of the visited two households, a household is engaged in scissor making and selling where father and his son make 12 scissors a day and sell them at 1,700Kyats per pair. Net gain is 300Kyats per pair. In the other household, 4 people are engaged in scissor making producing 30 pairs a day earning net profit of 2,000Kyats a day.
2) Twisted yarn making with fragment cloth: twisted thread made of cotton and polyster yarn is processed by buying fragment cloth at the cost of 350Kyats per 1viss（1.64kg） and arranging colored thread. Net gain per month amounts to 100 - 150 thousand Kyats.
3) Blanket processing with cotton refuse: The visited factory employs 100 villagers. It pays 900Kyats for male and 500Kyatsto female worker per day.
4) Slipper making with used tire: 4 people provide slippers by purchasing used tire paying 3,000Kyats per tire and making 100 pairs of slipper per day from 5 used tires. Net profit of 500 - 1,000Kyats per tire is gained, amounting to 150 thousand Kyats per month.
5) Fried broad bean: 20 laborers fry broad bean harvested in their village. They earn net profit of 5,000-10,000 Kyats per day where rice husk, groundnut husk and tyres are utilized for cooking fuel.
6) Manufacturing mattresses made of cotton and pillows: 5 family members and 15 employers are engaged in the manufacturing in the visited factory. During peak production period falling in March and April, they treat 10,000-15,000viss of cotton. Annual net profit comes to 1 - 1.5 million Kyats. Initial investment to the factory amounted to 500 thousand Kyats. According to the factory keeper, 10 families are engaged in the same industry in the village.

As small-scale industries related to agriculture, rice mills have been developed in the villages. Compulsory delivery quota of rice was mitigated in 1989, then it was completely abolished in 2003. This must have fostered the evolution of surplus gained from paddy farming. At present, small-scale private rice millers that are in many cases run by well-off farmers have emerged in the villages specialized in paddy production. Rice milling had long been under the monopoly of state enterprises in the Union, but now many private rice millers participate in the milling activities.

Table 3.7.1 below indicates numbers and milling capacity of both state-run rice millers and registered private rice millers where the total milling capacity of private millers exceeds that of state-run rice millers by more than twice. In this concern, number of registered private millers as of 2000/01 was counted at 462 enterprises in the Union (122 enterprises in total 3 Divisions). It means that around more than one small-scale rice millers exist per village specialized in paddy farming. Judging from this number the table below likely includes only larger-scale registered millers. In any case, rice milling is run as a small-scale industry in paddy producing areas.

Table 3.7.1 Rice Millers Owned by MAPT and Private Rice Millers (as of 2000/01)

Division	State owned		Privately owned		Total	
	No.	Capacity	No.	Capacity	No.	Capacity
Sagaing	6	120	68	1,610	74	1,730
Mandalay	-	-	39	590	39	590
Magway	2	40	15	270	17	310
Whole Country	68	5,308	462	12,347	530	17,655

Note: Capacity= tons/8hr, Source: MAPT (Myanmar Agricultural Produce Trading)

Condensed milk production making use of ceramic bath tub (using stalks of post-harvest pigeon pea residue)

Small-scale industries are also found in livestock sector. Most commonly found industry in the CDZ is condensed milk processing, ranging from family-run small-scaled ones to large-scaled ones run by private enterprises. Most frequently observed one is condensed milk processing run by a family where hybrid cows, crossed indigenous cow specie with Friesian, are milked and then milk is gently boiled for many hours to produce condensed milk (see photo right). Condensed milk is used mixing with tea for routine drinks.

In addition, cream separated by means of churning equipment is processed into butter. In some villages small-scale sausage processing from pork/ poultry meat is run. Dried mutton / beef are also included in the repertory of small-scale livestock product processing in the CDZ, but from hygienic aspect slaughtering is allowed only for the licensed butchers except for poultry.

Enterprise-based small-scale industries run in township and large villages have been registered in the office of Cottage Industries Department under the Ministry of Cooperative. Though they are registered as "small industries", they have in fact larger scaled operations in the aspect of output/ number of employees in comparison with small-scale industries run as cottage industies in villages. According to Promotion of Cottage Industries Law, enacted in October 1991, small-scale industry is defined as "production, repair, maintenance and service business carried out jointly and in a small size by family members and employed laborers". It is in more detail termed as 1) minor scale industry with mechanical power not exceeding 3 horse-power or with manual labor not exceeding 9 employees, or 2) handicraft business (no limitation as concern number of laborers).

Small-scale industries run in the CDZ are summarized below, and as mentioned above, they are confined to registered enterprises; that is to say, small-scale industries run in townships and comparatively in large villages, however those like cottage industries in small villages are likely excluded from the list

Table 3.7.2 Registered Enterprises to the Department of Small Industries in 3 Divisions (as of March 2006)

Business Category	Sagaing Division	Mandalay Division	Magway Division
1. Aliment & Potable Water	20	115	13
2. Textile and Garment	34	173	16
3. Construction / Architectural Materials	0	17	0
4. Personal Utility	5	40	12
5. Family Appliances	0	3	2
6. Printing /Publishing	1	17	1
7. Industrial Materials	1	14	22
8. Metal Ores & Petrol	25	9	4
9. Agriculture	2	4	0
10. Processing Machinery and Equipment	4	21	0
11. Transport and Vehicles	6	39	8
12. Electric Appliances	3	15	0
13. General Industrial Produce	225	852	68
Total	326	1,319	146

Source: Department of Small Industry, Upper Myanmar Office, Mandalay

Summarizing small-scale industries in the CDZ, it can be mentioned that small-scaled industries of cottage industrial type, with their markets targeted within villages or nearby townships such as weaving oriented more to self-supply or sewing by the use of few sewing machines are run in almost all villages in the CDZ. They include wide variety of business activities such as manual weaving with its historic background origin of dynasty era, stoneware, lacquer ware and jaggery. Expansion of scale in these industries is taking place in the outskirt of larger townships – for example nearby Mandalay City – where access to materials is easier. As an example, mechanical weaving making use of engines has shown up.


Weaving Widely Practiced in the CDZ


Watering Can Production by Tinsmith Workers

Some villagers try to establish new type of small-scale industries like rice milling by investing the surplus gained in agricultural activities, or others try to enlarge the scale of existing industries that has so far been confined in the scale of cottage industry. Also, it is known that the rate of landless farmers is higher in the rural areas of the Union including the CDZ, and small-scale industries offer hiring opportunities to these poor villagers.

3.8 Rural Society in the Study Area

This sub-chapter discusses the rural society in the Central Dry Zone from available references, published document, and also a baseline survey. This Study carried out a baseline survey in 6 target villages for the pilot project implemented in 2007/08. A total of 419 households were covered by the baseline survey, divided in the 6 villages. A prescribed questionnaire asking household structure, income & expenditure, debt situation, frequency of eating meat/ fish, etc. was administered in 2007/08. 'Chapter 3.8.1' presents the result of the baseline survey.

3.8.1 State of Villages in the Study Area

Village Tract is the smallest administrative unit in the Union, as stated above, and usually includes about 3 villages as average. Rural people usually inhabit in densely aggregated way though in some cases a hamlet with few houses are found isolated from normal villages on Bago Hills, probably because the inhabitants have to cater for isolated farmland. Villages are normally located in somewhat higher elevation where the entire village site is surrounded with fences in the same way as each homestead is bordered with fences. Village fences are made from live shrubs and split bamboo. Some fences of village borders have gates.

The overall shape of a community area can be overviewed whenever we move from Yangon City to Mandalay City by air, and many of them have round shape near a circle. Passage networks within a village are well structured in checked alignment where houses are neatly aligned along the roads. Normally, inhabitants who live in semi-arid area, among others those who hold livestock herds tend to limit the size of a natural village within several ten households per village in order to procure certain area of grazing space. That is to say, they are apt to form the smallest administrative community composing of a few small-scale, sparsely distributed natural villages. In any case, however, the habitation form observed in the Study Area is not the same one found in the semi-arid areas but undoubtedly identified as a densely flocked community typically found in farming ethnic groups in Asian monsoon zone.

At the outside of a community, monasteries are located surrounded by separate fences that are in many cases made of bricks and it can be said that the most magnificent building in a community is unexceptionally monastery. Besides, almost no exception, a couple of pagodas have been established in a village. It is well known that people in the Union are religious. Even poor families are strong in faith by offering alms of rice, vegetables and others in reply to monk's mendicancy as routine practice. While outsiders are surprised with their strength in faith, at the same time they are also amazed by higher carrying capacity as the whole village in the context of development potential.

As an illustration, there exist 18 temples in Legaing Village, a target village of the Pilot Project in 2007/08 where 40 monks and 3 nuns are getting along (as of July 2007). Legaing Village is a relatively large community where about 770 households are found. The village is situated in favorable conditions where paddy can be cropped twice a year, simultaneously where 18 households support one monk as average. This situation can be found in almost all the villages in the CDZ, as exampled in other target villages of the Pilot Project in 2007/08 e.g.; in Ar La Ka Pa village, every 15 households support one monk in case of minimum amongst the 6 pilot villages while Khaungkawe village 24 households do a monk in case of maximum.

In addition, it was clarified through the baseline survey conducted in the target villages of the Pilot Project that the item "donation & ceremonials" is included in the expenditure items of the villagers, in which 30,000Kyats (equivalent to about 22$ at market exchange rate as of September 2007) - 50,000Kyats (equivalent to about 37$) are expensed by majority of the villagers. It was also found that a villager annually contributed to alms by spending at maximum 300,000Kyats (equivalent to

about 220$). Though livelihood in the areas of adverse conditions like the CDZ must be very rigorous, the CDZ still has potential enough to keep carrying capacity that enables inhabitants to support their religious belief (in this connection, the share of charity & ceremonials on the total annual household expenditure at the Union level is shown in the box right).

Charity & Ceremonials of Myanma:

Central Statistics Organization conducted "Household Expenditure and Income Survey" in 2001 selecting 75 TSs located in 14 divisions and states throughout the Union as samples of the survey.

According to the result of this survey, the item "charity and ceremonials" accounts for the following share out of the total household expenditure:

The whole sample :	4.4%
Of which, townships :	5.3%
Of which rural areas :	3.9%

In this regard, expenses of rice, vegetables etc offered as alms to mendicant monks are not included above expenditure, but separately counted in the cost of aliment.

As regards the structure of a village, a leader of a group of 10 households exists taking care of the 10 households. The leader is ordinarily selected out under an agreement of the related households without any election because they have a solid society. Then, a leader of a group of 100 households also exists among the relevant households where the 100 HHs leader is not from the 10 HHs leaders, but different personnel. Since 770 households are counted in the above referred Legaing Village, 77 leaders for groups of 10 households and 8 leaders for groups of 100 households have been elected. Most leaders in the target villages of the Pilot Project are farmers, probably categorized into medium-scaled to lead-farmers judging from their costumes and countenances. Some of them understand English language at the level of greetings and some extent of daily conversation.

Village chairmen are appointed by the superior agency, PDC at TS level among leaders. Current political power introduced a qualification since 2006 that village chairmen should be graduates of universities (this information was obtained through interviews at the villages but not yet identified on documents). By this reason, all the village chairmen except one whom the Study Team is allowed to visit have been chosen from younger generations (if there is no university graduate in the village, chairman can be selected from hitherto aged leaders). In many cases, leaders of groups of 10 households and those of groups of 100 households are aged ones, and these aged leaders are main respondents during interviews but in many cases young village chairmen abstain from getting involved in the interview sitting only in the rear seats. It seems that the attitude of paying respect toward the aged prevails among young generations that is very often observed in Asian society.

PDC established at the Village Tract level consists of the village chairman and a few leaders, and their role is similar to that of PDC at the Union level, that is keeping public order and developing activities in their village. The major role of groups of 10 households and those of 100 households linked with PDC is to inform and deliver messages from VT chairman attended to the meeting that is held once a month at PDC at TS level to the related village households.

Besides, they play leading roles in various events in their village. Principal events held in the village relate to religious activities. They lead and mobilize related households into such activities as repairs and new building of temples and pagodas and act as promoters of collecting contributions. In addition, they act as voluntary arbitrators of strife – difficulty in debt repayment, divorce, quarrels etc – though these are not their formal duties as leaders. Such mediation has another dimension, rather voluntary private contributions since they are recognized as cadres or care takers in village society.

Not only in the Study Area, but also in most villages there do not exist any organizations or groups engaged in routine development activities and this is a typical and common character found in the communities of the Union. A host of donors addresses to poverty reduction through MDG initiative in LLDCs wherein they often adopt grouping as means of approach to the target inhabitants. As a result, many donor-oriented groups - in essence supply-driven groups since grouping is arranged

assuming input is brought about - have been established.

Within the Study Area, women group established in the course of the activities by a part of donors including UNDP etc and the group managing micro-finance already exist. However, except for these small groups, no example of established group is so far observed in most villages where a group is formally registered participating in development activities, and is sustaining its routine activities except Women's Affairs Association.

Women's Affairs Association is a nation-wide organization (where the First Lady takes the chair) and in the case of Legaing Village 300 women have membership of this association (accounting for about 40% of the total village households). It is explained that the association is engaged in development activities in the villages, for example campaign for preventive vaccination towards children and expected mothers in which health stations play leading role, dispatch of proxy for teachers in case of shortage of teachers in primary schools to which village children commute (villagers who graduated from university are proxy for teachers), persuasive efforts towards the families with non-enrolled children, collection of contributions as need arises etc.

Judging from these above services, the functions of the association closely resembles those of Women Associations often found in rural areas in Japan. Other than the association, no particular group engaged in development activities exist. Once need arises to develop the village - the term "construction works" is considered appropriate - ad hoc grouping would be made among village chairman, leaders of 10 households or 100 households so that the group take initiative for implementing villagers' collective works.

3.8.2 Household Baseline in Selected Villages (for the 6 Pilot Project Villages)

A baseline survey was carried out from mid August to October 2007, covering 6 villages where pilot projects in 2007/08 had been implemented. The objective of the survey is to grasp baselines for the villagers including income and expenditure. JICA Study Team prepared questionnaire for the survey, which had been administered by local staff to village chairmen, village leaders who are regarded as key informants, sampled villagers, etc.

Questions asked are population, farm land, farm household number, off-farm household number, cultivation area, farm land by acreage, crops cultivated in the village, cottage industry in the village, electrification, diseases prevalent in the village, etc. For those who own landholdings thereby regarded as farm household, such items were questioned as farm area by crop, yield by crop and by harvest index, farm management issues, income and expenditure, etc. For those who are deemed as non-farm household, their income source was mainly asked together with expenditure.

Sample numbers are 228 for farm household and 191 for non-farm household, totaling to 419 households. Out of the 191 non-farm households, daily wage farm labors are 67, those who mainly earn from livestock are 11, and those who are mainly engaged in cottage industry are 16 for employed and 69 for self-running, and then others such as government officers, teachers, etc. are 28 households. Sample by village and by the main income source is listed in the Table 3.8.1. Sampling was randomly done.

Table 3.8.1 Summary of the Samples Surveyed

Village	Farm Household	Non Farm Household (Landless)					Total
		Casual Farm Labor	Livestock	Cottage Industry		Others	
				Employed	Self-running		
Mingan	11	0	0	2	8	1	22
Magyi	41	2	2	0	5	-	50
Khaungkawe	29	1	2	5	9	2	48
Ar La Ka Pa	76	17	4	6	23	13	139
Ma Gyi Sauk	31	9	1	1	5	6	53
Legaing	40	38	2	2	19	6	107
Total	**228**	**67**	**11**	**16**	**69**	**28**	**419**
% b/t FHH & Non FHH	54	46					100
% b/t FHH & Non FHH		16	3	4	16	7	100
% among Non FHH	0	35	6	8	36	15	100

Source: JICA Base Line Survey 2007

1) Family Structure, Age Cohort and Education

As seen from Table 3.8.2, average family member per household ranges from 4.9 at Legaing Village to 5.6 at Ma Gyi Sauk Village with overall average of 5.1 for the 6 villages. Average age of husbands is 49.0 years old while that of wife is 47.0 years old. Average number of children for boy is 1.2 and that of girl is 1.3, which gives 2.5 as average number of children per family. As seen from the table, they run nuclear family as does Bamar race commonly.

Table 3.8.2 Family Structure of the Samples Surveyed

Village	Persons/ HH	Age		Average of the children's number by household		
		Husband	Wife	Male	Female	Total
Mingan	5.2	49.3	48.9	1.1	1.4	2.5
Magyi	5.5	52.1	49.4	1.4	1.4	2.9
Khaungkawe	5.4	47.0	44.2	1.2	1.3	2.5
Ma Gyi Sauk	5.6	50.1	47.8	1.5	1.4	2.9
Ar La Ka Pa	4.9	48.8	46.9	1.0	1.3	2.3
Legaing	4.9	47.9	46.5	1.1	1.4	2.5
6 Villages	5.1	49.0	47.0	1.2	1.3	2.5

Source: JICA Base Line Survey 2007

Figure 3.8.1 and Figure 3.8.2 show the age cohort for male and female of the sampled household members respectively. As shown in the figures, there may be two points to mention; 1) reduction of age groups of 40 – 49 and 30 –39 for male, and 2) big reduction of the number for children's age group, 0 – 9 year age. The former may be attributable to off-house working which is common in rural areas of CDZ, while the latter to reduction of the children's number per family which may have been supported by family planning though the extent is not exactly known.

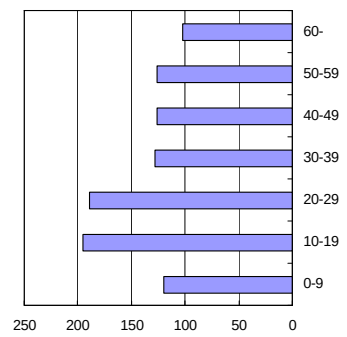


Figure 3.8.1 Male Cohort, Nr

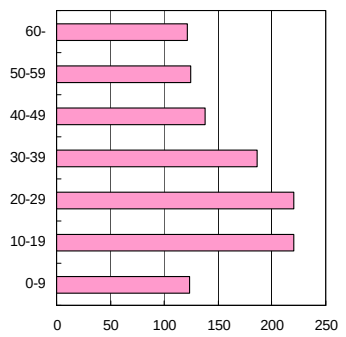


Figure 3.8.2 Female Cohort, Nr

Figure 3.8.3 shows the final education level by husband and by wife, namely by gender. As one may see, the lower level of education the more wife finished, while the higher level of

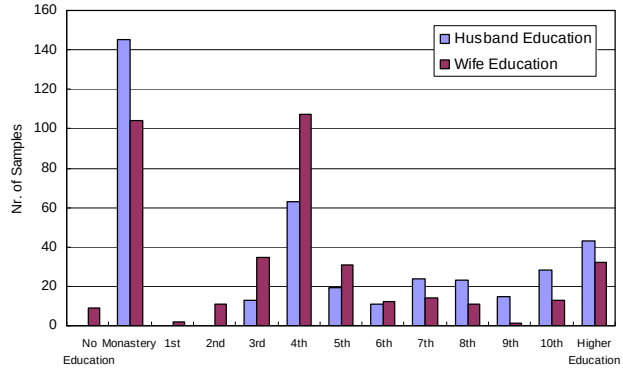


Figure 3.8.3 Final Education by Gender

education the more husband finished. Also 9 wives out of total 382 sampled wives have not received any education though no such case can be found in case of husband. Nowadays, it is said that there is little gender imbalance between boy and girl education, however as far as parents age cohort is concerned, we can see gender gap in education level.

2) Income by Social Stratum

Figures 3.8.4 shows average annual household income by farm HHs and non-farm HHs for each village. Figure 3.8.5 further elaborates the annul household income by their main income source as such that farm labor, for example, means the biggest share of his/her income comes from farm casual labor engagement, livestock means the biggest share of his/her income comes from livestock raising, so on so forth. Figure 3.8.5 clearly shows that farm household income is bigger than that of non-farm household in any of the villages, with an average of 1.56 million Kyats per household per annum for farm household as against 964,000 Kyats for non-farm household. Figure 3.8.5 implies that the poorest villagers may be in the stratum for those who are engaged in farm casual labor works. In most of the cases, farm labors' income is smaller than the others.

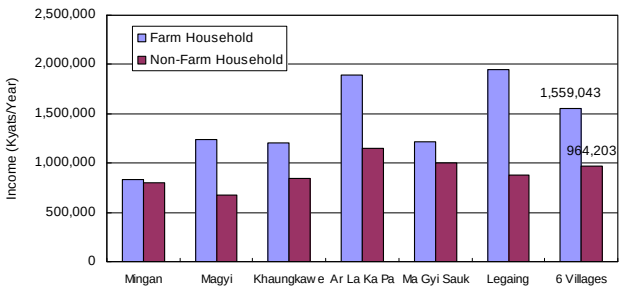


Figure 3.8.4 Annual HH Average Income by FHH & Non-FHH

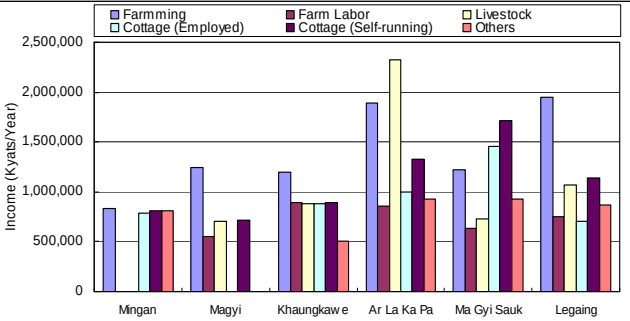


Figure 3.8.5 Annual HH Average Income by Source

Table 3.8.3 shows their household income in relation to the education level of husband. Of the total valid reply of 384, 221 (58%) respondents finished their final education in primary or in monastery, while 163 (42%) respondents finished in higher standard than primary level. There is not always clear relationship between the two indicators. However one thing clear is that as far as average is concerned those who had attended only primary or monastery school earn less than those who have attended more than primary school. The average income for the former is 1.2 million Kyats while that of latter is 1.6 million Kyats per household.

Table 3.8.3 Husband Education vs. Family Income

Standard	Education for Husband	Av. of Family Income (Kyats/year/HH)
Monastery	145	1,295,574
1st	0	-
2nd	0	-
3rd	13	751,088
4th	63	1,024,668
Subtotal	221	Average 1,227,008
5th	19	1,202,132
6th	11	1,834,673
7th	24	1,070,527
8th	23	1,956,950
9th	15	1,312,043
10th	28	1,719,113
Higher Education	43	1,645,051
Subtotal	163	Average 1,656,301
Total	384	Average 1,441,165

3) Income by Household Member

Bamar race establishes a nuclear family when they get married. Hence, husband, wife and children are principal household members, besides, their parents also consist of the member in some cases and even their relatives abide under the same livelihood in a few cases. Livelihood in a household is roughly divided into the income (with its sources) and the expenditure. Here, the breakdown of the latter, expenditure into each member is not very significant since expense for food covers 63% (in the case of farm households) - 71% (of non-farm households) of the total household expenditure

according to the baseline survey. On the contrary, it is often possible to obtain the breakdown of household income by its members. In this context, it would be relevant to interpret income from farming, animal husbandry and remittance as that derived from the members as a whole rather than specifying their sources into particular individual members.

Figure 3.8.6 shows the annual household income by its members/ activities in an average farm household (222 samples were referred to). The database of this figure stems from the result of the baseline survey in 2007/08. The farming income is dealt as an income earned by the members as a whole. The figure reveals that income from non-farming origins contributes very little portion in a farm household income. There is an income for the husband from small-scale industry he himself runs (see 2nd bar chart from the left), and all other incomes than this, earned by other household members are in fact negligible. In this figure, income of the wife remains lower level than that of her daughter. However, the wife's contribution may have been recorded as a part of that of the cottage run by the husband.

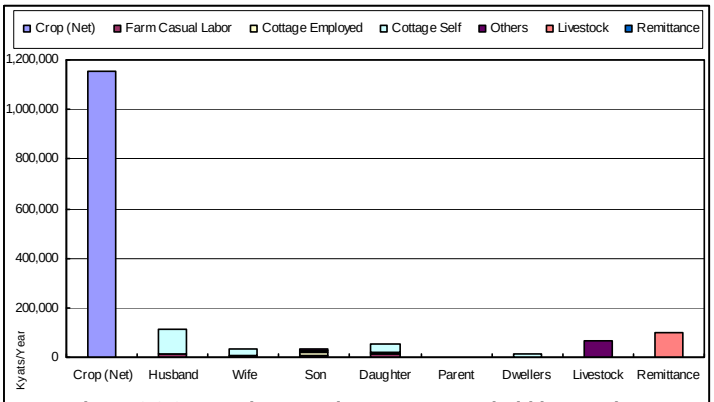


Figure 3.8.6 Annual Income in a Farm Household by Members

Figure 3.8.7 shows the annual household income by its members/ activities in a standard non-farm household (190 samples were referred to). It indicates outstanding share of the husband's income, in particular that from a small-scale industry he engages in contributes much. Income of the wife follows that of the husband, but its share is only about a fourth thereof. Here also, the same reason as stated above for the farm household income is conceivable in its background. In other words, both husband and wife run their small-scale home-industry in very many cases though the income is generally reported as the income of the husband.

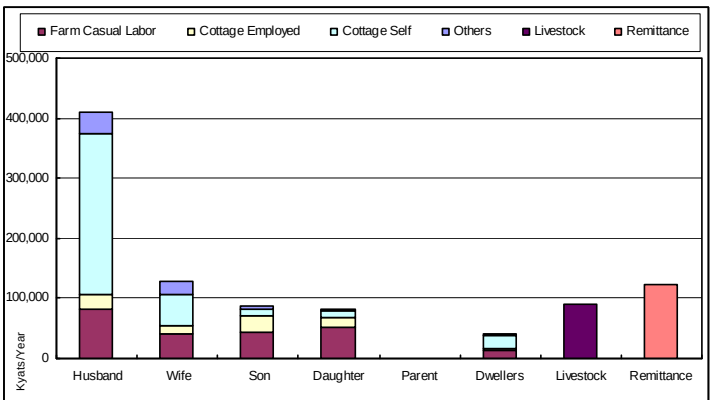


Figure 3.8.7 Annual Income in a Non-farm Household by Members

Figure 3.8.8 presents income and its sources by household member in a typical farm laborer's family (67 samples were referred to, and here, the farm laborer's household is termed as that in which wage earning by farm labor has the largest share in its livelihood. Also, samples classified as non-farm household include those of farm laborers.) As shown in the figure, the income by the husband has the

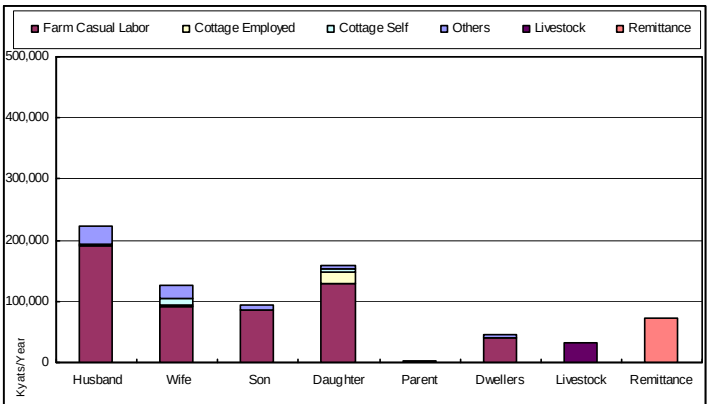


Figure 3.8.8 Annual Income in a Farm Laborer's Household

largest share, followed by that of the daughter and the wife. In this concern, labor wage per diem for a male laborer is around 1,000 Kyats, while that for a female one is only 700 – 800 Kyats, or 70 ~ 80% of that of a male laborer.

Namely, as far as the income from farm labor wage is concerned, that earned by the husband (or father) amounts the highest, while the daughter is engaged in farm labor services for almost the same or somewhat less days only as that engaged by her father if the days are estimated based on the above cited rate of labor wage per diem (where the rate of earned amount by wage is 67% for daughter's wage income). Since weeding and harvest are of delicate practices, employers tends to prefer female laborers to male, and this tendency possibly reflects in the annual working days of daughter's farm labor that is comparable to her father's.

Income from animal husbandry and remittance are dealt as the income as the whole household member in any of the above 3 figures. It is non-farm households where the income from livestock has the largest share in their annual livelihood (amounting to 90,000 Kyats/HH), followed by farm household (65,000Kyats/HH), while that of farm laborer's households remains in the lowest share (72,000Kyats/HH). The reason why share of remittance is larger in non-farm households than in farm household might be interpreted as the children in the former household do not have farmland (leasehold right) for their farming and as a result they cannot help leaving households seeking for casual labor earning in and out of their village.

4) Trend of Income and Expenditure through a Year

Figures 3.8.9 – 3.8.11 show the trend of income and expenditure by such social stratum as 1) farm casual labor household, 2) paddy farmer household, and 3) upland farmer household respectively. Figure 3.8.9 shows that typical farm casual labor household can earn more in 2 times a year as farm preparation period and harvesting time. The former takes place in June – August, corresponding to the beginning of rainy season, and the latter is in November and December. Their expenditure pattern shows 2 peaks such as in April and November. There is New Year cerebration in Myanmar in April, spending some items including cloth for the cerebration. Expenditure in November is corresponding to some ceremony, including donation, associated with harvest.

According to Figure 3.8.10, the typical paddy farmer household spends much in June and July for the preparation of rainy season paddy. As we can see, expenditure on labor and farm input becomes very high in June and July while in December expenditure only on labor becomes high since winter crop, mostly chick pea, does not require chemical fertilizer. Their income starts appearing in December corresponding to the harvest of rainy season paddy, then continues till next year probably April to March depending on how long he can keep the paddy and also how much he can produce winter crop following the rainy paddy. Their debt usually starts in the season of rainy paddy preparation, and continues until harvest.

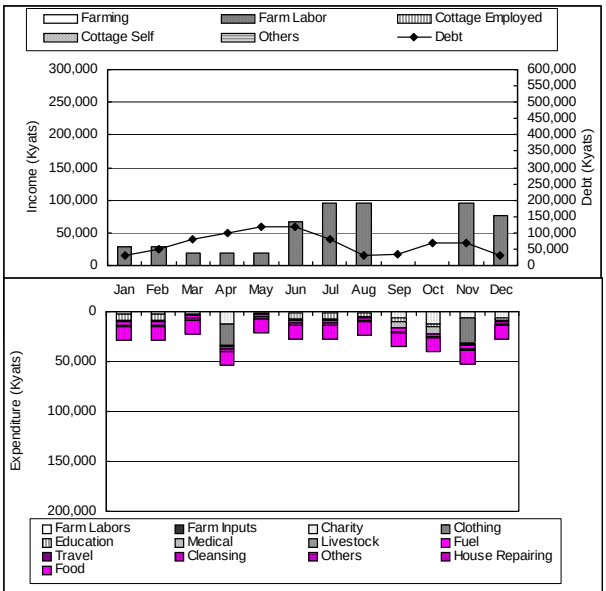


Figure 3.8.9 Trend of Income & Expenditure for Farm Casual Labor HH

Figure 3.8.11 shows even income than paddy farmer because most of upland farmers cultivate 2 – 3 crops by mixed cropping, e.g. groundnut/ sesame with pigeon pea, and also by relay cropping. Thanks to that system, their income

becomes slightly even throughout year than paddy farmer household. The expenditure pattern is very much affected by preparation of rainy season crop and winter crop, similar to paddy farmer household. Their debt may start as early as in April, corresponding to New Year cerebration, and keep a constant level probably until July/ August. In August, harvest of early upland crop, like sesame, can be started thereby reducing the debt amount.

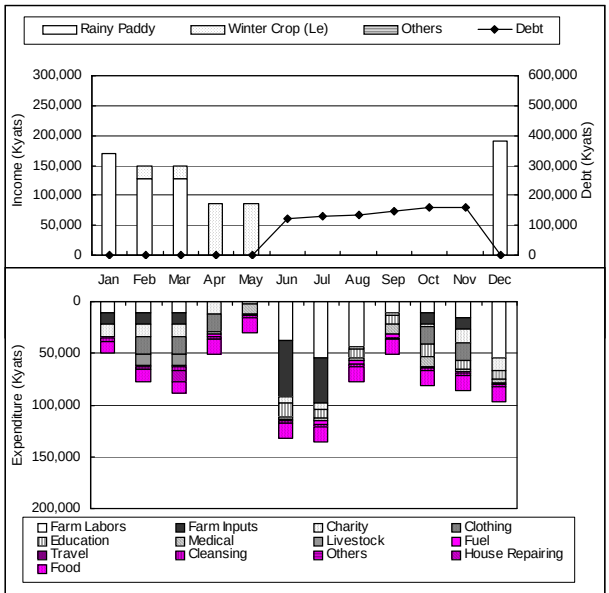


Figure 3.8.10 Trend of Income & Expenditure for Paddy Farm HH

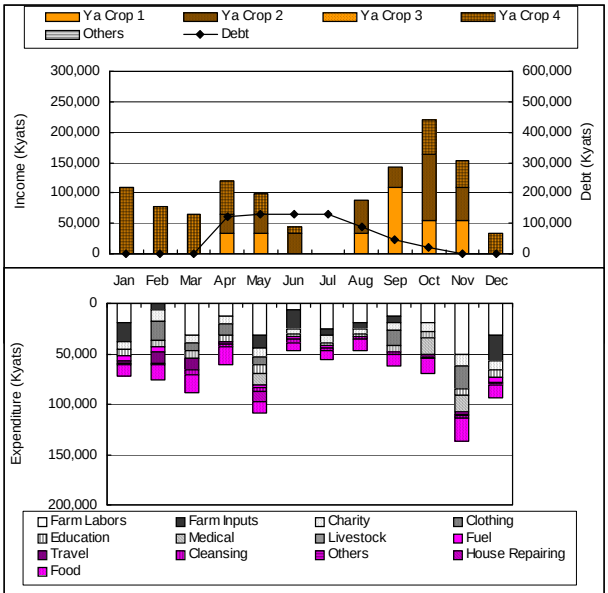


Figure 3.8.11 Trend of Income & Expenditure for Upland Farm HH

5) Crop Production by Village

Figure 3.8.12 shows sesame production by village and by harvests indexes such as 'almost nothing', 'worse', 'average', and 'better' according to the farmers' perception. Looking at the harvest that the respondents replied as average, one may recognizes that the harvests for such three villages as Mingan, Magyi, and Khaungkawe are much lower as 3.2 to 3.7 baskets per acre than the ones in other 3 villages. Harvest in Ar La Ka Pa Village is 6.5, 5.7 in Ma Gyi Sauk, and 6.6 baskets per acre in Legaing Village. It may be noteworthy that there is nearly about two times production difference between the former villages and latter villages though all these villages are located in CDZ.

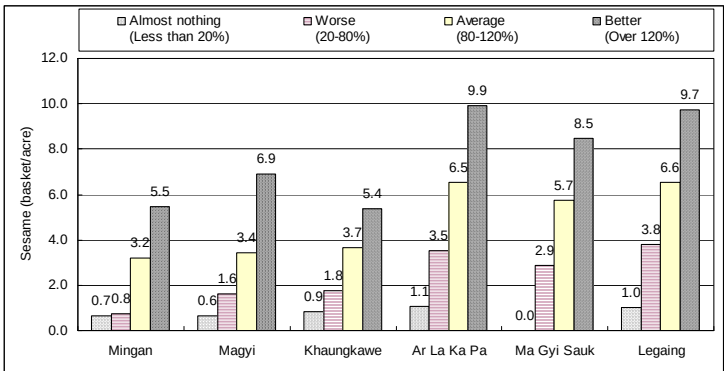


Figure 3.8.12 Sesame Production by Harvest Indexes

Likewise, Figure 3.8.13 shows paddy harvest by village and by harvests indexes such as again 'almost nothing', 'worse', 'average', and 'better' (in Khaungkawe and Mingan Villages, no paddy data available because of its tiny cultivation area). Paddy harvest in Legaing Village, which is located in

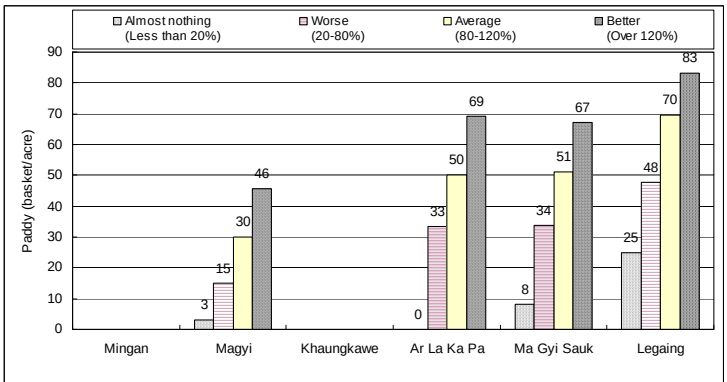


Figure 3.8.13 Paddy Production by Harvest Indexes

favorable agricultural condition, is the highest thanks to the irrigation, reaching to 70 baskets per acre as average and over 80 baskets per acre in case of 'better'. Paddy harvests in Magyi village is the lowest because all the paddy cultivation is practiced under rainfed, while that of Ar La Ka Pa is in Kaing/Kyun area of Ayeyarwady River and paddy field in Ma Gyi Sauk is partly irrigated by a pumping station operated by Irrigation Department.

6) Debt in Villagers

Unable to make ends meet leads to borrowing money. Borrowing money is very common phenomena in almost all villages in CDZ. Commonly applied interest per month is 5% with collateral, and without collateral it is around 10% and in few cases it goes to as high as 20%. In general, the interest for government loan is the lowest, which 2.6 % per month (see Table 3.8.4).

Table 3.8.4 Interest per Month

Lender	Interest (%)
With Collateral	5.3
Without Collateral	10.0
From Government	2.6

Source: JICA Questionnaire

Borrowing money is practiced for many villagers regardless of him being farmer or being non-farm household. Figure 3.8.14 summarizes the situation of debt, in that we can see the average debt amount for the 6 villages at about 230,000 Kyats. The highest debt amount can be seen in farm households (about 270,000 Kyats) while the lowest debt amount in casual farm labor households (120,000 Kyats). This does not necessarily mean that the casual farm labors are in little debt but rather it implies that they cannot access to enough loans.

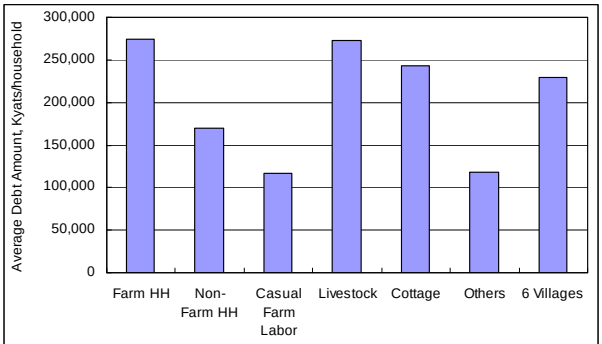


Figure 3.8.14 Average Debt Amount by Occupation

Figure 3.8.15 shows the percentage of debtors for farm household by village while Figure 3.8.16 depicts that of non-farm household. Average ratio for farm household debtors is 64% while that of non-farm household debtors is 58%, not much different between the 2 groups. The figures also show debtors by occasionally or regularly. One thing notified is there are less regular debtors in farm household than in non-farm household. This means that non-farm household cannot help borrowing money in most of the times.

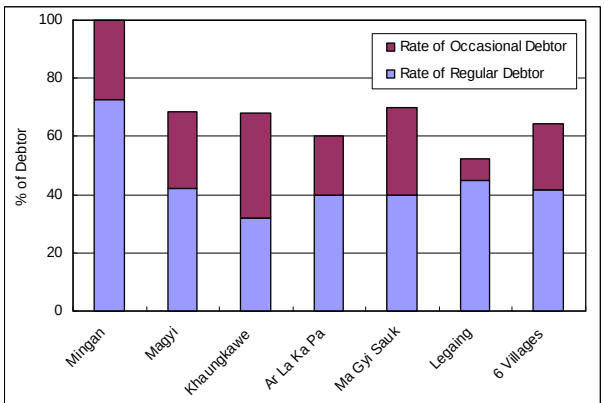


Figure 3.8.15 Ratio of Debtors for Farm HH

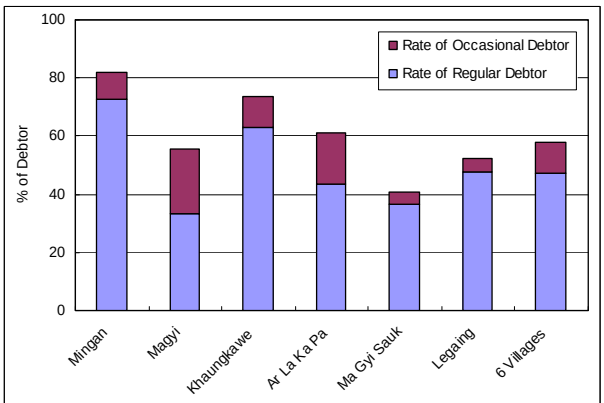


Figure 3.8.16 Ratio of Debtors for Non-Farm HH

Figure 3.8.17 and Figure 3.8.18 show the loan sources for farm household and for non-farm household respectively; namely, from whom they borrow money. They borrow money from colleague villagers being the most, followed by relatives, by outside lenders away from their village. Difference in 2 groups can be seen in the share of government as lender. Government as loan provider shares 13%

for farm household while it shares only 3% for the non-farm household. One may see how difficult for the non-farm household to access government loan.

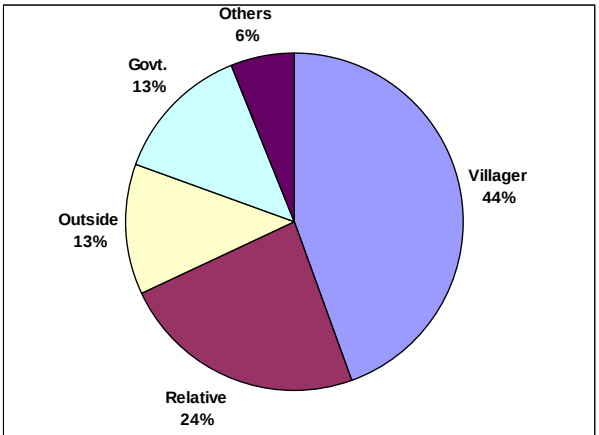


Figure 3.8.17 Loan Source (Lenders) for Farm HH

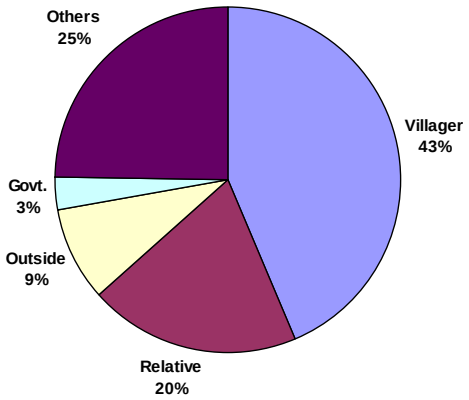


Figure 3.8.18 Loan Source (Lenders) for Non-Farm HH

Figures 3.8.19 and 3.8.20 explain for what purposes they had to borrow money. Figure 3.8.19 shows the purposes for farm household and Figure 3.8.20 for non-farm household. For farm household, what comes first is for agriculture input, followed by food. For non-farm household, agriculture purpose, of course, does not exist and food comes first for the reason why they had to borrow money. Borrowing money for education and medical purposes occupies considerable shares; 14% and 10% for farm household, and 14% and 14% for non-farm household.

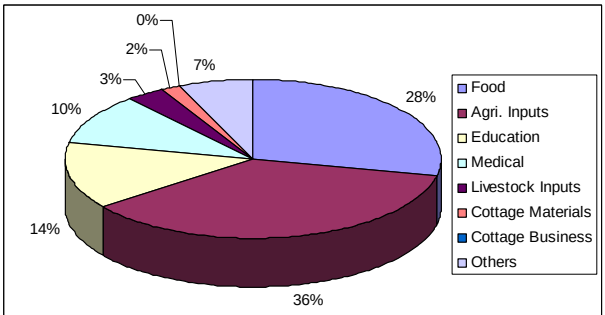


Figure 3.8.19 Reasons for the Debt for Farm HH

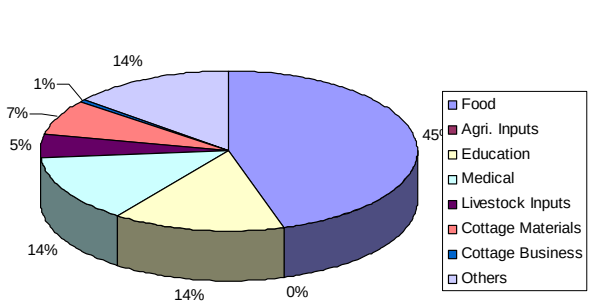


Figure 3.8.20 Reasons for the Debt for Non-Farm HH

7) Meat and Fish Consumption

Non-farm households are usually placed in poorer stratum than farm household as aforementioned. Of the non-farm households, those engaged in casual farm labor constitutes of the poorest of the poor. As an example of how they are poor, Table 3.8.5 shows the occasion that they consume meat. The table firstly shows by the categories of farm household and non-farm household, and out of the latter casual farm labor alone is listed at the bottom row. As seen from the table, casual farm labors responded that on average they consume meat about 3 - 4 times per month which is rarer as compared to farm households, about 7 times.

Table 3.8.5 Occasion of Consuming Meat

Category	No. of Samples	times/month		
		Now	10 yrs ago	20 yrs ago
Farm Household	199	6.4	6.4	6.3
Non-Farm Household	162	5.0	5.7	6.3
Casual Farm Labor	55	3.7	4.4	4.1

Source: JICA Baseline Survey 2007

Table 3.8.6 Occasion of Consuming Fish

Category	No. of Samples	times/month		
		Now	10 yrs ago	20 yrs ago
Farm Household	217	8.8	9.0	9.0
Non-Farm Household	179	7.3	7.2	7.5
Casual Farm Labor	63	7.9	7.8	7.7

Source: JICA Baseline Survey 2007

Table 3.8.6 shows the occasion of consuming fish in a same way as meat consumption. Though the

difference amongst the strata is not much big like meat consumption, it can be said that fish consumption in farm household is more frequent than that of non-farm households and casual farm labors. Here, comparison between non-farm labor and casual farm labor shows that the latter, the casual farm labors, consumes fish a little more frequently than the former. This, however, does not necessarily mean that they buy fish more frequently because many of them just go to streams and catch fish themselves as found out from interviews by the Team.

8) Property Possession by Social Stratum

Figure 3.8.21 shows major properties owned by different category of the respondents as to what major income source they have such as farming, casual farm laboring, livestock raising, cottage, etc. As easily understood, casual farm labors do have very little property as compared to other households categorized by the major income source. They rarely have radio and TV, and bicycle to some extent say 36% as compared to over 60% for other categories' household, and no casual farm labor household has motorcycle. It may be noteworthy that farm households own those properties more than the others in most cases while casual farm labors have those the least.

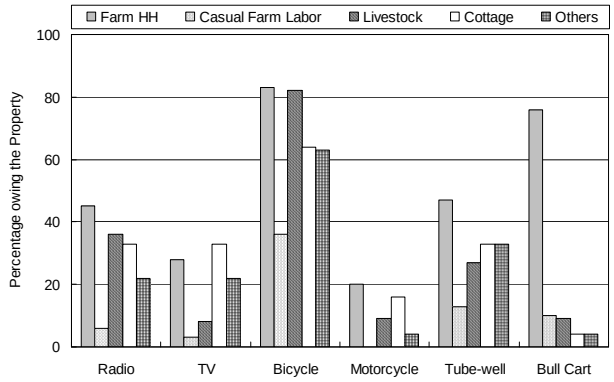


Figure 3.8.21 Properties by Household Category

9) Best Moment in Life

Figure 3.8.22 and Figure 3.8.23 summarize the responses to what was your best moment in your life for farm households and non-farm households respectively. What comes first for farm households is the novitiation for their son, followed by their own marriage, donation, 'not yet experienced', passing of university admission, etc. For non-farm households, on the other hand, 'not yet experienced' and their own marriage shared the top position, then followed by novitiation, the time when they had children, passing of university admission, donation, at bachelor age, etc. A difference between the farm household and non-farm household may be seen in 'novitiation' and 'not yet experienced'. Though novitiation came first for farm households, it was positioned at 3rd place. 'Not yet experienced' for farm household was placed in 4th position while that of non-farm households in the top position.

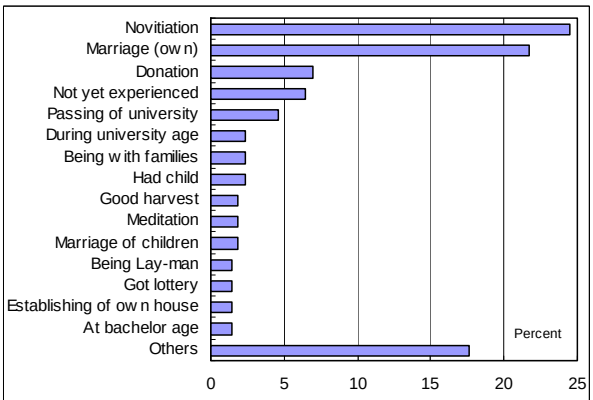


Figure 3.8.22 Best Moment in Life for Farm HHs

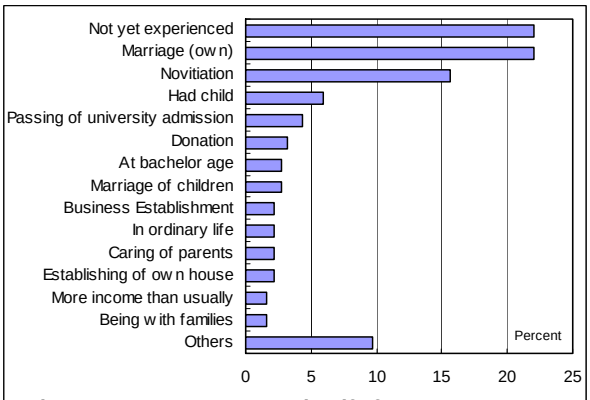


Figure 3.8.23 Best Moment in Life for Non-Farm HHs

3.9 Existence of the Landless in the Study Area

Farmland in Myanmar is owned by the Union based on the "Land Nationalization Act" enacted in 1953. By the Act, farmers only hold landholding right for cultivation but proprietorship of farmland is not allowed. Although no agricultural land shall be mortgaged, sold or otherwise transferred or divided (by paragraph 4 of the Land Nationalization Act, 1953), land holder right is granted till to next generations especially for those who work in the farmlands as their main living and the lands are utilized in accordance with their parents. When the parents are getting old and unable to work well, then the descendants have the right to manage and continue working for the farm business. Moreover re-concentration of farmlands in the hands of a few rich households is controlled.

After independence from British colony, newly formed Myanmar government enacted the Land Nationalization Act (1948 and 1953) as a regard of looking after poor landless citizens through land reforms. Nevertheless, the farmland reallocation was not finished to cover all over the Country owing to conditions and situation of the Country at that time of post-independence. Therefore landless may have more occurred in the regions than ever before where farmland reallocation was not accomplished. There are still landless people in rural area as of now, and some best reasons that explain the existence of landless and increasing number of rural landless might be interest of people in farming work, increasing population in limited land resources, people's livelihood in off-farm work and better job opportunities other than farming in the rural areas.

3.9.1 History of Land Reform in the Union and Existence of the Landless

Although the Land Nationalization Acts had great advantages for most of poor rural landless during the post-independence era of Myanmar, the land reallocation through the reformation of land policy could not cover all the whole Country. Nowadays, the Government of the Union of Myanmar is encouraging to upgrade agriculture sector as well as livelihood of rural people, by implementing market-oriented economy. On the other hand, the Government is creating job opportunities for those rural landless to absorb in other industry sectors. In this connection, according to the result of interview surveys in 6 villages of the Pilot Project conducted in 2006/07, no one reported to have become complete landless in nowadays situation. That is to say that those people who are degenerated from ordinary farmers to the newly appeared landless would be quite rare. Thus, it can be said that the major reason why the landless actually exists in rural area would be imputed to the aforementioned reasons.

Though the landless farmers have not their own, they can make money by working as one-season hired or casual labour to peasant farmers, which shall support part of income for their livelihood. The landless also have works such as cutting wood, bamboo as sources of income. They can get money by charcoal making and selling bamboo-based materials (e.g. baskets), mats, and other home utilities. So they have several sources of income even during off-season. These materials are commonly in need of all households in the villages as well as in towns. To produce these, sources for raw materials and skillful labour can be available in villages only.

The enactment of "Land Nationalization Act in 1948" by the Union was coincided with its independence in January 1948. The Act aimed at expelling absentee landlord, and distribution of landholding right to tenants. As for land ownership, however, it was not given to farmers and the Union held it in order to liberalize farmlands formerly owned by the absentee landlords and to prevent their revival in the future. Under the Act, the tillage right was made valid for only one generation, thus probably intending to prepare for future land holding by farmer group as was the case in China. Therefore, the tillage right given may be deemed as "the loosely-bound landholding right".

The enactment of this land reform in 1948 was interrupted in the following year. The reason of the

interruption had been attributed to not only furious resistance by such land lent collectors as landowners, money lenders and merchants but also opposition by peasant farmers to the abolishment of private land ownership. The target of this land reform covered only parts of Myanmar such as lower Myanmar excluding ethnic minority regions and upper Myanmar including the CDZ.

Of them, in lower Myanmar Indian money-lending cast owned as much as half of the farmlands without any interest on agriculture, whereas in upper Myanmar where Bamar race predominated in ethnic composition, farmer owned 7,125,710 acre (2,850,284 ha) equivalent to 87% of the total farmland of 8,203,498 acre (3,280,000 ha). Particularly in upper Myanmar, opposition to the abolishment of private land ownership by the same ethnic Bamar race may have been one of the reasons that made the then independence regime withdraw Land Nationalization Act in 1948.

Later in 1953, "Land Nationalization Act" was promulgated with a nominal objective of supervising agriculture but actually in such a form as acknowledging continuance of absentee landlords. In this Act, private transfer of farmland was strictly limited, but division, exchange and inherited holding were admitted for both farm households exempted from farmland expropriation and those allocated with farmland. In other words, the Act allowed farmers not only to have right of farmland use but also to have disposal right in broad range. Moreover, it was stipulated that both exempted and allocated farm households were allowed to have landholding right. Namely, the Act was based on land ownership or "tightly-bound landholding right".

Nevertheless, Land Nationalization Act in 1953 was not thoroughly put into effect from the standpoint of farmland transfer from landlords to tenants and to peasant laborers. Farm acreage under non-farming farmers (i.e., major absentee landlords) accounted for 33.4% of the total farmland area as of 1947, while that in 1958, after 5 years when the application of Land Nationalization Act in 1953 was substantially interrupted still remained about 27% (Pati yeiya dhadinsin, No.3 Mar. 1965). This means that only 6% of the total farmland was offered as the target of expropriation - reallocation - during the time the Act had been effective. The most plausible reason why the Act was interrupted only after 5 years since the enactment is said to be insecurity under civil administration at that time. The area securely governed by the then central government at this period had been only Yangon and its outskirts, whilst administratively difficult land reform could not be enforced unless mighty power governed over the target areas.

After all, land reform made only little progress by Land Nationalization Act in 1948 with the opposition by farmers. Either with Land Nationalization Act in 1953, even under a policy of partially admitting "land ownership", land reform again did little in the targeted form of disintegration of absentee landlords and allocation of farmland to tenants. This is due to then instable administration by civil power though peasants and tenants supported the reform. Another major reason may be due to failure of establishing official organization covering village level with enough competency to perform land reform. Under such instable circumstances, no measures were as a matter of course taken for farm laborers who constituted the landless in villages.

Later, a revolutionary council took the administrative power in March 1962, and the resulted revolution power took a policy with regard to land reform orienting again towards "the loosely-bound landholding right" once prevailed in 1948. The power intended to guard tenant's leasehold right through Tenancy Act in 1963 as well as Act of Protection of Farmers' Rights and also to prevent the degradation of owner-farmers to tenants or to the landless owing to mortgaged farmland. Through these efforts of bringing all the farmland under nationally owned property, the Government tried to allocate farmland to those who needed land including the landless. However, it considered this plan of nationalizing and allocating existing farmland inapplicable any more in March 1964 by the reason of insufficient farmland area against needy agricultural population. At that time of land reform

implemented, it was impossible to estimate around how much farmland area was required to allocate piece of land to peasant laborers because no data was available for estimating then-landless population engaged in farm labor.

However, since the revolution power aspired joint ownership of farmland by group, there could be an assumption that it envisaged strongly enforcing national control of farmland to form group farming where it intended to accommodate the landless[1]. Surely, there was a movement that farm laborers were organized into farming groups in alluvium lands and group farming was intensified so that all the farm laborers could be absorbed in these groups. However, in real life grouping was too sluggish entailing in current issue of the landless (farm laborers) living within villages.

3.9.2 Farm Household, Off-farm Household and Agricultural Laborers

Around three quarters of the national population live in rural areas in the Union. However, all of them are not farmers. This situation is the same in the CDZ. They are divided into farm households to which landholding right is vested by the Union and off-farm ones without landholding right. In other words, the only difference between them is that whether a household has farmland with landholding right or not. The landless is categorized into the latter. Off-farm households are further classified into “households engaged in farm labor” and “those engaged in off-farm labor.

Households engaged in farm labor are referred to as those which have income through working as a laborer hired by farm households, while households engaged in off-farm labor are composed of carpenters, official staff, venders, teaching staff, those engaged in cottage industry, livestock rearing villager, etc. Part of non-farmers is considered consisting of households engaged in farm labor, however, no formal statistics are available as to their number. These households engaged in farm labor relying their major income on wages from farm labor constitute the poorest strata in villages. As there exists no explicit definition on farm labor households, here it is defined as “households earning 50% or more of their income from agricultural labor”, the same as defined by Fujita[2] et al.

1） Off-farm Households / The Landless at Country Level

No statistical data has so far been published with regard to the landless. Notwithstanding, farm households with landholding right have been registered at PDC offices under each TS in so far as all the land has been nationalized but only the right of tillage have been vested to farmers. Therefore, the number of so-called “the landless” can be estimated from the difference between the number of total households and that of the registered farm households (with landholding right). UNDP/FAO have provided the number of farm households by land size and the landless households in 17 divisions/ states as a summarized table: Distribution of Different Types of Households in Myanmar (2003) in Agricultural Sector Review and Investment Strategy, 2004 (refer to Table 3.9.1).

According to Table 3.9.1, the total households in the Union stood at about 8.06 million, of which farm households was counted at 4.82 million and the rate of farm households was 59.9% as of year 2003. It follows that landless households, equivalent to farm households subtracted from the total ones, comes to 3.23 million accounting for 40.1% of the total households. This table also lists up rural population, rural households and the landless where an assumption was made that the rate of the landless in rural areas is equal to that between the total landless and the total households. Hence, the rate of the landless in only the rural areas cannot precisely be estimated. However, taking that three quarters of the total population live in rural into account, it can be assumed that the rate of the landless in the rural area is not significantly different from the overall rate of the landless: that is about 40%.

[1] Leadership and organizations of rural development in Southeast Asia, IDE, JETRO, Noriyoshi KANO, Jan. 1991 (Japanese version)
[2] Change in Myanmar’s Transitional Economy, IDE, JETRO, Koichi FUJITA, Oct. 2005 (Japanese version)

Table 3.9.1 Number of farm households by land size and the landless households by division/ state in Myanmar, of the landless and the rate of the landless to the total

Division/ State	No. of HHs	Number of Households by Land Size							Landless HHs	% of Landless HHs	% of Rural Population	No. of Rural HHs	No. of Rural Landless HHs
		<5ac	5-10 ac	10-20 ac	20-50 ac	50-100 ac	>100 ac	Total					
	①							②	③=①-②	④=③/①*100		⑤	⑥
Mandalay	1,197,334	320,665	177,138	69,022	18,851	113	7	585,796	611,538	**51.1**	73.5	880,040	449,480
%	100	26.8	14.8	5.8	1.6	0.0	0.0	48.9					18.40
Sagaing	787,081	276,320	167,902	80,076	24,294	596	0	549,188	237,893	**30.2**	86.1	677,677	204,826
%	100	35.1	21.3	10.2	3.1	0.1	0.0	69.8					8.39
Magway	586,156	380,241	121,906	49,935	10,353	139	4	562,578	23,578	**4.0**	84.8	497,060	19,994
%	100	64.9	20.8	8.5	1.8	0.0	0.0	96.0					0.82
Kayah	36,183	20,832	9,548	830	89	1	0	31,300	4,883	**13.5**	73.8	26,703	3,604
%	100	57.6	26.4	2.3	0.2	0.0	0.0	86.5					0.15
Kayin	191,990	121,004	31,538	10,884	2,270	38	13	165,747	26,243	**13.7**	73.8	141,689	19,367
%	100	63.0	16.4	5.7	1.2	0.0	0.0	86.3					0.79
Chin	78,855	56,753	5,571	263	11	0	0	62,598	16,257	**20.6**	85.4	67,342	13,883
%	100	72.0	7.1	0.3	0.0	0.0	0.0	79.4					0.57
Tanintharyi	187,309	104,154	26,674	6,419	1,707	233	90	139,277	48,032	**25.6**	76.4	143,104	36,696
%	100	55.6	14.2	3.4	0.9	0.1	0.0	74.4					1.50
Mon	335,584	137,468	48,585	24,289	5,334	106	41	215,823	119,761	**35.7**	71.8	240,949	85,988
%	100	41.0	14.5	7.2	1.6	0.0	0.0	64.3					3.52
Rakhine	463,590	222,336	49,948	12,013	3,598	139	4	288,038	175,552	**37.9**	85.1	394,515	149,395
%	100	48.0	10.8	2.6	0.8	0.0	0.0	62.1					6.12
Ayeyarwaddy	1,108,770	415,070	209,356	101,184	21,106	626	183	747,525	361,245	**32.6**	85.1	943,563	307,419
%	100	37.4	18.9	9.1	1.9	0.1	0.0	67.4					12.59
Bago(east)	512,928	136,818	96,635	43,303	6,121	227	132	283,236	229,692	**44.8**	80.5	412,907	184,902
%	100	26.7	18.8	8.4	1.2	0.0	0.0	55.2					7.57
Bago(west)	579,677	161,648	85,765	21,957	1,317	11	10	270,708	308,969	**53.3**	80.5	466,640	248,720
%	100	27.9	14.8	3.8	0.2	0.0	0.0	46.7					10.18
Yangon	1,092,886	70,015	45,606	44,248	10,009	354	192	170,424	922,462	**84.4**	31.8	347,538	293,343
%	100	6.4	4.2	4.0	0.9	0.0	0.0	15.6					12.01
Shan(south)	338,667	167,869	44,418	12,877	3,379	31	8	228,582	110,085	**32.5**	78.7	266,531	86,637
%	100	49.6	13.1	3.8	1.0	0.0	0.0	67.5					3.55
Shan(north)	297,685	198,272	51,392	10,786	2,425	50	69	262,994	34,691	**11.7**	78.7	234,278	27,302
%	100	66.6	17.3	3.6	0.8	0.0	0.0	88.3					1.12
Shan(east)	121,525	117,257	3,820	380	39	8	11	121,515	10	**0.0**	78.7	95,640	8
%	100	96.5	3.1	0.3	0.0	0.0	0.0	100.0					0.00
Kachin	143,526	107,198	24,588	6,457	763	26	54	139,086	4,440	**3.1**	77.9	111,807	3,459
%	100	74.7	17.1	4.5	0.5	0.0	0.0	96.9					0.14
Total	**8,059,746**	**3,013,920**	**1,200,390**	**494,923**	**111,666**	**2,698**	**818**	**4,824,415**	**3,235,331**	**40.1**	**75.5**	**6,085,108**	**2,442,675**
%	**100**	**37.4**	**14.9**	**6.1**	**1.4**	**0.03**	**0.01**	**59.9**					**100.00**

Source. Myanmar Agricultural Sector Review and Investment Strategy, UNDP/FAO 2004. Original data from DAP

Viewing 3 divisions, namely Mandalay, Sagaing, Magway where the Study Area is located, the rate of the landless in Mandalay Division where the Mandalay City is included shows the highest of 51.1%, followed by that in Sagaing Division standing at 30.2%. The rate of the landless in Magway is listed as only 4%, but this figure is evidently a result of underestimation, seemingly statistical error or misprinting of order. As stated earlier, as number of the farm households exists as a statistical data, it may be reasonable that such an error in statistics or in order was made at the number of farm households in Magway Division.

2) Off-farm Households / The Landless in 51 TS Within the Study Area

The Study Team has collected various kinds of socio-economic information in 2006 as basic data to provide poverty profiles of 51 TSs in the Study Area. With these data the rates of off-farm households / farm households by TS were calculated and summarized in Figure 3.9.1. Viewing the figure the rates of off-farm households are found in a range of about 20 - 60% though considerable difference is observed among TSs. The lowest rate of off-farm households is found in Ayadaw TS (5%) in Sagaing Division, whereas the highest is recorded in Pakokku TS (80%) in Magway Division.

The large difference in the rate of farm/ off-farm households by TS is said to have bearing on whether land reform has been executed in the past or not (according to verbal communication with elder cadres and those who have related with MAS). This fact suggests that though the land reform was not perfectly reinforced as a whole, a general

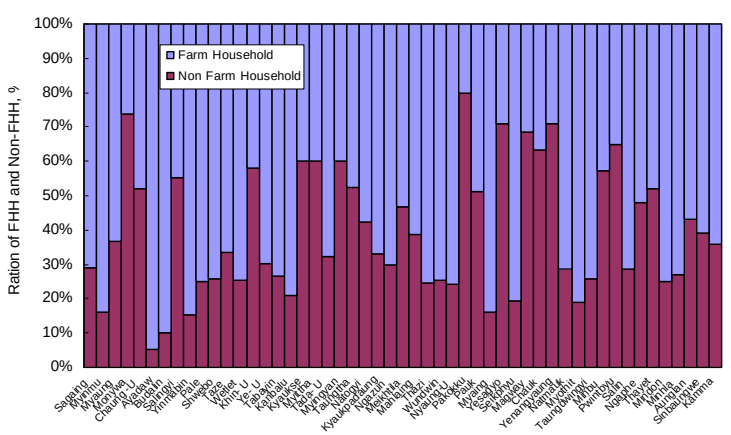


Figure 3.9.1 Rate of Off-farm HHs / Farm HHs by TS (in 2005)

tendency of lower rate in terms of off-farm households was quite probable in TSs where land reform had been carried out.

Table 3.9.2 summarizes number of farm households, off-farm ones and the breakdown of off-farm ones in 51 TSs. Viewing this table, Magway Division has the highest rate of off-farm households, 49%, followed by Mandalay Division with 43%, and Sagaing Division has the lowest rate at 33%. Then, the rate of off-farm households in terms of the whole Study Area (or landless ratio) stands at 42%. The data presented in the table are collected from PDC offices in the districts where off-farm households are in more detail broken into the landless and others including official employees etc and the former are further sub-divided into non-farm and casual labor.

Here, it is interpreted that non-farm includes the households that raise off-farm income, namely with major livelihood means in small-scale industries, plasterers, carpenters etc, while casual labor does those who are engaged in construction labor works in common and also in farm labor. However, this division is not necessarily definite because no statistics exist as to livelihood and income sources at TS level. Further, since the landless are apt to be in general engaged in several kinds of labor works in order to sustain their life, it is difficult to definitely categorize them by their major income sources without any household survey on the income.

Table 3.9.2 No. of FHHs, Off-farm HHs and the Rate of FHHs / Off-Farm HHs in 3 Divisions in 2005

Division Study Area only	Farm Households	Non Farm Household	Landless		Others	Total
			Non-Farm	Casual Labor		
Sagaing	375,710	188,872	67,623	65,168	56,081	564,582
%	67	33	12	12	10	100
Mandalay	344,751	262,093	110,737	49,928	101,428	606,844
%	57	43	18	8	17	100
Magway	342,511	326,970	110,062	127,410	89,498	669,481
%	51	49	16	19	13	100
Total	1,062,972	777,935	288,422	242,506	247,007	1,840,907
%	**58**	**42**	**16**	**13**	**13**	**100**

Source: PDC Offices of the Districts

In anyway, the rate of off-farm households (number of the landless), 42%, can be approximated to the national average of 40%. In addition, it can be said that those who consist of the poorest of the poor are the farm labors owing to its explicit seasonally and they may consist of 30 % at maximum as a sum of non-farm landless (16%) and casual labor (13%) as shown in the above table.

3) Off-farm Households / The Landless in the Sampled Villages

The Study Team has conducted a PRA survey in 17 villages in 2006, where number of farm/ off-farm households were inquired. Further, the same inquiry was made in the target 6 villages of the Pilot Project implemented in 2007/08. Table 3.9.3 shows the colleted results on the total number of households, that of farm households and that of off-farm ones in these 17 villages and 6 villages.

Table 3.9.3 Total No. of Households, That of Farm Households and of Off-farm One in Sampled Villages in 2006 & 2007

Survey	Division	TS	Village	Total HHs	Farm Households		Non-Farm Households	
					No.	%	No.	%
PRA survey in 2006	Sagaing	Myinmu	Garu	196	141	71.9	55	28.1
		Chaung U	Kyauk Sit Kan	144	100	69.4	44	30.6
		Ayadaw	Ywar Shay	82	15	18.3	67	**81.7**
		Pale	Letpakan	303	229	75.6	74	**24.4**
		Khin U	Myay Ni Sho	132	83	62.9	49	37.1
		Subtotal		857	568	66.3	289	33.7
	Magway	Yesagyo	Myay Phyu	101	23	22.8	78	77.2
		Chauk	Chaung Pike	112	82	73.2	30	26.8
		Magway	Si Pin Tha	115	21	18.3	94	81.7
		Myothit	Magyicho	142	87	61.3	55	38.7
		Pwintbyu	Ywar Thit	89	43	48.3	46	51.7
		Thayet	San Aite	227	157	69.2	70	30.8
		Subtotal		786	413	52.5	373	47.5
	Mandalay	Taungtha	Chaung Nar	250	71	28.4	179	71.6

		Ngazun	Zalokema	210	45	21.4	165	78.6
		Meikhtila	Let Pan Kaung	158	83	52.5	75	47.5
		Thazi	Pyun Kan	240	202	84.2	38	15.8
		Wundwin	Leik Tet	98	40	40.8	58	59.2
		Nyaung U	Ku Ywar	92	23	25.0	69	75.0
		Subtotal		1,048	464	44.3	584	55.7
	Above Total			**2,691**	**1,445**	**53.7**	**1,246**	**46.3**
Pilot Village in 2007/08	Sagaing	Myinmu	Ar La Ka Pa	1,152	640	55.6	512	44.4
		Ayadaw	Ma Gyi Sauk	260	100	38.5	160	**61.5**
	Mandalay	Tada U	Khaungkawe	242	144	59.5	98	40.5
		Ngazun	Magyi	245	200	81.6	45	**18.4**
	Magway	Chauk	Mingan	110	56	50.9	54	49.1
		Pwintbyu	Legaing	776	326	42.0	450	58.0
	Above Total			**2,785**	**1,466**	**52.6**	**1,319**	**47.4**
Grand Total				**5,476**	**2,911**	**106**	**2,565**	**46.8**

Source: interviewed result of PRA Survey conducted in 2006, interview by the Study Team in the target villages of the Pilot Project in 2007

With an overview of 17 villages for the PRA survey in 2006, the highest rate of no-farm household was found in Ywar Shay Village in Sagaing Division standing at 82%, while the lowest one was identified in Letpakan in the same division at 24%. Then, as to 6 target villages of the Pilot Project in 2007/08, the highest rate of off-farm households is recorded at 62% in Ma Gyi Sauk Village and the lowest at 18% in Magyi Village.

The average rate of off-farm households among 17 villages targeted by PRA survey is 46%, while that among 6 villages targeted by the Pilot Project in 2007/08 is 47%. A wide variation in the rate is seen from village to village and the reason is considered similar to what is mentioned on Figure 3.9.1 as to wide difference in the rates of farm/ off-farm households. This rate of off-farm households, 47%, is approximately comparable to the national average at 40% and the calculated mean of 42% on related TS basis though the level referred to is somewhat higher than these.

3.9.3 Livelihood Means of the Landless

From what is mentioned above, it is identified that around 40% of off-farm strata exists in the Union although partial inconformity among various sources of statistical data is observed. Also, it was recognized that the rate of off-farm households stands at 42% at the level of TSs within the Study Area, and it is estimated at 47% from the result of village level survey though number of samples are limited. These results will lead to a conclusion that villagers who do not hold any land - termed as off-farm households/ the landless - are estimated at around 40 - 50% (at the rate of 1 household out of 2) in the rural part of the Study Area. Off-farm households/ the landless generally have plural sources of income in additions to farm labor, and the following states their representative means of livelihood/ cash income sources.

1) Engagement in Farm Labor

The commonest income source of landless households constitutes of farm labor. Even if farm laborers are indispensable in terms of farming, the hiring opportunities are not guaranteed throughout the year because off-season accompanies with highly seasonal farming practices. The periods with high rate of hired labor in terms of paddy cultivation fall on seedling preparation and transplanting, and on the harvesting works in case of upland farming. During these periods many laborers share the given hiring opportunities.

Work division is observed in such a way that male tends to work for seedling preparations and female does for transplanting but both male and female are engaged in harvesting and threshing. According to interview results held at 6 target villages of the Pilot Project in 2007/08, the working duration under farm labor ranges from the longest 7 months (in the area with irrigated paddy land) and the shortest around 1.5 months only or so.

Some laborers seek for hiring opportunities in other villages than their native ones in the case of the villages with short labor duration. Moreover, a few cases are observed where competition will arise because the number of landless households exceeds that of farm ones, leading to narrower chances of hired labor earning among the landless. Such cases are not only identified in Ma Gyi Sauk Village in Monywa TS in Sagaing Division but also in Chaung Paik Village in Chauk TS that the Study Team visited in the occasion of examining the target candidate villages for the Pilot Project.

2) Small-scale Industrial Labor

There are some cases where hiring opportunities in small-scale industries play a pivotal role in securing income for the landless rather than farm labor accompanying with off-season. A typical example is found in Khaungkawe Village in Tada U TS in Mandalay Division, one of the target villages under the Pilot Project implemented in 2007, where employment by local small-sized industries offers a precious income sources for the landless. A lot of landless people who are not at all engaged in farm labor are found in this village, though the mainstream of the village's economy is still agriculture.

Somewhat different character from above example it may have, major chances the landless are as well hired lie in off-farm small-scale industries in the case where mainstream of village economy has been founded on small size industrial activities. In such cases, agricultural economy is positioned at subsidiary role, as observed in Mingan Village in Chauk TS in Magway Division where about 80 % of the villagers are engaged in sandstone ware processing industry[3]. Khaungkawe Village, bestowed with favorable marketing conditions supported by sustainable demand, may bring about more sustainable employment to the landless than Mingan Village can do. However, in both cases small industries offer precious opportunities to the landless.

3) Livestock Raising

Some of laborer's households hold livestock to supplement their labor wage income. The PRA survey conducted in 2006 in 17 villages revealed that 69 out of 170 were landless households, out of these 12 households (17%) held livestock. They consisted of 6 households raising goats, one with sheep, 4 with cattle and one with pigs. Annual livestock income of these 12 households with goats as major livestock species accounted for 22% of the total annual household income.

Other than self-owned livestock, some households have made year-round livestock rearing contracts with other livestock owners undertaking feeding of the owner's herds. In this case, the contracts are concluded on that 50% of the delivered offspring can be transferred to the contracted undertakers. Some of such undertakers have become livestock owners by multiplying received offspring.

In addition, hiring opportunities for the landless include undertaking of grazing herds of indigenous cattle and goats on the daily wage basis (e.g. 500 Kyats/day as of September 2007) and sceneries with grazing boys/ girls and youths are common everywhere. Grazing areas are found in woodlands, grasslands, harvested farmland and roadsides etc. Means for laborers' households to acquire livestock include savings of part of wages, transfer of offspring as mentioned above, saving of income from side-business etc. It can be said that livelihood status of laborers' households is better off than those without livestock. In this way, income disparity perceives even among the landless.

4) Off-village Piecework

The CDZ is thought to be a source of supplying labor for construction works in the metropolitan Nay

[3] There are only 3 places in Myanmar where *Tanaka* grinder made of sandstone can be produced. One of the villages is the Mingan Village referred here, wherein almost 80% or more people are engaged in sandstone processing in form of either producer or trader.

Pyi Taw where construction is under way. Though it is hard to identify number of laborers by their addresses, a village in Magway Division is reported that villagers of hundred order are constantly leaving their villages for a duration of 1 - 3 months for the capital Nay Pyi Taw and some other urban areas to do casual work. HIES (Household Income and Expenditure Survey) in 1997 revealed that Magway Division was placed at the lowest income level among related 3 divisions, and this fact implies that the income level is in conformity with the rate of villagers engaged in off-village piecework.

5) Income Sources of the Landless

Sixty nine out of the sampled 170 households (41%) during PRA survey done in 2006 were found as off-farm households. About half of them may be considered as those engaged in farm labor, and the result on their household budget along with that of farm households is summarized in Table 3.9.4. The table shows that annual budget of off-farm households keeps a positive balance, but as far as the rate of indebted households, they have higher rate, 58% as against that of farm households, 44%.

Table3.9.4 Comparison of HH Expenses between Farm and Off-farm HHs

Items	Farm Households		Non-Farm Households	
	Amount	%	Amount	%
No. of sampled HHs	101	-	69	-
Average annual income	1,483,044	100	623,167	100
of which, agricultural income	1,209,904	81.6	0	0.0
livestock income	153,656	10.4	53,352	8.6
non-farm income	119,484	8.1	569,815	91.4
Average annual expenses	986,233	(100)	552,761	(100)
of which, average food cost	570,745	58	373,052	67
HHs with deficit (%)		44		58

Source. PRA Survey by JICA Study Team 2006

Some of off-farm households raise livestock, mostly goats, but the rate of keeping livestock is as low as 17% of 69 sampled ones. This is likely attributable to lack of fund to purchase stock animal, or to their inability of saving such fund, judging from the fact that rearing goat does not generally require any particular skills except for the epizootic prevention/control although some possibility remains in their ignorance of raising skills. Similarly, food expenditure on their household budgets shows higher ratio, 67% as compared to that of farm households, 58%, where most of this expenditure seems to be appropriated for purchase of rice.

Mean per-diem wage of male stands at 1,000 Kyats as of 2007, by which he can buy 1.25 pyi (2.55kg) of rice per day assuming that the market price of standard grade polished rice is 800 Kyat/pyi. It follows that 970kg of polished rice is annually required to feed a family with an average number of family member, 5.39 persons, assuming that 180kg thereof is annually consumed per member. Likewise, the family has to earn wages equivalent to the amount of 1,940kg (924 pyi) of rice supposing annual expense for buying rice accounts for a maximum of 50% of the total household expenditure. This is equivalent to 739,200 Kyat (924x800), whereas the mean annual income per laborer's household is 623,167 Kyats/year/HH, or only 84% of the required income level.

Under such circumstances, farm laborers' households are forced to have other income sources, and get along with such an impoverished life as borrowing from others, asking for advanced wage payment or dispensing subsidiary foods or other livelihood components. The interview to the villagers who rely mainly on farm labor has revealed that they buy edible oils in addition to rice however, some of them seldom buy vegetables, consume meats only a few times in a year, or some of them in an extremely poor state don't eat meat except for the occasion of religious events.

3.9.4 Involvement in Farm Labor of the Landless

As mentioned above, "the households engaged in farm labor" that are mainly dependent on agricultural labor wages form the worse-off class in village communities. The households engaged in farm labor often have plural cash-income sources in addition to the engagement in farm labor because

of seasonality in farm employment. As to the scale of existing households engaged in farm labor, an estimation was tried in the household income survey carried out in the selected 8 villages included in the Pilot Project by the Government of Myanmar that was implemented in 41 TSs throughout the Country in 2001, as referred to in "Changes in Myanmar's Transitional Economy" (refer to Table 3.9.5).

In this household income survey, 2 villages belonging to a TS in Magway Division and one village in a TS in Mandalay Division were included. According to the said survey, off-farm households without landholding right accounted for 43% as a mean of surveyed 8 villages. Out of this, farm labor households that rely more than 50% of their household income on income from farm labor wages accounted for 59% on average, equivalent to 25% of the total number of households in these villages.

Summarizing what is mentioned above, the rate of off-farm households in the Study Area ranges about 40 - 50%, out of which 60% or equivalent to 20 - 30% of the total village households are estimated to earn more than half of their income from farm labor wages. That is to say, one out of about 2 households is off-farm household without landholding right, and one out of 3 - 5 households can be estimated as ones earning more than half of the household income from farm labor among the landless. Likewise, the fact that the ratio between farm and off-farm households greatly varies by village or by TS can be deemed as a typical character observed both in the Study Area and throughout the Country.

Table 3.9.5 Rate of No. of Farm HHs, Off-farm HHs and Farm Laborers in Sample villages by Fujita et al (2001)

Division	Townships	Total Households ①	of which, FHHs ②	of which Non-FHHs ③	Ratio of Non- Farm Households ③/①	No. of Sample Non-FHHs ④	of which, Tenants	of which, Farm Labors ⑤	of which, Non-Farm Labors	Ratio of Farm Labors ⑥=⑤/④	Ratio of Farm Labor HHs ④x⑥
Tanintharyi	Myeik	515	232	283	55.0	33	1	17	15	51.5	28.3
Bago	Waw	456	213	243	53.3	40	0	30	10	75.0	40.0
Magway	Magway	219	118	101	46.1	37	6	18	13	48.6	22.4
	Taundwingyi	662	326	336	50.8	16	0	12	4	75.0	38.1
	Subtotal	881	444	437	49.6	53	6	30	17	56.6	28.1
Mandalay	Kyaukse	510	334	176	34.5	16	2	12	2	75.0	25.9
Southern Shan	Nyaungshwe	842	544	298	35.4	12	0	9	3	75.0	26.5
	Kalaw	497	622	75	15.1	6	0	2	4	33.3	5.0
Ayeyarwaddy	Myaungmya	1,167	647	520	44.6	20	5	7	8	35.0	15.6
Total		5,749	3,480	2,469	42.9	233	20	137	76	58.8	25.3

Source : Market Oriented Economy and farm Labor in Myanmar, Japanese Version, Fujita Koichi

3.9.5 Relationship Between Landless Farm Laborers and Farmers

Farm labor households earn their income through being employed by farm households, while farm households hire them to weed and to harvest in upland farming and to carry and transplant seedlings, to weed, to harvest and to thresh in paddy cropping, thus interrelationship between them is observed. This is because only self-supplied family labor cannot meet timely cultivation and timely harvesting. Seemingly that family labor can cover these requirements in small-scale farm households, possibility can hardly be denied that an income insuring principle exerts to provide chances of employment for the landless. Table 3.9.6 and Table 3.9.7 give cases of employing laborers surveyed by Takahashi[4].

Table 3.9.6 Pre-monsoon Paddy in Tin Daung Gyi Village (Kyaukse TS, Mandalay Division) unit: Kyat/ac

Labor Type	Below 6ac	6 to 12 ac	12 to 18 ac	18 to 24 ac	Above 24 ac
Family labor	384	320	151	221	0
Hired labor	2,918	3,034	3,126	3,176	3,447

Source: "Rural Economy in Contemporary Myanmar" Akio Takahashi, 2000

Table 3.9.7 Upland Crops in Kan Tha Lay Village(Magway TS, Magway Division) unit: Kyat/ac

Labor Type	Groundnut	Sesame	Green gram	Sorghum
Family labor	79	127	125	276
Hired labor	763	905	808	504

Source "Rural Economy in Contemporary Myanmar" Akio Takahashi, 2000

[4] Rural Economy in Contemporary Myanmar, Akio TAKAHASHI, 2000, Tokyo University Publication (Japanese version)

Table 3.9.6 shows paddy cropping, where farm laborers are always hired regardless of farming scale in terms of work per acre. Viewing this, it is understood that except farmers with over 24 acre/household, there found little difference among hired labor wages regardless of acreage per farm household, though hiring wage payment is somewhat lower in those with less than 6 acre/household. Likewise, Table 3.9.7 indicates relationship between family labor (already reflected in the conversion into labor wage) and hired labor wages in upland farming where labor hiring is also identified.

While hiring of farm labor is indispensable in the CDZ where agriculture has not yet been much mechanized, mutual interdependency is observed in a way that farm households offer opportunity of wage labor for the landless, as seen in the above example of paddy cropping where even petty-sized farmers are greatly dependant on hired labor. Therefore, the relationship between the farm and non-farm household may be illustrated as in Figure 3.9.2.

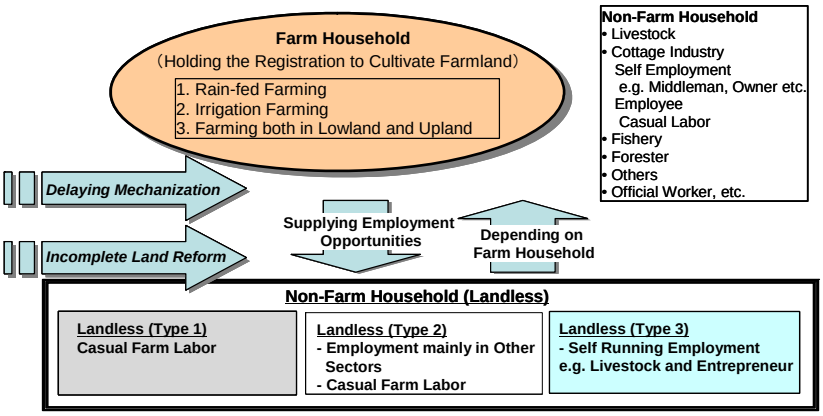


Figure 3.9.2 Household Type and Employment Structure in CDZ

3.9.6 Extent of the Landless in the Central Dry Zone

Summarizing aforementioned discussions, it is concluded that non-farm households consist of 42 %[5] of the total rural households in the Central Dry Zone, say about one household out of every two in rural areas of CDZ does not have farm land (in precisely, land tillage right). One of the characteristics of the landless in the CDZ is the wide variation in their existence from township to township and also by village. An example is that the lowest rate of non-farm households is only 5 % found in Ayadaw TS in Sagaing Division, whereas the highest rate is 80 % recorded in Pakokku TS (80%) in Magway Division.

The landless people are engaged in several occupations such as employment in small cottage industry, rearing of livestock, casual construction work, farm casual labor, etc. The poorest of the poor among the landless people can be found in farm casual labor. Due to the nature of the seasonality in farming activities, farm casual labor are not dependent totally on farm laboring but are trying to engage in any kind of income activities. In simplicity, assuming that farm casual labor are the ones whose more than half income comes from farm laboring, they are estimated at about 20 to 30 % according to a sample field survey by Fujita. It is, therefore, that one household out of every 3 to 5 households in rural area of CDZ are farm casual labors.

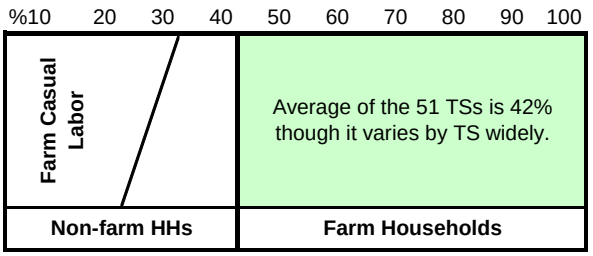


Figure 3.9.3 Ratio of Non-farm HH and Farm HH

[5] According to information from District PDC Office in Mandalay, Sagaing, and Magway Divisions.

CHAPTER 4 DEVELOPMENT PLAN FORMULATION: PLANNING

This chapter deals with the formulation of development plan for the Study Area. Prior to the plan formulation, development potentials and development constraints intervening in the Study Area are identified, and then planning is elaborated referring to this identification. In planning, future development vision of the Study Area is presented, and development approach and strategies to be applied to realize the vision, as well as projects and programmes as concrete development activities are proposed. Since the Study Area has vast area extending over 75,169km^2, it is categorized into some types, and priority projects to be implemented in each of development types are proposed and linkage between types and the proposed programmes is also presented.

4.1 Development Potential in the Study Area

A host of development potential can be identified in the Study Area. These include “development strengthening” possessed by communities, and available resources or “development opportunities”. Here, as available potentials in promoting development of the CDZ, 1) farming system and animal husbandry in conformity with environmental characteristics in the CDZ, 2) high status of women and high social indicators and 3) cottage industries with high technical level are taken up for examination.

4.1.1 Farming System and Livestock Fit in the Environmental Characteristics of the CDZ

The CDZ within the Study Area is located in the east of Rakhine Hills Range, the situation of which is the shadow area of southwestern monsoon. Lower atmospheric humidity prevails in this shadow area, and by this reason rainfall is less. Such a geographic condition leads to a dry zone exceedingly peculiar in subtropical monsoon area. Under such environmental situation, a strength is identified in the Study Area, that is well adapted farming/ cropping system to the environmental characteristics prevailed in the CDZ.

That farming/ cropping system has been established during the long, historical efforts of acclimatization. In addition to crop cultivation, goats tolerable to dry land have been raised, and these coupled with adaptable farming/ cropping system to ambient characters have contributed to the stabilization of inhabitants life. Of course some room for further technical improvement is found, already established foundation in terms of environmentally adaptable farming and livestock nurtured in the stream of historical development process can serve as strong resort in developing the Study Area.

Farmland is called Le, Ya, Kaing and Kyun in Burmese language. Le means paddy land, Ya is upland, Kaing means farmland reclaimed over flood plain appearing as flood recedes in Ayeyarwady River at the beginning of dry season and Kyun is alluvial sand banks in the stream bed. Le extends not only alongside of Ayeyarwady River and its tributaries, but is also found in lowland with rain-fed cultivation.

Kaing and Kyun lands are developed along the basin of Ayeyarwady River where annual water-level fluctuation reach 6 - 7m, and also inside the riverbed of the River. Its shape varies from year to year depending on the discharge of Ayeyarwady River. By this reason, farmers are not so willingly invest on Kaing and Kyun lands as they do on permanent farmland, however, the land productivity on this is awfully high because fertile silt deposits thereon every year transported in water from upstream.

Various cropping systems are observed in the CDZ. Paddy is cropped on Le while Ya produces partly paddy, partly oil-crops like sesame, and pulses. Onions as well as chili etc. are cropped in Kaing and Kyun. Land use in the CDZ is briefed in the following way; Le has the highest farming potential where paddy is cultivated and even double cropping of paddy is practiced within the perimeter of irrigation facility.

In the case of double cropping of paddy, farmers crop pre-monsoon paddy during April - July followed by rainy season paddy during July - October. Wherever irrigation water is not sufficient or paddy cultivation is difficult due to sandy soil, they crop alternative crops in place of paddy, such as green gram that can be grown within a short duration. As relay crop after rainy season paddy, pulses, usually chickpea that is cultivable even during cool winter, are cultivated. Therefore, considerably intensive farming has been established in Le bestowed with favorable cropping conditions.

In lowland, staple rice is planted whenever rainfall is enough to allow it, but if it's not enough maybe sorghum, chickpea etc are grown. Over Ya, farmers usually crop oil-crops like sesame, sunflower, groundnut etc, sorghum and pulses if soils are relatively water retentive. In the CDZ, exportable pulses has been much produced since early 1990s, increasing these cropping in a form without expanding cultivated acreage, in such a way that drought resistant pigeon pea has been intercropped with sesame and groundnut. Green gram is cropped in the similar way, in pre-monsoon period as catch crop prior to rainy season paddy, or intercropped with sesame over Ya. Thus farmers have intensified their cropping for increasing acreage under these crops without expanding farmland area.

Oil-crops, sorghum and pulses are cultivated in the tracts with relatively favorable soil conditions within Ya, while cotton is grown over futile sandy or gravelly soils. Production of cotton has been declined as international market prices fall. Growing on fertile and water retentive soils makes cotton plant undesirable vegetative growth, in which only vegetative shoots are vigorously thriving with poor bud formation and boll maturing is delayed.

That is to say, cotton can be cropped on the land where sesame, green gram, etc. can hardly be grown. Since cotton cultivation tends to be extended into devastated land, it seldom competes with other existing crop cultivation and this is considered a merit of cotton production. At present, cotton is barely utilized in cottage weaving industries run by family members, but it is useful to disperse risks of poor harvest, because even though other crops are poorly harvested due to poor rainfall, cotton can inversely bring a bumper crop.

The CDZ does not provide favorable environment to guarantee farm production owing to short rainfall and irregular rainfall patterns. Yet, as mentioned above, farmers have flexibly managed farming by combining crops and land use harmoniously. The reason why civilization has been blossoming as long as 20 centuries time since Pyu tribe founded its chiefdom in Upper Myanmar may lie in this farmer's wisdom even if the land is not at all suitable for crop production except for paddy areas along Ayeyarwady River and its tributaries.

Particularly, in the extension of pulses mainly exported to India, MAS has succeeded in raising their cropping intensity without expanding farmland area by introducing green gram with short growing period or by promoting pigeon pea intercropped with sesame. Though there found still some room for improving crop yields, the fact that farming systems well adapted to environmental characteristics have already been established serves as a reliable strength in formulating development plan for the CDZ.

4.1.2 Status of Women and the State of Social Indicators

It is already mentioned elsewhere that women of Bamar race dominant in the CDZ have a high social status. High social status of women results in generally lower rate of occurrence of under-weighed infants or mal-nutrition infants, since mothers tend to have more room for regarding their children's health (see box as an example in India). Also, it will lead to longer life expectancy because such care allows to lower infant mortality and mortality of child younger than five years old regardless of infant's sex. So it can be deduced that where women's status is high favorable environment has been developed in which subjective participation of women can readily be realized particularly in

promotion of social development oriented activities, e.g. in the fields of education and health. This will help develop the Study Area.

Figure 4.1.1 shows the ratio of mal-nutritive infants (rate of weight against height) collected at TS level in 3 Divisions in the Study Area as compared to the national average in Myanmar. Here, the equivalent figure for national average is taken from the data of 2003 in Statistical Yearbook 2004, while those in 3 Divisions in the Study Area were as of 2004/05. Although the years referred to differ, the ratio of mal-nutrition infants in the Study Area is judged slightly lower than the mean ratio of national level.

Kerala Province where Woman's Status is High:

A. Sen and Martha C. Nussbaum often refer to high educational or health indicators of women whenever they argue potential capacity building approach. India is a country where demographic rate of women has never exceeded 1 ever since statistics were initiated in early 20th century, also where discrimination of girls and ladies is said to be serious.

However, amongst such discrimination, Kerala State has higher female ratio and achieved favorable social indicators for women. Here in Kerala State, since medieval age a tradition of matriarchal inheritance has rooted because male laborers seasonally leave their villages. Until 17th century, polygamy with many husbands had at times been practiced. Thus, women's status in this State was traditionally high and this has fairly fostered the achievement of high social indicators

Development as Freedom, A Sen, 2003,

Women and Human Development, M.C. Nussbaum, 2000

Figure 4.1.2 compares rates of infant mortality and that of under-5 year old child collected at TS level within 3 Divisions in the Study Area with that of the average in Myanmar (the rate is presented as per 1000 live births). The data by UNICEF in 2004 as well as those in 2003 by the Statistical Yearbook 2004 are taken for the average in Myanmar and 2004/05 data are used for mortalities in the Study Area. Though the years of data collection differ, it is found from this comparison that the rates of infant and child mortality in the Study Area are by far lower than the national averages. For example, while the rate of child mortality under-5 is averaged at 106 per thousand live births for a national average (value reported by UNICEF) or 72 per 1000 live births (value reported in Myanmar Yearbook 2004), those in 3 Divisions in the Study Area range 31 – 44 only, with the mean 38 per 1000 live births.

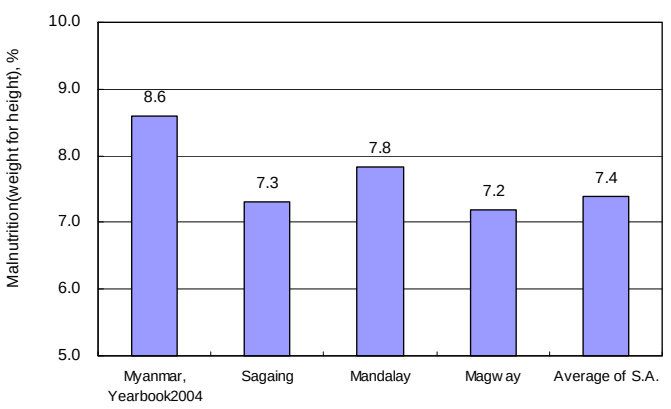


Figure 4.1.1 Rate of Infant Under Nutrition under 5 Years Old

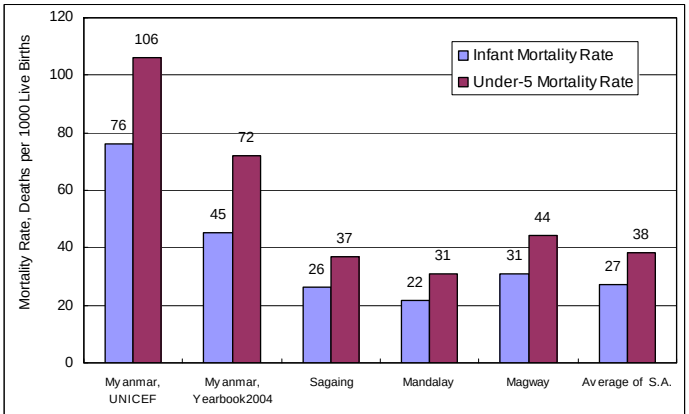


Figure 4.1.2 Rate of Infant & Under 5 Mortality Rates

The rate of infant's under nutrition mentioned above gives slightly lower value for the Study Area as compared with the national average, but the mortalities of infant and under-5 year child show by far lower level for the Study Area than that of the national average. Conceivable reasons for this difference may lie in well-managed care for infant health including immunization reflecting higher status of women, as well in a favorable environmental condition of dry area for health management.

The rate of access to immunization in the Study Area is even higher among the areas of Myanmar where political importance has been attached to health care for mother and children. Viewing, for instance, the rate of immunization in 2007 by the Rural Health Centres covering 6 target villages of the Pilot Project in 2007, they show high value of over 80 - 100%. Besides the preventive

vaccinations, endemic and epidemic diseases and those contagious sicknesses are less prevalent in dry areas where hygienic conditions are naturally better prevailing than high humid areas. These background conditions are interpreted as major factors that lower infant & child mortality rates in the Study Area.

Table 4.1.1 Rate of Immunization in Rural Health Centers covering the Target Villages of the Pilot Project in 2007

Village	Division	Population Covered	Immunization by Type					
			BCG	DPT	OPT	HP.B	Measles	Tetanus
Khaungkawe	Mandalay	6,347	80	99	100	100	54	98
Magyi		19,254	100	100	100	100	100	100
Ma Gyi Sauk	Sagaing	28,112	94	91	91	91	93	91
Ar La Ka Pa		37,757	104	108	104	104	100	103
Mingan	Magway	27,662	99	97	97	97	97	99
Legaing		24,349	85	87	87	89	91	79

Source： collected data by the Study Team directly from the health centers covering the target villages of the Pilot Project（value in 2006）

As generally observed throughout Myanmar, educational indices of particular Bamar race are high in addition to health parameters. Gender difference of these rates is also not much. Under such circumstances, participation of women in development programme related to health / hygiene and education may relatively readily be secured although male tends to be major target of development intervention oriented to livelihood improvement (at least as far as entry point of outsider's contact is concerned). It can anyway be said that favorable social environment exists where the fruit from social development is readily brought about. In other words, high women's status can serve as influential development potential in promoting development in the Study Area, among others social development.

4.1.3 High-Tech Cottage Industry, Inexpensive High-Quality Labor Force

Hand weaving and other traditional industries have been developed in the Study Area. Lately, imports of cheap raw materials from China enabled people in the Study Area to promote various manufacturing industries such as tinsmith, sewing, embroidering. Some small-scale cottage industries have also been run in the six target villages of the Pilot Project being implemented in 2007. The scale of these cottage industries is variable, some relying only on family labor and other weaving enterprise hiring at maximum 20 handloom operators.

Those who are engaged in these industries are very often part-time working with agriculture or livestock. Villagers employed in these small-scale industries are often observed to have refined workmanship and high working spirit. As an instance of technical level, some handloom operators are making device to automatically pass shuttle that leads filling through warp making use of rebounding force of loom while others are endeavoring delicate devices (see photo).

Many industrious people engaged in cottage industries toil, in some cases from 7 o'clock in the morning till after sunset, or even after sunset until around 9 o'clock in the evening with candle light in the target villages of the Pilot Project. Such labor force is of quality and what's more it is characterized with cheap wage not merely in the CDZ but also in the entire Country. Though this cheap but quality laborforce currently has limited opportunity to make use due to economic blockage imposed by Euro-American countries, such villager's potential labor force in the CDZ will provide a great driving force in future for promoting small-scale, export-oriented industries and processing

industries in the rural agro-economy.

Agriculture earns 45% of national GDP in Myanmar, while manufacturing sector contributes only 9.8% (as of 2003/04). On the other hand, viewing GRDP of the Study Area, agricultural sector counts 50% and manufacturing does 19%, or about the double to GDP[1]. The larger contribution of manufacturing sector in the Study Area seems partly attributable to active, traditional small-scale industries developed therein.

Moreover, it is well known that in an embryonic period of industrialization in the process of economic development manufacturing industries tend to emerge first, among others debut of sewing industry that needs relatively small initial investment. Evidently, it does not mean traditional handloom weaving generally observed in the CDZ, but it is CMP (Cutting, Making, and Packing). That is to say the most popular form of CMP is entrusted processing in a factory where such imported free-of-charge raw materials like texture and accessories like buttons are cut, sewn and packaged for re-export, but at any rate skilled and cheap labor always attracts the investors (see the box).

Trends of Trade in Garment in Myanmar:

The share of garment in export composition of Myanmar stood at only 2.5% in 1990. However, the share indicated a rapid rise every year reaching 28% in 1999 and 30% at its peak in 2001. This is owing to many foreign investors mainly from ASEAN countries because of cheap and quality labor force.

Thereafter, garment (sewing) industry has shrunken its export share to 8% in 2005 on account of various conditions including initiation of regular export of natural gas to Thailand in 2002 and influence by the U.S. economic sanction since July 2003.

Nevertheless, it still remains in an important industry from employment capacity of rural labor point of view, and still preserves potential of restoration once a drastic change takes place in political situation.

In this connection, an interview survey targeted on sewing workers in 2005 (by T. Kudo) revealed that 21% of the respondents were eligible for schooling in the universities and another 27% were in the level of high school students. Even though employment opportunities were limited, it is an outstanding feature that highly educated women are found in those who are hired in sewing industry.

Comparing Myanmar's labor market with that of other ASEAN countries, the largest comparative advantage of the former is found in its inexpensive and high quality labor force. Viewing labor wages by major Asian cities as of 2003, monthly wage level of skilled labor in Yangon was $20 – $48[2] and this is lower than that in Dacca in Bangladesh standing at $29 - $60. At that time it was $78 - $143 in Hanoi in Viet-Nam and even as high as $109 - $218 in Shanghai in China.

From the above comparison, thus, low wage level was outstanding in Myanmar. In this context, it is worth referring to the controlled price level of rice in Myanmar. Under the circumstance of state controlling the entire rice exports, domestic rice market has in principle been isolated from international one. Price levels of Myanmar's rice have been equivalent to around 30 - 60% of those of globally marketed rice, thereby cheap levels of employees' wages have successfully been sustained.

Cheap wage levels and high quality labor force serve as competitive advantage in labor markets for Myanmar, above all for the inhabitants in the CDZ where health indices and education standards are higher than those in other areas. Quality of labor force is not directly tangible all right, but as far as literacy rate is concerned, Myanmar's level is considerably higher as compared with that in such ASEAN countries as Cambodia, Laos, Bangladesh and India.

Also, in connection with comparative advantage, one of the typical features in Myanmar, among others in the CDZ where Bamar race predominates, lies in the negligible disparity in literacy rate between male and female. In shifting to highly industrialized status, availability of high quality and inexpensive labor force and by-far higher female literacy rate than that of neighboring countries that is chiefly welcomed by sewing industry etc can positively contribute to higher industrial competitiveness.

[1] Data from Planning Department, Ministry of Planning and Economic Development
[2] JETRO, 2003

4.2 Development Constraints in the Study Area

Major development constraints in the Study Area are discussed here, including the state of stationing agricultural extension staff and livestock extension staff belonging to TS who contact with villagers at the frontline, fruit-figure-the principle of fulfilling norm for norm sake, and the level of agricultural techniques mastered by agricultural extension staff and recognition of livestock by livestock extension staff in this context.

4.2.1 Stationing of Agricultural / Livestock Extension Staff

Taking a look of manning state in regional offices of Ministry of Agriculture and Irrigation, as well as Ministry of Livestock and Fisheries, offices have been located at the level of division, district, township (TS) of which the frontline is TS office. Cottage Industries Department under Ministry of Cooperatives is also a directly related office to this Study, however the office within the Study Area is only located in Mandalay City that covers the entire Upper Myanmar. It means that the Cottage Industries Department doesn't currently have extension activity directly targeting and developing cottage industries distributed in rural area.

51 TSs are situated in the Study Area, the mean area of which is 1,474km^2 per TS calculating from the entire area of the Study Area, 75,169km^2, that is equivalent to a square area of approximately 38km x 38km. Administratively, under the TS with an area of 38km x 38km, village tracts are placed, and under a village tract villages are placed, but at these levels no government staff has been in charge except those health centres belonging to Ministry of Health. That is to say, such government staff as agricultural/ livestock extension staff is working in the offices located in township, or the center of TS. It means that they have to reach their villages by bike individual staff have or by public autobus called "line bus" (small - medium sized bus).

As to number of these staff, Table 4.2.1 shows number of agricultural extension staff and livestock extension staff working at TS offices in the Study Area (only technical staff are shown here). The table indicates the number of agricultural extension staff (MAS staff) per office ranges 8 - 22 though varying with TS on average 12 staff working in an office. Estimating average village coverage per extension staff, it comes to 8 - 25 villages by Division, on average 12 villages, and on household basis in the villages it ranges 1,300 - 3,500 households per staff, or on average 1,850 households. About 3 villages consist of a village tract in the Study Area, and about 50% of the total village households hold landholders right, namely farm household. It follows that an extension staff should cover 4 village tracts or about 900 farm households considering from VT level or target farm household level.

Number of livestock extension staff in the Study Area is about 1/4 of that of agricultural staff, or 213 staff as against 832 staff of agriculture. Consequently, very few staff, 4 - 5 workers under a TS. A livestock extension staff must cover 49 villages (equivalent to around 16 village tracts) accommodating about 7,200 households. Number of livestock holding households is not available, but it can be estimated at maximum the same number of farm households taking account of the fact that current livestock extension activities target at draft cattle. Since the number of farm households in the Study Area is almost equivalent to about 50% of the total households, the number of households to be catered by a livestock extension staff is at maximum 3,600.

Table 4.2.1 State of MAS and LBVD staff Stationing at TS Offices

Division in the Study Area	No. of Township	No. of Village	Rural Household	MAS Staff at TS Level				LBVD Staff at TS Level			
				Total in Division	Average per TS	Village per Staff	HH per Staff	Total in Division	Average per TS	Village per Staff	HH per Staff
Sagaing	17	2,986	485,268	373	17	8	1,302	84	5	36	5,777
Mandalay	13	3,003	443,515	285	22	11	1,556	52	4	58	8,529
Magway	21	4,369	609,844	174	8	25	3,505	77	4	57	7,920
Total/ Average	51	10,358	1,538,627	832	16	12	1,850	213	4	49	7,224

Source : Interview to Division Office concerned, as of July 2007

It is considered from what's mentioned above that both agricultural and livestock extension staff stationed in the frontline have too many villages and households to take care of. Further, they have to use motorbikes or public transport means to visit their jurisdiction because they station at their offices in the centre of townships.

Budgetary Provision of MAS in Myanmar:

Budget of MAS in Myanmar is directly allocated from Headquarters to division, district and township. Budget items include 1) Administration, 2) Extension, 3) Procurement and 4) Account in which salaries/ allowances are included. Salaries for office directors (ex. Divisional manager, District manager, TS manager) are exclusively included in the item of administration, those for ordinary extension staff are included in the item of extension, and those for clerks are in the items of accounting. By this reason actual cost for extension activities must be estimated by subtracting amounts of salaries from actual quarterly disbursement for item of extension, thus making it difficult to know the budget only available for extension activities.

Recurrent budget available to TS offices are directly delivered from the headquarters to each office based on the approved budgetary frame, though about 80% of the budget consists of salaries. Concerning actually available budget for extension activities, it is difficult to estimate exactly (see box in the right). However, as an example, a result of the interview with extension staff in TS offices supervising the target villages of the Pilot Project implemented in 2007 has revealed that the disposable budget to a staff is mostly 2,000 - 3,000Kyats/ month (equivalent to $2 -3 only) and as an office it is about 1.0 – 1.5 million Kyats per year only. While fuel cost as of September 2007 stands at 1,100Kyats/liter (around $1), this budget level hardly allows them to engage in extension.

It may be concluded from this estimation that agricultural extension activities are fairly difficult except targeting at paddy cropping that has topmost priority in Myanmar. Moreover, the activities may be confined to paddy demonstration plots or around them that have been established not so far from extension offices. In upland areas, extension staff visits the areas located near their offices where such priority crops as oilseeds and pulses are much produced, but they cannot actually visit remote villages for extension purpose. The situation is more or less the same for livestock extension and where the daily extension services have hardly been provided and they are confined to emergency measures at the occasion of endemic outbreak, and preventive vaccination to livestock in response to the request of villagers. In fact, interviews revealed that extension budget actually disposable is only about 100,000 – 150,000 Kyats per annum per TS office, much lower than that of TS MAS office.

In brief, agricultural/ livestock extension workers who should support agriculture and livestock as the mainstay of inhabitant's livelihood in the CDZ cannot extend their services except around their offices due to too vast service area to cover, also due to limited number of staff. Besides, budget allocation to meet necessary extension activities is confined, limiting them to visit remote villages – where poverty rate possibly is higher. Current status of manning of extension staff and logistics provided for them are badly insufficient as government public service for improving livelihood of those who are living in rural areas.

4.2.2 Fruit–Figure–Principle of Fulfilling Norm for Norm Sake of Agriculture Staff

Several researchers have repeatedly pointed out that the agricultural extension in Myanmar has been based on by the principle of fulfilling norm for norm sake. It is in particular observed for rice. The political implication of supplying cheap rice throughout production increment, thus envisaging welfare of rural rice purchasers including landless multitude who are living in rural areas may be in a sense justified. On the other hand, farmers are not at all "means" of producing crops but "managing entities" who make decisions including the crop selection to produce and marketing options taking account of market situations.

During the era of socialism based on a planned economy which continued until 1988, it may be said that farmers had been treated as means of production from state viewpoint under cropping system constrained by compulsory harvest delivery (refer to box in the right). Such way of thinking may be still remaining in the attitude of MAS staff even today despite economic liberalization that abolished

compulsory cropping system except for paddy in irrigated perimeter, sugarcane and cotton, the latter two of which are much less cropped in the Study Area. Under such situations, principal duty is given to agricultural extension to achieve the target production of crops hierarchically allotted from Division, District and TS decided at state level. It is equal to say that the principal norm given to agricultural extension still remains in cropping and production drive following the cropping plan though the controlling authority through planned cropping and compulsory delivery system has been loosened as compared to that prevailing before 1988.

Planned Cropping and Compulsory Delivery up to 1988:

In Myanmar, nationalization of farmland, planned cropping and compulsory delivery of major crops continued until 1988 (controlled crops of compulsory sale to government included rice, sugarcane, cotton etc, but excluded oil-crops and pulses). Under nationalized farm land ownership, cropping was allocated from government such as rice to lowland, oil crops and pulses to upland, and in the case of rice compulsory sale to the state at around 1/4 of market prices was imposed to rice producers.

It had been instructed to expropriate farmland from the farmers who did not follow cropping allocated or did not accept compulsory delivery to other villagers. In other words, land nationalization, planned cropping and compulsory crop delivery comprised of trinity system as a foundation of planned economy for fulfilling targeted crop outputs.

Nowadays, land nationalization still continues as it is, but as to planned cropping and compulsory delivery, they are discontinued except planned cropping of rice in irrigated land, sugarcane and cotton, compulsory sale of sugarcane and cotton. However, agricultural extension still instructs farmers to follow what government plans for every year cropping even now. Namely, way of agricultural extension itself does not change much from the state before 1988 in spite of no need of compulsory delivery and no worry about deprivation of landholding right.

Crop production drive is not deniable, but in so far as agriculture is “means” of mainstay for farmers, consideration of what can be done with the surplus brought about by the production drive is more important. This may paradoxically be equivalent to the argument that lower income itself is not a problem in poverty reduction but inability of doing something due to short income is really the problem. Also, deeming farmers as managing entity, way of extension services by which diverse options can be offered for them is really required. In other words, whether a technique is employed or not is a matter of selection by farmers who are farm-managing entities, meanwhile technique providers like extension staff should provide a wide spectrum of options of farming techniques and also their combinations.

Since 1963, Myanmar maintained practically isolationist system until 1988, and is still later from 1989 to date subject to economic blockage by western countries. That is to say, except the support from Japan, a major donor thereto, almost no support has been made from other DAC countries. Further, even support from Japan has mainly be confined to hardware like construction of dams and irrigation facilities, with fewer contribution for software like farming techniques. It seems therefore that, in Myanmar’s agricultural sector, development of farming techniques by outer stimulation has been less than that of other Asian countries. Likewise, amidst the planned economy stream, priority has tended to be placed on the fulfillment of targeted outputs by heavy input of chemical fertilizers, thus agricultural sector has been in a closed state where endogenous development for farming techniques hardly takes place.

Farmland in the CDZ has larger yield variance, except for irrigated lands, under the natural condition typically represented by erratic rainfall pattern. In such unstable area, straightforward output-oriented efforts such as heavy input of expensive chemical fertilizers often lead to vain hope. Under such unstable environment, it is essential to make a livelihood founded on a risk hedge strategy. Standing by the side of extension staff responsible for supporting farmers, they have not only to straightforwardly fulfill targeted yields but to be versed in various techniques to avoid and hedge risk in livelihood so that they can advise these wherever necessity arises. Therefore, shift of attitude toward extension is prerequisite for government staff in addressing poverty reduction in the CDZ. The attitude of extension staff brewed in an atmosphere familiar with planned economy for a long time, consequently tamed by standardized norm to straightforwardly fulfill targeted output without fail, might be the largest issue in pursuing poverty reduction in the CDZ.

4.2.3 A View of Livestock by Veterinary Extension: not as Means of Livelihood but as Animals

A TS Veterinary Office is placed functioning as the frontline of livestock extension at the TS level of the Study Area. He/ she belongs to Livestock Breeding and Veterinary Department (LBVD) under the Ministry of Livestock and Fisheries. 51 TSs exist in the Study Area where 34 veterinary officers and 179 deputy veterinary officers have been stationed (as of September, 2006 as interviewed from LBVD). That is to say, 213 staff in total are servicing in extension activities in the field of livestock in the Study Area.

Number of veterinary officers and deputy veterinary officers per TS varies with TS, for example 12 staff work in Taundwingyi TS whereas no staff has so far been assigned to Nyaung U TS. In this regard, average number of staff per TS veterinary office is counted as around 4. Their terms of reference in the service activities are as follows:

- Vaccination,
- Medical treatment,
- Livestock development, extension and education,
- Artificial insemination,
- Taking of livestock census,
- Meat inspection for public health, and
- Duty assignment by TS Peace and Development Council

Viewing the current activities rendered by the staff of TS Veterinary Office, they are almost confined to the charged vaccination and medical treatments. In other words, the original duty to be pursued in their extension activities, i.e., livestock development, extension and education seems to be put aside as an auxiliary administrative service. Artificial insemination for improving livestock breed has hardly been practiced.

Furthermore, the target priority of vaccination and medical treatment seems to be attached to draught and indigenous cattle kept in paddy producing areas from the standpoint of relative importance given to paddy production. They are farm households with landholding right that keep draught cattle, while their livelihood is relatively better off than the landless living in the same villages. It follows that an interrelation seems to have formed in which well-off farmers have room for requesting LBVD staff for treatment and as consequence the targets of veterinary services are concentrated on draft cattle.

On the contrary, the above-cited performances of service activities for goat herds including both vaccination and medical treatment tend to be inert as compared with those oriented to draft animal. The main cause of this inertness may lie in the inclination that major services by TS Veterinary Office put their priority on the care of draft cattle all right, but it is further considered that owners of goat herds have weaker access to such veterinary services as vaccination and medical treatment. In other words, villagers to raise goats are mostly smallholder farmers and the landless who are mostly not economically viable, hence they hardly have access to preventive (and charged) veterinary services apart from such emergency cases as outbreak of epizootic diseases.

Such vet-services as vaccination and medical treatment are important on one hand, feeding environment of livestock is also an essential factor, on the other, to affect livestock productivity. Although environment of livestock raising influences productivity thereof, current services seldom instruct on such environmental implication as structure of barns, hygienic care around barns and barnyard, fodder production.

In the Study Area, large disparity is observed in live weight of livestock of the same age, and this

reflects different ration in terms of both quantity and quality. Frequent occurrence of such epizootic diseases as Foot and Mouth Disease (FMD) has bearing to lack of systematic extension activities to control livestock diseases, as judged from current random state of grazing or browsing herds and lack of restricting direct contact of herds with ambient people.

In short, current status of extension activities by TS Veterinary Office is too much specialized in vet-services recognizing livestock as mere animal. As a result, farmer's recognition towards the services provided by TS Veterinary Office comes up with similar to that of office staff, requesting livestock treatment to veterinary officers only when such emergency case arises from their livestock herds as progressive diseases of cattle that is the most important property for them.

Of course vet-services are essential, but livestock in rural areas is vested with special position as means of livelihood improvement of the villagers as well as even sustenance of their life. Therefore, in addition to currently operated practices of extension services, that is veterinary oriented services, it is necessary to address to improvement of farmer's feeding management techniques and of livestock capacity.

Current extension staff of TS Veterinary Office consists of veterinarians, mostly young staff, but their capacity building is still required in terms of such comprehensive livestock management as nutritional management, rearing environment management, fodder crop production and storage, treatment and utilization of farmyard/ barn manure. Especially, it is imperative that these staff have recognition of livestock not only as animal but also essential means of improving and sustaining villager's livelihood.

From now onward, it is necessary to build a service system in which, in addition to hitherto vet-services, adequate feeding management techniques can be packaged to offer villagers, among others poor strata so that they can raise their livestock in a sustainable and productive manner and thus realizing livelihood improvement. It is also considered necessary to strengthen such agronomic activities as fodder cultivation, pasture development, manure utilization or restoration to soils, regeneration of fodder seeds, but only little particular coordination with MAS has so far been provided. Therefore, from now it is required to create liaison with MAS in providing extension for this field.

4.3 Poverty and Development of the Study Area

In this sub-chapter definition of poverty employed in Myanmar and concept of poverty proposed by JICA and international organizations are articulated. Thereafter, based upon the results of the Study, profile of poverty as major issue in the Study Area is illustrated and thereby direction of development intervention to the CDZ can be foreseen.

4.3.1 Definition of Poverty in Myanmar: Poverty in Economic Term

Central Statistics Organization (CSO) carried out Households Income and Expenditure Surveys (HIES) in 1997 and 2001. Referring to the results of these surveys, CSO publicized the rate of poverty estimated on the basis of subsistence cost, namely the minimum cost to secure nutritional requirement defined by the Ministry of Health. This concept (though it is not explicitly described in HIES) could be referred to as overall poverty (in economic term) if it is interpreted including nutritional and other prerequisite necessary for daily life[1].

In the above publication, CSO has not specified any "minimal cost" required for getting along minimum level of life including nutritional requirement, or economic poverty line. At any rate, however, as far as the government places base for the estimation of poverty rate on "the cost" of sustaining minimum life, it considers so-called "poverty in economic term" as major component of poverty.

4.3.2 Definition of Poverty in JICA: Poverty Reduction on Capability Approach

JICA defines poverty as follows: "poverty means a state in which people are deprived of any chance to develop capability to humanly sustain basic life and at the same time they are excluded from social arenas and development process". Further, poverty reduction doesn't merely aim at betterment of income, but it is termed as "Everyone can spend healthy and creative life without lack of clothing, eating and dwelling, can be a member of social community without being maltreated from the State or from the community to which she/he belongs and also is capable of sustaining freedom, dignity and self-respect".

In that definition of poverty reduction, an idea attached on Capability Approach introduced by A. Sen and M.C. Nussbaum can be found, that is poverty reduction or in another word development "towards better well-beings", "broadening choices of individual's way of life" or "expanding freedom of choosing one's life". In nowadays context, it may therefore be said that capability approach has presented basic concept of poverty reduction advocated by JICA and international organizations (of all others UNDP).

Capability approach attaches importance on the facilitation of environment and institutions as a core strategy of national public policy, thereby enabling individual actor to enlarge their liberal living. That is to say, current concept of poverty reduction is founded on an assertion that the individual can enlarge extent of freedom in individual way of life, in which expanding domain of 'being' and 'doing' of each and every individual is considered the most important where need arises for public policy.

In this connection, as to what capability means concretely, A. Sen declines from listing up, leaving it liberal selection of what capability means according to individual contexts. Differently, M.C. Nussbaum suggests fundamental 10 articles of capability from her view of giving suggestions of how development interventions should be by policymakers. Both of these supporters deem political freedom – a core function of democracy – as an imperative capability in the context of development, in other words poverty reduction, in their argument.

[1] In contrast, exclusive cost meeting basic nutrition only is generally called "Food Poverty".

As seen in the present government development interventions, it is understood that the norm of directly controlling people's production related activities is still prevalent in government staff including those working in CP organizations, in a narrow context in agriculture sector it is still trying to directory control production, instead of facilitating of environment wherein the individual lives and the individual can make choice of ways of how to improve their productions. Consequently, policies and their development interventions of this Country are different from its root of concept from the viewpoint of the context of poverty reduction that the capability approach stresses. The following argue poverty issues apart from the consideration of political environment:

4.3.3 Presentation of Poverty in the Study

In this Study, the most backward poverty in economic term is concluded as poverty, after referring to the definition of JICA and studying social dimensions, particularly focusing on the examination of 3 profiles of human development indices (HDI), namely economy, education and health that are convenient for availability of data and for comparison. In this regard, CP organizations of this Study consist of Ministry of Agriculture and Irrigation, Ministry of Livestock and Fisheries and Ministry of Cooperatives in charge of small-scale industrial promotion, and all of these line ministries are in charge of support for livelihood sector of the population, or the agencies directly related to the reduction of poverty in economic term.

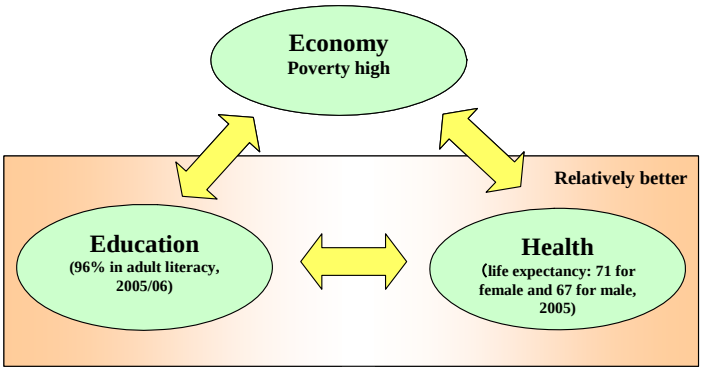


Figure 4.3.1 State and Link among 3 Cross-sections, namely, Economy, Education and Health

It is interpreted that such social development sectors as education and health are important ones for the sake of poverty reduction, while these are found to be relatively favorable in the Study Area. Based on the concept of HDI, life expectancy as a barometer of health in 3 Divisions where the Study Area is located is averaged at 71 years old for female and 67 for male[2], implying not so short as compared to that of Myanmar mean or of ASEAN countries. In addition to the relatively better life expectancy, infant and under-5 mortality rates and also maternal mortality rate are lower as compared to those of other parts of Myanmar (for detailed discussion, see Chapter 4.1.2). It can therefore be said that health status may not be so back-warding as in the economic situation to be mentioned later.

With regard to education, adult literacy, as an earmark indicator of education level, of the area indicates 96%, a considerably high level[3]. HDI educational indices include gross primary enrollment rate in addition to the adult literacy rate. However, data for estimating gross primary enrollment rate, indicating ratio of enrolled number of children versus number of children who reach schooling age at a specified period, was not available though data was available on how many people have graduated from primary school and how many have dropped out. According to an inquiry in villages of the Central Dry Zone, some children who fail to graduate primary schools no doubt exist. However, the rate estimated by the result of inquiry may be at maximum 20% or less, and even these non-graduated children can read and write owing to literate-trainings in monasteries.

[2] The life expectancy in the Study Area was collected from TS PDC office.

[3] It is assumed that favorable health and educational indicators have bearing with the degree of women's status observed in the Study Area. Even though woman's activities in social forum or in public societies are as inert as that in Japan, no bias in gender has existed in property succession or daily labor (labor division by gender does exist), and women directly manage household budget in many households. Under such circumstances, woman's status is outstandingly high at family level, and this seems to contribute to providing favorable state in the dimensions of health and education.

Meanwhile, from economic point of view, the results of PRA and interview survey have revealed that there are marginalized people who are indebted as a result of failing to procure enough income to sustain livelihood, who cannot borrow money anymore because of outstanding debts, who cannot buy enough food to meet nutritional supply, who cannot help allowing their children being engaged in child labor (for an example, see box), who have lost landholders right that had been placed as collateral becoming a landless (precisely no landholders right) though the extent varies with villages or with individuals.

An example of child labor:

It is reported that within the 6 target villages of the Pilot Project carried out in year 2007/08, there are 2 villages which graduation rate of the primary school is not 100 percent. Recent rate of primary graduate in Khaungkawe Village stands at 75% only, and that in Mingan Village at around 90% only (reported by the village chairmen concerned).

Presence of available occupations, tinsmith cottage industry in Khaungkawe Village and sandstone ware production in Mingan Village which even children can be engaged, gives negative impact on the graduation rate, implying that children have to drop out from primary education because of poverty of their households in economic term.

Particularly observable in the case of landless farm laborers, many people live from hand to mouth due to their limited income amount, and seasonal fluctuation of income source availability is considerable. The result of individual interviews also shows that some landless farm laborers hardly have the chance of eating meats other than the occasions of religious festival / events in the villages. Some of them even have rare chance to eat vegetables, and usually they live on poor menu consisting of rice, fish-paste and edible oil only.

That is to say, such poverty now arises in the Study Area because of lack of income, the basic means of life as failing to spend decent and healthy life with insufficient nutritional intake, or depriving children of education opportunities, one of fundamental human rights, as observed in Khaungkawe Village and Mingan Village. Further aggravated state of poverty seems to appear when one fails to refund his/her debt. Failing of settling his/her debt may degrade one's self-respect and may lead to possibility of losing landholding right entailing to the increased landless population.

4.3.4 Poverty Line

This Study employs Cost of Basic Needs method to establish the Poverty Line same as the previous studies[4]. Under this method, there are conventionally 2 poverty lines; namely, 1) Food Poverty Line, and 2) Non-food Poverty Line. Then, so-called Poverty Line is defined as sum of the 2 poverty lines. Food Poverty Line is the minimum food expenditure in monetary term necessary to pay for a consumption basket that will satisfy caloric requirements of a representative typical adult. Non-food Poverty Line, on the other hand, is defined as reasonable non-food expenditure to meet basic human needs apart from food expenditure. The non-food expenditures are incurred from, for example, education, health and medical treatment, clothing, housing, charity, etc. The Non-food Poverty Line is usually estimated as the non-food expenditure for those whose total food expenditures are around the food poverty line.

1) Food Poverty Line

To establish the Food Poverty Line, we need to calculate the caloric requirements of a representative household in calories per adult equivalent[5]. This Study employs 2,300 kcal per adult equivalent per day as the basis of the requirement. In fact, Dolly used 2,100 kcal while UNDP estimated the basic requirement at 2,303 kcal for the first round survey and 2,295 kcal for the second round survey. UNDP multiplied the size of each population category by the weighted caloric requirement, summed up all population categories, and then divided the sums by the reference household size in adult

[4] One was carried out by UNDP in 2004 to 2005, from which Poverty Profile covering the entire nation was published in June 2007. Another study was carried out in 2003 by Dolly Kyaw covering Central Dry Zone and published in 'Arming & Rural Systems Economics' edited by Siegfried Bauer and Lila Bahadur Karki.

[5] In estimating the adult equivalent, 0.65 is applied to child for 5 - 14 years old and 0.24 to child from 0 year to 4 years old.

equivalent. The calculated caloric requirements were 2,303 kcal and 2,295 kcal respectively for the 2 round surveys. The average of the calories is around 2,300 kcal, which is employed in this Study.

Second step is to establish a food basket, based upon what the population actually consumes, in order to meet the basic caloric requirement of 2,300 kcal. To establish the food basket, this Study refers to the food composition table presented by Dolly Kyaw and also the questionnaire survey result by JICA Team carried out in 2007. Following table shows representative food items which are actually consumed by the CDZ population, necessary food consumption scaled up to meet the basic requirement of 2,300 kcal per adult equivalent, and calories contained in each food item[6].

Table 4.3.1 Estimation of Food Basket and Food Poverty Line per Adult Equivalent per Year as at August 2007

Items	Consumption per Year, Kg	Calorie per 100g	Received Calorie (contribution,%)	Unit Price In Aug. 2007	Cost, Kyats/ Year (contribution,%)
Rice	160.6	351	1,545 (67)	600	45,897 (28)
Oil	13.3	884	323 (14)	3,200	25,854 (16)
Meat/fish	11.7	147	47 (2)	2,889	20,424 (12)
Eggs	0.0	156	0 (0)	100	30 (0)
Pulses	23.0	218	137 (6)	1,300	18,118 (11)
Vegetable	61.7	33	56 (2)	844	31,538 (19)
Spices	19.7	144	78 (3)	1,000	11,917 (7)
Sugar/ Jaggery	8.3	382	87 (4)	1,200	6,060 (4)
Beverage	1.4	278	11 (0)	3,162	2,759 (2)
Others	5.7	106	16 (1)	380	1,305 (1)
Total			2,300 (100)/day		163,903 (100)

Source: the JICA Study Team

By using the prevailing food costs in August 2007, when the survey was carried out, above Table 4.3.1 now gives the Food Poverty Line. The Food Poverty Line estimated is 163,903 Kyats per adult equivalent per year at the current price of August 2007. This is equivalent to US$ 130 by applying prevalent market exchange rate of 1,260 Kyats against US$ 1.0. The table also shows a typical food basket, to which rice contributes the most by 67% in terms of calorie composition, followed by oil (14%), and then by pulses (6%), so on so forth. As to monetary value, rice also consists of the largest portion of the food basket by 28%, followed by vegetable (19%), by oil (16%), by meat/fish (12%), etc. There is a unique finding, e.g. though rice contributes as much as 67% in calorie consumption while people spend as low as 28% on it in monetary value.

2) Non-Food Poverty Line

Figure 4.3.2 shows the contents of the non-food item that the people actually consume or spend on. Figure 4.3.2 shows the average expenditure monetary value in Kyats per typical household per year out of valid 397 sample households carried out in baseline survey of year 2007. As we can notice, what comes first is the payment to farm casual labors, followed by purchase of farm input such as chemical fertilizer, seeds, etc, and by charity, by clothing, education, medical expenses, and so on so forth. Obviously, the largest 2 expenditures; payment to farm casual labors and purchase of farm input do not accrue for non-farmer households. Figure 4.3.3 and Figure 4.3.4 show the difference very clearly by illustrating the expenditures by social category; namely, by farm household and non-farm household respectively.

Figure 4.3.3 tells us that typical average farm household spends 850,000 Kyats per year for non-food items, amongst which what comes first is the payment to farm casual labors and followed by purchase of farm input. They spend an average amount of 261,000 Kyats for the payment to farm casual

[6] Calorie values came from FAO calorie conversion table of 1985, and calorie recommendations by the Ministry of Agriculture of Japan, etc.

labors and 162,000 Kyats for the farm input, totaling 423,000 Kyats. The total expenditure of 423,000 Kyats arrives at around half of their total expenditure of 850,000 Kyats.

On the other hand, obviously no such expenditures as payment to farm casual labors and purchase of farm input accrue in non-farm households as shown in Figure 4.3.4. They, non-farm households, spend the most on charity, which may root in the deep religious belief in this Country, and then followed by clothing, education, livestock, medical treatment, cleansing, travel, etc. Their total expenditure arrives at around 308,000 Kyats per non-farm household per year, which is about 36% of what an average farm household spends per annum.

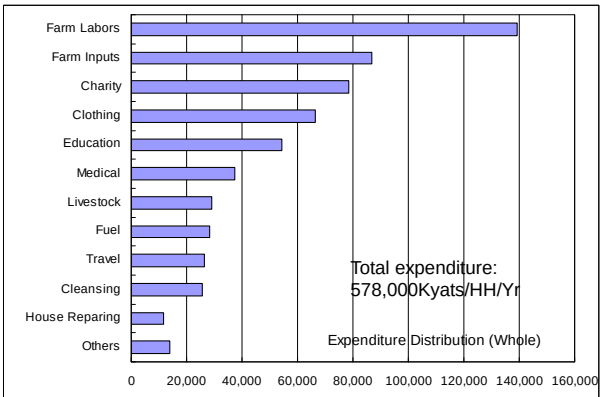


Figure 4.3.2 Non-food Items and Expenditures, whole sample

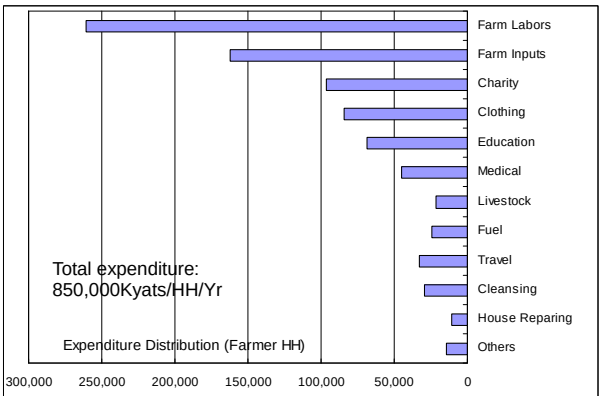


Figure 4.3.3 Non-food Items and Expenditures, Farm HHs

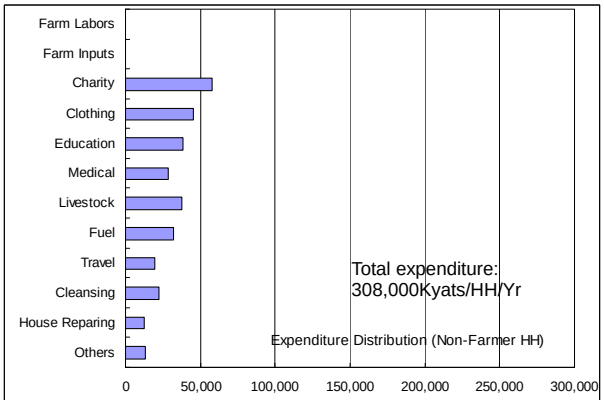


Figure 4.3.4 Non-food Items and Expenditures, Non-farm HHs

The difference on the non-food expenditure between farm household and non-farm household indicates that the non-food poverty line should be established separately by social category, e.g. by farm household and by non-farm household. To establish the non-food poverty line, firstly non-food poverty line excluding the 2 items of payment to farm casual labors and purchase of farm input is estimated, which can be regarded as the Non-food Poverty Line for non-farm household, and then the 2 expenditures are to be topped up for the Non-food Poverty Line for farm household.

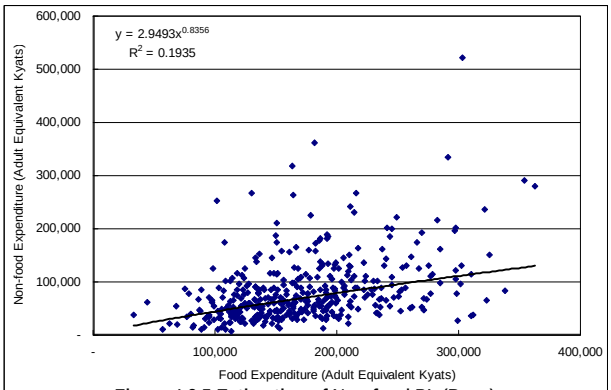


Figure 4.3.5 Estimation of Non-food PL (Base)

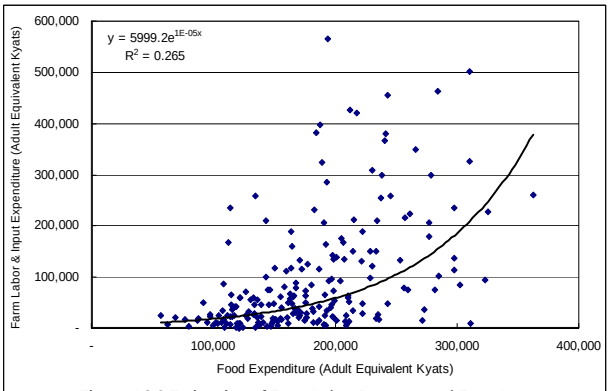


Figure 4.3.6 Estimation of Farm Labor Payment and Farm Input

Figure 4.3.5 illustrates the relationship between food expenditure on its horizontal axis and non-food expenditure excluding the 2 items of payment to farm casual labors and purchase of farm input on its

vertical axis[7]. Non-food poverty line per adult equivalent per annum is the non-food expenditure on the food poverty line of 163,903 Kyats. This arrives at 67,147 Kyats (US$ 53) per adult equivalent per year, which is the non-food poverty line for non-farm household. Figure 4.3.6 shows the relationship between the sum of the 2 expenditures of payment to farm casual labors and purchase of farm input on its vertical axis and food expenditure on its horizontal axis. The expenditure amount in Kyats corresponding to the food poverty line of 163,903 Kyats is 30,897 (US$ 25). Topping up of this 30,897 Kyats onto 67,147 Kyats arrives at 98,044 Kyats (US$ 78), that is the Non-food Poverty Line for farm household.

3) Poverty Line by Social Stratum

The Poverty Line as aforementioned is the sum of Food Poverty Line and Non-food Poverty Line. The lines are summarized in Table 4.3.2 and illustrated in Figure 4.3.7; which are 261,947 Kyats (US$ 208) per adult equivalent per annum for farm household, 231,050 Kyats (US$ 183) per adult equivalent per annum for non-farm household. The shares of the food poverty line out of the poverty line are 63% and 71 % for farm household and non-farm household respectively.

Table 4.3.2 Poverty Lines per Adult Equivalent per Year estimated by JICA Study as of August 2007

Poverty Line	Farm HH	Non-farm HH	Market Rate in 2007	Farm HH	Non-farm HH
	Poverty Line, Kyats			Poverty Line, US$	
Food Poverty Line	163,903	163,903	1,260 (Kyats/$)	130 (63%)	130 (71%)
Non-food Poverty Line	98,044	67,147		78 (37%)	53 (29%)
Poverty Line	261,947	231,050		208 (100%)	183 (100%)

Source: JICA Study Team

Poverty lines estimated above are the necessary expenditures in Kyats per adult equivalent per annum to keep their livelihood by uptaking 2,300 kcal per day and also basic non-food items. By multiplying number of typical family members into the poverty line per adult equivalent per annum gives us a typical poverty line now estimated per household per annum. According to the baseline survey carried out by JICA Team in 2007, average number of family members is 5.141 and this comes to 4.680 after multiplying reduction factors[8] to children against adult-equivalent in order to adjust caloric requirement for children. The poverty lines per household per annum are therefore worked out as shown in Table 4.3.3. The poverty lines are about 1.2 million Kyats (US$ 973) and about 1.1 million Kyats (US$ 858) for farm household and non-farm household respectively.

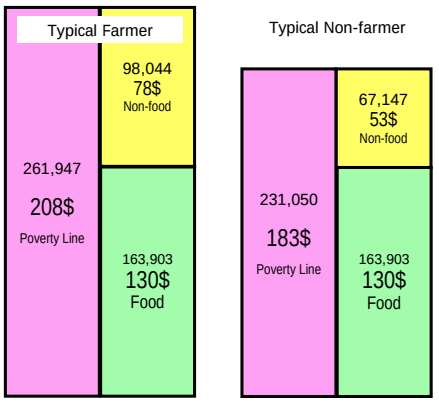


Figure 4.3.7 Poverty Lines for Farm HH and Non-FHH per Adult Equivalent per Year

[7] One may say that the non-food poverty line can be estimated based on the whole non-food expenditures by social category, in that non-food poverty line based on what is shown in Figure 1.2.2 and on what is shown in Figure 1.2.3. In fact, this may be one of the estimation methodologies, however this estimation would lead us to lower non-food poverty line for non-farm household since their expenditures are obviously lower than that of farm household simply because they are poorer. As human being equal in its right to make livelihood, the JICA Team is of the opinion that expenditures excluding the 2 items of payment to farm casual labors and purchase of farm input should be equally pursued regardless he/she is farmer or not. Therefore, the non-food poverty line in this report was firstly estimated for those excluding the 2 items regardless he/she is farmer or not, and then the 2 items were topped up on the base non-food poverty line.

[8] In estimating the adult equivalent, 0.65 is applied to child for 5 - 14 years old and 0.24 to child from 0 year to 4 years old, Poverty Lines in Theory and Practice, Living Standard Measurement Study, Working Paper No.133, WB)

Table 4.3.3 Poverty Lines per Typical Household per Year estimated by JICA Study as of August 2007

Poverty Line	Farm HH	Non-farm HH	Market Rate in 2007	Farm HH	Non-farm HH
	Poverty Line, Kyats			Poverty Line, US$	
Food Poverty Line	767,066	767,066	1,260	609 (63%)	609 (71%)
Non-food Poverty Line	458,846	314,248		364 (37%)	249 (29%)
Poverty Line	1,225,912	1,081,314		973 (100%)	858 (100%)

Source: JICA Study Team

In countries that poverty lines have not yet been established based upon baseline survey, a simple methodology is often applied. The simple method estimates poverty line to be just US$ 1 per day per person. This gives us US$ 365 per person per annum. Given a typical number of family members of 4.68, the simple poverty line for a typical household comes to US$ 1,708. The poverty lines shown in Table 4.3.3, US$ 973 and US$ 858 for farm household and non-farm household respectively, are found to be about half of the simple poverty line of US$ 1,708. This fact attributes to the low prices of the major commodities, especially rice, in the Study Area, and in the Country by and large.

4) Poverty Ratio

Given the Poverty Lines in Table 4.3.2, poverty ratios are estimated by all the sampled households, by farm household and non-farm household separately, and further poverty ratio only for farm casual labor household, the poorest of the poor in most cases, is estimated. Then poverty ratios by gender, by male-headed household and by female-headed household, are estimated separately. In addition, poverty ratios by village are also estimated. The poverty ratios for all the samples, by gender, and for the villages are calculated by weighting the poverty ratios for farm and non-farm households with the sample numbers respectively.

Figure 4.3.8 shows the cumulative adult equivalent headcount by category such as farm HH, non-farm HH and farm-casual labor HH, and Figure 4.3.9 by gender such as male-headed HH and female-headed HH, versus log of the annual expenditure per adult equivalent. The poverty line of 261,947 Kyats per adult equivalent per year is at the scale '5.42' in log while the poverty line of 231,050 Kyats is at the scale '5.36'. With these log scales, poverty ratios are calculated as summarized in Table 4.3.4, and pointed out are:

1) Poverty ratio by all the sampled households is 43%, and the ratio for farm household only is 33% whereas the one for non-farm household is 55%. This clearly shows poverty for non-farm household is deeper than that of farm-household. Further the poverty ratio for farm casual labor is as high as 75%. This result clearly shows where the poorest people are; that is in the category of farm casual labors.

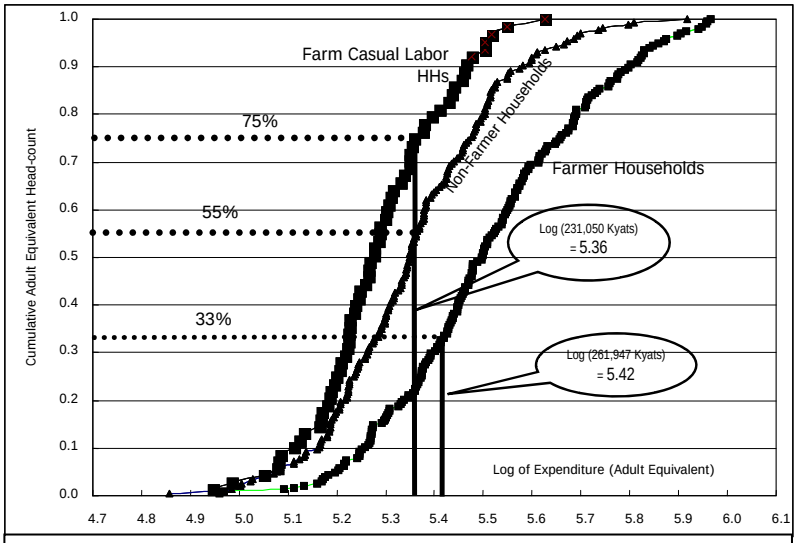


Figure 4.3.8 Estimation of Farm Labor Payment and Farm Input

2) Poverty ratio by gender shows deference as expected; namely, the ratio for male-headed household

is 43% while the one for female-headed household is 49%. Though the sample number for female-headed household is not enough, say only 34 samples (only 8% out of whole 419 sample households), yet we can see the tendency for female-headed household suffering more in poverty.

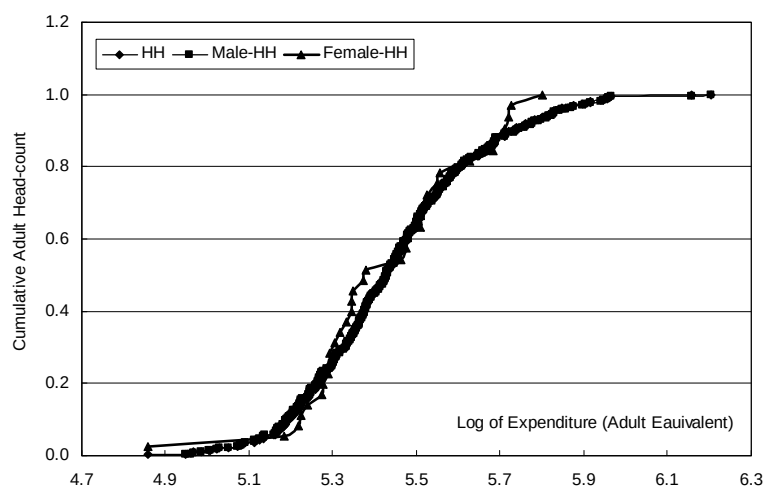


Figure 4.3.9 Cumulative Headcount vs. Expenditure by Gender

3) Poverty ratio by village varies widely from 31% to as high as 72% (see Table 4.3.4). Villages showing relatively low poverty ratio are Ar La Ka Pa village (31%), Ma Gyi Sauk village (42%), Khaungkawe village (43%) and Legaing village (43%). Ar La Ka Pa village is endowed with good accessibility to urban areas by which economy is facilitated. Khaungkawe village has lots of cottage industry activities giving employment opportunities to the villagers, while such 2 villages as Ma Gyi Sauk and Legaing are equipped with irrigation facilities whereby 2 paddy croppings are available. On the other hand, the poverty ratio for Mingan village is 56% and the one for Magyi village is as high as 72%, the highest amongst the 6 villages. These 2 villages are located in very remote areas and hit often by drought, resulting in unstable agricultural production.

4) Table 4.3.9 shows poverty gap ratio as well, indicating the depth of the poverty; corresponding to the distance between the poverty line and the average of expenditures for those who fall below the poverty line. In other words, adding the monetary value calculated by multiplying the poverty gap ratio into the poverty line, the person can be lifted up to the poverty line. The poverty gap ratios are; 11%, 8%, 14%, and 20% for whole sampled households, farm household, non-farm household, and farm casual labor household. It is indicated that the depth of the poverty for non-farm household is deeper than that of farm household, and again that of farm casual labor household is further deeper than that of non-farm household. The poverty for farm casual labor household is more than 2 times deeper than that of farm household (20% vs. 8%).

Table 4.3.4 Poverty Ratios by Category and by Village

Particular	Valid Sample No.	Poverty Ratio, % (Expenditure)	Poverty Gap Ratio (%)	Poverty Square Gap Ratio (%)
Whole of 6 Villages	397	**43**	10.69	3.68
Farm HH	212	**33**	8.19	2.75
Non-farm HH	185	**55**	13.56	4.74
Farm Casual Labor	66	**75**	19.68	6.75
Male Headed HH	363	**43**	10.73	3.71
Female Headed HH	34	**49**	10.20	3.36
Mingan village	21	56	8.34	2.06
Magyi village	49	72	23.33	9.06
Khaungkawe village	48	43	9.88	3.32
Ar La Ka Pa village	130	31	6.97	2.21
Ma Gyi Sauk village	53	42	8.56	5.90
Legaing village	96	44	9.65	2.89

Source: JICA Study Team

5) Necessary Sum of Raising the Poor to the Poverty Line

The poverty gap ratio is used to provide an estimate of the sums required to raise the consumption level of all poor families up to the poverty line. For example, at all the village average level, the poverty gap ratio stands at 11% which means that the additional expenditure to raise the poor up to the poverty line equals to 11% of the poverty line as average. Here the average poverty line arrives at 247,594 Kyats by weighting the 261,947 Kyats for farm household poverty line and 231,050 Kyats for non-farm household poverty line with its sample numbers, 212 and 185 respectively. Then, by multiplying the target population with the additional expenditure, we can know how much total sum is required to raise all the poor people up to the poverty line.

Table 4.3.5 calculates the necessary sum to raise all the poor in CDZ. To raise a typical poor, there should be an additional expenditure of 26,463 Kyats per year (equivalent to 21 US$ by applying market prevalent ratio of 1,260 Kyats against US$ 1.0 as of August 2007). Multiplying the population to the additional expenditure arrives at 102 billion Kyats (US$ 93 million) per year for the whole population of CDZ (51 TSs), and 98 billion Kyats (US$ 81 million) per year for the whole rural population of CDZ (51 TSs). Note is that the poverty line, 247,594 Kyats, was estimated on basis of household survey done in 6 villages for the FY 2007/08 pilot project, thereby in essence it can be applied to the rural population only but not accurate in applying to the population in urban area.

Table 4.3.5 Estimation of Necessary Sum of Raising the Poor to the Poverty Line

Particular	Estimation	US$ (1,260 Kyats/1US$)	Remarks
Poverty Line, Kyats	247,549		Weighted mean of FHH &Non-HH
Poverty Ratio, %	43		
Poverty Gap Ratio, %	10.69		
Required Amount per Poor, Kyats & US$	**26,463**	**21**	@1,260Kyats/$
Population in CDZ in 2003	9,841,620		for 51 townships
Rural Population in CDZ in 2003	8,293,199		84%
Urban Population in CDZ in 2003	1,548,421		16%
Adult equivalent Pop. in CDZ in 2003	8,959,109		X 4.680 / 5.141 Factor to estimate adult equivalent population
Adult Equivalent Rural Pop. in CDZ in 2003	7,549,537		
Adult Equivalent Urban Pop. in CDZ in 2003	1,409,572		
Required Sum for Total Pop. of CDZ, Kyats	**101,946,507,630**	**80,909,927**	exclusive of City Council Area
Required Sum for Rural Pop. of CDZ, Kyats	**85,906,860,981**	**68,180,048**	
Required Sum for Urban Pop. of CDZ, Kyats	16,039,646,649	12,729,879	reference

Source: JICA Study Team

4.3.5 Inequality in Income: Gini Index

There should be inequality in villagers' income. The inequality itself may be justified if it is not so big since it may spur people's competition towards economic vigorous activities. However, if the inequality between the rich and poor, or between the Haves and Have-nots, are considerably high, it may not be accepted socially and social security cost may arise in some societies. Here inequality among villagers is examined by using the baseline survey results administered to the 6 target villages for the pilot project implemented in FY 2006/07.

1) Measuring of the Inequality: Gini Index

To measure the inequality among village members, Gini index is employed in this Study. Gini index is understood by the geometry definition "Area enclosed by the *Lorenz* curve and the diagonal". If one may take the horizontal axis as the cumulative share of people from lower income and draw the cumulative share of income earned, then the curve becomes *Lorenz* curve, and the area between the *Lorenz* curve and the straight line

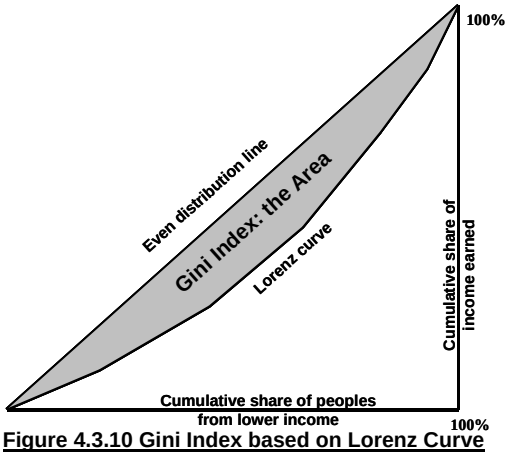


Figure 4.3.10 Gini Index based on Lorenz Curve

(diagonal = even distribution line) becomes Gini Index (the triangular area composed of the axis and the diagonal is assumed to be 1).

Given the magnitude of the Gini Index, one can understand the value of the Gini Index as the degree of income inequality. The Gini Index is 0.3 in "the society where one king owns 30 % of the whole income and the other people have others" and also in "the society where the citizen layer of 70% gets all income and the slave layer of 30% gets nothing"[9]. There is no clear definition of the difference in this case. A right table is one standard to understand the degree of inequality according to the value of the Gini Index.

Table 4.3.6 Standard Interpretation of Gini Index

Gini Index	Standard Interpretation of Gini Index
Less than 0.1	There is an artificial background for leveling.
0.1 – 0.2	Though considerably equal, there is an anxiety to obstruct the effort to the improvement.
0.2 – 0.3	Usual distribution type that exists in general in society.
0.3 – 0.4	Though there are some differences, there is also a desirable respect in the improvement through competition.
0.4 – 0.5	The difference is serious.
Over 0.5	The improvement is required except under special circumstances

Source: Wikipedia

2) Gini Index for the 6 Villages

Figure 4.3.11 shows the *Lorenz* curve for the 6 villages, based on which Gini Indexes are calculated. Table 4.3.7 summarizes the Gini Index by village with incomes by such category as whole sample, farm households who in most cases are the richest, farm casual labor households who in turn are the poorest, etc. Figure 4.3.12 compares the Gini indexes by village and Figure 4.3.13 comparatively shows the annual incomes of farm household and farm casual labor household; the richest and the poorest (since almost no farm casual labor household in Mingan village, it was replaced by income of those who earn from sandstone ware production, the poorest of the people in the village). It is noted that:

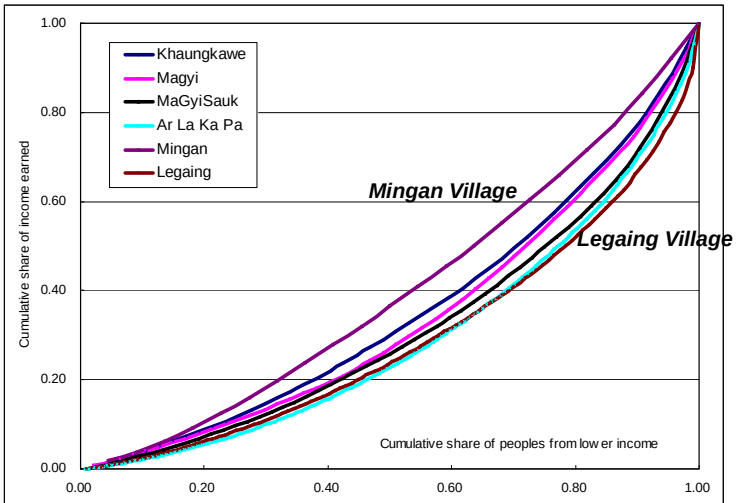


Figure 4.3.11 Lorenz Curve for the 6 Villages

1) Gini Index ranges from 0.197 for Mingan Village to 0.411 for the Legaing Village with an average of 0.387. Mingan village is only the one whose Gini index is lower than 0.2 while there are 2 villages where the Gini index is already over 0.4, which are Ar La Ka Pa and Legaing.

2) Mingan village's Gini index is the lowest, 0.197, and also the average income per year per household is 817,317 Kyats which is also the lowest amongst the 6 villages. This village is located in remote area in Bago Hills and very often hit by drought, resulting in low and unstable agricultural production. Here in this village, we may say people are poor and equally poor.

3) In 2 villages of Ar La Ka Pa and Legaing where the Gini index is over 0.4, we may say the difference between rich and poor is considered somewhat already serious. As indicated in Figure 4.3.13, the gap in annual income between the farm household and farm casual labor reaches as much as 3 times. Ar La Ka Pa village is situated at a relatively accessible location to urban areas where some villagers may have fetched good opportunities to raise their income while the others

[9] This Gini Index is decided by the area, and is not related to the shape of the Lorenz curve. Therefore, even if the ratio of a rich layer to the poor layer is different, the Gini Index becomes the same in some cases.

may have not. Legaing village is blessed with irrigated paddy field, whereby income gap between the farmer and landless may have become large, giving the Gini Index over 0.4.

Table 4.3.7 Gini Index by Village and Income by Source

Village Name	Valid Sample No.	Average of Income (Kyats/Year/HH)							Gini Index
		Whole	Farm Household	Casual Farm Labor	Livestock	Cottage Industry		Others	
						Employed	Self-running		
Mingan	22	817,317	1,037,467	-	-	789,600	724,545	584,755	**0.197**
Magyi	47	1,131,688	1,147,471	550,700	707,500	-	1,159,876	2,367,500	**0.321**
Khaungkawe	47	1,059,165	1,442,082	894,750	841,897	1,204,173	877,797	499,300	**0.291**
Ar La Ka Pa	139	1,543,106	2,022,950	860,665	1,684,475	1,066,625	1,279,183	964,777	**0.406**
Ma Gyi Sauk	52	1,126,079	1,183,606	597,940	723,000	1,455,000	1,709,000	1,231,108	**0.363**
Legaing	108	1,269,271	2,184,371	748,074	1,068,800	708,500	1,199,112	1,067,423	**0.411**
6 Villages	415	1,304,199	1,669,984	754,956	1,200,146	1,063,644	1,127,951	1,286,556	**0.387**

Source: JICA Study Team

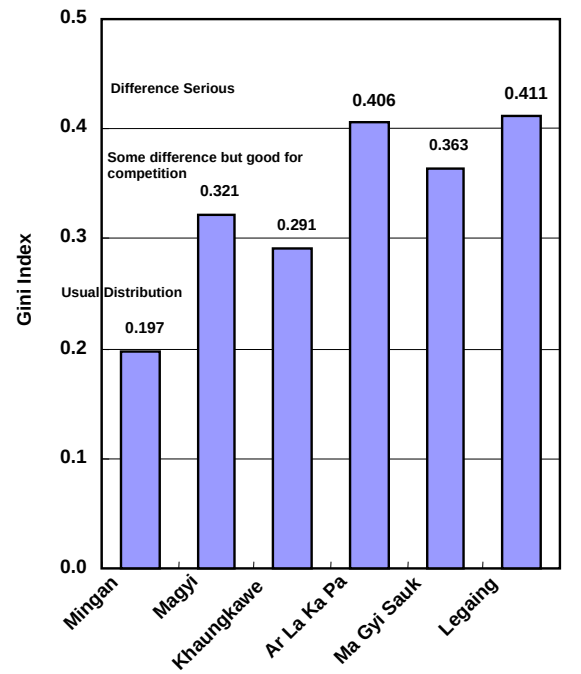


Figure 4.3.12 Gini Index by Village

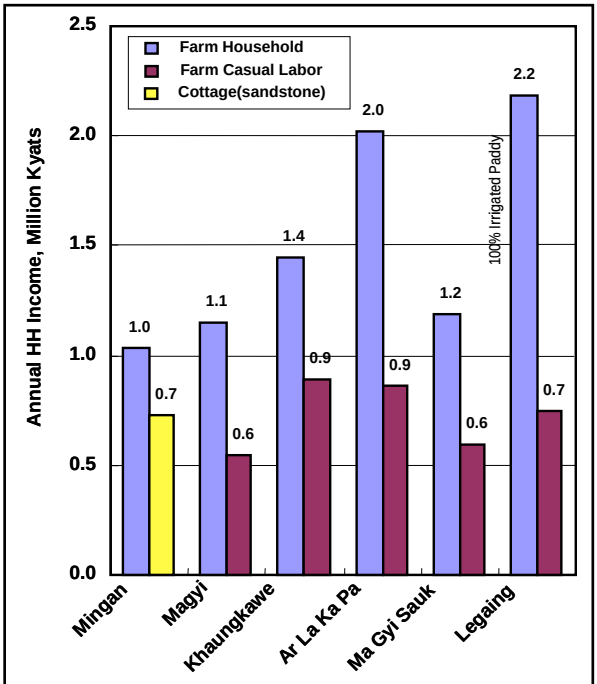


Figure 4.3.13 Annual Incomes of Farm HH and Non-farm HH

Taking into account above results, one may suggest that income for the poor should be increased. In fact, even in case that both husband and wife have been engaged in farm casual labor work throughout year, they cannot get out of the poverty, as indicated by their annual income 648,000 Kyats (1,800 x 360 days) vs. 1,081,314 Kyats that is the poverty line for non-farm household. They need to find additional means of income, or they cannot get out of the poverty. Assistances of increasing their income or diversifying their income should be provided.

In addition, a distribution policy from the rich, mostly farmers, to the poor may have to be put in place since there are already villages where a considerable income gap is found as Gini index over 0.4[10]. With respect to this, there is land tax for farmers in Myanmar, which is about 5 Kyats per acre for a productive land and as little as 1 Kyats per acre for non-fertile lands. These rates were established under the colonial rule, since which they have not been revised. One of the policies for raising the poor in economic term or narrowing the gap between the rich and the poor may be to raise these land taxes, and then distribute according to social needs.

[10] As a reference, Gini index of Japan is 0.526 before tax adjustment, and this is converted into 0.387 after taking into account social warfare programme, tax redistribution, pension payment, etc., Source: Report on Income Distribution, August 2007, Ministry of Labor and Welfare)

4.4 Development Vision, Strategy, and Typology of the Study Area

4.4.1 Development Vision of the Study Area

Major means of livelihood in the Study Area is agriculture, and also animal husbandry and small-scale industries are run supporting the mainstay. While extensive agriculture is practiced over dry upland of rolling hill topography as typically observed in Bago Hills, intensive agriculture also exists in the Study Area that is engaged in fertile farmland developing along Ayeyarwady River and in irrigated paddy land. Animal husbandry is complementary means supporting agriculture, possibly serving as a precious income source especially for the landless poor who raise sheep and/or goats depending on dryness of land. Indigenous endemics seldom occur owing to land dryness, but some parts of the dry zone have difficulty in securing water while in some other parts along Ayeyarwady River floods in rainy season deteriorate living environment.

Thus, a variety of livelihood and life are sustained adapting to various natural environment in the CDZ. In view of these situations, it has been agreed in the Scope of Works prior to the commencement of this Study to elaborate development programmes including 4 major scopes consisting of 1) agricultural development, 2) creation of off-farm income sources, 3) living improvement and 4) supporting activities, focusing on the inhabitants livelihood. Taken these scopes into account, development vision in the CDZ – future scope of development – is proposed as "*Area Wherein People Enjoy Well-beings*[1] *Based Primarily Upon Agriculture and Livestock Production Suitable to the CDZ Environment, Off-farm Incomes from Cottage Industry, Good Living Environment and also Better Supporting Systems*".

4.4.2 Guiding Principles of the Study Area

Wherever relatively bestowed with resources, efforts of improving the productivity of existing income sources as well as those of enhancing income levels will lead to the entire growth of the CDZ. Not only smallholder farmers but also large-scale ones holding irrigated farmland can additionally create benefits for poorer strata through the enlarged employment opportunities. On the other hand, wherever handicapped by precarious climatic/ meteorological conditions in the CDZ, first of all it is imperative to stabilize the existing crop production, following to diversifying income sources for hedging risks. Further, in parallel with these measures, living environment should be improved and basic infrastructure must be improved in order to activate/ facilitate economic activities by the inhabitants. Keeping these in mind, 5 guiding principles are given as follows to achieve the above proposed development vision;

1) Improving productivity of the existing income sources including agriculture, livestock, small-scale industries: Though people living in the Study Area earn their livelihood by means of agriculture, animal husbandry and small-scale industries, their crop and animal husbandry techniques still remain in a low level, and crop sales networks are not well developed either. These bottlenecks have kept productivity at low level and have limited benefits from their activities. Hence, it is planned to improve the production and productivity of the existing income sources, and to strengthen sales network thereby increasing income.

2) Diversification of income sources by introducing livestock/ new industrial activities to improve and stabilize income of the poor strata: Diversification of income sources serves as safety net for livelihood sustenance above all that for the landless and smallholders, playing an important role of reducing their poverty. Diversification of income sources is pursued through the promotion of livestock promotion chiefly with goat raising that is more suitable for dry zone, also

[1] Bamar race people residing in the CDZ are very much concerned with their religious beliefs in their ordinary life, in that 'Well Beings' rather than just 'Economic Betterment' may be suitable for their future vision.

through the promotion of small-scale industries that are not affected by climatic vagary to envisage stabilizing the income of poor strata.

3) Raising productivity and expansion of employment opportunities of poor strata/ the landless by promoting fore-running industries: In order to raise productivity as well as to create employment opportunities for poor strata, on-going industrial activities in progressive TSs or in leading villages should be strengthened/ escalated. Likewise, as advanced agricultural areas like irrigated perimeter have been under the stable productive environment, improvement of farm productivity is pursued and in parallel increased employment of farm laborers is envisaged.

4) Improvement of living environment through improvement of basic infrastructure as a public safety net: Among village life-related infrastructure, those particularly related to poverty in the Study Area including 3 profiles, namely, secured supply of safe water, housing improvement and rural electrification are given prior importance, for which support for vitalizing villagers economic activities is planned. Besides, vitalization of economic activities in wider area requires better marketing networks especially improvement of road networks.

5) Extension of living improvement providing options: Livelihood base on risk hedging serves as rationale of village life for the villagers living in the unstable environment like dry zone except for the villages bestowed with irrigable farmland tracts. In such an area, instead of a mere fruit-oriented extension pursuing straightly the same pre-determined goals, a more flexible way of extension is required providing so-to-speak options for villagers selection so that diversification of livelihood can be realized. The government staff concerned should acquire diversified and versatile techniques and employ a flexible extension approach, leaving the villagers what to select for their own development.

4.4.3 Typology of the Study Area with the Development Strategies

The Study Area holds an area of 75,169km^2, extending latitudinally about 560km, longitudinally about 130km. In this vast space, natural conditions like precipitation, topography, soils etc diversely vary, so do inhabitants' livelihoods. In formulating development plan of the CDZ, typology should be established for this vast area based on relevant indicators. It is necessary to make the development plan more concrete and more effective, so that diverse types of development plan – intervention measures – can be proposed according to various typologies.

Typology is tried at TS level. 51 TSs are included in the Study Area. TS is a frontline where many government offices are placed, and data required for the basis of typology are available at this level. In this concern, basal unit of inhabitant's life is village. 10,358 villages exist within the Study Area (as of August 2006), however, no systematized data exists at this level. This is the reason why the unit of typology is set at TS level, though it inevitably means that some of the averaged 203 villages in a TS have different characters from the established typology for the TS.

Even within the same TS, cases possibly arise where mainstay of livelihood – namely typology at village level – varies from village to village. Many villages belonging to certain TS fall into the typology given to the TS, but it doesn't necessarily mean that all the villages in the TS have the same typology. Therefore, in so far as so-called community-based services except for public works like widely stretching roads are concerned, interventions by village unit (or its upper stratum; Village Tract) will commonly be made, but practically, actual intervention menu should be examined not only referring to the given typology at TS level but also by identifying village-wise (or Village Tract wise) typology.

As to indicator to be employed for the typology, diverse indicators are applicable such as natural condition represented by topography and rainfall, social one including health and education. Though

the former greatly varies with areas, the latter doesn't have much difference as the inhabitant's type of behavior within vast predominance of the same ethnicity (Bamar race). Also, health and education are heavily dependent on uniform administrative services given by the Government. That is to say, although some difference by location is possibly found in the dimension of health/ hygiene, for example water security that is heavily affected by natural environment, social condition as a whole tends to be similar regardless of location as compared to natural one.

Taking these into accounts, establishing of typology of the Study Area starts with natural environment, above all such natural condition as topography, rainfall, soil types etc that directly influence inhabitants' livelihoods and daily life, then examined are mean landholding, ratio of smallholder farm households, ratio between upland and paddy land, rate of irrigated perimeter (irrigable paddy land) and other factors related to agriculture, the mainstay of the Study Area.

In addition, ratio of farm/ off-farm households, rate of agricultural sector contribution to regional GDP and degree of access to market estimating from the distance from village to township etc are taken into consideration. The results of the examination are briefed in the following along with Table 4.4.4 indicating 5-step evaluation, in a scale of 1 to 5, of these indicators by TS.

1) Topography and soil conditions of the Study Area can roughly be divided into Bago Hills running through around the central part of the Study Area from the southern tip of the Area towards north and the rest of plain area. Because Bago Hills is situated in exceedingly dry area and is covered with weathered soils derived from sandstone, agricultural productivity on this hilly area is very low. Extensive upland farming predominates in overall land use along Bago Hills range except Myothit TS and Taungdwingyi TS characterized with developed paddy farming along streams, located in the south of this hilly area.

2) Out of the areas where livelihood relies on plain land, the part nearer to Bago Hills belongs to the same upland area where extensive farming is engaged. Also, upland farming is engaged in remote areas distant from the plain of Ayeyarwady River bestowed with fertile fluvial deposit soils. On the other hand, on the same plain more intensive farming is practiced in fertile farmland tracts along Ayeyarwady River and its tributaries, and in the areas located nearer to townships where economic activities are viable.

3) Intensive paddy farming develops where water resources are relatively available (farmland area located in lowland where irrigated paddy can be cultivated accounts for 28% of the whole Study Area). In addition, irrigated paddy is cropped in farmland equipped with irrigation facilities where intensity of agriculture reaches a peak. In brief, the most extensive farming is practiced on upland over Bago Hills, whereas the most intensive one engages irrigated paddy area located along Ayeyarwady River and its tributaries.

4) The geographic distribution of goats is closely correlated with rainfall distribution. In fact, around the center of the Study Area where rainfall is scanty, the population of goats tends to be larger. Also, crop area under pigeon pea that is most resistant against dry climate tends to increase. Inversely, wherever with higher precipitation farming becomes more intensive, accompanying with lowering rate of goats against cattle. In such an area draft cattle used for tillage are more held instead of goats.

5) The relation between rate of smallholders or ratio of farm households to off-farm ones and farming intensity does not distinctly appear (in common, the higher farming intensity grows the smaller farmland area per household becomes, and vice versa the more extensive farming remains the larger landholding area is required). One of the reasons of this complexity may come from incomplete aftermath of past agrarian reforms. Another conceivable reason is found in the fact

that edible oil extracted from sesame, typical extensively produced crop in upland field had been dear in the past that allowed farmers to sustain their livelihood with narrow farmland (at present, however, prices of domestically produced oilseeds have been slackened because of large imports of palm oil from Malaysia).

6) Where farm household ratio is high, i.e., rate of the landless is low, and share of agricultural sector contributing to Regional GDP is naturally high. However, high agricultural sector contribution at TS level does not necessarily warrant high farm output per farm household. While the share of agricultural sector in Regional GDP composition is high in TSs where agriculture predominates, the determinant factor of agricultural productivity in these TSs is the presence and degree of irrigated farmland that has the highest intensity among various forms of farming.

Concluding from what is mentioned above, 5 types as illustrated in Figure 4.4.1 and summarized in Table 4.4.1 are proposed as typology that are positioned in between two extremes, one representing TS located mostly along Bago Hills where the most extensive upland farming takes place and the other representing that with irrigated paddy land where the most intensive paddy farming is engaged.

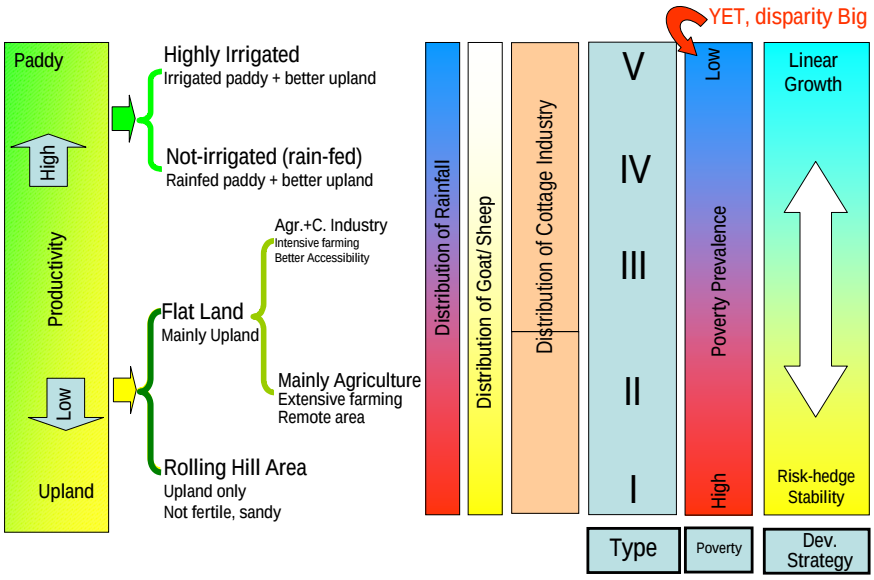


Figure 4.4.1 Typology of the Study Area

Table 4.4.1 Characteristics and Explanatory Remarks of Type I - V Observed in the Study Area

Type	Characteristics	Explanatory Remarks
I	Plateau, Extensive farming, Livestock area with goats, Inert cottage industrial activities, highly poverty stricken area	The area extends over Bago Hills. Soils are futile and very much dry due to scanty rainfall. Agricultural productivity is low and goats are raised. Poverty rate is the highest of all the area.
II	Plain, Remote and extensive farming area, Inert cottage industrial activities, high rate of poverty	Located in plain but particularly nearer to Bago Hills, or remote area from township. Farming is chiefly practiced on upland, rather extensively though soils and other ambient conditions are better than those in Type I.
III	Plain, in the vicinity of streams, fertile soil, nearer to township with favorable market access, fairly active cottage industries, medium poverty rate	Area develops along Ayeyarwady River and its tributaries. Upland farming predominates, and slightly intensive with favorable ambient conditions with better soils. Industries have more developed than type I and II because of large townships are located inside the area nearer to it.
IV	Paddy land zone, intensive farming area, more cattle are kept in place of goats, fairly active cottage industries, low poverty rate	Paddy area occupies over one-third of whole farmlands in this area. Farm productivity is higher than that in Type I - Type III owing to fairly flat farmland with more bestowed rainfall where upland extends beside paddy land. Farming becomes rather intensive. Draft cattle are more fed in place of goats. Cottage industries are highly developed near townships.
V	Intensive farming area with irrigated paddy. Draft cattle are held rather than goats, low poverty rate, but larger disparity. Industries like rice mills exist.	Paddy area occupies over one-third of whole farmlands in this area, and further one-third of them are irrigated. Farmers practice the most intensive farming. Fewer goats are reared but more draft cattle are fed. Various industries prosper from cottage scale weaving to rice milling starting by investing surplus of farm income. Poverty rate in the area is low but wider disparity is found between farm households and the landless.

Source: JICA Study Team

Further, the result of typological characterization of 51 TSs according to the proposed typology is shown in Table 4.4.2 and Figure 4.4.4. The area mainly developing over Bago Hills is typed into Type I, while the area with large extent of irrigated paddy land is classified into Type V. Thus, the nature of farming shifts from extensive to intensive as the Type proceeds from I towards V.

Table 4.4.2 Typology and Target Area of Type I - V Observed in the Study Area

Type	Characteristics	Target Area (Division / TS)	
I	Plateau, Extensive farming, Livestock area with goats, Inert cottage industrial activities, highly poverty stricken area	Mandalay (2)	Kyaukpadaung, Nyaung-U
		Sagaing (0)	
		Magway (7)	Pakokku, Pauk, Chauk, Natmauk, Minhla, Aunglan, Sinbaungwe
II	Plain, Remote and extensive farming area, Inert cottage industrial activities, high rate of poverty	Mandalay (4)	Taungtha, Natogyi, Ngazun, Mahlaing
		Sagaing (3)	Budalin, Yinmabin. Pale
		Magway (3)	Myaing, Yesagyo, Seikphyu
III	Plain, in the vicinity of streams, fertile soil, nearer to township with favorable market access, fairly active cottage industries, medium poverty rate	Mandalay (2)	Tada-U, Myingyan
		Sagaing (4)	Sagaing, Myinmu, Monywa, Salingyi
		Magway (3)	Magway, Yenangyaung, Minbu
IV	Paddy land zone, intensive farming area, more cattle are kept in place of goats, fairly active cottage industries, low poverty rate	Mandalay (3)	Meikhtila, Thazi, Wundwin
		Sagaing (6)	Myaung, Chaung-U, Ayadaw, Taze, Khin-U, Kanbalu
		Magway (7)	Myothit, Taungdwingyi, Salin, Ngaphe, Thayet, Mindon, Kamma
V	Intensive farming area with irrigated paddy. Draft cattle are held rather than goats, low poverty rate, but larger disparity. Industries like rice mills exist.	Mandalay (2)	Kyaukse, Myittha
		Sagaing (4)	Shwebo, Wetlet, Ye-U, Tabayin
		Magway (1)	Pwintbyu

Source: JICA Study Team

Likewise, annual rainfall progressively augments from Type I to Type V. Coinciding with this shift of precipitation, high rate of goats observed in Type I or Type II shifts to high rate of cattle in Type V. As to the distribution pattern of small-scale industries no distinct characterization can be mentioned. However, a tendency is detectable that cottage industries including rice milling are slightly more developed where more intensive farming is practiced, in other words favorable living conditions prevails.

Viewing the extension of typology from physiographical aspect, Type I develops over hilly area, while type II - Type V are mostly situated in flat plain. Then, Type II is found in remote areas and in the vicinity of Bago Hills where farming intensity is higher than that in Type I, but still extensive farming is practiced. Such extensive farming is shifting as area approaches to Type III to more intensive farming such as one practiced in fertile farmland along Ayeyarwady River and its tributaries.

In addition, townships are located near the area under Type III where access to market can be secured. Then, paddy cultivation that enables more intensive farming than upland cultivation is often observed in the area under Type IV and Type V. The TS in which paddy area exceeds one-third of the total farmland thereof falls into Type IV, and further out of these TSs those with more than one-third of paddy land therein irrigated fall into Type V.

Above typology is examined by a statistical analysis, e.g. principal component analysis. Table 4.4.3 shows the result of the factor proportion ratios according to the component No.1 to No.5. Factor proportional ratio means correlation ratio between the factors and the components where the nearer to 1.0 the factor is the higher positive correlation it is observed. Component one shows 0.879 in the percentage of paddy area against upland area and 0.586 in the share of irrigated area in cultivated land.

This result implies these 2 factors command the typology to greater extent whereby the above typology result is justified statistically.

Table 4.4.3 Proportional Ratios in Accordance with Factors (showing only factor No.1 – No.5)

Factor	1	2	3	4	5	Remarks
Share of marginary arable land	0.197	-0.230	-0.525	-0.430	0.445	
% of Deposit & Alluvial Soil	0.172	0.655	0.012	-0.436	-0.199	
% of Foot Plain & Terrace	-0.305	-0.351	0.424	0.716	-0.202	
Average rainfall for 5 years (2001/05)	0.510	-0.220	0.126	0.263	-0.200	
% of Goat/Sheep ag/ Cattle	**-0.841**	-0.098	-0.127	-0.256	-0.095	
% of Pigeon Pea against net sown area	**-0.643**	-0.325	0.131	-0.301	-0.061	
Average Farm Land, acre	-0.430	-0.230	-0.396	0.426	0.140	
Share of small scale farmer less than 5 acres	0.078	0.637	0.623	0.016	0.108	
% of Paddy ag/ Upland	**0.879**	0.220	-0.235	0.097	-0.101	
Share of irrigated area in cultivated land	**0.586**	0.031	-0.515	0.386	-0.028	
% of Kaing/ Kyun ag/ whole	0.078	0.687	0.255	0.043	0.150	
% of Farm Households	0.474	-0.698	0.252	-0.323	-0.100	
% of Non FHH in Rural	-0.471	0.695	-0.254	0.336	0.151	
% of Agriculture GDP	0.278	-0.366	0.401	0.196	0.523	
Agr. GDP per FHH	0.118	-0.042	0.387	-0.170	0.524	
Distance from Divisional HQs	0.118	-0.018	0.150	-0.181	-0.635	

Source: JICA Study Team

From inhabitant's extent of poverty point of view, Type I may have the highest poverty rate, and the rate would become lower as the type proceeds to Type V. In this connection, Type V in which farmers are engaged in the most intensive irrigated paddy farming may have wider disparity between irrigated landholders and the landless. Namely, though TSs falling into Type I are poor but the villagers may be uniformly poor, whereas those falling into Type V has higher average income but may be with larger economic disparity.

This estimation is exampled in Figure 4.4.2 as the case of Gini index by 6 target villages for the pilot project implemented in 2007/08. The Gini index for Mingan village which falls in the TS of Type I is 0.20 only meaning very minimal income disparity among villagers while the Gini index becomes bigger as moving toward Legaing village which falls in the TS of Type V.

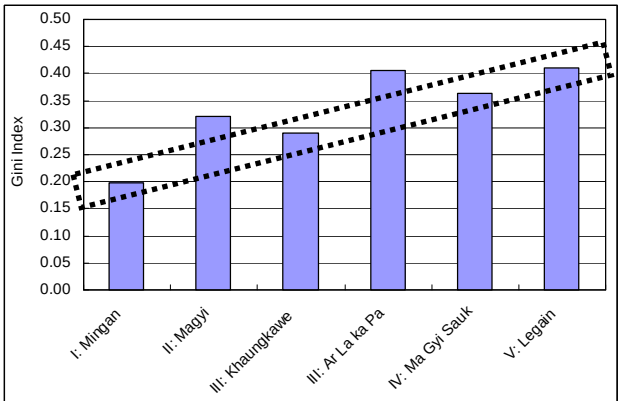


Figure 4.4.2 Gini Index by Village in Different Typologies

Since TSs falling into Type I - II are susceptible to drought damages it is not so easy to step up themselves with the accumulated surplus from farm production invested in industries. On the contrary, TSs falling into Type IV and Type V are possible to practice highly productive farming under stabilized environment, where some people can establish their own enterprises such as rice millers making use of the accumulated surplus out of farming activities.

Precarious rainfall typically in the CDZ tends to occur in the area under Type I where livelihood tends to be unstable. In contrast, TSs under Type V with high irrigation rate have capability of yielding stable and high level outputs. Reflecting these conditions, TSs under Type I require measures to stabilize currently unstable livelihood, or development based on risk-hedging as the development strategy. Under higher risk of losing output from investment, it is the best policy to refrain from venture oriented to ambitious production through straightforward input of chemical fertilizers. Whereas, TSs under Type V have tools, e.g. irrigation facilities, that can control natural vagary,

enabling to follow straightforward process of growth that entails increased outputs as very often resorted by the extension services in Myanmar. A kind of linear growth oriented development can be applied in this Type V as the development strategy.

In summary, development strategy should be changed according to the typology of the TSs in the Study Area; namely the nearer the TS is located in Type I the more risk-hedged strategy should be pursued while the nearer the TS approaches Type V, the more linear oriented growth development can be pursued. Two bipolarized strategies should be pursued in those extremes of the Study Area, and practically somewhat combined strategy with one or the other more prioritized as to which extreme the concerned TS is nearer should be applied (see Figure 4.4.3).

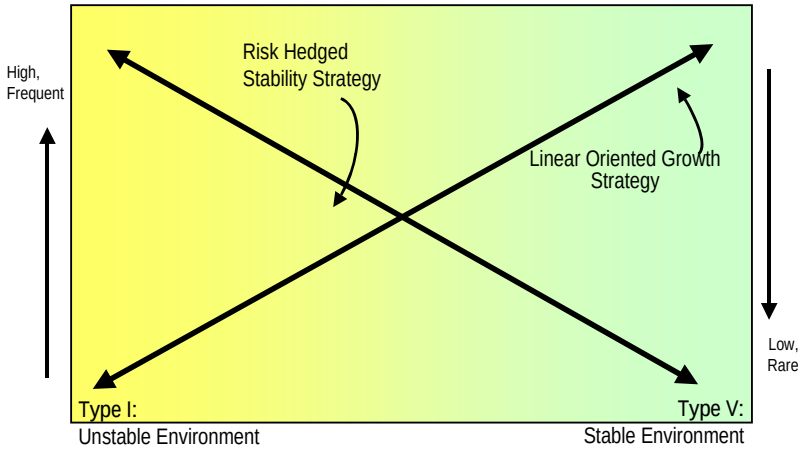


Figure 4.4.3 Development Strategy by Typology

Table 4.4.4 Typology of the Study Area

Division	District		Township	Topography	Share of marginary arable land *		% of Deposit & Alluvial Soils *		% of Foot Plain & Terrace *		Average rainfall for 5 years (2001/02) **		% of Goat/Sheep ag/ Cattle ***		% of Pigeon Pea **		Average Farm Land, acre ***		Share of small scale farmer less than 5 acres ***		% of Paddy ag/ Upland **		Share of irrigated area in cultivated land ****		% of Kaing/ Kyun ag/ whole ***		% of Farm Household **		% of Non FHH in Rural **		% of Agriculture ODF ***		Agr. GDP per FHH ***	availability of Towns *****		Distance from Divisional HQs *****		Typology
					%	Evaluation	%	Evaluation	%	Evaluation	Inch/year	Evaluation	%	Evaluation	%	Evaluation	Acre	Evaluation	%	Evaluation	%	Evaluation	%	Evaluation	%	Evaluation	%	Evaluation	%	Evaluation	%	Evaluation	%	Evaluation	000Kyats	Evaluation		Km	Evaluation	
Sagaing	Sagaing	1	S1 Sagaing	F	52.6	3	15.8	1	32	2	29.2	2	23.6	3	9.8	4	5.89	2	53.0	3	25.8	3	5.7	2	6.0		70.8	4	25.1	4	49.6	4	424	1	5	20	4	III
		2	S2 Myinmu	F	79.2	2	2.6	1	18	2	26.7	2	33.3	2	7.0	4	8.37	3	49.0	3	18.6	2	2.0	1	2.4		84.0	5	14.6	5	75.9	5	656	2	4	60	3	III
		3	S3 Myaung	F	46.7	3	27.8	2	26	2	17.4	1	23.7	3	6.5	4	7.25	2	60.0	2	34.6	4	3.1	1	27.5	4	63.1	4	33.5	3	61.2	5	579	2	1	95	3	IV
	Monywa	4	S4 Monywa	F	32.7	4	6.1	1	61	4	29.1	2	36.9	2	17.2	2	6.15	2	53.0	3	10.2	2	4.7	1	9.1		26.1	2	67.2	1	34.0	2	479	1	5	0	5	III
		5	S5 Chaung-U	F	68.0	2	28.9	2	3	1	19.3	1	50.2	1	12.7	3	6.27	2	58.0	3	35.5	4	3.3	1	18.3	3	48.1	3	43.6	2	54.7	4	562	2	2	25	4	IV
		6	S6 Ayadaw	F	12.9	5	2.1	1	85	5	34.9	3	32.8	2	15.6	2	9.60	3	22.0	4	34.2	4	6.7	2	1.9		84.9	5	4.3	5	54.5	4	430	1	3	40	4	IV
		7	S7 Budalin	F	19.6	5	2.7	1	78	4	31.3	3	21.8	3	15.2	2	7.67	3	19.0	5	21.7	2	3.4	1	0.4		90.0	5	9.6	5	62.7	5	522	2	3	35	4	II
		8	S8 Salingyi	F	95.3	1	4.7	1	0	1	29.6	2	52.2	1	13.0	3	11.35	4	14.0	5	6.1	1	1.4	1	4.6		44.7	3	31.3	1	19.5	1	50	1	3	20	4	III
		9	S9 Yinmabin	F/S	8.5	5	11.3	1	80	5	34.9	3	31.5	2	10.2	3	7.04	3	13.0	5	17.1	2	7.4	2	4.6		84.8	5	8.1	5	67.5	5	507	2	2	30	4	II
		10	S10 Pale	S	28.0	4	1.4	1	71	4	40.6	4	10.9	4	8.0	4	8.11	4	18.0	5	32.1	3	3.2	1	1.4		75.0	4	16.7	5	63.5	5	558	2	2	55	3	II
	Shwebo	11	S11 Shwebo	F	9.5	5	1.1	1	89	5	33.8	4	11.0	4	3.7	5	4.80	1	48.0	3	63.8	5	45.8	5	0.8		74.1	4	22.6	4	37.8	2	333	1	4	95	3	V
		12	S12 Taze	F	54.4	3	7.5	1	38	2	33.8	3	1.5	5	1.1	5	6.28	2	42.0	3	62.5	5	25.7	4	7.6		66.7	4	23.3	4	66.1	5	535	2	1	125	2	IV
		13	S13 Wetlet	F	39.4	4	0.8	1	60	4	38.0	4	12.4	4	4.7	5	7.48	2	20.0	4	60.2	5	41.5	5	0.8		74.6	4	21.9	4	60.0	5	589	1	3	90	3	V
		14	S14 Khin-U	F	42.2	3	5.0	1	53	3	31.0	3	7.5	5	12.4	3	17.62	5	56.0	3	46.8	4	28.1	4	0.3		41.7	3	47.6	2	72.4	5	1,432	3	3	125	2	IV
		15	S15 Ye-U	F	39.0	4	11.4	1	50	3	37.0	4	4.9	5	3.4	5	5.62	2	23.0	4	80.2	5	39.0	5	1.4		69.6	4	24.8	4	66.5	5	548	2	3	110	2	V
		16	S16 Tabayin	F	40.9	3	0.0	1	59	3	37.0	4	3.4	5	6.1	4	10.33	4	24.0	4	64.5	5	53.2	5	0.2		73.4	4	25.6	4	74.5	5	785	2	2	90	3	V
		17	S17 Kanbalu	H/F	62.7	2	0.5	1	37	2	35.5	4	4.7	5	16.7	2	10.89	4	64.0	2	36.8	4	8.9	2	0.6		79.0	4	20.0	4	59.4	4	702	2	3	180	1	IV
Mandalay	Kyaukse	18	M1 Kyaukse	H	27.7	4	62.5	4	10	1	30.4	3	12.2	4	1.8	5	5.89	2	53.0	3	58.7	5	44.4	5	1.1		40.0	3	49.2	2	19.9	1	715	2	4	50	3	V
		19	M2 Myittha	S/F	0.0	5	76.9	4	23	2	27.7	2	17.9	4	1.1	5	7.50	3	57.0	3	56.5	5	45.1	5	0.4		40.0	3	44.4	2	40.0	4	6,724	5	3	80	3	V
		20	M3 Tada-U	F	0.0	5	93.5	5	6	1	31.8	3	21.1	3	7.9	4	8.90	3	41.0	3	14.3	2	3.7	1	4.8		67.7	4	29.7	4	58.9	4	2,692	4	3	30	4	III
	Myingyan	21	M4 Myingyan	F	9.6	5	79.5	4	11	1	26.6	2	30.0	2	18.6	2	5.09	2	68.0	2	16.7	2	0.3	1	11.0	3	40.0	3	42.9	2	9.9	1	100	1	5	125	2	III
		22	M5 Taungtha	F	16.1	5	20.3	2	64	4	25.2	2	49.7	1	11.6	3	7.56	3	42.0	3	7.0	1	0.5	1	1.6		47.8	3	48.7	2	40.2	3	992	2	3	145	2	II
		23	M6 Natogyi	F	0.9	5	47.4	3	52	3	24.8	1	30.9	2	29.8	1	7.55	3	67.0	2	16.3	2	2.9	1	0.0		37.7	3	39.3	3	60.2	5	1,111	3	3	140	2	II
		24	M7 Kyaukpadaung	H	24.3	4	4.5	1	71	4	31.7	3	39.6	2	25.3	1	7.86	3	38.0	4	10.3	2	2.3	1	0.2		66.8	4	28.9	4	23.8	1	167	1	4	115	2	I
		25	M8 Ngazun	F	14.3	5	13.6	1	72	4	27.0	2	36.2	2	23.5	1	4.85	1	61.0	2	15.1	2	0.2	1	12.3	3	70.0	4	28.0	4	61.7	5	1,199	3	3	70	3	II
	Meiktila	26	M9 Meiktila	F	31.8	4	28.0	2	40	3	33.9	3	40.7	1	14.8	3	5.93	2	35.0	4	37.5	4	10.3	2	0.4		33.3	3	32.0	3	34.9	2	745	2	5	160	1	IV
		27	M10 Mahlaing	F	44.4	3	0.0	1	56	3	35.2	3	51.9	1	34.0	1	9.62	3	32.0	4	15.3	2	1.0	1	0.0		61.2	4	28.7	4	40.3	3	1,626	3	3	180	1	II
		28	M11 Thazi	S/F	63.6	2	28.9	2	8	1	28.9	2	24.1	3	2.2	5	5.79	2	61.0	2	54.2	5	14.7	2	0.7		75.6	4	21.0	4	52.1	4	1,105	3	4	180	1	IV
		29	M12 Wundwin	F/H	9.3	5	60.5	4	30	2	29.0	2	24.6	3	2.0	5	6.87	2	50.0	3	51.0	5	19.9	3	0.9		74.5	4	22.2	4	49.2	3	970	2	4	195	1	IV
	Nyaung-U	30	M13 Nyaung-U	F/H	17.0	5	38.1	2	45	3	26.6	2	45.0	1	15.6	2	8.67	3	46.0	3	0.1	1	0.0	1	0.5		75.6	4	26.5	4	66.9	5	972	2	5	155	1	I
Magway	Pakokku	31	G1 Pakokku	F/H	0.0	5	17.7	1	82	5	24.4	1	40.3	1	11.9	3	11.12	4	67.0	2	0.8	1	0.0	1	17.5	3	20.1	2	55.3	1	38.0	2	805	2	5	110	2	I
		32	G2 Pauk	F/H	0.0	5	3.7	1	96	5	44.1	4	34.0	2	4.1	5	8.82	3	66.0	2	7.6	1	0.4	1	4.3		48.6	3	46.4	2	63.2	5	745	2	3	190	1	I
		33	G3 Myaing	F	0.0	5	0.0	1	100	5	28.7	2	40.8	1	20.4	1	8.15	3	61.0	2	12.7	2	0.3	1	0.4		84.0	5	15.6	5	62.9	5	413	1	3	110	2	II
		34	G4 Yesagyo	F	0.0	5	29.8	2	70	4	20.5	1	35.9	2	2.6	5	7.93	3	80.0	1	22.1	3	0.0	1	30.2	5	28.9	2	57.3	1	57.8	4	948	2	4	70	3	II
		35	G5 Seikphyu	H/F	0.0	5	4.9	1	95	5	23.2	1	19.9	4	1.1	5	6.35	2	66.0	2	19.4	2	0.7	1	4.8		80.6	5	16.5	5	66.1	5	489	1	4	130	2	II
	Magway	36	G6 Magway	F	0.0	5	2.5	1	98	5	36.6	4	24.8	3	8.9	4	9.95	3	65.0	2	2.1	1	0.0	1	2.4		31.6	2	52.7	1	53.7	4	930	2	4	0	5	III
		37	G7 Chauk	F/H	0.0	5	1.5	1	99	5	22.6	1	43.0	1	24.4	1	10.25	4	59.0	3	1.8	1	0.0	1	2.9		36.7	2	46.9	2	45.8	3	593	2	4	125	2	I
		38	G8 Yenangyaung	F	0.0	5	3.3	1	92	5	23.2	1	38.9	2	14.6	3	10.29	4	66.0	2	0.6	1	0.0	1	10.6	3	29.0	2	59.5	1	45.7	3	871	2	4	55	3	III
		39	G9 Natmauk	F/H	4.0	5	0.0	1	96	5	34.6	3	38.2	2	13.4	3	12.15	4	45.0	3	10.4	2	0.6	1	0.0		71.5	4	26.7	4	74.2	5	790	2	3	70	3	I
		40	G10 Myothit	H/F	3.3	5	10.5	1	86	5	33.5	3	20.8	3	5.5	4	7.34	2	53.0	3	36.6	4	19.9	3	0.0		80.9	5	18.1	5	21.7	1	6,939	5	3	125	2	IV
		41	G11 Taungdwingyi	F/H	47.0	3	0.0	1	53	3	36.6	4	4.0	5	3.0	5	5.12	2	66.0	2	30.6	5	10.7	2	0.0		74.1	4	21.2	4	54.6	4	409	1	4	90	3	IV
	Minbu	42	G12 Minbu	F/S	29.0	4	9.6	1	62	4	31.1	3	14.8	4	2.7	5	9.87	3	53.0	3	30.5	3	28.2	4	10.8	3	42.9	3	48.6	2	58.8	4	1,203	3	4	10	5	III
		43	G13 Pwintbyu	F	13.0	5	24.6	2	63	4	32.8	3	19.9	4	1.0	5	11.74	4	64.0	2	66.6	5	48.7	5	26.3	4	34.9	2	62.5	1	61.4	5	1,444	3	3	60	3	V
		44	G14 Salin	F/S	2.4	5	20.6	2	77	4	23.1	1	18.9	4	3.0	5	6.23	2	81.0	1	33.3	4	23.5	3	22.6	4	71.4	4	27.2	4	63.2	5	696	2	3	80	3	IV
		45	G15 Ngape	H	10.0	5	0.0	1	90	5	46.6	5	3.0	5	7.5	4	4.91	1	88.0	1	38.5	4	11.5	2	10.9	3	52.1	3	43.1	2	59.9	4	538	2	2	70	3	IV
	Thayet	46	G16 Thayet	F	11.1	5	35.6	2	53	3	39.6	4	3.3	5	5.4	4	4.50	1	89.0	1	42.5	4	0.0	1	14.4	3	47.8	3	41.2	2	49.0	3	373	1	4	185	1	IV
		47	G17 Mindon	H	21.4	5	60.7	4	18	2	47.2	5	4.3	5	6.5	4	2.68	1	100.0	1	83.2	5	0.0	1	39.7	5	74.9	4	21.1	4	49.3	3	246	1	2	135	2	IV
		48	G18 Minhla	H	41.7	3	16.7	1	42	3	35.1	4	10.3	4	19.8	2	3.76	1	94.0	1	16.0	2	0.0	1	2.8		73.2	4	22.8	4	97.3	5	26,710	5	3	45	4	I
		49	G19 Aunglan	S/F	37.9	4	18.2	1	44	3	38.5	4	5.1	5	5.3	4	6.13	2	72.0	2	22.5	3	0.0	1	3.5		56.7	3	32.6	3	44.5	3	623	2	3	75	3	I
		50	G20 Sinbaungwe	S/F	43.8	3	0.0	1	56	4	20.3	1	16.2	4	7.8	4	6.72	2	68.0	2	13.0	2	0.0	1	1.3		60.9	4	36.9	3	63.6	5	553	2	3	95	3	I
		51	G21 Kamma	H	0.0	5	58.7	3	41	3	33.0	3	2.8	5	0.4	5	4.76	1	100.0	1	60.4	5	0.0	1	25.0	4	64.1	4	33.0	3	57.4	4	473	1	3	90	3	IV

Legend:																																							
Slope	S	over 80	1	over 80	5	80<=	5	over 40	5	over 40	1	over 20%	1	over 12.5	5	over 80	1	over 50	5	over 33	5	over 30	5	over 80%	5	over 50	1	over 60%	5	3000<	5	5: City	over 150km	1				
Slope/Flat	S/F	60 - 80	2	60 - 80	4	60 - 80	4	35 - 40	4	35 - 40	2	15 - 20	2	10 - 12.5	4	60 - 80	2	33 - 50	4	25 - 33	4	20 - 30	4	60 - 80	4	40 - 50	2	50 - 60%	4	2000 - 3000	4	4: Town	100 - 150	2	I				
Flat/Slope	F/S	40 - 60	3	40 - 60	3	40 - 60	3	30 -35	3	30 -35	3	10 - 15	3	7.5 - 10	3	40 - 60	3	20 - 33	3	15 - 25	3	10 - 20	3	40 - 60	3	30 - 40	3	40 - 50%	3	1000 - 2000	3	3: R. Town	50 - 100	3	II				
Flat/Hill	F/H	20 - 40	4	20 - 40	2	20 - 40	2	25 - 30	2	25 - 30	4	5 - 10	4	5 - 7.5	2	20 - 40	4	10 - 20	2	5 - 15	2			20 - 40	2	20 - 30	4	30-40%	2	500 - 1000	2	2: Near	20 - 50	4	III				
Hill/Flat	H/F	less than 20	5	less than 20	1	<20	1	less than 25	1	less than 25	5	less than 5	5	less than 5	1	less than 20	5	less than 10	1	less than 5	1			less than 20%	1	less than 20%	5	less than 10%	1	<500	1	1: None	less than 20	5	IV				
Hill	H																																		V				
Flat	F																																						

Source:*: MAS Division Office, **: MAS Township Office, ***: Township Profile, TFDC, Various reports from Township MAS, Settlement and Land Record Department records, ****: Land Use by MAS, *****: from 1/1million Map

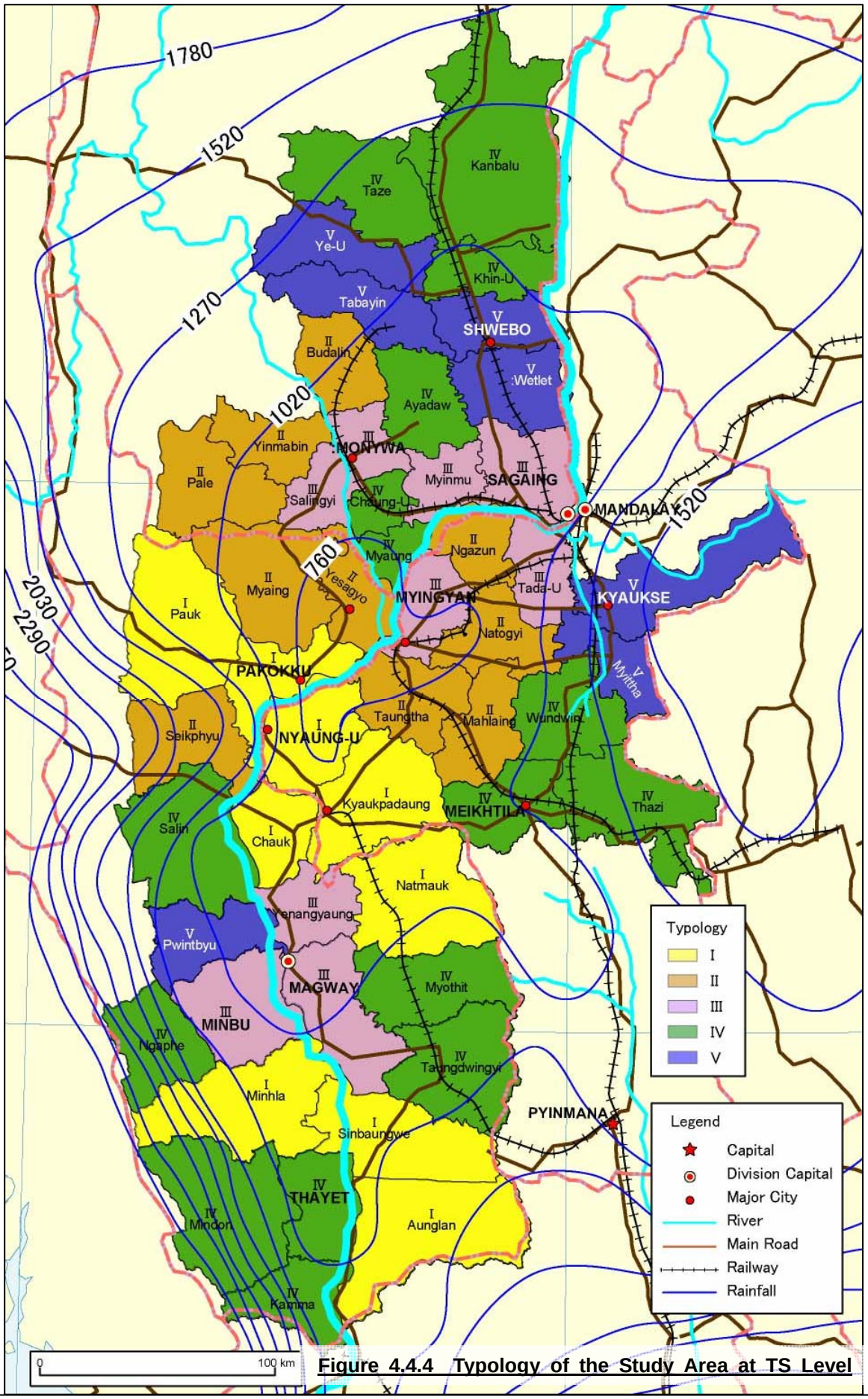


Figure 4.4.4 Typology of the Study Area at TS Level

4.5 Development Planning for the Central Dry Zone (Macro Level)

This sub-chapter undertakes development planning to meet the development vision, strategies and the typology discussed in aforementioned sub-chapter 4.4. Develop planning here is done at macro level, namely dealing with CDZ as a whole, and development planning at village level is to be carried out in the next sub-chapter '4.6 Development Planning at Village Level'.

The development planning in this sub-chapter is based on a series of participatory workshop inviting villagers as well as government officers from the concerned 3 ministries as agriculture, livestock and cottage. Summing up all the works done in the workshops together with contributions by the JICA Study Team, a prioritized CDZ framework is finally presented together with project/ programme description in a simplified project design matrix (PDM).

Development framework presented in this sub-chapter can be a guide when the concerned 3 ministries try to carry out development activities in the CDZ because the framework provides with concrete development components, those priorities by sector and by area (TS) at which what projects should be carried out. In addition, any organizations which work in CDZ can refer to the framework from which they can know where to carry out their development intervention with what priority. In this way, the frameworks can also work as a development platform where all the concerned development partners can make concerted efforts.

When considering development intervention in a village, there should be comprehensive activities required. Not only agricultural activities but also livestock, cottage industry, and other development activities would be required since there are different livelihoods even in a village. Simple example is that there are farmer households and non-farmer households in a village, thereby when thinking of village level development, agriculture alone can hardly raise the wealth of whole villagers. The framework presented here implies that such comprehensive intervention would be achieved as a result in that each concerned ministries carry out development intervention according to the priority set in the framework. Therefore, the plan can be implemented by the current government organizational set up.

On the other hand, there is another development intervention approach undertaking village from comprehensive point of view directly. A village, for example, is picked up and then plural development activities are planned and comprehensively implemented covering agriculture, livestock and cottage industry, so on. In this approach, a task team will be required to coordinate such comprehensive activities. Such task team can be organized by government concerted efforts or otherwise with a help of external organization, like JICA study team which was in charge of coordinating the activities of pilot project implementation. This approach is further elaborated in the next sub-chapter:

4.5.1 Priority Approaches and Strategies by Participatory Approach

This Study had carried out a series of participatory workshops inviting villagers engaged in 6 target villages for the pilot projects done in 2007/08, TS level government officers, district, divisional and also headquarters' level officers. The participatory workshop for the purpose of development planning was done 2 times in 2007 at the same when mid-term and final evaluation workshops for the pilot project were held. Participants to the workshops are listed as below:

Table 4.5.1 Participants to the Divisional and District Planning Workshop

Category	1st (Mid-term Eva.) Workshop 5-7 December 2007	2nd (Final Eva.) Workshop 30, 31 Jan, 1 Feb, 2008	Remarks
Headquarters Officer	8	5	
Divisional Officer	13	9	

District Officer	12	12	
Township Officer	20	17	
Villagers	32	24	
Total	85	67	

Source: Workshop supported by JICA Study Team

During the first workshop, township government officers and villagers participated in prioritization by sector, and problem identification as well as those prioritization since they are considered to be the most familiar with the situation on the ground. The sector prioritization was done in such sectors as agriculture, livestock, cottage, education, infrastructure, health, and environment. Figures 4.5.1 and 4.5.2 show the results of the prioritization, and the former shows the prioritizations by TS officers and villagers separately while the latter shows the aggregated priorities for the 2 groups.

From Figure 4.5.1, it is observed that villagers prioritized agriculture, cottage and livestock in its order, and then followed by education, infrastructure and health, and by environment. The government officers, as shown in Figure 4.5.1, prioritized agriculture, infrastructure, education in its order, and followed by livestock. Cottage industry was ranked at 2nd last next to environment. Top aggregated priority was, as shown in Figure 4.5.2, given to agriculture, and then to education, livestock, infrastructure, cottage, health and environment in its order.

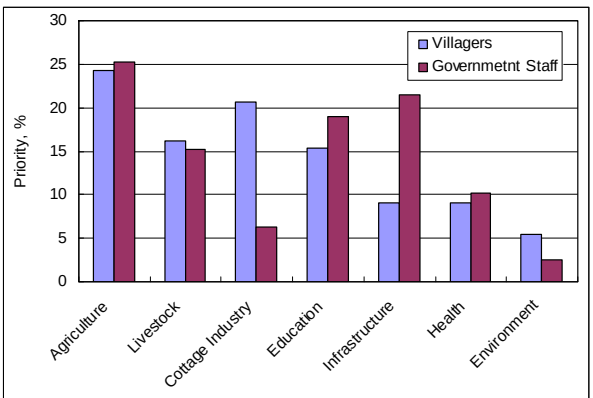


Figure 4.5.1 Prioritization by Sector by 2 Groups

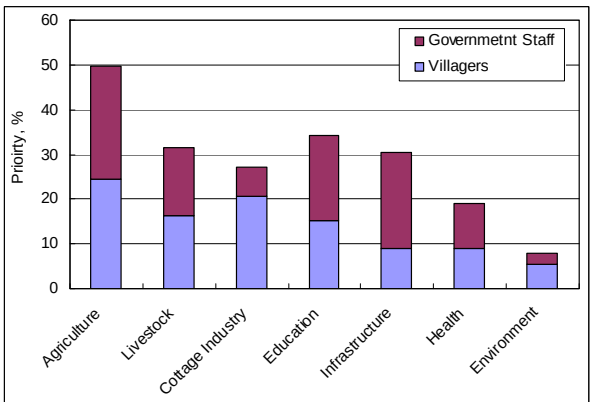


Figure 4.5.2 Aggregated Prioritization by Sector

The results implies that the villagers think of such 3 sectors as agriculture, livestock and cottage industry being most important while TS government officers give more priority to infrastructure and education after agriculture. This tendency can be seen commonly; namely, common people tend to put priority on such sectors in which they can make livelihood while government side tends to give priority to public service provisions which in this case appeared in infrastructure and education. Though health was given 2nd last priority, it may not necessarily mean they think so less important but it might be a sign that people feel health condition is not much poor.

Following the sector prioritization, villagers and TS government officers went to a problem analysis session, in which PCM problem analysis[1] was employed as the tool. The problem analysis dealt with only 3 sectors of agriculture, livestock and cottage industry which are the major sectors aimed to improve under the Study's scope. Figure 4.5.3 summarizes the analysis results, left of which was developed by TS officers while right of which by villagers. Percentage in the table shows the priority given in its level, and the problem statements are arranged in its order within the sector; namely the higher it is placed, the higher the priority is given.

Next step is to identify the priority development purposes taking into consideration the problem

[1] A tool employed in Project Cycle Management (PCM). This analysis identifies cause-effect relationship, and develop a so-called problem tree.

statement and those priorities. Basically upon converting the problem statements into positive statements, we can get preliminary development purposes, or development areas to focus, in each sector (In PCM analysis, it is called Objective Analysis). Picking up major problem statements and also dropping such problems out of our control, for example 'no rainfall' which namely cannot be solved by a project, we can have focus problems which should be tackled by project/ programme. Those focus problem statements were converted into positive statements, now called development purposes here. Development purposes were prioritized during the 2nd workshop by such 3 levels as; villagers, TS officers and higher government cadres' officers that are from headquarters, divisions and districts concerned.

Prioritization results for the purposes are given in Figure 4.5.4. The figure starts with sectors; sometimes called development approach, priority ranking by higher cadres' government officers, priority ranking by TS government officers, priority ranking by villagers, and at the most right column are the weighted ranking for those 3 levels. The higher the statement is placed the higher the priority is given in each of the development sector. 'Weighted' was done by simply giving 1 additional mark each as moving to upper statement.

Agriculture (Government TS staff)	No.1 (43%)	Our yield is low.		
		No.1 (13%)	Cultivators are weak to follow the technical instruction by MAS.	
		No.2 (10%)	We do not get enough water for farming.	
				We do not get enough water owing to weather conditions.
		No.3 (9%)	We need good and pure variety seeds.	
		No.4 (8%)	Villagers can not afford to use many inputs.	
				Inputs are expensive and so we can not use much.
		No.4 (8%)	Villagers can not do mechanized farming.	
		No.7 (5%)	Soil is not fertile.	
		No.9 (2%)	There are natural disaster (e.g. Flood).	
		No.12 (0%)	Crop type is unsuitable according to soil type.	
	No.2 (18%)	Cultivated land is small scale.		
		No.9 (1.7%)	Investment is poor.	
	No.3 (15%)	Our farm inputs are expensive but farm-gate price is low.		
		No.8 (4%)	Villagers can not wait to sell their products until farm-gate price is high.	
		No.4 (8%)	Farm inputs are expensive	
		No.11 (0.8%)	Labor charge is high.	
Livestock (Government TS staff)	No.1 (83%)	Villagers have small flock size.		
		No.1 (13%)	Villagers lack investments.	
		No.4 (8%)	Villagers do not have backyard farm.	
		No.4 (8%)	Villagers have difficulties of space for livestock.	
		No.6 (7%)	Villagers have shortage of animal feed.	
				Villagers lack pasture land.
		No.7 (4%)	Villagers have no reliable market.	
	No.2 (17%)	Villagers lack technologies.		
		No.2 (12%)	Villagers have weakness to follow the instruction by experts.	
		No.2 (12%)	Villagers have weakness to follow the technical instruction by LBVD.	
		No.3 (108%)	Villagers lack upgrade for breeding.	
		No.3 (10%)	Villagers lack first aid training.	
		No.5 (8%)	Villagers investment is poor.	
		No.8 (3.5%)	Villagers lack livestock knowledge.	
		No.9 (2.5%)	We lack fulfill the nutrient requirements.	
		No.10 (2%)	We have weakness of feeding system.	
Cottage Industries (Government TS staff)	No.1 (49%)	Villagers lack skillful technique.		
		No.3 (10%)	Villagers have lack of opportunities on cottage industries technologies.	
		No.5 (6%)	Our products are low quality.	
	No.2 (42%)	Villagers lack production.		
		No.1 (13%)	Villagers lack investments.	
		No.1 (13%)	Villagers have no modernized instruments.	
		No.2 (12%)	Villagers lack skills.	
		No.4 (9%)	Villagers lack instruments.	
		No.5 (6%)	Villagers lack raw materials.	
		No.6 (3%)	We do not have enough electricity for cottage industries.	
		No.8 (2%)	Villagers have difficulties in getting inputs.	
		No.8 (2%)	We lack cooperation and coordination.	
		No.9 (1%)	Production cost is high.	
		No.9 (1%)	The price of raw materials is high.	
	No.3 (9%)	Villagers lack market.		
		No.4 (9%)	Villagers are under control of brokers.	
		No.5 (6%)	We have no available market to sell products after produce.	
		No.6 (3%)	We have no mass production.	
				Villagers have lack of individual product.
		No.7 (2.5%)	Villagers lack wide market.	
		No.8 (1.5%)	We have poor advertising.	

Agriculture (Villagers)	No.1 (18%)	We are unable to do mechanized farming.		
		No.8 (5%)	We lack capital.	
				Our income is low.
	No.2 (17%)	It is difficult to get good variety seeds.		
		No.5 (7%)	We can not afford to buy good variety seeds.	
	No.3 (16%)	We do not get enough water for cultivation.		
		No.6 (6%)	We do not get enough irrigated water.	
		No.10 (3%)	We get less rain.	
	No.4 (15%)	Our yield is low.		
		No.2 (9%)	Input such as fertilizer is expensive.	
		No.2 (9%)	We do not have modern technology.	
		No.3 (8%)	Farming method is not correct.	
		No.4 (7%)	We suffer low yield because of insects and pests.	
		No.8 (5%)	Soil is not fertile.	
		No.12 (2.5%)	We can not afford to buy necessary inputs to get high yield.	
	No.5 (9%)	We can not grow crops in time.		
		No.9 (4%)	We lack female transplanters.	
		No.12 (2.5%)	Owing to irregular weather, we cannot grow crops in time.	
	No.6 (8%)	We own a few acres.		
		No.9 (4%)	We can not afford to buy more acres.	
		No.13 (2%)	Population grows.	
	No.7 (7%)	Inputs are expensive.		
		No.7 (5%)	We can not produce inputs by ourselves.	
		No.11 (3%)	Assistance given by the state is not enough.	
		No.13 (2%)	Transportation charges are high.	
	No.8 (6%)	We get low prices for our products.		
		No.1 (9%)	We can not do storing up.	
		No.12 (2.5%)	We had to sell our products as soon as harvesting.	
		No.12 (2.5%)	Our products are low quality.	
	No.9 (4%)	Weather is erratic.		
		No.13 (2%)	Forest is depleting.	
Livestock (Villagers)	No.1 (27%)	There are no modern technologies.		
		No.3 (16%)	There are no experts in respective sector.	
	No.2 (24%)	We have no good species.		
		No.2 (17%)	We are still sticking to conventional method.	
	No.3 (18%)	We do not get much profit.		
		No.4 (11%)	There is no stable market.	
		No.5 (9%)	We sell before well-grown up.	
		No.6 (8%)	Death rate is high owing to disease and weather.	
	No.4 (16%)	We can not do livestock breeding on large scale.		
		No.1 (20%)	We do not have enough capital.	
	No.5 (15%)	We can not feed enough food.		
		No.7 (7%)	Pastures are narrow.	
		No.8 (6%)	The price of animal food is high.	
		No.8 (6%)	We can not get enough animal food from cultivation.	
Cottage Industry (Villagers)	No.1 (24%)	We lack modern technology.		
		No.2 (11%)	There are no experts.	
		No.3 (9%)	We can not afford to learn any cottage industry skill.	
	No.2 (21%)	We are unable to use modern machines.		
		No.4 (8%)	We can not afford to buy modern machines.	
		No.8 (6%)	Because we cannot rely on electricity to a large extent.	
	No.3 (20%)	We lack market.		
		No.1 (14.5%)	We can not produce good quality goods.	
		No.7 (6%)	We can not open up a sale-shop.	
		No.9 (4%)	We can not compete with the middlemen.	
		No.9 (4%)	We can not overcome the industrialists.	
	No.4 (18%)	Our income is low		
		No.5 (7.5%)	Job-opportunity is scarce.	
		No.11 (2%)	Although the price of raw materials is high, our products get low price.	
	No.5 (13%)	It is difficult for us to get raw materials.		
		No.6 (7%)	We can not store up raw materials.	
		No.7 (6%)	Raw materials are imported from abroad.	
		No.9 (4%)	The price of raw materials is high.	
		No.10 (3%)	We can not get raw materials sufficiently within our community.	
	No.6 (4%)	We have no capital.		
		No.4 (8%)	We do not have regular income.	

Figure 4.5.3 Problem Identification and its Prioritization for the 3 sectors

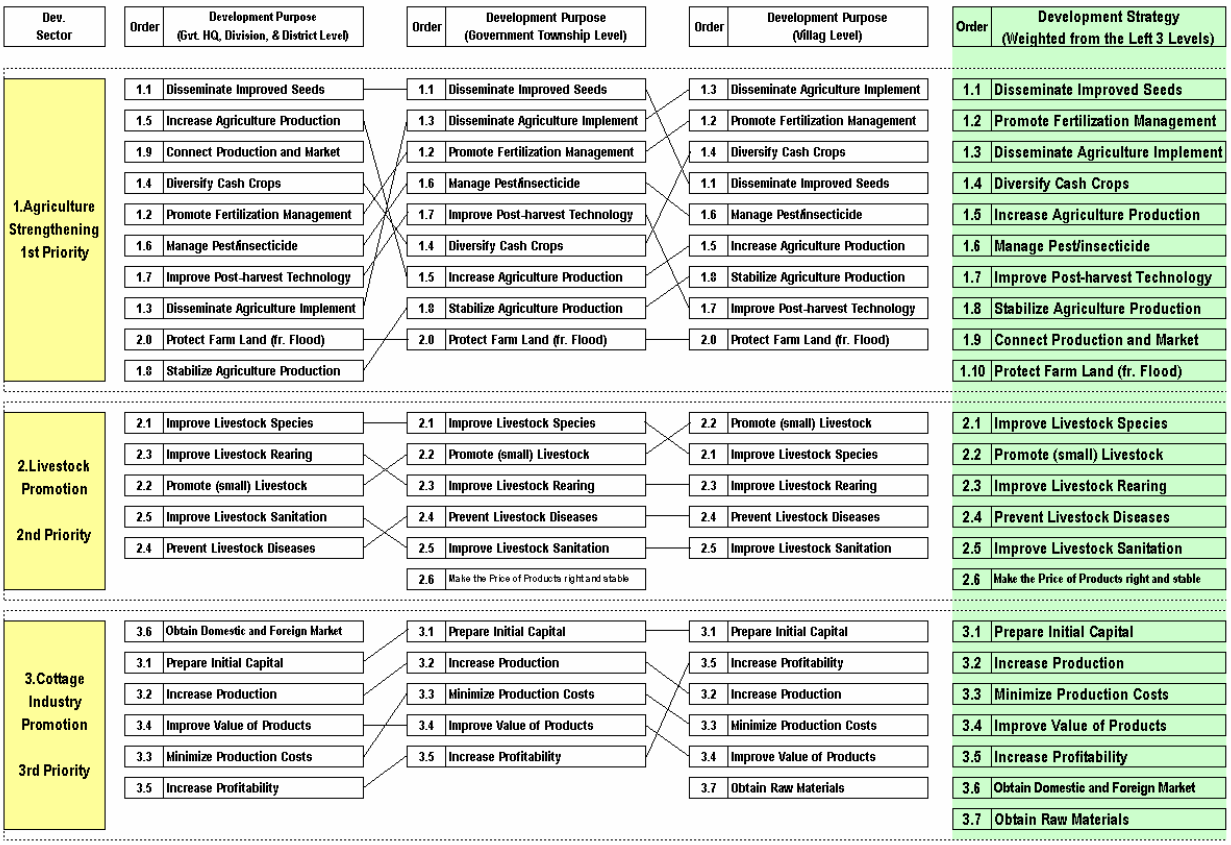


Figure 4.5.4 Prioritization of Strategies, Areas to Focus, by Different Cadres

4.5.2 Development Framework (Macro Level)

Development framework is a kind of guiding that shows us the tangible way of reaching the development vision aforementioned. It shows development sectors (approaches) and development purposes sought to achieve the development vision, as well as intervention activities that are usually called development project or development programme. The framework should also have the priority at different levels of, e.g. sector, purpose, project/ programme, with which we can consider which development interventions should be put in implementation given limited resources.

The Study Area is categorized in 5 types, and therefore if the framework can relate those projects/ programmes with the typology, it could be great help for those who are participating in developing the central dry zone area. This means that given the relationship we can know which project/ programme should be implemented in which type of the area, making development intervention easier according to the characters of the types categorized and increasing the efficiency in fund allocation as well.

Framework can be presented in several ways, and here applied is a tree structure which starts with development vision, and is cascaded to development sector, development purpose and finally down to the project/ programme. The sector should of course be related to existing government service sectors such as agriculture, livestock, industry, health, education, environment, etc., for each ministry can see and know at which parts of the sectors they are placed and how they are related with other ministries. In fact, what was practiced in the 2 times workshops aforementioned was in line with this.

An example of development framework is shown below schematically. In case of MAS, seeing the development sector of ‘agriculture strengthening, they can know what purposes they should follow

and accordingly what project/ programme they should carry out. Also related with the project/ programme is the typology illustrated at the most right hand column. Given, as an example, marks putting different priorities, they know which projects/ programmes should be carried out in which typology with how much priority being put.

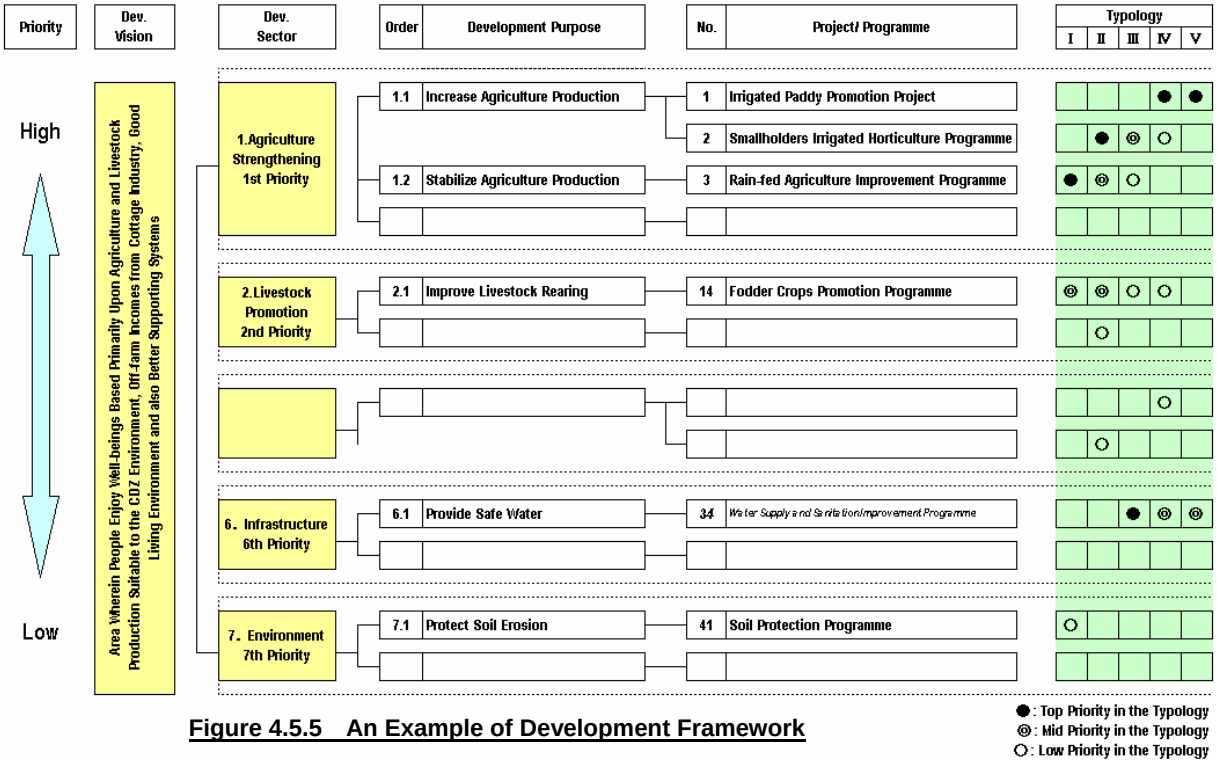


Figure 4.5.5 An Example of Development Framework

Development framework is now established as shown in Figure 4.5.6 by taking into consideration what was practiced through the workshops as well as Study Team's findings. The sectors are identified as in improving or promoting of 'Agriculture', 'Livestock', 'Cottage Industry', 'Education', 'Health', 'Infrastructure' and 'Environment' with those priorities from top side to down side according to the Study scope and also taking into account the priorities ranked by villagers and TS government officers (though TS government officers prioritized education and infrastructure higher than livestock and cottage sectors, the top 3 sectors are aligned according to the Scope of Work of this Study, that are 'Agriculture', 'Livestock', and 'Cottage'). Purposes are also placed under each of the sectors according to the priority, and accordingly projects/ programmes which were identified by the JICA Study Team together with the counterpart personnel.

At the left side from the list of the programmes/projects, there is a matrix table having such symbols as ●, ◎, ○. This matrix shows the guidance of which projects/ programmes should be carried out in which typology with how much of priority. The prioritization in the matrix was done by cross cutting from top to bottom by the typology, for example 1) half of the projects/ programmes in each typology are prioritized with the symbol of ○ (low priority), out of which half are prioritized with the symbol of ◎ (mid-priority), and again out of which half are prioritized with the symbol of ●, the top priority.

The development framework further covers; 1) identification of pro-poor projects, 2) level of environmental impact by 'A', 'B', and 'C', 3) implementing agency relative to each project, 4) collaborators to implement those projects, 5) project implementation period, 6) project cost and 7) expected fund sources. Noted here is that since this Study is of master planning, projects which require certain investment, e.g. '7. Irrigation Facilities Improvement Project', should undertake feasibility study before commencement of the investment.

As for project implementation period, the overall time frame was set to cover a total of 11 years from 2010 to 2020. Of them, year 2010 is corresponding to the end year of this Study and therefore it can be set as preparation period for those proposed programmes and projects. In this sense, the development framework covers a net total of 10 years for the implementation. This 10-year period may seem too short for a master plan period. However, taking into account the current situation of Myanmar, it may not be so meaningful to establish a master plan covering long term, e.g. 20 years or 30 years. From another point of view, many of the proposed programmes and projects can be of recurrent activities, which imply the development framework itself can be of rolling plan. Sometime after the government has implemented prioritized programmes and projects, the framework can be reviewed and rolled over to cover further periods. Therefore the development framework presented here is to cover only 10 years.

The 10-year period is composed of; 1) preparation, 2) short-term, 3) mid-term and 4) long-term periods. The terms cover 1 year, 2 years, 3 years and 5 years respectively. During the short-term period, highly prioritized programmes/projects should be carried out, and during the mid-term period, next ones be carried out. During this mid-term period, preparation for those programmes/projects which require huge investment shall also be carried out, e.g. feasibility study. Low priority programmes/projects as well as those which need huge investment are to be carried out the last term period. Programmes/projects under the 3 sectors of agriculture, livestock and cottage are summarized in the following table by the implementation term. Some programmes/projects are to be carried out covering short to mid or mid to long term period, and in this case those ones are repeated.

Table 4.5.2 Implementation Terms and Programmes/Projects

Term	Programmes and Projects
Preparation: 2010	This year corresponds to the year of the completion of this Study. Therefore this year is set aside the preparation period during which government current plans have to be adjusted and necessary fund should be secured.
Short term: 2011 - 2012 (2 years)	Agriculture Sector: 1. Certified Seeds Dissemination, 2. Low-input Agriculture Promotion, 4. Landless oriented Mushroom Promotion, 5. Small-scale Irrigated Horticulture, 6. Paddy Cultivation Improvement, 10. Rain-fed Agriculture Improvement, 11. Rain Harvesting Farmpond Establishment,
	Livestock Sector: 14. Local Bred Improvement (Cattle), 15. Goat Raising Promotion, 16. Pig Promotion, 17. Local Chicken Promotion, 20. Livestock Disease Prevention
	Cottage Sector: 23. Village Revolving Fund Establishment, 26. Product's Quality Improvement, 29. Raw Material Revolving
Mid-term: 2013 - 2015 (3 years)	Agriculture Sector: 1. Certified Seeds Dissemination, 2. Low-input Agriculture Promotion, 3. Farm Equipment and Machinery Promotion, 4. Landless oriented Mushroom Promotion, 5. Small-scale Irrigated Horticulture, 6. Paddy Cultivation Improvement, 7. Irrigation Facilities Improvement, 10. Rain-fed Agriculture Improvement, Rain Harvesting Farmpond Establishment
	Livestock Sector: 14. Local Bred Improvement (Cattle), 15. Goat Raising Promotion, 16. Pig Promotion, 17. Local Chicken Promotion, 18. Livestock Feeding Improvement, 20. Livestock Disease Prevention
	Cottage Sector: 23. Village Revolving Fund Establishment, 24. Equipment Modernization, 26. Product's Quality Improvement, 27. Cooperative Strengthening, 28. Marketing Strengthening, 29. Raw Material Revolving
Long term: 2016 - 2020 (5 years)	Agriculture Sector: 7. Irrigation Facilities Improvement, 8. Integrated Pest Management, 9. Post-harvest Improvement, 10. Rain-fed Agriculture Improvement, 12. Market Information Dissemination, 13. Farmland Protection (from floods)
	Livestock Sector: 17. Local Chicken Promotion, 18. Livestock Feeding Improvement, 19. Fodder Crops Promotion, 20. Livestock Diseases Prevention, 21. Livestock Housing Improvement, 22. Livestock Market Information Dissemination
	Cottage Sector: 24. Equipment Modernization, 25. Fuel Saving, 26. Product's Quality Improvement, 27. Cooperative Strengthening, 28. Marketing Strengthening

Figure 4.5.6 presented programmes and projects by sector, and then those priorities in relation to typology (equivalent to type of TS) were shown in the matrix. Next practice is to rearrange all those programmes and projects by typology, not by sector. Figure 4.5.7 extends the horizontal axis by 5 typologies, under each of which programmes and projects are rearranged. The higher a programme or project is placed in a specific typology, the higher priority the programme or the project is given.

In other words, those programmes and projects are rearranged within a specific typology according to the order of symbol ●, symbol ◎, symbol ○, and then no symbol which were identified in the priority matrix already shown in Figure 4.5.6. When one can refer to the Figure 4.5.7, the one can know what programmes and projects should be carried out in a specify typology of township or village. The bottom column of the Figure 4.5.7 also shows the names of the townships categorized according to the typology.

4.5.3 Project Description (Simplified Project Design Matrix)

Projects/ programmes under ‘Agriculture’, ‘Livestock’ and ‘Cottage Industry’ are elaborated in a simplified project design matrix (PDM) as attached hereto.

Figure 4.5.6 CDZ Development Framework (Macro Level)

Priority: High → Low

Dev. Vision: Area Wherein People Enjoy Well-beings Based Primarily Upon Agriculture and Livestock Production Suitable to the CDZ Environment, Off-farm Incomes from Cottage Industry, Good Living Environment and also Better Supporting Systems

Development Sector	Order	Development Purpose	No.	Project/ Programme	Typology I	Typology II	Typology III	Typology IV	Typology V	Pro-Poor	Environment Assessment A	Environment Assessment B	Environment Assessment C	Implementing Agency	Collaborators	Project Implementation 2010–2020	Cost (US$)	Expected Source
1.Agriculture Strengthening	1.1	Disseminate Improved Seeds	1	Certified Seeds Dissemination Programme	◎	●	●	●	●				○	DAR, MAS, MICDE, MADB	International Donors		440,000$	DAR, MAS, MADB, International Donors
	1.2	Promote Fertilization Management	2	Low-input Agriculture Promotion Programme	●	●	●	◎	◎				○	MAS, (MOAI)	International Donors, NGOs		128,000$	MAS, NGOs, International Donors
	1.3	Disseminate Agriculture Implement	3	Farm Equipment & Machinery Promotion Programme	○	●		○	○				○	AMD, SLRD, MAS, (MOAI)	International Donors		61,200$	FMD, Donors, NGOs
	1.4	Diversify Cash Crops	4	Landless Oriented Mushroom Promotion Programme			●	○	○	○			○	MAS, MICDE, (MOAI)	International Donors, NGOs		40,000$	MAS, Donors, NGOs
			5	Small-scale Irrigated Horticulture Programme	●	◎	◎			○		○		MAS, WRUD, MICDE, MADB	International Donors, NGOs		48,960$	MAS, MADB, NGOs, International Donors
	1.5	Increase Agriculture Production	6	Paddy Cultivation Improvement Programme				●	●			○		MAS, WRUD, (MOAI), MADB	International Donors, NGOs		74,880	MAS, MADB, International Donors
			7	Irrigation Facilities Improvement Project		◎	◎	○	○			○		ID, (MOAI)	International Donors		10M$	ID, Donors
	1.6	Manage Pest/insecticide	8	Integrated Pest Management Programme				○	◎				○	MAS, MICDE, (MOAI)	International Donors, NGOs		20,800$	MAS, NGOs
	1.7	Improve Post-harvest Technology	9	Post-harvest Improvement Programme (rice)				●	●				○	MAS, AMD, MICDE, (MOAI)	International Donors, NGOs		74,880$	MAS, Donors
	1.8	Stabilize Agriculture Production	10	Rain-fed Agriculture Improvement Programme	●	●	○						○	MAS, (MOAI)	International Donors, NGOs		70,000$	MAS, Donors, NGOs
			11	Rain Harvesting Farmpond Establishment Programme	●	●	○						○	ID, MAS, (MOAI)	International Donors, NGOs		169,480$	ID, Donors
	1.9	Connect Market and Production	12	Market Information Dissemination Programme				◎	◎				○	MAS, (MOAI)	PDC, NGOs		41,600$	MAS, NGOs
	1.10	Protect Farm Land (from Flood)	13	Farmland Protection Project (from flood)	○	○	○					○		ID, MAS, (MOAI)	International Donors		816,000$	ID, International Donors
2.Livestock Promotion	2.1	Improve Livestock Species	14	Local Breed Improvement Programme (cattle)	○	○	○	●	●				○	LBVD, (MOLF), MLFDB	International Donors, NGOs		210,000$	LBVD, MLFDB, International Donors, NGOs
	2.2	Promote (small) Livestock	15	Goat Raising Promotion Programme	●	●	◎			○			○	LBVD, (MOLF), MLFDB	International Donors, NGOs		877,500$	LBVD, MLFDB, International Donors, NGOs
			16	Pig Promotion Programme				●	●	○		○		LBVD, (MOLF)	International Donors, NGOs		362,500$	LBVD, International Donors, NGOs
			17	Local Chicken Promotion Programme	○	○	○			○			○	LBVD, (MOLF)	International Donors, NGOs		152,500$	LBVD, International Donors, NGOs
	2.3	Improve Livestock Rearing	18	Livestock Feeding Improvement Programme	◎	◎	○	○		○			○	LBVD, (MOLF)	MAS		40,000$	LBVD, International Donors, NGOs
			19	Fodder Crops Promotion Programme	◎	◎	○						○	LBVD, (MOLF)	MAS		24,000$	LBVD, International Donors, NGOs
	2.4	Prevent Livestock Diseases	20	Livestock Diseases Prevention Programme	○	○	◎	○	○				○	LBVD, (MOLF)	International Donors		125,000$	LBVD, International Donors
	2.5	Improve Livestock Sanitation	21	Livestock Housing Improvement Programme			○	○	○				○	LBVD, PDC	NGOs		11,100$	LBVD, PDC, NGOs
	2.6	Make the Price of Products right and stable	22	Livestock Market Information Dissemination Programme				○	○				○	LBVD, PDC	PDC, NGOs		50,000$	LBVD, PDC, NGOs
3.Cottage Industry Promotion	3.1	Prepare Initial Capital	23	Village Revolving Fund Establishment Programme	◎	◎	●	●	●	○			○	CID, CD, (MOC)	Companies, NGOs		1,250,000$	MOC, International Donors
	3.2	Increase Production	24	Equipment Modernization Programme	○	○	◎	○	○				○	CID, CD, (MOC)	NGOs		included in above	MOC, International Donors
	3.3	Minimize Production Costs	25	Fuel Saving Project (e.g. for Jaggery)	○	○				○			○	CD, (MOC)	NGOs		21,000$	MOC, International Donors, NGOs
	3.4	Improve Value of Products	26	Product's Quality Improvement Programme			●	◎	○				○	CID, CD, (MOC)	Companies, NGOs		60,000$	MOC, International Donors, NGOs
	3.5	Increase Profitability	27	Cooperative Strengthening Programme				◎	◎			○		CD, (MOC)	Companies, NGOs		40,000$	MOC, International Donors, NGOs
	3.6	Obtain Domestic and Foreign Market	28	Marketing Strengthening Programme	○		●	◎	○				○	CID, CD, (MOC)	PDC, Companies, NGOs		40,000$	MOC, International Donors, NGOs
	3.7	Obtain Raw Materials	29	Raw Material Revolving Programme	○	○				○			○	CID, CD, (MOC)	NGOs		80,000$	MOC, International Donors, NGOs
4.Education Improvement	4.1	Improve Education Level	30	School Education Strengthening Programme	No-priority by Typology								○	MOE	International Donors		60,000$ / division	MOE, International Donors
	4.2	Improve Education Facilities	31	Education Facilities Improvement Programme	At school facility not enough								○	MOE	International Donors, NGOs		4,000$ / place	MOE, International Donors, NGOs
	4.3	Strengthen informal Education	32	Literacy Improvement Programme	No-priority by Typology								○	MOE	TPDC, VPDC, NGOs,		3,000$ / TS	MOE, NGOs
5.Infrastructure Improvement	5.1	Provide Safe Water	33	Rural Water Supply Programme (deep well)	●	○						○		DDA, WRUD	International Donors, NGOs		45,000$ / place	DDA, WRUD, International Donors
	5.2	Generate on Renewable Energy	34	Village Electrification Project (by bio-gas)			○	○	◎			○		CD (MOC), PDC	International Donors, NGOs		9,000$ / place	Public Works, International Donors
	5.3	Improve Cooking Stove	35	Improved Cooking Stove Promotion Programme	◎	○	○						○	CD, (MOC)	TPDC, NGOs		200$ / village	MOC, NGOs
	5.4	Improve Transport Network	36	Rural Road Improvement Programme	No-priority by Typology							○		Public Work, PDC	International Donors		5,000$ / mile	Public Works, International Donors
	5.5	Mitigate Floods (alg Ayeyarwady R.)	37	Ring Levee Construction Project	Along Ayeyarwady River							○		ID, (MOAI)	International Donors		30,000$ / place	MOAI, International Donors
6.Health Improvement	6.1	Improve Rural Sanitation	38	Rural Water Supply Programme (deep well)	same as No.33 programme						same as No.33 programme			DDA, WRUD	International Donors, NGOs		same as No.33	DDA, WRUD, International Donors
			39	Livestock Housing Improvement Programme	same as No.21 Programme						same as No.21 Programme			(MOH), LBVD	NGOs		same as No.21	LBVD, International Donors
	6.2	Eradicate Child Malnutrition	40	Children's Nutrition Improvement Programme	◎	○							○	(MOH)	International Donors, NGOs		6,000$ / TS	MOH, International Donors, NGOs
	6.3	Promote Endemic Diseases	41	Primary Health Care Promotion Programme	No-priority by Typology								○	(MOH)	International Donors, NGOs		6,000$ / TS	MOH, International Donors, NGOs
	6.4	Strengthen Medical Services	42	Medical Services Strengthening Programme	No-priority by Typology								○	(MOH)	International Donors		30,000$ / TS	MOH, International Donors
7.Environment	7.1	Protect Soil Erosion	43	Soil Conservation Programme	○								○	MAS, (MOF)	International Donors, NGOs		8,000$ / TS	MAS, International Donors, NGOs
	7.2	Promote Forestation	44	Community Based Forestation Programme					○				○	(MOF)	International Donors, NGOs		12,000$ / TS	MOF, International Donors, NGOs

●: Top Priority in the Typology
◎: Mid Priority in the Typology
○: Low Priority in the Typology

A: Serious
B: Moderate
C: Not expected

Department, (Ministry)

Preparation
Implementation

Figure 4.5.7 CDZ Development Framework by Typology (Macro Level)

Dev. Vision: Area Wherein People Enjoy Well-beings Based Primarily Upon Agriculture and Livestock Production Suitable to the CDZ Environment, Off-farm Incomes from Cottage Industry, Good Living Environment and also Better Supporting Systems

Poverty Prevalence Low, yet Disparity Small ⟷ Poverty Prevalence Low, yet Disparity Big

Risk Hedged Stability Strategy ⟷ Liner Growth

Development Sector	Type I	F	NF	Type II	F	NF	Type III	F	NF	Type IV	F	NF	Type V	F	NF
1.Agriculture Strengthening (Low <- Priority -> High)	1 Certified Seeds Dissemination Programme	●		1 Certified Seeds Dissemination Programme	●		1 Certified Seeds Dissemination Programme	●		1 Certified Seeds Dissemination Programme	●		1 Certified Seeds Dissemination Programme	●	
	10 Rain-fed Agriculture Improvement Programme	●		2 Low-input Agriculture Promotion Programme	●		2 Low-input Agriculture Promotion Programme	●		6 Paddy Cultivation Improvement Programme	●		6 Paddy Cultivation Improvement Programme	●	
	2 Low-input Agriculture Promotion Programme	●		3 Farm Equipment & Machinery Promotion Programme	●		4 Landless Oriented Mushroom Promotion Programme	○	●	9 Post-harvest Improvement Programme (rice)	●		9 Post-harvest Improvement Programme (rice)	●	
	11 Rain Harvesting Farmpond Establishment Programme	●		10 Rain-fed Agriculture Improvement Programme	●		5 Small-scale Irrigated Horticulture Programme	●	○	2 Low-input Agriculture Promotion Programme	●		2 Low-input Agriculture Promotion Programme	●	
	5 Small-scale Irrigated Horticulture Programme	●	○	11 Rain Harvesting Farmpond Establishment Programme	●		7 Irrigation Facilities Improvement Project	●		12 Market Information Dissemination Programme	●		12 Market Information Dissemination Programme	●	
	3 Farm Equipment & Machinery Promotion Programme	●		7 Irrigation Facilities Improvement Project	●		11 Rain Harvesting Farmpond Establishment Programme	●		7 Irrigation Facilities Improvement Project	●		8 Integrated Pest Management Programme	●	
	13 Farmland Protection Project (from flood)	●		5 Small-scale Irrigated Horticulture Programme	●	○	10 Rain-fed Agriculture Improvement Programme	●		3 Farm Equipment & Machinery Promotion Programme	●		3 Farm Equipment & Machinery Promotion Programme	●	
	4 Landless Oriented Mushroom Promotion Programme	○	●	13 Farmland Protection Project (from flood)	●		13 Farmland Protection Project (from flood)	●		8 Integrated Pest Management Programme	●		7 Irrigation Facilities Improvement Project	●	
	7 Irrigation Facilities Improvement Project	●		4 Landless Oriented Mushroom Promotion Programme	○	●	12 Market Information Dissemination Programme	●		4 Landless Oriented Mushroom Promotion Programme	○	●	4 Landless Oriented Mushroom Promotion Programme	○	●
	8 Integrated Pest Management Programme	●		6 Paddy Cultivation Improvement Programme	●		6 Paddy Cultivation Improvement Programme	●		5 Small-scale Irrigated Horticulture Programme	●	○	5 Small-scale Irrigated Horticulture Programme	●	○
	6 Paddy Cultivation Improvement Programme	●		12 Market Information Dissemination Programme	●		9 Post-harvest Improvement Programme (rice)	●		11 Rain Harvesting Farmpond Establishment Programme	●		13 Farmland Protection Project (from flood)	●	
	12 Market Information Dissemination Programme	●		8 Integrated Pest Management Programme	●		8 Integrated Pest Management Programme	●		13 Farmland Protection Project (from flood)	●		11 Rain Harvesting Farmpond Establishment Programme	●	
	9 Post-harvest Improvement Programme (rice)	●		9 Post-harvest Improvement Programme (rice)	●		3 Farm Equipment & Machinery Promotion Programme	●		10 Rain-fed Agriculture Improvement Programme	●		10 Rain-fed Agriculture Improvement Programme	●	
2.Livestock Promotion (Low <- Priority -> High)	15 Goat Raising Promotion Programme	○	●	15 Goat Raising Promotion Programme	○	●	15 Goat Raising Promotion Programme	○	●	16 Pig Promotion Programme	○	●	14 Local Breed Improvement Programme (cattle)	●	
	18 Livestock Feeding Improvement Programme	●	●	18 Livestock Feeding Improvement Programme	●	●	20 Livestock Diseases Prevention Programme	●	●	14 Local Breed Improvement Programme (cattle)	●		16 Pig Promotion Programme	○	●
	19 Fodder Crops Promotion Programme	●	●	19 Fodder Crops Promotion Programme	●	●	14 Local Breed Improvement Programme (cattle)	●		22 Livestock Market Information Dissemination Programme	●	●	22 Livestock Market Information Dissemination Programme	●	●
	14 Local Breed Improvement Programme (cattle)	●		14 Local Breed Improvement Programme (cattle)	●		19 Fodder Crops Promotion Programme	●	●	20 Livestock Diseases Prevention Programme	●	●	20 Livestock Diseases Prevention Programme	●	●
	17 Local Chicken Promotion Programme		●	17 Local Chicken Promotion Programme		●	18 Livestock Feeding Improvement Programme	●	●	21 Livestock Housing Improvement Programme	●	●	21 Livestock Housing Improvement Programme	●	●
	20 Livestock Diseases Prevention Programme	●	●	20 Livestock Diseases Prevention Programme	●	●	21 Livestock Housing Improvement Programme	●	●	18 Livestock Feeding Improvement Programme	●	●	18 Livestock Feeding Improvement Programme	●	●
	21 Livestock Housing Improvement Programme	●	●	21 Livestock Housing Improvement Programme	●	●	17 Local Chicken Promotion Programme		●	15 Goat Raising Promotion Programme	○	●	19 Fodder Crops Promotion Programme	●	●
	22 Livestock Market Information Dissemination Programme	●	●	22 Livestock Market Information Dissemination Programme	●	●	22 Livestock Market Information Dissemination Programme	●	●	19 Fodder Crops Promotion Programme	●	●	15 Goat Raising Promotion Programme	○	●
	16 Pig Promotion Programme	○	●	16 Pig Promotion Programme	○	●	16 Pig Promotion Programme	○	●	17 Local Chicken Promotion Programme		●	17 Local Chicken Promotion Programme		●
3.Cottage Industry Promotion (Low <- Priority -> High)	23 Village Revolving Fund Establishment Programme	○	●	23 Village Revolving Fund Establishment Programme	○	●	23 Village Revolving Fund Establishment Programme	○	●	23 Village Revolving Fund Establishment Programme	○	●	23 Village Revolving Fund Establishment Programme	○	●
	29 Raw Material Revolving Programme		●	29 Raw Material Revolving Programme		●	26 Product's Quality Improvement Programme	○	●	28 Marketing Strengthening Programme	○	●	27 Cooperative Strengthening Programme	○	●
	24 Equipment Modernization Programme	○	●	24 Equipment Modernization Programme	○	●	28 Marketing Strengthening Programme	○	●	27 Cooperative Strengthening Programme	○	●	26 Product's Quality Improvement Programme	○	●
	25 Fuel Saving Project (e.g. for Jaggery)	○	●	25 Fuel Saving Project (e.g. for Jaggery)	○	●	24 Equipment Modernization Programme	○	●	26 Product's Quality Improvement Programme	○	●	24 Equipment Modernization Programme	○	●
	28 Marketing Strengthening Programme	○	●	27 Cooperative Strengthening Programme	○	●	27 Cooperative Strengthening Programme	○	●	24 Equipment Modernization Programme	○	●	28 Marketing Strengthening Programme	○	●
	26 Product's Quality Improvement Programme	○	●	28 Marketing Strengthening Programme	○	●	29 Raw Material Revolving Programme		●	29 Raw Material Revolving Programme		●	29 Raw Material Revolving Programme		●
	27 Cooperative Strengthening Programme	○	●	26 Product's Quality Improvement Programme	○	●	25 Fuel Saving Project (e.g. for Jaggery)	○	●	25 Fuel Saving Project (e.g. for Jaggery)	○	●	25 Fuel Saving Project (e.g. for Jaggery)	○	●
4.Education Improvement (High ->)	31 Education Facilities Improvement Programme			31 Education Facilities Improvement Programme			31 Education Facilities Improvement Programme			31 Education Facilities Improvement Programme			31 Education Facilities Improvement Programme		
	30 School Education Strengthening Programme			30 School Education Strengthening Programme			30 School Education Strengthening Programme			30 School Education Strengthening Programme			30 School Education Strengthening Programme		
	32 Literacy Improvement Programme			32 Literacy Improvement Programme			32 Literacy Improvement Programme			32 Literacy Improvement Programme			32 Literacy Improvement Programme		
5.Infrastructure Improvement (High ->)	33 Rural Water Supply Programme (deep well)			33 Rural Water Supply Programme (deep well)			34 Village Electrification Project (by bio-gas)			34 Village Electrification Project (by bio-gas)			34 Village Electrification Project (by bio-gas)		
	35 Improved Cooking Stove Promotion Programme			34 Village Electrification Project (by bio-gas)			35 Improved Cooking Stove Promotion Programme			36 Rural Road Improvement Programme			36 Rural Road Improvement Programme		
	34 Village Electrification Project (by bio-gas)			36 Rural Road Improvement Programme			33 Rural Water Supply Programme (deep well)			37 Ring Levee Construction Project			37 Ring Levee Construction Project		
	36 Rural Road Improvement Programme			35 Improved Cooking Stove Promotion Programme			36 Rural Road Improvement Programme			33 Rural Water Supply Programme (deep well)			33 Rural Water Supply Programme (deep well)		
	37 Ring Levee Construction Project			37 Ring Levee Construction Project			37 Ring Levee Construction Project			35 Improved Cooking Stove Promotion Programme			35 Improved Cooking Stove Promotion Programme		
6.Health Improvement (High ->)	40 Children's Nutrition Improvement Programme			41 Primary Health Care Promotion Programme			41 Primary Health Care Promotion Programme			41 Primary Health Care Promotion Programme			41 Primary Health Care Promotion Programme		
	38 Rural Water Supply Programme (deep well)			40 Children's Nutrition Improvement Programme			42 Medical Services Strengthening Programme			42 Medical Services Strengthening Programme			42 Medical Services Strengthening Programme		
	39 Livestock Housing Improvement Programme			42 Medical Services Strengthening Programme			40 Children's Nutrition Improvement Programme			39 Livestock Housing Improvement Programme			39 Livestock Housing Improvement Programme		
	41 Primary Health Care Promotion Programme			38 Rural Water Supply Programme (deep well)			39 Livestock Housing Improvement Programme			40 Children's Nutrition Improvement Programme			40 Children's Nutrition Improvement Programme		
	42 Medical Services Strengthening Programme			39 Livestock Housing Improvement Programme			38 Rural Water Supply Programme (deep well)			38 Rural Water Supply Programme (deep well)			38 Rural Water Supply Programme (deep well)		
7.Environment (↑)	43 Soil Conservation Programme			43 Soil Conservation Programme			43 Soil Conservation Programme			43 Soil Conservation Programme			44 Community Based Forestation Programme		
	44 Community Based Forestation Programme			44 Community Based Forestation Programme			44 Community Based Forestation Programme			44 Community Based Forestation Programme			43 Soil Conservation Programme		

Characteristics and Explanatory Remarks of Type I - V Observed in the Study Area and Township Names	Type I	Type II	Type III	Type IV	Type V
	Characteristics: Plateau, Extensive farming, Livestock area with goats, Inert cottage industrial activities, highly poverty stricken area **Explanatory Remarks:** The area extends over Bago Hills. Soils are futile and very much dry due to scanty rainfall. Agricultural productivity is low and goats are raised. Poverty rate is the highest of all the area. Mandalay (2) Kyaukpadaung, Nyaung-U Sagaing (0) Magway (7) Pakokku, Pauk, Chauk, Natmauk, Minhla, Aunglan, Sinbaungwe	**Characteristics:** Plain, Remote and extensive farming area, Inert cottage industrial activities, high rate of poverty **Explanatory Remarks:** Located in plain but particularly nearer to Bago Hills, or remote area from township. Farming is chiefly practiced on upland, rather extensively though soils and other ambient conditions are better than those in Type I. Mandalay (4) Taungtha, Natogyi, Ngazun, Mahlaing Sagaing (3) Budalin, Yinmabin. Pale Magway (2) Myaing, Yesagyo, Seikphyu	**Characteristics:** Plain, in the vicinity of streams, fertile soil, nearer to township with favorable market access, fairly active cottage industries, medium poverty rate **Explanatory Remarks:** Area develops along Ayeyarwady River and its tributaries. Upland farming predominates, and slightly intensive with favorable ambient conditions with better soils. Industries have more developed than type I and II because of large townships are located inside the area nearer to it. Mandalay (2) Tada-U, Myingyan Sagaing (4) Sagaing, Myinmu, Monywa, Salingyi Magway (2) Magway, Yenangyaung	**Characteristics:** Paddy land zone, intensive farming area, more cattle are kept in place of goats, fairly active cottage industries, low poverty rate **Explanatory Remarks:** Paddy area occupies over 40% in this area. Farm productivity is higher than that in Type I - Type III owing to fairly flat farmland with more bestowed rainfall where upland extends beside paddy land. Farming becomes rather intensive. Draft cattle are more fed in place of goats. Cottage industries are highly developed near townships. Mandalay (3) Meikhtila, Thazi, Wundwin Sagaing (6) Myaung, Chaung-U, Ayadaw, Taze, Khin-U, Kanbalu Magway (8) Myothit, Taungdwingyi, Minbu, Salin, Ngaphe, Thayet, Mindon, Kamma	**Characteristics:** Intensive farming area with irrigated paddy. Draft cattle are held rather than goats, low poverty rate, but larger disparity. Industries like rice mills exist. **Explanatory Remarks:** Paddy area occupies over 40% in this area, and further 40% of them are irrigated. Farmers practice the most intensive farming. Fewer goats are reared but more draft cattle are fed. Various industries prosper from cottage scale weaving to rice milling starting by investing surplus of farm income. Poverty rate in the area is low but wider disparity is found between farm households and the landless. Mandalay (2) Kyaukse, Myittha Sagaing (4) Shwebo, Wetlet, Ye-U, Tabayin Magway (1) Pwintbyu

Project / Title	**No. 1: Certified Seeds Dissemination Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	◎	●	●	●	●
Target Groups	Interested individual farmers				
Implementing Agency	DAR, MAS, MICDE, Ministry of Agriculture and Irrigation (MOAI), Myanma Agricultural Development Bank (MADB)				
Collaborators	International Donors				

Objectives: To increase agricultural productivity of the CDZ

Rationale: The yield of the crops (cereal, oil seed, forage and pulses) remains low in CDZ despite its importance to the regional economy because farmers still rely on local seeds produced in their farms every year. Certified seeds are required because good certified seed can raise crop yield by 10 to as much as 20% according to international practices.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
	■ ■ ■	▬	▬	▬	▬	▬					

Expected Outputs	**Development Indicators and Targets per Village**
・Common Farmer groups are established. ・Farmers find appropriate seed variety and technology, and adopt them. ・DAR is strengthened in providing certified seeds. ・Improved seeds are delivered from DAR to MAS, and then to contact farers, and multiplied at farmer level. ・Seeds for farmers are renewed every 2 to 3 years. ・Crop yield is increased. ・Farmer's income is increased.	・Number of groups formed in a village: 1 ・Number of farmers adopting technologies; 30 farmers/village ・Percentage of farmers who use certified seeds:10% ・Value added per acre; 5% ・Increase of farmer's income; 5% ・Increase of total production in village; 5%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize farmers. ・Selection of suitable seeds for CDZ. ・Strengthening of DAR in producing and providing certified seeds to MAS. ・Develop certified seeds by DAR ・Disseminate improved seeds for multiplication from MAS to contact farmers (in this regard, farmer participnatry seeds multiplication approch should be taken into account). ・Disseminate pre-& post harvest handling & storage facilities skills.	Seed: 10$ x 50ac = 500$ 500$ x 800villages = 400,000$ Logistics: 40,000$ Total: 440,000$	MAS, International Donors
	Note: Industrial crops such as jute, sugarcane, and especially cotton can also be included in this programme since MICDE is promoting such crops as priority strategy.	

Project Risks: Rainfall fluctuation, late release of funds

Environment Assessment (C) : Certified seeds produced in CARI and DAR are distributed to farmers, and regenerated at the contact farmer level. After that, the improved seeds are revolved amongst the farmers in a village. No farmland reclamation is included in this programme, hence no environmental negative impact is expected.

Lessons from Pilot Project: The table shows a Cropping Pattern of the Representative Crops in CDZ. In Ar La Ka Pa village, the Village Committee is making efforts to be able to carry out an improved revolving system. According to the improved revolving system, the first generation beneficiaries are, since they were provided with seeds and compound chemical fertilizer too, to hand over 2 times of the original quantity of seeds to the Village Committee as "interest" for provided chemical fertilizer.

Cropping Pattern of the Representative Crops in CDZ

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Monsoon		Early		Mid		Late						
Pre-Monsoon Paddy	▬	▬	▬	▬								▬
Post Monsoon paddy					▬	▬	▬	▬	▬			
Monsoon Sesame		▬	▬	▬								
Late Monsoon Sesame						▬	▬	▬	▬			
Monsoon Groundnut		▬	▬	▬	▬	▬	▬	▬				
Late Monsoon Groundnut					▬	▬	▬	▬	▬	▬		
Pigeon Pea		▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬

An improved revolving system

FY	Beneficiary Group	Received (A) and hand over to (B)	
		(A)	(B)
2008-09	1st	28	50
2009-10	1st	25	25
	2nd	25	25
20010-11	3rd	50	50

Project Title	**No. 2: Low-input Agriculture Promotion Programme (e.g. IMO) (Reference: Technical Manual 1.14 to 1.17, 1.19-1.20)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	●	●	●	◎	◎
Target Groups	Interested Farmers				
Implementing Agency	Myanma Agriculture Service (MAS), Ministry of Agriculture and Irrigation (MOAI)				
Collaborators	International Donors, NGOs				

Objectives: To increase agricultural productivity by introduction of organic farming

Rationale: Sandy soils are dominant in the area. These soils have problems to grow upland crops such as poor water holding capacity, erosion, low nutrient contents and capacity and location exchange capacity. To improve the soil texture and physical characteristics, applying organic fertilizers made with IMO, earthworm, EM are very effective. However, farmers do not know how to prepare organic fertilizers and the application methods. Therefore, extension of the organic fertilizer including preparation and application are very important to improve crop productivity at low price.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
	■ ■ ■	▬	▬	▬	▬	▬					

Expected Outputs	**Development Indicators and Targets per Village**
・Farmer groups are established. ・Farmers are trained and adopt organic fertilizers to their field. ・Crop productivity is improved. ・Profitability of crops is increased with cost reduction ・Soil texture especially water holding capacity of the soil is improved. ・Total crop production in village is increased	・Number of IFG's formed in a village: 1 ・Number of groups formed in a village: 1 ・Number of farmers adopting technologies 30 farmers/village ・Percentage of productivity increase: 5%. ・Increase of crop profitability with cost reduction: 5% ・Increase of water holding capacity of the soil: 10% ・Increase of total crop production in village: 5%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize farmer groups. ・Demonstration of on how to make organic fertilizers ・Disseminate the improved methods of preparation and application technology of organic fertilizers. ・Establishment of demonstration farm(s) ・Comparison of yield and profitability with crops cultivated by conventional farming methods ・Data collection and analysis	Organic Farming: 100$/village 100$ x 900 villages = 90,000$ Logistics: 38,000$ Total: 128,000$	MAS, NGOs, International Donors

Project Risks: Late release of funds, low willingness of farmers

Environment Assessment (C) : It is to utilize natural bacteria in making compost manure (IMO and EM Bokashi) and the compost made with earthworm. No negative environmental impact is expected.

Project Title	**No. 3: Farm Equipment & Machinery Promotion Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	○	●		◎	◎
Target Groups	Interested individual farmers				
Implementing Agency	Agricultural Mechanization Department (AMD), Settlement and Land Record Department (SLRD), Myanma Agriculture Service (MAS)				
Collaborators	International donors				

Objectives: To increase crop productivity with farm mechanization.

Rationale: Crop cultivation in the area is characterized by low productivity because of primitive farming practices. Especially the most popular problem is seeding practice. Usually seeds sown by hand lose about 30 % compared to mechanized seeding. Recently improved seed is dealt at high price because of its limited production. Crop production is expected almost double when using machine. Therefore, introduction of locally-made seeder is an urgent issue to increase crop productivity. Moreover, agriculture in CDZ has not been mechanized to date. Agricultural mechanization must be promoted to increase crop productivity by ploughing soil deeper.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
			■ ■ ■	■	■	■					

Expected Outputs	**Development Indicators and Targets per Village**
・Farmers groups are formed ・Farmers find the effectiveness of the new farm tools and adopt them ・Farmers are distributed improved tools and agricultural machinery is used and managed by the group. ・Increase of crop yields. ・Utilization of labor and cost-saving farm equipment expands in the CDZ. ・Village development fund using rental fee is established.	・Number of farmer group formed in a village: 1 ・Number of farmers adopting technologies: 30 farmers/village ・Seed loss reduction: 15% ・Yield increase: 20 %, increase in total crop production in village: 10% ・Increase of farmer's income: 5% ・No. of villages established village development fund: 10%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identifying and organizing farmers ・Identification of farm tools and equipment to be improved ・Identification of needs for agricultural machinery type and HP (power tiller, thresher), and its demonstration ・Manufacturing of improved tools and equipment ・Demonstration using improved farm tools and equipment and distribution*. ・Data collection and analysis in comparison with traditional farming methods by crops, by farm practice.	Seeder: 50$ 50$ x 900 villages = 45,000$ Logistics: 16,200$ Total: 61,200$	AMD, Donors, NGOs
	*Note: where there is undulated topographic condition, introduction of farm machinery may need land levelling and farm reshaping. This situation may appear in western and west-north areas of the CDZ where there are mountainous areas.	

Project Risks: Poor weather conditions, late release of funds

Environment Assessment (C) : The programme aims to lend out small scale agricultural machinery such as power tiller and thresher manufactured in China or reconditioned from AMD to the Ministry of Cooperatives in order to make current farming practices more effective. Therefore negative impact on environment is predicted. Moreover, no ambient noise with operation of farm machinery is caused because farming practices are done in daytime, and village houses and farmlands are distant each other.

Project Title	**No. 4: Landless Oriented Mushroom Promotion Programme (Reference: Technical Manual 1.1)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
			●	◎	◎
Target Groups	Interested Landless				
Implementing Agency	(MAS, MICDE, Ministry of Agriculture and Irrigation (MOAI)				
Collaborators	International Donors, NGOs				

Objectives: To diversify income source for landless and women groups

Rationale: Poverty rate of landless casual households and female headed households is extremely high in CDZ. Mushroom can be cultivated at backyard with minor cost without holding farmland and also is not affected by fluctuating and scarce rainfall in CDZ. Therefore mushroom cultivation is proposed to increase income mainly for landless households and women including female headed households.

Project Implementation	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	■ ■ ■	■	■	■	■	■					

Expected Outputs	**Development Indicators and Targets per Village**
・ Common interest groups are established. ・ Women groups and landless groups are formed. ・ Participants are taught appropriate technology and adopt them. ・ Income of landless people, especially farm/casual labours is increased and become stable. ・ Mushroom production by landless people expands. ・ Poverty ratio of landless HHs and female headed HHs is reduced.	・ Number of IL's and women groups formed in a village: 1 ・ Number of groups formed in a village: 1 ・ Number of landless and women groups adopting technologies : 30 landless and women/village ・ Total mushroom production and amount of sale: No. of Producer x yield x unit price/viss ・ Increase of household income: 10%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・ Identify and organize landless, women groups ・ Disseminate technologies of cultivating mushroom	Mushroom:30$(Bed, Seed) x 51TSs x 20villages = 30,600$, Logistics:9,400$, Total: 40,000	MAS, Donors, NGOs

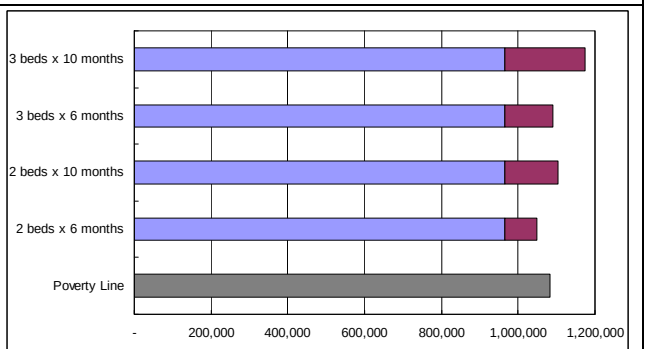
Project Risks: Unexpected heavy rain, late release of funds

Environment Assessment (C): The target group of the programme is landless people as mushroom production doesn't need farmland. Raw materials such as rice straw, water hyacinth are available abundantly in the area. No negative impact on both natural and social environment is predicted since cultivation is done in small scale targeting the pro-poor people.

Lessons from Pilot Project :

Estimation net profit of mushroom cultivation

The table shows a base of average annual income (4,000 Kyats) earned by a landless household (non-farm household) obtained in the baseline survey conducted in 6 target villages of the Pilot Project in 2007, and the additional income by mushroom culture added thereon. Also, at the base of the figure average poverty line in a landless household 1,081,000Kyats is inserted in parallel. As compared with the poverty line at 1,081,000Kyats, the mean annual income for the landless household (non-farm HH) amounts to 964,000Kyats, or lower by 11% than this line. To this amount, if the household culture mushroom at the standard scale observed in Legaing Village (3 beds x 10 months), the net profit amounted at about 210,000 Kyats is added, and then the household income exceeds the poverty line. Also, in the case of culturing mushroom for 6 months/year with 3 beds, or for 10 months/year with 2 beds, the total household income barely clears the line. The net annual profit from the culture for 6 months with 2 beds comes to around 84,000 Kyats, but in this case the total annual household income amounts to 1,048,000 Kyats, slightly failing to reach the poverty line. Mushroom culture can provide beneficial income source for the landless because it doesn't require arable land. Yet, it seems to be rather high-hurdled income generating activity for the poorest, farm laborers' households to begin with. Namely, they have to overcome a host of conditions such as access to telephone, procedures for paying inputs, provision of initial cost, yield character with great variability and access to markets etc. This may have resulted in the fact that among 15 culturists who were respondents of an interview survey conducted in Legaing Village in 2008, only 2 households engaged in farm labor service were included.



Net profit and mean household income of non-farm household

Project Title	**No. 5: Small-scale Irrigated Horticulture Programme (Reference: Technical Manual 1.5, 1.18)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	●	◎	◎	○	
Target Groups	Interested Farmers and women groups				
Implementing Agency	MAS, MICDE, Water Resources Utilization Department (WRUD), MOAI, Myanma Agricultural Development Bank (MADB)				
Collaborators	International Donors, NGOs				

Objectives: To diversify income source for smallholders

Rationale: Rice cultivation areas and some upland farm areas are endowed with relatively rich water resources such as groundwater and surface water because those areas are located along the river. Small scale irrigation in those areas is possible to cultivate vegetables, medical herbs during the dry season and fruit trees too. To diversify income source for smallholders and improve villager's diet, small-scale irrigated horticulture is proposed to the area.

Project Implementation	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
		■ ■ ■	■	■	■						

Expected Outputs	**Development Indicators and Targets per Village**
・ Interested farmer groups and women groups are established. ・ Farmers acquired appropriate technology on horticultural production and adopt them. ・ Increase in income ・ Improvement of nutrient condition of villagers	・ Number of smallholder groups formed in a village: 1 ・ Number of groups formed in a village: 1 ・ Number of farmers adopting technologies: 30 farmers/village ・ Percentage of income increase: 5% ・ Effect of nutritious improvement: BMI index by age

Major Activities in Line with the Expected Outputs	**Expected Sources**
・ Identify and organize IFG's and WG's. ・ Training for groups on vegetable cultivation and water management (basically groundwater), and also processing and preservation for perishable crops ・ Disseminate improved farming skills using small scale irrigation (water source should be primarily stream and shallow aquifer, and secondary deep groundwater as an alternate. For exploring deep groundwater see below). ・ Establishment of demonstration farm for small scale irrigation. ・ Disseminate vegetable and herb seeds, young fruit trees and fertilizer for demonstration farm.	MAS, NGOs, International Donors **Total Cost (US$)** 600$ X 3Villages X 20TSs + 12,960$ = 48,960$

Project Risks: Low farmer's willingness to horticulture

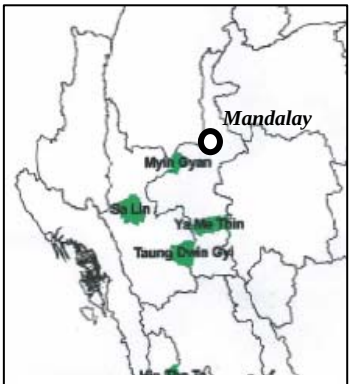
Environment Assessment (B) : Shallow well may be constructed at the edge of farmland provided by farmer. The volume of pumping water will be the level that can be pumped up by using treadle pump and small pump with engine. Namely, if groundwater level declines 7 to 8 m lower than ground level, pumping becomes difficult automatically. Therefore, both decline of groundwater level and ground settlements are not predicted. Many villages in CDZ are depending on manual pumping for water supply, so water volume being pumped up by hand pumps may be decreased if groundwater level declines 7 to 8 m. Measures to reduce impacts: Villages in CDZ form aggregated ones surrounded by hedges, and upland and paddy field are distributed nearby those village areas. Therefore, shallow wells for irrigation purpose should be installed at least 30 m distant from outskirts of the village. By doing so, impact on declining water level of shallow wells could be minimized.

Feasibility study on groundwater (for deep aquifer exploration):
Where there is no stream or shallow aquifer, there may be an option of exploring deep aquifer groundwater. However, development of deep aquifer is very costly, and therefore there should be feasibility study including sinking of exploratory wells. According to preliminary survey by WRUD, there could be 4 areas for groundwater exploration (deep aquifer) as shown in the figure; Myin Gyan, Ya Me Thin, Sa Lin, and Taung Dwin Gyi. To explore these aquifers' feasibility, following surveys should firstly be carried out:

Electric resistivity prospecting (horizontal) : 2 lines, 200 - 300 m each per point
Electric magnetic prospecting (vertical)): 300m per point

Exploratory well: 100 – 300m depth wells (50 m increment, thereby total 5 nos together with 5 observation wells) per prospective area, 150 mm steel casing and reinforced continuous wire-wrapped screens, 3 types pumping tests such as constant yield, recovery and step-draw-dawn tests.

Feasibility: approximately 30 liters per second of yield or more shall be secured from economic point of view.



Source: Project proposal of groundwater exploration and pilot development, WRUD, May 2010

Project Title	**No. 6: Paddy Cultivation Improvement Programme (Reference: Technical Manual 1.7 - 1.16)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
				●	●
Target Groups	Paddy Grower				
Implementing Agency	Myanma Agriculture Services (MAS), Water Resources Utilization Department (WRUD), MOAI, Myanma Agricultural Development Bank				
Collaborators	International Donors, NGOs				

Objectives : Dissemination of high-yielding paddy cultivation and production technology which enables to reduce cost of production and to earn more net profit.

Rationale: In CDZ, paddy cultivation has been practiced in about 30% of farmland. However, under the climate condition of erratic rainfall pattern, paddy yield has been fluctuated and resulted in low income of farmers. Meanwhile, chemical fertilizer is expensive especially for small-scale farmers, and utilization of such chemical fertilizer is risky. Considering these situations of paddy farming, ICM (integrated crop management) technologies are recommended.

Project Implementation	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	■ ■ ■	■	■	■							

Expected Outputs	**Development Indicators and Targets per Village**
・ Systematic rice growing technology is disseminated by extension staff MAS, and by farmer-to-farmer extension method. ・ Good paddy yield is realized by adopting quality seed selection, Bokashi, and Dapog method etc. ・ Net profit is increased with low production cost. ・ Farmer's income is increased. ・ Total paddy production in a village is increased.	・ Number of groups of farmers (at least 1 group, 20 villagers/ village). ・ There can be appearance of contact-farmers (3 household/village) ・ Production cost be reduced by about 10,000 Ks/ac. ・ Paddy yield can be increased by about (10) baskets/ac. ・ Farmers who go to contact-farmers to study paddy cultivation can be one-third (1/3) of all farmers (at village level). ・ Income from paddy cultivation increased by 10%.

Major Activities in Line with the Outputs	**Total Cost (US$)**	**Expected Sources**
・ Selection of model plot for demonstration. ・ Extension and demonstration concerning systematic paddy cultivation are implemented by MAS extension staff at model-plots. ・ Technical pamphlets are to be distributed to farmers (utilize technical manual as pamphlets). ・ For farmers, to practically carry out ICM* at their own farms. ・ Carry out follow-up activities by MAS extension staff.	1,800$ X 30TS = 54,000$ Logistics: 20,880$ Total: 74,880$	MAS, International Donors

* Note: one of ICM technologies is Dapog nursery. This was once introduced in Myanmar in 1980s', however it had failed. This technology cannot be tried in uneven farmland condition. Therefore it should be tried in leveled farm land also equipped with irrigation and drainage system. Another good point for Dapog is that it can be ferried to farmers by loading it on rear of motorbike. When MAS extension staff try to disseminate new variety of paddy by just distributing seeds, it may not be well disseminated but with rolled up Dapog nursery ferried by motor bike, farmers would accept the new variety at least at trial basis.

Note: In case that supplement water is required, ground water can also be an option, and in this case WRUD should be involved. In fact, WRUD has developed groundwater a lot as shown in the table right. However to develop deep aquifer, there should be a feasibility study as indicated in No. 5 Small Scale Irrigated Horticulture Programme.

Groundwater Development by WRUD

Division	Tube-well	Shallow well	Irrigated area, ac	Percentage, %
Sagaing	879	1,968	51,800	53
Mandalay	1,165	675	17,144	17
Magway	1,298	-	10,553	11
Union	5,062	2,979	98,638	100

Source: Water Resources Utilization Department, Information About Water Resources Utilization, 2009

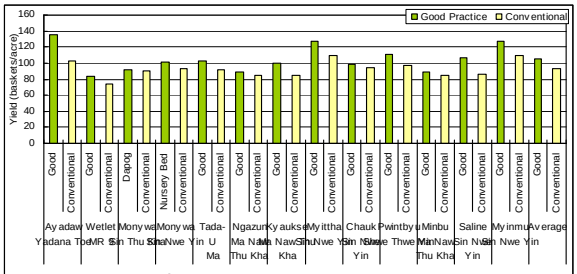
Project Risks: Management of Irrigation, drought, outbreak of disease and infestation

Project Title	**No. 6: Paddy Cultivation Improvement Programme (Reference: Technical Manual 1.7~1.16)**

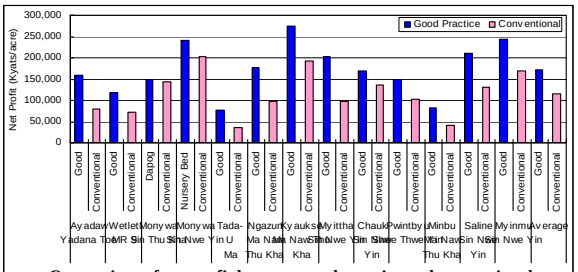
Lessons from the Pilot Project :

1. Calculation of net profit earned by ICM-based paddy cultivation

Selection of good seeds by soaking in salt water, reduced area wet-bed nursery or nursery preparation by Dapog method, systematic application of fertilizer and correct dosage, weed control, etc. are ICM-based technologies. Summer paddy (irrigated) was cultivated by good practice (ICM) and by conventional method to find out the difference of yield and cost of those two practices. The top figure on the right shows comparison of yield between good practice and conventional one. In Ayadaw, Wetlet, Tada-U and Kyaukse townships, the yield by good practice was increased by about 10 baskets/acre. In those townships, the cost for nursery preparation was less than 10% of total cost. Nursery preparation by Dapog method can protect the roots of young seedlings from being damaged and the seedlings grow very well after being transplanted.



Comparison of yield between good practice and conventional one

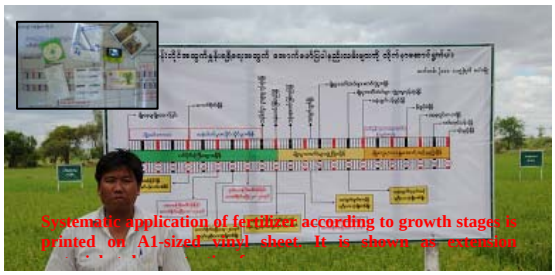


Comparison of net profit between good practice and conventional one

Seedlings of 15-25 days sown in well-prepared nursery bed are sure to get large and strong tillers when they are transplanted in main field, and by systematic application of fertilizer number of panicles with ripened grains can be increased. The right figure (below) shows comparison of net profit between good practice and conventional one. Concerning an average of net profit of (12) townships, good practice gained 173,076 kyats/ acre and conventional one gained 115,507 kyats/acre respectively. The achievement of good practice is to increase 57,570 kyats/acre net profit balance. The yield by good practice is about 12 baskets/acre more than that by conventional one. If the price of paddy per basket is calculated as 3,200 kyats, more income of 38,400 kyats/acre can be expected. On the other hand, the cost by good practice can be reduced as much as 17,710 kyats/acre than that by conventional one. Therefore, more income of 56,110 kyats/acre (38,400 + 17,710) can be expected by good practice.

2. Digital Extension

In the photo on the right is the crop calendar which shows cultivation management for paddy plants according to their growth stages. It is a vinyl sheet of 4' x 8' and the cost for the sheet is 32' x 250 kyats = 8,000 kyats. Service charge for design is 3,000 kyats and so the total cost is 11,000 kyats. Moreover, in the framed-photo a VCD which recorded the process of extension activities in digital photos is shown. The charge for copying is 1,000 kyats/disc. Then, clockwise from the CD are a large vinyl sheet described a method of providing paddy husk charcoal with kinds of materials and their required quantities, a MP4 player, a book of pictures, a technical hand book distributed in the last training, a crop calendar in A4 size, and a leaflet. In Kyaukse township, extension work by using MP4 player is being carried out, showing recorded video-photos to farmers. It is learnt that the price of a MP4 player is about 25,000 kyats.



Project Title	**No. 7: Irrigation Facilities Improvement Project**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
		◎	◎	○	○
Target Groups	Interested Farmers				
Implementing Agency	Irrigation Department (ID), MOAI				
Collaborators	International Donors				

Objectives: To increase crop yield with year-round irrigation

Rationale: Irrigated farmland in CDZ is only 13% at present, meaning most of farmers rely on scarce and fluctuated rainfall, and in addition drought has broken out every 3 to 5 years. Under the condition, irrigation is the key factor for farmers to get stable harvest to feed family. In fact, there exist farmlands without equipped on-farm facilities such as farm ditch, diversion work etc. despite that they have already constructed main and secondary canals etc. In order to irrigate those kinds of farmland, on-farm irrigation facilities need to be constructed/improved.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
		▪▪▪	▪▪▪	▪▪▪	▬	▬	▬	▬	▬		

Expected Outputs	**Development Indicators and Targets per Village**
・Interested farmer groups are established. ・Farmland is equipped with irrigation facilities. ・Land use ratio is increased. ・Yield and total crop production are increased. ・Increase in farm income. ・Poverty ratio in the irrigated area is alleviated	・1 nr. of farmer groups formed in a village ・Farmlands newly equipped with irrigation facilities: 5% ・Percentage of increase of crop yield and production: 10% ・Percentage of farm income increase: 10% ・Percentage of increase of land use ratio:5% ・Reduction of poverty ratio: 3%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify farmland without on-farm irrigation facilities under irrigation project that had been implemented. ・Organizing beneficial farmer groups as WUA ・Designing and carry out the cost estimation for on-farm facilities (also, examine the feasibility of introducing micro hydropower generation within the canal where there is enough hydraulic gradient for generation*). ・Construction of on-farm facilities. ・Operation and maintenance of on-farm facilities by beneficial groups. *Note: maximum power is given by: KW = 9.8 x Q (flow) x h (effective head) x efficiency (0.7 in most cases). According to a theory, minimum head should be more than 1 m, however from practical point of view at least 3 m effective head is required or turbine becomes bigger thereby resulting in financial non-feasibility.	2M$ X 5years Total: 10M$	ID, Donors

Project Risks: Late release of fund

Environment Assessment (B) : On-farm facilities are constructed to improve farming condition of the existing farmlands where many farmers have already cultivated crops. Therefore excavation and transportation of the soil volume will be small. Measures to reduce impacts: The on-farm irrigation facilities should be designed carefully to minimize volume of the soil to be moved, and also to minimize pollution of river/creeks. In addition, transportation of various construction materials by truck should be controlled carefully to avoid accident when passing residential areas.

Project Title	**No. 8: Integrated Pest Management Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
				○	◎
Target Groups	Interested Farmers				
Implementing Agency	MAS, MICDE, MOAI				
Collaborators	International Donors, NGOs				

Objectives: To reduce crop damage and to increase crop yield

Rationale: One of the issues on agricultural production in CDZ is crop damage with pests. According to farmers, they have experienced pest damage very seriously. Once pest damage breaks out combined with drought, farmer's income is seriously affected. In order to reduce pest damage, Integrated Pest Management (IPM) technology should be applied to control pest damage on farm level. IPM is an effective and environmentally sensitive approach to pest management, which relies on combination of rotating farming, selecting pest-resistant varieties, and pest-free rootstock, including pheromones to disrupt pest mating, mechanical control such as trapping (sweet oil etc) or weeding. However, farmers are not aware of controlling pest damage with IPM technology.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
						■ ■ ■ ■	■ ■ ■	■	■	■	■

Expected Outputs	**Development Indicators and Targets per Village**
・Interested farmer groups are established. ・Suitable control means to prevent crop damage in the area are developed ・Farmers acquired appropriate technology on IPM ・Reduce of economic loss ・Stabilization of crop production	・Number of farmers groups formed in a village: 1 ・Number of booklets on IPM distributed: 300 ・Number of farmers adopting technologies: 30 farmers/village ・Expected percentage of reduce of economic loss: 5%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize IFGs ・Identification of pests and their life cycle ・Identification of proper pheromone for insects ・Identification of pest-resistant varieties of crops ・Monitoring insect's activity on farm by season ・Preparation of booklet showing practical application of IPM on farm level ・Establishment of demonstration plot(s) ・Training for groups and disseminate booklet on IPM ・Establishment of demonstration farm.	250$ X 13TSs = 3,250$ 3,250$ X 4yrs = 13,000$ Logistics: 7,800$ Total: 20,800$	MAS, NGOs

Project Risks: Low farmer's willingness to IPM technology

Environment Assessment (C) : The emphasis of IPM technology is on control, not eradication. The first work for IPM is to establish acceptable pest level on farm to minimize pest damage. Then suitable means such as application of pest-resistant varieties, traps etc are to be planned to control pests. Therefore, negative impact is not predicted.

Project Title	**No.9: Post-harvest (e.g. rice) Improvement (Reference: Technical Manual 1.21)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
				●	●
Target Groups	Interested individual farmers and Youth groups				
Implementing Agency	MAS, MICDE, Agriculture Mechanization Department (AMD), MOAI				
Collaborators	International Donors, NGOs				

Objectives: To increase income for farmers through the improvement of post harvest technologies especially on drying paddy

Rationale: Marketing prices of crops especially rice and pulses are depending on moisture content of those crops. Myanmar people prefer long-stored rice because of its fragrance, which is dealt at higher price. However, farmer in the area usually sells paddy just after the harvesting because they do not have proper warehouse to store crops along with lack of post harvest technology. Therefore, more construction of storages is necessary to sell those crops at higher price in parallel with improvement of post harvest technologies. One of issues on summer paddy is drying after harvesting. By drying paddy with high moisture content using energy of rice husk, farmer can sell paddy at good price.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
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Expected Outputs	**Development Indicators and Targets per Village**
・Common interested groups are established. ・Women groups and youth groups are formed. ・Farmers acquire appropriate post harvest technologies and adopt them. ・Post-harvest losses are reduced. ・Farm products are added its value. ・Increase of farmer's income.	・Number of IFG's formed in a village: 1 ・Number of groups formed and trained in a village: 1 ・Number of storage constructed: 1 ・Number of farmers adopting technologies: 30 farmers/village ・Reduction of loss:5% ・Increase of farmgate prices: 5% ・Increase of farmer's income: 10%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize IFG's. ・Construct storage for demonstration ・Construction of paddy dryer ・Disseminate improved storage skills and improved paddy drying skills ・Disseminate pre- and post harvest handling skills	Preparation: 500$ x 30TSs = 15,000$ Storage Facility: 1,000$ 1,000$ x 30TSs = 30,000 Logistics: 29,880$ Total: 74,880$	MAS, Donors

Project Risks: Weather conditions, late release of funds

Environment Assessment (C) : The things what are proposed are introduction of paddy dryer for summer season paddy and storage technology. As to paddy dryer, rice husk is used for fuel source and its waste (ash) is used for nursery bed etc as supplemental fertilizer. Since storage is constructed using wood and bamboo thatch by farmer themselves, no negative impact is predicted as well.

Project Title	**No. 10: Rain-fed Agriculture Improvement Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	●	●			
Target Groups	Youth groups and interested individual farmers				
Implementing Agency	Myanma Agriculture Services (MAS), MOAI				
Collaborators	International Donors, NGOs				

Objectives: To stabilize agriculture production in the central dry zone.

Rationale: About 70% of cultivated areas in CDZ are occupied by upland, implying about 70% of farmers are living on those rain-fed upland farming. Agriculture productions in undulating upland areas prone to be damaged by fluctuating and scarce rainfall and soil erosion. It is said that the unstable crop production is the biggest cause of poverty not only for farmers but also farm workers of landless people. To stabilise agriculture production appropriate cropping system such as alley cropping and contour farming are proposed in the rain-fed upland areas with undulating land condition.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
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Expected Outputs	**Development Indicators and Targets per Village**
・Interested farmer groups are established. ・Farmers acquire appropriate technologies on rain-fed farming and adopt them. ・Agriculture production in rain-fed uplands becomes stable. ・Farmer's income increases. ・Farmland is preserved. ・Improved technology for upland farming is extended to other areas.	・Number of IFG's formed in a village: 1 ・Number of groups formed in a village: 1 ・Number of farmers adopting the technologies: 30 farmers/village ・Acreage developed under the programme: 1 acre ・Increase of crop yield: 5% ・Increase of farmer's income: 5%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identification of rain-fed areas to be developed under the programme. ・Identify and organize IFG's. ・Construction of model farm(s) in the selected area(s) ・Disseminate upland farming skills such as contour farming and agro-forestry etc. ・Disseminate seedlings such as fruit trees, forage trees and windbreak.	Preparation: 500$ x 30TSs = 15,000$ Construction: 1,000$ 1,000$ x 30TSs = 30,000 Demo Farming: 500$ x 30TSs = 15,000$ Logistics: 10,000$ Total: 70,000$	MAS, Donors, NGOs

Project Risks: Weather conditions, late release of funds

Environment Assessment (C) : The programme aims to improve rain-fed farming which has been practiced under the unstable rainfall condition. It is composed of introduction of contour farming at sloped areas, dosage of compost to improve soil texture at flat and sloped areas, introduction of mulching using farm residues to cover field surface and introduction of drought tolerant crops etc. Since the programme is planned a part of environment preservation, any negative impacts are predicted.

Project Title	**No. 11: Rain Harvesting Farmpond Establishment Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	●	●	○		
Target Groups	Youth groups and interested individual farmers				
Implementing Agency	Irrigation Department (ID), Myanma Agriculture Services (MAS), MOAI				
Collaborators	International Donors, NGOs				

Objectives: To stabilize agriculture production in the central dry zone.

Rationale: About 70% of cultivated areas in CDZ are occupied by upland, implying about 70% of farmers are relying on those rain-fed upland farming. In order to make use of rain water for farming purpose, construction of farm pond to impound rain is effective way to irrigate rain fed farming areas. By doing so, crop productivity in upland areas will be increased and stabilized, and people's living standard will be improved as well.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
		■ ■ ■ ▮	▬	▬	▬					

Expected Outputs	**Development Indicators and Targets per Village**
・Interested farmer groups are established. ・Farmers acquire appropriate technologies on rain-fed farming and adopt them. ・Agriculture production in rain-fed uplands becomes stable. ・Farmer's income increases.	・Number of IFG's formed in a village: 1 ・Number of groups formed in a village: 1 ・Number of farmers adopting the technologies: 30 farmers/village ・Acreage developed under the programme: 10 acre ・Increase of crop yield: 5% ・Increase of farmer's income: 10%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identification of rain-fed areas to construct a farm pond under the programme. ・Identify and organize farmers groups. ・Construction of model farm pond(s) and model farm(s) in the selected area(s). ・Disseminate upland farming skills such as water saving farming and agro-forestry etc.	5,000$ X 30TS = 150,000$ Arrangement: 18,480$ Total: 168,480$	ID, Donors

Project Risks: Weather conditions, late release of funds, geological condition of the site(s) to store water

Environment Assessment (B) : The programme aims to improve rain-fed farming which has been practiced under the unstable rainfall condition. It is composed of introduction of construction of farm pond and model farm in rain-fed farming areas. Measures to reduce impacts: Site shall be selected carefully and design shall be done carefully to minimize soil volume to be excavated and transported. Traffic of trucks for construction work shall be controlled carefully when passing residential areas.

Project Title	**No. 12: Market Information Dissemination Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
				◎	◎
Target Groups	Youth groups and interested individual farmers				
Implementing Agency	Myanma Agriculture Services (MAS), MOAI				
Collaborators	PDC, NGOs				

Objectives: To stabilize agriculture production in the central dry zone.

Rationale: Market information especially unit prices of various commodities are very important for farmers to sell them at higher prices as possible as they can. When swine flu broke out in 2009, pig price had come down even in CDZ, but in a few villages, beneficiaries could sell pig at the reasonable price as compared to other villages because they could know current market price through merchant and villagers. Like this, if they are provided market information, they will be able to know proper selling time and can get higher profit. In addition, they can know the market to which they can sell products at higher price than other markets.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
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Expected Outputs	**Development Indicators and Targets per Village**
・Interested farmer groups are established. ・Farmers acquire latest market price of commodities by each market. ・Farmer's income increases. ・Marketing activities by farmers themselves are encouraged.	・Number of IFG's formed in a village: 1 ・Number of groups formed in a village: 1 ・Number of farmers involving this programme: 30 farmers/village ・Frequency of market information distributed to farmers: once every 2 weeks ・Number of farmers who could know market news: 10% ・Increase of farmer's income: 3%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize IFG's. ・Identification of major market(s) ・Identification of major commodities to be collected prices for farmers ・Identification of information means suitable for farmers ・Record keeping of market prices all year round to know trend by commodity ・Dissemination of weekly or monthly basis price to farmers	500$ X 20TSs X 4yrs = 40,000$ Arrangement: 1,600$ Total: 41,600$	MAS, NGOs

Project Risks: Low willingness of farmers to this programme, late release of funds

Environment Assessment (C): The programme deals with market information for farmers to sell their products at higher prices considering condition of demand and supply of each products. Therefore, no negative impact is predicted.

Project Title	**No. 13: Farmland Protection Project (from flood)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	○	○	○		
Target Groups	Youth groups and interested individual farmers				
Implementing Agency	Irrigation Department (ID), Myanma Agriculture Services (MAS), MOAI				
Collaborators	International Donors				

Objectives: To stabilize agriculture production in the central dry zone.

Rationale: Though CDZ is known as dry area, flood damage has caused especially in lowland located beside rivers depending on year. In fact, one of the pilot project villages for FY 2007 was flooded for 3 to 5 months and flood damage happened not only on crops but also on livestock and housing. Moreover people's livelihood was also seriously affected. By constructing banks along river(s) flood damage will be able to reduce and village life also be improved as well.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
							■■■■	■■■■	■■■■	■■■■	■■■■

Expected Outputs	**Development Indicators and Targets per Village**
・Reduction of crop damage. ・Reduction of loss of village infrastructure. ・Reduction of loss in livestock. ・Reduction of economic loss of farmers	・Bank length and height: (to be estimated by survey) ・Farmer' group organized in a village: 1 group/village ・Reduction of loss crop damage: 80% ・Reduction of loss in livestock damage: 50% ・Reduction of loss in infrastructure: 60% ・Reduction of economic loss of farmers: 70%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify area(s) and flood damage frequency. ・Measurement of the site(s) ・Design and cost estimation ・Economic study on feasibility ・Organize people for O & M ・Construct bank(s) along river (s) and drainage canal(s)	10,000$ X 17TSs X 3yers = 510,000 Arrangement: 306,000$ Total 816,000$	ID, International Donors

Project Risks: Weather conditions, late release of funds

Precondition of this Project: During the flood, the floods, as a positive impact, may deposit large amount of sediments to the farmland which work as natural fertilizers benefiting the farmers periodically. Therefore, it is necessary to make an additional investigation about the ecosystem and the effect of this project upon beneficial processes to farmland apart from its protection.

Environment Assessment (B) : The objective of this programme is to prevent farmlands along Ayeyarwady River from flood and submergence. Construction of large scale drainage pump station is not included, and major work is to embank surrounding farmlands developed along the Ayeyarwady River. However, it is predicted that some areas may be lost with embankment work. Measures to reduce impacts: The magnitude of embankment work surrounding farmlands will be limited at 1.5m height that can be constructed by simple machinery and manpower. To minimize loss of land, it will be necessary to embank in the direction of Ayeyarwady River. When constructing bank, the work will be done at the lowest part of farmlands as far as possible so as to not touch marshlands (in other words, any farmland reclamation is not planned at the marshlands).

Project Title	**No. 14: Local Breed Improvement Programme (cattle & goat)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	○	○	○	●	●
Target Groups	Farm households owning local cattle/goats				
Implementing Agency	Livestock Breeding and Veterinary Department (LBVD), Ministry of Livestock and Fisheries (MOLF), Myanma Livestock and Fisheries Development Bank (MLFDB)				
Collaborators	International Donors, NGOs				

Objectives: To improve productivity of cattle and local goats

Rationale: Since agricultural mechanization has been underdeveloped in the CDZ, draft cattle are indispensable for farm households. However, the size and capacity of local cattle have trend to become smaller and smaller year by year, according to cattle owners. Cattle and draft cattle are necessary mainly for farmers and goats mainly for the poor as well. In order to increase productivity of those livestock natural mating is to be planned which is suitable mean if considering current situation of LBVD's capability and condition of CDZ. Goats (Indian Nubian breed) for breeding are to be imported from India.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
	■ ■ ■	■	■	■							

Expected Outputs	**Development Indicators and Targets per Village**
・Common interest groups are organized. ・Power and productivity of local cattle will be increased ・A provided breeding bull is managed and replaced every 5 to 6 years using ・Body size of local goats become bigger collected mating fee ・Quality goats are distributed	・Number of breeding bull delivered: 1 head/village ・Number of female cows mated: 50 head/year ・Number of cattle owners asked mating by a bull: 50HHs/village ・Number of calves born by mating: 40 calves ・Imported breeding goats: 5 head/village ・Number of kid being born: 5~8 head/year

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize villagers and bull group ・Breed and mate bull ・Collection of charge to purchase a breeding bull for replacement ・Collective use of delivered breeding bull among group	Bull: 700 x 10Villages X 10TSs X 3years = Total: 210,000$	LBVD, International Donors, NGOs

Project Risks: Sudden death of provided bulls

Environment Assessment (C) : The programme aims to improve local cattle and goats using natural mating. Any impacts on eco-system are not forecasted since native breed is used in the programme.

Lessons from Pilot Project:

Estimation net profit of bull raising

In Legaing village, a bull (Shwe Ni breed) purchased in 2007 was changed into a new bull on October 2008 since beneficiaries considered that the former bull does not have enough qualification as a breeding bull. The new bull (also Shwe Ni breed) with brownish skin and aged 1.5 to 2 years old was bought at 430,000 Kyats. As the former bull could be sold at 400,000 Kyats, they had to borrow 30,000 Kyats from the village fund also established in this village as a part of FY 2007/08 pilot projects without interest. Mating charge is 3,000 Kyats/time. As of January 2010, 57 cows were served and 18 calves were born. This bull became very famous in and around the village since villagers recognized good qualification of calves. Though the owner has spent on feeding more than the income from mating, he can now expect that the balance will be improved in near future according to increase of the mating.

New bull (Shwe Ni) in Legaing Village had served for 57 cows and got 18 calves to date.

Project Title	**No. 15: Goat Raising Promotion Programme (Reference: Technical Manual 2.1, 2.3)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	●	●	◎		
Target Groups	Landless casual/farm workers and small scale farm household				
Implementing Agency	Livestock Breeding and Veterinary Department (LBVD), MOLF, Myanma Livestock and Fisheries Development Bank (MLFDB)				
Collaborators	International Donors, NGOs				

Objectives: To generate stable income source to supplement inadequate income from farm wage

Rationale: Landless households and smallholders form poor strata in the CDZ. They are mainly living on low income from farm work in vulnerable agriculture. Small ruminant raising can be done without holding farmland and without running cost. Reflecting higher demand for goat meat, small ruminant raising is considered very promising. All the beneficiaries are required to construct improved goat housing with raised floor. Based on the proposed revolving system, no. of beneficiaries will be able to increase yearly basis. Therefore small ruminants will contribute to improve living standard of the poor.

Project Implementation	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	■ ■ ■	■	■	■	■	■					

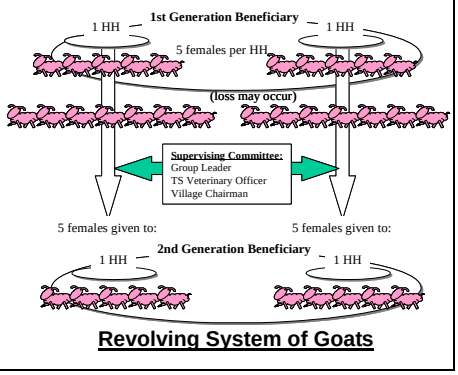
Expected Outputs	**Development Indicators and Targets per Village**
・ Income of the poor is increased ・ Poverty ratio in village is decreased ・ Economic disparity in village is improved. ・ Living standard of the poor is improved. ・ Utilization of UMMB is extended in village	・ Number of goats beneficiary groups: 2(10HHs) ・ Number of goats delivered: 50 head (5 head/HH) ・ Number of kid born : 80 head/year ・ Nr. of goats died including kids:10 head/year ・ Nr. of goats to 2nd generation: 75 for 15HHs ・ Percentage of beneficiary using UMMB:80%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・ Identify and organize goat raising groups ・ Procure and deliver goats (female and male) with vaccination ・ Construction of model goat housing ・ Handover goats to next generation ・ Data collection and monitoring	Nubian Goat: 35 x 50Heads 10Villages X 10TSs X 5years = 875,000$, Logistics: 2,500$, Total: 877,500$ *Note: For the caccination, LBVD should vaccinate all goats and sheep whenever the LBVD implements this goat/sheep revolving project since beneficiaries of goat/sheep raising project are generally poor.*	LBVD, International Donors, NGOs

Project Risks: Before the project commencement, carrying capacity of existing grazing ground should be examined to estimate the number of livestock to be grazed in each TS including by-product of crops such as rice straw in order to avoid overgrazing. If the number of existing livestock exceeds the calculated number, excessive number must be sold to keep balance of the carrying capacity of grazing ground. In the calculation, livestock unit defined in Myanmar shall be used." General project risks are; outbreak of infectious diseases, overgrazing in future as mentioned above.

Environment Assessment (C) : Under the programme, native goats are to be distributed to the poor to revolve kids born to 2nd generation beneficiaries, aiming at reducing poverty based on the proposed revolving system. It is expected to contribute to improve economic disparity in village as the programme is targeting pro-poor. Any negative impacts, therefore, are predicted.

Lessons from Pilot Project: 5 original goats are provided for a household, so the total heads come to 75 per village for 15 beneficiaries. The beneficiary household will hand the same 5 heads of kids (she-goats) out of the offspring born from the received stocks over to the secondary beneficial households such as landless or smallholders in the same village according to the revolving system. The time limit given to the primary beneficiary households is as a rule one year. The secondary beneficiary households that received 5 does again give the same number of heads (she-goats) to next generation as well. One good advantage is that goat is not affected by swine flu nor bird flu, so that goat (also sheep) is superior to pig and chicken in disease regard.



Revolving System of Goats

Project Title	**No. 16: Pig Raising Promotion Programme (Reference: Technical Manual 1.17, 2.2)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
				●	●
Target Groups	Landless casual/farm workers and smallholders				
Implementing Agency	Livestock Breeding and Veterinary Department (LBVD), Ministry of Livestock and Fisheries (MOLF)				
Collaborators	International Donors, NGOs				

Objectives: To generate new income source for the poor who are living mainly on low farm wage

Rationale: Myanmar people prefer pork too as well as chicken. If feeding well, piglet can be sold within 10 months. And a matured female can reproduce 8 to 10 piglets per time. Therefore, piggery will be suitable to generate income especially for the poor. Revolving system shall be applied to expand beneficiaries of next generation.

Project Implementation	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	■ ■ ■	■	■	■	■	■					

Expected Outputs	**Development Indicators and Targets per Village**
・ Piglets are delivered from 1st generation to next generation according to the revolving system. ・ Economic disparity in village is improved. ・ Living standard of the poor is improved.	・ Number of beneficial groups: 2 groups/village ・ Number of piglets to be delivered: 2 head/HH ・ Number of pig housings per village: 5 house/village ・ Number of piglets handed over to 2nd group: 20 heads for 10HHs

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・ Identify and organize beneficiary groups ・ Procurement of quality piglets and delivering to beneficiaries (native bred piglets should be procured) ・ Construction of model pig housing. ・ Handover grown pig to next generation ・ Data collection and monitoring	Piglet: 40$ x 30Heads x 6Villages X 10TSs X 5years = 360,000$ Logistics: 2,500$ Total: 362,500$	LBVD, International Donors, NGOs

Project Risks: Continuous affect of the swine flu. Appreciation of feed cost (bran and broken rice)

Environment Assessment (B) : In the paddy producing areas, grazing ground for goat/sheep is limited due to intensive land use all year round. Conversely, piggery programme is introduced for the poor by feeding mainly kitchen waste and rice bran. No impact on eco-system is forecasted but has possibility of causing afoul smell of pig housing, which may influence to neighboring. Measures to reduce impacts: Pig housing must be done by beneficiary as duty to receive piglets. The pig housing is floored by brick, stones and clayey soil and higher than the ground level for drainage. Moreover, EM compost making should be promoted to reduce afoul smell on the bedding (EM is also effective to eliminate afoul smell of dung and urine).

Lessons from Pilot Project: During the implementation of pig raising pilot project, it was learned that local pig was stronger in free range than that of hybrid. Therefore, local piglets were procured in the 2nd year pilot project. One of the beneficiaries had mated provided female, and got 12 piglets. She could get more income by selling grown piglets after weaning. There is another beneficiary who also went on breeding. He reared the two piglets provided. He could enjoy the fruits of his labour on 8th August 2008. On that day, from his pigs provided in November 2007, 5 piglets were born, 1 male and 4 female. One female piglet died five days later unfortunately. So there left two big pigs and four piglets. Thus, the beneficiaries can be divided into two, those who fatten piglets, and those who fatten and do breeding at the same time. For the former, it is very important to grow pigs reasonably bigger for marketing to sell at a good price. Regarding breeding, it requires some specific knowledge and technology to judge timing of mating and feeding for sows, etc rather than simple fattening but it will generate more profit by regular kidding of piglets of 8 to 10 head (sometimes 12 head), which can be sold after weaning at about 25,000 Kyats /head for fattening purpose. In other words, it may bring profit in shorter period if s/he succeeds in the breeding. Depending upon the condition allowed such as feeding cost for sows, service charge, availability of space for pigs, beneficiaries may choose fattening, breeding or integrated one.

She is a success 2nd generation beneficiary, who got 12 piglets by breeding..

Project Title	**No. 17: Local Chicken Rearing Promotion Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	○	○	○		
Target Groups	Landless casual/farm workers and smallholders				
Implementing Agency	Livestock Breeding and Veterinary Department (LBVD), Ministry of Livestock and Fisheries (MOLF)				
Collaborators	International Donors, NGOs				

Objectives: To generate new income source for the poor who are living mainly on low farm wage

Rationale: Chicken is popularly reared in every village in CDZ for both egg and meat. Chicken meat is most popular meat for Myanmar people, and therefore demand is high. Chicken rearing is considered promising for the poor to generate additional income and to improve their nutrition status. Local chicken can be sold within 2 to 3 months and reared at lower price. Revolving system shall also be applied for chicken rearing programme to extend beneficiaries.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
	■ ■ ■ ■	■ ■ ■ ■	■	■	■	■	■				

Expected Outputs	**Development Indicators and Targets per Village**
・Beneficiaries' groups are established. ・Animal health workders are equipped with necessary knowleadge. ・Beneficiaries acquire suitable rearing method to avoid bird flu and other diseases such as Newcastle disease. ・Living standard of the poor is improved, and economic disparity in village is improved.	・Number of beneficial groups: 2 groups/village ・Number of chicks to be delivered: 10 birds/HH ・Number of chicken housings per village: 5 house/village ・Number of beneficiaries handed over chicks: 10HHs/village

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize beneficiary groups ・Training of animal health workers ・Procurement and delivering of local chicks (In providing start-up poultry, 1:10 ratio of chicken package/ household is enough for landless livestock farmers). ・Construction of model chicken housing. ・Handover grown chicks to next generation ・Data collection and monitoring	Bird: 10$ x 30Heads x 10Villages X 10TSs X 5years = 150,000$ Logistics: 2,500$ Total: 152,500$	LBVD, International Donors, NGOs

Project Risks: Breakout of the bird flu

Environment Assessment (C) : Any negative impact is predicted because this program is for reduction of poverty, and to be practiced at villager's backyards in small scale.

Project Title	**No. 18: Livestock Feeding Improvement Programme (Reference: Technical Manual 2.3)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	◎	◎	○	○	
Target Groups	Livestock owners				
Implementing Agency	Livestock Breeding and Veterinary Department (LBVD), Ministry of Livestock and Fisheries (MOLF)				
Collaborators	Myanma Agriculture Service				

Objectives: To teach proper feeding for livestock to livestock owners including FHHs and landless people.

Rationale: Though there are many livestock in CDZ not only for producing animal products such as milk and meats but also for ploughing, transportation and for home consumption, nutrient conditions of those livestock are quite different area by area because of availability of feed and animal management by owners. Generally, villagers are not aware of nutrition management for livestock. In order to keep livestock healthier and productive, villagers have to acquire proper feeding management. So far, LBVD's service at village level has been focusing on veterinary services. UMMB (Urea Molasses Mineral Block) making using locally available materials is to be taught to livestock owners in the training.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
		▪▪▪▪	▪▪▪	▬▬▬	▬▬▬	▬▬▬	▬▬▬	▬▬▬			

Expected Outputs	**Development Indicators and Targets per Village**
・Villager groups are established. ・Livestock's productivity and power are increased. ・Beneficiaries acquire proper feeding method for livestock. ・Living standard of livestock owners is improved.	・Number of villager group: 1 group/village ・Number of villagers participated in the training: 30 persons/village ・Number of villagers who tried the technologies learned in the training: 20 persons/village ・Number of participants who taught technologies to other villagers: 10 persons/village

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize villagers ・Provision of training and demonstration ・Preparation of training material ・Data collection and monitoring	8,000$ X 5years = Total: 40,000$	LBVD, International Donors, NGOs

Project Risks: Low interest of livestock owners to this programme

Environment Assessment (C) : This programme is composed of provision of training and demonstration for villagers. Therefore, any negative impacts are not predicted.

Lessons from Pilot Project :

UMMB (Urea Molasses Mineral Block) making

Though effectiveness of UMMB was recognized by many villagers, there are difficulties as 1) most of villagers cannot afford to buy raw materials necessary for UMMBs etc. 2) collecting of all the necessary ingredients, about 7 materials, can hardly be done if arranged individually, 3) some ruminants are not familiar to the UMMB so they did not lick, suggesting ruminants themselves should be trained to go on licking, and 4) UMMB may be sustainably used for dairy cow owners but goat/ sheep may not be so as they are conventionally herded on natural grassland.

Villagers made UMMBs practically in the UMMB making training (Khaungkawe village).

Project Title	**No. 19: Fodder Crops Promotion Programme (Reference: Technical Manual 1.6)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	◎	◎	○		
Target Groups	Cattle owners				
Implementing Agency	Livestock Breeding and Veterinary Department (LBVD), Ministry of Livestock and Fisheries (MOLF)				
Collaborators	Myanma Agriculture Service				

Objectives: To increase fodder production for cattle to improve current nutrient status of cattle

Rationale: In CDZ, 5.5 million head of cattle including 288 thousand head of milk cows are raising. Cattle are very important for farming, transportation, milk production and reproduction of calves. Despite its importance, fodder production for cattle is not adequate to meet nutrient requirement not only in acreage but also total production. Broadcasting method has been practiced in the conventional sorghum production along with poor crop management, resulting in low yield and low nutrient content. In order to keep cattle healthier and powerful, more fodder crops with higher yield have to be produced and fed to cattle. For this purpose, intercropping of sorghum and leguminous crops is considered suitable to attain the objective.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
							■ ■ ■	■	■	■	■

Expected Outputs	**Development Indicators and Targets per Village**
・Cattle owner groups are established. ・Cattle owners acquire new technology of fodder production. ・Improved fodder crop production technology is extended in village. ・Cattle's productivity and power are improved. ・Living standard of the cattle owners is improved.	・Number of cattle owner group: 1 group/village ・Number of villagers participated in the training: 30 persons/village ・Number of villagers who tried the technologies learned in the training: 20 persons/village ・Number of participants who taught technologies to other villagers: 10 persons/village

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize cattle owners who are interested in the programme ・Establishment of model plot(s) ・Provision of training and demonstration (for demonstration, sorghum with rice bean and/or sorghum with pigeon pea are recommended sicne leguminous crop can fix atmospheric nitrogen hence contributing to increasing the harvest of sorghum, a good fooder) ・Preparation of training material ・Data collection and monitoring	6,000$ X 4years = Total: 24,000$	LBVD, International Donors, NGOs

Project Risks: Low interest of cattle owners to this programme

Environment Assessment (C) : This programme aims to teach cattle owners on how to increase fodder production under the proposed intercropping method planted with leguminous crops. Therefore, no negative impact is predicted.

Project Title	**No. 20: Livestock Diseases Prevention Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	○	○	◎	○	○
Target Groups	Livestock owners				
Implementing Agency	Livestock Breeding and Veterinary Department (LBVD), Ministry of Livestock and Fisheries (MOLF)				
Collaborators	International Donors				

Objectives: To decrease livestock diseases, and to keep both human and livestock healthier

Rationale: CDZ has so far suffered from various animal diseases such as FMD, Anthrax, NCD, bird flu, scabies, Mange and so on. In spite of the current condition, livestock owners and people have not been aware of disease control. In fact, some provided original goats and kids in FY 2007 under JICA pilot project have died of illness. Vaccination service is available if livestock owners ask to TS LBVD office. Sanitation environment around livestock shed at backyard need to improve to control diseases not only for animals but also human. There exist many poor households who cannot afford to ask service to LBVD. In order to support livestock owners, practical supports of diagnosis, vaccination, de-worming etc are required to reduce mortality of livestock and to protect villagers from animal-related diseases. For disinfection, lime powder, sand soup are to be used to spray backyards.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
	■ ■ ■	■	■	■	■						

Expected Outputs	**Development Indicators and Targets per Village**
・Livestock owner groups are established. ・Livestock owners acquire new technology to prevent diseases. ・New technologies to control diseases are extended in village. ・Ratio of outbreaks of illness for both human and livestock is decreased ・Living environment for villagers is improved.	・Number of livestock owner group: 1 group/village ・Number of livestock owners participated in the training: 30 persons/village ・Number of participants who tried the technologies learned in the training: 20 persons/village ・Number of participants who taught technologies to other villagers: 10 persons/village

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize livestock owners ・Preparation of training materials ・Provision of training and demonstration at village site(s) ・Data collection and monitoring	25,000$ X 5years = Total: 125,000$	LBVD, International Donors

Project Risks: Low interest of livestock owners to this programme

Environment Assessment (C) : The programme aims to reduce animal and human diseases in village level using locally available materials. Therefore, no negative impact is predicted.

Project Title	**No. 21: Livestock Housing Improvement Programme (Reference: Technical Manual 2.1, 2.2)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
			○	○	○
Target Groups	All villagers who own livestock				
Implementing Agency	Livestock Breeding and Veterinary Department (LBVD), Peace and Development Council (PDC)				
Collaborators	NGOs				

Objectives: To generate new income source for the poor who are living mainly on low farm wage

Rationale: In CDZ, all livestock are raising at backyards nearby villager's houses, and free-range method has been practiced for long time. Under the condition, both human and animal had suffered from illness each other as we know swine flu and bird flu over these several years. Considering this situation, it is recommendable to reduce contact of villagers and animals by constructing independent livestock shed to enclose animals inside. It is expected that this programme is conducted combined with the **No. 20: Livestock Diseases Prevention Programme**

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
								■ ■ ■	■	■	■

Expected Outputs	**Development Indicators and Targets per Village**
・Livestock owner groups are established. ・Livestock owners acquire technology to enclose livestock inside shed. ・Livestock housing to control diseases are extended in village. ・Ratio of outbreaks of illness for both human and livestock is decreased ・Living environment for villagers is improved.	・Number of livestock owner group: 1 group/village ・Number of livestock owners participated in the training: 30 persons/village ・Number of participants who constructed livestock housing learned in the training: 20 persons/village ・Number of participants who taught the technologies to other villagers: 10 persons/village

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize livestock owners ・Preparation of training materials ・Provision of training and demonstration at village site(s) ・Data collection and monitoring	8$ X 80villages x 5TSs = 3,200$, Logistics: 500$ 3,700$ X 3years = Total: 11,100$	LBVD, PDC, NGOs

Project Risks: Low interest of livestock owners to this programme

Environment Assessment (C) : The programme aims to reduce animal and human diseases village level by consulting livestock shed to avoid contact as possible as they can use locally available construction materials (bamboo, wood). Therefore, no negative impact is predicted.

Project Title	**No. 22: Livestock Market Information Dissemination Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
				○	○
Target Groups	Livestock owners				
Implementing Agency	Livestock Breeding and Veterinary Department (LBVD), Peace and Development Council (PDC)				
Collaborators	PDC, NGOs				

Objectives: To get latest market prices of animals to sell at higher price as far as possible

Rationale: Market information especially unit prices of livestock are very important for farmers who are living on rearing animals, and those who want to sell at higher prices as possible as they can. When swine flu broke out in 2009, pig price had come down even in CDZ, but in a few villages, beneficiaries could sell pig at the reasonable price as compared to other villages because they could know a good market to sell through merchant and villagers. Like this, if they are provided latest market information, they will be able to know proper selling time and get higher profit. In addition, they can know the market to which they can sell animals at higher price than other markets.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
						■ ■ ■	■	■	■	■	■

Expected Outputs	**Development Indicators and Targets per Village**
・Interest livestock owner groups are established. ・Livestock owners acquire latest market price of livestock of each market. ・Livestock owner's income increases. ・Marketing activities by livestock owners are encouraged.	・Number of interested livestock owners formed in a village: 1 ・Number of groups formed in a village: 1 ・Number of livestock owners involving this programme: 30 farmers/village ・Frequency of market information distributed to livestock owners : once every 2 weeks ・Number of livestock owners who could know market news: 10% ・Increase of livestock owner's income: 3%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize interesting livestock owners. ・Identification of major livestock market(s) and livestock breed being dealt. ・Identification of information means suitable for farmers ・Record keeping of market prices of animals all year round to know trend ・Dissemination of weekly or monthly basis price to livestock owners ・Data collection and monitoring	1,000$ X 10TSs X 5years = Total 50,000$	LBVD, PDC, NGOs

Project Risks: Low willingness of farmers to this programme, late release of funds

Environment Assessment (C) : The programme is to deal with market information of animals for livestock owners to make them sell animals at higher prices as far as possible considering condition of demand and supply of each animal. Therefore, no negative impact is predicted.

Project Title	**No. 23: Village Revolving Fund Establishment Programme**				
Priority in approaches	Type I	Type II	Type III	Type IV	Type V
	◎	◎	●	●	●
Target groups	Cottage industry workers, landless people				
Implementing agency	Cottage Industry Department (CID), Cottage Department（CD）、Ministry of Co-operative（MOC）				
Collaborators	Companies, NGOs				

Objectives： To establish revolving fund together with expansion of cottage industry.

Rationale： In Myanmar, 45% of GDP is occupied by agriculture sector, meanwhile, not more than 10% by cottage industry. In CDZ as well, agriculture accounts for 50% and 19% by the cottage industry. There are various cottage industries in CDZ such as weaving, knitting, embroidery, Jaggery production etc and provide villagers employment opportunities especially for landless people. It is expected that strengthening and expansion of cottage industries in villages can generate additional income and job-opportunities for the poor. Necessary machines to promote the cottage industries are invested, and rental fee for those machines and the money obtained by redemption for the cost of machines become a source of the village revolving fund or group revolving fund from which every villager can borrow money at low interest rate. Those funds are able to encourage villagers who are going to manage small scale industries by lending loans at low interest.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
	■ ■ ■	▬	▬	▬	▬	▬					

Expected Outputs	**Development Indicators and Targets per Village**
・Cottage industry in villages can be specific. ・Only cottage industries judged feasible are to be encouraged ・Producer organizations can appear (about 10-30 pax) ・There can be technical improvement for members of cottage producer organizations. ・The base of cottage industry in village can be set up (workshop). ・Members' income increases. ・Fund can be established by saving members' contributions. ・Saved money collected from members can be used to invest for other activities. ・Making use of the fund, job opportunity is created especially for the poor.	・Depending on activity, the number of beneficiary-groups (group/village) can be different. ・Number of members who attended the training. ・Depending on activity, the amount of capital can be different. ・Machines and raw materials to be provided. ・Increase of beneficiaries' income (at least 20% increase for farm-labourers). ・Establishment of fund with beneficiaries' contributions. ・The amount lent out from group fund or village fund. ・Number of villagers who borrowed money from the fund.

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**
・Cottage industries in targeted village-tract will be specified. ・Demand and market trend of the product s will be analysed (including ability to compete with imported products) from economic point of views. ・Cottage industry beneficiaries will be mobilized into an organization ・Training will be conducted to improve the technology according to respective cottage industry ・Initial investment such as capital, raw materials, and machines will be done. ・Beneficiaries will use those machines and raw materials to produce their products. ・Rental fee for machines and a certain amount from their profit from sale will be collected. ・Financial status (fund) will be open to all. ・Data collection and monitoring	250,000 X 5years Total: 1,250,000$ **Expected Sources** MOC, International Donors

Project Risks: Unexpected rapid and sharp price down at market (e.g. no more markets due to the world's business depression in 2008.) inability to compete with imported cheap products in price (e.g. China products), no money to establish fund due to default of rental fee by members whose business are down

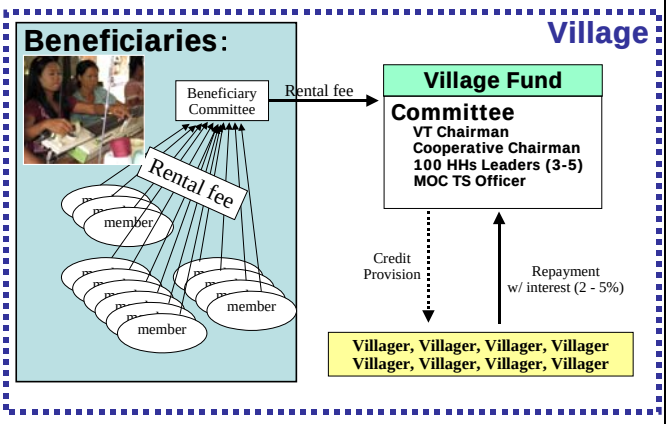
Project Title	No. 23: Village Revolving Fund Establishment Programme

Lessons from Pilot Project :

1. Synergy by Village Fund

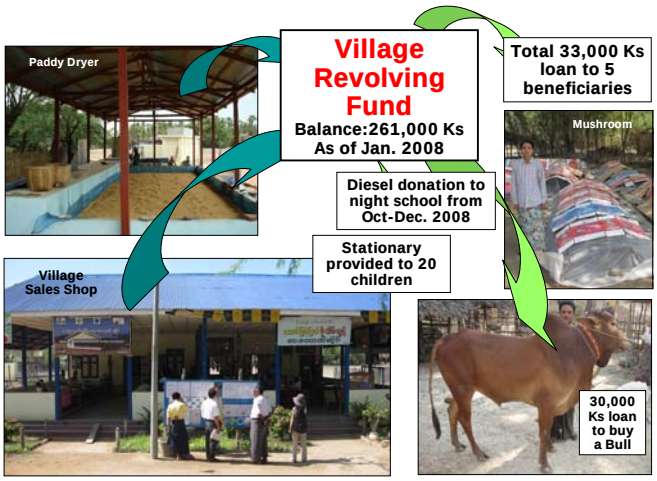
If cottage industries are in good and convenient situation, group fund and village fund will be able to be established. As for an example of village fund, in Legaing village loans out of village fund could be disbursed out to villagers for buying a bull for local cattle improvement pilot project, and to mushroom beneficiaries to be used as initial investment in mushroom cultivation with 3% interest. Not only that, diesel for 3 months' consumption for a generator of village night school was provided. In Mingan village, a fire-victim was provided with contribution out of village fund and for that fire-victim to be freed from custody on bail, village fund was used. (if there is an outbreak of fire, action is taken against the head of household for negligence). If new things will be bought again by spending fund established with rental fee for machines and contributions from beneficiaries, according to business situation, it may take a longer period than the first-planned period. However, it is sure that village fund is widely beneficial for many villagers.

2. Case of Ma Gyi Sauk Village



In the pilot project of this Study, village fund was established by 3 groups such as motorized-weaving group, knitting group and embroidery group in Ma Gyi Sauk village in cottage industry sector. Anyway, the person who uses the machines will have to pay rental fee to the Main Committee formed at village level. (rental fees as of August 2009 are motorized-weaving machine 20,000 kyat, knitting machine 6,000 kyat/month (there are 6 machines), and embroidery machine 150 kyat/day (there are 3 machines). This system carries out saving to Village Revolving Fund as above-mentioned picture on the right. The flow of rental fee is exactly mentioned in the right picture. Money saved as village fund can be used for buying more machines and non-beneficiaries can borrow money from that fund, it has been arranged.

3. Case of Legaing Village



In Legaing village, with income from Paddy Drier and Rural Development Sales Centre. The Paddy Drier dried altogether 7,200 baskets of paddy from July to August and earned 125,000 kyats. For test-run, alignment, and for minor repairing, to date, 20,000 kyats were spent. So, net profit of 105,000 kyats (12,500 – 20,000) were saved as village fund. Moreover, Rural Development Sales Centre earns 20,000 kyats/month from restaurant and beginning from August 2009 earned 100 kyats/shop/day from 8 small shops. That money is kept as village fund. In other words, village fund of Legaing village is saved from two sources and due to that fund much more benefit can be brought about. Loans for mushroom beneficiaries for their initial investment, loan for getting a new bull for local cattle improvement, provision of diesel for 3 months' consumption for village night school, and provision of stationery to 20 poor primary pupils could be done by spending village fund.

Project Title	**No. 24: Equipment Modernization Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	○	○	◎	○	○
Target Groups	Those engaged in cottage industries (owner and workers) who are willing to expand their markets				
Implementing Agency	Cottage Industry Department (CID), Cooperative Department (CD), Ministry of Cooperatives (MOC)				
Collaborators	NGOs				

Objectives: To increase productivity of cottage industry by supplying modernized equipment.

Rationale: Most existing cottage industries in CDZ have been managed using deteriorated equipments to date, and therefore, their productivity has been stagnant. By renewal of existing equipment to more productive and effective equipment, producer's and worker's income will increase, and generate more employment opportunity especially landless workers. A certain amount of profit from sale of products shall be deposit as group's fund.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
				■ ■ ■ ■	■ ■ ■	■	■	■	■		

Expected Outputs	**Development Indicators and Targets per Village**
・Beneficiaries group is identified and organized. ・Productivity of cottage industry products is increased. ・Quality of products is improved. ・Demand for the products is increased. ・Producer's and worker's income are increased. ・Group fund is established. ・Disparity in income is alleviated. ・Women's economic activities are encouraged. ・Stable employment opportunity for villagers. ・Cottage industries are encouraged.	・Nr. of the groups formed: 1 ・Production increase: 10% ・Increase of sales amount: 5% ・Amount of refund: 100% ・Reduction of repairing cost: 10% down ・Income of producer's and workers: 5% up

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify major cottage industries and demand for the products as well as unit price, productivity per day ・Organization of producers and workers. ・Economic examination of the industries from view point of sustainability and validity ・Provision of necessary equipment. ・Provision of training on quality, design and marketing, as well as maintenance of the equipment and group fund to be established. ・Data collection and monitoring	Included in Project No. 23	MOC, International Donors

Project Risks: Depression of economy in domestic and international markets, Default of the members for revolving group fund

Environment Assessment (C) : The programme aims to provide them equipment for cottage industries to increase income and to alleviate poverty in village level. Any earthwork and construction are not included in the programme. Therefore, no negative impact on environment is expected.

Project Title	**No. 25: Fuel Saving Project (e.g. for Jaggery) (Reference: Technical Manual 4.2)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	○	○			
Target Groups	Those engaged in cottage industries (owner and workers) who are willing to expand their markets				
Implementing Agency	Cooperative Department (CD), Ministry of Cooperatives (MOC)				
Collaborators	NGOs				

Objectives: To reduce cost for firewood to increase profitability of processing Jaggery

Rationale: The share of Jaggery production of CDZ is 93% of the whole country, and many landless HHs including landless farm workers are engaged in this industry. According to producers, however, it is said that fuel sources to boil up Toddy Juice (raw material for Jaggery) have been reducing year by year for, resulting in higher cost for getting firewood. Therefore, it is necessary to design effective stove to boil up Toddy Juice to shorten boiling hours and to save cost in order to sustainable production of Jaggery and to provide employment opportunity for landless HHs.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
				■ ■ ■	■	■	■				

Expected Outputs	**Development Indicators and Targets per Village**
・Beneficiaries group is identified. ・Jaggery production continues by landless HHs in the future too ・Profitability of processing Jaggery increases ・Fire wood consumption can be reduced ・Employment for landless HHs can be secured. ・Income of those who are engaged in Jaggery production is increased.	・Nr. of Jaggery producers participated:10 persons/village ・No. of Jaggery producers who constructed energy effective stove: 10 persons ・Cost saving by the energy effective stove: 30 to 50% ・Increase of profitability of processing Jaggery: more than 30% ・No. of participants who taught on how to make energy effective stove to other villagers: 10 persons

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize Jaggery producer group ・Provision of training and demonstration at the selected site(s) ・Data collection and monitoring about cost of production to compare before and after the project	Stove: 20$ X 900villages = 18,000$ Logistics: 3,000$ Total: 21,000$	MOC, International Donors, NGOs

Project Risks: Low interest of Jaggery producers to the programme

Environment Assessment (C) : The programme aims to reduce consumption of firewood to boil up Toddy Juice to increase profitability of Jaggery production, which will contribute to conserve forest resources for next generation. An energy effective stove can be made using rice straw, clayey soil. No negative impact on environment is expected.

Project Title	**No. 26: Product's Quality Improvement Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
			●	◎	○
Target Groups	Those engaged in cottage industries (owner and workers) who are willing to expand their markets				
Implementing Agency	Cottage Industry Department (CID), Cooperative Department (CD), Ministry of Cooperatives (MOC)				
Collaborators	Companies, NGOs				

Objectives: To improve quality of products to sell them at higher price

Rationale: In CDZ, there are many types of cottage industries, which provide employment opportunity for landless people, mainly for women. However, quality including design of the existing products need to improve to make products more attractive for buyers, tourists and consumers not only in domestic but also in international markets. Stable demand for quality products produced in cottage industries is expected to bring producers more income, and cottage industries are encouraged in parallel. Villagers also have to recognize importance of design and quality of their products since they have tendency to adhere to produce relying on traditional design and idea.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
		■ ■ ■	■	■	■	■	■				

Expected Outputs	**Development Indicators and Targets per Village**
・Beneficiaries group is identified and organized. ・Quality and design of products are improved and become more attractive ・Domestic and international markets are developed ・Producer's and worker's income increases ・Cottage industries are encouraged ・Disparity in income is alleviated. ・Women's economic activities are encouraged ・Stable employment opportunity for villagers	・Nr. of the groups formed: 1 ・No. of producers trained:30 persons/village ・No. of products improved its design and quality: to be decided ・Increase of unit price of products: 10% up ・Increase of income of producers and workers: 5% ・No. of producers (participants) who introduced new design: 30 persons

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify major cottage industries and organize villagers. ・Examination of products for economic point of views including clients in domestic and international markets. ・Provide producers and workers with training to improve quality, design, and marketing. ・Study tour to advanced areas. ・Data collection and monitoring	Tools: 1,000$ X 5Villages X 10TSs = 50,000$ Logistics: 10,000$ Total: 60,000$	MOC, International Donors, NGOs

Project Risks: Default of the members for revolving fund

Environment Assessment (C) : Major activities for this programme is to provide producers and workers with training to improve quality of products and their conventional consciousness on production. No negative impact on environment is expected.

Project Title	**No. 27: Cooperative Strengthening Programme (e.g. road station)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
				◎	◎
Target Groups	Those engaged in cottage industries (owner and workers) as well as farming, willing to expand their markets				
Implementing Agency	Cooperative Department (CD), Ministry of Cooperatives (MOC)				
Collaborators	Companies, NGOs				

Objectives: To expand markets of the cottage industry products, either domestically or internationally

Rationale: There are many small scale cottage industries in CDZ. In each village, some small-scale cottage industries are observed, which have potentiality. However, their marketing has been limited so far and practiced basically individually and resulted in low income for producers. Under the buyer's market, they had to sell products at buyer's price. This programme intends to assist producers through provision of marketing facility (Road Station) and training on market development strategies, exhibition or trade fairs, in parallel with strengthening of bargaining power of producers.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
				■ ■ ■	■	■	■	■	■		

Expected Outputs	**Development Indicators and Targets per Village**
・Cottage industry or beneficiary's groups are organized. ・Beneficiaries obtain opportunities to sell their products. ・The necessary activities (e.g. trade-fair), training (e.g. the way to negotiate), or facilities (e.g. a road station) are identified, based on the village's needs and the marketing environments ・Villagers sell their locally-made products. ・Revolving fund are generated from beneficiary's group ・Small scale industries at village level is encouraged ・Employment opportunity for landless HHs is secured	・Nr. of the groups formed: 1/village ・Construction of sales shop (Road Station): 1/100 village. ・Kinds of products dealt with groups: ・Amount of sales sold at the sales shop: ・No. of passengers bought products at the sales shop: more than 500 per month ・No. of vehicle and buses stopped at the sales shop: more than 300 per month

Major Activities in Line with the Expected Outputs	**Expected Sources**
・Evaluate cottage industry products from economic point of views ・Beneficiaries groups are identified and organized ・Construction of small-scale sales center. ・Provide training on stronger marketing power. ・Development of attractive products for consumers ・Identify existing markets and demand for the products ・Data collection and monitoring	MOC, International Donors, NGOs
	Total Cost (US$)
	800$ X 50Villages Total: 40,000$

Project Risks: Market situations are unstable, depression of national and regional economy

Environment Assessment (B) : The objectives of the programme are to encourage marketing of local products at constructed a small scale "Road Station" originally developed in Japan, which will contribute to expansion of marketing channel and connect consumers and producers. Survey is necessary to secure land since the construction of the Road Station requires some space. → Measures to reduce impacts: It is necessary to confirm existence of precious vegetation and wild lives to be preserved when procuring site (though Road Station is generally constructed nearby village or suburban areas where precious vegetation and wild lives do not exist in general). Moreover, when procuring the site, public area such as existing market etc is given top priority to avoid removal of people.

Project Title	**No. 28: Marketing Strengthening Programmee**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	○		●	◎	○
Target Groups	Those engaged in cottage industries (owner and workers) who are willing to expand their markets				
Implementing Agency	Cottage Industry Department (CID), Cooperative Department (CD), Ministry of Cooperatives (MOC)				
Collaborators	Peace and Development Council (PDC), Companies, NGOs				

Objectives: To strengthen marketing of products produced in cottage industries

Rationale: Though there exist many kinds of cottage industries in CDZ, marketing (how to and to where sell products) needs improvement. Producers are generally reluctant to find and develop markets, neither domestic nor international ones. New markets and new buyers have to find to sell products stably to continue cottage industries in which many women workers (mainly landless workers) are engaged in parallel with strengthening bargaining power of producers and improvement of quality of products.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
			■ ■ ■	■	■	■	■				

Expected Outputs	**Development Indicators and Targets per Village**
・Beneficiaries group is identified and organized. ・Potential domestic and international markets are developed. ・Demand for products is increased. ・Producer's and worker's income increase. ・Existing cottage industries are encouraged. ・Disparity in income in village is alleviated. ・Women's economic activities are encouraged ・Stable employment opportunity for villagers	・Nr. of the groups formed: 1 ・Nr. of producers participated in the training: 30 persons ・Nr. of markets newly developed: at least 2 ・Nr. of buyers newly found: 10 persons ・Increase of sale: 10% ・Increase of income: 5%

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify major cottage industries and organization of producers group ・Examination on competitiveness of products about quality, price, and attractiveness. ・Analysis of demand by potential domestic and international markets. ・Provision of training with producers on marketing to improve their conventional consciousness on marketing. ・Study tour to advanced areas. ・Data collection and monitoring	800$ X 50villages = Total: 40,000$	MOC, International Donors, NGOs

Project Risks: Depression of domestic and international economy, low interest of producers to the programme

Environment Assessment (C) : The objective of the programme is to strengthen producer's capacity for more marketing through provision of educational training on marketing. No negative impact on environment is predicted.

Project Title	**No. 29: Raw Material Revolving Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	○	○			
Target Groups	Those engaged in cottage industries (owner and workers) who are willing to expand their markets				
Implementing Agency	Cottage Industry Department (CID), Cooperative Department (CD), Ministry of Cooperatives (MOC)				
Collaborators	NGOs				

Objectives: To supply raw materials for cottage industries for sustainable operation

Rationale: For cottage industries operating in village level, one of the issues is instable supply, higher price of raw materials, and lack of running expenses, which is resulted in shortening of operation days and lower income of workers. Currently most of workers working in cottage industry borrow raw materials from middlemen to produce products, and eventually they are compelled to sell their products to the middlemen at lower price because of debt. By supplying raw materials, their cottage industry will be able to operate all year round and bring mainly women more income and stable employment opportunity as well.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
	■ ■ ■	▬	▬	▬	▬						

Expected Outputs	**Development Indicators and Targets per Village**
・Beneficiaries group is identified. ・Small scale cottage industries are encouraged. ・Income of those who are engaged in industries is increased. ・Disparity in income is alleviated. ・Women's economic activities are encouraged ・Stable employment opportunity for villagers	・Nr. of the groups formed: 2 (average) ・Amount of raw materials supplied: 1 set/group (to be decided) ・Amount of refund: 100% ・Operation days a year: 300 days ・Income of workers: 5% up

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify major cottage industries and necessary raw materials by industrial type in the village ・Analyse cottage industries from economic point of views including demand and marketing. ・Provide raw materials depending on industrial types ・Evaluate those cottage industries from long-term economic viability ・Collect a certain amount of money from the members for revolving. ・Maintain the collected money for purchasing materials for revolving in group ・Identify existing markets and demand for the products ・Data collection and monitoring	Revolving Materials: 500$ x 160villages = Total: 80,000$	MOC, International Donors, NGOs

Project Risks: Default of the members for revolving fund

Environment Assessment (C) : The programme aims at purchasing raw materials collectively or purchasing individually by borrowing money from village fund mentioned in No..23 to sell products at fair prices to secure profit. No negative impact on environment is expected.

Project Title	**No. 30: School Education Strengthening Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	No-priority by Typology				
Target Groups	Village children				
Implementing Agency	MOE				
Collaborators	NGOs, DPDC, TPDC, VPDC				

Objectives: To improve quality of the current education in rural level.

Rationale: It is considered that uplift of the current education programme is necessary if considering importance of education for next generation in parallel with the Programme of No. 30. Currently, mathematics, science, and national language of Myanmar, English and so on are being taught in a school. Considering that importance on knowledge about science and mathematics will become more important than now we have considered in the future, and teachers are required to have adequate capability, knowledge and information to teach children. At the same time, quality of textbooks now using in a school may need to be improved, for example, more visual one. Since recently many kinds of audio visual aids are available, audio visual education should be taken into consideration.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
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Expected Outputs	**Development Indicators and Targets per Village**
・Teacher's capability is upgraded. ・.Children's knowledge is upgraded. ・Parent's interest in education becomes higher. ・Budget allocation for education in rural area is increased. ・Enrolment rate of children in a village is increased. ・Quality of education in rural area is improved. ・Data collection and monitoring	・Nr. of teachers trained: 50% /Division ・Nr. of teachers invited from urban schools: 50 teachers/division/year ・No. of schools introduced audio visual aids: 50% of the schools/division ・No. of rural teachers who sent to urban schools to promote exchange: 50 teachers/division/year ・No. of unit of the audio visual aids introduced: at least 50 units/division

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Organize PDC officers at division, district and village level including rural people to discuss about current education status to grasp needs to be improved in education sector. ・Promotion of exchange with teachers in urban schools. ・Introduction of audio visual aids. ・Provision of training for teachers. ・Improvement of currently used textbooks to make them more visual (e.g.).	60,000$ / division	MOE, International Donors

Project Risks: Inadequate budget allocation and late in budget allocation

Environment Assessment (C) : Since the programme aims to improve educational status of rural schools, no negative impact is predicted.

Project Title	**No. 31: Education Facilities Improvement Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	At school facility not enough				
Target Groups	Village children				
Implementing Agency	MOE				
Collaborators	International Donors				

Objectives: To improve educational conditions for students and children in a village without a school.

Rationale: It is estimated that still there are many villages without a school in a village in CDZ. Students and children in those villages have to go to the school away from their villages. It may be one of reasons for imperfect enrolment of children in CDZ, and make parents and children reluctant to learn in a school. Meanwhile, there are also many villages having a school with poor educational facilities in CDZ. In order to improve those conditions taking into consideration importance of education for the next generation, the programme aims to construct a school in a village which has no school, or to improve educational facilities such as desks, blackboards, chairs, roof, wall, toilets, water supply etc. The programme will contribute to encourage chance to learn especially for young generation.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
		■ ■ ■	■	■	■	■	■				

Expected Outputs	**Development Indicators and Targets per Village**
・ Enrolment rate of children in a village increases. ・ Educational environment is improved. ・ Quality of education is improved. ・ Literacy rate of children is increased. ・ School is managed well by villagers.	・ Nr. of villagers participated in assembly: 100% of the HHs ・ Nr. of parents contributed in the school construction:100% of the HHs ・ Amount of money donated from parents: (to be decided) ・ Nr. of desks, blackboards, chairs provided: Number of units to meet nr. of students. ・ Nr. of toilets, water supply improved or newly constructed; Number of units to meet student's demand. ・ Enrolment ratio before and after the programme; 100% after the programme

Major activities in line with the expected output	**Expected Source**
・ Organize villagers to discuss educational conditions in a village. ・ Site selection if construct a new school in a village. ・ Construct a new school in the village without a school, if construct a new school. ・ Improve school facilities such as toilet, water supply, desks, blackboards, chairs, wall, roof etc in cooperation with villagers, if improving just facilities. ・ Management of a school in good condition by villagers. ・ Periodical inspection and repairing of school facilities by villagers.	MOE, International Donors, NGOs
	Total Cost (US$)
	4,000$ / place

Project Risks: Inadequate budget allocation and late in budget allocation

Environment Assessment (C) : Any large scale earthwork is not done even when constructing a school. If anything, installment of toilets, water supply is expected to improve educational environment for children. Therefore, any negative impacts are not predicted.

Project Title	**No. 32: Literacy Improvement Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	No-priority by Typology				
Target Groups	Village children				
Implementing Agency	MOE				
Collaborators	Township Peace and Development Council (TPDC), VPDC (Village Peace and Development Council), NGOs				

Objectives: To improve literacy rate of villagers

Rationale: Though current literacy rate in CDZ is estimated at more than 90%, still there are many villagers, especially rural children who cannot access to school. If considering importance of education for next generation, all young generation including some grown-ups have to be educated to eradicate illiteracy in rural area.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
			■ ■ ■	▬	▬	▬	▬	▬			

Expected Outputs	**Development Indicators and Targets per Village**
・Illiteracy is eradicated ・People's interest in education is increased. ・People's living standard is improved. ・Educational environment is improved. ・Quality of education is improved.	・Nr. of children and grown-up who can read and write: 100% ・Enrolment ratio of rural children before and after the programme; 100% after the programme

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Organize villagers to discuss educational conditions in a village. ・To find best way (site, method, frequency, text, and charge if required etc) to implement the programme ・To find suitable teacher(s) for the programme ・Data collection and monitoring	3,000$ / TS	MOE, NGOs

Project Risks: Inadequate budget allocation and late in budget allocation

Environment Assessment (C) : The programme is educational one aiming at improving literacy rate in rural areas, no negative impact is predicted.

Project Title	**No. 33: Rural Water Supply Programme (deep well)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	●	○			
Target Groups	All HHs in a village				
Implementing Agency	DDA, Water Resources Utilization Department (WRUD)				
Collaborators	International Donors, NGOs				

Objectives: To supply stably clean and safe water to all villagers throughout the year

Rationale: There is higher correlation between accessibility to safe water and outbreak of water-borne diseases. However, it is difficult to access safe water especially in rural areas in CDZ. Some villages get drinking water from ponds and others from shallow well, river and creeks etc. However, water quality of those sources is mostly poor. Safe water is indispensable for human being in dried CDZ for both adults and children. If water is not safe, people especially children suffer from water-borne diseases like diarrhea etc. In CDZ, it is reasonable to get safe water from deep well than that from shallow well because of its geological condition, though it requires much more investment. It is expected that mortality rate of infants and children aged less than 5 years who suffered from water-borne diseases will be able to reduce by digging deep wells, and hard work to fetch water (mainly by women) everyday can be reduced as well.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
	■ ■ ■	■	■	■	■	■					

Expected Outputs	**Development Indicators and Targets per Village**
・Villager's accessibility to safe water increases. ・Water-borne diseases are decreased. ・Expenses for medical care are decreased. ・Mortality rate of infant and children is decreased. ・Hard work to fetch water by women and children is improved.	・Hours to fetch water: 80% decrease of present condition ・Outbreak of water-borne diseases: 90% decrease ・Expenses for medical care for water-borne diseases: 90% decrease ・Mortality rate of children suffered water-borne diseases: 90% decrease

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Survey on geological condition (depth of boring), water quality test and cost estimation. ・Construct deep well ・Organize villagers to manage a deep well ・Preparation of regulation for using the deep well, and agreement by villagers. ・Regular inspection of water quality. ・Water charge collection from users for O & M of the deep well. ・Data collection and monitoring	45,000$ / place	DDA, WRUD, International Donors

Project Risks: Inadequate budget allocation for boring and late in budget allocation

Environment Assessment (B) : This programme is a kind of improvement of well-being of villagers who are not blessed with safe water. Of course, water quality must be inspected before supplying. Therefore, any negative impacts are not predicted.

Project Title	**No. 34: Village Electrification Project (by bio-gas) (Reference: Technical Manual 4.3, 4.4)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
			○	○	◎
Target Groups	All households in a village				
Implementing Agency	Cottage Department (CD), Ministry of Cooperative (MOC), Peace Development Council (PDC)				
Collaborators	International Donors, NGOs				

Objectives: To supply electricity for lighting to make all households comfortable at night

Rationale: There are many villages having no electricity in CDZ. Meanwhile, there are natural sources such as cow dung and rice husk in CDZ which are usable for power generation. By supplying electricity for all households in a village, their village life during night and early morning will become much more comfortable, and electrification will also contribute to cottage industry, student's education as well as cost saving for candles.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
	■ ■ ■ ■	■ ■ ■ ■	■	■	■	■	■				

Expected Outputs	**Development Indicators and Targets per Village**
• Present expenses (candle, battery) for lighting are decreased. • Villager's life during night becomes comfortable. • Children can study longer even at night. • Villagers can work longer even at night. • Villager's income is increased because of working at night. • Collected electric fee can become a source for village fund	• No of beneficial households in a village: all HHs • Percentage of fee collected from HHs: 100% • Percentage of HHs paid electricity fee charged:100% • Daily operation hours: 3 to 6 hours/day • Operation days a year:365 days • Income of HHs: 5% up • Cost saving for candle:100%

Major Activities in Line with the Expected Outputs	**Expected Sources**
• Village assembly to get agreement for the construction of a plant • Designing and cost estimation of a plant • Construction/installation of power generation plant • Establishment of electricity committee • Establishment of regulation for electricity utilization • Collection of electricity charge from all beneficial users • Operation and maintenance of the plant by the committee • Data collection and monitoring	Public Works, International Donors
	Total Cost (US$)
	9,000$ / place

Project Risks: Illegal use of electricity by villagers, low collection rate of electricity charge for O & M, and appreciation of oil price

Environment Assessment (B) : Category is (b) but earthwork for the construction of the power plant is done during dry season taking into considering environment conservation of the surrounding area of the plant. Residue of cow dung and rice husk after power generation can be used for farming as organic fertilizers. Therefore, no negative impact is predicted.

Pictures from Pilot Projects :

Project Title	**No. 35: Improved Cooking Stove Promotion Programme (Reference: Technical Manual 4.1)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	◎	○	○		
Target Groups	All households in a village				
Implementing Agency	Cottage Department (CD), Ministry of Cooperative (MOC)				
Collaborators	TPDC, NGOs				

Objectives: To preserve forest resources by reducing firewood consumption by using improved energy effective cooking stove

Rationale: People have been using firewood for cooking on the conventional so called three-stone stove with low energy efficiency. Meanwhile, forest resources are originally very limited in CDZ. In order to preserve precious forest resources in CDZ for the next generation, it is recommendable to introduce and extend improved energy effective cooking stove in every HH, which will contribute to reduce entire firewood consumption in CDZ because of its designed higher energy efficiency than the conventional one.

Project Implementation	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	■ ■ ■	■	■	■	■	■				

Expected Outputs	**Development Indicators and Targets per Village**
・ Firewood consumption of each HH is reduced. ・ Existing forest resources are preserved. ・ Risk of catching fire is to be reduced. ・ Expense for firewood for cooking is reduced. ・ Alternate firewood becomes available and also income increases in case horticulture tree is planted.	・ No of the groups formed: 1/village ・ No. of villagers who made an improved stove by themselves: above 80% of HHs in a village ・ Cooking time: 30% reduced ・ No. of villagers who taught how to make improved stove to other villagers: 20% of participants

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・ Organize villagers ・ Provide training and practical demonstration on how to make energy effective cooking stove ・ Villagers make an improved stove by themselves according to the provided training and demonstration. ・ Also, plant first growing local horticulture tree, e.g. Ju Mu Be, as alternative firewood (Ju Ju Be grows very fast and bears good fruits, providing income opportunities as well).	200$ / village	MOC, NGOs
	Note: Agro-waste recycling, biomass densification, and bio briquette utilization shall also be considered with this project in order to save scarce natural resources.	

Project Risks: Low willingness of villagers

Environment Assessment (C) : Improved energy effective cooking stove can be made easily using locally available soil, wooden plates, rice straw etc at low price. It takes about 2 to 3 hours to complete a stove even by villagers. Entire firewood consumption can be reduced by at least 1/3 by implementing the programme. Therefore, no negative impact is predicted.

Lessons from Pilot Project: The stove in right (Photo 2) has simpler structure than the first one, which cooks only one item at a time (smaller hole at the end of the body is chimney). The simple one is not structured in 2 stories but still has same function to some extent. Placed at the bottom is iron grating through which ash can drop to a hole made underneath the stove though the function is not as efficient as the 2-storied one. This stove is in fact movable, so that users can move from inside of kitchen house to outside, e.g. to house compound, reducing the risk of catching fire. In fact, there are many villagers who prefer cooking outside to inside the kitchen house during summer because they want to avoid the risk of catching fire.

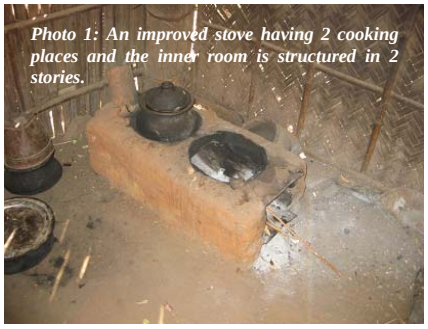

Photo 1: An improved stove having 2 cooking places and the inner room is structured in 2 stories.

Photo 2: Another type of cooking stove, simpler one. Has one cooking place only.

Project Title	**No. 36: Rural Road Improvement Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	No-priority by Typology				
Target Groups	All villagers in a village				
Implementing Agency	Public Work, PDC				
Collaborators	International donors				

Objectives: To improve daily traffic of people on marketing, transportation of agricultural materials and harvested crops, and communication with the centre of TS

Rationale: There are 10,090 villages in the Study Area in CDZ. Though most of main roads are paved by asphalt, feeder roads from the main roads to village centre are mostly rough roads that are not paved even by gravel, which become muddy when once rain comes in rainy season and has constrained people's activities on marketing agricultural crops which are main income source of farmers, daily traffic to the centre of TS too. By improvement of existing rural roads connecting with main roads, people's activities are encouraged in the transportation of harvested crops and industrial products such as Longyi and necessary agricultural materials (seeds, fertilizers, agricultural machinery etc) too. Moreover, the gravel-paving rural roads contribute to emergency transport of patients to a hospital at the centre of TS.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
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Expected Outputs	**Development Indicators and Targets per Village**
・Marketing of agricultural crops and industrial products by villagers is encouraged. ・Villager's traffic to the centre of TS is improved and the time is shortened. ・Transportation of agricultural materials becomes easier and smooth. ・Emergency transport of patients to a hospital at the centre of TS is shortened. ・Farmers cultivating paddy, upland crops apply advanced technologies.	・Length of rural road paved by gravel (to be decided) ・Times shortened by improving existing rural road: 20% decrease ・No. of patients transported to a hospital: (to be decided) ・No. of villagers contributed to rural road improvement work:100% of the HHs ・No. of regular maintenance of the improved rural road: 2 times a year at least

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Organize villagers to discuss road improvement. ・Road pavement by gravel. ・Preparation of regulation for rural road use. ・Management of rural road by villagers. ・Regular maintenance of the rural road by villagers.	5,000$/mile	Public Works, International Donors

Project Risks: Late allocation of budget for the programme

Environment Assessment (B) : The programme does not aim to construct new rural road but to improve existing rural road by gravel. Any large-scale earthwork is not included. All works are to be done by participated villagers. Therefore, no negative impacts are predicted in this programme.

Project Title	**No. 37: Ring Levee Construction Project**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	Along Ayeyarwady River				
Target Groups	All HHs in a village				
Implementing Agency	Irrigation Department (ID), Ministry of Agriculture and Irrigation				
Collaborators	International Donors				

Objectives: To improve residential environment of villagers and agricultural environment for stable crop production in parallel

Rationale: There are some villages located along the Ayeyarwady River where is flooded every year in rainy season, and have damaged in infrastructure, housing, livestock, even crops grown. Under the condition, proposed ring levee is suitable to prevent people and farmlands from annual flood and submergence. By constructing ring levee surrounding a village, living standard of people will be improved so that they can produce crops every year without suffering damage by flood and submergence.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
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Expected Outputs	**Development Indicators and Targets per Village**
・Infrastructure and farmlands become safe from flood and submergence ・People's life become safe from flood ・Crop production of a village become safe and productive ・Cost for rehabilitation of infrastructure and farmlands is saved ・Ring levee construction is extended to other villages	・Construction cost per meter: to be decided ・No. of HHs benefited by the programme: to be decided ・Amount of crop production benefited/saved to be decided ・Amount of rehabilitation cost saved to be decided

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Survey on geological condition (length and height). ・Designing and cost estimation and economic analysis ・Organize villagers to manage ring levee ・Regular inspection of the ring levee ・Data collection and monitoring.	30,000$ / place	MOAI, International Donors

Project Risks: Unpredicted water level of the Ayeyarwady River

Environment Assessment (B) : Earthwork shall be done in dry season to avoid environmental pollution. As to traffic, trucks shall pass residential area slowly to avoid accident. Design of a ring levee shall be done carefully to minimize soil volume.

Project Title	**No. 38: Rural Water Supply Programme (deep well) same as No. 33 programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	●	◎			
Target Groups	All HHs in a village				
Implementing Agency	DDA, Water Resources Utilization Department (WRUD)				
Collaborators	International Donors, NGOs				

Objectives: To supply stably clean and safe water to all villagers throughout the year

Rationale: There is higher correlation between accessibility to safe water and outbreak of water-borne diseases. However, it is difficult to access safe water especially in rural areas in CDZ. Some villages get drinking water from ponds and others from shallow well, river and creeks etc. However, water quality of those sources is mostly poor. Safe water is indispensable for human being in dried CDZ for both adults and children. If water is not safe, people especially children suffer from water-borne diseases like diarrhea etc. In CDZ, it is reasonable to get safe water from deep well than that from shallow well because of its geological condition, though it requires much more investment. It is expected that mortality rate of infants and children aged less than 5 years who suffered from water-borne diseases will be able to reduce by digging deep wells, and hard work to fetch water (mainly by women) everyday can be reduced as well.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
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Expected Outputs	**Development Indicators and Targets per Village**
・Villager's accessibility to safe water increases. ・Water-borne diseases are decreased. ・Expenses for medical care are decreased. ・Mortality rate of infant and children is decreased. ・Hard work to fetch water by women and children is improved.	・Hours to fetch water: 80% decrease of present condition ・Outbreak of water-borne diseases: 90% decrease ・Expenses for medical care for water-borne diseases: 90% decrease ・Mortality rate of children suffered water-borne diseases: 90% decrease

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Survey on geological condition (depth of boring), water quality test and cost estimation. ・Construct deep well ・Organize villagers to manage a deep well ・Preparation of regulation for using the deep well, and agreement by villagers. ・Regular inspection of water quality. ・Water charge collection from users for O & M of the deep well. ・Data collection and monitoring	45,000$ / place	DDA, WRUD, International Donors

Project Risks: Inadequate budget allocation for boring and late in budget allocation

Environment Assessment (B) : This programme is a kind of improvement of well-being of villagers who are not blessed with safe water. Of course, water quality must be inspected before supplying. Therefore, any negative impacts are not predicted.

Project Title	**No. 39: Livestock Housing Improvement Programme (Reference: Technical Manual 2.1, 2.2) same as No. 21 programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
			○	○	○
Target Groups	All villagers who own livestock				
Implementing Agency	Ministry of Health (MOH), Livestock Breeding and Veterinary Department (LBVD),				
Collaborators	NGOs				

Objectives: To generate new income source for the poor who are living mainly on low farm wage

Rationale: In CDZ, all livestock are being raised at backyards nearby villager's houses, and free-range method has been practiced for long time. Under the condition, both human and animal had suffered from illness each other as we know swine flu and bird flu over these several years. Considering this situation, it is recommendable to reduce contact of villagers and animals by constructing independent livestock shed to enclose animals inside. It is expected that this programme is conducted combined with the **No. 20: Livestock Diseases Prevention Programme**

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
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Expected Outputs	**Development Indicators and Targets per Village**
・Livestock owner groups are established. ・Livestock owners acquire technology to enclose livestock inside shed. ・Livestock housing to control diseases are extended in village. ・Ratio of outbreaks of illness for both human and livestock is decreased ・Living environment for villagers is improved.	・Number of livestock owner group: 1 group/village ・Number of livestock owners participated in the training: 30 persons/village ・Number of participants who constructed livestock housing learned in the training: 20 persons/village ・Number of participants who taught the technologies to other villagers: 10 persons/village

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Identify and organize livestock owners ・Preparation of training materials ・Provision of training and demonstration at village site(s) ・Data collection and monitoring	11,000$	LBVD, International Donors

Project Risks: Low interest of livestock owners to this programme

Environment Assessment (C) : The programme aims to reduce animal and human diseases village level by consulting livestock shed to avoid contact as possible as they can use locally available construction materials (bamboo, wood). Therefore, no negative impact is predicted.

Project Title	**No. 40: Children's Nutrition Improvement Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	◎	○			
Target Groups	All villagers including children in a village				
Implementing Agency	(Ministry of Health)				
Collaborators	International Donors, NGOs				

Objectives: To construct a village development center in a village for various public activities by villagers

Rationale: Most of villages in CDZ have no public space where is used for various villager's activities to improve village life of the people despite higher demand for such kind of centre. In order to discuss issues and countermeasure to solve them under the village assembly, the centre will contribute to provide suitable space for villagers, which will be used for multi-purposes equipped with an improved stove for cooking meal, small-scale library if required, and exhibition panel(s) showing well-balanced food and nutrient intake and scientific knowledge as well etc. The centre contributes to improve welfare for all strata of the villagers.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
		■ ■ ■	▬	▬	▬	▬	▬				

Expected Outputs	**Development Indicators and Targets per Village**
・Villagers are organized to select committee members to manage the centre. ・Regulation of the centre is prepared and agreed by villagers. ・Woman's activities are encouraged. ・People's knowledge on health care, nutrients and food etc is improved. ・Entire well-being of the people is improved.	・Nr. of the groups used the centre: above 3/month ・Nr. of villagers used the centre: 60-80% of adults ・Nr. of women used the centre: 60-80% of adult women ・Nr. of assembly/WS held at the centre: at least once a month ・Nr. of technologies and knowledge shown on the panels: 5 ・Nr. of visitors (Dist. And TS officers/villagers) to see the centre from other villages

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Organize villagers to discuss the function of the centre. ・Construction of the centre (building) ・Villager's contribution to construction works. ・Construction of an improved stove for cooking to serve meal at assembly, seminar etc. ・Construction of a small-scale library, if required as option. ・Preparation of exhibition panel(s) ・Installment of a water tank to collect rainwater, if necessary ・Regular cleaning of the centre by villagers. ・Operation and maintenance of the centre mainly by the committee ・Data collection and monitoring	6,000$ /TS	MOH, International Donors, NGOs

Project Risks: People's willingness to establish and maintain the centre

Environment Assessment (C) : The centre will contribute to people's well-being by providing public space for general and regular assembly of villagers. Earthwork is very limited and small-scale. Therefore, any negative impacts are forecasted.

Project Title	**No. 41: Primary Health Care Promotion Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	No-priority by Typology				
Target Groups	All villagers in a village in all TSs				
Implementing Agency	Ministry of Health (MOH)				
Collaborators	International donors, NGOs				

Objectives: To improve and strengthening public medical services for villagers

Rationale: Although there are 10,090 villages in the Study Area in CDZ, it is inferred that there still exist many villages without RHC (Rural health Centre) and its sub-centre or villages having a RHC with only poor drugs and medicines. RHC/sub-centre is very important to prevent villagers from diseases and physical damages by providing first aid, and also it is the base of educating villagers on health care and daily nutrition management. However, existing RHC/sub-centre is inadequate in number and not equipped with enough drugs and medicines to meet people's demand for medical care and so on. Improvement or newly construction of RHC/sub-centre will contribute to villager's well-being and health care in the rural areas.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
		■ ■ ■	■	■	■	■	■			

Expected Outputs	**Development Indicators and Targets per Village**
・People's accessibility to health care is improved. ・Expenses for medical care are decreased by using nearest RHC/sub-centre. ・Mortality rate of infant and children is decreased. ・Proper first aid can be provided in a village. ・People's awareness of health and nutrition management is improved.	・Nr. of patients used the RHC/sub-centre for first aid: (to be decided) ・Nr. of assembly on medical care and nutrition management: 2 times a year. ・Nr. of villagers participated in the assembly held at RHC/sub-centre: 100% of the HHs ・Nr. of patients sent to a hospital at the centre of TS: (to be decided)

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Construction of RHC/sub-centre depending, if the village has not both. ・Provision of medicines and equipment to meet minimum essentials, if a village has already a RHC/sub-centre. ・Educational activities on health care and daily nutrition management for villagers ・Preparation of regulation for using RHC/sub-centre. ・Data collection and monitoring.	6,000$ / TS	MOH, International Donors, NGOs

Project Risks: Late allocation of budget for the programme

Environment Assessment (C) : The programme aims to improve current medical care condition in CDZ keep people healthier and more comfortable in village life. Therefore, no negative impacts are predicted.

Project Title	**No. 42: Medical Services Strengthening Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	No-priority by Typology				
Target Groups	All villagers in a village in all TSs				
Implementing Agency	Ministry of Health (MOH)				
Collaborators	International donors				

Objectives: To improve and strengthening public medical services for villagers

Rationale: Combined with the Programme 41, human resource for medical services should be strengthened for villagers since such kind of services in rural areas have been not met people's demand if compared to those in urban areas. Therefore, number of doctors and midwives to be deployed in RHC/sub-centre should be increased depending on population of a village. Moreover, those doctors/midwives should be educated enough to deal with every kind of disease and physical injuries at village level. People's life in village will be improved by the programme.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**

Expected Outputs	**Development Indicators and Targets per Village**
・Quality of medical services at village level is improved. ・Enough number of doctors and midwives is deployed in rural areas. ・People's demand for advanced medical services is met. ・Number of patients who required to go to TS's hospital is decreased. ・Incidence of infectious disease is decreased. ・Expenses for medical care are decreased since doctors/midwives can deal with diseases and physical injuries. ・Mortality rate of infant and children is decreased. ・Proper first aid can be provided in a village.	・Nr. of doctors/midwives deployed: (to be decided) ・Nr. of patients who were provided medical procedure at village: (to be decided) ・Nr. of patients who were sent to TS's hospital: (to be decided)

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Provision of training for doctors/midwives to deal with various diseases and physical injuries in rural areas. ・Construction of RHC/sub-centre depending, if the village has nothing (No41). ・Provision of necessary quantity of medicines and equipment to meet demand at village level.	30,000$ / TS	MOH, International Donors,

Project Risks: Late allocation of budget for the programme

Environment Assessment (C) : The programme aims to improve quality of medical services at village level. Therefore, no negative impacts are predicted.

Project Title	**No. 43: Soil Conservation Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	○				
Target Groups	All HHs in a village				
Implementing Agency	Myanma Agriculture Service (MAS), Ministry of Forestry				
Collaborators	International Donors, NGOs				

Objectives: To conserve soil to secure agricultural production at undulating and sloping areas

Rationale: About 70% of cultivated areas in CDZ are occupied by upland mainly composed of sandy soil and sloping ground along the Bago Hill. Moreover, it is known in CDZ that even in CDZ called dry area having scarce and erratic pattern of rainfall, rainfall intensity is strong once falls. The sandy soil on sloping areas is eroded by the rainfall, and crops grown are damaged or lost. Despite these conditions, proper countermeasure such as contour farming cannot be observed in CDZ. Farmers living in these sloping areas are generally poor compared to those who live in low land because of difference in availability of water and soil condition. More farming suitable for sloping areas should be promoted in CDZ to help farmers who are not blessed in farming conditions.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
	■ ■	■	■	■	■	■					

Expected Outputs	**Development Indicators and Targets per Village**
・Proper farming methods in sloping areas are developed. ・Agricultural environment the sloping areas in CDZ is conserved. ・Agricultural production/productivity in the sloping areas is increased. ・Farm income of FHHs in the sloping areas is increased. ・Disparity in income is improved. ・Developed farming technologies are extended to other areas.	・No. of FHHs participated in the training: at least 30 persons/village ・No. of FHHs practically tried the contour farming: 20 persons/village ・Crop yield compared to conventional method: 10% up ・Farm income per acre: 5% up ・No. of FHHs who taught the technologies to other villagers: 20persons/village

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Analytical and field survey on soil condition (texture, depth, erosion etc). ・Cost estimation for contour farming. ・Construct of stone hedge(s), and plant fodder trees, fodder crops such as Elephant grass etc. ・Dosage of much cow dung and Bokashi. ・Organize villagers to manage contour farming. ・Provision of training on slope land farming. ・Establishment of model farm(s). ・Preparation of technical manual of slope land farming technologies. ・Data collection and monitoring.	8,000$ / TS	MAS, International Donors, NGOs

Project Risks: Low interest of FHHs to the Programme, Inadequate budget allocation for the programme

Environment Assessment (C) : This programme is a kind of countermeasures to conserve soil for agricultural production in CDZ. Contour farming is to be practiced. Therefore no negative impacts are predicted.

Project Title	**No. 44: Community Based Forestation Programme**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
					○
Target Groups	All HHs in a village				
Implementing Agency	Ministry of Forestry				
Collaborators	International Donors, NGOs				

Objectives: To conserve forest resources with forestation involving village people

Rationale: As we can find many fossils of woods everywhere in CDZ, the area was covered by forest long long time ago. However, recently forest resource has been deteriorated, and climate has also changed. Though many efforts on forest resource conservation have been made by the concerning ministries including international aids, more efforts should be made, involving villagers who are major users of woods as fuel source, for next generation.

Project Implementation	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
			■ ■ ■	■	■	■	■	■			

Expected Outputs	**Development Indicators and Targets per Village**
・ Bare lands and areas to be reforested are identified. ・ Forest resources in CDZ are conserved for the next generation. ・ Villagers recognize importance of conserve forests by saving firewood.	・ No. of organized villagers: at least 50 persons/village ・ No. and acreage of nursery beds: (to be decided) ・ Acreage for reforestation: (to be decided) ・ No. of villagers participated in practical transplanting: 50 persons ・ No. of nurseries transplanted: (to be decided) ・ Survival rate of nurseries: 80% ・ No. of nurseries re-transplanted: (to be decided)

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・ Survey on forest resources (density, varieties, averaged height and diameter etc). ・ Site selection for reforestation. ・ Selection of suitable varieties for the area ・ Organize villagers. ・ Establish nursery beds. ・ Construct shallow well, if necessary. ・ Manage nursery beds and transplanting by villagers. ・ Data collection and monitoring by villagers and the concerning ministries.	12,000$ / TS	MOF, International Donors, NGOs

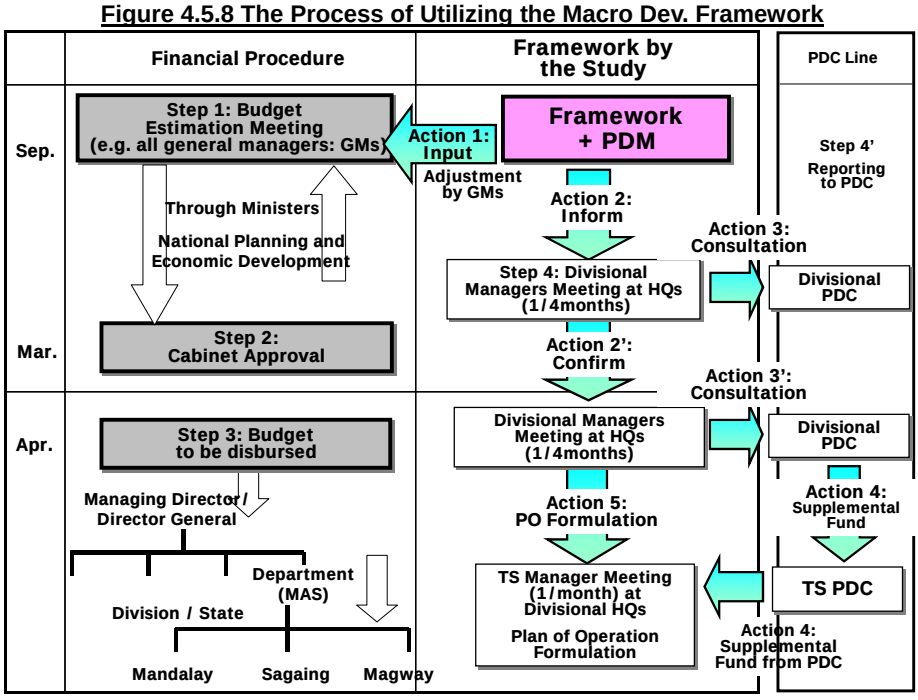
Project Risks: Inadequate budget allocation for the Programme boring and late in allocation

Environment Assessment (C) : This programme aims to conserve forest resources for the next generation by carrying out planting young trees involving villagers in bare lands and area to be reforested. therefore any negative impacts are not predicted.

4.5.4 Implementation Arrangement (for Macro Framework Utilization)

The macro development framework is planned to be used by current government offices such as MAS, LBVD, Cooperative Department and Cottage Industry Department, as well as other departments such as Farm Mechanization Department and Irrigation Department in case of Ministry of Agriculture and Irrigation. In this regard, the framework should be well linked up with the current government annual procedure of planning and budgeting. The procedure as well as to which how the development frameworks should be referred to are illustrated in the Figure 4.5.8.

Figure 4.5.8 The Process of Utilizing the Macro Dev. Framework



1) Planning and Budgeting Process in Myanmar

Based on the Figure 4.5.8, the annual process of planning and budgeting in Myanmar is briefed hereunder. The numbers of steps below are correlated to the number shown in the figure:

Step 1:

Myanmar financial year starts at the beginning of April and closes at the end of March following year. To prepare next year's budget, there is usually a meeting called 'Budget Estimation Meeting', which is held in September in the previous year. As an example, MAS HQs holds such meeting in every September calling all general managers responsible for each department under the MAS. During the meeting, activity planning and cost estimation for the next financial year are done.

Step 2:

The plan and project cost prepared by each department goes to the Ministry level and summarized. After having made adjustment amongst the departments, the plans together with project costs are sent to the Ministry of Planning and Economic Development (MPED) through respective ministers. The MPED scrutinizes all the project budgets by ministry, and according to a ceiling in conjunction with the national budget available for next financial year the MPED may send back to ministries for revision. Then, after all the budgets have been adjusted according to the national ceiling, the budget plan is to be sent to the cabinet for its approval. The Cabinet, after scrutinization, approves it in March, and then the budget for the new financial year becomes authorized. From April and onwards, thus the budgets come to respective ministries.

Step 3:

The budget which comes to a department, e.g. MAS, is divided according to planned activities by

division (e.g. extension division, seed division, etc.). Then, the budget is further divided into division/ state. In case of Extension division of MAS, the HQs division further divides the already allocated budget into regional divisions e.g. Mandalay division, Sagaing division, Magway division, etc. Again, necessary budget is allotted for district as well as for townships.

Step 4:

As for the reporting at field level, there is monthly meeting at divisional level calling all the TS managers thereof. Activities achieved at each TS level are reported to respective divisional manager. At the HQs level, there is usually divisional managers meeting once in every 4 months in case of MAS. The participants, divisional managers, report what they have done so far with reference to the plan and the budget approved. When necessary, revision and adjustment for the on-going plans may be made together with additional budget allocation if available. In Myanmar supplemental budget becomes eligible from September, and this budget may be allocated according to the revision and adjustment.

Step 4':

In Myanmar, reporting is made not only according to the technical line as above-mentioned but also to PDCs. For example, there is monthly PDC meeting at all level of division, district and township. Divisional PDC meeting calls all the government head at divisional level including MAS, LBVD, education, health, etc. At the meeting, not only agriculture and livestock but also other important issues e.g. relating to education, infrastructure, health are to be reported to the chairman. Then, the chairman instructs what the participating ministry offices should do with reference to the reports. In case of paddy and other strategic crops such as oil crop and pulses, the chairman may further instruct how much acre should be planted and how much harvest should be achieved, etc. In this regard, the PDC may supplement some activities e.g. proving logistics support for paddy cultivation promotion.

2) Utilization of the Development Framework

To utilize the development framework prepared under this Study, the entry point is that the participants to the Budget Estimation Meeting held in September should refer to it. Putting the framework on the discussion table for the planning of next year's activities should be the beginning of utilizing the development framework. With this as the entry, there should be a process through which the framework is well utilized. This process is illustrated in Figure 4.5.8 (see Action No.).

Action 1:

Participants to the budget estimation meeting refer to the development framework. There are responsible heads of all the divisions under a department in this meeting. They discuss the activities for the next year as well as necessary budget. In case of MAS activities planned in FY2008/09, activities planned were 'high yield promotion for monsoon paddy', 'upgrading of oil seed', 'promotion of beans & pulses production', 'promotion of horticulture', etc. Most of these activities can also be seen in the development framework.

The participants should discuss the next year's activities with reference to the programmes and projects shown in the development framework together with the priorities marked for each and every programme and project. Activities that they have carried out during the previous year should also be examined in comparison with those programmes and projects in the development framework. When they find a specific programme or project in the framework, which have not been undertaken by them so far, they should try to include them into their budget estimation. In so doing, programmes and projects presented in the framework are to be incorporated in the government budget estimation, becoming a part of government programme. With regard to areas

(TS) at which a programme/ project is to be implemented, priority matrix by typology shown in the development framework should also be referred. With this priority matrix, the participants can easily identify in which TSs such projects should be implemented.

Action 2:

There is divisional manager meeting at headquarters once in every 4 months (see Step 4 in Figure 4.5.8). Taking opportunity of this meeting held upon finalization of budget estimation for the next financial year, all the participants will be informed the budget estimation which should come with the development framework. In so doing, the respective 3 divisional managers can know how the budget estimation is linked up with the framework. Then, the 3 divisional managers bring back not only budget estimation paper but also the development framework for the Action 3.

Action 3:

Utilization of the framework should be pursued not only along above-mentioned technical line but also by involving PDCs. For example, right after Action 2 done, 3 divisional managers bring back the development framework from the headquarters and then explain what the development framework shows to the chairman of divisional PDC during a divisional meeting held at least once in a month. Divisional PDC chairman can also become familiar what programmes / projects should be required in his area with what priorities and also the relationship between the programmes / projects and TSs where those programmes / projects should be implemented.

Action 2' & Action 3':

Upon approval of the budget by Cabinet, the financial year's budget together with respective activities are to be informed from the headquarters to relevant field offices e.g. divisional offices. This can also be done taking opportunity of divisional managers meeting held at the headquarters once every 4 months. Then, the respective 3 divisional managers should bring back the information to their office and should consult with the chairman of divisional PDC. If the approved budget is not enough for a priority project, also linked up with the development framework, the MAD divisional manager may consult with the chairman for the possibility of supplemental budget from the PDC.

Action 4:

In fact, PDC has its own operation budget mostly coming from registration fee, license fee, market fee, etc. Therefore, if the divisional PDC agrees what is presented in the year's activities well linked up with the framework but with little financial endorsement, the PDC may consider to provide some supplemental budget. Especially, activities related to paddy promotion, oil crops promotion and also pulses promotion, which are all national priorities, may be better supplemented by PDC's budget since it is very much concerned with. If divisional PDC approves, some budget could come to respective TS PDCs, and they start working with MAS TS offices.

Action 5:

Above-mentioned actions are related to how to avail of necessary budget. Besides, to start project just development framework and PDM are not enough but there should be plan of operations (also called schedule of work, etc). PDM presents, for a specific programme or project, necessary activities by step and respective outputs, indicators to measure the outputs, inputs (investment), issues which should be well undertaken, etc. With reference to the PDMs, relevant officers at divisional level, district level and TS level should prepare the plan of operation by themselves. Then, concrete action on the ground can start.

3) Possible Collaboration with Donor activities in CDZ

To implement the programmes and projects presented in the framework, government fund should be utilized as much as possible including PDC fund. Included in the government funds are loan provision by e.g. Myanma Agricultural Bank and Myanma Livestock & Fisheries Development Bank. Besides, there are some INGOs and international donors which are operating in the CDZ with whom there may be a possibility to collaborate. Current institutions which are operating in the CDZ as of early 2010 are listed in Table 4.5.3 including government owned development banks, INGOs and international bilateral donors. The table also shows the possibility areas to which they can contribute:

As for government owned development bank, there are 2 banks which are considered vital to support the development programme and projects presented in the framework; these are as aforementioned Myanma Agricultural Bank and Myanma Livestock & Fisheries Development Bank. The loan provide by the Agricultural Bank ranges US$ 35 – 40 per farmer and thus it is not big enough. However when looking into the total disbursed amount in the 3 divisions of CDZ, it reaches as much as US$ 19.5 million as of 2007. Most of the loans disbursed were spent on purchase of chemical fertilizers. However in addition to the fertilizer this loan can facilitate farmers who hope to embark on relevant agriculture related programmes such as No.1 Certified Seeds Dissemination Programme. With this loan available, they can purchase certified seeds.

As for livestock sector, Myanma Livestock & Fisheries Development Bank now provides considerable amount of loan even to small scale livestock farmers on condition that the federation to which the small scale farmer belongs should guarantee. In Magway division for example, as much as 418 million Kyats (equivalent to about US$ 418,000) loan is available in FY 2009/10 though it is only for goat promotion. This loan definitely can facilitate Programme No.15 Goat Raising Promotion. With this loan disbursed, the small scale livestock farmer can purchase the initial stock and then s/he can enlarge the stock.

For agriculture sector, OISCA has been active in CDZ already over 10 years. The INGO promotes organic farming and in fact a pilot project under this Study linked up with the OISCA, training over 40 MAS staff in FY 2008/09. OFID may have a possibility of proving certified and good oil seeds. In addition, livelihood improvement is undertaken by such INGOs as PACT Myanmar, AMDA and Save the Children. In fact, PACT has been engaged in rural credit sector, and covered as many as 1,736 villages with 212,008 customers in total as of 2009. The total disbursed amount in 2009 reached about US$ 11.21 million, considerably big coverage. With this loan, credit beneficiaries can start mushroom culture, vegetable cultivation, native chicken rearing, etc.

As for rural water supply, BAJ (Bridge Asia Japan) has been operating over 10 years based at Kyaupadoung TS. This INGO has covered 10 townships near Kyaupadoung TS. In and around this areas, groundwater is deep often more than 150 m. The depth of a tube-well in this area therefore reaches as deep as over 200m. One tube-well may cost about US$ 40,000 or more. The INGO has sunk about 10 tube-wells per year over the 10 years operation. To construct a deep well, collaboration with BAJ should firstly be pursed. Furthermore, KOICA is now operating in forestation sector. Though the project is not much big, covering about 150ha in Nyaung-U TS, forestation programme presented in the development framework should seek a collaboration with KOICA.

Table 4.5.3 Donors Operating in the CDZ and Possible Collaboration with Them

Organization	Activities	Possible Collaboration
MAS TS	Extension staff in each TS: 10 - 15 Project cost: 1,000 - 1,500 US$/TS/yr	To provide agricultural extension service

LBVD TS	Veterinary officer in each TS: 3 - 4 Project cost: 100 - 150 US$/TS/yr	To provide livestock extension service, to prevent animal disease
Cooperative TS	Extension staff in each TS: 10 - 20 Project cost: 100 - 200 US$/TS/yr	To support farmers in organizing farmers, to carry out audit trainings.
Myanma Agricultural Development Bank (Govt.)	To provide agricultural loan 19.5 billion Kyats (19.5 M US$) loan were provided In FY 2008 / 09, in 3 divisions	No.1 Certified seeds dissemination programme No.5 Small-scale Irrigated horticulture programme No.6 Paddy cultivation improvement programme Can provide loan to start up above programmes (as for recent performance, about one third of the whole farmers in the CDZ are covered, and average disbursement per farmer is about US$ 35 – 40).
Myanma Livestock & Fisheries Development Bank (Govt.)	To provide livestock loan. In past; Mandalay: 246.5 M Kyats (2008) Sagaing: 150.4 M Kyats (2009) Magway: 418.0 M Kyats (2008)	No.14 Local breed improvement programme (cattle) No.15 Goat raising promotion programme Can provide loan to purchase livestock to start up above programmes (especially, in Magway division, about US$ 400,000 loan in total is available meant for goat promotion. Loan provision per beneficiary ranges about 100,000 - 200,000 Kyats equivalent to the cost of 3 – 6 goats
OISCA	Field: Yesagyo TS (Magway division, Pakokku district) To train 20 trainees (Male 10, Female 10, May - March) for agricultural promotion	No.2 Low-input agriculture promotion programme Can train farmers to promote low-cost agriculture practices related to above programme by sending advanced farmers to the OISCA training course.
OFID (OPEC Funded International Development、2006～2011)	To promote technologies and to provide facilities for oil crops production high in CDZ and (technical cooperation by FAO), 1.23 M US$	No.1 Certified seeds dissemination programme No.10 Rain-fed agriculture improvement programme Can provide certified seeds for oil crops used in the above programmes.
PACT Myanmar (Microfinance)	627 staff in Kyaupadoung TS office (as of 2009) Covering 10TSs in CDZ (Magway 6 TS, Sagaing 2 TSs, Mandalay 2 TSs) for micro-credit	No.4 Landless oriented mushroom promotion programme No.5 Small-scale Irrigated horticulture programme No.17 Local chicken promotion programme No.29 Raw material revolving programme Can provide seed money to start up above programmes (covered as many as 1,736 villages with 212,008 customers in total as of 2009. The total disbursed amount in 2009 reached about US$ 11.21 million, considerably big coverage).
AMDA	At project office Meikhtila TS Livelihood improvement project covers 37 village (1,454 beneficiaries) Project cost is about 100,000 US$ in 2008 and 2009	No.4 Landless oriented mushroom promotion programme No.5 Small-scale Irrigated horticulture programme No.40 Children's nutrition improvement programme No.41 Primary health care promotion programme Can collaborate in implementing above programmes.
Save the Children	Magway project office has covered 6 TSs in 2009 with 31 staff. It started 2006. Mandalay project office has covered 4 TSs with 49 staff. It started 1997. Activities are primary health care, nutrition improvement, livelihood improvement, and education improvement etc..	No.40 Children's nutrition improvement programme No.41 Primary health care promotion programme Can collaborate with above programmes (Annual operational budget in Magway office is about US$ 98,500 and the one in Mandalay office is about US$ 1,161,000, relatively large scale operation).
Bridge Asia Japan (BAJ)	Project office at Kyaupadoung TS Until 2009 (over the 10 years operation), it has covered 252 villages. It costs about 400 M US$ Achievements for 10 years are 101 tube-wells, 151 rehabilitation wells.	No.33 Rural Water Supply Programme (deep well) Can collaborate in sinking deep tube wells in areas where groundwater table is very deep e.g. deeper than 150 meters (they are based in Kyaupadoung TS and covers 5 TSs nearby where groundwater is all deep).
KOICA (2008～2010)	Reforestation: 150ha Project cost: 1.5M US$	No.44 Community Based Forestation Programme Can collaborate a forestation programme to be carried out around Bukin mountain in Nyaung-U TS, Mandalay division.

Source: JICA Study Team based on interviews to the respective organizations.

4.6 Development Planning at Village Level (Micro Level)

Aforementioned sub-chapter 4.5 'Development Planning (Macro Level) formulated a sort of master plan targeting whole CDZ area taking into account typology by township. With the development framework and accompanied project descriptions, concerned ministries can know what activities are required to develop CDZ with priorities. The projects/ programmes specified in the development framework are designed able to be implemented by current government institutional setting-up. As a result of what each government organization has played their roles, several activities would be brought into a village, thereby comprehensive intervention covering plural sectors could be achieved.

On the other hand, this sub-chapter discusses different approach of development intervention, which is to directory undertake comprehensive intervention at village level. In this approach, what comes first is a village at which several development interventions are planned taking into different livelihoods we can see even in a village. In most cases, there are agriculture, livestock and cottage related livelihoods even in a village. Here development intervention is planned to undertake all these livelihoods from the village level.

In putting this approach into implementation, there should be a coordinating team as JICA study team undertook in implementing pilot projects covering different sectors. This kind of team may be set up by concerted efforts by the concerned ministries, or otherwise with a help of external organization. Given this kind of task team, comprehensive development intervention at village level dealing with different livelihoods can be realized. For this purpose, planning at village level is discussed hereunder; starting with people's different livelihoods with typology, putting up of village level development framework (or micro level framework), presentation of simplified project design matrixes and then the implementation arrangement referred to when using the micro framework.

In addition to above, how to seek strategic association of the 2 development frameworks is also discussed at the end of this sub-chapter. Since resources are always limited in terms of not only human resources but also financial resources, there should always be strategic collaboration wherever more than one approach are tried in the same area. In this case, as an example, we can say the village development based on the micro framework can work as a model or as a demonstration village to all those ones undertaken by macro level development framework.

4.6.1 People's Livelihoods and Typology

There are by definition farm households and non-farm households in the CDZ rural area, former of whom is vested land tillage right and later of whom not. Farmers who cultivated farmlands in Typology IV and V are blessed with better natural resources such as rainfall, water, and even irrigation facilities sometimes. Whereas, in Typology I and Typology II areas, farmers are suffering from erratic and marginal rainfall and even soils they are not fertile in most cases. As one moves towards Typology V, the more resource rich farmers the one can meet while towards Typology I the more resource poor farmers the one will see.

				People's Livelihoods and Typology				
				I	II	III	IV	V
Livelihoods	Agriculture	Tillage right	Resource rich farmer			+	++	+++
			Resource poor farmer	+++	++	+		
	Non-agriculture		Livestock (goat)	++	++	+		
			Cottage	+	+	++	++	++
		Landless	Farm Casual Labor	+	+	+	++	++

Figure 4.6.1 Relationship between People's Livelihoods and Typology

As for non-farm households, there are different livelihoods they are engaged in but amongst them the livelihoods are livestock rearing, cottage industry employed, and farm casual labor work. Goat and sheep can be seen in dryer areas and therefore as one moves to Typology I area, more goats can be found. Cottage industry can be found in almost all villages in CDZ though the scale becomes small in Typology I and Typology II where severe climatic condition prevails. Concerning farm casual labors, they are more found in better environmental areas like Typology IV and Typology V. This is simply because farmers in these areas are rich enough to employ the farm casual labors. Figure 4.6.1 summarize the people's livelihoods and the prevalence by area according to the typology. '+++' means there are lots of such livelihood we can see in the typology, '++' fairly seen, '+' seen.

4.6.2 Development Framework at Village Level

Figure 4.6.2 shows the development framework, which should be referred to in pursuing comprehensive development intervention at village level. Development intervention (component) is demarcated by 2 categories at first, namely, a group of interventions, which benefit specific target villagers and the other benefiting whole villagers. Then, upper part of the framework demarcates the intervention by the category of farmer households and non-farmer households, and further elaborates by category of farmers and also by category of livelihood such as cottage industry, livestock, etc.

In case of macro development framework discussed in previous sub-chapter 4.5, those interventions placed at upper part of the framework were given higher priority; namely, the upper a development intervention (project or programme) is placed, the higher priority it is given. However, the framework established here does not give any priority by the location wherever it is placed but just according to the category of the livelihoods. Instead, the matrix table with '+++', '++', '+' shows to what magnitude the component is required in accordance with the typology. For example, component No.1 'Improved Paddy Cultivation Promotion' is needed the most in a village where typology V characteristics prevail (e.g. a village where paddy is found a lot and even with irrigation facilities).

Right to the matrix table is the indication of pro-poor projects. Components marked with triangular and circle are meant specifically for poor people like landless people, farm casual labors, etc. So called pro-poor projects are; small-scale irrigated horticulture which can create job opportunity for farm labors, mushroom cultivation not requiring farm land, livestock raising such as goat, pig, and native chicken. In cottage strengthening, there should be experienced villagers in the membership. However, new members can be recruited from poor people like landless villagers.

Cost is an indication of how much should be required in carrying out such components at a village. Therefore as number of villages to be undertaken increases, the cost will automatically multiply. Not all the projects (components) are required in just one village of course. Therefore, those project costs should not be simply summated to know the total investment in a village. At first, project components should be carefully selected according to the typology where the village is situated, and then the villagers' needs should also be confirmed. Components only met with the villagers' needs should be put into implementation.

The bottom column recommends the components required for development support activities; e.g. project cycle management strengthening, capacity development in the field of organizing villagers, technology documentation and dissemination, and dissemination of people's success stories. The first and second components are carried out by administering trainings to the concerned officers. All these components are not directed to the villagers but to the government officers who are to be engaged in the village development.

4.6.3 Project Description (Simplified Project Design Matrix)

Following the development framework, simplified project design matrix (PDM) for each project component is presented. The PDMs show not only the project designs but also lessons and experienced indicators through pilot project implementation. Also, numbers shown after the project title are the reference numbers to the Technical Manual prepared separately under this Study. The technical manual was presented to the government at the end of February 2010, upon completion of all the field works, covering different technologies. Farmer themselves based on the extension by government officers can try most of the technologies. When one hopes to know relevant technology in detail, the one should refer to the technical manual.

Figure 4.6.2 Development Framework at Village Level (from Micro Level)

Dev. Vision: Area Wherein People Enjoy Well-beings Based Primarily Upon Agriculture and Livestock Production Suitable to the CDZ Environment, Off-farm Incomes from Cottage Industry, Good Living Environment and also Better Supporting Systems

Target Group	No.	Component	Typology&Priority I	II	III	IV	V	Pro-Poor	Cost US$/Village
1. Farm Households – Resource Rich Farmer	1.1	Improved Paddy Cultivation Promotion	+	++	++	+++	+++		700
	1.2	Post-harvest (e.g. rice) Improvement	+	+	+	+	++		5,500
	1.3	Small-scale Farm Mechanization			+	+	++		2,000
1. Farm Households – Resource Poor Farmer	1.4	Local Cattle Improvement (for draught)	++	++	++	++	++		1,000
	1.5	Small-scale Irrigated Horticulture	+	+	+++	+		△	1,000
	1.6	Certified Seeds Dissemination	++	++	++	++	++		500
	1.7	Low-input Agriculture Promotion (e.g. IMO)	+++	+++	++	+	+		300
	1.8	Rain-fed Agriculture Improvement	+++	+++	++	+			300
2. Non-farm Households – Livestock Households	2.1	Landless Oriented Mushroom Promotion	+	+	+++	+	++	○	1,000
	2.2	Goat/sheep Raising Promotion (revolving)	+++	+++	+			○	3,000
	2.3	Pig Promotion (revolving)			+	++	+++	○	2,000
	2.4	Native Chicken Promotion (revolving)	++	++	++	+	+	○	500
2. Non-farm Households – Cottage Households / Farm Casual Labor Households	2.5	Cottage Strengthening (w/ Revolving Fund Est't)	Existing Cottage Industry Primarily Targeted. No-priority by Typology					○ :Basically landless targeted	3,000
		Weaving Promotion (multiple layers, engine driven)							
		Knitting Promotion							
		Embroidery Promotion, etc, etc.							
	2.6	Raw Material Revolving							1,000
	2.7	Rural Development Sales Center (road station)	At Place Many Visitors Expected						7,000
3. Whole Villagers	3.1	Improved Cooking Stove Promotion	+++	++	+	+	+	All villagers benefited	200
	3.2	Village Garbage/Rubbish Disposal	+	+	+	+	+		–
	3.3	Rural Development Center	+	+	+	+	+		5,000
	3.4	Rural Water Supply (deep well)	+++	++					12,000
	3.5	Village Electrification	For Adaptability						8,000
		Paddy Husk Power Generation			+	++	+++		
		Cow Dung Power Generation	+	+	+	++	++		
		Diesel Power Generation	+	+	+				
	3.6	Education Facilities Improvement	At school facility not enough						4,000
	3.7	Rural Health Center (RHC) Improvement	At RHC facility not enough						3,000
	3.8	Village Road Improvement	At the beginning of dry season						-
	3.9	Rural Road Improvement (village-center)	At poor roads to centers						5,000/mile
4. Development Support	41	Project Cycle Management Strengthening	To be required for above activities. In case of training, 40pax/batch is planned					For Government Officers	5,000
	42	Organizing Capacity Development							5,000
	43	Technology Documentation & Dissemination							2,000
	44	Success Story Dissemination							2,000

Several Villages

Project Title	**No. 1.1: Improved Paddy Cultivation Promotion (Reference: Technical Manual 1.7~1.16)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	+	++	++	+++	+++
Target Groups	Paddy Grower				
Implementing Agency	Myanma Agriculture Services (MAS), MOAI, Myanma Agricultural Development Bank (MADB)				
Collaborators	International Donors, NGOs				

Objectives : Dissemination of high-yielding paddy cultivation and production technology which enables to reduce cost of production and to earn more net profit.

Rationale: Even in CDZ, paddy cultivation is being given priority and have practiced in 30% of farmland. However, under the climate condition of little and erratic rainfall pattern, paddy yield has been fluctuated and resulted in low income of farmers. Meanwhile, chemical fertilizer is expensive especially for small scale farmers, and utilization of such chemical fertilizer is risky. Considering these situations of paddy farming, ICM (integrated crop management) technology combined with seed selection with salt solution, Dapog method for seedling, reduced area wet-bed nursery, utilization of Bokashi compost etc. are recommendable from economic point of views.

Expected Outputs	**Development Indicators and Targets per Village**
・Systematic rice growing technology is disseminated by extension staff MAS, and by farmer-to-farmer extension method. ・Good paddy yield is realized by adopting quality seed selection, Bokashi, and Dapog method etc. ・Net profit is increased with low production cost. ・Farmer's income is increased. ・Total paddy production in a village is increased.	・Number of groups of farmers (at least 1 group, 20 villagers/ village). ・There can be appearance of contact-farmers (3 household/village) ・Production cost can be reduced by about 10,000 Ks/ac. ・Paddy yield can be increased by about (10) baskets/ac. ・Farmers who go to contact-farmers to study paddy cultivation can be one-third (1/3) of all farmers (at village level). ・Income from paddy cultivation can be increased at least 10%.

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Designation of paddy-cultivating farmer group and formation of group is to be done. ・Selection of model plot for demonstration. ・Extension and demonstration concerning systematic paddy cultivation are to be done by MAS extension staff at model-plots. ・Technical pamphlets are to be distributed to farmers (utilize technical mannual produced in this Study). ・For farmers, to practically carry out ICM* at their own farms. ・Carry out follow-up activities by MAS extension staff. ・To carry out monitoring to take data.	Demonstration (Dapog nursery, ICM, etc.) Materials: 650$, Logistics: 50$, Total: 700$	MAS, International Donors
	** Note: one of ICM technologies is Dapog nursery. This was once introduced in Myanmar in 1980s', however it had failed. This technology cannot be tried in uneven farmland condition. Therefore it should be tried in leveled farm land also equipped with irrigation and drainage system. Another good point for Dapog is that it can be ferried to farmers by loading it on rear of motorbike. When MAS extension staff try to disseminate new variety of paddy by just distributing seeds, it may not be well disseminated but with rolled up Dapog nursery ferried by motor bike, farmers would accept the new variety at least at trial basis.* *Note: In case that supplement water is required, ground water can also be an option, and in this case WRUD should be involved. However to develop deep aquifer, there should be a feasibility study as indicated in No. 5 Small Scale Irrigated Horticulture Programme of the Macro Development Framework.*	

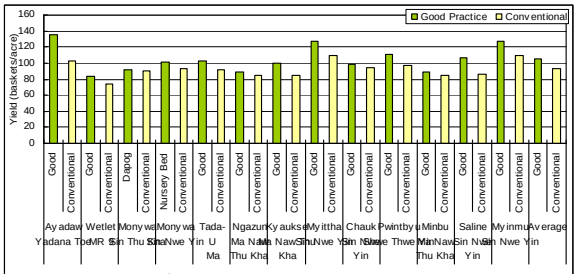
Project Risks: Management of Irrigation, drought, outbreak of disease and infestation

Project Title	No. 1.1: Improved Paddy Cultivation Promotion (Reference: Technical Manual 1.7~1.16)

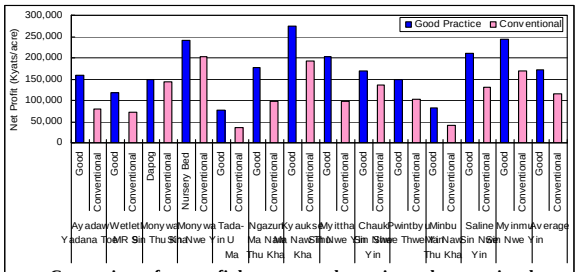
Lessons from Pilot Project :

1. Calculation of net profit earned by ICM-based paddy cultivation

Selection of good seeds by soaking in salt water, reduced area wet-bed nursery or nursery preparation by Dapog method, systematic application of fertilizer and correct dosage, weed control, etc. are ICM-based technologies. Summer paddy (irrigated) was cultivated by good practice (ICM) and by conventional method to find out the difference of yield and cost of those two practices. The top figure on the right shows comparison of yield between good practice and conventional one. In Ayardaw, Wetlet, Tada-U and Kyaukse townships, the yield by good practice was increased by about 10 baskets/acre. In those townships, the cost for nursery preparation was less than 10% of total cost. Nursery preparation by Dapog method can protect the roots of young seedlings from being damaged and the seedlings grow very well after being transplanted.



Comparison of yield between good practice and conventional one

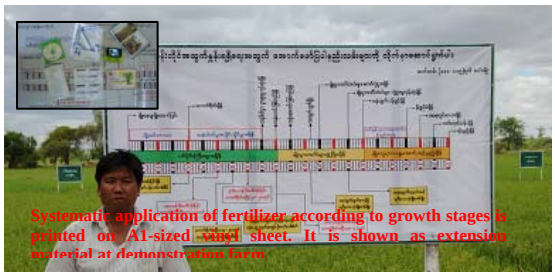


Comparison of net profit between good practice and conventional one

Seedlings of 15-25 days sown in well-prepared nursery bed are sure to get large and strong tillers when they are transplanted in main field, and by systematic application of fertilizer number of panicles with ripened grains can be increased. The right figure (below) shows comparison of net profit between good practice and conventional one. Concerning an average of net profit of (12) townships, good practice gained 173,076 kyats/ acre and conventional one gained 115,507 kyats/acre respectively. The achievement of good practice is to increase 57,570 kyats/acre net profit balance. The yield by good practice is about 12 baskets/acre more than that by conventional one. If the price of paddy per basket is calculated as 3,200 kyats, more income of 38,400 kyats/acre can be expected. On the other hand, the cost by good practice can be reduced as much as 17,710 kyats/acre than that by conventional one. Therefore, more income of 56,110 kyats/acre (38,400 + 17,710) can be expected by good practice.

2. Digital Extension

In the photo on the right is the crop calendar which shows cultivation management for paddy plants according to their growth stages. It is a vinyl sheet of 4' x 8' and the cost for the sheet is 32' x 250 kyats = 8,000 kyats. Service charge for design is 3,000 kyats and so the total cost is 11,000 kyats. Moreover, in the framed-photo a VCD which recorded the process of extension activities in digital photos is shown. The charge for copying is 1,000 kyats/disc. Then, clockwise from the CD are a large vinyl sheet described a method of providing paddy husk charcoal with kinds of materials and their required quantities, a MP4 player, a book of pictures, a technical hand book distributed in the last training, a crop calendar in A4 size, and a leaflet. In Kyaukse township, extension work by using MP4 player is being carried out, showing recorded video-photos to farmers. It is learnt that the price of a MP4 player is about 25,000 kyats.



Project Title	**No.1.2: Post-harvest Improvement (e.g. for rice) (Reference: Technical Manual 1.21)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	+	+	+	+	++
Target Groups	Interested individual farmers and Youth groups				
Implementing Agency	Myanma Agriculture Services (MAS), Myanmar Industrials Crops Development Enterprise (MICDE), MOAI				
Collaborators	International Donors, NGOs				

Objectives: To increase income for farmers through the improvement of post harvest technologies especially on drying paddy

Rationale: Marketing prices of crops especially rice and pulses are depending on moisture content of those crops. Myanmar people prefer long-stored rice because of its fragrance, which is dealt at higher price. However, farmer in the area usually sells paddy just after the harvesting because they do not have proper warehouse to store crops along with lack of post harvest technology. Therefore, more construction of storages is necessary to sell those crops at higher price in parallel with improvement of post harvest technologies. One of issues on summer paddy is drying after harvesting. By drying paddy with high moisture content using energy of rice husk, farmer can sell paddy at good price.

Expected Outputs	**Development Indicators and Targets per Village**
・Common interest groups are established. ・Women groups and youth groups are formed. ・Farmers acquire appropriate post harvest technologies and adopt them. ・Post-harvest losses are reduced. ・Farm products are added its value. ・Increase of farmer's income.	・Number of IFG's formed in a village: 1 ・Number of groups formed and trained in a village: 1 ・Number of storage constructed: 1 ・Number of farmers adopting technologies: 30 farmers/village ・Reduction of loss:5% ・Increase of farmgate prices: 5% ・Increase of farmer's income: 10%

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Identify and organize IFG's. ・Construct storage for demonstration ・Construction of paddy dryer ・Disseminate improved storage skills and improved paddy drying skills ・Disseminate pre- and post harvest handling skills	Preparation: 450$ Logistics: 50$ Storage Facility: 5,000$ Total: 5,500$	MAS, Donors

Project Risks: Weather conditions, late release of funds

Environment Assessment (C) : The things what are proposed are introduction of paddy dryer for summer season paddy and storage technology. As to paddy dryer, rice husk is used for fuel source and its waste (ash) is used for nursery bed etc as supplemental fertilizer. Since storage is constructed using wood and bamboo thatch by farmer themselves, no negative impact is predicted as well.

Project Title	**No. 1.3: Small-scale Farm Mechanization**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
			+	+	++
Target Groups	Interested individual farmers				
Implementing Agency	Agricultural Mechanization Department (AMD), Settlement and Land Record Department (SLRD), Myanma Agriculture Service (MAS), MOAI				
Collaborators	International donors				

Objectives: To increase crop productivity with farm mechanization.

Rationale: Crop cultivation in the area is characterized by low productivity because of primitive farming practices. Especially the most popular problem is seeding practice. Usually seeds sown by hand lose about 30 % compared to mechanized seeding. Recently improved seed is dealt with high price because of limited production. Crop production is expected almost double when using machine. Therefore, introduction of locally-made seeder is an urgent issue to increase crop productivity. Moreover, agriculture in CDZ has not been mechanized to date. Agricultural mechanization must be promoted to increase crop productivity by ploughing soil deeper.

Expected Outputs	**Development Indicators and Targets per Village**
・Farmer's groups are formed ・Farmers find the effectiveness of the new farm tools and adopt them ・Farmers are distributed improved tools and agricultural machinery is used and managed by the group. ・Increase of crop yields. ・Utilization of labor and cost-saving farm equipment expands in the CDZ. ・Village development fund using rental fee is established.	・Number of farmer group formed in a village: 1 ・Number of farmers adopting technologies: 30 farmers/village ・Seed loss reduction: 15% ・Yield increase: 20 %, increase in total crop production in village: 10% ・Increase of farmer's income: 5% ・No. of villages established village development fund: 10%

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Identifying and organizing farmers ・Identification of farm tools and equipment to be improved ・Identification of needs for agricultural machinery type and HP (power tiller, thresher), and its demonstration ・Manufacturing of improved tools and equipment ・Demonstration using improved farm tools and equipment and distribution*. ・Data collection and analysis in comparison with traditional farming methods by crops, by farm practice	Seeds 10$ x 10a = 100$ Logistics: 50$ Machines :1,850$ Total: 2,000$ *Note: where there is undulated topographic condition, introduction of farm machinery may need land levelling and farm reshaping. This situation may appear in western and west-north areas of the CDZ where there are mountainous areas.	AMD, Donors, NGOs

Project Risks: Poor weather conditions, late release of funds

Environment Assessment (C) : The programme aims to lend out small scale agricultural machinery such as power tiller and thresher manufactured in China or reconditioned from AMD to the Ministry of Cooperatives in order to make current farming practices more effective. Therefore negative impact on environment is predicted. Moreover, no ambient noise with operation of farm machinery is caused because farming practices are done in daytime, and village houses and farmlands are distant each other.

Project Title	**No. 1.4: Local Cattle Improvement (for draught)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	++	++	++	++	++
Target Groups	Farm households owning local cattle/goats				
Implementing Agency	Livestock Breeding and Veterinary Department (LBVD), Ministry of Livestock and Fisheries (MOLF), Myanma Livestock and Fisheries Development Bank (MLFDB)				
Collaborators	International Donors, NGOs				

Objectives: To improve productivity of cattle and local goats

Rationale: Since agricultural mechanization has been underdeveloped in the CDZ, draft cattle are indispensable for farm households. However, the size and capacity of local cattle have trend to become smaller and smaller year by year, according to cattle owners. Cattle and draft cattle are necessary mainly for farmers and goats mainly for the poor as well. In order to increase productivity of those livestock natural mating are to be planned which is suitable mean if considering current situation of LBVD's capability and condition of CDZ. Goats (Indian Nubian breed) for breeding are to be imported from India.

Expected Outputs	**Development Indicators and Targets per Village**
・Common interest groups are organized. ・Power and productivity of local cattle will be increased ・A provided breeding bull is managed and replaced every 5 to 6 years using ・Body size of local goats become bigger collected mating fee ・Quality goats are distributed	・Number of breeding bull delivered: 1 head/village ・Number of female cows mated: 50 head/year ・Number of cattle owners asked mating by a bull: 50HHs/village ・Number of calves born by mating: 40 calves ・Imported breeding goats: 5 head/village ・Number of kid being born: 5~8 head/year

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Identify and organize villagers and bull group ・Breed and mate bull ・Collection of charge to purchase a breeding bull for replacement ・Collective use of delivered breeding bull among group	Bull: 700$ Logistics and the others: 300$ Total: 1,000$	LBVD, International Donors, NGOs

Project Risks: Sudden death of provided bulls

Environment Assessment (C) : The programme aims to improve local cattle and goats using natural mating. Any impacts on eco-system are not forecasted since native breed is used in the programme.

Lessons from Pilot Project:

Estimation net profit of breeding bull cultivation

New bull (Shwe Ni) in Legaing Village had served for 57 cows and got 18 calves to date.

In Legaing village, a bull (Shwe Ni breed) purchased in 2007 was changed into a new bull on October 2008 since beneficiaries considered that the former bull does not have enough qualification as a breeding bull. The new bull (also Shwe Ni breed) with brownish skin and aged 1.5 to 2 years old was bought at 430,000 Kyats. As the former bull could be sold at 400,000 Kyats, they had to borrow 30,000 Kyats from the village fund also established in this village as a part of FY 2007/08 pilot projects without interest. Mating charge is 3,000 Kyats/time. As of January 2010, 57 cows were served and 18 calves were born. This bull became very famous in and around the village since villagers recognized good qualification of calves. Though the owner has spent on feeding more than the income from mating, he can now expect that the balance will be improved in near future according to increase of the mating.

Project Title	**No. 1.5: Small-scale Irrigated Horticulture (Reference: Technical Manual 1.5, 1.18)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	+	+	+++	+	
Target Groups	Interested Farmers and women groups				
Implementing Agency	Myanma Agriculture Services (MAS), Myanmar Industrials Crops Development Enterprise (MICDE), Irrigation Department (ID), MOAI, Myanma Agricultural Development Bank (MADB)				
Collaborators	International Donors, NGOs				

Objectives: To diversify income source for smallholders

Rationale: Rice cultivation areas and some upland farm areas are endowed with relatively rich water resources such as groundwater and surface water because those areas are located along the river. Small scale irrigation in those areas is possible to cultivate vegetables, medical herbs during the dry season and fruit trees too. To diversify income source for smallholders and improve villager's diet, small-scale irrigated horticulture is proposed to the area.

Expected Outputs	**Development Indicators and Targets per Village**
・ Interest farmer groups and women groups are established. ・ Farmers acquired appropriate technology on horticultural production and adopt them. ・ Increase in income ・ Improvement of nutrient condition of villagers	・ Number of smallholder groups formed in a village: 1 ・ Number of groups formed in a village: 1 ・ Number of farmers adopting technologies: 30 farmers/village ・ Percentage of income increase: 5% ・ Effect of nutritious improvement: BMI index by age

Major Activities in Line with the Expected Outputs	**Expected Sources**
・ Identify and organize IFG's and WG's. ・ Training for groups ・ Disseminate improved farming skills using small scale irrigation ・ Establishment of demonstration farm for small scale irrigation. ・ Disseminate vegetable and herb seeds, young fruit trees and fertilizer for demonstration farm.	MAS, NGOs, International Donors
	Cost (US$/village)
	Pump and the others: 700$, Logistics: 300$, Total: 1,000$

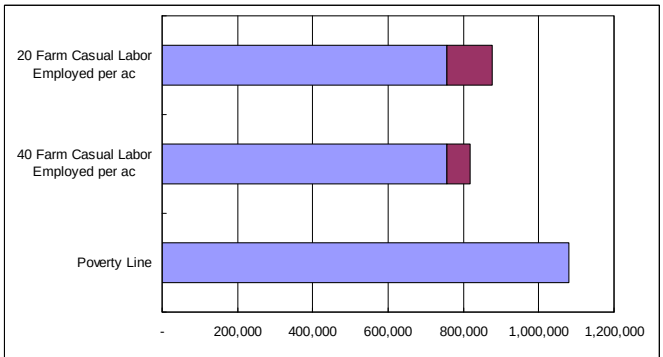
Project Risks: Low farmer's willingness to horticulture

Environment Assessment (B): Shallow well is constructed at the edge of farmland provided by farmer. The volume of pumping water will be the level that can be pumped up by using treadle pump and small pump with engine. Namely, if groundwater level declines 7 to 8 m lower than ground level, pumping become difficult automatically. Therefore, both decline of groundwater level and ground settlement by large scale pumping are not predicted. Many villages in CDZ are depending on manual pumping for water supply, so water volume being pumped up by hand pumps may be decreased if groundwater level declines 7 to 8 m. Measures to reduce impacts: Villages in CDZ form aggregated ones surrounded by hedges, and upland and paddy field are distributed nearby those village areas. Therefore, shallow wells for irrigation purpose should be installed at least 30 m distant from outskirts of the village. By doing so, impact on declining water level of shallow wells could be minimized.

Lessons from Pilot Project: Estimation net profit of onion cultivation

Here, the increment amount of income brought about by the increase of hired opportunity of farm laborers is examined in a model case in which 20 farmers per village are assumed to crop onion on 1 acre / farmer. It is assumed that 140 man-days (40 man-days / male, 100 man-days / female) are created per acre as new hiring opportunity referring to the case of onion cultivation seen on the table.

The required farm labor per day per acre ranges 20 - at maximum 40 persons as experienced so far (for weeding 20 - 30 man-day /acre are hired but for harvesting 40 man-day /acre at maximum are hired because it's necessary to harvest timely). Given the above-mentioned conditions, also assuming that 20 - 40 farm laborers are hired for all the practices of vegetable cultivation in total 20 acres, the income derived from wage labor is estimated as shown in a figure. The figure gives the sum of the basal annual income of a farm laborer's household (756,000 Kyats) and wage earned from farm labor for vegetable cultivation. The poverty line of non-farm household is also shown at the lowest part of bar graph in this figure (the same amount as poverty line is applied to farm laborer's household).



Mean annual income of FL HH & income from wage labor

Project / Title	**No. 1.6: Certified Seeds Dissemination**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	++	++	++	++	++
Target Groups	Interested individual farmers				
Implementing Agency	Department of Agricultural Research (DAR), Myanma Agriculture Service (MAS), Myanma Agricultural Development Bank (MADB), Myanmar Industrials Crops Development Enterprise (MICDE)				
Collaborators	International Donors				

Objectives: To increase agricultural productivity of the CDZ

Rationale: The yield of the crops (cereal, oil seed, forage and pulses) remains low in CDZ despite its importance to the regional economy because farmers still rely on local seeds produced in their farms every year. Certified seeds are required because good certified seed can raise crop yield by 10 to as much as 20% according to international practices.

Expected Outputs	**Development Indicators and Targets per Village**
・Common Farmer groups are established. ・Farmers find appropriate seed variety and technology, and adopt them. ・Seeds for farmers are renewed every 2 to 3 years. ・Crop yield is increased. ・Farm produce are value added. ・Farmer's income is increased. ・Total production in the village is increased	・Number of groups formed in a village: 1 ・Number of farmers adopting technologies; 30 farmers/village ・Percentage of farmers who use certified seeds:10% ・Value added per acre; 5% ・Increase of farmer's income; 5% ・Increase of total production in village; 5%

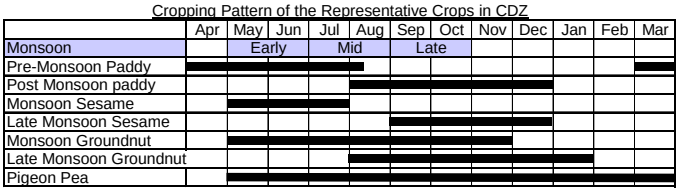
Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Identify and organize farmers ・Selection of suitable seeds for the village according to farmers' preference. ・Disseminate improved farming skills ・Disseminate improved seeds for multiplication from MAS seed farms ・Disseminate pre-& post harvest handling & storage facilities skills	Seed: 10$ x 50ac = 500$ (Including logistics) Total: 500$	MAS, International Donors
	Note: Industrial crops such as jute, sugarcane, and especially cotton can also be included in this programme since MICDE is promoting such crops as priority strategy.	

Project Risks: Rainfall fluctuation, late release of funds

Environment Assessment (C) : Certified seeds produced in CARI and DAR are distributed to farmers, and regenerated at the contact farmer level. After that, the improved seeds are revolved amongst the farmers in a village. No farmland reclamation is included in this programme, hence no environmental negative impact is expected.

Lessons from Pilot Project : The table shows a Cropping Pattern of the Representative Crops in CDZ. In Ar La Ka Pa village, the Village Committee is making efforts to be able to carry out an improved revolving system. According to the improved revolving system, the first generation beneficiaries are, since they were provided with seeds and compound chemical fertilizer too, to hand over 2 times of the original quantity of seeds to the Village Committee as "interest" for provided chemical fertilizer.

Cropping Pattern of the Representative Crops in CDZ



An improved revolving system

FY	Beneficiary Group	Received (A) and hand over to (B)	
		(A)	(B)
2008-09	1st	28	50
2009-10	1st	25	25
	2nd	25	25
20010-11	3rd	50	50

Note; When the first generation beneficiaries hand over the seeds to the second generation beneficiaries, 3 baskets of chickpea seed destroyed by rain and 3 baskets of interest - total in 6 baskets - will be exempted.

Project Title	**No. 1.7: Low-input Agriculture Promotion (e.g. IMO) (Reference: Technical Manual 1.14 to 1.17, 1.19-1.20)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	+++	+++	++	+	+
Target Groups	Interested Farmers				
Implementing Agency	Myanma Agriculture Service (MAS), Ministry of Agriculture and Irrigation (MOAI)				
Collaborators	International Donors, NGOs				

Objectives: To increase agricultural productivity by introduction of organic farming

Rationale: Sandy soils are dominant in the area. These soils have problems to grow upland crops such as poor water holding capacity, erosion, low nutrient contents and capacity and location exchange capacity. To improve the soil texture and physical characteristics, applying organic fertilizers made with IMO, earthworm, EM are very effective. However, farmers do not know how to prepare organic fertilizers and the application methods. Therefore, extension of the organic fertilizer including preparation and application are very important to improve crop productivity at low price.

Expected Outputs	**Development Indicators and Targets per Village**
・Farmer groups are established. ・Farmers are trained and adopt organic fertilizers to their field. ・Crop productivity is improved. ・Profitability of crops is increased with cost reduction ・Soil texture especially water holding capacity of the soil is improved. ・Total crop production in village is increased	・Number of IFG's formed in a village: 1 ・Number of groups formed in a village: 1 ・Number of farmers adopting technologies 30 farmers/village ・Percentage of productivity increase: 5%. ・Increase of crop profitability with cost reduction: 5% ・Increase of water holding capacity of the soil: 10% ・Increase of total crop production in village: 5%

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Identify and organize farmer groups. ・Demonstration of on how to make organic fertilizers ・Disseminate the improved methods of preparation and application technology of organic fertilizers. ・Establishment of demonstration farm(s) ・Comparison of yield and profitability with crops cultivated by conventional farming methods ・Data collection and analysis	Preparation, demonstration, materials, etc.: 250$, Logistics: 50$ Total: 300$	MAS, NGOs, International Donors

Project Risks: Late release of funds, low willingness of farmers

Environment Assessment (C) : It is to utilize natural bacteria in making compost manure (IMO and EM Bokashi) and the compost made with earthworm. No negative environmental impact is expected.

Project Title	**No. 1.8: Rain-fed Agriculture Improvement**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	+++	+++	++	+	
Target Groups	Youth groups and interested individual farmers				
Implementing Agency	Myanma Agriculture Services (MAS), MOAI				
Collaborators	International Donors, NGOs				

Objectives: To stabilize agriculture production in the central dry zone.

Rationale: About 70% of cultivated areas in CDZ are occupied by upland, implying about 70% of farmers are living on those rain-fed upland farming. Agriculture productions in undulating upland areas prone to be damaged by fluctuating and scarce rainfall and soil erosion. It is said that the unstable crop production is the biggest cause of poverty not only for farmers but also farm workers of landless people. To stabilize agriculture production appropriate cropping system such as alley cropping and contour farming are proposed in the rain-fed upland areas with undulating land condition.

Expected Outputs	**Development Indicators and Targets per Village**
・ Interest farmer groups are established. ・ Farmers acquire appropriate technologies on rain-fed farming and adopt them. ・ Agriculture production in rain-fed uplands becomes stable. ・ Farmer's income increases. ・ Farmland is preserved. ・ Improved technology for upland farming is extended to other areas.	・ Number of IFG's formed in a village: 1 ・ Number of groups formed in a village: 1 ・ Number of farmers adopting the technologies: 30 farmers/village ・ Acreage developed under the programme: 1 acre ・ Increase of crop yield: 5% ・ Increase of farmer's income: 5%

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・ Identification of rain-fed areas to be developed under the programme. ・ Identify and organize IFG's. ・ Construction of model farm(s) in the selected area(s) ・ Disseminate upland farming skills such as contour farming and agro-forestry etc. ・ Disseminate seedlings such as fruit trees, forage trees and windbreak.	Preparation: 50$ Procurement: 200$ Logistics: 50$ Total: 300$	MAS, Donors, NGOs

Project Risks: Weather conditions, late release of funds

Environment Assessment (C) : The programme aims to improve rain-fed farming which has been practiced under the unstable rainfall condition. It is composed of introduction of contour farming at sloped areas, dosage of compost to improve soil texture at flat and sloped areas, introduction of mulching using farm residues to cover field surface and introduction of drought tolerant crops etc. Since the programme is planned a part of environment preservation, any negative impacts are predicted.

Project Title	**No. 2.1: Landless Oriented Mushroom Promotion (Reference: Technical Manual 1.1)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	+	+	+++	+	++
Target Groups	Interested Landless				
Implementing Agency	Myanma Agriculture Services (MAS), Myanmar Industrials Crops Development Enterprise (MICDE),				
Collaborators	International Donors, NGOs				

Objectives: To diversify income source for landless and women groups

Rationale: Poverty rate of landless casual households and female headed households is extremely high in CDZ. Mushroom can be cultivated at backyard with minor cost without holding farmland and also is not affected by fluctuating and scarce rainfall in CDZ. Therefore mushroom cultivation is proposed to increase income mainly for landless households and women including female headed households.

Expected Outputs	**Development Indicators and Targets per Village**
・ Common interest groups are established. ・ Women groups and landless groups are formed. ・ Participants are taught appropriate technology and adopt them. ・ Income of landless people, especially farm/casual labours is increased and become stable. ・ Mushroom production by landless people expands. ・ Poverty ratio of landless HHs and female headed HHs is reduced.	・ Number of IL's and women groups formed in a village: 1 ・ Number of groups formed in a village: 1 ・ Number of landless and women groups adopting technologies : 30 landless and women/village ・ Total mushroom production and amount of sale: No. of Producer x yield x unit price/viss ・ Increase of household income: 10%

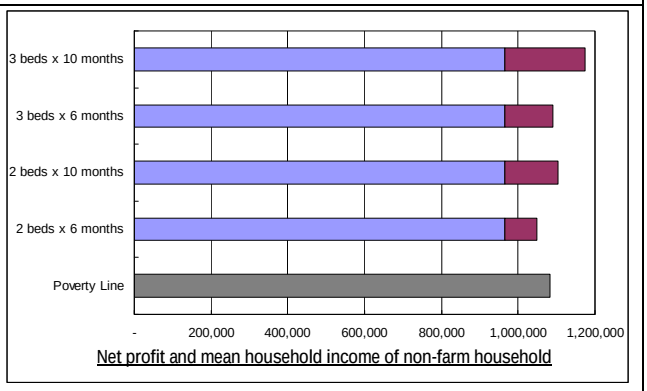
Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・ Identify and organize landless, women groups ・ Disseminate technologies of cultivating mushroom	Mushroom (Bed, Seed, others): 50$, Arrangement: 950$, Total: 1,000$	MAS, Donors, NGOs

Project Risks: Unexpected heavy rain, late release of funds

Environment Assessment (C): The target group of the programme is landless people as mushroom production doesn't need farmland. Raw materials such as rice straw, water hyacinth are available abundantly in the area. No negative impact on both natural and social environment is predicted since cultivation is done in small scale targeting the pro-poor people.

Lessons from Pilot Project: Estimation of net profit of mushroom cultivation

The table shows a base of average annual income (4,000 Kyats) earned by a landless household (non-farm household) obtained in the baseline survey conducted in 6 target villages of the Pilot Project in 2007, and the additional income by mushroom culture added thereon. Also, at the base of the figure average poverty line in a landless household 1,081,000Kyats is inserted in parallel.



Net profit and mean household income of non-farm household

As compared with the poverty line at 1,081,000Kyats, the mean annual income for the landless household (non-farm HH) amounts to 964,000Kyats, or lower by 11% than this line. To this amount, if the household culture mushroom at the standard scale observed in Legaing Village (3 beds x 10 months), the net profit amounted at about 210,000 Kyats is added, and then the household income exceeds the poverty line. Also, in the case of culturing mushroom for 6 months/year with 3 beds, or for 10 months/year with 2 beds, the total household income barely clears the line. The net annual profit from the culture for 6 months with 2 beds comes to around 84,000 Kyats, but in this case the total annual household income amounts to 1,048,000 Kyats, slightly failing to reach the poverty line.

Mushroom culture can provide beneficial income source for the landless because it doesn't require arable land. Yet, it seems to be rather high-hurdled income generating activity for the poorest, farm laborers' households to begin with. Namely, they have to overcome a host of conditions such as access to telephone, procedures for paying inputs, provision of initial cost, yield character with great variability and access to markets etc. This may have resulted in the fact that among 15 culturists who were respondents of an interview survey conducted in Legaing Village in 2008, only 2 households engaged in farm labor service were included.

Project Title	**No. 2.2: Goat / Sheep Raising Promotion (revolving) (Reference: Technical Manual 2.1, 2.3)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	+++	+++	+		
Target Groups	Landless casual/farm workers and small scale farm household				
Implementing Agency	Livestock Breeding and Veterinary Department (LBVD), Ministry of Livestock and Fisheries (MOLF), Myanma Livestock and Fisheries Development Bank (MLFDB)				
Collaborators	International Donors, NGOs				

Objectives: To generate stable income source to supplement inadequate income from farm wage

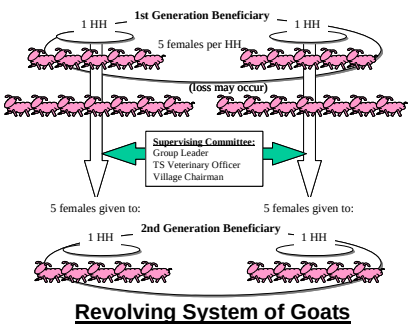
Rationale: Landless households and smallholders form poor strata in the CDZ. They are mainly living on low income from farm work in vulnerable agriculture. Small ruminant raising can be done without holding farmland and without running cost. Reflecting higher demand for goat meat, small ruminant raising is considered very promising. All the beneficiaries are required to construct improved goat housing with raised floor. Based on the proposed revolving system, no. of beneficiaries will be able to increase yearly basis. Therefore small ruminants will contribute to improve living standard of the poor. In parallel with raising goat, UMMB making shall be promoted for more effective and healthier growing.

Expected Outputs	**Development Indicators and Targets per Village**
・ Income of the poor is increased ・ Poverty ratio in village is decreased ・ Economic disparity in village is improved. ・ Living standard of the poor is improved. ・ Utilization of UMMB is extended in village	・ Number of goats beneficiary groups: 2(10HHs) ・ Number of goats delivered: 50 head (5 head/HH) ・ Number of kid born : 80 head/year ・ Number of goats died including kids:10 head/year ・ Nr. of goats to 2nd generation: 75 head for 15HHs ・ Percentage of beneficiary using UMMB:80%

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・ Identify and organize goat raising groups ・ Procure and deliver goats (female and male) ・ Construction of model goat housing ・ Handover goats to next generation ・ Data collection and monitoring	Goat: 40$ x 60Heads = 2,400$ Logistics: 600$ Total: 3,000$	LBVD, International Donors, NGOs

Project Risks: Before the project commencement, carrying capacity of existing grazing ground should be examined to estimate the number of livestock to be grazed in each TS including by-product of crops such as rice straw in order to avoid overgrazing. If the number of existing livestock exceeds the calculated number, excessive number must be sold to keep balance of the carrying capacity of grazing ground. In the calculation, livestock unit defined in Myanmar shall be used." General project risks are; outbreak of infectious diseases, overgrazing in future as mentioned above. Outbreak of infectious diseases should also be one of the risks.

Lessons from Pilot Project: 5 original goats are provided for a household, so the total heads come to 75 per village for 15 beneficiaries. The beneficiary household will hand the same 5 heads of kids (she-goats) out of the offspring born from the received stocks over to the secondary beneficial households such as landless or smallholders in the same village according to the revolving system. The time limit given to the primary beneficiary households is as a rule one year. The secondary beneficiary households that received 5 does again give the same number of heads (she-goats) to next generation as well. One of the advantages of goat (sheep) is not affected by swine flu nor by bird flu, and therefore it is superior to pig and chicken in this disease regard.



Revolving System of Goats

Environment Assessment (C) : Under the programme, native goats are to be distributed to the poor to revolve kids born to 2nd generation beneficiaries, aiming at reducing poverty based on the proposed revolving system. It is expected to contribute to reduce economic disparity in village as the programme is targeting pro-poor. Any no negative impacts, therefore, are predicted.

Project Title	**No. 2.3: Pig Promotion (revolving) (Reference: Technical Manual 1.17, 2.2)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
			+	++	+++
Target Groups	Landless casual/farm workers and smallholders				
Implementing Agency	Livestock Breeding and Veterinary Department (LBVD), Ministry of Livestock and Fisheries (MOLF)				
Collaborators	International Donors, NGOs				

Objectives: To generate new income source for the poor who are living mainly on low farm wage

Rationale: Myanmar people prefer pork too as well as chicken. If feeding well, piglet can be sold within 10 months. And a matured female can reproduce 8 to 10 piglets per time. Therefore, piggery will be suitable to generate income especially for the poor. Revolving system shall be applied to expand beneficiaries of next generation.

Expected Outputs	**Development Indicators and Targets per Village**
・ Piglets are delivered from 1st generation to next generation according to the revolving system. ・ Economic disparity in village is improved. ・ Living standard of the poor is improved.	・ Number of beneficial groups: 2 groups/village ・ Number of piglets to be delivered: 2 head/HH ・ Number of pig housings per village: 5 house/village ・ Number of piglets handed over to 2nd group: 20 heads for 10HHs

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・ Identify and organize beneficiary groups ・ Procurement of quality piglets and delivering to beneficiaries ・ Construction of model pig housing. ・ Handover grown pig to next generation ・ Data collection and monitoring	Piglet: 50$ x 30Heads = 1,500$ Logistics: 500$ Total: 2,000$	LBVD, International Donors, NGOs

Project Risks: Continuous affect of the swine flu. Appreciation of feed cost (bran and broken rice)

Environment Assessment (B) : In the paddy producing areas, grazing ground for goat/sheep is limited due to intensive land use all year round. Conversely, piggery programme is introduced for the poor by feeding mainly kitchen waste and rice bran. No impact on eco-system is forecasted but has possibility of causing afoul smell of pig housing, which may influence to neighboring.
Measures to reduce impacts: Pig housing must be done by beneficiary as duty to receive piglets. The pig housing is floored by brick, stones and clayey soil and higher than the ground level for drainage. Moreover, EM compost making should be promoted to reduce afoul smell on the bedding (EM is also effective to eliminate afoul smell of dung and urine).

Lessons from Pilot Project: During the implementation of pig raising pilot project, it was learned that local pig was stronger in free range than that of hybrid. Therefore, local piglets were procured in the 2nd year pilot project. One of the beneficiaries had mated provided female, and got 12 piglets. She could get more income by selling grown piglets after weaning. There is another beneficiary who also went on breeding. He reared the two piglets provided. He could enjoy the fruits of his labour on 8th August 2008. On that day, from his pigs provided in November 2007, 5 piglets were born, 1 male and 4 female. One female piglet died five days later unfortunately. So there left two big pigs and four piglets, being six in number.

She is a success 2nd generation beneficiary, who got 12 piglets by breeding..

Thus, the beneficiaries can be divided into two, those who fatten piglets, and those who fatten and do breeding at the same time, in both 1st and 2nd generation. For the former, it is very important to grow pigs reasonably bigger for marketing to sell at a good price. Regarding breeding, it requires some specific knowledge and technology to judge timing of mating and feeding for sows, etc rather than simple fattening but it will generate more profit by regular kidding of piglets of 8 to 10 head (sometimes 12 head), which can be sold after weaning at about 25,000 Kyats /head for fattening purpose. In other words, it may bring profit in shorter period if s/he succeeds in the breeding. Depending upon the condition allowed such as feeding cost for sows, service charge, availability of space for pigs, beneficiaries may choose fattening, breeding or integrated one.

Project Title	**No. 2.4: Native Chicken Promotion (revolving)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	++	++	++	+	+
Target Groups	Landless casual/farm workers and smallholders				
Implementing Agency	Livestock Breeding and Veterinary Department (LBVD), Ministry of Livestock and Fisheries (MOLF)				
Collaborators	International Donors, NGOs				

Objectives: To generate new income source for the poor who are living mainly on low farm wage

Rationale: Chicken is popularly reared in every village in CDZ for both egg and meat. Chicken meat is most popular meat for Myanmar people, and therefore demand is high. Chicken rearing is considered promising for the poor to generate additional income and to improve their nutrition status. Local chicken can be sold within 2 to 3 months and reared at lower price. Revolving system shall also be applied for chicken rearing programme to extend beneficiaries.

Expected Outputs	**Development Indicators and Targets per Village**
・Beneficiaries' groups are established. ・Economic disparity in village is improved. ・Living standard of the poor is improved. ・Beneficiaries acquire suitable rearing method to avoid bird flu and other diseases such as Newcastle disease.	・Number of beneficial groups: 2 groups/village ・Number of chicks to be delivered: 10 birds/HH ・Number of chicken housings per village: 5 house/village ・Number of beneficiaries handed over chicks: 10HHs/village

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Identify and organize beneficiary groups ・Procurement and delivering of local chicks ((In providing start-up poultry, 1:10 ratio of chicken package/ household is enough for landless livestock farmers). ・Construction of model chicken housing. ・Handover grown chicks to next generation ・Data collection and monitoring	Bird: 10$ x 40Heads = 400$ Logistics: 100$ Total: 500$	LBVD, International Donors, NGOs

Project Risks: Outbreak of the bird flu

Environment Assessment (C) : Any negative impact is predicted because this program is for reduction of poverty, and to be practiced at villager's backyards in small scale.

Project Title	**No. 2.5: Cottage Strengthening (w/ Revolving Fund Est't)**				
Priority in approaches	Type I	Type II	Type III	Type IV	Type V
	Existing Cottage Industry Primarily Targeted. No-priority by Typology				
Target groups	Cottage industry workers, landless people				
Implementing agency	Cottage Industry Department (CID), Cottage Department（CD）、Ministry of Co-operative（MOC）				
Collaborators	Companies, NGOs				

Objectives： To establish revolving fund together with expansion of cottage industry.

Rationale： In Myanmar, 45% of GDP is occupied by agriculture sector, meanwhile, not more than 10% by cottage industry. In CDZ as well, agriculture accounts for 50% and 19% by the cottage industry. There are various cottage industries in CDZ such as weaving, knitting, embroidery, Jaggery production etc and provide villagers employment opportunities especially for landless people. It is expected that strengthening and expansion of cottage industries in villages can generate additional income and job-opportunities for the poor. Necessary machines to promote the cottage industries are invested, and rental fee for those machines and the money obtained by redemption for the cost of machines become a source of the village revolving fund or group revolving fund from which every villager can borrow money at low interest rate. Those funds are able to encourage villagers who are going to manage small scale industries by lending loans at low interest.

Expected Outputs	**Development Indicators and Targets per Village**
・Cottage industry in villages can be specific. ・Only cottage industries judged feasible are to be encouraged ・Producer organizations can appear (about 10-30 pax) ・There can be technical improvement for members of cottage producer organizations. ・The base of cottage industry in village can be set up (workshop). ・Members' income increases. ・Fund can be established by saving members' contributions. ・Saved money collected from members can be used to invest for other activities. ・Making use of the fund, job opportunity is created especially for the poor.	・Depending on activity, the number of beneficiary-groups (group/village) can be different. ・Number of members who attended the training. ・Depending on activity, the amount of capital can be different. ・Machines and raw materials to be provided. ・Increase of beneficiaries' income (at least 20% increase for farm-labourers). ・Establishment of fund with beneficiaries' contributions. ・The amount lent out from group fund or village fund. ・Number of villagers who borrowed money from the fund.

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**
・Cottage industries in targeted village-tract will be specified. ・Demand and market trend of the product s will be analysed (including ability to compete with imported products) from economic point of views. ・Cottage industry beneficiaries will be mobilized into an organization ・Training will be conducted to improve the technology according to respective cottage industry ・Initial investment such as capital, raw materials, and machines will be done. ・Beneficiaries will use those machines and raw materials to produce their products. ・Rental fee for machines and a certain amount from their profit from sale will be collected. ・Financial status (fund) will be open to all. ・Data collection and monitoring	3,000$ **Expected Sources** MOC, International Donors

Project Risks: Unexpected rapid and sharp price down at market (e.g. no more markets due to the world's business depression in 2008.) inability to compete with imported cheap products in price (e.g. China products), no money to establish fund due to default of rental fee by members whose business are down

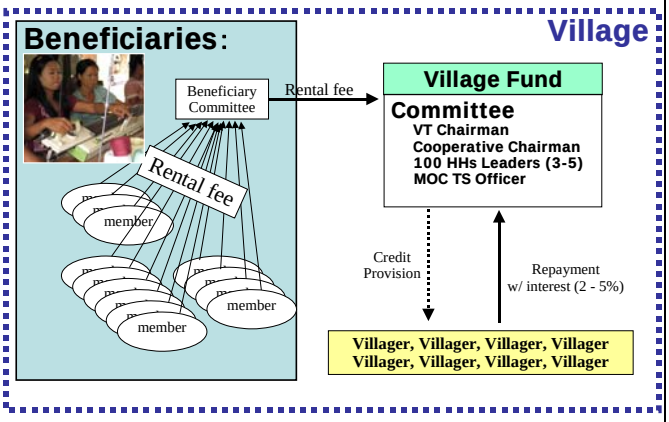
Project Title	No. 2.5: Cottage Strengthening (w/ Revolving Fund Est't)

Lessons from Pilot Project :

1. Synergy by Village Fund

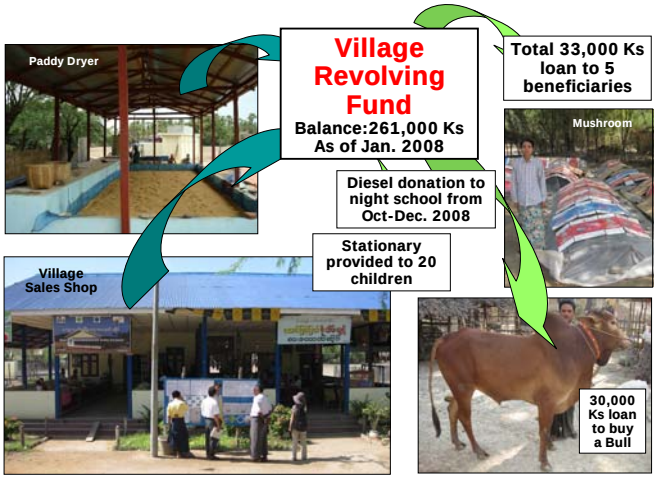
If cottage industries are in good and convenient situation, group fund and village fund will be able to be established. As for an example of village fund, in Legaing village loans out of village fund could be disbursed out to villagers for buying a bull for local cattle improvement pilot project, and to mushroom beneficiaries to be used as initial investment in mushroom cultivation with 3% interest. Not only that, diesel for 3 month' consumption for a generator of village night school was provided. In Mingan village, a fire-victim was provided with contribution out of village fund and for that fire-victim to be freed from custody on bail, village fund was used. (if there is an outbreak of fire, action is taken against the head of household for negligence). If new things will be bought again by spending fund established with rental fee for machines and contributions from beneficiaries, according to business situation, it may take a longer period than the first-planned period. However, it is sure that village fund is widely beneficial for many villagers.

2. Case of Ma Gyi Sauk Village



In the pilot project of this Study, village fund was established by 3 groups such as motorized-weaving group, knitting group and embroidery group in Ma Gyi Sauk village in cottage industry sector. Anyway, the person who uses the machines will have to pay rental fee to the Main Committee formed at village level. (rental fees as of August 2009 are motorized-weaving machine 20,000 kyat, knitting machine 6,000 kyat/month (there are 6 machine), and embroidery machine 150 kyat/day (there are 3 machines). This system carries out saving to Village Revolving Fund as above-mentioned picture on the right. The flow of rental fee is exactly mentioned in the right picture. Money saved as village fund can be used for buying more machines and non-beneficiaries can borrow money from that fund, it has been arranged.

3. Case of Legaing Village



In Legaing village, with income from Paddy Drier and Rural Development Sales Centre. The Paddy Drier dried altogether 7,200 baskets of paddy from July to August and earned 125,000 kyats. For test-run, alignment, and for minor repairing, to date, 20,000 kyats were spent. So, net profit of 105,000 kyats (12,500 – 20,000) were saved as village fund. Moreover, Rural Development Sales Centre earns 20,000 kyats/month from restaurant and beginning from August 2009 earned 100 kyats/shop/day from 8 small shops. That money is kept as village fund. In other words, village fund of Legaing village is saved from two sources and due to that fund much more benefit can be brought about. Loans for mushroom beneficiaries for their initial investment, loan for getting a new bull for local cattle improvement, provision of diesel for 3 months' consumption for village night school, and provision fo stationery to 20 poor primary pupils could be done by spending village fund.

Project Title	**No. 2.6: Raw Material Revolving**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	No-priority by Typology				
Target Groups	Those engaged in cottage industries (owner and workers) who are willing to expand their markets				
Implementing Agency	Cottage Industry Department (CID), Cooperative Department (CD), Ministry of Cooperatives (MOC)				
Collaborators	NGOs				

Objectives: To supply raw materials for cottage industries for sustainable operation

Rationale: For cottage industries operating in village level, one of the issues is instable supply, higher price of raw materials, and lack of running expenses, which is resulted in shortening of operation days and lower income of workers. Currently most of workers working in cottage industry borrow raw materials from middlemen to produce products, and eventually they are compelled to sell their products to the middlemen at lower price because of debt. By supplying raw materials, their cottage industry will be able to operate all year round and bring mainly women more income and stable employment opportunity as well.

Expected Outputs	**Development Indicators and Targets per Village**
・Beneficiaries group is identified. ・Small scale cottage industries are encouraged. ・Income of those who are engaged in industries is increased. ・Disparity in income is alleviated. ・Women's economic activities are encouraged ・Stable employment opportunity for villagers	・Nr. of the groups formed: 2 (average) ・Amount of raw materials supplied: 1 set/group (to be decided) ・Amount of refund: 100% ・Operation days a year: 300 days ・Income of workers: 5% up

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Identify major cottage industries and necessary raw materials by industrial type in the village ・Analyse cottage industries from economic point of views including demand and marketing. ・Provide raw materials depending on industrial types ・Evaluate those cottage industries from long-term economic viability ・Collect a certain amount of money from the members for revolving. ・Maintain the collected money for purchasing materials for revolving in group ・Identify existing markets and demand for the products ・Data collection and monitoring	Revolving Materials: 1,000$ Total: 1,000$	MOC, International Donors, NGOs

Project Risks: Default of the members for revolving fund

Environment Assessment (C) : The programme aims at purchasing raw materials collectively or purchasing individually by borrowing money from village fund mentioned in No..23 to sell products at fair prices to secure profit. No negative impact on environment is expected.

Project Title	**No. 2.7: Rural Development Sales Center (road station)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	At Place Many Visitors Expected				
Target Groups	At Place Many Visitors Expected				
Implementing Agency	Cooperative Department (CD), Ministry of Cooperatives (MOC)				
Collaborators	Companies, NGOs				

Objectives: To expand markets of the cottage industry products, either domestically or internationally

Rationale: There are many small scale cottage industries in CDZ. In each village, some small-scale cottage industries are observed, which have potentiality. However their marketing has been limited so far and practiced basically individually and resulted in low income for producers. Under the buyer's market, they had to sell products at buyer's price. This programme intends to assist producers through provision of marketing facility (Road Station) and training on market development strategies, exhibition or trade fairs, in parallel with strengthening of bargaining power of producers.

Expected Outputs	**Development Indicators and Targets per Village**
・Cottage industry or beneficiary's groups are organized. ・Beneficiaries obtain opportunities to sell their products. ・The necessary activities (e.g. trade-fair), training (e.g. the way to negotiate), or facilities (e.g. a road station) are identified, based on the village's needs and the marketing environments ・Villagers sell their locally-made products. ・Revolving fund are generated from beneficiary's group ・Small scale industries at village level is encouraged ・Employment opportunity for landless HHs is secured	・Nr. of the groups formed: 1/village ・Construction of sales shop (Road Station): 1/100 village. ・Kinds of products dealt with groups: ・Amount of sales sold at the sales shop: ・No. of passengers bought products at the sales shop: more than 500 per month ・No. of vehicle and buses stopped at the sales shop: more than 300 per month

Major Activities in Line with the Expected Outputs	**Expected Sources**
・Evaluate cottage industry products from economic point of views ・Beneficiaries groups are identified and organized ・Construction of small-scale sales center. ・Provide training on stronger marketing power. ・Development of attractive products for consumers ・Identify existing markets and demand for the products ・Data collection and monitoring	MOC, International Donors, NGOs
	Cost (US$/village)
	7,000$

Project Risks: Market situations are unstable, depression of national and regional economy

Environment Assessment (B) : The objectives of the programme are to encourage marketing of local products at constructed a small scale "Road Station" originally developed in Japan, which will contribute to expansion of marketing channel and connect consumers and producers. Survey is necessary to secure land since the construction of the Road Station requires some space. → Measures to reduce impacts: It is necessary to confirm existence of precious vegetation and wild lives to be preserved when procuring site (though Road Station is generally constructed nearby village or suburban areas where precious vegetation and wild lives do not exist in general). Moreover, when procuring the site, public area such as existing market etc is given top priority to avoid removal of people.

Project Title	**No. 3.1: Improved Cooking Stove Promotion (Reference: Technical Manual 4.1)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	+++	+	+	+	+
Target Groups	All households in a village				
Implementing Agency	Cottage Department (CD), Ministry of Cooperative (MOC)				
Collaborators	TPDC, NGOs				

Objectives: To preserve forest resources by reducing firewood consumption by using improved energy effective cooking stove

Rationale: People have been using firewood for cooking on the conventional so called three-stone stove with low energy efficiency. Meanwhile, forest resources are originally very limited in CDZ. In order to preserve precious forest resources in CDZ for the next generation, it is recommendable to introduce and extend improved energy effective cooking stove in every HHs, which will contribute to reduce entire firewood consumption in CDZ because of its designed higher energy efficiency than the conventional one.

Expected Outputs	**Development Indicators and Targets per Village**
・Firewood consumption of each HH is reduced. ・Existing forest resources are preserved. ・Risk of fire is expected being reduced. ・Expense for firewood for cooking is reduced. ・Alternate firewood becomes available and also income increases in case horticulture tree is planted.	・No of the groups formed: 1/village ・No. of villagers who made an improved stove by themselves: above 80% of HHs in a village ・Cooking time: 30% down ・No. of villagers who taught how to make improved stove to other villagers: 20% of participants

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Organize villagers ・Provide training and practical demonstration on how to make energy effective cooking stove ・Villagers make an improved stove by themselves according to the provided training and demonstration. ・Also, plant first growing local horticulture tree, e.g. Ju Mu Be, as alternative firewood (Ju Ju Be grows very fast and bears good fruits, providing income opportunities as well).	200$	MOC, NGOs
	Note: Agro-waste recycling, biomass densification, and bio briquette utilization shall also be considered with this project in order to save scarce natural resources.	

Project Risks: Low willingness of villagers

Environment Assessment (C) : Improved energy effective cooking stove can be made easily using locally available soil, wooden plates, rice straw etc at low price. It takes about 2 to 3 hours to complete a stove even by villagers. Entire firewood consumption is able to reduce by implementing the programme. Therefore, no negative impact is predicted.

Lessons from Pilot Project:

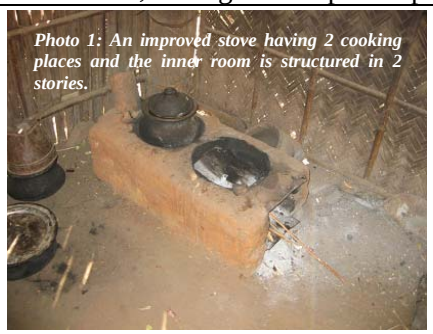


Photo 1: An improved stove having 2 cooking places and the inner room is structured in 2 stories.

Photo 2: Another type of cooking stove, simpler one. Has one cooking place only.

The stove in right (Photo 2) has simpler structure than the first one, which cooks only one item at a time (smaller hole at the end of the body is chimney). The simple one is not structured in 2 stories but still has same function to some extent. Placed at the bottom is iron grating through which ash can drop to a hole made underneath the stove though the function is not as efficient as the 2-storied one. This stove is in fact movable, so that users can move from inside of kitchen house to outside, e.g. to house compound, reducing the risk of catching fire. In fact, there are many villagers who prefer cooking outside to inside the kitchen house during summer because they want to avoid the risk of catching fire.

Project Title	**No. 3.2: Village Garbage/Rubbish Cleanness Promotion**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	All villages				
Target Groups	All villagers in a village in all TSs				
Implementing Agency	Ministry of Health (MOH)				
Collaborators	International donors, NGOs				

Objectives: To improve quality of villager's daily life and environment in their village by expanding hygienic toilet and rubbish disposal involving all villagers

Rationale: Generally speaking, sanitary condition in village is not good from viewpoint of epidemic prevention. For example, sanitary toilet free from fly is not extended in rural areas, and moreover many waste/garbage are also observed along village roads, which imply that villagers are not aware of hygienic management and environment preservation of their village. Village hygienic necessary for villager's health can be improved by educating villagers combined with extension of fly-proof toilet and proper rubbish disposal methods. This programme contributes to improve village environment and people's health.

Expected Outputs	**Development Indicators and Targets per Village**
・Village environment is improved. ・Villager's health is improved. ・People's awareness of environment and public health is improved. ・Outbreak of diseases is decreased. ・Expenses for medical care are decreased. ・People's public morals are improved. ・Rubbish is disposed properly	・No of the villagers participated in assembly: 100% of HHs ・No. of wastebaskets made by villagers: 50(average) ・No. of villagers participated in clearing/waste disposal: 100% of HHs ・No. of fly-free toilets installed: 80% of HHs

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Organize villagers to discuss issues on sanitary management of the village in assembly. ・Strategies to improve hygienic and environment are decided by villagers themselves. ・Wastebasket making by villagers ・Installment of wastebaskets along village road and in public spaces. ・Installment of fly-proof toilets. ・Provision of educational training on hygienic and environment preservation of a village for adults and children. ・Waste disposal/clearing by villagers		MOH, International Donors, NGOs

・PROJECT RISKS: Reluctance of VPDC, Villager's willingness, Late of budget allocation

Environment Assessment (C) : This programme is to improve village environment and villager's health through installation of fry-proof toilets and wastebaskets in and around the village. No earthwork is included in the programme. Therefore, any negative impacts are not predicted.

Project Title	**No. 3.3: Rural Development Center**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	+	+	+	+	+
Target Groups	All villagers including children in a village				
Implementing Agency	(Ministry of Health)				
Collaborators	International Donors, NGOs				

Objectives: To construct a village development center in a village for various public activities by villagers

Rationale: Most of villages in CDZ have no public space where is used for various villager's activities to improve village life of the people despite higher demand for such kind of centre. In order to discuss issues and countermeasure to solve them under the village assembly, the centre will contribute to provide suitable space for villagers, which will be used for multi-purposes equipped with an improved stove for cooking meal, small-scale library if required, and exhibition panel(s) showing well-balanced food and nutrient intake and scientific knowledge as well etc. The centre contributes to improve welfare for all strata of the villagers.

Expected Outputs	**Development Indicators and Targets per Village**
・Villagers are organized to select committee members to manage the centre. ・Regulation of the centre is prepared and agreed by villagers. ・Woman's activities are encouraged. ・People's knowledge on health care, nutrients and food etc is improved. ・Entire well-being of the people is improved.	・Nr. of the groups used the centre: above 3/month ・Nr. of villagers used the centre: 60-80% of adults ・Nr. of women used the centre: 60-80% of adult women ・Nr. of assembly/WS held at the centre: at least once a month ・Nr. of technologies and knowledge shown on the panels: 5 ・Nr. of visitors (Dist. And TS officers/villagers) to see the centre from other villages

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Organize villagers to discuss the function of the centre. ・Construction of the centre (building) ・Villager's contribution to construction works. ・Construction of an improved stove for cooking to serve meal at assembly, seminar etc. ・Construction of a small-scale library, if required as option. ・Preparation of exhibition panel(s) ・Installment of a water tank to collect rainwater, if necessary ・Regular cleaning of the centre by villagers. ・Operation and maintenance of the centre mainly by the committee ・Data collection and monitoring	5,000$	MOH, International Donors, NGOs

Project Risks: People's willingness to establish and maintain the centre

Environment Assessment (C) : The centre will contribute to people's well-being by providing public space for general and regular assembly of villagers. Earthwork is very limited and small-scale. Therefore, any negative impacts are forecasted.

Project Title	**No. 3.4: Rural Water Supply (deep well)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	+++	++			
Target Groups	All HHs in a village				
Implementing Agency	DDA, Water Resources Utilization Department (WRUD)				
Collaborators	International Donors, NGOs				

Objectives: To supply stably clean and safe water to all villagers throughout the year

Rationale: There is higher correlation between accessibility to safe water and outbreak of water-borne diseases. However, it is difficult to access safe water especially in rural areas in CDZ. Some villages get drinking water from ponds and others from shallow well, river and creeks etc. However, water quality of those sources is mostly poor. Safe water is indispensable for human being in dried CDZ for both adults and children. If water is not safe, people especially children suffer from water-borne diseases like diarrhea etc. In CDZ, it is reasonable to get safe water from deep well than that from shallow well because of its geological condition, though it requires much more investment. It is expected that mortality rate of infants and children aged less than 5 years who suffered from water-borne diseases will be able to reduce by digging deep wells, and hard work to fetch water (mainly by women) everyday can be reduced as well.

Expected Outputs	**Development Indicators and Targets per Village**
・Villager's accessibility to safe water increases. ・Water-borne diseases are decreased. ・Expenses for medical care are decreased. ・Mortality rate of infant and children is decreased. ・Hard work to fetch water by women and children is improved.	・Hours to fetch water: 80% decrease of present condition ・Outbreak of water-borne diseases: 90% decrease ・Expenses for medical care for water-borne diseases: 90% decrease ・Mortality rate of children suffered water-borne diseases: 90% decrease

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Survey on geological condition (depth of boring), water quality test and cost estimation. ・Construct deep well ・Organize villagers to manage a deep well ・Preparation of regulation for using the deep well, and agreement by villagers. ・Regular inspection of water quality. ・Water charge collection from users for O & M of the deep well. ・Data collection and monitoring	12,000$	DDA, WRUD, International Donors

Project Risks: Inadequate budget allocation for boring and late in budget allocation

Environment Assessment (B) : This programme is a kind of improvement of well-being of villagers who are not blessed with safe water. Of course, water quality must be inspected before supplying. Therefore, any negative impacts are not predicted.

Project Title		**No. 3.5: Village Electrification**				
Priority in Typologies	**Paddy Husk Power Generation**	Type I	Type II	Type III	Type IV	Type V
				+	++	+++
	Cow Dung Power Generation	Type I	Type II	Type III	Type IV	Type V
		+	+	+	++	++
	Diesel Power Generation	Type I	Type II	Type III	Type IV	Type V
		+	+	+		
Target Groups		All households in a village				
Implementing Agency		VPDC, TPDC				
Collaborators		International Donors, NGOs				

Objectives: To supply electricity for lighting to make all households comfortable at night

Rationale: There are many villages having no electricity in CDZ. Meanwhile, there are natural sources in CDZ which are usable for power generation such as rice husk, cow dung etc. By supplying electricity for all villagers, their village life during night and early morning will become more comfortable, and electrification will also contribute to cottage industry and student's education too.

Expected Outputs	**Development Indicators and Targets per Village**
• Present expenses (candle, battery) for lighting are decreased. • Villager's life during night becomes comfortable. • Children can study longer even at night. • Villagers can work longer even at night. • Villager's income is increased because of working at night.	• No of beneficial households in a village: all HHs • Percentage of fee collected from HHs: 100% • Percentage of HHs paid electricity fee charged:100% • Daily operation hours: 3 to 6 hours/day • Operation days a year:365 days • Income of HHs: 5% up

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
• Construction/installation of power generation plant • Establishment of electricity committee • Establishment of regulation for electricity utilization • Collection of electricity charge from all beneficial users • Operation and maintenance of the plant by the committee	8,000$	TPDC, International Donors, NGOs

Project Risks: Illegal use of electricity by villagers, low collection rate of electricity charge for O & M, and appreciation of oil price

Environment Assessment (C) : Earthwork for the construction of the power plant is considered easy in CDZ because of scarce rainfall. Residue of cow dung and rice husk after power generation will be used for farming. Therefore, negative impact is not predicted.

Pictures from Pilot Projects :

Project Title	**No. 3.6: Education Facilities Improvement**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	At school facility not enough				
Target Groups	Village children				
Implementing Agency	MOE				
Collaborators	International Donors				

Objectives: To improve educational conditions for students and children in a village without a school.

Rationale: It is estimated that still there are many villages without a school in a village in CDZ. Students and children in those villages have to go to the school away from their villages. It may be one of reasons for imperfect enrolment of children in CDZ, and make parents and children reluctant to learn in a school. Meanwhile, there are also many villages having a school with poor educational facilities in CDZ. In order to improve those conditions taking into consideration importance of education for the next generation, the programme aims to construct a school in a village which has no school, or to improve educational facilities such as desks, blackboards, chairs, roof, wall, toilets, water supply etc. The programme will contribute to encourage chance to learn especially for young generation.

Expected Outputs	**Development Indicators and Targets per Village**
・Enrolment rate of children in a village increases. ・Educational environment is improved. ・Quality of education is improved. ・Literacy rate of children is increased. ・School is managed well by villagers.	・Nr. of villagers participated in assembly: 100% of the HHs ・Nr. of parents contributed in the school construction:100% of the HHs ・Amount of money donated from parents: (to be decided) ・Nr. of desks, blackboards, chairs provided: Number of units to meet nr. of students. ・Nr. of toilets, water supply improved or newly constructed; Number of units to meet student's demand. ・Enrolment ratio before and after the programme; 100% after the programme

Major activities in line with the expected output	**Expected Source**
・Organize villagers to discuss educational conditions in a village. ・Site selection if construct a new school in a village. ・Construct a new school in the village without a school, if construct a new school. ・Improve school facilities such as toilet, water supply, desks, blackboards, chairs, wall, roof etc in cooperation with villagers, if improving just facilities. ・Management of a school in good condition by villagers. ・Periodical inspection and repairing of school facilities by villagers.	MOE, International Donors, NGOs
	Cost (US$/village)
	4,000$

Project Risks: Inadequate budget allocation and late in budget allocation

Environment Assessment (C) : Any large scale earthwork is not done even when constructing a school. If anything, installment of toilets, water supply is expected to improve educational environment for children. Therefore, any negative impacts are not predicted.

Project Title	**No. 3.7: Rural Health Center (RHC) Improvement**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	At RHC facility not enough				
Target Groups	All villagers in a village in all TSs				
Implementing Agency	Ministry of Health (MOH)				
Collaborators	International donors, NGOs				

Objectives: To improve and strengthening public medical services for villagers

Rationale: Although there are 10,090 villages in the Study Area in CDZ, it is inferred that there still exist many villages without RHC (Rural health Centre) and its sub-centre or villages having a RHC with only poor drugs and medicines. RHC/sub-centre is very important to prevent villagers from diseases and physical damages by providing first aid, and also it is the base of educating villagers on health care and daily nutrition management. However, existing RHC/sub-centre is inadequate in number and not equipped with enough drugs and medicines to meet people's demand for medical care and so on. Improvement or newly construction of RHC/sub-centre will contribute to villager's well-being and health care in the rural areas.

Expected Outputs	**Development Indicators and Targets per Village**
・People's accessibility to health care is improved. ・Expenses for medical care are decreased by using nearest RHC/sub-centre. ・Mortality rate of infant and children is decreased. ・Proper first aid can be provided in a village. ・People's awareness of health and nutrition management is improved.	・Nr. of patients used the RHC/sub-centre for first aid: (to be decided) ・Nr. of assembly on medical care and nutrition management: 2 times a year. ・Nr. of villagers participated in the assembly held at RHC/sub-centre: 100% of the HHs ・Nr. of patients sent to a hospital at the centre of TS: (to be decided)

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Construction of RHC/sub-centre depending, if the village has not both. ・Provision of medicines and equipment to meet minimum essentials, if a village has already a RHC/sub-centre. ・Educational activities on health care and daily nutrition management for villagers ・Preparation of regulation for using RHC/sub-centre. ・Data collection and monitoring.	3,000$	MOH, International Donors, NGOs

Project Risks: Late allocation of budget for the programme

Environment Assessment (C) : The programme aims to improve current medical care condition in CDZ keep people healthier and more comfortable in village life. Therefore, no negative impacts are predicted.

Project Title	**No. 3.8: Village Road Improvement**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	At the beginning of dry season				
Target Groups	All villagers in a village				
Implementing Agency	Public Work, PDC				
Collaborators	International donors				

Objectives: To improve daily traffic of people on marketing, transportation of agricultural materials and harvested crops, and communication with the centre of TS

Rationale: Village roads which are used everyday by villagers have not been maintained well. Since bull cart has been using generally in rural areas, village roads need to maintain well by levelling and widening at least two times a year. In fact, most of them have been already deteriorated with galley erosion, undulating, narrowing of width etc. The improvement of the existing village roads contributes to encourage villager's daily activities not only on transportation, but also on farming, commute and cottage industry

Expected Outputs	**Development Indicators and Targets per Village**
・Communication between neighbouring villages is improved ・Commute of students become comfortable. ・Transportation of agricultural materials, crops and drinking water by a bull cart is improved.	・No of people who are willing to provide labour: all adults ・Total length of village road improved: (to be decided) ・No. of days used to improve roads: (to be decided) ・Total man・day spent for road improvement:(to be decided) ・Amount equivalent to man・day in Kyat: (to be decided)

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・Organize villagers to render their services(labour) to road improvement. ・Discuss and identify the road to be improved. ・Earthwork (levelling, widening etc) concerning road improvement. ・Procurement of materials, if necessary.		Public Works, International Donors

Project Risks: Villager's willingness to improve village roads collectively

Environment Assessment (B) : The programme aims to improve existing village roads in a village. Earthwork mainly for levelling and widening of width etc. will be small-scale. Therefore, any negative impacts are not predicted during and after the improvement works.

Project Title	**No. 3.9: Rural Road Improvement (village-center)**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	At the beginning of dry season				
Target Groups	All villagers in a village				
Implementing Agency	Public Work, PDC				
Collaborators	International donors				

Objectives: To improve daily traffic of people on marketing, transportation of agricultural materials and harvested crops, and communication with the centre of TS

Rationale: There are 10,090 villages in the Study Area in CDZ. Though most of main roads are paved by asphalt, feeder roads from the main roads to village centre are mostly rough roads that are not paved even by gravel, which become muddy when once rain comes in rainy season and has constrained people's activities on marketing agricultural crops which are main income source of farmers, daily traffic to the centre of TS too. By improvement of existing rural roads connecting with main roads, people's activities are encouraged in the transportation of harvested crops and industrial products such as Longyi and necessary agricultural materials (seeds, fertilizers, agricultural machinery etc) too. Moreover, the gravel-paving rural roads contribute to emergency transport of patients to a hospital at the centre of TS.

Expected Outputs	**Development Indicators and Targets per Village**
・ Marketing of agricultural crops and industrial products by villagers is encouraged. ・ Villager's traffic to the centre of TS is improved and the time is shortened. ・ Transportation of agricultural materials becomes easier and smooth. ・ Emergency transport of patients to a hospital at the centre of TS is shortened. ・ Farmers cultivating paddy, upland crops apply advanced technologies.	・ Length of rural road paved by gravel (to be decided) ・ Times shortened by improving existing rural road: 20% decrease ・ No. of patients transported to a hospital: (to be decided) ・ No. of villagers contributed to rural road improvement work:100% of the HHs ・ No. of regular maintenance of the improved rural road: 2 times a year at least

Major Activities in Line with the Expected Outputs	**Cost (US$/village)**	**Expected Sources**
・ Organize villagers to discuss road improvement. ・ Road pavement by gravel. ・ Preparation of regulation for rural road use. ・ Management of rural road by villagers. ・ Regular maintenance of the rural road by villagers.	5,000$/mile	Public Works, International Donors

Project Risks: Late allocation of budget for the programme

Environment Assessment (B) : The programme does not aim to construct new rural road but to improve existing rural road by gravel. Any large-scale earthwork is not included. All works are to be done by participated villagers. Therefore, no negative impacts are predicted in this programme.

Project Title	**No. 41: Project Cycle Management Strengthening**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	To be required for above activities. In case of training, 40pax/batch is planned				
Target Groups	Governmental Officers/Extensionists of the Three Ministries concerned				
Implementing Agency	-				
Collaborators	NGOs, International Donors				

Objectives: To strengthen capability of governmental officers/extensionists to promote poverty reduction projects and regional development in CDZ

Rationale: Governmental officers including extensionists belonging to Ministry of Agriculture and Irrigation, Ministry of Livestock and Fisheries, and Ministry of Cooperatives deployed in each Division, District and TS are responsible for regional and village development to improve regional and village economy and people's well-being. However, their recognition on regional development is generally inadequate because of lack of recognition and knowledge on concept of development, analyzing and planning methods based on collected data and information of each area. In order to improve people's well-being not only for FHHs and non-FHH including landless people, it is requited for those governmental staff/extensionists to acquire necessary knowledge and technologies to develop villages/regions taking into consideration actual people's life and land conditions etc.

Expected Outputs	**Development Indicators per Time**
・Officers/extensionists acquire knowledge, development tools and concrete technologies necessary for village/regional development planning and OM of them. ・Officers/extensionists recognize approach, strategies and action plans proposed on the frame work by JICA Study Team. ・Proper regional and village development based on people's demand is planned and extended in CDZ and other areas too by trained governmental officers/extensionists. ・Regional and village economy and people's well-being is improved. ・Governmental supporting services for village/regional development, especially financial aspect, are improved.	・Nr. workshops to be executed: 2 times a year ・Nr of governmental officers/extensionists to be trained: 80 persons (40/time) ・Nr. of trainees who extended knowledge and technology to other staff: 90% of the trainees ・Nr. of trainees who prepared materials by themselves to extend knowledge and technology to other staff: 90% of the trainees ・Nr. of officers/extensionists who were provided knowledge and technologies on development methods from the trained extensionists: 100 extensionists

Major Activities in Line with the Expected Outputs	**Expected Sources**
・Organize officers/extensionists of the three Ministries concerned ・Preparation of training materials on development tools and project planning methods, and project concepts to be taken into consideration. ・Provision of workshop on regional and village development methods according to the Typology. ・Execution of study tour to the villages where various pilot projects have been implemented under the Development Study by JICA. ・Practical training in the study tour by the governmental staff/extensionists at the selected village(s). More extension of regional planning methods from trained staff and extensionists to other government officers/extensionists.	International Donors, NGOs **Total Cost (US$)** 5,000$

Project Risks: Inadequate budget allocation and late in budget allocation

Environment Assessment (C) : This programme is a kind of educational training for the officers/extensionists in a classroom. Therefore any negative impacts are not predicted.

Project Title	**No. 42: Organizing Capacity Development**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	To be required for above activities. In case of training, 40pax/batch is planned				
Target Groups	Governmental Officers/Extensionists of the Three Ministries concerned				
Implementing Agency	-				
Collaborators	NGOs, International Donors				

Objectives: To strengthen capability of governmental officers/extensionists for organizing villagers to implement projects

Rationale: It is very important to organize beneficial villages to implement project effectively and successfully. Success or otherwise is depending on people's willingness and their aggressive activities. However, governmental officers including extensionists belonging to Ministry of Agriculture and Irrigation, Ministry of Livestock and Fisheries, and Ministry of Cooperatives deployed in each Division, District and TS are not accustomed to organize beneficial people when starting implementation of projects. In order to lead the projects to success, they have to be trained in preparation of operation plan, selection of responsible person, grouping considering people's strata, O & M of the project, fund management and conflict solution etc.

Expected Outputs	**Development Indicators per Time**
・Officers/extensionists acquire knowledge and technologies including procedure necessary for organizing village people for implementing project(s) ・Officers/extensionists recognize importance of understanding people's willingness to involve them in the project. ・Village people also understand procedure of organizing group(s) and their roles to implement the project(s) effectively ・The proposed project(s) is expected to implement successfully in cooperation with villages and extensionists and governmental officers.	・Nr. workshops to be executed: 2 times a year ・Nr of governmental officers/extensionists to be trained: 80 persons(40/time) ・Nr. of trainees who extended knowledge and technology that they have learned to other staff: 90% of the trainees ・Nr. of trainees who prepared materials by themselves to extend knowledge and technology to other staff: 90% of the trainees ・Nr. of officers/extensionists who were provided knowledge and technologies on organizing villagers from the trained extensionists: 100 extensionists

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Organize officers/extensionists of the three Ministries concerned ・Preparation of training materials on organizing villagers taken into consideration people's strata . ・Provision of workshop on organizing people. ・Execution of study tour to the villages where various pilot projects have been implemented under the Development Study by JICA. ・More extension of organizing people from trained staff and extensionists to other government officers/extensionists.	5,000$	International Donors, NGOs

Project Risks: Inadequate budget allocation and late in budget allocation

Environment Assessment (C) : This programme is a kind of educational training for the officers/extensionists in a classroom. Therefore any negative impacts are not predicted.

Project Title	**No. 43: Technology Documentation & Dissemination**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	To be required for above activities. In case of training, 40pax/batch is planned				
Target Groups	Extensionists in the Three Ministries Concerned				
Implementing Agency	MAS, LBVD, CD				
Collaborators	NGOs				

Objectives: To extend advanced technologies described on the Technical Handbook prepared by JICA Study Team

Rationale: The major industry in CDZ is agriculture on which many farmers (58% of HHs in CDZ) are living on their income by producing sesame, groundnuts, paddy, and various beans. Landless farm labour (15 to 30% of HHs in CDZ) is also mainly living on farm wage from farm households. Despite importance of agriculture as main income source, crop productivity has been stagnant mainly because of uncertain and scarce rainfall and primitive farming technology of farmers, resulting in low income of farmers and landless people as well. Since 2007, JICA Study Team has implemented various types of pilot projects in CDZ and prepared the Technical Handbook that will be finalized in 2010. The visual Technical Handbook including many drawings covering agriculture, livestock and livelihood is the first case in Myanmar. Improved and advanced technologies on the Technical Handbook should be made use of in the all rural areas in CDZ through daily activity of the extensionists belonging to the three Ministries concerned in order to improve people's living standard and well-being. If required, the prepared Technical Handbook shall be touched up according to the results of their activities.

Expected Outputs	**Development Indicators and Targets per Village**
・Farmers cultivating paddy, upland crops apply advanced technologies. ・Crop's productivity and yields increase. ・Crop profit increases. ・Livestock productivity and total production increases. ・People's well-being is improved. ・Farmer's and landless people's income increase. ・Poverty ratio in CDZ decreases. ・The quality of the Technical Handbook is upgraded according to extensionist's activities.	・Nr. of the Technical Handbook printed in addition. (to be decided) ・Nr. of extensionists participated in WS: 40/time ・Nr. of the Technical Handbook distributed to TSs: (to be decided) ・Nr. of TSs provided the Technical handbook: 51 TSs ・Nr. of technologies added to the Technical Handbook: (to be decided)

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Organize extensionists of the three Ministries ・Provision of WS to share knowledge and technologies on the Technical Handbook. ・More printing of the Technical Handbook. ・Upgrading and updating of the contents of the Technical Handbook. ・Distribution of the Technical Handbook to every TS in CDZ.	2,000$	NGOs

Project Risks: Late allocation of budget for the programme

Environment Assessment (C) : The programme aims to make use of the Technical Handbook to extend advanced and improved technologies on agriculture, livestock and livelihood improvement in CDZ for educational purposes. Therefore, no negative impacts are predicted.

Project Title	**No. 44: Success Story Dissemination**				
Priority in Typologies	Type I	Type II	Type III	Type IV	Type V
	To be required for above activities. In case of training, 40pax/batch is planned				
Target Groups	All villagers in a village in all TSs				
Implementing Agency	MAS, LBVD, DC, VPDC, TPDC,				
Collaborators	NGOs				

Objectives: To enlighten villagers by introducing promising businesses in agriculture, livestock and cottage industry sectors using prepared the promotion videos at village levels

Rationale: JICA Study Team has prepared the promotion videos covering three sectors of agriculture, livestock and cottage industry based on the success stories in the village where the pilot projects were implemented since 2007. If considering limited activity of extensionists of the three Ministries, those kinds of the promotion videos have to be made use of in order to introduce promising business that can be managed in rural areas according to village conditions. There are video shops even in village levels where many villagers come to enjoy watching video movies everyday, which is considered to be the most useful place to introduce promising technologies and promising businesses in rural areas learned from the implemented pilot projects to enlighten villagers.

Expected Outputs	**Development Indicators and Targets per Village**
・Villagers are enlightened for business promotion. ・Villagers composed of FHHS and landless HHs find opportunity to improve their standard of living. ・No. of farmers applying introduced technologies increases. ・Village economy is improved. ・Economic disparity is improved. ・Some villagers formulate groups to start introduced business.	・Nr. of the villagers gathered: 80% of the HHs/village ・Nr. of the farmers applied the introduced technologies: 80% of the FHHs/village ・Nr. of landless HHs started introducing goat raising: 60% of the landless HHs/village ・Nr. of video CDs duplicated: 1,000 in total ・Nr. of TSs distributed video CDs: 51 TSs ・Nr. of villages where the video CDs were shown: 1,000 villages in total ・Nr. of villages who started introducing businesses collectively: 5% of a villages

Major Activities in Line with the Expected Outputs	**Total Cost (US$)**	**Expected Sources**
・Organize villagers to show the video CDs at a video shop. ・Play the video CDs. ・Discuss their impression on the introduced technologies and businesses ・Duplicate more video CDs for more extension to distribute them to each village.	2,000$	NGOs

Project Risks: People's low interest in the promotion video CDs, late allocation of budget for the programme

Environment Assessment (C) : The programme aims to make use of the promotion video CDs prepared by JICA Study team for educational purposes. Therefore, no negative impacts are predicted.

4.6.4 Implementation Arrangement (for Micro Framework Utilization)

1) Who to use the micro development framework (village level framework)

The micro development framework centers on concerted development intervention in a specific village from different livelihood point of view. It may be said similar to that of integrated rural development approach. In fact, the concept is very comparable to that but the focusing point is at village or villagers' different livelihoods found even in a village.

This approach may be better utilized by a local government, which has not only own human resources but also fiscal autonomy (own revenue source or block granted fund from the national government). As of 2010 in Myanmar, such autonomous organization does not exist. In future, PDC might be turned to such autonomous organ after the general election expected in late 2010. In this case, Planning officer under the National Planning and Economic Development should play such coordinating role for all those concerned officers, e.g. MAS, LBVD, Cooperative, and even education and health.

However, as of 2010, since autonomous organ or coordinating body in development cannot be found in Myanmar, the one who uses the micro level development frameworks could be an INGO, special task force like JICA study team which once played a coordinating role in implementing pilot projects, or otherwise concerned ministries should establish such special task force by assigning officers from different expertise.

2) Procedure of how to use the micro development framework

Procedure of how to use the micro development framework, village level framework, is presented below:

Table 4.6.1 Procedure of Utilizing the Village Level Development Framework

Step	Action	Remarks
1.	Selection of the target TSs	
2.	Invite TS officers of MAS, LBVD, Coop, and PDC to a kick-off WS	Sharing of the project
3.	Selection of target villages in the specified TSs	
4.	Project Planning Ws at those targeted villages	Identification of components
5.	Designing and decision of the projects	
6.	Training to MAS and LBVD officers for extension components	Technical know-how top up training
7.	Project implementation, M&E	

Source: JICA Study Team

Step 1: Selection of the target TSs

There are 51 TSs in the CDZ. The pilot project in FY2007/08 and FY2008/09 had undertaken a total of 12 TSs. From this experience and also according to a fact that a meeting or training workshop can accommodate at most 50 – 60 participants per batch, it can be said that there could be around 10 TSs able to be undertaken per year. Within the maximum number of 10 TSs, target TSs should be selected in such a way that each TS should be located nearby so that logistics can be facilitated.

Step 2: Invite TS officers of MAS, LBVD, Coop, and PDC to a kick-off WS

A kick-off workshop should be held by inviting all concerned officers from TS MAS, TS LBVD, TS Coop-department, and TS PDC inclusive of their supervisors at district and divisional levels. The kick-off workshop should accommodate about 50 – 60 participants. The contents of this workshop is to familiarize the participants with the project components, activities, time frame, etc. The development frameworks (micro framework) should be well understood by all the participants. In addition, characteristics pertinent to the CDZ should be presented to the participants, e.g.

unstable rainfall, existence of landless people (about 40%), poverty line and also the poverty ratio by social strata, etc.

Step 3: Selection of target villages in the specified TSs

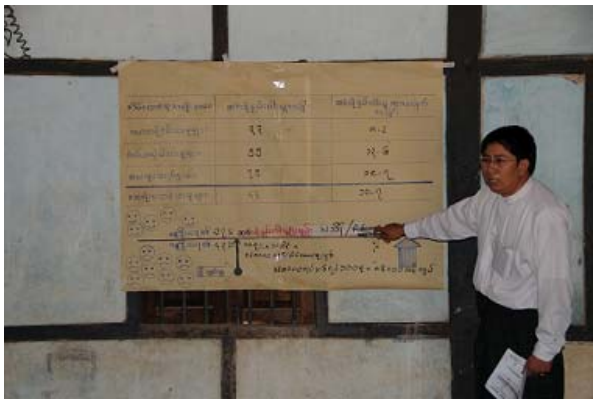
Upon kick-off workshop done, TS officers who participated in the kick-off WS should present the project to the TS PDC meeting which is held once a month. Since this TS level PDC meeting calls all the village tract chairmen, it can be the venue to select target villages based on the discussion amongst the chairmen. Selection criteria could be; 1) villages where lots of landless people can be found thereby poverty is prevalent, and 2) villages located in remote areas since so far TS technical officers have had difficulties to extend their services into remote areas due to insufficient logistics.

Step 4: Project Planning WS at those targeted villages

Project planning at village level is the core part of using the development framework. In fact, taking advantage of village level workshops held in early 2010 (meant for final pilot project evaluation), trial was already conducted to know how effective the use of village level development frameworks is in order to identify community based project components. Following are the typical procedure of utilizing the development framework in identifying the project components.

1) At first, annual average income can be shown to the villagers, which was estimated based on a baseline survey carried out under this Study. Villagers can see how big the disparity is between farmer household and non-farm household, and between them and farm casual labors who are the poorest of the poor. In addition to the income disparity, poverty lines and poverty ratios by social strata should be presented to the villagers. With this, they can know how deep the poverty for landless people is as compared with farmer households, etc. This practice would lead the participants to recognize different social cadres of people even in a village and to know where poorer people are, thereby pro-poor oriented project components would arise or at least poor strata would not be left out from the project planning.

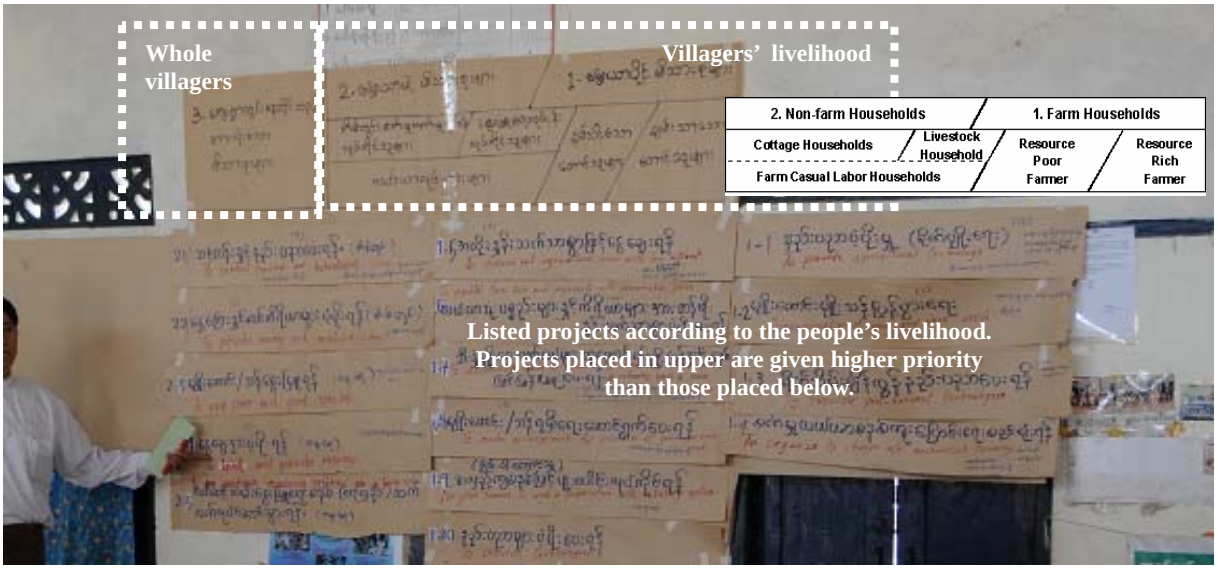
A practice done in Ar La Ka Pa village. Villagers are seeing as much as 3 times different in income between farm households and farm casual labor households.



Facilitator is showing the poverty line of villagers and how much is required to uplift the poor people at least to the poverty line.

2) According to the villagers' livelihood shown in the framework, projects needed should be identified, e.g. 1) projects for farm households, 2) projects for non-farm households, 3) projects for those engaged in livestock raising, 4) projects for farm casual labors, etc. The photo below shows villagers livelihoods from mid to right parts and at the most left side is for whole villagers. Under each and every category, projects can be identified and according to their priority, projects should be rearranged in such a way that the higher it is placed, the higher priority it is given. Note is that the development framework in aforementioned Figure 4.6.2 shows the category in vertical way but in the photo it is in a horizontal way according to the

easy facilitation.



A planning workshop held at a village identified necessary project according to the people's livelihood in just 2 hours.

3) The project team should compare between the projects proposed by the villagers and those recommended in the development framework. If pro-poor projects were omitted, the project team should suggest to include such projects for the betterment of the poorer strata. Pro-poor projects are goat raising, pig raising, chicken raising, etc. which should be recommended by relevant LBVD officer. Also, if the village is located in very hot and dry area and improved cooking stove has not yet been introduced, coop officer may suggest the introduction of improved cooking stove, which can greatly contribute to reducing the risk of fire. As for agriculture component, farmers may request just a good practice or an advanced technology instead of listing specific technology. This is because farmers simply do not know such specific technology. In this case, TS MAS officer should properly intervene by introducing some specific technologies, which can meet the farmers' demand.

Step 5: Designing and decision of the projects

After a series of planning workshops at village level has finished, all those components should be tabled by village and by sector. An example is shown in the following Table 4.6.2. Out of the projects, only possible ones which can be undertaken by the Project should be selected. For other projects which cannot be carried out under the Project scope, possibly large scale project e.g. dam construction, irrigation construction, etc, the information should be forwarded to relevant organization for their consideration. Then, project to be undertaken by the Project should be again classified into two; 1) one place done type or 2) extension based type. For example, rural electrification by bio-gas can be one of the former type while improved paddy cultivation based on ICM technology is of the latter in that such technology can be disseminated by extension service covering many villages. Also, donor activities around the area should be examined and if there is an NGO carrying our similar project, villagers needs may be met by the NGO's project thus overlapping can be avoided.

Table 4.6.2 Project Identification at Village Level

Sector	Village A	Village B	Village C	Village D	Village E
Farm household	Improved seeds, smallscale irrigation	Paddy improved seeds, improved paddy technology, paddy dryer	Low input agricultre Smallscale irriagtion	Vegetable cultivation	Rain-fed agriculture improvement, improved seeds (chick pea)
Livestock	Draught cattle improvement Local chicken	Draught cattle improvement	Goat raising Feeding improvement	Sheep raising	Goat raising
Cottage	ー	Weaving promotion	ー	Kinitting promotion	Sawing improvement
Whole village	Electrification	Bio-gas generation	Rural health center improvement	Electrification Cooking stove	Primary school Improved cooking stove
Others		Dam construction	Building road		

Source: JICA Study Team

Step 6: Training to MAS and LBVD officers for extension components

For those projects which need extension activities, there should be a training course inviting relevant MAS and LBVD TS officers. Necessary technologies and skills can be topped up for the participants on what they have had so far. Noted is that on the last of the training, action plan should be prepared by the participant themselves which shows what activities they are to disseminate, how many villages they are to cover, how many demonstrations they are to carry out, etc. with time bounded frame.

Step 7: Project implementation, M&E

Feedback to the target villages should be made upon finishing all the above-mentioned process. During the feedback, role and responsibility for the both sides, e.g. project side and villagers' side, should be clearly mentioned and be agreed. Upon agreement, relevant TS officers should facilitate the villagers to prepare their action plan (plan of operation). It can be simple one, which shows only activities, time, responsible person, villagers' due, project contribution, etc. Then, project implementation should follow including extension based components.

4.6.5 Strategic Collaboration between Macro and Micro Development Frameworks

Aforementioned macro framework intends to carry out wide coverage activities, basically based on extension, except for such projects as irrigation facility construction, road construction, etc. which require huge investment at a place. Then, another framework, village level or micro level framework was also presented in just beforehand. In carrying out both approaches based projects, there should be of course collaboration to be pursued. Strategic correlation between the components by two approached projects should be sought. An example of such correlation is summarized in Table 4.6.3.

Very simple example can be given in Certified Seeds Dissemination Programme, Paddy Cultivation Improvement Programme, etc. Project carried out based on village level framework may establish demonstration farms to which other villagers can also be invited to see specific technologies. In this way, those programmes carried out under macro framework can be benefited. In sum, demonstration farms should be not only for those benefited by latter approach, micro frame based approach, but also for those covered by macro frame based programme. Another simple example can be given in livestock project. If micro frame based project has established an improved model livestock house, e.g. improved goat house, those benefited by macro frame based programme should also see the improved animal house, thereby they may construct according to the model house.

Furthermore, MAS does not have enough fund to administer technical trainings to its staff. LBVD

does not either. In this case, the Project carried out under the micro frame may invite not only direct relevant officers but also neighbor townships officers to the trainings. Thus, one batch training can spill out the output over the project target area.

Table 4.6.3 Strategic Collaboration between Macro and Micro Development Frameworks

No.	Programmes and Projects under Macro	No.	Components under Micro Frame and Contribution to the programmes / projects shown in left colume
1	Certified Seeds Dissemination Programme	1.6	Disseminate improved seeds -Establishment and disseminate seeds revolving
2	Low-input Agriculture Promotion Programme	1.7	Low-input (e.g. *dochakukin*) Agriculture Promotion Programme -Low-input agricultural training to government staff. -Demonstration farm sharing
3	Farm Equipment & Machinery Promotion Programme	1.3	Disseminate Agriculture Implement -Improved seeder promotion -Dissemination of improved Seeder
4	Landless Oriented Mushroom Promotion Programme	2.1	Landless oriented mushroom promotion -Study tour to good mushroom cultivators
5	Small-scale Irrigated Horticulture Programme	1.5	Small-scale irrigated horticulture promotion -Demonstration of treadle-pump promotion
6	Paddy Cultivation Improvement Programme	1.1	Good practice of paddy cultivation technologies promotion -Good practice of paddy cultivation agricultural training to more government staff -Demonstration farm sharing
9	Post-harvest Improvement Programme (rice)	1.2	Post-harvested improvement promotion -Demonstration of paddy drier
10	Rain-fed Agriculture Improvement Programme	1.8	Rain-fed agriculture improvement promotion -Demonstration farm sharing
14	Local Breed Improvement Programme (cattle)	1.4	Local breed improvement promotion -Livestock feeding improvement training to more government staff -Demonstration bulls for breeding
15	Goat Raising Promotion Programme	2.2	Goat and sheep raising promotion -Livestock feeding improvement training to more government staff -Demonstration of improved goat housing
16	Pig Promotion Programme	2.3	Pig raising promotion -Livestock feeding improvement training to more government staff -Demonstration of improved pig housing
17	Local Chicken Promotion Programme	2.4	Local chicken raising promotion -Demonstration of improved chicken housing
18	Livestock Feeding Improvement Programme		The trainings which carried out in provisions of 1.4、2.2、2.3、2.4 are given to more government staff.
19	Fodder Crops Promotion Programme		
20	Livestock Diseases Prevention Programme		
21	Livestock Housing Improvement Programme		Demonstration of improved housing in provisions of 1.4、2.2、2.3、2.4
23	Village Revolving Fund Establishment Programme	2.5	Strengthening and promotion of cottage industry (e.g. village revolving fund establishment) -Introduction of village revolving fund
29	Raw Material Revolving Programme	2.6	Raw materials revolving -Introduction of raw materials revolving system
31	Education Facilities Improvement Programme	3.5	Education facilities improvement -School construction mainly in poverty area
33	Rural Water Supply Programme (deep well)	3.2	Rural water supply facilities construction -Supporting with deep-well
34	Village Electrification Project (by bio-gas)	3.4	Rural electrification -Demonstration of electrification by biogas such as cow dung and rice husk
35	Improved Cooking Stove Promotion Programme	3.1	Improved cooking stove promotion -Demonstration of improved cooking stove
36	Rural Road Improvement Programme	3.7	Rural road improvement -Supporting of rural road improvement

38	*Rural Water Supply Programme (deep well) (same as No. 33 programme)*	3.2	Rural water supply facilities construction -Supporting with deep-well
39	*Livestock Housing Improvement Programme (same as No. 21 programme)*		Demonstration of improved livestock housing in provision of 1.4、2.2、2.3、2.4
40	Children's Nutrition Improvement Programme	3.3	Children's nutrition improvement -Demonstration of feeding center -Demonstration nutrition improvement by BMI states

Source: JICA Study Team, Note: Project not listed in the right column mean there is not relation with the components in the right column.

CHAPTER 5 THE PILOT PROJECT

This chapter briefs the contents of pilot project carried out from FY 2007/08 to FY 2009/10 over 3 years with last year being only for monitoring. Detailed record and discussion are incorporated in a separate Report of 'Pilot Project Implementation', and therefore following are summary of the pilot project implementation and the result of evaluation. There are lots of lessons gained through the implementation of the pilot project. Specific ones are incorporated in the separate report and generalized ones, or deduced ones, are presented in the next Chapter 6 'Issue and Lessons through Pilot Project Implementation'.

5.1 Target Townships and Villages for the Pilot Project

The pilot project was firstly commenced in FY 2007/08 and then some new components were added in FY 2008/09. In FY 2007/08, selection of the townships and thereby villages was based on the typology applied to this CDZ. Finally a total of 6 villages covering different typologies, Type I – V, were selected for the pilot project in FY 2007/08. In FY 2008/09, basic idea was to extend additional pilot components within the same townships where the 6 villages were located. All the pilot components in FY 2008/09, excluding agricultural extension related ones, were so arranged. As to the agricultural extension related pilot project, given a request from relevant MAS officers, the townships were extended from the original 6 to 12 townships. Figure 5.1.1 shows the townships and villages for the FY 2007/08 pilot project as well as the additional 6 townships for the FY 2008/09 pilot project.

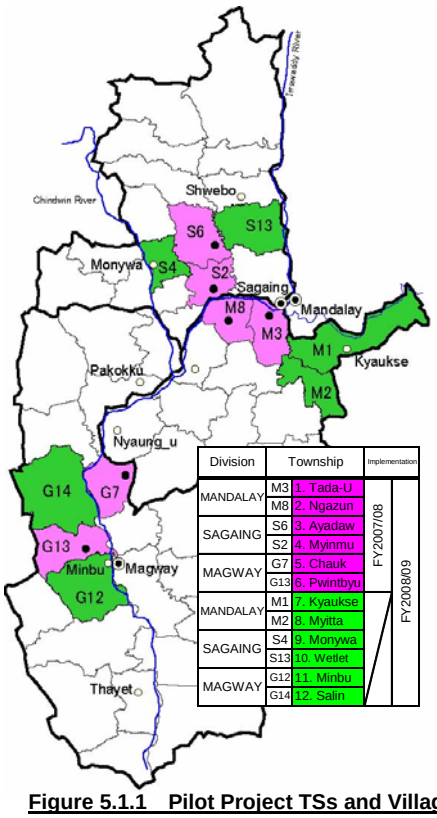


Figure 5.1.1 Pilot Project TSs and Villages

5.2 Design of the Pilot Project

In designing the pilot project, 2 different approaches were employed. Namely, components of the pilot project commenced in FY 2007/08 have been directly identified through a series of workshops at the concerned village level. The Study Team conducted a preliminary analysis on the components of the pilot project at analytical WS at the village level held during November - December 2006. In this analysis, issues in 6 target villages of the pilot project were identified by using Problem Analysis developing cause and effect relationship into a tree structure. Under a core theme: "People's income is low", various causes had been identified.

Whereas, the components of pilot project commenced in FY 2008/09 have been designed by extracting a part of high-priority projects in the development framework, for the purpose of wide extension on top of the lessons learnt during the FY 2007/08 pilot project implementation. Namely, the pilot project in FY 2008/09 was in a first place directed towards extension for wider coverage of beneficiaries. In other words, the pilot project in FY 2008/09 has followed a principle to make full use of extension staff for putting particular pilot components into practice in wider areas.

In sum, the pilot project in FY 2007/08 was assembled in a "micro" sense (bottom ground; village level), while that in FY 2008/09 was composed from a "macro" aspect (top ceiling; development framework). Differently speaking, the pilot project in FY 2007/08 was based upon demands by the concerned villagers, whereas that in FY 2008/09 was provided in a "supply driven" way through the development framework covering the whole CDZ. Table 5.2.1 summarizes the pilot project components commenced in FY 2007/08 and Table 5.2.2 in FY 2008/09.

Table 5.2.1 Summary of Pilot Project Components commenced in FY 2007/08

Sector	Pilot Project	Remarks
Agriculture	07A1. Raised Bed Cultivation Project	
	07A2. Improved Seeding Practice Project	
	07A3. Improved Seeds Regeneration Project (chick pea)	
	07A4. “Bokashi” Compost Making Project	
	07A5. Pro-poor Oriented Mushroom Culture Promotion Project	
Livestock	07L1. Pro-poor Oriented Sheep Revolving Project	
	07L2. Pro-poor Oriented Goat Revolving Project	
	07L3. Pro-poor Oriented Piggery Revolving Project	
	07L4. Livestock Feeding Improvement Project	
	07L5. Local Cattle Improvement Project	
	07L6. Intercropping of Sorghum & Rice Bean Project	
	07L7. Animal Housing Improvement Project	
Cottage	07C1. Tinsmith Strengthening Project	
	07C2. Guitar-Key Strengthening Project	
	07C3. Embroidery Promotion Project	
	07C4. Weaving Improvement Project	
	07C5. Knitting Promotion Project	
	07C6. Sandstone Ware Production Improvement Project	
	07C7. Road Station Project	
	07C8. Paddy Drier Establishment Project	
	07C9. Fruit Processing Project	
Living Improvement	07I1. Drinking Water Project	
	07I2. Biogas Generation Project	
	07I3. Electricity by Diesel Generator Project	
	07I4. Primary School with Roof Catchment Project	

Table 5.2.2 Summary of Pilot Project Components commenced in FY 2008/09

Field	Pilot Project／Programme	Project Type	Component-wide	Implemented in 2007
Agriculture	08A1. Improved paddy Cultivation Promotion Programme		○	
	08A2. Organic Farming Promotion Programme(with indigenous microorganism: IMO)		○	
	08A3. Improved Seeds Regeneration project (with the introduction of seeder)	○		△（grade up）
	08A4. Pro-poor Oriented Mushroom Culture Promotion Project	○		△（grade up）
	08A5. Small-scale Irrigation Promotion Project (shallow well + treadle pump)	○		
	08A6. Crop Storage Depots Promotion Project	○		
	08A7. Minimum tillage Promotion Project (mixed cropping with forage)	○		
	08A8. New Varieties Adaptability Trial Project	○		
Livestock	08L1. Pro-poor Oriented Goat Revolving Programme		○	○
	08L2. Pro-poor Oriented Piggery Revolving Programme		○	○
	08L3. Livestock Feeding Improvement Programme (molasses block, silo, Ipil Ipil, etc)		○	△（grade up）
Small-scale Industries	08C1. Village Revolving Fund Establishment Project (by amortization of capital invest’)	○		○
Living Environment	08I1-1. Firewood Substituting Bio-fuel Promotion 08I1-2. Improved Cooking Stove Promotion Project	○		
	08I2. Paddy Husk Power Generation Project	○		
	08I3. Children’s Nutrition Improvement Center	○		

5.3 Final Evaluation of the Pilot Projects

Pilot project started in FY 2007/08 and FY 2008/09. Over 2 years have passed for the pilot projects commenced in FY 2007/08 while for those which started in FY 2008/09 about one to one and half years have passed. This chapter carries out the final evaluation of the pilot project as at February 2010. The evaluation is carried out for all these pilot projects from the view point of 5 aspects – Efficiency, Effectiveness, Impact, Relevance, and Sustainability. There are in fact a lot of lessons and recommendations thereon, which are to be presented in Chapter 6 'Lessons and Issues'.

5.3.1 Final Evaluation of the Pilot Projects commenced in FY 2007/08

Table 5.3.1 shows the project evaluation from the 5 aspects and Table 5.3.2 elaborates sustainability only together with remarks and issues to be noted. The evaluation is made in a range of 1 – 5 with the 1 being the least and 5 being the highest while evaluation 3 means the project has performed as designed. In the column of sustainability of Table 5.3.2, there are 3 evaluation results; the top ones are what is evaluated now, namely final evaluation results, and the left one in the bracket below shows the evaluation result made in February 2009), and the right one for as of August 2009. Evaluation itself was done by all the project members engaged in February 2010, e.g. 3 JICA members, 4 counterparts and 3 national staff having been engaged in the monitoring of pilot projects. Evaluation results are summarized below by sector:

1) Agriculture related pilot projects such as raised-bed cultivation, improved seeding practice and chick pea seed regeneration have in general marked relatively high mark. In fact, chick pea seed regeneration was evaluated higher than others because harvested seeds were revolved to the succeeding 2nd and 3rd generation beneficiaries. On the other hand, Bokashi compost making was evaluated low. Though beneficiaries recognized the effectiveness of Bokashi, it is a sort of tiresome work to prepare for and thereby not much extension from farmer to farmer was made. This current status resulted in lower mark. There are 2 methods in making Bokashi extended, 1) EM Bokashi and 2) IMO Bokashi. Of them, EM Bokashi was hardly extended due to unavailability of EM liquid at most of TS MAS offices. As for mushroom cultivation, it has been smoothly carried out in Legaing village while in Ar La Ka Pa village mushroom was competed by natural sprout mushroom. Therefore the evaluation for mushroom cultivation in Ar La Ka Pa village stayed low.

2) As for livestock sector, goat revolving pilot project marked very high evaluation. Local cattle improved was also evaluated high with the background that most of the farmers in the CDZ depend on draught cattle. Sheep was recognized to have high relevance. However, reproduction ratio of sheep was lower than that of goat, thereby giving lower mark than that of goat. Pig raising had been performing very well till end of December 2008, and then it was faced with swine influenza. The price of pig in fact nose-dived at that time. However since late 2009, the price has been recovering and this situation lead to good evaluation result. As for improved feeding system and intercropping sorghum and bean were recognized important but the farmers did not like such tiresome activities, which contributed to lower marks. Animal house improvement cannot go well alone since most of the villagers do not want to spend on such construction. Therefore the introduction of animal house improvement should be accompanied with animal provision.

3) In the sector of cottage, the evaluation varies by component very much. Tinsmith strengthening and guitar-key strengthening were rated lowest. There was big hike in material cost and also since late 2008, cheap Chinese made products started flowing into Myanmar. The beneficiaries had lost competitive power against Chinese made products. On the other hand, embroidery, knitting and weaving for which beneficiaries are female members, have performed better.

Sandstone ware production tried in Mingan village also marked good evaluation result, and paddy dryer did the same. In Mingan village, rural electrification by diesel engine has also contributed to boosting the sand ware production thereby it performed well. Paddy dryer together with improvement of milling has created a lot of added values, which contributed to high evaluation result. Fruit processing was not extended to business level except 2 – 3 women during paddy transplanting period when it is in big demand. Energy efficient stove for Jaggery showed very high energy efficiency, cutting firewood by more than half. However due to the cost (50,000 Kyats), it was not extended to other farmers, resulting in lower evaluation results.

4) Living improvement projects have marked relatively high evaluation. Those projects undertook basic infrastructure, which were met with villagers' need. Also, the benefit has extended to almost all the villagers. This resulted in high evaluation results. Those project earned the highest result especially in terms of relevance, which means the projects were really met in their needs. In addition, skilled technicians can be found even in rural areas of Myanmar. With this background, the sustainability was also rated high.

Table 5.3.1 5-aspect Evaluation for the FY 2007/08 Pilot Project (as at February 2010)

Pilot Project	Efficiency	Effectiveness	Impact	Relevance	Sustainability	Remarks
07A1. Raised-bed Cultivation	3.1	3.1	3.6	3.1	3.1	
07A2. Improved Seeding Practice	3.6	3.7	3.3	3.4	3.3	
07A3. Chickpea Seed Regeneration	3.9	3.9	3.3	3.6	3.9	
07A4. Bokashi Compost Making	3.0	2.6	2.6	3.3	1.7	With EM
	3.0	2.7	2.7	3.3	2.1	With IMO
07A5 Mushroom Cultivation	3.1	3.0	2.6	2.4	2.0	Ar La Ka Pa
	3.0	3.1	3.4	3.0	3.0	Legaing
07L1. Sheep Raising	2.9	3.0	2.9	3.4	3.0	Magyi
	2.8	2.8	2.8	3.1	2.4	Ma Gyi Sauk
07L2. Goat Raising	3.5	3.9	3.8	4.1	3.9	4 villages
07L3. Pig Raising	3.2	3.0	3.3	3.9	3.4	Swine influenza
07L4. Improved Feeding System	2.1	2.1	2.4	3.0	2.1	
07L5. Local Cattle Improvement	3.3	3.1	3.2	4.0	3.6	Ar La Ka Pa
	3.3	3.4	3.3	4.0	3.8	Legaing
07L6. Intercropping of Sorghum & Bean	2.4	2.1	2.1	2.5	1.8	
07L7. Goat, Cattle, Pig and Chicken House improvement	2.6	2.8	2.6	3.1	2.4	Only house
	3.3	3.1	3.0	3.3	3.3	With livestock
07C1. Tinsmith Strengthening	1.8	1.6	2.0	2.4	1.5	
07C2. Guitar-Key Strengthening	1.6	1.6	2.0	2.1	1.2	
07C3. Embroidery Promotion	3.0	3.1	3.5	3.4	3.1	
07C4. Weaving Improvement/ Motorized One)	3.3	3.4	3.1	3.4	3.1	Ma Gyi Sauk
	3.3	3.1	3.3	3.1	3.2	Khaungkawe
07C5. Knitting Promotion	3.5	3.6	3.5	3.6	3.5	
07C6. Sandstone Ware Production	3.0	3.1	3.6	3.8	3.6	
07C7. Rural Sales Center (Road Station)	2.5	2.4	2.7	2.8	2.9	
07C8. Paddy Drier	3.5	3.4	3.5	3.9	3.5	
07C9. Fruit Processing	2.6	2.1	2.5	2.6	2.3	
07C10. Energy Efficient Stove for Jaggery	2.7	3.0	2.7	3.1	2.9	
07I1. Drinking Water	3.5	3.6	3.5	3.5	3.5	

07I2. Biogas Power Generation	3.8	3.9	4.0	4.3	4.1	
07I3. Electricity by Diesel Generator	3.6	3.9	4.0	4.3	3.9	
07I4. Primary School with Roof Catchment	3.9	4.1	4.1	4.3	4.0	

Table 5.3.2 Sustainability Assessment for the Pilot Project in FY 2007/08, as at February 2010

Pilot Project	Sustainability Last→Now	Remarks
07A1. Raised-bed Cultivation	3.1 (3→3) (for impact, 4 thanks to the job creation for farm casual labors)	There are 3 villages tried. In Khaungkawe village, about 10 original members + 5 new ones are continuing the raised bed-cultivation (originally 20 trained). In Magyi, original 7 members continue. In Magyi village, it was tried with well development, and in 2007, 3 farmers joined by digging their own wells. In Ma Gyi Sauk village, there are only 3 beneficiaries continuing the raised bed. Beneficiaries learned, aside from the raised bed, that 1) ash can work as a conventional fertilizer nurturing good nurseries, 2) irrigation water can be saved by the raised method or more precisely suitable irrigation water can be applied, etc. This method cultivates vegetables, which creates job opportunity for farm casual labors, e.g. 140 - 150 person.days from original 40 – 70 person/day per acre. High net profits are shown in such cases; 1.5 million Kyats from onion cultivation and 300,000 Kyats from gladiolus cultivation.
07A2. Improved Seeding Practice	3.3 (4→4)	They used to sow about 24 pyi per acre by broadcasting, but with the seeder they can now cover one acre of farmland with 16 pyi of seeds, a reduction by 8 pyi. When the new sowing season came, which is the end of October 2008, 23 beneficiaries used the same seeder in Ya (upland) agriculture (in 2007, 20 beneficiaries used). The seeder cannot well be used in Le (lowland) due to the soil heaviness, thereby they used in Ya only. In 2008 season, the committee started collecting seeder rental fee, 300 Kyats per day from the users, totaling about 6,000 – 6,900 Kyats. This is meant for maintenance and repair of the seeders.
07A3. Improved Seed Regeneration (Chick pea)	3.9 (4→4)	98 beneficiaries in Magyi village and 20 beneficiaries in Ma Gyi Sauk village have regenerated the good quality seed and revolved same amount provided to the 2nd beneficiaries already (in Ma Gyi Sauk village, one beneficiary failed to harvest due to heavy rainfall, and therefore 19 beneficiaries revolved in fact). The 2nd beneficiaries sowed the seed in October – November 2008, and harvested in February 2009. All the 2nd beneficiaries also revolved for the 3rd generation beneficiaries. Now in Magyi village, all 210 farmers were covered and in Ma Gyi Sauk 40 covered (about 40% covered). In both villages, the committee charged 1 pyi per 1 basket as an interest to enlarge the benefit, thereby sustainability is high.
07A4. "Bokashi" Compost Making	1.7 w/EM:(2→2) 2.1 w/IMO:(2→3)	In 2007, training of Bokashi making was conducted for 150 farmers in five villages. Trainees from Khaungkawe village made Bokashi compost by themselves after the training. However, due to difficulty of getting EM original concentrate, except some cases, and cumbersome work for farmers (about 400kg Bokashi is necessary to input per acre), Bokashi compost with EM has not been extended so far. However, Bokashi with IMO which was introduced in 2008 has been tried by farmers through MAS extension services. However, in 2008/09, IMO Bokashi was used in only demonstration farms due to the cumbersome work.
07A5. Mushroom Culture	2.0 / 3.0 (2 / 5→ 3 / 4)	There are 2 villages where mushroom was tried in 2007. In Ar La Ka Pa village about 7 – 8 beneficiaries intermittently cultivated mushroom. In this village, there are natural mushrooms shooting up during rainy season so that the activities are not well extended. However, the group leader taught mushroom cultivation 2 farm-casual labors in the same village and another 2 farm labors in his native village (130km away). In Legaing village, there are 4 – 1st generation beneficiaries and also already 13 2nd generation beneficiaries who are doing mushroom cultivation in 2008 – early 2009. Here villager-to-villager extension has occurred. They extended market to neighboring townships and Magway city as well. In 2009, the cultivator in Legaing village took rest in April – July due to its hottest weather, and a few beneficiaries started in August. This year's price is 1800 Kyats/viss cheaper than that of last year, 2000 Kyats/viss. Therefore in 2009, lower turnout of the cultivator took place, thereby it is ranked from previous 4 to 3 as of February 2010.
07L1. Sheep Revolving	3.0 (3 / 2) →	Totally 101 sheep were delivered to 20 beneficiaries of 2 villages in late 2007. In Ma Gyi Sauk village, one group (5 members) quit sheep raising after handover, and sold out all remaining sheep at 600,000 Kyats (120,000 Kyats each). Three beneficiaries out of the five spent the profit to continue livestock

	2.4 (2 / 2)	related activities by purchasing 3 goats for contract raising, 2 cows for breeding purpose, and one draft cattle for rental basis cultivation service respectively. The remaining 2 beneficiaries spent money for rice and cooking oil etc, and then went for migration work. 26 sheep handed over to the committee were sold out at 408,000 Kyats in total, which will be used to procure necessary goats (not sheep) for 2nd generation. Magyi village, 3 groups are still raising 35 female and 13 male as of February 2010 to continue, though handover has not yet realized. The rate for Ma Gyi Sauk villages is 3.0, and 2.4 for Magyi village from its sustainability.
07L2. Goat Revolving	3.9 (4→4)	In total, 359 head (349 female and 10 male) of goats were delivered to 70 beneficiaries in 4 villages in late 2007. As of February 2010, number of beneficiaries has increased from original 70 to 106, which shows expansion of effectiveness of revolving system. At present there are 389 goats raised by the 1st generation and 203 goats by the 2nd generation and 59 head by 3rd generation respectively. To date, handover to 2nd generation has been done in 3 villages of Khaungkawe, Mingan and Ma Gyi Saul villages, and 3rd generation only in Ma Gyi Sauk village. Especially the number of beneficiaries in Ma Gyi Sauk village had increased from original 25 to once as many as 40 but 10 beneficiaries who had fulfilled handover had worked out for migrant work. As of February 2010, 35 beneficiaries including the 3rd generation are still raising Moreover real goat owners were generated in this village who could earn net profit by selling their own goats. However, 10 members of this village had quit raising goats. In Mingan village, one beneficiary lost eight goats and house too by fire in January 2009 but villagers provided his family with 5 goats along with goat housing without any charge to support the family. Sale of goat dung to farm households generates small income such as Magyi village, where 13 baskets of goat dung brought 3,000Kyats for a beneficiary, which is equivalent to 3-day wage of a farm labour.
07L3. Pig Revolving	3.4 (4→2) risk, swine flue	In late 2007, 30 piglets for fattening purpose were delivered to 15 beneficiaries of Legaing village (2 piglets per each beneficiary). After 8 to 10 months, 24 pigs were sold to hand over piglets to 2nd generation, and 35,000 kyat/head were repaid to the main committee, though 6 piglets had died of coldness in winter. Seven beneficiaries out of 15 of the 1st generation could get net profit even after subtracting expenses. Four beneficiaries of 2nd generation also could get profit by selling piglets born from original female pigs. However, swine flu broken out in April 2009 had affected the pilot project in price down at 1/3 to 2/3 as compared to 2008 prices. As result, many beneficiaries had to sell pigs because they could not expect net profit. As of February 2010, even so, 2 beneficiaries of 1st generation raise 6 pigs, and 8 beneficiaries of 2nd generation raise 15 pigs continuously. Taking into consideration sluggish condition of beneficiaries, the main committee decided to reduce the charge of refunding from 35,000Kyats to 15,000Kyats per head.
07L4. Improved Feeding System	2.1 (2→2)	Totally 120 trainees of four villages were provided with UMB making training in the late 2007 and made UMBs by themselves in the training. However, as of February 2010, no one in the four villages is making and using UMBs for ruminants because of low interest, lack of money to purchase raw materials, and lack of awareness of proper nutrient for livestock. This activity is rated at 2.1.
07L5. Local Cattle Improvement	3.6 (2→2) Ar La Ka Pa 3.8 (3→3) Legaing	One breeding bull each was provided to Ar La Ka Pa and Legaing villages in the late 2007. However villages of both villages wanted to change the bulls because the bulls are considered to have low performance for breeding purpose. Finally new bulls were purchased in August 2008 for Legaing village and January 2010 for ar La Ka Pa village respectively. Deficits were rented from village fund of both village committees. To date, the bull of Legaing village had mated with 57 cows and 17 calves were born, and is becoming famous in and around the village because of calf's quality. The bull of Ar La Ka Pa village will be in service on coming July 2010. Charge for mating service is set up at 3,000Kyats per time in Legaing village and 5,000Kyats in Ar La Ka Pa village respectively. At this moment, all the collected charge has spent for feeding cost. The rates for this pilot project are 3.6 for Ar La Ka Pa village and 3.8 for Legaing village respectively.
07L6. Intercropping of Sorghum and Rice Bean	1.8 (2→2)	Despite attainment of higher sorghum yield than the conventional method in three villages of Khaungkawe, Mingan and Legaing villages, the villagers have not applied this method because they prioritize food crops to animal feed. Most of villagers consider the proposed intercropping system is somewhat cumbersome to produce sorghum just for cattle feed which does not bring them direct profit. The rate is 1.8.
07L7. Animal Housing	2.4	Excluding extension of improved goat housing combined with goat raising

Improvement	(2→3) w/ goat revolving 3.3 (2→3) w/ goat revolving	revolving pilot project, the project concept has not been materialized by villagers to date (February 2010) due mainly to financial reason and, to some extent, people's low awareness to sanitation and disease control, especially for pig, cattle and chicken housings, which are predominantly kept in backyard in free-range in CDZ. However, villagers of Ma Gyi Sauk village had constructed collective goat houses getting idea of cost saving, which is also applied in the FY 2008 project. In the case improved housing is made in parallel with 07L1, 07L2, the project can be rated 2.4 in case of without oat revolving, and 3.3 in case of with goat revolving respectively.
07C1. Tinsmith Strengthening	1.5 (2→1)	The beneficiaries produced about 650 buckets per day for the first 2 months after the commission of late 2007. However, this project was seriously affected by fuel hike as well as by material price hike by almost 30%. Though the fuel price got low from December 2008, the material cost is still high by about 50% as compared with the one in FY 2007/08. To cope with this situation, they have reduced the size of buckets which cannot be fabricated by the machine provided by the project. They are hardly producing their tinsmith products with the machine provided. Another equipment for nickel plating is still used for handles of tin boxes, etc. Since the main machine is not in use, the evaluation is rated as such low.
07C2. Guitar-Key Strengthening	1.2 (1→1)	They started the production in late 2007, but soon after the commencement, the producers have been hit by fuel price hike as well as by cheap Chinese-made products. However, a producer made pinion gears at his own house with his old machines, and then he used the machines provided by the Project for other sophisticated parts such as small holes for tightening guitar strings, screw bolts, and small iron plates. He tried to market his products in Mandalay and Yangon as well. However, the product cannot compete with Chinese made cheap guitar key, cheaper by about 30% less. The beneficiaries explored to produce e.g. screw drivers with that machine, but it required an expertise skills, so that they were not able to embark it. The machine is not in use as of August 2009.
07C3. Embroidery Promotion	3.1 (4→3)	There were 3 embroidery groups related to the 3 machines provided. Each group consists of 10 members, totaling to 30 memberships in this embroidery production activity. They started production in March 2008. As an example, about six members in a group were already experienced so that they could get order while the remaining 4 were still beginners, who could not take any order yet. The beginners were learning from the experienced members by working together, e.g. a kind of on-the-job-training. In addition, as of January 2009, there are 3 women who came to Ma Gyi Sauk to learn the embroidery technology. They pay 25,000 Kyats per month as tuition (in other places it is 50,000 Kyats per month per person). Through this on-the-job training, 11 members grew up to quasi-trainer level, ready to get order. Beginning from the month of March 2009, 3 embroidery work-groups had to sometimes stop their embroidery activity due to either difficulty to be able to monthly subscribe the rental for the machines or difficultly for group-leaders to supervise their members. To solve the problems faced by embroidery groups, meetings were held, and as of January 2010 the machines are rented or hired out with rental of 150 Kyats per day to anybody who wants to use it.
07C4. Motorized Weaving / Weaving Improvement (material revolving)	3.1 (2→3) Ma Gyi Sauk 3.2 (4→4) Khaungkawe	In Ma Gyi Sauk village, faced with the price hike of the diesel, the production was dormant till January 2009, and so expected profit could not be generated. They started improving the production from February 2009, after busy agriculture season has finished. From the 3 machines, altogether 178 pieces of Pasoe (man's nether garment) and Longyi (woman's nether garment) could be woven and 100 pieces were sold (some on credit and some in cash). Then another group was assigned to the engine weaving machine in January 2010. They started the production in early February 2010. In Khaungkawe village, the pilot project provided raw materials since they were just given materials by brokers thereby working only as wage workers. 250 lbs of wool provided by the Project were divided for 5 groups, each group procuring 50 lbs of wool. The raw materials are operated on a revolving system. They could sell their products to the market directly and so they got more profit, at least 15% more though depending upon the then-market situation. For members they used to earn only 500 Kyats per bag previously and after the provision of wool their labor charge was raised to 600 Kyats per bag, increased by 20%, as hand loom owners got their profit more than before.
07C5. Knitting Promotion	3.5 (5→3)	Finally 50 memberships came to the 5 machines provided by the Project in early 2008. The pilot project sent 5 members, one each from the 5 groups, to Pyin Oo Lwin to learn the advanced technology with the double-layer deck machine. They had transferred the technology to 22 colleague beneficiaries by using the machine together so far. A smart lady came up. She used to work as a

		wage worker fetching that 750 – 800 Kyats only per day. With the machine provided, she produced 100 baby sweaters in just about 10 days. She gained a net 2,000 Kyats per day. Another lady earned about 1 million Kyats in net since March 2008 to January 2009. Out of this profit, she bought TV, DVD, and loaned out money of 150,000 Kyats to a relative in exchange of farmland of 1 acre. However, on 13th June 2009, the Project made a field-trip to Ma Gyi Sauk and learnt that knitting industry could not run in a regular condition beginning from March 2009. To improve the situation, renting system was established wherein anybody who want to use can use the machine by paying a rental fee of 200 Kyats/day. As of February 2010, all 6 knitting machines are rented out and those are operational.
07C6. Sandstone Ware Production Improvement	3.6 (3→3)	The committee had by themselves, improved the trollergy by inching up the height of the body to have more clearance from ground, putting up wooden frame enabling more loads per transportation. As at beginning of August 2008, the trollergy earned about 300,000 Kyats from which they returned a debt of 100,000 Kyats which had been used to improve the trollergy. In 2009, the trollergy has been used about 8 – 9 times per month to ferry their products, earning about 50,000 Kyats of net profit per month. In addition, the trollergy is nowadays utilized in not only transporting their products but also transportation of agriculture products, rental services to village retailers for commodities, and emergency cases e.g. carrying a sick villagers to a nearby hospital (so far 3 times). The activity has been continuing, and as of February 2010, the committee has accumulated 260,980 Kyats.
07C7. Rural Development Sales Center (Road Station)	2.9 (3→4)	The committee divided the road station into two parts - one for 8 small shops and the other for one restaurant. The restaurant paid an amount of 30,000 Kyats as rental fee, and the committee till January 2009 collected a total amount of 150,000 Kyats. By using this amount, the committee constructed the entrance road leading to a parking area of the station, and also donated fuel cost for high school's night study for the final examination (9th and 10th standard students) from October to December 2008. This fuel donation was done in 2009 as well. In addition, there is an information exchange billboard right in front of the station, showing their activities, etc. The Project and the Sales Centre Committee discussed with 7 interested persons in mid 2009. At the other part of the sales centre altogether small 7 new shops have been opened as of July 2009. Shopkeepers earn profit of maximum 3,000 Kyats to minimum 700 Kyats per day depending on their products. One of the shopkeepers could buy even a bicycle worth more then 20,000 Kyats. They collectively contributed voluntary service and donations towards building of 'Travelers Lounge'. During the month of July 2009, a CDMA phone could be fixed at the Centre after getting a permit from Magway Division Tele Communication Centre. However due to sluggish sales, as of February 2010 only 3 shop keepers are operational.
07C8. Paddy Drier	3.5 (5→3)	The operation committee keeps about 105,000 Kyats as net profit, equivalent to 105 man-day farm casual labor wages as of January 2009. The user farmer can fetch 5,000 Kyats per basket, much higher than 3,500 Kyats, after 4-6 months storage upon drying of the summer paddy with the dryer. Even without long storage, the milled white rice after going through the drier can fetch about 600 Kyats per bag more than the ones just dried under sunshine. In addition, a training of improving rice milling was administered in 2008. With the technology, the milling machine attracts more customers increased by as many as 30%, saves 2 days for maintenance required in every 75 days, and increases the volume of milling paddy by 10%. There is another outcome carried from this paddy dryer project. Out of the profit, each 6,600 Kyats was disbursed out to 5 mushroom cultivators in October 2008, totaling 33,000 Kyats, as a loan with an interest of 3% per month. In 2009, the paddy drier was planned to run from around June-July. However, there was sever drought in 2009, delaying rainy season very much. Therefore farmers have not used the paddy dryer but dried the paddy under natural sunshine. Though it was not used in 2009, the evaluation mark is 3.5 since it can contribute to the paddy farmers a lot.
07C9. Fruit Processing	2.3 (3→2)	Aside from the construction of road station, 20 women villagers undertook a training of fruit processing in FY 2007/08. Out of them 5 members did sales on business, including sales in the road station in 2007 to early 2009. At the road station, one pack of dried fruit was sold at a price of 40 Kyats till around May 2009. However, since raw materials are expensive, as of February 2010 all the beneficiaries stopped to do sales on business. They now produce and sell the processed fruits only during paddy transplanting period when farm owners are supposed to provide snacks to the transplantors. Also, they do the fruit processing whenever at religious occasions and when they have many guests in

		their houses.
07C10. Energy Efficient Stove	2.9 (3→3)	The producer used to use one cart of pigeon pea stem, 2,000 Kyats/cart, for a total 3 days operation, but now with this energy efficient stove he can operate 3.5 days with the same amount of fire material (energy efficient was improved by 17%). The cooking time was reduced by 2 – 3 hours per day. Previously he used to work from 6AM to 14:30/15:00 but now from 6AM to 12:00. This means he can now save about one third time of what he used to spend. The stove itself is highly efficient as mentioned, however the cost of constructing the stove is about 50,000 Kyats, making them difficult to extend this type of energy efficient stove. Since it is continuously used, it is rated at almost 3.
07I1. Drinking Water	3.5 (4→3)	In October 2008, the facility was improved by heightening land level so that kids (sheep and goats) can drink water easily. This improvement was done by themselves. As of August 2009, water supply of this facility stopped due to outage of the electric-powered pump. The committee repaired the pump spending about 11,500 Kyats from village fund. So far, about 50 head of cattle and 70 – 100 goat/sheep are using this water facility every day. In addition, primary school nearby, fish sale shop, car owners as well as about 30-50 nearby households are also using the facility. No water charge is collected from users but is born by village PDC committee.
07I2. Biogas Generation	4.1 (4→4)	The villagers made arrangement for the 2 tanks excavation by collecting 1,500 Kyats each household. Construction was completed in January 2008, and the power supply started on February 1, 2008 for all the 307 places in lighting. Their monthly expenditure on candles by a typical family used to arrive at as much as 4,500 Kyats. Now they pay 500 Kyats per household per month only. For the viability at the system level, the total payment of 500 Kyats per household per month arrives at around 150,000 Kyats, when collected all. This amount is enough to cover all the necessary expenses such as the operator's salary of 50,000 Kyats, engine oil of 16,000 Kyats, which are the major expenses. Though there was problem of power fluctuation, caused by illegal use of the power for battery charging and TV, the committee introduced DC-AC converter out of their income. The power is now stable. Furthermore, a village volunteer established a night school in May 2009. He teaches as many as 32 pupils. It is very much sustainable.
07I3. Electricity by Diesel Generator	3.9 (3→4)	The charge per night was 50 Kyats and thereafter raised to 70 Kyats per night due mainly to hike of the diesel cost in 2008. The charge, 70 Kyats/night, was again reduced to 50 Kyats per night since January 2009. This cost is much cheaper than that of candles, less than half expenditure, but a little higher than that of battery-powered-bulb. Subtracting those who use battery for their lighting, there were 96 households in total provided with the generator electricity as of January 2010. There was a problem, evading from paying the charge. In July 2009, a new committee was formed with 9 old members and 5 new members. Out of the non-paid amount of 220,000 Kyats, the committee has collected 160,000 Kyats within about 2 weeks, and the remaining 60,000 Kyats was still being collected by the Chairman till the end of 2009. Monthly income and expense of electrification activity is now made known to all villagers through PDC Chairman and 10-household leaders. It is very sustainable, giving a mark of 3.9.
07I4. Primary School with Roof Catchment	4.0 (4→4)	The school was constructed in March 2008, and officially opened on July 1, 2008. There are 52 pupils, who are no longer in need to commute previous school located far away via dangerous steep path. Parents are very happy because now even their 3-4 year-old children can go to school together with their elder brothers or sisters as pre-kindergarten pupils. They feel confident for their children to complete their primary-level education because there were some people in the village who did not complete their primary-level education. In the construction, villagers have contributed casual labor works, stones used for foundation, toddy-palm leaves for temporary wall, and plate-like cutting sandstones for permanent wall. Throughout 2009, the School Committee was carrying out its construction activity under the leadership of Village PDC Chairman. As a united effort, each and every household of the village contributed 2 blocks of stone each which are used in erecting walls for the school. In addition, 80,000 Kyats had been spent for making wooden door-frames and window-frames. School construction work is intermittently being done depending on the number of stones received. The village chairman has struggled a lot to mobilize his villagers, through which he has improved his leadership.

Remarks
1: the project cannot sustain to operate or run
2: the project cannot sustain on itself but with support it can sustain to operate

3: the project is operating or running as designed
4: the project is operating or running, and also well maintained, more than what was designed
5: the project is generating outcome (positive impact) e.g. extension by itself

5.3.2 Final Evaluation of the Pilot Projects commenced in FY 2008/09

Table 5.3.3 shows the project evaluation from the 5 aspects and Table 5.3.4 elaborates sustainability only. The evaluation is made in a range of 1 – 5 with the 1 being the least and 5 being the highest. In the column of sustainability of Table 5.3.4, the top ones are the evaluation result as of February 2010. In addition there are 2 evaluation results in the below bracket; left ones are the evaluation made in February 2009, and the right for as of August 2009. Evaluation was exercised same as those pilot projects commenced in FY 2007/08, namely, by all the project members engaged in February 2010, e.g. 3 JICA members, 4 counterparts and 3 national staff having been engaged in the monitoring of pilot projects. Evaluation results for the FY 2008/09 pilot projects are summarized as below by sector:

1) For agricultures pilot project, improved paddy cultivation was given higher evaluation result and also improved seed regeneration project earned high marks. Organic farming promotion with the introduction of IMO culture, on the other hand, was not evaluated so high since extension from farmer to farmer did not take place so much. Besides, storage and minimum tillage did not receive higher marks either. In most of the CDZ villages, farmers' production is not so much and therefore the usage of storage at village level was limited but at the household level. This status contributed in lower marks. For the minimum tillage cultivation, unfortunately perennial leguminous crops had withered due to hot and dry weather which prolonged in 2009.

2) Livestock pilot project shows more or less same results as those in FY 2007/08. Goat revolving was given higher evaluation result. Goats are adjustable to the CDZ weather and can be reared by landless poor people on grazing ground. This situation contributed to higher marks. Pig revolving was once evaluated very low due to swine flu effect. However, pig raising can be a good income opportunity for landless people especially in paddy areas, therefore giving high mark in relevance. Also pig price started coming back in late 2009, and therefore good marks were given to the final evaluation results. Livestock feeding improvement is very important, leading to relatively high mark in terms of relevance. However since it requires a cumbersome step in making UMMBs and also villagers are poor to buy necessary materials, it was not extended.

3) In cottage sector, establishment of revolving fund has been tried either at group level or at village level. The evaluation result varies from village to village or by component. In Magyi village, the evaluation is relatively low because they lost market in Thailand due to world wide financial crisis. In Ma Gyi Sauk village, member-to-member technical transfer had taken place, and also the main committee lent about 600,000 Kyats to weaving group out of rental fees of the machines. These activities gave high marks to that of Ma Gyi Sauk village. In Ar La Ka Pa village, amortization fee which came from tractor rental fee contributed to village development, e.g. repair of motor for water drinking facility and also lent 300,000 Kyats to renew breeding bull. These performances contributed to high evaluation results.

4) For living improvement, most of the pilot projects were given higher evaluation results except firewood substituting bio-fuel promotion project and improved cooking stove in some villages. In this pilot project, an extractor for *Jetropha* oil was fabricated and it worked. However, since the availability of seeds in rural areas is not yet enough, it has resulted in less usage of the extractor. For improved cooking stove, it was not needed in village where there are still a lot of firewood while in North Pabe village, it was due required due to high risk of fire in that village and also shortage of firewood. Paddy husk power generation was given high evaluation result

since it has contributed to raise the villagers living standard and also it is well maintained. Rural development centre, started as children's nutrition improvement centre, was also given good marks in evaluation.

Table 5.3.3 5-aspect Evaluation for the FY 2008/09 Pilot Project (as at February 2010)

Pilot Project	Efficiency	Effectiveness	Impact	Relevance	Sustainability	Remarks
08A1. Improved paddy cultivation promotion programme	3.5	3.5	3.7	3.8	3.3	
08A2. Organic farming promotion programme (with IMO)	3.3	2.8	2.8	3.2	2.7	
08A3. Improved seeds regeneration project	3.6	3.6	3.6	3.6	3.6	
08A4. Pro-poor oriented Mushroom culture promotion project	2.8	3.0	3.0	2.6	2.5	Zee Bwa
	2.6	2.6	2.6	2.4	1.7	Za Yit
08A5. Small-scale irrigation promotion project (shallow well + treadle pump)	3.3	3.3	3.2	3.3	3.2	
08A6. Crop storage depots promotion project	3.0	2.7	2.3	2.8	3.0	Ma Gyi Sauk
	3.2	2.8	2.3	2.8	3.0	Legaing
08A7. Minimum tillage promotion project	2.1	2.0	1.9	2.0	1.4	2 villages
08A8. New varieties adaptability trial project	NA	NA	NA	NA	NA	Test trial
08L1. Pro-poor oriented goat revolving programme	3.6	3.6	3.6	4.4	3.9	12 villages
08L2. Pro-poor oriented piggery revolving programme	3.0	3.0	3.1	3.9	3.3	Risk: Swine influenza
08L3. Livestock feeding improvement programme (molasses block, silo, etc)	2.4	2.8	2.6	2.6	2.2	
08C1. Community revolving fund establishment project (by using rental fee and/or amortization of the capital)	3.0	3.0	3.0	3.4	2.9	Magyi
	3.6	3.5	3.5	3.9	3.8	Ar La Ka Pa
	3.4	3.1	3.1	3.5	3.4	Ma Gyi Sauk
08I1-1. Firewood substituting bio-fuel promotion project	2.4	2.3	2.3	2.1	2.0	Firewood substitute
	3.0	2.7	2.7	2.7	2.5	Nga Zin Yine
08I1-2. Improved cooking stove promotion project	3.0	2.2	2.2	2.0	1.8	Kan Pyuu
	3.6	3.4	3.8	3.9	3.8	North Pabe
08I2. Paddy husk power generation project	3.5	3.6	3.9	4.1	4.0	
08I3. Rural Development Centre Project (children's nutrition improvement center project as entry)	3.1	3.5	4.0	3.8	3.7	

Table 5.3.4 Sustainability Assessment for the Pilot Project in FY 2008/09, as at February 2010

Pilot Project	Sustainability Last→Now	Remarks
08A1. Improved paddy cultivation promotion programme	3.3 (4→4)	A 6-day training was carried out in late January 2009 focusing specifically on integrated crop management (ICM) based rice production technologies. And a refresher course inviting good farmers was carried out in August. Forty-two extension staff participated in this training, who came from 12 townships of MAS, 6 districts and 3 divisional offices. At the end of the first training conducted, the participants prepared an action plan covering both 2009 pre-monsoon paddy and 2009 monsoon paddy cultivation. For summer paddy extension, MAS staff have carried out 13 activities for extension in 190 villages (178 planed), out of which they have demonstrated in 84 villages (80 planed). And For monsoon paddy, MAS staff have carried out also 13 activities for extension in 274 villages (243 planed), out of which they have demonstrated in 123 villages (98 planed). Then, concerning pre-monsoon paddy 109 villages with 458 farmers have tried some of the extended technologies by themselves. On the other hand, on monsoon paddy 109 villages with 970 farmers have tried something technologies. During the course of extension, Minbu TS and Ayadow TS prepared a chart which show paddy cropping calendar on a big plastic paper, like A-0 size, and Magway MAS divisional office has made the copy and distributed to all the TSs under the division. Since it has been well extended, the sustainability is evaluated at 3.3.
08A2. Organic farming promotion programme (with indigenous microorganism: IMO))	2.7 (4→4)	Training on "Organic Farming Promotion including Improved Paddy Cultivation" was conducted in July 2008, and refresher course was conducted in November 2008 at OISCA Agro Forestry Training Center - Yesagyo. The number of participants trained was total 42 MAS staff. During the training, the extension staff had set their target of extension services. In fact, 340 villages were covered by extension activities, out of which there were demonstrations (e.g. organic manure making with IMO, nursery preparation with Dapog, etc.) in 169 villages, which account at 117 % accomplishment and 136 %

		accomplishment against the targets respectively. In fact, 83 villages with 610 farmers have tried some of what had been taught. Seeds used in nursery was reduced to 0.68 baskets from 2 baskets, and for the cost of the preparation of nursery, it was 25,043 Kyats/acre by Dapog method, while the cost by conventional method was 35,000 Kyats/acre. This indicates Dapog can reduce the nursery preparation cost by about 10,000 Kyats/ac. For the total cost including harvest, it was reduced by as much as 26,000 Kyats/ac. The yield was about 100 baskets per acre under improved practices while 60, 101, and 85 baskets under conventional ones. However, since organic farming is of cumbersome work, it has not been well extended, thus resulted in lower evaluation result.
08A3. Improved seeds regeneration project	3.6 (4→4)	Seed regeneration training was conducted during 1st week of October 2008 in all the target 4 villages. The training had enhanced the beneficiaries' awareness on; 1) importance of seeds for crop production, 2) seed regeneration process by farmers, 3) importance of post harvest crop handling process, and 4) storage of seeds at farmers' level. In Nga Zin Yine village, a total of 97 farmers participated and they were provided with Yezin 6 chick pea seeds. The yield was 14 baskets/ac which is higher than conventional V2 variety with 10 baskets/ac in most years. Farm gate price were 14,700 Kyats/basket and 13,600 Kyats/basket respectively (since Yezin 6 is better in quality, it is traded with higher farm-gate price.). In Ar La Ka Pa village, Yezin 6 was distributed to 25 farmers. Yezin 6 recorded about 14 baskets/ac against 10 baskets/ac for conventional V2 variety. In Htee Saung village, there are 25 beneficiaries and the results were almost the same as other villages. In Ma Gyi Souk village, paddy seed regeneration was tried. The variety is Sin New Yin, and the yield ranged from 23 to as high as 105 baskets/ac with an average of 80 baskets/ac. All the beneficiaries have already revolved the seeds for the 2nd generation beneficiaries, so that sustainability is high.
08A4. Pro-poor oriented Mushroom culture promotion project)	2.5 (2→2) Zee Bwa 1.7 (1→1) Za Yit	Mushroom cultivation training-1st time was conducted during August 2008 with 20 participants each in 2 villages. In Zee Bwa village, 2 beneficiaries have continued the cultivation. On September 7, 2008, about 40 persons including responsible persons from World Vision studied mushroom cultivation in Zee Bwa (at that time 'vegetable cultivation training' was being conducted at 'Koe Su' village which is situated 6 miles away from Zee Bwa under the arrangement of World Vision). At the invitation of Koe Su village, some beneficiaries from Zee Bwa went to Koe Su to gave necessary instruction for 5 beds of mushroom cultured by Koe Su villagers. Here village to village technical transfer was carried out. In Za Yit village after the training carried out, there were only 2 - 3 beneficiaries who carried on mushroom cultivation intermittently. For the beneficiaries, it was difficult to buy mushroom seeds (to buy seeds they have to go to Monywa). In addition, natural mushroom is available in the rainy season. So, cultured mushroom is not preferred. It is rated at 2.5 for Zee Bwa village and 1.7 for Za Yit village.
08A5. Small-scale irrigation promotion project (shallow well + treadle pump)	3.2 (3→3)	Treadle pumps had been delivered to Zee Pin Gwe village and Kan Ma village in October 2008, 3 pressure-ype and 5 simple-type pumps per each village. There are 20 beneficiaries and 22 beneficiaries in each of the villages respectively. In Zee Pin Gwe village, farmers efficiently utilized the treadle pumps for onion crop as well as other winter crops such as vegetables e.g. cauliflower, mustard, egg plant, water crest, and seasonal flowers. All 20 onion beneficiaries had made the IMO Bokashi for their crop. In Kan Ma village, beneficiary group managed to collect rental charge of 300 Kyats per day for utilizing treadle pumps supported by the project. The collected fund, 3,800 Kyats as of end January 2009, will be used for repair and maintenance of the pumps. The farmers can manage to irrigate 0.5 acre in 2 days, with 3 people, which they can save about 8 gallons of diesel (to irrigate 1 acre, they used to spend 16 gallons). The sustainability is rated at 3.2 for the both villages.
08A6. Crop storage depots promotion project	3.0 (2→3) Ma Gyi Sauk 3.0 (2→2) Legaing	In Ma Gyi Sauk Village, by the end of December 2008, the depot started utilized for storage of paddy crop. Training on crop storage systems & storage pest control was conducted in December 2008 at the village with 31 participants. About 80 -100 baskets of paddy under seed regeneration program have been collected in the crop storage depot as of January 2009, organized by main committee. The committee also collected and stored about 40 baskets of chickpea from last year, seed regeneration program, for the distribution to next generation beneficiaries. In Legaing village, the storage is situated near paddy drier for the purpose of storing dried paddy by the drier. However, since the drier was not used in 2009, the storage is now keeping about 16,00 bags of Urea fertilizer which was provided to 5 village-tracts including Legaing village-tract for FY 2009/10. This fertilizer is for rainy season paddy of 2009.

		The storage is managed under a joint-arrangement of Township PDC and Village PDC. In both villages, the sustainability is rated at 3.0.
08A7. Minimum tillage promotion project	1.4 (2→1) Kan Ma 1.4 (1→1) Htee Saung	In Kan Ma village, 2-days training programme had been conducted during 2nd week of October 2008 with 28 interested farmers. The perennial legume plants had been transplanted first and chickpea as major crop was plated later, at the end of October, by intercropping. In Htee Saung village, same 2-days training program had been conducted during 2nd week of October 2008 with 13 interested farmers. Major crop, sunflower, had already been sown at the end of September 2008, and the perennial legume plants had been transplanted by inter-cropping during the end of October 2008. The leguminous crops had been growing well during the rainy season, however they could not survive hot and dry season due to the high temperature and its dryness. Till June 2009, all the leguminous crops had died unfortunately. It is therefore the sustainability is rated very low.
08A8. New varieties adaptability trial project	NA	This pilot project carries out adaptability test trials of new varieties. For rainy crops, groundnut, pigeon pea, sunflower, and green gram were tested in 2008. The results are i) Pigeon pea new varieties 2043 (B) is of medium age and flowerings are the same and there is no difference in yields, ii) Peanut new variety Sinn Pa Da Tha (8) cultivated in 2 target townships got promising yield and there were no signs of leaf spot disease, iii) Sunflower new variety Sinn Shwe Kyar (3) produces higher yield than local variety, iv) 2 new varieties of green gram (Agriculture - 1 and Yezin - 11) were tried the yield of Yezin 11 is higher and promising. Six new varieties of winter crops were sown beginning from September 2008. Those winter crops were winter sesame, winter peanut, maize, winter green gram, winter chickpea and sunflower. For these crops, sesame, maize green gram and sunflower showed higher yields than those of local varieties. In addition, 2 varieties of cotton were tried and showed much higher yield than local one. Since this is a test trial, sustainability is not counted.
08L1. Pro-poor oriented goat revolving programme	3.9 (4→4)	All beneficiaries in 12 villages where goat revolving pilot project has been implementing had constructed model-typed goat house individually or collectively. In late October 2008, 497 does and 51 bucks were delivered to beneficiaries. Learned fro FY 2007, some representative of beneficiaries and LBVD staff went to goat market, and consequently good quality goats were procured, and vaccination was also done by LBVD officers just after delivery, which was resulted in low mortality rate compared to FY2007. As of February 2010, number of beneficiaries has increased from original 120 to 190 including 70 beneficiaries of 2nd generation. At the same time, number of goats has also increased from original 548 head to 926 head (708 female and 218 male). Entire mortality rate is estimated at 16.6%, which is higher than acceptable 5 to 10%. Some 1st generation beneficiaries have got profit from selling own goats after fulfilling handover. Moreover, small amount of secondary income from sale of goat dung as fertilizer has generated. Goat market price has once been depreciated in 2009 but now recovering in early 2010. Advantage of goat raising exists in less feeding cost because of year-round grazing. The rate is 3.9.
08L2. Pro-poor oriented piggery revolving programme	3.3 (2→2) swine influenza	80 piglets (37 female and 43 male) were delivered to 40 beneficiaries of selected 10 villages, who had constructed pig housing by their own expenses. As of February 2010, total number of pigs reached at 61 head (28 female and 33 male). Influence of swine flu had affected pig raising even in pilot project being implemented in 4 villages, and pig price had depreciated in 2009 compared to 2008 price. As the result, many beneficiaries had stopped raising to avoid falling into debut. Even so, as of February 2010, 26 beneficiaries are still raising pigs. One of beneficiaries in Ar La Ka Pa village, previously a farm labor, could get profit from piglets born from a mated original female, and became a seed broker. Pig price has been recovering in early 2010 though it was once declined in 2008. The rate of this pilot project is 3.3 though it was affected by unpredictable risk of swine flu.
08L3. Livestock feeding improvement programme (molasses block, silo, Ipil Ipil, etc)	2.2 (3→3)	In total 33 TS LBVD extension staff were invited 2 times to the training held in July 7 to 11 in 2008, and October 2008. In the 2nd training, LBVD officers formulated action plan to be implemented by themselves in their areas in charge. Number of villages was targeted at 253 for extension and 145 villages for demonstration. LBVD officers had carried out activities on UMMB making, silage making, improved feeding, disease control etc. As of February 2010, accomplishment for the extension reached 401 villages and 294 for demonstration. However, even now, no villagers had applied and used those technologies to date. The rate of this pilot project is 2.2.
08C1. Community revolving fund establishment project (by	2.9 (2→2)	Revolving is done either at the village level or at the group level; e.g. former case being tried in Ar La Ka Pa village and the latter in Magyi village for

using rental fee and/or amortization of the capital investment)	Magyi 3.8 (4→4) Ar La Ka Pa 3.4 (2→3) Ma Gyi Sauk	example. In Magyi village, the weaving group was provided with 5 units of multi-layer hand looms during 2nd week of October 2008. The beneficiaries had started using them under the revolving fund rules. They produced 83 sets of clothes targeted at Thai markets and gained 124,500 Kyats in net profit and another 11,700 Kyats for Kchin race cloths from February to April 2009. As of January the committee has 45,250 Kyats for revolving. In Ar La Ka Pa village, the village cooperative society composed of almost all households in the village was provided with a 67 HP- tractor. The tractor had started first operating on 19th November 2008. Since then till rainy season of year 2009/10, the tractor was used in 64.5 acre harrowing and 48.5 acre ploughing, and the net profit till then arrived at 1,220,125 Kyats. This amount is kept as village development fund. In Ma Gyi Sauk village, there are 3 cottage groups of embroidery, knitting, and weaving. Since July 2009, several meetings were held between the main committee and group members. They decided to change the operation system from group based one to rental basis one. Now anybody who wants to use machine can make a contract with the main committee paying 150 Kyats/day for an embroidery machine, 200 Kyats/day for a knitting machine and 20,000 Kyats/month for the 3 engine weaving machines. Evaluation is 2.9 in Magyi, and 3.8 in Ar La Ka Pa village. In Ma Gyi Sauk villages, it is rated at 3.4 now.
08I1-1. Firewood substituting bio-fuel promotion project 08I1-2. Improved cooking stove promotion project	2.0 (2→2) fuel substitute 2.5 (3→3) Nga Zin Yine 1.8 (1→1) Kan Pyuu 3.8 (4→4) North Pabe	One set of Jetropha oil extractor was provided to each of the 3 villages by February 2009. According to the demonstration, one piece of compacted oil cake can burn 45 minutes to one hour. Since Jetropha seeds are not much available at village level, however, the extractor has not yet been utilized as alternative cooking fuel producer. As for cooking stove, in Nga Zin Yine village, altogether about 20 stoves have been made and the villagers have been using those stoves. Total households of Nga Zin Yine village are about 200 and so it can be said that 10% of the whole village are using the stoves. For Kan Pyu village, villagers showed no interest of making improved cooking stoves because firewood can be available abundantly at any time in and around their village. Not only that, according to their village's situation, there is a pond beside the village and so it is not necessary for villagers to worry about outbreak of fire. For North Pabe North village, over 80 households out of 140 households in the village are using improved cooking stoves. According to villagers, by using improved cooking stoves, the use of firewood could be reduced from at least one-third to at most half. In connection with cooking hours, the stoves could reduce 20 - 50 % of duration. One of the advantages for them is no need to worry about outbreak of fire. Previously they found it difficult to use pigeon pea stems as firewood because the stems produced large tongues of flame. Now, improved stoves are plastered with clay and brick and so flames cannot spread out as before.
08I2. Paddy husk power generation project	4.0 (4→4)	Construction was completed in 3rd week February 2009, and test run done in the same week. The generator started providing electricity on 18th February 2009 to the villagers, a total of 404 lighting points composed of 380 HHs, some in 2 monasteries, some in 1 primary school, and 12 points along road sides. Each household pays 1,000 Kyats per month for the electricity (20 HHs are exempted from the payment: they are poor households and committee member households). They collect the charges at the community hall situated in the middle of the village by using a loud-speaker. Collecting the charges by using loud-speaker is, according to the committee members, very effective because villagers who have not yet paid the charge are ashamed of being their names announced. With this electrification, lighting expenses for common households reduced to 2,500 to at most 4,000 Kyats per household from previous 3,000 – 7,400 Kyats per households per month. As of January 2010, primary school level students are being taught in the evening at village primary school with lighting by a voluntary teacher. In addition, 4-5 women started working in night with the light earning extra money. It is therefore sustainability is very high.
08I3. Rural Development Centre Project (children's nutrition improvement center project as entry)	3.7 (4→4)	Construction of the center was completed on August 28, and the committee started the support for the children by mobilizing colleague villagers. "Nutritious food feeding program for BMI low status children" had been conducted 3 days a week, well organized by the village elders' group, starting from September 23, 2008 to end of the October 2008 for 4 weeks for the first batch children. The second batch group, composed of 21 children, was given lunch 3 days per week from 1st week of November to mid December 2008 for 6 weeks. From January 2009, third batch group, composed of about 20 children, was started and beginning from July 18, 2009, 10 children of the fourth batch have enjoyed meals till August 18, 2009 on Mondays, Wednesdays and Fridays, 3 days a week like previous batches. Positive impacts are not only

		nutritional improvement for the beneficiary children but also they learned wash hand, cut nails; behave neatly, etc. according to the mothers. The Nutrition Center is also used as a multi-purpose hall for several village activities, e.g. village meeting, Buddha's book reading for elders, venue for discussion of living improvement, etc. Also, a library was constructed within the compound of the center at a cost of 150,000 Kyats donated by the village chairman in May 2009. It is rated at 3.7 for sustainability.

Remarks
1: the project cannot sustain to operate or run
2: the project cannot sustain on itself but with support it can sustain to operate
3: the project is operating or running as designed
4: the project is operating or running, and also well maintained, more than what was designed
5: the project is generating outcome (positive impact) e.g. extension by itself

5.4 Output and Lessons from 3 Trainings on Agriculture and Livestock 2008 Pilot Projects

5.4.1 Trainings on 08A1 Improved Paddy Promotion Pilot Project

Under pilot project "08A1. Improved paddy promotion programme, 2 trainings were carried out. In the first training carried out in January 2009, participants learned improved paddy cultivation technologies based on Integrated Crop Management (ICM), formulated action plans to disseminate what they have learnt technique in their jurisdiction. In this training, 42 extension staff participated who came from 12 townships of MAS, 6 districts and 3 divisional offices.

The second training aims at following up and reviewing action plans according to the outcome of extension activities in the participants' service areas. At the same time, since the participants themselves have shared their experiences, the training can foster generating individual learning through exchanging their experiences. Furthermore, not only extension staff but also advanced farmers in the CDZ area were invited to the training and so more developed discussions on the real situations encountered by the participants could be held with much effect. The participants are altogether 48, 43 from MAS staff and 5 from advanced farmers. Five advanced farmers were 3 farmers from Mandalay division, 1 farmer from Sagaing division, and 1 farmer from Magway division.

1) Training Contents based on ICM (Integrated Crop Management)

Since the first training was carried out in January 2009, which is in dry season unfortunately, there were limitations as far as practices were concerned. However, the institute as well as the trainer tried to arrange such opportunities as soaking of seeds to facilitate good germination, seeding practices, preparation of reduced area wed-bed seed nursery, and also a study tour to a paddy field where the participants could observe dry season paddy cultivation assisted by irrigation. At the end of the training session, the participants prepared an action plan covering both 2009 pre-monsoon paddy cropping and also 2009 monsoon paddy cropping. This training does mutual discussions of the participants among themselves on the performances shown in the action plans formulated in January 2009, experiences, issues of their extension activities and lessons learnt through the process of solving these issues and also review of their targets (number of villages) by activity.

The Problem Sharing Session facilitated by the chief counterpart.

2) Problem and Lesson sharing amongst Participants

Table 5.4.1 summarizes problems they have faced and solutions they have applied in extending paddy

cultivation in the past. The top problem listed was "Farmers rely more on inputs than improved technologies", followed by "Farmers cannot get quality seeds easily", "Farmers resist to change from conventional method", "Water management is difficult", and so on so forth. On the other hand, the extension staff tried to overcome the difficulties by promoting organic farming such as IMO bokashi, doing demonstration and also extension, encouraging farmers through contact farmers who are mostly lead farmers in their areas. Several staff raised lack of technologies for themselves and they seemed to have got necessary extension knowledge through training as well as depending on training materials provided.

Table 5.4.1 Problems encountered by the participants and their solutions

Nr.	Problems or difficulties in extension	Solution
9	Farmers rely more on inputs than improved technologies	Carry out organic farming promotion such as IMO Bokashi.
8	Farmers cannot get quality seeds easily	Demo and Extension of seed production procedure at farmers level
8	Farmers resist to change from conventional method	Encourage through contact farmers (advanced farmers)
6	Water management is difficult	Manage through local authorities
5	Farmers prefer growing marketable and profitable crops (e.g. chickpea) to rice	Organize farmers through local authorities
5	Farmers are weak in using natural fertilizer	Demonstration of model plots
Others	Extension workers are lack of new and advanced technologies. Extension lacks Information Education Communication	Learned new technologies on attending training and training materials

Source: Questionnaire interviews administered during the training, JICA Study team

The participants gave comments on the training to provide better training course for the next following up training. One of the comments said the participants gathered from different places, then they exchanged different topics taking place in each of their places. They communicated each other, peer – peer, so that they could share individual constraints and their experiences, thereby getting collective insight. All the participants provided the same comment during the session of problem sharing. Considering these comments, it is very much important to provide a venue wherein the participants discuss each other and thereby share problems. There were requests of inviting contact farmers to the next training together with extension staff.

3) Targets, Accomplishments, and Lesson learnt on 2008 Improved Paddy Promotion

Following up paddy training, carried out in August 2009, it is focused that it is not concerned with what technique was used, but how technique was to be conveyed to farmers. The following show acquisition of output through their field work, and these are their lessons learnt to develop their extension for way-forward:

1) Methodology of extension varies from TS to TS. It is considered for them that extension activities are performed standing on the farmers side by explanation with pamphlet containing figures and tables or explanation visualized with pictures and movies prepared, even their extension does not include demonstration. In common extension way among most TSs, they made a paddy calendar as an extension material to clarify fertilizer amount and its timing for use according to growing stage, which is illustrated on A1 size plastic sheet. They explained to farmers coming to demonstration farm that farmers can decide the amount of fertilizer and its timing for use in accordance the ways of the calendar.

Extension materials made by Kyaukse TS MAS. There are many kinds of materials including MP-4 player.

2) Extension staff take pride in their extension way, in addition to the pride few of them care whether the way is suitable for farmers or not. Some extension staff think that farmers do not understand their extension because farmers' understanding is poor. The chief counterpart suggested that the staff should not blame the farmers for the reason why they cannot understand their extension, but consider whether the way of extension is suitable for farmers or not. So the staff can always improve their extension much more ever before, due to reviewing their works.

3) The staff have to carry out their extension to a lot of farmers within the limited budget and time. In order to carry out their extension effectively in the situations, although the staff do not access to every village there are villagers who can do extension in the same way in villages, suggested as one of ideas. Extension staff make efforts to solve problems encountered in their field through contact farmers, on the other hand, they make their extension increase through them. Therefore, it is possible for them not only to accelerate their extension but also to produce villagers' interactive learning by means of contact farmers.

Table 5.4.2 shows the number of villages and their villagers as the targets of extension / demonstration activities on summer paddy cultivation. The table gives total 190 villages were covered by extension activities, out of which there were demonstrations in 80 villages, which account at 107 % accomplishment and 95 % accomplishment against the targets respectively. Concerning summer paddy where the extended techniques were actually put into practice, the number of villages was 94, and the number of villagers was total net 458. The number of villagers who actually put the learned techniques into practice in harvesting with minimum loss shows an outstanding number as compared to that of other activities.

This is related to the fact that for example Ayadaw TS and Wetlet TS farmers hired threshing machines, and the farmers who learnt the technique voluntarily tried to use the machines. Aside from harvesting with minimum loss, we can see there were many villagers as many as 335 and villages as many as 44 in seed selection. Because MAS staff have extended seed selection activity since before, this may have caused a higher accomplishment and a large number of villagers who tried to practice.

On the other hand, table 5.4.3 gives the number of villages and their villagers as the targets of extension / demonstration activities on rainy paddy cultivation. The table gives total 274 villages were covered by extension activities, out of which there were demonstrations in 123 villages, which account at 113 % accomplishment and 126 % accomplishment against the targets respectively. Concerning summer paddy where the extended techniques were actually put into practice, the number of villages was 109, and the number of villagers was total net 970.

Table 5.4.2 Number of Villages & Villagers Tried against Target of Extension / Demonstration (Summer Paddy)

Activity		Target (Nr. of Villages)		Accomplishment (Nr. of Villages)		Accomplishment (%)		Of which how many villagers actually tried (After Demo)	
		Ext.	+Demo.	Ext.	+Demo.	Ext.	+Demo.	Nr. of Villages	Nr. of Villagers
1	ICM-Paddy Demonstration	111	20	177	26	159	130	33	41
2	IMO Seed Extraction	151	68	165	71	109	104	37	46
3	IMO Bokashi Making	141	57	143	55	101	96	32	35
4	Seed Selection	158	59	173	53	109	90	44	335
5	Proper Land Preparation Practice	145	41	169	34	117	83	45	225
6	Reduced Area Wet-bed Nursery	160	35	169	33	106	94	44	137
7	Early Transplanting	162	35	170	32	105	91	46	127
8	Proper Fertilizer Application Practice	142	38	177	42	125	111	48	255
9	Proper Water Management	138	34	157	39	114	115	40	147
10	Dapog Method	124	16	115	17	93	106	18	45
11	Rice Husk Charcoal Making	136	19	102	21	75	111	26	7
12	Weeding Practice	155	36	166	45	107	125	60	278
13	Harvesting with Minimum Waste	156	33	174	33	112	100	46	344
Nr. of Villages (Net)		178	84	190	80	107	95	94	458

Source: JICA Study Team

Table 5.4.3 Number of Villages & Villagers Tried against Target of Extension / Demonstration (Rainy Paddy)

Activity		Target (Nr. of Villages)		Accomplishment (Nr. of Villages)		Accomplishment (%)		Of which how many villagers actually tried (After Demo)	
		Ext.	+Demo.	Ext.	+Demo.	Ext.	+Demo.	Nr. of Villages	Nr. of Villagers
1	ICM-Paddy Demonstration	189	15	212	23	112	153	21	35
2	IMO Seed Extraction	178	52	200	69	112	133	33	50
3	IMO Bokashi Making	173	45	206	58	119	129	40	64
4	Seed Selection	202	68	224	87	111	128	98	828
5	Proper Land Preparation Practice	195	47	198	54	102	115	66	425
6	Reduced Area Wet-bed Nursery	176	27	200	33	114	122	23	106
7	Early Transplanting	188	40	191	38	102	95	34	155
8	Proper Fertilizer Application Practice	207	51	216	63	104	124	67	528
9	Proper Water Management	207	47	226	53	109	113	43	208
10	Dapog Method	163	13	192	22	118	169	17	72
11	Rice Husk Charcoal Making	101	13	151	11	150	85	6	8
12	Weeding Practice	202	66	215	73	106	111	71	590
13	Harvesting with Minimum Waste	200	47	218	63	109	134	62	632
Nr. of Villages (Net)		243	98	274	123	113	126	109	970

Source: JICA Study Team

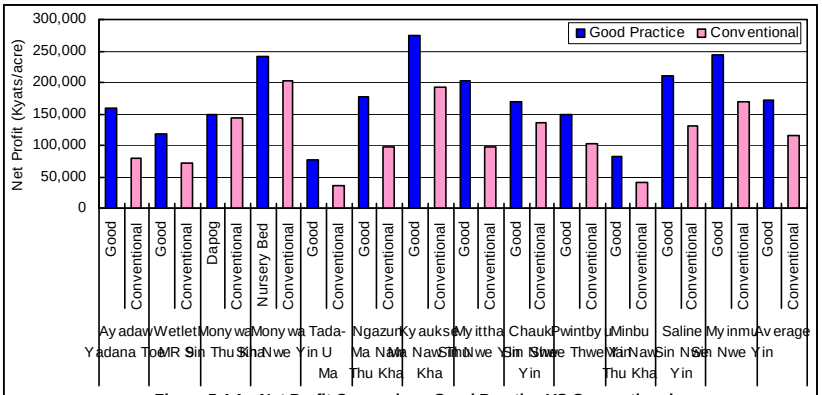


Figure 5.4.1 Net Profit Comparison Good Practice VS Conventional

Figure 5.4.1 shows difference of net benefit between good practice and conventional method. Concerning an average of net profit, good practice gained 173,076 Kyats / acre, conventional one gained 115,507 Kyats / acre respectively. The achievement of good practice is to increase 57,570 Kyats / acre net profit balance. In Ayadaw TS, yield by good practice increased by 30basket / acre, in Myittha TS yield by good practice increased by 17 basket/ acre, and furthermore expenditure generated 53,250 Kyats / acre in cost reduction. Considering the average of yield increase in 12 TSs, good practice generated an increase of 12 basket / acre. Supposing the sales price is 3,200 Kyats / basket, it generates 38,400 Kyats / acre benefit. On the other hand, Cost estimation of good practice is lower than conventional one as 17,710 Kyats / acre balance. It is hopefully expected that good practice generates 56,110 Kyats / acre net profit (38,400+17,710).

5.4.2 Trainings on 08A2 Organic Farming Promotion Pilot Project

Under pilot project "08A2. Organic farming promotion programme (with indigenous microorganism: IMO), 2 training courses were administered; one in late July and the other in late October to early November. The first one was the session proper and the latter was for follow-up and refresher. In these training courses, 44 MAS staffs were trained. Through these training courses, various techniques related to indigenous microorganism utilization as well as paddy improvement were transferred to the trainees.

1) Contents of the Organic Farming Training

This project aimed at making farmers get used to applying organic manure prepared by using indigenous microorganism (IMO) instead of chemical fertilizers so that farming cost can be reduced and soil fertilizer will be improved in the long run. In addition, this is aimed at introducing modern and scientific agricultural technologies such as nursery preparation by Dapog method, early and sparse

transplanting, application of rice husk charcoal, application of rice husk vinegar as bio-insecticide, pesticide and foliar fertilizer, etc. to farmers to fully understand the method of 'low cost, good yield'. Trying to offer these practical training modules to the participants so that they can acquire ability to demonstrate what they have learnt immediately after the training course, modules were provided in a way giving equal weight to theoretical lectures and field practices. In addition, trainees were oriented to formulate their action plans for disseminating the fruits of training to their extension areas on the 4th day of the training, and on the 5th day they went on a study tour to the villages in the vicinity of OISCA where OISCA deploys its technical extension activities.

Participants are now mixing up all the soils collected for the preparation of extracting IMO.

2) Knowledge Enhanced

Prior to the training, a few questions were given to the participants, which are about the definition of organic farming they were thinking or sketched in their image, on organic farming they taught to others in the past, or on any practice of organic farming that was observed in their jurisdictions. After the completion of the training, a question was again posed to the participants as to their concept on organic farming, by asking what the key point of organic farming that they have learned throughout the training. Table 5.4.4 summarizes their replies. In the pre-training test, many of the participants mentioned that chemical fertilizers were not applied in organic farming but organic fertilizers like manure were applied, and that organic farming was useful for improving arable soils.

From these points of view, similar replies were obtained in the post-training test, but in the pre-training test, nothing mentioned about the reasons why organic farming was worthwhile to improve arable soils, and contents of the former reply had been abstractive. On the other hand, in the post-training test conducted after the completion of the training, more replies mentioned why organic farming was useful in their field even though contents of the reply were similar between these two tests.

For example, the reply referring to the mitigation of drought damages by retaining moisture in soils was more observed in the post-training test of both the first and the second batches. From such concrete way of reply, the participants seem to have realized that the application of organic farming has allowed to improve soil physical property, eventually leading to possibility of running more robust farming against risk of drought etc. Likewise, comparing description in the pre-training stage with that in post-training stage, way of expression in the reply was diversified in the latter, implying that participant's concept /image on organic farming has been developed not only deeper but also wider in their spectrum of concept.

Table 5.4.4 View of organic farming acquired through the training, (Post-training)

What organic farming means
Enrich soil fertility（with low-cost farming）
Alleviate damaging effect of drought through increased retention of soil water
Lessen environment pollution by dispensing doze of chemical fertilizers
Enable sustainable soil conservation
Enable to ease the damages of pests/ crop diseases
Allow soil improvement on a larger time span owing to application of microorganisms and organic matter

Source: JICA Study Team

3) Targets, Accomplishments, and Lesson learnt on 2008 Improved Paddy Promotion

The photo is an example of the extension material that Kyaukse TS actually uses in its extension sites. A method of providing paddy husk charcoal with kinds of material and their required quantities is described on a large vinyl sheet with oil colored pens. The reason why they used large vinyl sheets lies in its various advantage, as it is visible to a multitude of farmers, it is usable even when it gets wet and it is easily portable by folding.

An Extension Material made at Kyaukse TS on a plastic paper, which shows how to make paddy husk charcoal.

Table 5.4.5 shows the number of villages and their villagers as the targets of extension / demonstration activities on organic farming promotion. The table gives total 340 villages were covered by extension activities, out of which there were demonstrations in 169 villages, which account at 117 % accomplishment and 169 % accomplishment against the targets respectively. Concerning the extended techniques were actually put into practice, the number of villages was 136, and the number of villagers was total net 610.

Amongst the activities villagers actually tried, seed selection surpasses by far, showing as many as 425 villagers had actually tried the technology. Aside from the seed selection, it can be known there were many villagers in such activities as IMO Bokashi making and IMO seed preparation. This may be because those technologies do not need expensive materials.

Table 5.4.5 Number of Villages & Villagers Tried against Target of Extension / Demonstration (Summer Paddy)

Activity		Target (Nr. of Villages)		Accomplishment (Nr. of Villages)		Accomplishment (%)		Of which how many villagers actually tried (After Demo)	
		Ext.	+Demo.	Ext.	+Demo.	Ext.	+Demo.	Nr. of Villages	Nr. of Villagers
1	Making IMO Bokashi compost	264	67	314	121	119	181	52	194
2	IMO seed preparation	264	96	318	135	120	141	43	144
3	Paddy husk charcoal	263	93	290	112	110	120	26	49
4	Paddy husk vinegar	187	26	231	25	124	96	4	4
5	Dapog method	214	51	244	56	114	110	10	36
6	Early & sparse transplanting	219	42	239	34	109	81	9	35
7	Organic Farm establishment	141	15	101	28	72	187	5	6
8	Foliar fertilizer by local products	70	13	93	31	133	238	11	27
9	Seed selection	126	20	100	49	79	245	34	425
Nr. of Villages (Net)		291	124	340	169	117	136	136	610

Source: JICA Study Team

Figure 5.4.2 shows cost incurred by *Dapog* nursery as compared to conventional nursery preparation. Average cost arrives at 25,043 Kyats/acre by *Dapog* method, and at 35,000 Kyats/acre by conventional method. This indicates *Dapog* can reduce the nursery preparation cost by about 10,000 Kyats/ac. Figure 5.4.2 shows necessary cost incurred in main paddy field as well. Including

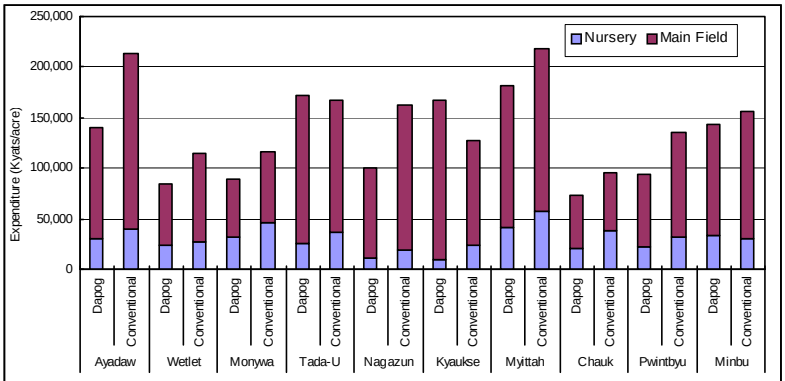


Figure 5.4.2 Cost Comparison b/t Dapog and Conventional

this cost for main field, the average cost arrives at 124,618 Kyats/acre for *Dapog* and 150,725 Kyats/acre for conventional method, former of which is reduced by about 26,000 Kyats/acre. However, the costs in Tada-U TS and Kyaukse TS are not the case, in that cost required for improved ones was higher especially in the main field. This is because harrowing costing the farmer as much as 30,000 Kyats/acre took place in the case of Kyaukse TS as early transplanting need more evenly leveled field. For Tada-U, compound fertilizer of 240,000 Kyats was applied to the improved one but no fertilizer to the conventional field.

Dapog enables lightening of nursery and also make it very simple and compact, thereby reducing seed amount required. In conventional nursery, farmers usually use 2 baskets of seeds per acre while only 0.68 baskets are required under Dapog method. This reduction of seeds led to a reduction of nursery cost by about 10,000 Kyats per acre. Reduction including the ones in main field reached as much as 26,000 Kyats per acre as average. Roots can hardly be damaged under Dapog method, and therefore growing right after the transplanting in the main field must be better than that of conventional method. This practice may realize 2 advantages as 1) reduction of necessary cost, and 2) increasing harvest.

5.4.3 Livestock Improvement and Extension Pilot Project in FY2008 (08L1,L2,L3)

2 sets of training courses were administered; one in mid July and the other in mid October 2008. In these training courses, 33 LBVD staffs were trained. The first one consisted of the training main part and the latter was for follow-up and refresher. These trainings were carried out as part of the pilot projects of 08L3 Livestock Feeding Improvement Programme in parallel with 08L1 Pro-poor Oriented Goat Revolving Programme and 08L2 Pro-poor Oriented Piggery Revolving Programme. Through these training courses, various techniques related to livestock development in the CDZ were transferred to the trainees. In addition, final results of extension and demonstration conducted by TS LBVD officers were confirmed in the workshop held in February 2009.

1) Knowledge Enhanced

In the first training, taking into consideration various experiences of the participants who are ranging from bachelor of veterinary science, veterinary assistant (diploma), and auxiliary staff, pre-test was also asked to the participants to know their knowledge on livestock. This test was also done on the final day of the training course as the post-test in order to compare the effect of this training. With a view to grasping change of knowledge levels on animal husbandry before and after the training, tests on the basic items concerning livestock were conducted. The total rate of right answer was improved from the state of prior training; 40% to that of post training; 74%. Their improved intelligence was assumed to originate from such subjects as feeds, animal nutrition, general livestock management guideline, marketing etc because most of the participants were veterinarians.

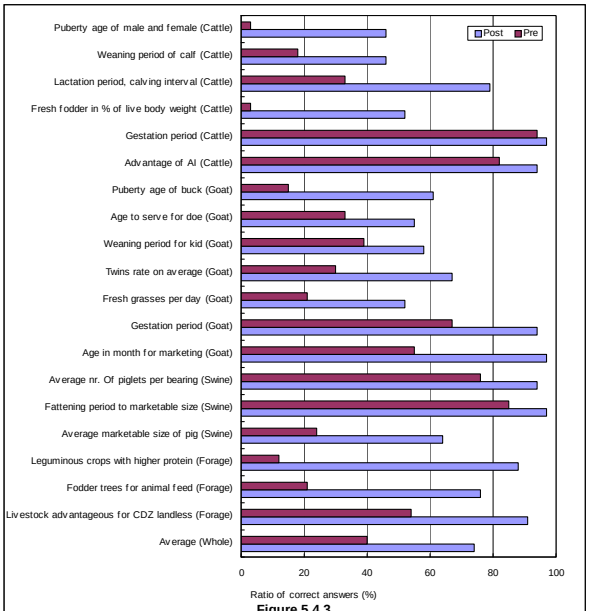


Figure 5.4.3
Result of knowledge identification tests at pre-training and post-training stages

2) UMMB（Urea Molasses Mineral Block）making and Study Tour

Despite its effectiveness for improving nourishment of ruminants, UMMB is not popularly used,

though some LBVD Officers know about it. However, some participants were not so willing to make it continuously for the reasons that goat/sheep don't prefer licking UMMB, villagers cannot afford to make UMMB due to lack of money, and UMMB making bothers for them etc. JICA Study Team considers that UMMB is worthy to be expanded in CDZ to improve productivity of ruminants because CDZ is the center of raising ruminants in Myanmar.


Practice of making UMMB

All the participants joined a practical training of making UMMB by weighing raw materials, mixing, and molding. Finally more than 30 UMMBs were made and kept for drying for about one week to make it harder enough to hang up in goat shed for licking.

In the day-4, participants visited Ma Gyi Sauk village in Ayadaw TS where goat and sheep revoloving pilot project has been implementing. Ma Gyi Sauk village was selected because of their unique management system established by the beneficiaries themselves. Since all the beneficiaries are the poor, they decided to keep 25 goats per group of 5 memebrs in a goat house collectively constructed as well as daily grazing. Participants could understand deeply the concept of the goat and sheep pilot project for the poor by visiting, looking at the site, which will bring them good information and experience for promoting pilot project under FY 2008/09.

3) Results of extension activities and output in 2008/09

The second training, Follow up and Refresher Training, was carried out in October 2008 for 3 days. For LBVD TS officers who have worked mainly for providing veterinary services so far, this kind of pilot projects implementing as package project of provision of ruminants and pigs along with extension and demonstration to help the poor is considered to be the first experience. In FY 2008, LBVD officers and representatives of beneficiaries went to livestock market nearby to purchase quality goats and pigs for 08L1 Goat Revolving pilot project and 08L2 Piggery revolving pilot project.

As to the extension manual that TS extension staff of LBVD prepared themselves, it was identified that it was done in 2 out of 6 TSs. As to its contents, a manual made in Pwintbyu TS provided two pamphlets on piggery and goat rearing, moreover, in Ayadaw TS the explanatory note was provided on how to prepare UMMB. However, judging from the fact that manual has so far been provided only in 2 TSs out of 6 TSs, provision of manual for training/ demonstration by extension staff of LBVD has not accomplished sufficiently to date.

As compared to FY 2007/08 project, TS LBVD officers have been involved in the project in FY 2008/09. Learned from FY 2007/08 project, both beneficiaries and extension staff of LBVD were involved in purchase of stock and as a result, better quality stock goats than initially expected could be procured. Also, the fact that inhabitants in a village adjacent to the target one built imitated model goat housing with lifted floor supports the pride of TS extension staff of LBVD in performing their extension services. Likewise, much involvement in project activity and such diffusion of copied goat housing strengthens their confidence of enabling to make revolving system well function

TS LBVD officers also reported that they could purchase and deliver more heads of stock goats within the budgetary appropriation through preliminary market survey and negotiations prior to purchase of stock goats and piglets, they could deliver goats and piglets for improving their livelihood, and in Ma Gyi Sauk village offspring from 1st generation to 2nd generation beneficiaries, which are considered to be fruitful results for them. In this context, what they reported includes that villagers built their housing making use of readily available material within their villages and that villagers made device to

adjust the ingredients of UMMB so that goats can lick it.

Table 5.4.7 shows comparison of the accomplishment of number of villages by Extension and Demonstration by Activity from July 2008 to July 2009 with target number of villages. The number of villages where they had carried out extension is 401, and 294 for demonstration respectively, meaning 158% of accomplishment for the former and 202% for the latter, which are bigger than what JICA Study Team had expected. However, the extension activities on UMMB making, pasture development etc have not been attained their target though extension could attain target by exceeding 100% excluding silage making/silo, probably because of low interesting for villagers and difficulty in getting raw materials for UMMB.

In fact, many villagers participated when TS LBVD officers visited their villages though it was sometimes reported that there was a difficulty of getting people on time. Among the 9 activities, Silage/silo programme shows smallest participants in number probably because they are not familiar with storing fodder crops for the season with scarce fresh grasses including TS LBVD officers.

The table also shows the number of villages and villagers in which villagers actually tried the technologies practically by themselves. The number of villages tried the technologies after training is 251, and number of villagers tried is 1,671 respectively. The activities that many villagers tried are disease control (1,575 villagers), followed by general training on livestock (556 villagers), castration (413 villagers), sanitation (407 villagers), and livestock housing (218 villagers).

Table 5.4.6 Number of Villages and Villagers Actually Tried the Technologies in Livestock Sector

Activity		Target (Nr. of Villages)		Accomplishment (Nr. of Villages)		Accomplishment (Nr. of Participants)		Of which how many villagers actually tried (After Demo)	
		Ext.	+Demo.	Ext.	+Demo.	Ext.	+Demo.	Nr. of Villages	Nr. of Villagers
1	UMMB making	146	16	104	34	3,501	896	16	80
2	Livestock housing	53	15	70	35	2,489	533	19	218
3	Urea treated straw	128	18	68	43	2,239	541	6	0
4	Castration	0	125	189	188	1,208	1,034	108	413
5	Disease control	148	80	373	275	8,761	7,789	242	1,585
6	Pasture development	136	15	120	28	1,815	525	8	50
7	Sanitation	96	26	126	48	2,932	1,637	135	407
8	General training on livestock	165	0	273	15	4,369	348	44	556
9	Silage /silo	84	16	10	14	218	246	0	0
Nr. of Villages (Net)		253	145	401	294	10,038	7,789	251	1,671

Source: JICA Study Team

5.5 08A8 New Varieties Adaptability Trial

There are two kinds of soil. They are (1) red brown savanna soil and (2) compact soil. In the rainy season, rainy sesame, rainy season peanut and pigeon pea are mainly cultivated and places where water is available, rainy season paddy is cultivated. In winter, chickpea is mostly cultivated and other crops such as wheat, onion, winter sesame + dolichos lablab and beans and pulses (true pea, lentil pea, lima bean, butter bean) are also cultivated. For places where irrigated water is available, rainy season paddy, chickpea and summer paddy are cultivated.

Under above condition, new varieties seeds, provided from DAR, were cultivated on trial with an objective of finding out new varieties, which are locally adaptable. According to Steering Committee's advice, MOAI and JICA Study Team cultivated new varieties on trial in target villages in CDZ. The variety test was carried out on rainy season crops (pigeon pea, peanut, green gram and sunflower), winter crops (sesame, maize, chickpea, green gram and peanut), and also on cotton as pre-monsoon crop. Under this pilot project of 08A8 New Varieties Adaptability Trial, there are 3 trials by season; namely, rainy crop, winter crop, and pre-monsoon crop (cotton only).

5.5.1 Rainy Cultivation Test Trial

Table 5.5.1 New Varieties for 2008 Rainy Season

Crop	New Variety Name	Nr. of Plot
Pigeon pea	2043 B	8
Groundnut	Sinn Pa De Tha (8)	2
Green gram	Agriculture (1), Yezin (11)	8
Sunflower	Sinn Shwe Kyar (3)	4
Total		22 Plots

In the rainy season, rainy sesame, rainy season peanut and pigeon pea are mainly cultivated and places where water is available, rainy season paddy is cultivated. In winter, chickpea is mostly cultivated and other crops such as wheat, onion, winter sesame + dolichos lablab and beans and pulses (true pea, lentil pea, lima bean, butter bean) are also cultivated. For places where irrigated water is available, rainy season paddy, chickpea and summer paddy are cultivated. The area of demonstration plot is 33' x 33' and it is divided into two parts. A new variety is cultivated in one part in comparison with a local variety in other part. New varieties were purchased from Tut Kone (Nay Pyi Taw) Seed Farm and the names of new varieties are shown in the table 5.5.1.

To be able to find out whether new varieties are locally adaptable or not, systematic data collection was done from the sowing time to harvesting time. The results of new varieties are summarized in the following tables and suggestions are given below:

Pigeon pea new varieties 2043 (B) is produced by Tut Kone Reserach Farm. That new variety is not yet submitted to National Seed Committee (NSC) to get confirmation. When it is cultivated competitively with local variety (late), it is found that 2043 (B) is of medium age and flowerings are the same and there is no difference in yields. It is learnt that trial should be extended to produce grain in CDZ. Especially, it is suitable for Upper Myanmar because it is the variety which is less infested with pests / insects and diseases.

Peanut new variety Sinn Pa De Tha (8) cultivated in 2 target townships got promising yield and there were no signs of leaf spot disease. It is found that farmers like new variety than local variety SP 121 because the sizes of pods and grains are bigger than those of SP 121 variety. A suggestion is that if more detailed supervision is given, the yield can be promoted to 'Goal Yield'.

Two new varieties of green gram (Agriculture - 1 and Yezin - 11) are much more pest/ insect-resistant and disease-resistant than Yezin (4). The yield of Yezin (11) is higher and promising while Agriculture (1) has not performed well. For Yezin (11), it has an advantage of labor saving because the variety bears seeds in a certain period while the local one has longer time of bearing seeds. In CDZ, Yezin (11) and Yezin (12), currently cultivated ones, should be cultivated on an extended scale. Farmers like these two varieties because the plants are short, more branches appear, there are more mature seeds and they can be harvested earlier. They are free from mosaic disease.

Sunflower new variety Sinn Shwe Kyar (3) produces higher yield than local variety. The size of flower is of medium size and the quantity of grains is good. It should be cultivated on an extended scale in places where sunflower is cultivated. Its age is short and it is suitable for places where water is scarce. According to the test trial, new varieties such as peanut (Sinn Pa De Tha (8)), green gram (Yezin 11), sunflower (Sinn Shwe Kyar (3)) can probably give better yield as compared to conventionally cultivated local varieties.

Table 5.5.2 Summary of the Result for the New Varieties of Rainy Season Crops

No	Crop	Variety		Period		Plant height		Pods/Plant		Seed/pod		Yield (basket)	
		New	Old	New	Old	New	Old	New	Old	New	Old	Old	New
1	Pigeon pea	2043(B)	Local	155	155	4' 5"	5' 4"	86	93	3.2	3.3	11.7	12.3
2	Groundnut	Simpadethar	SP 121	96	100	18"	18"	11	14	2	1.6	49.3	62.3
3	Greengram	Agri (1)	Local	83	87	20"	25"	12	18	10	9	10.2	10.5
		Yezin (11)	Yezin (12)	79	74	20"	18"	14	14	11	11	14.0	13.6
4	Sunflower	Sinshwekyar	Sanfola	90	95	115	110	-	-	357	287	16.9	26.0

Source: JICA Study Team

5.5.2 Winter Crops Test Trial

Following table summarizes the rainy season crops cultivated on trial basis in FY 2008/09 and also the TS and villages where the crops were tried.The area of demonstration plot is 33' x 33' same as the trial for rainy season crops, and it is divided into two parts. A new variety is cultivated in one part in comparison with a local variety in other part. New varieties were purchased from Tut Kone (Nay Pyi Taw) Seed Farm and the names of new varieties are shown in the table right.

Table 5.5.3 New Varieties for 2008 Winter Crops

Crop	New Variety Name	Nr. of Plot
Sesame	Sinn (3)	2
Groundnut	Magway (15)	18
Maize	Yezin (3), Yezin (4), Yezin (5)	4
Green gram	Yezin (11)	3
Chickpea	Yezin (6)	3
Sunflower	Yezin (1)	3
Total		35 Plots

Yields per acre of local varieties are summarized below in comparison with new varieties derived from Department of Agricultural Research, which were cultivated in (6) target townships in CDZ in winter of FY 2008/09. Suggestions are as follows:

For winter sesame, it is found that Sinn (3) new variety of DAR (Yezin) is better than local variety in yield, and it is a locally adaptable variety. Its yield and market situation is balanced and so sesame cultivation and production can become higher than before. If destruction of green sand flies which cause sesame phyllody disease can be protected in advance, the yield will furthermore increase.

Concerning winter peanut (groundnut), Magway (15) marked higher yield than SP 121 local variety but lower than another local variety of Sinn Pa De Tha (11). It is learnt that farmers like Magway (15), but it is necessary to be able to cultivate in time. In the dry zone, after sesame, peanut is the second important crop and so technologies for increasing yield per acre such as applying of lime/ rock phosphate, preventive measures for disease control and applying of boron and molybdenum of trace elements should be practiced.

When yields of new varieties and local varieties on maize are compared, it is found that yields of new varieties (average) are higher than those of local varieties. Farmers from Tada-U township have never seen maize and they have never experienced of cultivating it. So, sowing time was late and land preparation could not be done completely. As a result, it is found that the yield of Tada-U was the lowest. Farmers from Ayardaw township had no experience of maize cultivation either. For Pwintbyu township, there are only a few farmers who so far cultivated maize. Most farmers cultivate yellow maize variety of 'Ya (upland)' region. They also were lack of experience on maize cultivation. For these reasons, maize cultivation in the dry zone should be tried again, though, it is still necessary to arrange extension work and demonstration work for farmers.

For green gram, Yezin (11) variety was appreciated by farmers. It is a locally adaptable variety because its yield was good. It has a market and it is labor saving because the variety bears seeds in a shorter period than local variety. Therefore, it should be cultivated on an extended scale in the dry zone. The reason why its yield was low in Chauk TS is that Yezin (11) is not suitable to cultivate as winter crops, just suitable for monsoon crop, because the yield of green gram was 12 baskets per acre.

Concerning chickpea, although yield is not much different between local and new variety, the new variety (Yezin 6) was found promising because local varieties are not strong enough to resist fungus disease and stem-boring flies. Most of chickpea plants are easily destroyed by them, it is found. In the condition of bearing peas, Yezin (6) seemed to be better than V2 variety (local variety) at first. But Yezin (6) variety had a longer life period and so its growth stages are slow. It bears peas only when it is high. It is said that some farmers do not like it very much. However, yield per acre and price per basket are higher than those of V2 variety. So, requests for Yezin (6) were received. A remarkable point from Ar La Ka Pa village in Myinmu TS was that farmers got high yield of chickpea

because they could irrigate the plants at the time of pod-setting.

This sunflower new variety Yezin (1) should be cultivated in the dry zone. By cultivating this variety in winter/ monsoon crop either as inter-cropping crop or as main crop, it can serve as trap-plant for pests/ insects. Besides, it is a locally adaptable variety. But in Chauk TS, the yield was low because there was a mistake in selecting demonstration plot, e.g. very sandy soils with less moisture holding capacities.

Table 5.5.4 Summary of the Result for the New Varieties of Rainy Season Crops

No	Crop	Variety		Period		Plant height		Pods/Plant		Seed/pod		Yield (basket)	
		New	Old	New	Old	New	Old	New	Old	New	Old	Old	New
1.	Sesame	Sinn 3	Local	90	63	85cm	80cm	120	90	68	-	8.50	15.50
2.	Groundnut	Magway 15	Local	115	121	40 cm	40 cm	16	15	2-1	1-2	40.91	41.54
3.	Maize	Yezin 3,4,5	Local	86	86	200 cm	200 cm	Nil	Nil	Nil	Nil	45.51	50.15
4.	Green gram	Yezin 11	Local	67	67	38 cm	35 cm	14	14	11	11	10.88	13.03
5.	Chickpea	Yezin 6	Local	94	78	30 cm	30 cm	35	22	1-2	1-2	15.17	16.48
6.	Sunflower	Yezin 1	Local	102	102	115 cm	110 cm	Nil	Nil	350	280	14.12	17.47

Source: JICA Study Team

5.5.3 Cotton (pre-monsoon: summer)

Table 5.5.5 New Varieties for Winter Pre-monsoon Cotton

Variety Name	Nr. of Plot	Yield per acre
Ngwe Chi (6) (New)	2	2,502 kg / acre
Ka Mar (New)	2	593 kg / acre
Total		7 Plots

Depending on the time, there are 3 seasonal periods of cotton cultivation such as pre-monsoon (summer), mid-monsoon and late-monsoon. In connection with pre-monsoon cotton cultivation, Myanma Cotton Enterprise has been distributing Ngwe Chi (6) cotton variety to farmers. And there is another cotton variety imported from China by private traders named 'Ka Mar' (hybrid). The pilot project has tried the cultivation of 'Ngwe Chi (6)' cotton variety on trial and the cultivation of 'Ka Mar' (hybrid) cotton variety on trial in comparison with each other. Besides, the project also studied the situation of 'Ma Hlaing (5/6)', local variety, which was previously distributed by Myanma Cotton Enterprise.

When these two varieties were compared, we could see much difference in yield, e.g. 2,501 kg/ac for Ngwe Chi (6) and 593 kg/ac for Ka Mar. The reason was Ngwe Chi (6) variety is 'indeterminate type' and it produces many more branches after cotton has been picked once and irrigation had been done. So, the number of cotton buds increases and so does the yield. On the contrary, for Ka Mar (hybrid) variety, it is determinate type and flowering stage is only 'once'. Although the time of picking cotton is short and easy, it cannot compete with Ngwe Chi (6) in number of flowers and in yield per acre. Not only studying on demonstration plots, but also studying on farmers' plots on which Ngwe Chi (6) were cultivated, it was learnt that Ngwe Chi (6) variety is more disease-resistant than other cotton varieties.

When cost and income of two varieties were compared in Table 5.5.6, although yield per acre of Ngwe Chi (6) variety from demonstration plot was over 1500 viss, the cost was increased by about half as compared to Ka Mar (hybrid) variety which produces 400 viss per acre at maximum. However, since there is big difference in the yield, still net profit for Ngwe Chi (6) variety surpasses that of Ka Mar (hybrid) variety, e.g. 1,127,400 Kyats/ac for Ngwe Chi (6) against only 155,000 Kyats/ac for Ka Mar variety.

Table 5.5.6 also shows the net profit of Ngwe Chi (6) under the yield of 400 viss unlike 1,500 viss. This is because some farmers may not be able to afford to apply chemical fertilizer as was in the demonstration farm. The net profit is now 223,500 Kyats/ac which is still higher than that of Ka Mar (hybrid) variety. Therefore, farmers are more interested in Ngwe Chi (6) variety than Ka Mar China variety because its yield is stable and the higher yield can be enjoyed if it is well-looked after.

Table 5.5.6 Margin Analysis for 2 Cotton Varieties at Different Yields

Sr.	Particular	Ngwe Chi (6) Yield per acre: (1500) viss	Ka Mar (hybrid) yield per acre: (400) viss	Ngwe Chi (6) Yield per acre: (400) viss
1.	Land preparation	32,500	32,500	32,500
2.	Natural compost	20,000	20,000	10,000
3.	Chemical fertilizer	139,000	91,000	38,000
4.	Pesticide/ Insecticide	38,600	35,500	30,500
5.	Plant Protection (labour for spraying)	42,500	35,500	35,500
6.	Picking cotton	100,000	30,000	30,000
	Cost total, Kyats/ac	372,600	244,500	176,500
	Income per acre, Kyats/ac	1,500,000	400,000	400,000
	Net profit per acre, Kyats/ac	1,127,400	155,000	223,500

Source: JICA Study Team (based on MAS data)

In connection with study on Ma Hlaing 5/6 variety, a local variety cultivated in Ayardaw township, it still produces about (100) viss yield per acre. It was learnt that local variety was not as much pest-resistant as Ngwe Chi (6) and so the costs of pesticide and fertilizer were higher than Ngwe Chi (6) of 400 viss yield per acre. As a result, net profit became low in cultivating local variety.

5.6 Monitoring of the Video Promotion

5.6.1 Monitoring Methodology

For monitoring, follow-up forms, in which the number of video-show, the number of villagers who watched video, the number of villagers who imitated a certain activity from the stories due to agitation of characters and the number of villagers who copied video-stories were asked, were given to Village PDC chairmen requesting them to fill out the forms. Those forms were to be filled out beginning from April 2009 and they were to be collected in August and December in order to carry out follow-up survey, for example, who imitated which activity after having seen the video-stories. A final evaluation of the video monitoring is therefore as at December 2010.

Why such a thing happened was that township offices, foreseeing there would be villagers who would copy the video-stories, copied follow-up sheets for more number. That's why the numbers of collection were greater than the number of delivery. However, in 7 townships there were uncollected follow-up sheets in December 2010.

5.6.2 Extension Results of Video Promotion

1) How many times of video-show

Table 5.6.1 shows how many times of video-show for agriculture, livestock, and cottage industry stories have been done in respective townships as of December 2009. As per the table, from April to December 2009, agricultural story has been shown for 5,414 times, livestock story for 4,539 times, and cottage industry story for 4,524 respectively in 13 townships. In July, all stories were shown more times than those in other months. To be exact, 1,561 times for agricultural story, 1,454 times for livestock story, 1,452 times for cottage industry story in July 2009. From April to November the number of video-shows become fewer and fewer. Among those 3 stories, it is learnt that agricultural story were shown more times than the rest two.

Through follow-up survey, it is learnt that video-stories were shown at videos shops as well as teashops in villages. Video discs were usually kept by village PDC chairmen and they targeted the video shops, very often seen in almost all villages in the CDZ, and teashops with video-set as the places for the promotion. Moreover, since village PDC chairmen kept the discs, the stories could be shown to a mass of villagers. For example, in Ayadaw township, a village PDC chairman took the disc with him to the place where Fire Brigade members and villagers used to get together and the stories were shown.

Table 5.6.1 Number of Video-show

Particular	How many times have video show been held in the video house?									
	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Agricultural VIDEO	183	670	1,484	1,561	342	337	300	260	277	5,414
Livestock VIDEO	183	589	1,333	1,454	236	230	188	157	169	4,539
Cottage VIDEO	184	590	1,317	1,452	236	233	187	157	168	4,524

Source: JICA Study Team

2) Video Audience

Table 5.6.2 shows the number of villagers (above 10 years old) who have seen the video-stories by township. 71,650 villagers watched agricultural story, 59,312 villagers watched livestock story, and 59,120 villagers watched cottage industry respectively. Total villagers were 190,082 though it is estimated many of them must have were over-counted among the 3 sectors (meaning that one person saw all the 3 stories since the video time is about 20 minutes each).

Average population (above 18 years) of a township in CDZ is 147,000 according to the relevant township report 2004. If calculated according to that average, there will be 1,764,000 people in 12 townships (excluding Aunglan TS). It can also be calculated that about 10% of total population (above 18 years) have seen video-stories as aggregated percentage, or about 4% when taking 71,650 persons who have seen only agriculture video thereby who are supposed to have seen other 2 sectors videos. In other words, it can be assumed at least about 4 percent of the grown-up population in 12 townships must have seen at least one of the video-stories.

Table 5.6.2 Number of Villagers (above 10 years) who have seen video-stories

Particular	How many villagers have seen the video show?									
	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Agricultural VIDEO	2,062	12,794	22,037	20,665	2,955	3,119	2,724	2,629	2,665	71,650
Livestock VIDEO	2,025	11,357	19,186	19,275	1,587	1,690	1,327	1,461	1,404	59,312
Cottage VIDEO	2,039	11,254	19,041	19,298	1,587	1,701	1,331	1,465	1,404	59,120

Source: JICA Study Team

3) Villagers' activities after having seen video-stories

In Table 5.6.3, in agriculture sector, selection of seeds by soaking in salt water was carried out by most of the farmers and there were altogether 1,602 villagers who followed that activity. Next is reduced area wet-bed nursery. There were 23 activities in agriculture sector and 3,530 villagers in 12 townships tried practically those activities. An extension officer said that the promotion activity on improved paddy cultivation technology and activities shown in video had multiple-effect coupled with MAS extension activities carried out under agriculture related pilot project. So he assumed there were many villagers who followed different activities.

In livestock sector, 14 activities including vaccination were followed by 226 villagers in 12 townships. Among all activities, vaccination was mostly followed and there were altogether 77 villagers in 12 townships. Out of 14 activities in livestock sector, 8 were connected with "raising" or "breeding". Therefore, villagers took interest in livestock raising & breeding after having seen video-story for livestock sector.

In cottage industry sector, villagers carried out 6 activities such as knitting, sewing, etc. Cottage industry activities require enough capital for villagers to set up of their own. In other words, the number of villagers reported in knitting and sewing activities can be assumed that they are not owners but workers. According to a report by TS officers, some of them who have watched the video went to the machine owner and started being engaged in the industry as workers but not as owners yet.

Table 5.6.3 Number of villagers and their activities (Agriculture sector)

Activities	Number of Villagers Actually Tried Agricultural Activities												
	Tada-U	Ngazun	Kyaukse	Myittha	Myinmu	Ayadaw	Monywa	Wetlet	Chauk	Pwintbyu	Salin	Minbu	Total
Selection of seeds by soaking in salt water		26		73	161	8	79	7		504	188	556	1,602
Reduced area wet-bed nursery	10		19	406	46			17		547		43	1,088
Selection of main panicles and sowing them		42	5			3				329	665		1,044
Bokashi compost making and application plus chemical fertilizer											1,008		1,008
Sifting seeds with a sieve										799			799
Drying seeds under the sun										694			694
IMO Bokashi compost making and application			2	406		3	13	99	39				562
Harvesting with less loss and waste										515			515
Early and sparse transplanting			6	406				42					454
Weeding										430			430
Systematic application of chimical fertilizer	274				1					110			385
Early Transplanting	5		35		39					30	67	161	337
Bokashi compost making and application	10		1						10		57	206	284
Removing different variety										248			248
Systematic land preparation					10					134			144
EM/ IMO Bokashi compost making and application			59										59
Water Management										59			59
Rice husk vinegar making and application				17								25	42
Getting germinated seeds		26								15			41
Rice husk charcoal making and application				22									22
Dapog method				9				3					12
Systematic soil preparation					5								5
Shallow transplanting					4								4
Max Nr. of Villagers	274	42	59	406	161	8	79	99	39	799	1,008	556	3,530

Source: JICA Study Team

Table 5.6.4 Number of villagers and their activities (Livestock sector)

Activities	Number of Villagers Actually Tried Livestock Activities												
	Tada-U	Ngazun	Kyaukse	Myittha	Myinmu	Ayadaw	Monywa	Wetlet	Chauk	Pwintbyu	Salin	Minbu	Total
Vaccination						4		3			70		77
Goat raising					65							9	74
Cow raising					47								47
Chicken raising					44								44
Sheep raising					41								41
Goat raising (with raised-floor)								4			1	33	38
Pig raising					23								23
Goat raising (entrustment)	33					7					8		48
Urea Molasses Mineral Block									12				12
Chicken raising (for eggs)					10								10
Fish breeding					4								4
Good breed												3	3
Disinfection (Goat housing)			2										2
Duck raising					1								1
Disease control (Sheep/ Goat)								1					1
Max Nr. of Villagers	33	0	2	0	65	7	0	4	12	0	70	33	226

Source: JICA Study Team

Table 5.6.5 Number of villagers and their activities (Cottage industry sector)

Activities	Number of Villagers Actually Tried Cottage Industry Activities												
	Tada-U	Ngazun	Kyaukse	Myittha	Myinmu	Ayadaw	Monywa	Wetlet	Chauk	Pwintbyu	Salin	Minbu	Total
Weaving					87								87
Sewing				51									51
Making baskets and chairs					39								39
Making hats					3								3
Weaving bamboo-matting					3								3
Making hand-fans					2								2
Max Nr. of Villagers	0	0	0	51	87	0	0	0	0	0	0	0	138

Source: JICA Study Team

4) Expansion due to video copy

Table 5.6.6 shows the number of villagers who copied video-stories. Twenty-three villagers in Myittha township, 16 villagers in Ayadaw township, and 29 villagers in Minbu township - total 68 villagers in the 12 townships – got video-stories copied. It is learnt that villagers in Ayardaw township had to go to town where there are computer shops to get DVD copied. The number of villagers who followed the activities after having seen video-stories and the number of villagers who copied video-stories were quite different, it is learnt. It is assumed that there are no computer shops (where DVD can be copied) in villages and if they go to town to get DVD copied, the charge is at least 2,000 Kyats per disc and the charge is considerably high for villagers.

Table 5.6.6 Number of villagers who got DVD copied

Particular	How many villagers have copied the video-stories?									
	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Mandalay	0	0	12	11	0	0		0	0	23
Sagaing	0	3	11	2	0	0	0	0	0	16
Magway	0	0	21	8	0	0	0	0	0	29
Total	0	3	44	21	0	0	0	0	0	68

Source: JICA Study Team

CHAPTER 6 FINDINGS, LESSONS AND ISSUES IDENTIFIED THROUGH THE STUDY

This Chapter discusses findings, lessons and issues identified not only through pilot project implementation but also through the Study itself. Chapter 6.1 presents findings and lessons learnt mainly from the pilot project implementation, which are somewhat generalized. This chapter is meant to give suggestions in case similar projects are to be implemented in future. Chapter 6.2 discusses issues, some of which are pertinent to Myanmar context, and the Chapter 6.3 tries to present suggestions in promoting development in rural areas.

6.1 Findings and Lessons from Pilot Project Implementation

In this chapter, impact to the poor, notable matters to report, lessons learnt in the Pilot Project commenced in 2007 and 2008 etc. are recapitulated based on the results of monitoring up till February 2010. As regards evaluation of impact and lessons learnt, they will be described intending to generalize the results so that they can also be referred to in other project sites. In this connection, data collected from mid 2008 to January 2010 are used for the recapitulation.

6.1.1 Mushroom Culture Targeted to The Landless

Mushroom culture was introduced in total 4 villages in FY 2007/08 and FY 2008/09 targeting landless stratum. A series of training was provided for 20 villagers each in these four villages, out of these 5 - trainees trained in Legaing Village [1] and 13 beneficiary villagers who learned the culture as a second generation from these trainees continue the culture. Their benefits depend on their number of beds and yields, and a beneficiary woman has been found who cleared her debts by her benefit from the culture, as referred to the right frame. The following will examine how much impact mushroom culture gives to the original amount of income earned by the landless referring to their number of beds, yield, required input expenses, amount of sale etc.

No debt needed by mushroom culture:

There is a female member of mushroom culture in Legaing Village who is engaged in provision of traditional dancing team. Wherever pagoda festivals are held she earns income by visiting the places on business with a dancing team. During rainy season, no Pagoda festival is held, so her dancing business comes to an end. She recalls her previous life before encountering mushroom culture; her life cycle was a repetition of making debts (around 50,000Kyats) and redeeming them during dry season.

She is culturing mushroom on 3 beds simultaneously, and she was growing her third culture when we visited in August 2008. In the first culture, she invested 10,000Kyats and harvested 6 viss (about 10kg) on average per bed, or 18viss (about 30kg) from the total 3 beds. In the second culture, she again invested the same amount, 10,000Kyats and harvested on average 8～9 viss/ bed, or 26 viss (about 43kg) from 3 beds in total. She sold the harvested mushroom at a unit price 1,800 Kyats/ viss, obtaining a gross return amounting to 79,200Kyats, or a net profit 59,200Kyats. This amount of net profit surpasses that of her cumulative debt of around 50,000Kyats growing during rainy seasons. Namely, a new cash income source she grasped, mushroom culture during rainy seasons or off-season of her business made her capable of getting rid of her accumulated debts.

Table 6.1.1 Achieved performance of mushroom culture

Item	Range	Average
Number of beds per culture	1-6	3.0
Average yield, viss/bed	3.8-8.8	6.8
Cumulative total of culture beds	3-150	28
Estimated number of beds per year	15-180	51 (29)
Farm-gate price, Kyats/viss	2000	2000
Vacant off-season period	Nov.- Feb.	Winter
Cost for culture material, Kyats	6-9,000	7,000

The result of an interview survey collected from 15 respondents carried out in late October 2008 is referred to in this examination (9 out of 15 were classified as the landless, 2 others were farm laborers, and 10 out of 15 were women). Those who culture mushroom provided about 3 beds per culture[2], and obtained the mean yield of about 7viss (11.5kg). The first generation started the culture from September 2007, and so far 150 beds in total, of which a member alone cultured 80 beds. The estimated number of beds per member per annum is averaged at

[1] Mushroom culture is not made throughout the year. Usually, during rainy season with lowered atmospheric temperature, and during busy season for cultivation or for business, people do not engage in its culture. By this reason, some difficulty arises from accurately counting of number of people who still continue to culture mushroom at certain period of a year.

[2] A standard size of a culture bed has a rectangular 9 ft × 3 ft.

51 beds, while the mean except for those who culture more than 100 beds per member come to 29 beds per member per annum.

Judging from the performance of the culture mentioned above, a standard model of mushroom culture would have a scale of 30 beds per member per annum at their mean yield level of 7 viss/ bed. Assuming a scale of 3 beds / culture, 8~10 months would be annually required for its culture (harvest of mushroom is started from 2 weeks after inoculation and continued for a week or so after it). In addition to the above standard, another case of smaller scale culture with 2 beds per culture and only 1 bed per culture, and 2 culturing period, i.e., 6 months and 10 months per year, is assumed for convenience of a calculation trials (c.f. the standard case with 3 beds and 10 month/ year). The result of the trial calculation is summarized in the table below:

Table 6.1.2 Result of Estimating Gross Margin and Net Profit of Mushroom Culture

Bed Nr.	Yield, viss/bed	Farm gate price, Kyats	Gross income, Kyats	Unit Material Cost, Kyats/bed	Material Cost, Kyats	Net Income, Kyats	Month	Total Net, Kyats
2	7	2,000	28,000	7,000	14,000	14,000	6	84,000
							10	140,000
3	7	2,000	42,000	7,000	21,000	21,000	6	126,000
							10	210,000

Source：JICA Study Team

Figure 6.1.1 shows a base of average annual income (4,000 Kyats) earned by a landless household (non-farm household) obtained in the baseline survey conducted in 6 target villages of the Pilot Project in 2007, and the additional income by mushroom culture added thereon. Also, at the base of the figure average poverty line in a landless household 1,081,000Kyats is inserted in parallel[3]. Figure 6.1.2 gives a base of annual income earned by a quarter-bottom equivalent households of farm laborers' ones where the poor are clustered (annual income amount earned by a quarter-bottom equivalent households: 441,000Kyats/year) topped up by net profit from mushroom culture. At the base column the poverty line is added as a contrast. From these figures the following might be suggested.

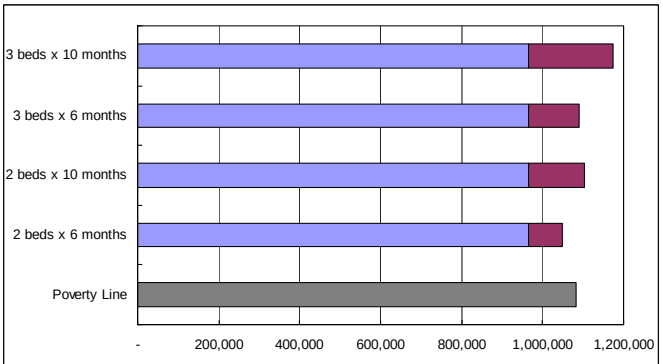


Figure 6.1.1 Net profit and mean household income of non-farm household

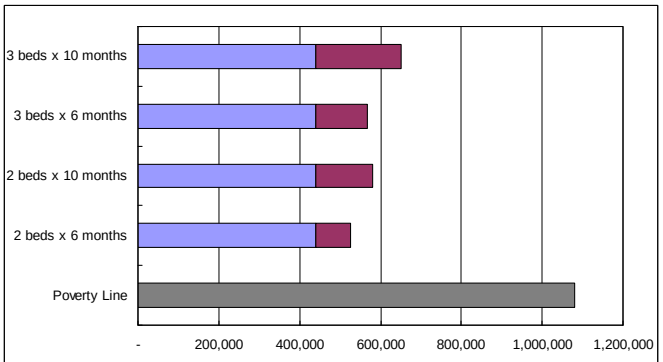


Figure 6.1.2 Net profit and mean HH income of 1/4 bottom equivalent FL HHs

1) As compared with the poverty line at 1,081,000Kyats, the mean annual income for the landless household (non-farm HH) amounts to 964,000Kyats, or lower by 11% than this line. To this amount, if the household culture mushroom at the standard scale observed in Legaing Village (3 beds x 10 months), the net profit amounted at about 210,000 Kyats is added, and then the household income exceeds the poverty line. Also, in the case of culturing mushroom for 6 months/year with 3 beds, or for 10 months/year with 2 beds, the total household income barely clears the line. The net annual

[3] The poverty line is in an original sense the amount estimated as required expenditure for food and non-food consumption, hence the amount is not linearly related to the amount of income. Notwithstanding, as many inhabitants in the Study Area toil for marginal subsistence, or spend indebted life, the comparison is made assuming that major portion of their annual income is appropriated for the consumption shown in the breakdown of the poverty line income.

profit from the culture for 6 months with 2 beds comes to around 84,000 Kyats, but in this case the total annual household income amounts to 1,048,000 Kyats, slightly failing to reach the poverty line.

2) The annual income of a farm laborer's household, equivalent to that of a quarter-bottom household; 441,000Kyats is as low as about 40% of the poverty line. This is why the income never outweighs the poverty line even if annual net profit gained from mushroom culture were added thereto. Nevertheless, when it comes to increment rate of the total annual household income brought about by mushroom culture, the income growth rates under the assumed scales reach 48%, 29%, 32% and 19%, respectively. That is, the culture contributes to around a half of the current annual income in the standard case where mushroom is cultured over 3 beds for 10 months/ year, and in another case where it is cultured over 2 beds for 6 months a year will lead to an increase of annual income by about 20%, thus the mushroom culture can contribute to poverty alleviation.

Lessons so far learnt from mushroom culture relate to both culture and sale. The culturist requires to purchase seed germ (spore) that is produced by seed suppliers located in the outskirt of Mandalay and in Monywa TS of Sagaing Province. The seed germ is not cultured in Magway Division in which Legaing Village is situated, so such provision as phoning the suppliers located in the outskirt of Mandalay asking to deliver the seed strain by nighttime bus is required for the culturists. As to the payment of the seed germ, a bill is drawn in banks or the amount is paid to the bus driver who undertakes delivery service. Anyway, culturists at least need access by telephone.

After obtaining mushroom seed strain, the culturist provides beds to inoculate it and he /she can harvest mushroom from 2 weeks after seed inoculation. One of the advantages of mushroom culture lies in its short embryonic period though its yield greatly varies with such conditions of culture as atmospheric temperature, watering, ventilation etc. Besides, around 7,000Kyats is required for the culturist to start the culture including cost for purchasing seed strain. The character of the culture, i.e., wide variability of the yield and need of initial investment cost may become a hurdle to overcome for the poorest stratum who like to start the culture.

Mushroom brings profit to the culturist when he/she sells it. Among the trainees of mushroom culture training course in 2007 there found women who buy domestic articles at Magway wholesale market and sell them in Legaing Village, or who carry vegetables and sell them in Magway City. They add mushroom to their merchandizes and sell mushroom produced by their comrades. Mushroom culture was also introduced into Ar La Ka Pa Village in 2007, but no one continues any more, except one who has cultured it before the Project introduced it. Among the trainees there was no one who had routine access to marketplaces.

Summarizing what mentioned above, Mushroom culture can provide beneficial income source for the landless because it doesn't require arable land. Yet, it seems to be rather high-hurdled income generating activity for the poorest, farm laborers' households to begin with. Namely, they have to overcome a host of conditions such as access to telephone, procedures for paying inputs, provision of initial cost, yield character with great variability and access to markets etc. This may have resulted in the fact that among 15 culturists who were respondents of an interview survey conducted in Legaing Village in 2008, only 2 households engaged in farm labor service were included. Same reasons may apply to the 2 villages implemented in FY 2008/09 where no one has continued up till early 2010 though some of them had intermittently continued till sometime after the mushroom training.

6.1.2 Revolving Project with Goat Rearing Targeted to the Poor Stratum

Goat rearing project targeted to poor households was implemented in 4 villages in FY2007/08 and 12

villages in FY 2008/09. Stock goats were delivered during September to November 2007 for FY 2007/08 project and August for FY 2008/09 respectively. In both fiscal years, 5 stock head per beneficiary villager were provided, 359 head for FY 2007/08 and 548 head for FY 2008/09 in total.

The state as of February 2010 is briefed in Table 6.1.3. The table shows that the total goat population has increased from original 359 head to 651 head for FY 2007/08 project covering goats under 2nd and 3rd generation beneficiaries, and 548 head to 926 head for FY 2008/09 including goats under 2nd generation beneficiaries as well. Entirely mortality rate of goats of both fiscal years is estimated at 15.8%, which is higher than usual 5 to 10%. Entire kidding rate (= number of kids / number of she-goats) for both fiscal years also estimated at 109.9%, which was improved from 70% in FY 2007/08.

Table 6.1.3 Current Number of Goat Raising (FY 2007/08 + FY 2008/09) as of February 2010

TS	Original Stock Provided	Stocks Died	Kids Born	Handover	Goats Sold	Current Status
Tada U	174	99	304	95	99	280
Ngazun	172	132	261	74	55	246
Myinmu	92	14	135	86	0	213
Ayadaw	182	81	386	177	175	312
Chauk	243	213	445	82	32	443
Pwintbyu	44	15	54	21	0	83
Total	907	554	1,585	535	361	1,577

Source: JICA Study Team, as of February 2010

Taking into account 36 beneficiaries (including both fiscal years) who had stopped goat raising after handover, now 260 (296-36) beneficairies are still continueing raising 1,577 head, 6.1 head per beneficary on average though it is different by village due to moratlity and kiddding rates.

Goat rearing activity has been implemented under two preconditions, i.e., revolving kids and the construction of improved hut with raised floor. The improved hut with raised floor was introduced taking into account of goat's habitude of preferring to stay higher place, but it also enables to keep inside the hut clean, and keep goat herd healthy and hygienic by fostering to drop down goat's dung from slits of floor board made of wooden/bamboo slats to the ground. Such huts were built in these 16 (4+12) villages by beneficiaries.

As to revolving, it is an expansion system under which 5 kids born from the delivered original she-goats are kept up to weaning and handed over to the second-generation beneficiaries, and further repeating this procedure to increase the range of beneficiary. According to this revolving system, as of February 2010, 260 beneficiaries of 1st, 2nd and 3rd generation are raisning goats, thus expansion of the revolving scale is being realized as planned. In addition, beneficiaries who had fulfilled handover have already reached at 101 persons in both fiscal years, though some of them had stopped raising after fulfilling the handover.

Table 6.1.4 Current Number of Goat Raising Beneficiaries (FY2007/08 + FY2008/09) as of February 2010

TS	1st Generation	2nd Generation	3rd Generation	Total	Remarks
Tada U	35	20	0	55	
Ngazun	35	16	0	51	
Myinmu	20	20	0	40	
Ayadaw	35	15	10	60	
Chauk	55	20	0	75	
Pwintbyu	10	5	0	15	
Total	190	96	10	296	

Source: JICA Study Team, as of February 2010

The revolving is expected one after another and year by year continuously, but it will take longer period until re-delivery is realized in the villages if suffering from low parturition ratio or high

mortality. Because of such a variability, an assumption is made to build an estimation model in a way that all the heads of delivered she-goats will be revolved in 3 years, and then the profit is estimated counting heads of goats as member's asset and taking into account of the observed state in 16 target villages of the Pilot Project. The premises and the estimation procedure are assumed as follow:

1) The first year mortality of the original stock is assumed at 15.8% as the mean of 16 villages. Also, the mortality of offspring of the first generation is again assumed at 15.8%. However, the mortality of kids of the second generation and later is assumed at 7.5%, or the average in general herds taking consideration that the beneficiary members get accustomed to rearing goat herds.

2) From a head of she-goat, it is assumed that a head of kid at the first year, and then 2 kids in the second and later years are born. Also, offspring-bearing ratio is continuously assumed at 109.9% as the mean of both FY, while the rate of bearing female is assumed at 50%.

3) The initial heads of stock goats per member consist of 5 she-goats. The beneficiary member is to revolve 5 heads of she-goats in total, handing over to the second generation beneficiary member, but the year-wise breakdown is assumed considering offspring-bearing ratio, at a head she-goat for the first year, and 2 heads she-goats each for the second and the third year.

4) The amount applied to the evaluation of goats as member's asset is estimated at 42,500 Kyats /head that is the market price as of September 2008. In fact, the price of goat got down in 2009 due partly to swine flue but started recovering since late 2009. It is as of January 2010 around 37,000 – just over 40,000 Kyats, and it is still recovering to that of the price in 2008. Therefore, the price of 2008 is adopted in this model estimation. Also, goat's dung can be sold to farmers and the income derived from goat's dung is estimated at 7,500 Kyats per year per head, based on the recorded performance.

5) The costs evolved from goat rearing include construction cost of goat hut, interest payment in the case of borrowing money for this construction, cost of medical payment etc. As to hut construction, it is assumed possible to remarkably reduce its construction cost per beneficiary member because the number of hut can be reduced to only one middle-scale hut in the case that goats herd is reared by a group of 5 members as observed in an example in Ma Gyi Sauk Village. In the examples in the 4 villages under FY 2007/08 proejct, cost incurred per beneficiary member ranges 5,000 - at maximum 29,000 Kyats, averaged at 19,000 Kyats. Assuming that this amount is managed by a debt without any collateral from a private credit agency, the debt service amounts at 10% equivalent of the debt amount per month calculated with simple interest. The cost for veterinary medicine is assumed at 1,700 Kyats per year per head based on actual performance.

Given the conditions cited above, the sum of the amount of annual income asset and profit from the sale of goat's dung is shown in the bottom level of Figure 6.1.3. In parallel with the above sum, another sum of the quarter bottom equivalent income of a farm laborer's household (441,000Kyats) and the total value of the reared goats evaluated at market price of live goats and their dung, also that of the mean annual income of a landless (non-farm) household and the total value of goats and their dung (964,000 Kyats) are given in the said figure. It also shows the poverty line of the entire landless (non-farm) households, 1,081,000 Kyats. The following are understood from this figure:

1) The sum of the total value of goats as asset and the margin by sale of goat's dung in the first year is equivalent to the amount of about 314,000 Kyats (the value after revolving a head). Comparing this with the annual income of a farm laborer household ranked in quarter-bottom (441,000Kyats), the latter is higher by 40% than the former. Even if these two amounts were added, the sum as annual household income, about 755,000Kyats, does not surmount the poverty

line.

2) Because the number of rearing goat heads increases in the second year and the third year, the value of goats as an asset and margin from sale of goat's dung also increase in parallel. In the second year, the annual value of goats as asset and the margin from sale of dung will amount at around 608,000 Kyats (the value after revolving 2 heads), while in the third year it will grow to 959,000 Kyats (the value after revolving again 2 heads). Adding these annual income to that of a farm laborer household ranked in quarter-bottom (441,000Kyats), the sum of the annual income of this household approaches to the poverty line. As a result, the income will reach around the poverty line in the second year.

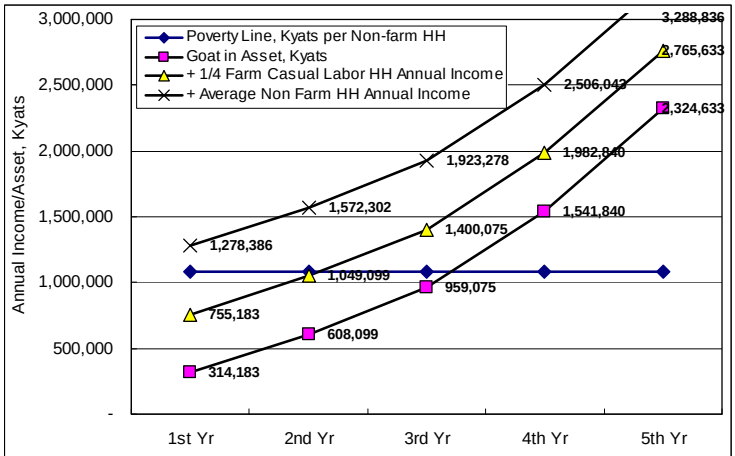


Figure 6.1.3 Change of net profit as asset + dung by rearing goats

3) The broken line shown at the top of the figure indicates the result of adding the sum of asset value of goats and the amount of sale of goat's dung to the mean annual income of a landless household (964,000 Kyats). This amount, (964,000 Kyats), is in short of the poverty line (1,081,000 Kyats) by 117,000 Kyats, however, provided that the asset value of goats and the margin from sale of goat's dung are added to it its annual income evidently outweighs the poverty line in the first year of goat rearing.

Lessons learnt in goat rearing include the method of procuring stock goats, selection of goat breed to rear and their mortality etc. The beneficiary villagers have made a few devices as to the investment to an improved goat hut. One of them is to build the hut with readily available materials within their place, and another is to build it for joint use to save the cost per member. As the actual device, the beneficiary of Ma Gyi Sauk village adopted the latter and most of the beneficiaries in FY 2008/09 applied the latter. In the Pilot Project in FY 2008/09 related to livestock, the Study Team advised extension staff in charge of livestock in their training courses on how to reduce costs and these measures were added in the extension manual.

In procuring stock goats in FY 2007/08, mainly the subcontractor procured them. This is the reason, according to what the stakeholders reflect, why stock goats with which the beneficiary villagers could satisfy could not necessarily have been procured (partly, political demonstration movement etc affected smooth purchase of stock goats). As seen in another case, this failure is also partly attributable to the purchase from remote areas or the purchased stock goats were debilitated on the way of transport and finally died. In arranging the procurement of stock goats in FY 2008/09, representatives of beneficiaries extension staff of LBVD and village chairman made market researching surveys prior to the procurement, and in this way the beneficiaries have been involved in purchasing goats. Owing to this arrangement, quality female goats with some pregnant ones could be procured and so the degree of satisfaction of the beneficiaries has also been improved as compared to FY2007/08.

Considerable difference has evolved from the selection of livestock breed. In Myanmar, sheep and goats are thought to have equal value with the same price per live weight. However, when it comes to the reproduction of offspring, twining ratio is higher in the case of goats, leading to more

advantageous herd expansion as compared with the case of sheep. This case was observed in Ma Gyi Sauk village. Out of 3 groups that reared at first sheep (3 × 5 = 15 members), 2 groups switched from sheep to goats, because in an evaluation WS held in their village in January 2008, they came to know the fact that goats more efficiently augment offspring than sheep. However, some beneficiary villagers in Magyi village still believe that sheep more suit to their climate than goats, and they are continuing sheep raising. In this context, sheep rearing was not planned in the Pilot Project in FY 2008/09.

Mortality beyond the ordinary rate (5 - 10%) was resulted in Khaungkawe Village. The conceivable causes of this abnormality may lie in that flood from Ayeyarwady River assaulted the village just after the delivery of stock goats, liver fluke prevailed after flood threatened the village and the procurement from remote areas fostered the death of delivered goats. Thus, lessons learnt from this toll are; procurement of stock should be done at nearby areas to avoid stock goat's debilitation, vaccination, routine monitoring by the beneficiaries and timely consultation with those who experienced rearing on how to cope with problems of rearing as needs arise should be performed to reduce avoidable losses.

6.1.3 Revolving Project with Sheep Rearing Targeted to the Poor Stratum

Sheep rearing was implemented in 2 villages (Magyi Village and Ma Gyi Sauk Village) only in FY 2007 targeting to poor households. It was started with the establishment of 3 rearing groups consisting of 15 members in each of these villages (5 members per group). As a result, the initial number of beneficiary counted 30 villagers in total, but later 10 of these members in Ma Gyi Sauk village converted their activity into goat rearing, thus 5 villagers had remained as beneficiary of sheep raising pilot project. However, finally they had stopped raising after handover in July to August 2009, and had left the villlage for migrant work. Similar to the revolving system of goat rearing, this system also applies a revolving: 5 lambs born from the delivered stock and then grown by the beneficiary are to be handed over to the second generation beneficiaries, thus repeating this process the number of beneficiaries are augmenting.

Five ewes were delivered to a beneficiary villager in this Project, so totally 100 ewes were granted to 20 beneficiary villagers in these two target villages in FY 2007/08. As of February 2010, 13 beneficiaries in Magyi village are still raisning 48 sheep and going to hand over soon to 2nd generation. Entire mortality rate of sheep since late 2007 to date is estimated at 20%, higher than ordinary range of 5 to 10%. Now number of sheep heads reared by a beneficiary in Magyi village is estimated at 3.7 heads. Table 6.1.5 summarizes the state as of February 2010.

Table 6.1.5 Current Status of Sheep Raising (FY2007/08 as of February 2010)

TS	Villages	Original Stocks Provided			Stocks Died			Kids Born			Handover			Sheep Sold			Current Status		
		F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total
Ngazun	Magyi	74	1	75	55	7	62	39	32	71	0	0	0	23	13	36	35	13	48
Ayadaw	Ma Gyi Sauk	25	1	26	0	0	0	20	12	32	25	1	26	20	12	32	0	0	0
Total		99	2	101	55	7	62	59	44	103	25	1	26	43	25	68	35	13	48

Source: JICA Study Team, as of February 2010

Based on the revolving project with sheep rearing in FY2007/08, a standard case of rearing is estimated employing the similar procedure to that applied to the case of goat rearing. In the case of sheep rearing, it is assumed that 1 original stock bear a head of offspring per year considering low bearing ratio. Low offspring bearing ratio also results in longer time span required for revolving. In the estimation, 5 years of the total revolving period is assumed with a plan of revolving a head of ewe per year from 5 granted heads as stock. Mortality of 20% (actual data to date) is employed in the first year, but it is reduced to 7.5% from the second year, as beneficiary gets accustomed to rearing sheep.

Costs incurred for rearing include that of building hut as required in the case of goat rearing, interest service in the case of resorting to credit debt for the purpose of building hut, medical expenses etc. These are estimated from the real performances. The building cost of a sheep hut is averaged at 17,000 Kyats, and it is assumed that the total amount is met by a debt with monthly interest of 10%. Then, the total debt and interest amounts to 20,400 Kyats /year. The fee of medical input is estimated at 1,700 Kyats per year as estimated in the case of goat rearing.

Given the conditions cited above, the sum of the value of sheep reared in the year evaluated at market price of live sheep and profit from the sale of sheep's dung is plotted in the bottom level of Figure 6.1.4. In parallel with the above sum, another sum of the quarter bottom equivalent income of a landless household (441,000Kyats) and the total value of sheep and their dung, also that of the mean annual income of a landless (non-farm) household and the total value of sheep and their dung (964,000 Kyats) are given in the said figure. Sale price at farm gate is assumed at 63,750Kyats per head considering bigger body size of a sheep than a goat.

It is evidently interpreted in this figure that the growth of the asset is sluggish even applying higher unit price than goat because of lower offspring bearing ratio of ewes as compared with that of she-goats. In the case of goat rearing, the estimated asset reaches 1,541,000 Kyats in the fourth year in terms of the sum of the value of goats as asset and the margin from sale of goat's dung, and the single sum surpasses the poverty line.

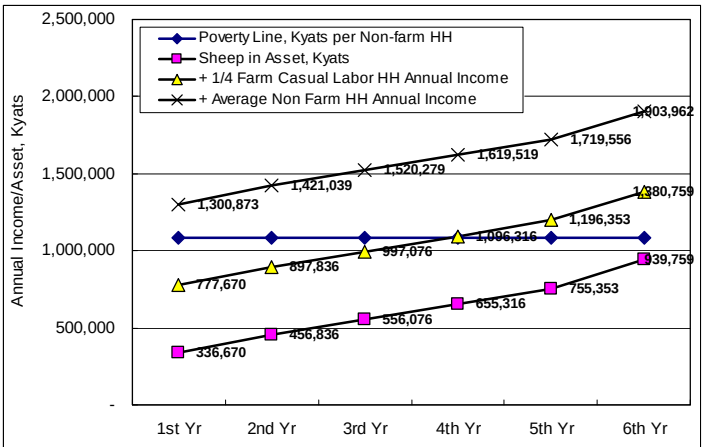


Figure 6.1.4 Change of net profit as asset + dung by rearing sheep

However, in the case of sheep rearing, the total amount of sheep as asset and the margin from sale of sheep's dung in the sixth year of rearing remains at 939,000 Kyats. Also, when this amount of the sum obtained from sheep rearing is added to the quarter bottom equivalent income of a farm laborer's household (441,000Kyats), the figure shows that the total annual income barely outweighs the poverty line in the fourth year (in contrast, in the case of goat rearing, it surpasses in the third year).

The lesson learnt from sheep rearing is the issue of selecting livestock breed for rearing activities. In order to try to share of project benefits as rapidly and as many poor beneficiaries as possible goat beneficiaries rearing gives the right choice. Similarly, goats are more adaptable to the climate in the CDZ. Although there exist some beneficiary villagers who believe sheep is more suited to the climate, the conversion from sheep to goats gives an alternative as observed in Ma Gyi Sauk village only if the beneficiary villagers have their intention of changing species.

6.1.4 Revolving Pig Project Targeted to the Poor Stratum

The Pilot Project of revolving with pig was firstly implemented in Legaing village in FY 2007/08 situated in paddy area from the aspect of feed availability. The Project targeted the poor strata comprising the landless households and small-scale farm ones. It was implemented adopting a revolving system so that the project benefit is broadened from the first generation to the next beneficiary. Under this system, offspring is not handed over to the next beneficiary as that adopted in goats or sheep rearing, but the next piglet is purchased using a part of pooled sales margin from sale of fattened swine.

Two piglets are basically delivered to each target beneficiary household, and the beneficiary sells them after fattening them for several months (around 8 months) and it returns a part of the sales margin to pig committee, and then the committee purchases and delivers 2 piglets to deliver to a beneficiary of the next generation.

Two piglets were delivered to each of 15 beneficiary villagers, or in total 30 piglets, in Legaing village in November 2007. After the distribution, 6 piglets died of winter coldness, and the rest 24 heads were sold after the fattening for 8 - 10 months (in this concern, it was found that 2 of them were mated and reproduced piglets. For example, as shown in the framed topics, 4 piglets born from a sow were sold while the sow was still kept in the initial beneficiary villager).

Purchasing rice by bag for the first time owing to the sale of piglets:

There was a landless villager in Legaing Village who was granted 2 heads of piglets, one was male and the other was female. He received them in November 2007, and after he grew them, 5 piglets were born from the sow in August 2008. Out of these, a head died later, but the rest normally grew. He sold 4 piglets in October 2008 and appropriated the sales margin for purchasing 2 piglets to be delivered to the second generation beneficiary. He could sell them at the total amount of 80,000 Kyats. From this amount, he provided 70,000 Kyats (because the piglets he purchased for revolving were larger sized ones, so 70,000 Kyats was needed to pay for them).

He spent the rest of sales margin 10,000Kyats for buying polished rice by bag. The quantity of rice packed in a bag is equivalent to 24pyi as Myanmar unit weight, but he used to buy it packed in a small vinyl pack (equivalent to 1pyi, or about 2.4liter). So, buying rice by large bag was for the first time for him to record a big reap in his career. He still keeps 2 heads of grown-up swine and he intends to raise them. These heads are estimated at 300,000 Kyats as an asset, equivalent to 300 days as per-diem wage of a farm laborer, or to the net profit for 600 - 750 days from the sale of fried vegetables that is his main livelihood earning source.

He envisages continuing to raise swine granted by the Project and to sell piglets as supplemental source of his livelihood. The number of piglets born at the first delivery was only 5 because the sow was too small. As she grows bigger, he expects the sow to bear about 10 heads of piglets.

According to the rule of the revolving system, each beneficiary villager pays back 70,000 Kyats to the committee as the cost of purchasing two piglets to be delivered to the next beneficiary, and then the committee delivered them to the second generation beneficiaries in August 2008 or around. In this occasion, in order to mitigate the burden of feeding cost, delivery rule was changed in a way that a head of piglet per beneficiary household is delivered instead of originally planned 2 piglets. Therefore, the second-generation beneficiary in Legaing Village received only a head of piglet, but the number of beneficiary has increased to 24 villagers.

Then, the impact of the benefit from pig activity to the poverty line is examined here. In examining this, two cases experienced in Legaing village will be taken as the base of the examination. One is the case of fattening a head of piglet to sell (it happens when a head out of two delivered, or only a head is delivered as in the second-generation beneficiary) and the other is the case of fattening two piglets. In this component, building of a pig hut is the condition to be provided by a beneficiary, and it costs around 5,000 Kyats even using readily available materials in the Project site. In this estimation, it is assumed that this amount is only met by a debt without collateral, and that simple interest rate at 10% per month as a standard in the rural areas is applied for the debt service as one of the expenses of starting pig rearing.

Though the costs incurred in the 1st year include that of building a piggery and accompanying interest service arising from the debt here, from the second year and later these initial cost can be dispensed to continue pig activity. Therefore, the estimation also covers the next year because the larger profit is likely evolved. In fact, 9 out of 15 beneficiary villagers as the first generation still continue pig rearing by again purchasing piglets by investing a part of the sales margin from their fattening, or by selling piglets born from the delivered and raised swine by mating them and continuing to keep the initially delivered swine. The following table summarizes the result of estimation by case of examination.

Table 6.1.6 Evolution of Profits in the Revolving Activity in Pig (the first year and the second year)

Expenditure/ Profit	1st year		2nd year		Remarks
	1 pig	2 pigs	1 pig	2 pigs	
Building a Pig Hut	5,000	5,000	-	-	
Interest (10%/M)	10,000	10,000	-	-	For 10 months
Medicine	1,000	2,000	1,000	2,000	
Feed	62,500	125,000	62,500	125,000	@62,500 for 10 months
For Revolving	35,000	70,000	-	-	
Purchase of Piglet (2nd year)			35,000	70,000	Capital
Above Total	108,500	207,000	98,500	197,000	
Income from Selling	150,000	300,000	150,000	300,000	@150,000 at 10 months
Net Profit	**41,500**	**93,000**	**51,500**	**103,000**	
Balance from 1st year			41,500	93,000	Carry over
Grand Net Profit			**93,000**	**196,000**	**For 2 years**

Source: JICA Study Team

Figure 6.1.5 gives the sum of income earned by a landless household from pig rearing and other sources, showing the mean annual income of a landless (non-farm) household (964,000 Kyats) obtained in the baseline survey conducted in 6 target villages of the Pilot Project in 2007 as a base and the income as the net benefit from the above-cited pig added on this base. Besides, the average poverty line of a landless household, 1,081,000 Kyats is also inserted at the base of the bar graph. Figure 6.1.6 presents the similar sum for a case of farm laborers, where the quarter-bottom annual household income of farm laborers to which majority of the poor belong (ranked as the lowest quarter household income: 441,000 Kyats/ year) is taken as a base, and the net benefit from pig is added in a similar manner. The poverty line is also drawn as a contrast at the base of the graph. The above table and these two figures imply the following results.

1) The net income earned from pig in the initial year comes to 41,500 Kyats for single head rearing and 93,000 Kyats for two heads rearing. These amounts are estimated assuming sale of pig(s) after fattening for about 10 months. Further, in the second year, benefit from pig will be increased because no more piggery is built nor debt interest service continues, to 51,500 Kyats for single rearing and 103,000 Kyats for 2 heads rearing.

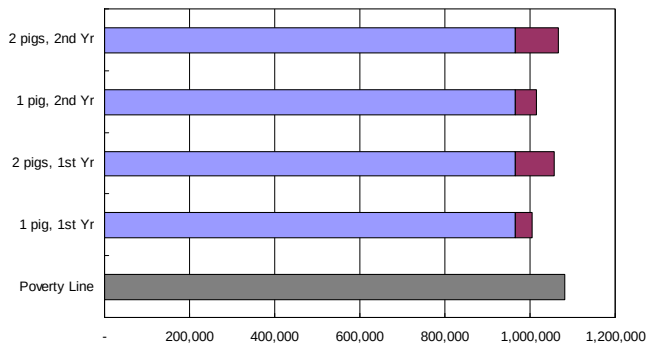


Figure 6.1.5 Mean income of non-farm household & net profit of pig

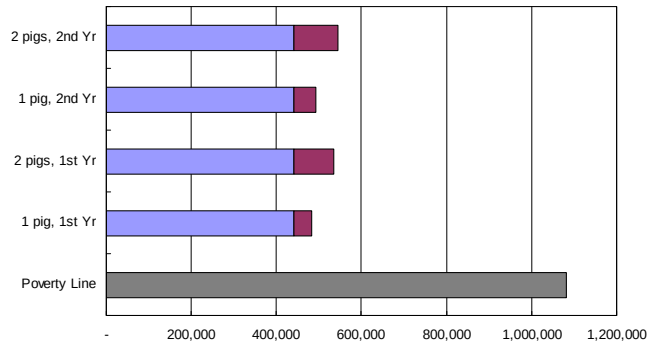


Figure 6.1.6 Mean income of 1/4 bottom FL HH & net profit of pig

2) The mean annual household income of the landless (non-farm) stratum as a whole stands at 964,000 Kyats. The difference to the poverty line: 1,081,000 Kyats still remains at 117,000 Kyats, but the net benefit from pig activity in the second year, rearing 2 heads of piglets: 103,000 Kyats is nearly comparable to this line. In other cases, though the amounts both fail to reach the poverty line, increment rates of annual income to the base income are 11%、5%、10%、4%, respectively, for the upper-ranked (in the second year rearing 2 heads) cases shown in Figure 6.1.5.

In brief, it can be deduced that pig rearing with a head of piglet will contribute to an increase by about 5% to the basal annual income in the case of average landless household, also by 10% with rearing 2 heads.

3) Due to low base income of farm laborer's household (the case shown in Figure 6.1.6 indicates the income of poor household ranked at the bottom of 4 quarters division), even if pig income from 2 heads rearing were added to the basal, the sum is still far below the poverty line. Yet, the result of calculating increments of base income by the net benefit of pig indicates 9 - 23% as increment rates because of low basal level. In other words, when a farm laborer's household ranked at the bottom of 4-quarter division fattens a head of piglet it increases the annual income by 10% or so, and in the case of fattening 2 heads it raises by 20% or so.

First of all, timely period of piglet's delivery or measures of keeping suitable temperature within pig hut during wintertime is learnt as a lesson. Piglets were delivered in around November under the Pilot Project in 2007 (as a demonstration took place in September when the initial delivery started, it was postponed). Atmospheric temperature happens to lower around this period, causing death toll of 6 heads out of 30 piglets delivered (20% of mortality). This suggests the necessity of recognition on timely delivery within the period of high atmospheric temperature, and awareness of the beneficiary villagers to take measures for keeping ambient temperature of piglets warm. In the training courses on livestock Pilot Project provided in 2008, notice on the necessity of keeping warmth was transferred to the attended extension staff of TS.

Period of fattening piglets is a key factor to sell them as high price as possible. However, some beneficiary villagers in Legaing Village requested to refund the fund handed over to the beneficiary of the next generation by selling their piglets at the eighth month though piglet's weight is not enough (as the result, no profit was earned). As far as the aim of introducing is placed at improving livelihood of the poor, it is imperative to make positive benefit by fattening piglets as fat as possible, and this message was informed to the members of the pig committee and the village chief.

The pigery committee in Legaing Village decided to deliver a head of piglet to a beneficiary villager in distributing piglets to the second-generation beneficiaries. This reduction in delivery head was intended to reduce the burden of the committee on feed payment. The cost of building a pig hut gets more expensive for single piglet fattening, but the beneficiary villagers who received only one piglet per villager manage to economize the cost of hut building by keeping piglet at a corner of homestead, or under a porch though hygienic issue might arise. Risk of mortality is anticipated in the case of only 1 piglet, but the committee in charge decided to exempt refund in the case of the death of the delivered piglet within two months after the delivery, thus the revision of the rule tries to mitigate the burden of the beneficiary. This is a new rule provided with the reflection of the toll of died 6 piglets.

6.1.5 Creation of Farm Labor Opportunities for the Landless by Vegetable Cultivation

Intensive vegetable cultivation requires more manual labor as compared to ordinary upland crop cultivation. About 40% of rural households in the CDZ are the landless, majority of which are engaged in farm labor hired by farm households (around 20 - 30% of the total households are estimated as farm laborers households). Because agricultural activities are highly seasonal and this leads to unstable livelihood of farm laborer's households where the poor strata is most frequently found.

Vegetable cultivation making use of raised bed (the height of bed not higher than 15 - 20cm) was tried in the Pilot Project in 2007. Also, vegetable cultivation during dry season (concentrated on onion) has been tried in the Pilot Project in 2008 coincided with the introduction of treadle pumps. Here, how much scale of farm labor opportunities can be created by vegetable cultivation with raised bed or

ordinary vegetable cultivation without raised bed is discussed.

Table 6.1.7 recapitulates farm labor requirement (expressed as man-day / ac.) for vegetable cultivation implemented in two target villages of the Pilot Project in 2007: Khaungkawe Village and Ma Gyi Sauk Village. The table refers to labor requirement by cultivated crop species including conventional onion and ordinary upland crops found in the CDZ; chickpea, sesame and pigeon pea. It is evidently seen in this table that ordinary upland crops require farm labor of about 40 - 70 man-days/ ac. /crop, while vegetables such as onions and cabbage do about 140 - 150 man-days/ ac. /crop. Namely, vegetable cultivation creates more labor opportunities, by 20 ~ at maximum 40% than labor required for ordinary upland crops.

Table 6.1.7 Farm Labor Requirement in man-days / acre by Upland Crops

Works	Sex	Onion (raised-bed)	Cabbage (raised-bed)	Onion (traditional)	Chickpea	Sesame	Pigeon Pea
Harrowing	Male	5.3	6.8	5.3	18	4	3
	Female						
Ploughing	Male	2.5	3.5	2.5	12	2	2
	Female						
Making the bed	Male	15	15				
	Female						
Planting/ Sowing	Male				0.25	0.25	0.25
	Female	30	30	30	0.25	0.75	0.25
Weeding	Male	10	22.5	37.5			
	Female	22.5	50	22.5	17.5	17.5	20
Insecticide, Foliar fertilizer	Male	6	22	7	5	0	2
	Female						
Harvesting	Male						
	Female	45	5	45	15	12.5	12
Male Total	Male	39	70	52	35	6	7
Female Total	Female	98	85	98	33	31	32
Grand Total	**M-day**	**136**	**155**	**150**	**68**	**37**	**40**

Source : JICA Study Team (values in the table were collected through interview from 12 samples in Khaungkawe Village and Ma Gyi Sauk Village)

Although vegetable cultivation gives farmers possibility of bringing high income, number of farmers engaged in vegetable production is limited due to high risk especially with cultivation during rainy season. Because of this risk, most of the cultivating season falls in the dry period even though the planting is started during the end of rainy season, and in many cases the cultivation during dry season relies on use of irrigation water conveyed from nearby streams or wells. As a result, 22 and 14 participants in Khaungkawe Village and Ma Gyi Sauk Village, respectively, were joined in vegetable cultivation at the beginning, and not sizable increase in number of participants has so far been reported because of the necessity of access to irrigation water. These novice participants start their cultivation with about 0.5 acre per participant and later expand the size to about 1 acre.

Here, the increment amount of income brought about by the increase of hired opportunity of farm laborers is examined in a model case in which 20 farmers per village are assumed to crop onion on 1 acre / farmer. It is assumed that 140 man-days (40 man-days / male, 100 man-days / female) are created per acre as new hiring opportunity referring to the case of onion cultivation seen on the above table.

The required farm labor per day per acre ranges 20 - at maximum 40 persons as experienced so far (for weeding 20 - 30 man-day /acre are hired but for harvesting 40 man-day /acre at maximum are hired because it's necessary to harvest timely). Given the above-mentioned conditions, also assuming that 20 - 40 farm laborers are hired for all the practices of vegetable cultivation in total 20 acres, the income derived from wage labor is estimated as shown in Figure 6.1.7 and Figure 6.1.8. Figure 6.1.7 gives the sum of the basal annual income of a farm laborer's household (756,000 Kyats) and wage earned from farm labor for vegetable cultivation.

The poverty line of non-farm household is also shown at the lowest part of bar graph in this figure (the same amount as poverty line is applied to farm laborer's household). Similarly, Figure 6.1.8 shows the sum of the basal annual income of a farm laborer's household ranked at the bottom of 4-quarter division (441,000 Kyats/ year) and wage earned from farm labor for vegetable cultivation. The poverty line is also drawn as a contrast at the base of the graph. The following are implied from these figures:

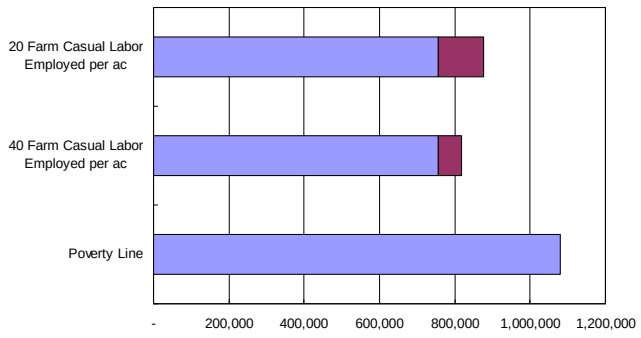


Figure 6.1.7 Mean annual income of FL HH & income from wage labor

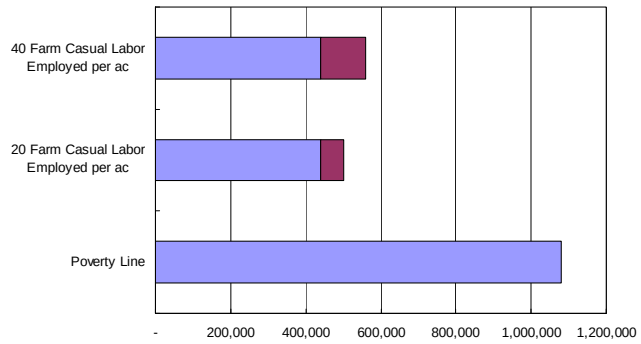


Figure 6.1.8 Mean annual income of 1/4 bottom FL HH & income from labor

1) In the case that 20 farm laborers are employed in vegetable cultivation on the total 20ac., the created wage per farm laborer amounts to 120,000 Kyats. Also, in the case of 40 farm laborers are hired in vegetable cultivation on the same condition as stated above, the wage per farm laborer comes to a half, or 60,000 Kyats (in the estimation, wage level of 1,000 Kyats /person/day for male laborer and 800 Kyats/person/day for female is applied as labor market price). Even these amounts are surmounted on the mean annual income of farm laborer's household or of quarter bottom equivalent household, their annual incomes cannot outweigh the poverty line.

2) However, if the wage income is interpreted as an increment factor of the basal income, the wage income by vegetable cultivation will bring an increment of 8 - 16% against the mean annual income of farm laborer's household; 756,000Kyats. Also, it allows an increase by 14 - 27% towards the lower-most income of the laborers ranked at the quarter-bottom; 441,000 Kyats.

3) That is, as the income of a farm laborers household is originally placed far below the poverty line, single contribution of additional income cannot bring it comparable to the poverty line even if new labor opportunities are created by vegetable cultivation. But if the additional wage from farm labor for vegetable cultivation is interpreted as a factor of income increment, there seems possibility of increasing the annual income of the household ranked at the bottom of 4-quarter division at maximum by 30% or so, thus the contribution fosters poverty alleviation.

4) In the above estimation, it is assumed that a vegetable cultivation activity is newly started at the scale of 20 ac on one hand, and the number of farm laborers employed in the activity is assumed at 20 - 40 laborers, on the other. Since farmers tend to employ well-accustomed or skilled farm laborers, possibility of continuously employing the same laborer to the same cultivation is high on "1 acre" basis. However, on another basis of the entire "20 acres" there seems possibility of additional employment beyond 20 - 40 laborers. Nevertheless, under the premise of the scale of vegetable cultivation, 20 ac per village, days of employment per laborer decreases inversely proportional to the number of available laborers.

6.1.6 Hardship of (semi) Dry Land Farming (at the yield level of chickpea)

Climate in (semi) dry land is not only characterized with low precipitation quantity but also its salient

feature lies in unstable rainfall pattern. Due to lack of hourly rainfall and other detailed data, it is not possible to calibrate variance (degree of dispersion) of statistical short-time rainfall intensity, but as a typical character in general, a large variability of short-time rainfall occurs depending on the area and the period of a year (namely, rainfall with its intensity takes place at random within space and time). This character inevitably makes the farming in dry land a highly risky activity.

Increased production of excellent quality seed of chickpea was tried in the Pilot Project in 2007. Chickpea is sown during mid - late rainy season. Though the crop utilizes rainfall during its growth stage, later it makes use of residual soil moisture until it reaches maturity ready for harvest. The said Project aiming at increased production of excellent quality seed also provided input of chemical fertilizers. The yields of chickpea achieved in the project area where chemical fertilizer is utilized can be compared with those obtained in other areas.

Table 6.1.8 Chickpea yields in Ma Gyi Sauk Village

Case	Yield, bsk/ac	Fertilizer,Kg/ac	Remarks
ICCV95311	13.7	46	Sample Nr.=7
Outside-Prj.	NA	NA	
ICCV2	11.5	61	Sample Nr.=7
Outside-Prj	8.2	4	

Source：JICA Study Team data collected by a sampling survey

Increased production of excellent quality seed of chickpea was implemented in 2 villages. Out of these, increased seed production in Ma Gyi Sauk Village was carried out in lowland called “Le” (if conditions are favorable, paddy can be cropped). Probably owing to favorable land conditions, effect of applying chemical fertilizer seems to be remarkable. Table 6.1.8 shows the briefed result. Since improved seed was used in the project, direct comparison cannot be made with the performances under ordinary seed in out-lying areas, but as far as ICCV95311seed is concerned, it gave a yield of 13.7 basket/ac.

The achieved yield level, 13.7basket/ac is exceedingly high as compared to the average yield of this variety, 8 - 10 basket/ac, so the effect of applying chemical fertilizer is considered effective though the quality of seed affects the yield. Also, another chickpea variety, ICCV2 gave 11.5 basket/ac with an input of 61kg/ac of chemical fertilizer, as compared to the yield level outside the Project Area; 8.2 basket/ac with the input of 4 kg of chemical fertilizer. The difference of yield between two areas comes to 3.3 basket/ac, and the net profit of the production is estimated at 170,485 Kyats/ac for the former and 137,217 Kyats for the latter. Namely, the net profit of the former is larger even though it accompanied heavier input of chemical fertilizer incurring high cost. In this context, it can be said that the use of chemical fertilizer leads to better yield and increase in yield.

Increased production of excellent quality seed of chickpea was implemented in Magyi Village was tried in Le (lowland) and Ya (upland). Seed targeted to increase production was ICCV2 variety. The result of the trial in Le is shown in Table 6.1.9. Also, the result in Ya is given in Table 6.1.10 where only data from 4 samples are available. According to the result obtained from the trial in Le, yield of about 9.4 basket/ ac was obtained applying around 32kg /ac of chemical fertilizer within the Project Area. In contrast, yield at about 8.8basket/ ac was achieved with the input of fertilizer (11.25kg), or less than a third of the input into Le within the Project Area in Le outside of the Project Area. In terms of net benefit, the former gained 147,014 Kyats/ ac, while the latter brought 145,375Kyats/ ac that is comparable to the yield or the former.

Table 6.1.9 Yield of chickpea in Le (lowland) in Magyi Village

Case	Yield, bsk/ac	Fertilizer, Kg/ac	Sample No.
Under Project	9.39	31.70	36
Outside Project	8.82	11.25	32
Average Year	8.58	8.79	32

Source：JICA Study Team , sampling survey

Table 6.1.10 Yield of chickpea in Ya (upland) in Magyi Village

Case	Yield, bsk/ac	Fertilizer, Kg/ac	Sample No.
Under Project	4.81	30.21	4
Outside Project	NA	NA	NA
Average Year	6.31	7.69	3

Source：JICA Study Team , sampling survey

According to the result of the trial in Ya, the yield performance is as low as 4.8 basket/ ac with considerable input of chemical fertilizer, 30kg/ ac, though the calculated number of the samples input

in the calculation is only 4. In 2007, no chickpea was introduced into Ya outside of the Project Area, but according to information from the site, ordinary yield in normal year amounts to 6 - 7 basket/ ac with 7 - 8kg of chemical fertilizer as input. According to the farmer's view in an interview, either the crop couldn't absorb nutrients from the applied chemical fertilizer due to meagre rainfall during the period after its application, or the fruiting was not sufficient because plants were affected by torrential rain threatened latter half of plant growth.

The above-mentioned examples suggest difficulty in applying chemical fertilizers in the (semi) dry land, above all in Ya (upland) where the ground gets severely dry. Since Le (lowland) develops in low areas, once rainfall occurs rainwater can readily be retained in soil layers as residual soil moisture, and as a result, the applied chemical fertilizers readily come into effect. On the contrary, use of chemical fertilizers in Ya (upland) would lead to augmenting risk of farming that has been practiced under precarious climatic /meteorological conditions by nature. In Ya, it might be necessary to improve soil physical property so that soil layers can retain sufficient moisture, as well to make device on manuring such as application of liquid fertilizers (for example foliar fertilizer) in place of applying granular type ones.

6.1.7 Project Design Taking Account of Technical Transfer and Public Equity

Pro-poor oriented approach and contribution to public welfare are being pursued as basic principles in the Pilot Projects implemented in this Study. Approach oriented to pro-poor activities is to select the poor as major target of the envisaged activities, also it intends to try to diffuse/ expand the benefits generated from project inputs, i.e., equipment/ material etc into not only the target beneficiaries but also into wider space through technical transfer to comrades or group members or through group- as well as village-funds. Here, examples of technical transfer from member to member and public welfare are discussed taking the instances of knitting group, stitch embroidering group under trial in Ma Gyi Sauk Village as well as weaving group in Magyi Village implemented in 2008.

1) Knitting (sweaters etc) group in Ma Gyi Sauk Village

Knitting (production of sweaters, etc) is one of the women group activities in Ma Gyi Sauk Village. Input from the Project comprises 5 knitting machines and training course. The training of knitting was held in Pyin Oo Lwin (located at 70km north-east of Mandalay City). Only 5 trainees participated in the training, who mastered the knitting techniques using Double Decker knitting machines (in this regard, Double Decker enables to knit more complicated patterns as compared to ordinary single knitting machine). They started production in April 2008, and as of January 2009, there are already success stories even at individual level (see box for an example). The initial members in the knitting group counted as many as 52, and other members except for the 5 trained people have received technical transfer of knitting by sitting at the side of trained ladies or the first generation and by practicing knitting work together with them.

A lady earned a net of 1 million Kyats in 9 months, and bought new TV, DVD and even loaned out;

One of the members for knitting group is Ma Kyu Kyu Swe, 29 years old. She started the knitting in May 2008, producing sweaters for both adult and children, and hats for baby. According to her, she has worked as many as 210 days since May 2008 to January 2009, though she cannot count exactly. She marketed the products by herself going to Mandalay, Htee Chaint TS and Chaung U TS where there are her relatives.

She went to Mandalay 2 times, Htee Chaint 3 times and Chaung U 3 times. The first adventure was in late October 2008. Her selling prices are 5,000 Kyats for adult thick sweater, 1,750 Kyats for adult thin sweater, 3,500 Kyats for children's thick sweater, 800 Kyats for children's thin sweater, and 1,500 Kyats for baby cap, which are in fact at least 300 – 1,000 Kyats higher than what she sells to middleman.

With above business, she earned about 1 million Kyats in net for the 1o months. This is quite surprising! The Poverty Line per family in this area is around 1.1 million Kyats. It means that she in fact earned almost equal money to the poverty line for a typical family by alone. With this big profit, she bought TV and DVD, replacing the old ones owned by the parent. In addition, she loaned out 150,000 Kyats to a relative by taking 1 acre Ya

52 members of the knitting group compose 5 sub-groups with about 10 members belonging to each sub-group. Since 5 knitting machines are available, each sub-group is equipped with a machine.

Each of the trained members has become the leader of each sub-group who manages the production of sweaters etc transferring knitting techniques to the rest of the sub-group members or around 9 comrades. The full operation of this production has started since April 2008, and until January 2010, 21 additional members reached the level of assistant trainers in addition to the original 5 members. That is to say, each lecturer has transferred techniques to 4 apprentices or more through on-the-job-training during the period of around 21 months.

The lady in the center is the leader of a small group consisting of 10 members. Ladies sitting both sides of her sea are apprentices who receive technical transfer from the leader.

As of January 2010, about 4 members per set of knitting machine have been equipped with productive level of techniques. Owing to this progress, those who are equipped with productive capacity can now be mobilized for about 7 - 8 days per month. Since 10 members have been allotted to a set of knitting machine, once all the members have acquired the same technical level and use the knitting machines with equal opportunities, days of mobilization per member will be only 3 days per month. Though there is possibility to purchase additional machines, but also possibility of reducing group members may arise. Anyway, it is significant that the opportunities of learning and acquiring techniques of knitting are available in this village.

2) Embroidering group in Ma Gyi SaukVillage

The embroidering group consists of 27 members. Number of delivered sewing machines for embroidering are 3, 9 members are allotted to an embroidering machine. The training of embroidering itself was held in this village and at first 10 trainees acquired the embroidering technique. However, only about 8 members who had sewing techniques before the training are now equipped with enough embroidering capacity to undertake orders from outside during this training. Among these 8 eligible members those who have remarkably high embroidering techniques have become the leaders of these 3 groups and manage them.

That is to say, the structure of this activity is the same as that of the above-cited knitting group, but the technical training is more systematic because embroidering techniques are transferred in a way that 19 untrained members are alternatively sitting by 8 members who have acquired enough technical level to undertake orders. Business operation has started in April 2008, and now 10 members in total have acquired enough technical level to undertake orders, while other 11 members have reached at assistant trainer's level. The pace of growth in the activity has itself been sluggish, attributable to limited orders as compared to that to knitting group, leading to less chance to receive technical transfer – less opportunities of business operation. Notwithstanding, technical transfer among members is here still proceeding on.

3) Weaving group in Magyi Village

Three women are engaged in weaving as wage earners in Magyi Village who use multiple filling-reed type weaving machine and material owned by a trader. Also, two other women who have acquired the technique to handle similar weaving machine live in the village. Under such circumstances, the Pilot Project in 2008 purchased these weaving machines from the trader, also it additionally purchased 2 other machines in a nearby village. It envisaged weaving homespun with better patterns using these 5 weaving machines, and recruited the members of the planned weaving group. 22 women participated in the group including the above-cited 5 skilled women.

Out of the total members, 17 except those who already have skill to handle the multiple filling-reed type weaving machine do not have the skill though they have experienced to use simple machine, or single filling-reed weaving one. In this Project, it has planned that a sub-group with 4 - 5 members operates a weaving machine including a skilled member, where 3 - 4 members without handling skill are planned to learn the skill from the skilled members through on-the-job-training. As of October 2008, the procurement of the multiple filling-reed weaving machines has been completed, and the business operation has partly been initiated from late October 2008 through on-the-job-training.

In fact, their main market venue is in Thailand since the machine can weave sophisticated designs. Buyers stationed in Mandalay periodically came to the Magyi village to order and buy the product. However, due to the world financial crises having taken place in late 2008, the market has dramatically shrunken, and thereby very little order from the Thailand side nowadays. The buyer started not frequently visiting the village. With this external shock, till January 2010 only one weaver has continued the weaving targeting nearby domestic market but the others had only to continue the production intermittently. Therefore the technology has not been transferred to other members, but still the designing of this project is same as above cases in Ma Gyi Sauk village.

4) Possibility of technical transfer and expansion of public welfare

In all of the above-mentioned Pilot Projects, technical transfer from the skilled members to un-skilled ones through the business operation is tried. Since members capable of handling machines increase as technical transfer progresses, the transfer results in fewer working days per member. To cope with this issue, it would be required to purchase more machines appropriating the gained margin of the business operation, or to be hired to work with the acquired skill.

In Ma Gyi Sauk village, the members are to pay charge of using machines to the main committee established at the village level. The rental fee of machines is set at 200 Kyats / day for the rent of a knitting machine, 150 Kyats/ day for the rent of a weaving machine. The committee has to spend major maintenance and repairs for the machines out of the rental fee except for minor ones which are placed under the user responsibility. As of January 2010 the balance is 252,600 Kyats for knitting group and 294,200 Kyats for embroidery group. Having these amount in hand, the committee will be able to can purchase a new machine or can lend out some money for other village development activities (in fact, as of January 2010, a part of this balance is lent to engine-weaving group also established in this village as one of pilot projects.)

In Magyi Village, it is planned that a part of the business margin is reserved not as the village level fund but as a group fund. At the start of the Pilot Project in 2008, the members of the group themselves have estimated how much amount out of the business profit can be reserved as their group fund, and how long it takes to achieve the procurement of machinery starting from 5 machines to all 22 held individually by each of 22 members (requiring about 5 years by an exponential calculation), and also how many additional machines can be purchased if the business profits are continuously gained for a decade. As a matter of course, various sorts of difficulty / hardship would arise in the actual operation.

The purchase of additional equipment will, in many cases, not be realized even if it were feasible on an envisaged plan. Likewise, as far as manufacturing is operated on business, profit cannot be realized unless the manufactured goods cannot be sold and hence the capital to purchase additional equipment may not be reserved. In any case, in the trials cited above, technical transfer has steadily been progressed though the process is sluggish. Also in Magyi Village, a target village of the Pilot Project in 2008, the actual manufacturing operation has already been initiated through on-the-job-training among the group members.

It is worthwhile to remind that in Myanmar arable land per population is narrower as compared to that in her neighbors such as that of Thailand (populations of Myanmar and Thailand are 54 million and 62 million, respectively, while arable land areas in these countries are 11 million ha and 21 million ha, respectively, or arable land in Myanmar is about the half of that of Thailand[4]). Furthermore, high quality, cheap labor force is available in Myanmar but inroad penetration of hiring opportunity-creative foreign enterprises like apparel/ sewing industries into Myanmar have greatly been restricted. As a consequence of such background, not only landless strata of rural population reside in rural areas, but also latent unemployment rate has been high. Given such circumstances, it might acutely be necessary to provide project designs in which technical transfer is made to as many member-participants as possible to ensure their means of livelihood.

6.1.8 Design of Projects Generating a Chain Value Addition (paddy drier)

In designing a project, one can intentionally make it in a way that synergetic effect evolves among plural projects. Once synergetic effect evolves, benefits from these projects would grow beyond a simple sum of individual benefit derived from each of these projects. Yet, basic principle requires that each project can generate its own benefit or even if each project is singly implemented it can feasibly, manageably be operated.

A paddy dryer drying about 200 baskets (4 MT). It can dry paddy to the required moisture content in 4 - 6 hours depending on the moisture state of paddy.

An example of actually generated synergetic impact can be seen in the introduction of paddy drier and improved milling techniques tried in the Pilot Project in 2007. Two projects were implemented in this trial, while the evolved benefits from these projects were identified in three dimensions, i.e., the income to the committee that manages and maintains paddy drier, the income and reduced expenses at the side of millers and the income of paddy farmers who utilize paddy drier and milling. Besides, the committee started servicing low interest loan, and some landless strata initiated mushroom culture using this loan as their capital for the culture. Although individual values (benefits) are marginal, a value-added chain already evolves in this structure.

The introduction of a paddy drier and improved milling techniques were implemented in Legaing Village in 2007. In addition to paddy cultivation during rainy season, that in dry season is also practiced in irrigable paddy fields in Legaing Village. Paddy cultivation in dry season is called summer paddy or pre-monsoon paddy and it starts at nursery bed preparation in March, completing at harvest in July - August. Meanwhile, monsoon rain in the CDZ starts in July. It is essential for paddy during rainy season, but the onset of rain coincides with harvest of summer paddy. Farm practices for keeping or sheltering the harvested paddy in dry space or for drying wet paddy imposes an exhaustive labor on paddy farmers who are engaged in summer paddy cultivation.

If paddy harvested during rainy season can be dried, it is storable. The storage enables farmers to improve their income in Myanmar where people prefer aged rice. Moreover, mechanical drying by drier as compared to drying under the sun enables more homogeneous drying and easier control of paddy moisture content at optimum or suitable range, leading to higher paddy milling ratio (lower rate of broken rice). Expecting these advantages, a paddy drier was introduced as an activity of the Pilot

[4] Population and arable land area is based on statistical Yearbook 2004 (data in 2003), while Thai data are referred to HP by the Ministry of Thailand (data in 2003).

Project in Legaing Village coupled with provision of a technical training including manufacturing of milling rollers for improving the villager's milling techniques. The paddy drier has simple structure. Heated air stream evolved from ignition of paddy husk is blown below the heap of paddy by means of a blower fan driven by a diesel engine. The quantity of paddy that can be dried per operation of the drier amounts to at maximum 200 basket (equivalent to about 4 tons), and required drying time ranges around 4 - 6 hours.

1) Benefits inputted to the committee that manages and maintains the paddy drier

Paddy farmers themselves carry their harvested paddy to the drier, but they have to pay the rental fee of the paddy drier to the committee. The rate of the rental fee is 2,000 Kyats per 100 baskets. About 7,200 baskets of paddy was mechanically dried as a total from July 2008, or the incipient period of the machine operation to late August. 125,000 Kyats in total has been collected as the rental fee (as the use of the drier is partly allowed on credit, all the fees could not so far collected from all the users). Out of the collected fee, about 20,000 Kyats has so far been expended including adjustment of installation at the trial run and minor repairing. Namely, the committee could gain a net profit amounting to 105,000 Kyats (= 125,000－20,000, this is equivalent to 105 man-days assuming the per diem wage of a farm laborer; 1,000 Kyats).

2) Benefits evolved in miller's activity

An example of a miller who improved his own milling machine after receiving training on improved milling techniques is mentioned here. After this improvement, capacity of dealing with paddy has increased from 150 to 200 baskets per day. Besides, expenses and number of days to change milling roller could be economized since this miller acquired technique of manufacturing milling roller by himself. What's more, time required for milling can be shortened if dried paddy with paddy dryer is milled. In the case of operating milling machine 10 hours a day, the capacity of milling machine is at maximum 200 baskets for sun-dried paddy, but this capacity will become 220 baskets for paddy dried mechanically by the drier. As such, the economic benefits evolved from improvement include: 1) a benefit increment by 30% evolves from increased clients through quality improvement, 2) Reduction of the running cost by about 10% through acquisition of techniques and 3) further benefit increment by 10% if mechanically dried paddy is milled.

3) Benefits evolved in farmer's activity using paddy drier

People in Myanmar prefer long-stored rice. Aged rice has a softer and more pleasant palate when boiled as compared with freshly harvested rice. Farm-gate price of paddy as of August 2008 stood at 3,500 Kyats/ basket (equivalent to about 21 kg) for freshly harvested rice, whereas long-stored rice was traded at 5,000Kyats or 1.43 times as dear as new one. Namely, storing paddy for about half a year will enable farmers to augment their margin by more than 40%. Farmers who cannot afford to store their harvests have to hastily sell them, while the rate of those who can afford might account for only about 20% of all the farmers. Anyway, paddy drier has given farmers who crop dry-season paddy a potential of earning 43% more at gross farm income.

Farmers in need of cash in their pockets too often sell paddy even when they are in a state to store paddy at home. Rice milled through paddy passed in paddy drier has such advantageous characters as higher storability owing to controlled moisture content, beautiful luster of grain surface, less rate of broken grains etc. Rice traders buy grain with these advantages at higher prices. By passing paddy through the drier, a net benefit equivalent to 15,500 Kyats per 100 baskets benefit will be added, or increase farmer's income by 4.3%.

The above-cited net benefit equivalent to 15,500 Kyats /100 baskets is evolved when farmers used

hitherto conventional driers. When they mill 100 baskets of paddy at ordinary mills, they can obtain 45 baskets of milled rice and about 3 baskets of broken rice. However, if they mill their paddy using mills equipped with improved milling techniques, they can increase yield of milled rice by 1.5 baskets, whereas they can reduce broken grain by the same 1.5 baskets. Milling with a milling machine with improved milling techniques enables farmers to obtain additional income equivalent to 4,100 Kyats /100 baskets, and if this increment is added to the above-cited benefit increase by 4.3%, the sum of the increment, or income increment by 5.5% as compared to hitherto amount of sale would be brought to the farmers.

4) Provision of a low-interest loan to the villagers

Mushroom culture targeted to the landless women is also promoted in Legaing Village as an activity under the Pilot Project. In most cases they can hardly afford to manage cost of material purchase to start this activity. The material needed to start the culture consists of seed strain of mushroom, vinyl sheets and supporting bamboo sticks to prepare dome shaped greenhouse of the scale; 40 - 50cm in height and about 5m in length and cow dung etc. The initial inputs required for starting mushroom culture with single bed of the scale 1.5m x 5m cost about 7,000Kyats. Loan with the monthly interest of 3% is serviced from the committee of paddy drier to the culturists who cannot afford to provide this amount appropriating a part of the rental fee deposits of the drier. In October 2008, the loan amounting to 6,600 Kyats per person was granted to 5 landless villagers for promoting mushroom culture. Since the monthly interest by private credit organizations ranges 5 - 10%, this loan provides the landless with a favorably mild credit condition.

5) Individual benefit and benefits by value added chain

Summarizing what has mentioned above, in terms of individual use of paddy drier, a net benefit amounting to 105,000 Kyats evolves at the operation and management committee (or equivalent to 105 man-days of farm wage laborers who receive 1,000 Kyats). At the same time, on the side of farmers who use paddy drier, the drier provides them with a potential of increasing their sale profit by about 40% assuming storage of paddy for half a year because they can manage to dry paddy harvested as dry-season during the onset of rainy season. Also, when farmers sell milled rice polished with improved milling machine after passing through paddy drier, they can increase their net benefit by around 4.3% because rice traders buy it at higher prices.

Evaluating this paddy drying activity from miller's side, increment of their benefit by 30% will evolve from augmented clients owing to improved rice quality. In addition, the miller can reduce his running cost by about 10% owing to his acquired ability of changing part, milling roller by himself. Based on this foundation, if he mills paddy passed through the paddy drier, 1.2% of the net benefit can be added onto the above-cited benefit increment by 4.3% owing to less rate of broken grain, thus obtaining net benefit increment by 5.5%.

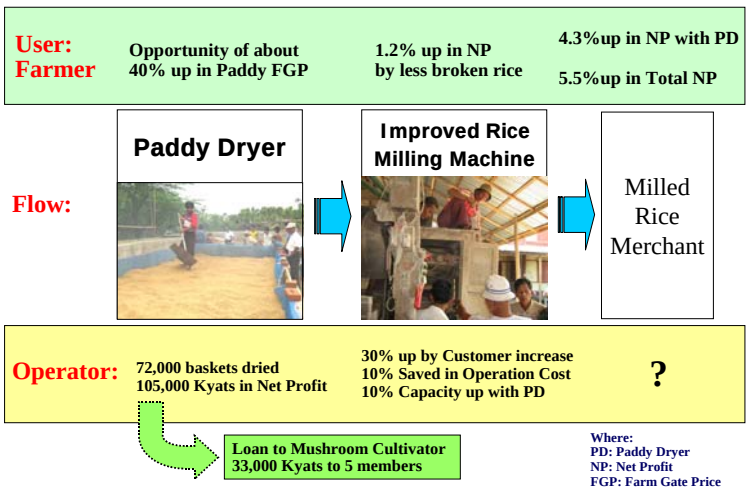


Figure 6.1.9 Value-added chain by paddy drier & improved milling machine

In this way, both introduction of paddy drier and improvement of milling techniques evolve benefits as separate projects, but they

bring increased benefit to the farmer's side, as well. In this case, if farmers use the paddy drier and the improved milling machine with improved milling techniques, they can enjoy with both of these activities. Besides, operation and management committee of the paddy drier has provided low-interest loan service. Taking all these into account, this value-added chain system evolves not only synergetic effect of the project, but also does real outcome (positive impact) covering the overall participants.

6.1.9 Revolving Fund as Project Safety Net

Under cottage sector pilot project as well village electrification project, there is a trial to establish village revolving fund. The logic is that necessary equipment is supplied to the system of cottage industry promotion, but the involved members are supposed to amortize the amount of capital fund or have to pay user rental fee to the main committee established at the village level. Also, the electricity charge paid by the villagers are to be collected at the committee in charge which is established at the village level, whereby it can work as village fund. This trial has been tried in 7 villages including the pilot projects commenced in FY 2007/08 as summarized in the following table.

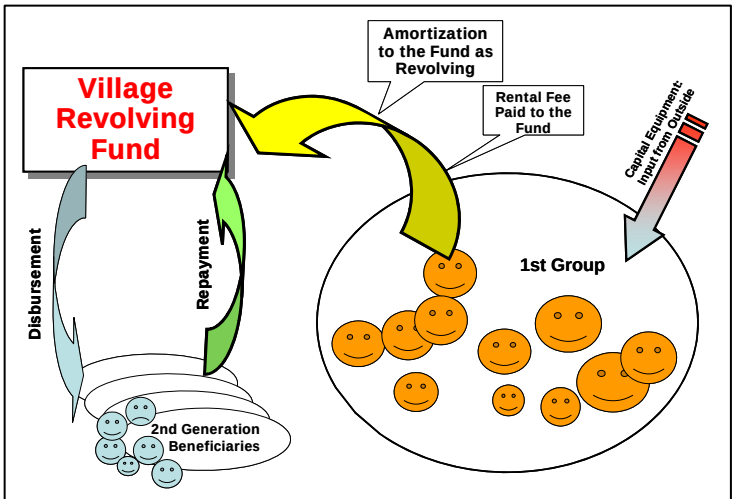


Figure 6.1.10 Mechanism of Village Revolving Fund

Table 6.1.11 shows the operation in terms of income and expenditure that the main committee has undertaken by village. Though they received income from different cottage activities except for Khaungkawe village where operation has ceased, they needed to spend expenditures such as repair of the equipment and machineries, improvement of the equipment, etc. Therefore the amount that the committee holds as of January 2010 may not seem much, ranging from about 45,000 to about 1,220,000 Kyats. However, there is at least positive balance, excluding village electrification in Mon Taw Gyi village, with which they can revolve or enlarge their activities. In fact, some village development related activities were already funded out of the income:

Table 6.1.11 Balance of the Village Revolving Fund, Kyats

Village	Project	Income	Expenditure	Balance	Remarks
Khaungkawe	Tinsmith, Guitar key	-	-	-	Not operational
Khaungkawe	Bio-gas electrification	3,890,200	3,370,465	519,735	
Ma Gyi Sauk	Embroidery, Knitting, Weaving	1,195,470	119,500	1,075,970	Including sold sheep & goat
Legaing	Paddy Dryer, Road station	366,000	316,460	49,540	
Mingan	Trollergy	2,913,200	2,652,220	260,980	
Mingan	Diesel Electrification	2,465,300	2,244,500	220,800	
Ar La Ka Pa	Tractor	3,862,000	2,641,875	1,220,125	
Magyi	Multiple Hand Weaving	-	-	45,250	Group revolving
Mon Taw Gyi	Paddy Husk Bio-gas electrification	2,419,000	2,651,055	-232,055	Still debt as of Jan. 2010

Source: Book keeping of each village's main committee

For Ma Gyi Sauk village, the committee keeps 766,770 Kyats which came from the selling of revolved goat, which was also one of the pilot projects in this village. At the time of handing over so-called revolving goat, there were no potential villagers who were to raise the goat. Therefore the committee

sold the goat and instead keeps the money in their account for future use. For the Mon Taw Gyi village, why the balance is negative is that there were villagers' parts in the construction, e.g. staff house, paddy husk storage, fencing, etc, which required as mush as about 700,000 Kyats. They are still paying back the due out of the income of electricity charge. So far, there have been some village related development activities funded by utilizing a part of the incomes in some villages. Some of the activities are as follows:

1) In Ma Gyi village, a total of 594,200 Kyats was lent to an engine-weaving group, one of cottage sector projects in the village. The activity requires certain amount of initial cost to start up, e.g. materials and diesel, etc. The committee decided to lend such money to start up the activity with which the activity revived and started the operation from February 2010.

2) In Legaing village, total 30,000 Kyats loan was disbursed to 5 mushroom cultivators in October 2008 as start-up capital with an interest of 3% per month. In addition, an amount of 30,000 Kyats was loaned to a group for the purpose of local cattle improvement without interest to purchase a better bull than what was provided by one of the pilot projects. In this project, they sold the original bull at a price of 400,000 Kyats and tried to purchase a better one. However, as the 400,000 Kyats was not enough, they asked the main committee to loan out 30,000 Kyats and it was granted.

3) In Legaing village, the committee donated diesel for night school from October to December 2008, to run generator. During this season, students are preparing national examination so that the generator helped their study during nighttime. This arrangement was also repeated in year 2009. In addition, the committee provided stationeries at a total cost of 10,000 Kyats to 10 new primary pupils in April 2009 who were attending Save the Children nursery school.

4) In Mingan village, 20,000 Kyats was availed as bailment. In December 2008, a villager was put in jail because the household broke a fire and burnt not only their house but also neighbor's house (at the same time all the goat under the goat revolving pilot project were lost). The person was released on the 20,000 Kyats bail which came from a part of electricity income.

5) In Ar La Ka Pa village, same event happened to the bull of Legaing village. The bull committee sold the original bull, provided by one of the pilot projects, and they got 400,000 Kyats at hand. What they wanted cost them as much as 700,000 Kyats, which means they were in shortage of 300,000 Kyats. Then, the village fund disbursed 300,000 Kyats without interest. With this top up of 300,000 Kyats, the committee could buy new bull. In addition, the village fund disbursed 115,000 Kyats for repairing motor for water supply facility. One of the pilot projects in this village established drinking place for both livestock and household use. The fund was utilized for the repair of the motor.


Mushroom culture supported by village fund


A bull purchased with a help of 30,000 Kyats loan by village fund

What can be seen in Legaing village is not only a synergy effect but also worked as a revival measure of local cattle improvement pilot project. The villagers did not like the original bull provided by the project. They finally sold it at a price of 400,000 Kyats in August 2008 to escape from the burden of feeding the bull (bull cannot be used as draught cattle). This money they got was not enough to buy a new one, and then they asked the committee to loan out them 30,000 Kyats. With this loan, they purchased a new bull in December 2008, and thereby the project was revived. Same event took place in Ar La Ka Pa village as well where the committee topped up 300,000 Kyats. In addition to these cases, we can see several village development related activities born from the village fund.

6.1.10 Technology in Different Contexts (as example of improved stove)

An improved cooking stove was introduced in 4 villages under 08I1-2 Improved Cooking Stove Promotion Project. Of the 4 villages, 2 villages of Pabe North in Chauk TS and Magyi in Ngazum TS showed very positive impact, but in the remaining 2 villages which are Kan Pyuu in Ayadaw TS and Nga Zin Yine in Tada-U TS, the project did not succeed. The improved stoves introduced are shown below, left of which has only one cooking hole while the right one has 2 cooking holes. Both types of the stoves have following advantages:

1) The stove is enclosed by clay soils available in and around the area, ensuring high-energy efficiency. Firewood can therefore be saved by at least 20% to as much as 50%, and in most cases they reported to be saved by one-third. Cooking time is also reduced by around 20% - 30%.

2) Since it is enclosed, fire hardly catches house. In fact, fire is an acute issue in CDZ. Almost every year, lots of people suffer fire, burning down their houses and properties. In fact, one of the goat beneficiaries in Mingan village in FY 2007/08 got fire and lost her all the goats, house, and also the rural health sub-center in that village was burnt down. With the stove enclosed, they can prevent fire from catching on their house, and what was stressed by villagers was that they can use even stems of pigeon peas. The stems of pigeon pea tend to spark when burning, easily catching fire if used on conventional stove.

3) Ashes after burning of firewood can drop down easily through iron mesh installed at the bottom of the stove. The ashes can easily be taken out from down-side hole (in the left photo) or from the space installed beneath the fireplace (in the right photo).

4) The stoves which have one cooking place can basically be moved. The stove with one fire place can be easily lifted up and put in other places. In CDZ, it can be often seen that the people cook in house yard and not in kitchen house during hot summer season. This is because they would like to reduce the risk of catching fire. The stove can follow this practice.

In the 2 villages of Magyi and North Pabe, there were about 20 used each as of January 2009, and the villagers were installing one by one. In fact, about 120 households out of total 140 households in North Pabe village have adopted such improved stove by the time of December 2009. On the other hand, in Nga Zin Yine village there are 15 stoves constructed during the demonstration but no sign of being extended is taking place. The villagers are accessible to a cheap pre-fabricated stove as shown in the photo below. It costs them only 300 Kyats. Though it is not durable which usually cannot be used over 1 year, villages prefer the prefabricated one since they can avoid masonry work required for making the stove suggested by the Project.

In Kan Pyuu village in Ayadaw TS, though one stove was constructed in October 2008 as demonstration at the house of village chairman, even that stove is no longer in use since February 2009. None of the villagers followed the improved stove. Their stoves are mostly made of only bricks or in some cases stones just placed. The villagers are in fact accessible abundant firewood in and around the village, and therefore they are not interested in firewood saving stove at least at this time. Also water is relatively much available as accessible to small lakes, reducing the risk of catching fire.

Villagers who live in firewood scarce areas and also in fire-risky areas accepted the improved stove. The villagers in Pabe North are really delighted with the fact they can now use the stems of pigeon peas as firewood substitute. However, villagers in Nga Zin Yine and Kan Pyuu do not like the introduced stove because they have other means to cook or are not worried about firewood. In future, they may accept the improved stove, but at this moment they would go simple pre-fabricated stove or even with conventional stoves. Thus even if technology itself is good, whether or not it works depends on the context where people make living.

6.1.11 Projects Affected by Outside Factors

Under cottage sector, there are 3 projects which are very dormant in operation or have ceased the operation. These are 07C1 Tinsmith Strengthening Project and 07C2 Guitar key Strengthening Project in Khaungkawe village, and multi-layer (manual) weaving promotion introduced in Magyi village under 08C1 Village Revolving Establishment Project. The reasons why they are not well operational are as follows:

At first the beneficiaries in tinsmith and guitar key production were hit by fuel price hike having taken place in year 2008. They could hardly fetch any profit with fuel costing them over 4,000 Kyats per gallon. Then the fuel price started nose-diving after September 2008 associated with the world wide financial crisis. Though the fuel cost became cheap, unfortunately material costs have not become cheap.

For example, tin materials cost has been hiked by as much as double as compared to what was in FY 2006/07 when the project was designed. To cope with the material cost hike, the tinsmith producers had to reduce the size of bucket in that they became able to produce 3 smaller buckets out of one-iron-galvanized sheet instead of standardized 2 buckets (in fact, this was a sneak measure to sell the bucket at the same price as before). The machine provided under the Project can hardly produce such smaller buckets, thereby the production by using the equipment came to the halt.

For the guitar key strengthening, apart from material cost hike, cheap Chinese-made guitar key started coming to Myanmar sometime since the mid of year 2007. Though there were already Chinese made

guitar key even before the time the project was designed, it was not much in market. The guitar key producers in Khaungkawe village were in fact only the ones who produced the guitar key in Myanmar. They tried to compete with the Chinese made guitar key by improving the quality using equipment provided by the project.


Tinsmith Production

However, the buyers started buying the Chinese made ones since it was cheap by about 30% as compared with what is produced in Khaungkawe village. This is partly because of high material cost in Khaungkawe village. The material cost was increased by almost double as compared to 2 years ago. Keys must be produced in bulk volume in China, which in turn contributes to making the Chinese guitar key further cheap. The keys produced in China are also more decorated, whereby younger generations are more attracted. All these situations led the producers to halt the key production in Khaungkawe village.


Guitar Key Production

In Magyi village, there are weaving groups who used to work as wageworker before the project came in. They used to operate multiple-layer weaving machines owned by a trader, where they worked as his workers. The projects purchased the machines and provided them. Since they have had the skill of using the multiple-layer weaving machine already, they smoothly started the operation. By the end of October 2008, each loom had produced minimum 8 sets to maximum 15 sets of products by the beneficiaries.


A Multiple Layer Weaving

However, out of 5 beneficiaries using special hand looms supported by the project, 4 had to often stop weaving, starting from mid December 2008. This is because of the aftermath of world wide financial crisis. The buyers come from Mandalay, which is still near the Magyi village. However, the market to which the buyers sell out is in Thailand. Since the products woven by multiple-layer machine is very sophisticated, rich Thai people used to like them. Faced with the world wide financial crisis, the market in Thailand was shrunken very quickly. As of January 2010, though one of the members has been continuing the production targeting nearby markets, other members are just intermittently producing according to orders from nearby.

As things get better in world financial market, the weaving project in Magyi village may probably be revived. However, tinsmith strengthening project and guitar key strengthening project in Khaungkawe may not be able to revive. Especially, guitar key strengthening project would be hardly revived. Though it is very difficult to predict these outside factors, there may be following lessons;

1) If there is competition to be expected with products which can be produced cheaply, e.g. Chinese made guitar key, there should be consideration in strengthening such cottage industry.

2) Equipment should be designed not to fix the product dimension but to be adjustable in producing different size of products if possible from technical point of view.

3) There should be measures to diverse markets not only in foreign ones but also domestic ones. To meet diverse markets, the producers may have to equip with different skills, producing different designs.

6.1.12 Provision of Venue of Peer – Peer Learning

Under pilot project of 08A1, 08A2, and 08L1,2,3, a series of training courses were arranged inviting MAS and LBVD officers. Agricultural extension officers came from 12 TSs and livestock officers from 6 TSs. The training courses undertook not only lectures and practices but also peer-peer learning. There were sessions wherein they listed problems and constraints they have faced in their jurisdictional areas and exchanged how they have solved or why these have not yet been solved (see an example in the photos below). Their achievements were also discussed. Through these sessions they exchanged their experiences, which we believe enriched their capability as extension worker. Following are excerpts of comments given by the participants;


The Problem Sharing Session facilitated by NPD


The Problem Sharing Session facilitated by CP

1) We gathered from different places, then we exchanged different topics taking place in each of our places. We communicated each other, peer – peer, so that we could share individual constraints and our experiences, thereby getting collective insight.

2) What we gathered from different places is in fact a merit, because we made exchange of topics through practices in a group and collective staying in the same lodging. We could share farming intelligence in each of our service areas. We debated advantages and shortcomings of our farming found in our fields of extension services. Therefore we could share concept and knowledge on individual farming practices. We appreciate that our mutual understanding, which deepened through our mutual communications, has created a benefit for us.

3) A female participant expressed her opinion in a way; ‘I had always been in a position of learning techniques, but in this training I could play both student’s role and teacher’s role since I could present my own experiences to all other participants’. In connection with this, participants commented; ‘to share among all the staff our experiences of confronting problems at our sites and of taking measures for our solution would make ourselves confident’.

4) A unique comment was that; we wanted to stay in one place (participants were divided into group for their lodging due to the accommodation’s capacity), because staying together in one place enables them to review/ home study among roommates, also exchange of views and opinions among ourselves.

When we carry out workshop, we very often can find similar comments. In workshop there is no chairman but only facilitator. Facilitator does not govern the floor but just facilitates exchange of opinions, exchange of views, on which participants themselves try to find a way by learning each other.

Teaching is in fact important in a training session, but at the same time we should try to arrange a venue wherein the participants can learn each other whereby themselves. Learning peer-peer is a reciprocal way of inputting information to our brain and outputting ideas from our brain. We tend to better remember things when we make our brain work in a reciprocal way.

There is a country where they do not use the word of 'teacher' or 'teach' in school. This is because they think the teacher's primary role is not to 'teach' but to make such enabling environment wherein student learns himself, herself, and themselves. In fact, problems and experiences the extension workers have faced in their areas could be live materials for training, on which trainers should start giving solutions by lecture, which can meet the field condition, thereby the solution should be more workable. Whenever training course is programmed there should be a session where they can learn each other.

6.1.13 Beneficiary Selection in Pro-poor Oriented Pilot Project

There are pilot projects targeting the poor, like non-farm households and specifically farm casual labor households who in most cases consist of the poorest of the poor. Those pilot projects are 1) mushroom culture, 2) goat/sheep revolving and 3) pig revolving. Following table summarizes the beneficiaries of these projects by their social category, e.g. farm HH, non-farm HH and out of which farm casual labor HH is segregated. The table indicates:

1) In the project of mushroom culture, percentage of the non-farm HH is 43% and 35% respectively in FY 2007/08 and FY 2008/09, indicating more than half of the beneficiaries were farm household. In fact their farmlands do not exceed 5 acres per household in most cases, falling in small-scale farmers with 1 – 3 acres only. The project informed the village authorities and also concerned TS officers to select the beneficiaries out of non-farm households as well as from small-scale farm households. Though both categories were covered, farmer household beneficiaries were more than the other, and the farm casual labor household beneficiaries consisted of a quarter (23%) to one third (33%) only. The reason behind is that 1) mushroom cultivation needs intensive care during the growing period of about 2 weeks, giving aeration, watering, etc. for which beneficiaries experienced in some cultivation were sought, 2) mushroom should be marketed outside village and so beneficiaries who have access to outside village were sought.

2) As per goat (sheep) revolving pilot project, most of the beneficiaries are in fact non-farm households, and also farm casual labor households are well incorporated in the project. Specially about 90 % of the beneficiaries in FY 2007/08 are from landless (non-farm) households, all of whom depend on farm casual laboring. For the beneficiaries in FY 2008/09, the percentage of the non-farm household beneficiaries were reduced but still about 80% are landless, depending on farm casual labors. In FY 2008/09, the selection was totally given the responsibility to the LBVD TS officers together with village authorities. The TS officers might have had a tendency to include smarter villagers who mostly come from farm household though the percentage is not much.

3) For pig revolving project, non-farm households and also farm casual labor households are well incorporated in the beneficiaries both in FY 2007/08 and in FY 2008/09, though, their percentages are bit lower than those of goat (sheep) revolving beneficiaries. The percentages of farm casual labor households were 67% in FY 2007/08 and 63% in FY 2008/09. Pigs have to be fed within their house yard, and therefore they need to purchase or access animal feed such as rice bran, oil cake, etc. This condition may have contributed to lowering the percentage of the poorest of the poor.

Table 6.1.12 Summary of the Pro-poor Pilot Project Beneficiaries by Social Category

Project	Category	FY 2007/08		FY 2008/09		Remarks
		Nr.	%	Nr.	%	
Mushroom Culture	Farm HH	23	58	26	65	
	Non-farm HH	17	43	14	35	
	Farm Casual Labor	9	**23**	13	**33**	
	Total	40	100	40	100	
Goat(Sheep) Revolving	Farm HH	8	9	25	21	
	Non-farm HH	82	91	95	79	
	Farm Casual Labor	82	**91**	95	**79**	
	Total	90	100	120	100	
Pig Revolving	Farm HH	3	20	15	38	
	Non-farm HH	12	80	25	63	
	Farm Casual Labor	10	**67**	25	**63**	
	Total	15	100	40	100	

Source: Field survey done by JICA Study Team, 2007 and 2008

6.2 Issues Identified through Study Implementation

Issues specifically related to pilot projects were mentioned in the previous sub-chapter 6.1 "Issues identified from Pilot Project Implementation". Referring also to these issues, here describes issues on extension activities in the context of rural development, of which MAS and LBVD are mainly in charge. The topics to argue are: rural development in the context of CDZ, official approach, private approach, necessity of interactive extension norm, policy and incentive to production / effects of policy on production, women involvement, and approach for the poor, etc.

6.2.1 Rural Development in the Context of CDZ

One of the specific characteristics of the CDZ is its unstable rainfall pattern. Rainfall is in fact not much falling, ranging from 800 to 1,200 mm per annum, and moreover the pattern varies very widely by year, by month and by place. Looking at the rainfall patterns for the last decade, there were drought in years 1997 and 1998 which rainfall reached only half of that of normal years. Rainfall pattern becomes much more instable at the onset of rainy season, that is May. The rainfall in May varies over 5 to sometimes 6 times between drought spell and normal spell. Farmers of course have been aware that phenomena, and feel the instability is getting more and more by year. Some of them reported that Le (low) lands have changed to Ya land (upland)[1].

On the other hand, one can see a lot of paddy fields along the Ayeyarwady River, its tributaries, and also in lowlands leading to those water courses. One may further be surprised at seeing irrigated paddy fields in such area called 'Dry Zone'. If the paddy fields are run under rainfed condition, paddy yield can easily be affected and varies very much accordingly, however the yield may still be within a reasonable range that the farmers can expect as compared to that of upland. In paddy fields blessed with irrigation facilities, 2 times paddy cultivations per year are usually practiced, and further together with chick pea cropping coming after rainy season paddy, such fields can realize 3 crops a year.

In sum, we may say there are 2 extreme poles in the CDZ, one of which is upland farming carried out under rainfed conditions, while the other is paddy farming blessed with irrigation facilities for which the yield can be stable even under instable rainfall. The former can be a representative of extensive farming while the latter be a representative of intensive farming. For the former, people's livelihood should be based on risk-hedged strategy while for the latter linear oriented growth can be pursued if so hoped because the farmers can expect calculable return as against the investment.

Here concerned is the extension norm of MAS officers; which centers on Production Increase. 1st priority is the increase of rice production which is the national staple food, 2nd priority is the increase of oil crops production which can save foreign currency expense[2], and 3rd priority is again the increase of pulses and beans which can earn foreign currency. In irrigated farmlands, linear oriented increase can be pursued because there is a high correlation between the investment and the return up till reaching to a threshold to curve down. However in upland depending totally upon instable rainfall, no one can expect consecutive normal level of harvests over 3 years especially along the Bago Hills. Under such condition, investment such as chemical fertilizer entails increasing of risk other than increasing of harvest, possibly resulting in a default of paying back the debts which in many cases are needed to buy the input.

[1] For example, U Kyaw Hlaing in Ar La Ka Pa village said soils and climate have been deteriorating year by year. In fact Yar lands have very much got worse since 7 years ago as far as he can remember. U Thaung Hlaing said rainfalls are scarce and instable as compared to the past, and especially paddy is nothing but worse nowadays. There are a lot of farmlands which have changed from Le to Yar. U Kyaw Thaung in Ma Gyi Sauk village said climate has been getting worse and worse, especially the rainfall, as compared to the past, and on top of that, harmful insects have been increasing.

[2] The Union is importing lots of palm oil chiefly from Malaysia. This is the reason whey the Government promotes oil crops which can reduce the import whereby saving foreign currency.

In areas where infrastructure is developed, conventional extension approach centering on norm of increase at any rate can work very well. However, on the other hand, extension norm should center on a risk hedged development strategy under instable condition which can be many seen in upland farming areas. This point inevitably leads us to low input farming promotion for upland farms placed under instable rainfall conditions. Other livelihoods which cannot easily be affected by instable rainfall should also be promoted in parallel with such low input farming, which are for example livestock and cottage industry.

Taking into consideration above point of view, MAS extension staff at TS level who are located at the frontline should be equipped with the extension norm pursuing risk hedged development in addition to what has been practiced so far that is the straight forward increase of product. To make it happen, MAS extension staff should collaborate with LBVD extension officer as well as officer of Cooperative Department such that they can have wider views in their extension activities from the view point of people's diversified livelihood which can realize risk hedged development.

6.2.2 Official Approach

1) Extension System

Extension system in Myanmar is well organized since the basis had been formed during the British colonial era. However, it has been noticed, through the pilot activities and interviews to the government officers, that the principle of extension for them differs from the one that the Study Team advocates. The principle of extension for the government officers is to send out the instruction of the government in every corner of the villages, so in this sense there will be little room for consideration of circumstances of each area.

The same variety of rice is grown almost everywhere, or the technologies introduced are the same in many places and there are many cases that the Study Team hears the precisely same responses from different extension officers as if they are written in the manuals. On the other hand, feedback from the ground is hardly observed except for the outbreak of pests. The principle that is, as the Study team thinks of, extending technologies according to the field situations would be hardly expected to exercise under the current norms of the extension work.

However, there is also a potential that the extension officers could give useful information to the farmers off the government's instructions, e.g. a lead farmer, who subscribes an agriculture magazine published by the Department of Agriculture Planning, states that the magazine is very much useful to acquire knowledge on farming and he trusts the articles. This example would indicate that the government officers could keep opportunities for performing both their duty as the government officer under the context of present Myanmar and abilities as agriculture or livestock expert.

The former opportunity is given to send the governmental instructions to the public and the latter one is exploited to disseminate information indifferently from the governmental instructions. It is recommended that the extension of the technologies according to the actual situations on the ground should be carried out through such media that are not really subject to the governmental instructions, namely enriching the contents of the media e.g. featuring specific local area at each publication. Adding to that, it is necessary to support the extension officers at TS level as the frontline officers to be able to understand the contents of the articles and accurately respond the inquiries from those farmers who rely on such published information.

2) Extension Officers

As mentioned above, major administrative institutions, which station extension officers in the Pilot Project area, are MAS in the Ministry of Agriculture and Irrigation and LBVD in the Ministry of

Livestock and Fisheries, and to an extent Cooperative Department under the Ministry of Cooperative. The common issue of these organizations is extremely insufficient budget and number of extension officers, e.g. wideness of the area to be covered by a TS office (38 km x 38km as average). It is difficult with this condition to assure that they have been performing sufficient extension works up to every corner of their jurisdiction.

The condition has resulted in limiting the range of their essential extension activities, as the work of MAS and LBVD has focused only on conveying the information on the government policy and to deal with animal diseases respectively. It is considered that this work could be their maximum extent with the current budget level, i.e. new activities like this Pilot Project require additional budget allocation or any other incentives for the extension officers. At the same time, it is also required for them to equip with wide range of knowledge on their expertise, which they have hardly exercised, albeit it is fundamentals for their work.

A good extension officer is the one who conveys the government policy precisely to the farmers, can urge all the farmers to follow the policy, and can achieve the numerical targets set by the government. In this context, the one who disseminates the appropriate technologies according to each and every circumstance is not always regarded as a good extension officer. This evaluation has hindered the extension officers from considering individual local situations instead of following nationwide uniform conditions.

That situation might have kept them a little away from thinking about the fundamental issues for agriculture extension such as paddy cultivation technologies (seed selection, nursery preparation, duration of nursery, land leveling, yield components, depth of transplanting, interval of plants, water management, drying grains, appropriate secondary crop etc.), technologies for upland field, which occupies 70% of the central arid land (deep tillage, fertilization with balanced NPK based on the soil diagnoses, organic pest control, kitchen gardening for the villages equipped with hand pumps, etc.), and livestock rearing (ruminant rearing, improved animal shed, improved feed combination, fodder crop production, breeding improvement, etc.).

On the other hand, the ability of the extension officers to mobilize villagers is excellently high; hence the possibility of acquiring a good number of villagers' participation in a project is high when cooperated with the village administrative institutions. However, it is not easy to confirm whether the mobilized villagers are really wishing the implementation of each and every project, because what the extension officers disseminate has neither options nor room to change the contents according to the situation. What is left for the villagers may only be whether to take or not and be successful with it or not. Under such circumstance, a lot of villagers make decision after they see the consequence of others who have taken the deal first.

Furthermore, the people live with a kind of religious background that would let them accept the failure as a misfortune (most of the beneficiaries in the Pilot Project area are Buddhist). As a result, it appears to the outsiders that the opportunity of obtaining lessons and feedback has been lost. Also the extension officers so often mention that the villagers are not educated, i.e. they identify the reason of failure as uneducated villagers, and so they could not understand the explanation of the extension officers. This idea has been a hidden obstacle to get feedback from the ground, which is a necessary process for improvement especially at a time of introducing a new technology.

When trying to improve the production technologies in the villages through the extension officers, one would realize that constraints on them borne in their environment are too rigid to work on agriculture and livestock, which deal with ever changing nature. As a result, it is likely that the extension officers would not be able to work out with responsiveness to the individual situations.

However, for the technologies that can uniformly be applied throughout the nation such as provision of seeds and fertilizers, vaccination, etc., the extension officers can work out their tasks swiftly and effectively on condition that the budget was secured. In other words, in case of dealing with the contents, which are difficult to put into manual, it would require alternative ways of extension for more effective dissemination other than using the existing arrangement and working norms because of the rigid conditions surrounding the extension officers.

3) Village Administrative Institutions

The administrative agency in the rural area is PDC based on Village Tract and the chairman of the PDC is unpaid but considered an honorable post, and appointive on condition that the one follows the policy of upper organs. Also because the chairman needs to be respected from the villagers, the candidate has to be a university graduate to qualify for the chairmanship since year 2006. In the PDC, as the secretaries are employees of the Ministry of Home Affairs (in normal case hired locally), they get paid from the state, thus their economic status may be a little better than the chairman.

The PDC in the Village Tract is the smallest unit of the administration with SPDC (State PDC) as the top organization. They are responsible for conveying policy of the upper organs down to the villagers and therefore they are usually in a position to receive orders from the upper organs. Although they sometimes convey the petition of the villagers to the upper organs, it should be said that such case is rare. This characteristic of the organization is the same for the government officers like the extension officers who visit the villages. When the Study Team visits villages with the counterparts, they always mobilize the concerned villagers very well.

PDC in the Village Tract (VT PDC) as the smallest unit of the administration is kept busy because it is always subject to follow the instructions of the upper organs and the members always have to take the lead for production allocation policy for crops. In such occasion, they so often take the opportunity of disseminating the technologies, but they are not in a position to judge whether the technologies are appropriate in their area or not.

What they are expected to do is not to choose technologies from variable options but to make the farmers apply the one instructed from the upper organs. As a result, it is difficult to get necessary feedback from the ground to improve the application of the technologies. It is a concern that the people are always occupied to solve the given issues and cannot spare time for due consideration.

It is thus the situation that the committees of VT PDC have not had much experience of choosing things from options. Therefore, considering them as a systematic mediator for extension activities in rural development would be incompatible with their original duties. However, their ability to mobilize villagers and convey information is excellent, and therefore it would be possible to realize efficient extension through their system as long as the media to convey the information is reliable.

6.2.3 Private Approach

1) Source of Technology Information within Village

Although the number is still few, there are people who are called lead farmers, or potential lead farmers, and the pioneer of certain rural industry in the village. Common characteristic observed from them is that they clearly reply with their own reasons and explanations to the question of “Why?”. We can derive a lot of lessons from their practices. Other interested villagers learn the technologies by seeing what the lead farmers do and if the application of the technologies is successful, that will gradually spread all over the village. This kind of useful information does not only come from their own village but also from neighboring villages or sometimes they receive information even miles away from their village. But in many cases the information only include “Who succeeded” and does

not reveal "How they have succeeded".

Under the nature of the CDZ except for the blessed areas with irrigated paddy fields, a natural condition, which makes it possible to apply certain technology for farming, can be changed after a few years or even every year. That means the success of this year would not be realized next year again. This could be one of the reasons why many technologies disappear before they are spread out. To the contrary, it is considered that for the technologies, which have brought the benefits for several times, farmers are possessed with the ideas and cannot leave them to change.

For example, intercropping of groundnut/sesame and pigeon pea can fetch high profit when some amount of rain is expected, but once rain is very little, farmers will go into loss. Despite the fact, farmers in Mingan village, one of the Pilot Project villages, go with the same cropping pattern every year. The farm-gate price of sesame was very high before 1988 because cheap Malaysian palm had not been much imported at that time and sesame was the major crop to extract oil. This background may have given incentive to the farmers to stick on the same cropping. In this village, farmers used to adopt new technologies after careful investigation before the success story came in. But once they got success, it seems difficult for them to leave the success story and try with next alternative crops.

In addition to the ever changing natural conditions in the CDZ, repeatedly disturbing market conditions on trade are making the technologies fostered by advanced farmers and pioneers no longer effective to fetch profit. Since these conditions and other environmental changes are unavoidable, it is considerable to introduce farming planning based on the long-term wide area weather forecast and the technologies with diverse options, from which farmers can select according to each and every condition. When farmers acquire technologies with diverse options, which can entail risk-hedged livelihood, such outcome would be expected that those who listen to the success stories become more attentive and the stories are told not as a superficial rumor but as a real one with more details.

2) Source of Technology Information outside Village

After MAS canceled the distribution of fertilizers to farmers[3], sales promotion of fertilizers and also pesticides by private sector has become active. The private companies explain farmers about how and when to use the fertilizers by colorful pamphlets or even PowerPoint. A farmer says that their explanation is more thoughtful and much easier to understand than MAS and their response to the question is also careful.

The services of the private sector may be said to differ from the extension by the public sector, since the private sector cannot promote the sales without satisfying the customers. However, there is no means for farmers to confirm the reliability of the products and a system to test the ingredients of fertilizers and pesticides by the government has been still under planning. So far the products, which are advertised on TV or magazines published by the Department of Agriculture Planning, have been regarded reliable among the farmers and salespersons selling such products tend to be more trusted.

It is also observed that information is disseminated through the people concerned on markets: brokers introducing lead farmers to plum production technology[4], lead farmers teaching peer farmers on mango production in order for them to secure the amount and quality to ship the products to markets[5],

[3] For chemical fertilizers, only Urea is produced in Myanmar. The fertilizer was produced by the state enterprise and distributed to farmers through MAS at TS level. The Ministry of Industry has undertaken the state enterprise since 2004 and been distributing the fertilizer to farmers through TS PDC. It is said that the production has been decreasing due to the aged factories and the supply price of fertilizer in 2007 increased up to 20,000Kyats in order to reduce the burden of the state. The price in private sector ranges 20,000 to 23,000Kyats as the difference in prices between the state enterprise and private sector is diminishing.

[4] For the purpose of exporting plum to China, plum brokers are disseminating plum production technology to advanced farmers in the suburb of Mandalay city, such as fertilization, how to distinguish fruits to pinch off, pruning etc.

[5] Mango production is also targeted to export to China. A lead farmer living in the suburb of Mandalay city is providing information for mango production technology to the mango producers in his area to collect the same variety and quality. The lead farmer has received the

etc. As for non-farm products, people go directly to markets to get information on hot-selling items e.g. weaving products, or there are people who try to get information on superior bulls in reference to the hearsay purchase price of a calf by broker. It appears that people acquire very little technical information through TV, radio, and newspapers except for the above-mentioned magazine.

Even in the villages remote from the local cities where there are markets, farmers there also receive marketing information to some extent when they sell products to brokers, but not enterprising way. However, the village successful as a whole community makes difference. In a village called Myauk Taw, Kyaukpadaung TS, Mandalay Division, where the villagers produce and sell tamarind, whenever anyone from the village goes to nearby market places, they get market price and share the information among the villagers so that everyone benefits from it to decide when to sell their produce.

Necessary information to be obtained outside village is categorized into technical information and market information. These pieces of information are requisite for people to go with the market economy. But because too much flow of information may cause confusion, it is important to pick and choose from them. On picking and choosing information as well as judging the reliability of the information, people need to have much experience and learning on that particular field. Relying on the judgment of lead farmers would help ordinary farmers make their own decision.

3) Selection / Filtering of Technical Information

The government advocates market economy, but setting targets for production and execution to attain them, and trade control by the government appear almost same as that of planned economy[6]. As a result, current extension system remains one-way from upper organ to the lower. Orders directed from the upper organ are conveyed to the lower. The contents to be disseminated as order have little possibility to choose and the feedback to the contents from the ground would be little expected. It even appears that the government officers may not welcome the feedback because it may be inconvenient for them if the feedback does not follow the attainment of the plan.

There may be cases that one-way technical information dissemination does not meet the situations on the ground (refer to the box). This situation makes farmers lose trust in the technology and furthermore they may become doubtful in anything dealt with the extension activities. Eventually the extension officers find themselves to say “farmers do not adopt the recommended technologies”. As an example, “Villagers are weak to follow the technical instruction” came as one of the priority problems identified by TS MAS and LBVD officers in a workshop held in December 2008. It may, from the farmers’ side, be natural that their response does not take place as expected if the agriculture technology now being extended does not fit in the context of the locality.

While the commercial salespersons have good reputation for their thoughtful responses, information the villagers can get from them are only on the technology information from brokers.

Example of extension, which does not fit the ground:

To well root the plant, using younger rice seedling (21-day) is recommended. However, in uneven paddy field the younger one is not recommendable because the water depth can be too deep for the younger one (it works well if applied on the well evened field).

As for seed selection, gathering seeds from the panicles in the center is instructed, but this is not really practical as it takes time. Seed selection with salt water can be suggested as an alternative.

Increasing compost manure and instead decreasing chemical fertilizers is recommended considering the rising price of the chemical fertilizers. However, average application of chemical fertilizers on the ground is 1/4 of recommended amount. If production increase is a priority policy, it should be recommended to apply both compost manure and chemical fertilizers.

Compost manure improves physical structure of soil, so that the expensive chemical fertilizers are well retained in the soil and the plant can well absorb the nutrients. Thus a combination effect is expected from the use of both kinds. However, the contents of extension in Myanmar tend to be single as recommending compost instead of expensive chemicals.

[6] After abolishing the compulsory delivery of rice to the government, confiscation of the land use was also abandoned. Then forcible measures to make farmers obey the system have been abandoned, but for the policy for agriculture production and pricing, the system has been almost the same as the time of planned economy.

products they are dealing with. Therefore, the salesperson is not a sufficient technical information source for farmers who need information according to the individual situations. Also the commercial providers do not deal with such farming technologies to minimize the external inputs as organic farming or utilization of soil microbe. If the items are so expensive that farmers hesitate to purchase them, they will see the performance of their neighbors who use the items before they make decision.

It is more likely that the lead farmers have been collecting a lot of technical information including those from commercial providers and the peer farmers could get advice from the lead farmers on the farming method according to their farming scale. In fact many extension officers have been working with the lead farmers as their contact farmers. In this case, it may safely be said that the key to successful extension in the area depends on the ability of the lead farmers to select the technology.

In many cases, lead farmers are also the leaders of 10 households group and/ or 100 households group, so that it can be said that the lead farmer inevitably becomes the contact farmer for the extension officers. Anyway one-way and limited technical information the extension officers convey to the farmers can be filtered by the lead farmers and spread afterwards to the farmers in the area.

Farmers are normally conservative with the technologies and they would not try the new one until they are really convinced of the effect. They usually try with only a single technology, as well. Since it adds cost to try several options and patterns at the same time, farmers normally observe the trials of their neighbors or friends at first to ascertain the effect of the technologies. However, if the farming and animal rearing conditions are different from one's own, the practice of their neighbors cannot be useful for them.

Therefore, it will be important for the extension to specify the conditions where the technologies are adopted. This implies the need of lead farmers as many as the existing different conditions and if there is not enough number of lead farmers, it will be necessary to nurture lead farmers. Filtering technical information by the lead farmers comes after they are established, but for the short term program like this Pilot Project, it requires to implement both developing lead farmers or pioneers and acquiring filtering skills from options.

4) Verification of Newly Introduced Technologies

The verification of newly introduced technologies has hardly been carried out. This issue could be attributed to the factors: the system of one-way information dissemination does not necessitate the verification by its nature, and the preconditions to apply for the technologies are hardly explained, hence the verification cannot make sense. Unless the preconditions for the new technologies are well explained, farmers may expect the almighty technologies, which can work under any conditions.

Consequently it is natural for farmers not to take time to experience that the new technology failed. Current extension activity undertaken by the extension officers is like instructing as manual says, and as the explanation of the contents and preconditions are insufficient, it makes it difficult to verify "Why the technology succeeded under which condition?".

As for introducing new technologies by lead farmers, the technologies are usually elaborated according to each and every condition of the lead farmers and it can be considered that they have already verified the technologies. Agricultural research centers and experiment stations in Myanmar are in charge of investigating the applicability of seeds developed in foreign research centers. It would be possible to consider that the technologies applied by the lead farmers have been verified in their surroundings.

From this viewpoint, it is proposed to strengthen the so-called horizontal flow, namely verification process of "lead farmer - neighboring farmers" in addition to the existing vertical one-way flow:

"research center - multiplying field - extension officers" for the seeds and "MAS - divisional office - district office - TS office / extension officers". This proposal is to realize the extension principles that the Study Team seeks under the unstable environment of the CDZ.

6.2.4 Synergy Effect through Merging the 2 Approaches

1) Utilization of Merits

Discussion was made on official extension approach and private extension approach as aforementioned. No priority can be identified in which approach is better or not better. This is because without official extension setting up, no wide range of extension could be implemented while without private extension approach, farmers cannot expect receiving of useful technologies and also transfer from farmer to farmer. Following table summarizes strengths and weaknesses by approach:

Table 6.2.1 Strengths and Weaknesses in Official and Private Approaches

	Official Approach	Private Approach
Strengths	Well structured organization, mobilizing capability, knowledge based on educational background	Individual oriented, providing options, latest technology, experiences
Weaknesses	Instruction oriented, one-way oriented activity, little trusted by the customers who are the farmers, little space of providing optional selections	Very much limited outreach, little scientific technical background

Source: JICA Study Team

Above table shows that official approach is superior in mobilization capability based on well structured organizational arrangement while that of private approach is superior in providing options, rich in practical technologies and also experiences specially in case of lead-farmers. During an evaluation workshop for the Pilot Project, participants saw village leaders presenting their activity reviews at first hesitantly but, as they got experienced, being very much proud of. Even government officers recognized that this kind of workshop was very useful to know the situation on the ground. From these experiences, merging both official approach and private one could be the most efficient way of extending agricultural technologies.

Looking at the present extension activities undertaken by MAS and LBVD, one may find it to be lecture oriented and hardly see actual demonstration, except for paddy cultivation, such as seedling, sowing, fertilization, etc. Trainees have rarely been given actual practices upon completion of the lecture oriented training. On the other hand, lead-farmers tend to show required knowledge/ technologies by doing what he has done rather than explaining verbally with technical terms. In this situation, trainees who are colleague farmers feel easy to clarify by giving questions about what they could not understand. They can more understand.

There were a series of trainings under the Pilot Projects. Upon completion of each training, we have carried out a simple post evaluation questionnaire survey covering 10 participants per training. The result of post evaluation questionnaire suggested that in some cases, as much as half of the trainees could not understand what was taught especially relating to technical terms[7]. They however just hesitated to give questions, or otherwise gave up in just stating that they learned only in monastery.

To transfer adaptable technologies, it is not always necessary to use technical term, English term. Though terms are not the same between what is used amongst colleague villagers and what is used by government extension officers, technical transfer must have been done just amongst farmers. Taking into account this, one good practice may be such that mobilization can be done by the government officers while practical demonstration by lead-farmers by using their own language.

[7] In livestock component, as much as half of the attendants could not understand what was taught because the trainer used technical English term in disease names and those symptoms, revealed the post training evaluation questionnaire survey.

2) Selection of Extension Components

What has been practiced by the government officers has been to deliver government policies, instructions, etc. from top to the bottom, which often does not agree with what the farmers want in relation to improvement of their livelihood. What the villagers want the most is in most cases to solve issues and problems facing them, means of ways of increasing income, etc. Both ends rarely meet, resulting in not effective agriculture extension services for the customers, the farmers. MAS usually does an extension activity in a half day during which government instructions are delivered and then question and answer are made. To this session, there could be a room to accommodate extension of new agriculture technologies.

There are cases, though few, that lead-farmers do demonstration in their farmlands asked by MAS. By referring to this example, such demonstration can be tried to incorporate in the MAS official extension activities. Issue in this case is whether or not the demonstration is possible in busy farming season for both the lead-farmers, who are the trainers, and colleague farmers, who are the trainees. Demonstration time automatically meets such time when most of the farmers are busy in land preparation, nursery preparation, harvesting, etc. Taking into account their religious belief, however, demonstration for other farmers can be one of the lead-farmer's dedication in Buddhism by which he could spare busy time for the demonstration. Trainees, on the other hand, could be convinced given more harvest thanks to the technologies.

Workable extension can only be done on condition that the environment between the provider, in this case a lead-farmer, and receiver, in this case colleague farmers should be more or less the same. Lead-farmer's farmland may sit on good fertile soil. Demonstration carried out on such good soils would not give same results if the technology demonstrated was tried on infertile soils. An example can be seen in a village, called Chaung-U, Mandalay division, wherein harvest is very much correlated with the soil condition giving as much as 2 times difference[8]. As fertilizer is hardly applied in this area, soil condition can define harvest almost exclusively. In such condition, a useful technology demonstrated by a lead-farmer would not work as expected.

3) Study Tour

Study tour could be a very efficient dissemination tool of new technologies. While MAS's extension activity centres on lecture style teaching, study tour can give an impact by letting the visitors see real situation. It has been said seeing is believing. By seeing other colleague farmers achievement, the visiting farmers could easily be motivated and embark on what they have seen. Here, point is again farming condition should be more or less the same between the visiting place and the ones where the visitors practice their farming. To have the condition clarified, visitors are requested to bring their sample crops with root and soils. By exchanging comments and ideas, both sides can enrich their knowledge.

6.2.5 Interactive Extension Norm

In the Union, instruction from the top to the bottom, that is village level, is very much efficiently done through the line of PDCs established at all the levels of state, division, district, township, and village tract. There is a regular monthly meeting at each level of the PDCs including technical officers posted at each level of administrative stratum. One thing pointed out here is that technical officers are not the members of the PDCs but attendants to report what they have achieved against plan and numerical target to the chairman of each PDC.

[8] Poverty profile (1st version), The development study on sustainable agricultural and rural development for poverty reduction programme in the central dry zone of the Union of Myanmar, JICA, March 2007 ,PP. 21

Taking into account above, as one character in Myanmar one may say information or instruction flow from top to bottom is very much efficiently done but on the other hand there may be a weakness in interactive information flow. For example, it is said that even if all the technical line ministries' officers are attendants of the PDCs, there happen few cases of exchanging views and constructive comments amongst the participants, but mostly such cases of reporting to the chairman only. In dealing with poverty reduction, which should be undertaken in a multi-faceted way, that one way style could be a weak point.

Turning to the ground where extension activities take place, there is a difficulty of getting feedback from the group and therefore forwarding it to the upper authorities. What is required for the extension officers is to report if the pre-set numerical targets have been achieved or not and not to report the process itself of how the targets have been achieved. The closer we go to the ground, the more important the process of achieving the targets becomes. Evaluating the process of achieving the targets should also influence the establishment of new extension norms.

Putting it in a simple way, no one should do same action again; namely, what we should do is only better extension and not the same extension activity. To make it possible for us to do only better actions, we should undertake process monitoring and evaluation by ourselves. It is not difficult at all. It is just by self-evaluating what one has done from a critical point of view in order to find out areas to further improve, modify, polish, etc. Attitude of self monitoring and self evaluation here becomes an important driver to lead us to better extension activities, which should be built as one of the extension officers norms.

Should there be interactive venue, the self monitoring and self evaluation could also be very much facilitated. An example is a workshop held 2 times in 2007/08 under the Pilot Project. The workshops invited village leaders, township officers, district officers, divisional officers, and headquarters' officers, totaling to 60 to about 80 participants. The village leaders presented what they have done, what difficulties they have faced, how they have solved, what lessons they have learned, and outputs/ outcomes including numerical indicators.

A questionnaire was administered at the end of the workshops, asking weak points and good points for the workshops. Good points the village leaders raised are 'exchanged views, ideas, opinions with other village leaders and also with the government officers at an equal basis' while the government officers replied 'good in exchanging views, comments, ideas, etc. amongst participants especially with different ministries' officers and also good in getting what has actually taken place on the ground'.

There is no chairman but facilitator in workshop. Meetings need chairman in fact and reporting as well, but workshops need facilitator who is a catalyst for the participants to exchange their views. In this sense, workshop is a kind of learning venue where all the participant can learn each other, thereby developing each other. So called interactive learning can enlarge rural people's view whereby they can evaluate what they have been

An Interactive Information Flow:

Workshop does not have any chairman but facilitator. This by nature leads the participants to interactive discussions and interactive information flow, thereby they can learn each other.

Through the 2 times workshops, the JICA Team recognized the interaction between village leaders and TS extension officers while working on activity review. Likewise, when a village raised difficulties, another village leaders very often gave some solutions or suggestions based on what they have experienced so far.

An example can be seen trollergy improvement. A village representative raised an issue of inching up the trollergy to load more volume of sandstone wares. Another village leader suggested to use steel plates instead of leaf spring which is expensive.

One village leader complained the quality of hammer provided. Another villager who have been engaged in tinsmith work gave his own experience in which his village has been engaged in tinsmith industry since long time ago, grandfather's era. Some of the villagers still use British made hammer manufactured about 60 years ago which is of very good quality. However such hammer is getting very scarce, and nowadays' hammer available in market is not good quality. The hammer the claimed villager has may be reasonable in today's context, said the tinsmith villager.

Above examples are just a tip of interactive information flow, which can enlarge the villagers view.

doing subjectively since they can now have milestones that they can compare each other (see box). With such an arrangement, government officers can also get feedback from the ground, directing their mind to the process through which numerical achievements have come out.

Workshop's success and pitfall are very much dependent on structuring of each session and those total flow, and also the skill of facilitator of course. Above example, however, indicates arranging of such venue wherein all the participants can interact each other could be one of the very important supports that donors should undertake.

6.2.6 Policy and Motivation for Production, Effect of the Policy over the Production

Main focus of the policy for agriculture and its products in Myanmar is always to stabilize the prices of major foods at lower range. Connecting the domestic price of food to the international price causes the rise of the domestic price of food produced by inexpensive labor in Myanmar. Because the rise of food price will bring the disaffection of the nation and may lead to insecurity of civil administration, the government has been repeatedly embargoing on export of agriculture products. Except for the products that are not related to the nation's major consumption, agriculture has been put into the environment of low profitability.

Embargo on export is rarely exercised for the agriculture products whose price rise is not much opposed due to little consumption by the people. Therefore, there are some crops, which give incentive farmers to make effort to increase productivity and profitability. However, such crops, e.g. rubber, orange, and betel, are constrained with the possible farming area, so the extension in wide area cannot be expected. For the major crops, motivation of farmers for production increase has often been decreased.

As for the development of small-scale industry, it needs to follow the fashion or create fashion itself. However, since the opportunity for communicating to the foreign countries is restricted, it is difficult to get information about new fashion. For example, for the clothing industry, with which the Pilot Project is dealing, the designs of the products have remained old-fashion. It is assessed that there is insufficient catalysts available for the industry, which will be necessary for the people to get motivation for creation of new designs. Moreover, access to international markets, which themselves could be a big catalyst, are very much restricted under the present condition.

Since the drafting cattle are expensive and essential for farming, they are always vaccinated, but the small ruminant like goats and sheep are kept by poor small-scale farmers or the landless and they are not vaccinated. Animals infected with FMD or anthrax are pasturing freely and therefore, it is difficult to undertake preventive measures against the diseases. Farmers also neglect the diseases of goats and sheep, and such attitude gives adverse effect as once the outbreak of a disease occurred in an area, farmers never want to keep the animals again.

When the people face the difficulties like ever changing policy of exporting agriculture products and loss of animals, they tend to think that the misfortune came because the goodness they gained in their previous life was not sufficient and therefore they need to gain more goodness to acquire fortune. Eventually they give in, as "it cannot help in this world". Under the circumstance, people accept the results of the wandering policy as "helpless" in their living norm. But this situation is a hindrance of development from the outsider's point of view.

6.2.7 Involvement of Women

The role of women in the Study Area is so important that they engage in domestic financial management for daily life, small animal rearing, fodder management for large animals. For the distribution of property left (farmland as major one), women have equal share to men, so that

sometimes farmland given to a woman from her parents when she marries is bigger than the one the husband receives from his parents. As a custom, sowing and transplanting are considered as women's work and only women are hired for these operations. But this custom does not force to give women heavier workload than men.

For textiles, in most cases women manage equipment like looming machine and knitting machine. Adding to the property like money and land, and equipment, women fully engage in the management of family health. For the discretionary power on the use of the property and equipment, interviews carried out by the Study revealed that in many cases the couple makes decision by mutual consent (wife normally respects the opinion of the husband). It is therefore considered that the position of women in many occasions is not placed inferior.

As for the position of women outside the household, it is considered that the opportunity for speaking is given to women not only inside the house but also in the rural community, e.g. when the Study Team held workshops in villages, 30% to 40% of the participants were women. In summary, the role of women in Bamar race is not only to supply labor for farming and domestic work but also to manage the property, means of production and family health. They are regarded as the cooperating decision maker and the power to exercise is given equally to them as men.

This point indicates that rural development cannot go without women's involvement or consent. However, it is frequently observed that women do not like discussion and they stand behind men (normally their husband) outside. Therefore, it needs to take into consideration: 1) do not make decision immediately in the meeting and take the issue back home first, 2) do not let them hurry in decision making even when the opinions differed, and 3) ask both husband and wife to participate in demonstrations even if it is troublesome.

6.2.8 Approaches to the Poor

Most of the people in the Pilot Project area are Buddhists. Pagoda and monasteries located on the edge of the village is so important for the Buddhist villagers as their symbols to believe in. Also erecting and maintaining pagoda and monasteries are the pride of the villagers as Buddhist. Important task for Buddhist in this world is to gain goodness. Gaining goodness is recognized not only by engaging in ascetic practice at monastery but also by giving alms to priests or other people.

Erecting pagoda is normally fulfilled by the donation from economically successful people who live in the village or who were born to the village, while the maintenance of pagoda and monasteries are most often undertaken by the cooperation of the villagers with their quota. For maintaining monasteries, major contribution by the villagers is to provide the priest (who come from the village) with food and daily necessities and the villagers make offerings according to their wealthiness.

There are difference in the quality and quantity of offering according to the wealthiness of the households, but the Buddhism teaches that goodness is equal in front of Buddha as "you do what you can do according to your situation". Therefore, even a very poor household willingly provides offerings. The monastery is a place where people in any economic strata can equally visit; hence it is the most public place of all the facilities including schools and administrative offices in the village.

It is therefore reasonable that the monasteries are sometimes used as a venue for extension activities and if the extension activities or development activities were stagnant, the issue would fall into the contents of the activities themselves. Then if the eldest priest gave his advice or view of approval to the development principles or the contents of the extension activities, the monastery would be able to work as the venue for disseminating information toward improving livelihood of the villagers.

As for the approaches for improving livelihood of the most poor, their economic activity is

distinguished with the lack of risk hedging. It may have been due to the system of education or training in the society, but it appears that the most of the villagers are not good at doing things at the same time. To the contrary, they have very high ability to concentrate on one thing and repeat to use the skill once they have acquired.

Based on such nature, the approach for improving livelihood of the poor tends to stick to single and occasional measure resulting in the lack of concept of risk hedging. In other words, because the beneficiaries wish the success with such single and occasional measure, the proposals on the project from the villagers are also in line with such wish. In this context, it is required that the outsider takes into consideration the method integrating the concept of risk hedging.

For example, for the project of growing mushrooms, which is more like a kitchen gardening, such approach can be considered: to conduct training on self-multiplication of the strain aside from purchasing it, to keep small animals and use the drops of the animals to the strain bed, to support the feed for the animals, to get rubbish like cardboard boxes disposed from markets to strengthen the strain bed, and to train on food processing technologies like smoking if the farmers slaughter small animal at house.

To sum up, it is required to think about such approaches as to prepare alternative way if one business goes loss, or to leave the beneficiaries possibility for employment in case the self-business does not go well. When the project consists of many components, of course the initial cost gets higher, but what is important is how the poor can establish the wide range of income sources or risk hedges. Single and occasional measure would only leave the poor a choice between two things: success but with low possibility or failure.

CHAPTER 7 EXTENSION MATERIALS

This chapter describes "Extension Materials", which have been prepared under this Study. The extension materials consist of technical manuals, one-point illustrations, and promotion videos. Technical manuals were once drafted in FY 2007/08 and FY 2008/09, and have been utilized through the pilot project implementation. One-point illustrations were prepared by TS officers who participated in a series of trainings administered in FY 2008/09. The promotion videos portray actual success stories covering 3 sectors of agriculture, livestock, cottage industry, and living improvement.

7.1 Technical Manuals

The Technical Manuals are composed of 2 parts; namely Part I and Part II. Part I briefly discusses the salient features of the Central Dry Zone (CDZ) by which the readers will be familiarized with the contexts wherein the people make their livelihood. Part II elaborates technologies based on the experiences of the Study, which were included in the implementation of pilot projects to examine the best ones appropriate in the context of the rural areas in the CDZ.

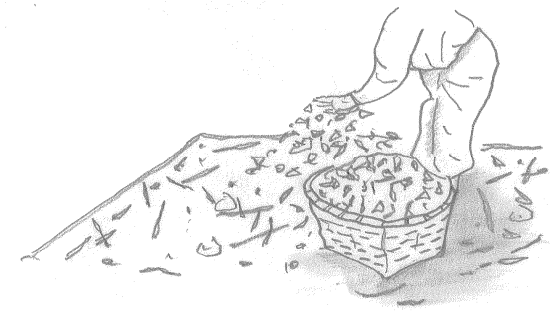
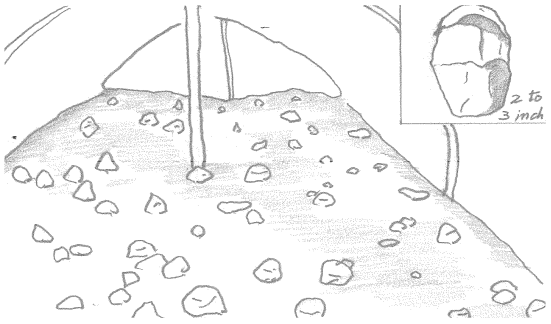
The Study, throughout the pilot projects, conducted various trials on agriculture improvement, livestock improvement, small cottage industry promotion, living improvement, etc., lessons from which are incorporated in this Manuals. Most of the technologies described in this Manuals basically center on low input ones, thereby not depending much on outside assistances. Although ideas in this Manual should not be over generalized, they are expected to be tools of practical application to further extend similar development activities to wherever there is potential applicability.

The Technical Manual shows the practical process of various technologies on agriculture, livestock, cottage industry and livelihood improvement to help frontline extension workers of concerning ministries with extension services to be provided. PD method[1] developed in IFIC, JICA was employed in producing this Manual, with which a step-wise detailed explanation is made together with illustrations following what to do step by step to, for example as shown below, Mushroom Culture. (excerption only).

Table 7.1.1 An Example of Technical Manual: Mushroom Culture

Process	*Description*
	***Select a site;*** *Firstly, select a suitable site for a bed with9 ft x 3 ft x 3 inches each. Then spray insecticides (20 to 30g) on the selected site to prevent insect damage.*

[1] The word of "PD method" comes from "Process Description method". This is a JICA technology transfer method of producing both an operation manual and (audio) visual aids using photos or illustrations, which are portrayed by superposing on the photos, of a series of actual activities of a work. This method is applicable not only for describing operation processes but also explaining all the field operation activities for a specific work. The process description is made by: 1) taking a series of photos of a work, and 2) describing the activities in the photos by step mostly by counterpart, through which the counterpart will acquire the skill and knowledge necessary for the work and also the manual will be produced simultaneously. Source: Hideyuki KANAMORI (1994): Effective Technology Transfer by PD Method (in Japanese), Journal of the Japanese Society of Irrigation, Drainage and Reclamation Engineering, Vol.62, No.12, pp.7-12

	***Soak newspaper into the water;*** *Soak newspaper (or carton box) into the water for about 3 to 5 minutes (15 minutes if using carton box) and then tear it into small pieces. Then spread the pieces of the soaked paper on the mixture of cow dung and water hyacinth evenly.*
	***Loosen strains;*** *5 seed bags are necessary for a bed in this culture method.* *Open mushroom strain bags and loosen it.*
	***Harvesting;*** *After 7 to 10 days, small lumps of mycelia growth can be seen and open the cover for 15 minutes daily in the noon time. Four to five days after the formation of mycelium clumps edible size mushroom will develop and can be harvested continuously for 3 days with yield of 3 to 5 viss per bed.*

The manual has been prepared through the experiences of FY 2007/08 and FY 2008/09 pilot projects, and the first draft was presented to all participants of concerning Ministries gathered at the workshop on October 2008. Out of 20 technologies of the agricultural components, 2 components are quoted from the "Crops of Burma 1949".

Agriculture Component:

1. Mushroom Culture
2. Vegetable Cultivation by Raised-Bed Method
3. Cabbage and Cauliflower by raised-Bed (from the Crops of Burma, 1949)
4. Direct Seeding of Onion (from the Crops of Burma, 1949)
5. Kitchen Garden for Vegetable Production
6. Intercropping System of Sorghum and Rice Bean
7. Paddy Seed Selection with Salt Solution
8. Dapog Method for Raising Paddy Seedlings by OISCA
9. Reduced-Area Wet Bed Nursery
10. Integrated Crop Management for Paddy
11. Local-Made Rotary Weeder for Paddy Farming

12. Rice Husk Charcoal Making
13. Rice Husk Vinegar Making
14. Indigenous Microorganism Concentrate by OISCA
15. Indigenous Microorganism Bokashi: Using IMO Concentrate of OISCA
16. Indigenous Microorganism Using Steamed Rice
17. EM Bokashi: Using EM Concentrate of MAS
18. Small Scale Irrigation by Local-Made Treadle Pump
19. Fermented Plant Juice (FPJ) Making
20. Fermented Fruit Juice (FFJ) Making
21. Crop Storage (Conceptual Design only)

Livestock Component:

1. Improved Goat Housing with Raised Floor
2. Improved Pig Housing
3. Local-Made Concentrate (Urea Molasses Mineral Block; UMMB)

Cottage Industry Component:

1. Paddy Dryer Using Rice Husk Energy

Living Improvement Component:

1. Energy Efficient Stove for Cooking (Kamado)
2. An Example of Bio-fuel Utilization (Firewood Substitute using Oil Cake of Jetropha)
3. Bio-Gas, Using Cow Dung, Power Generation Plant (Conceptual Design only)
4. Bio-Gas, Using Rice Husk, Power Generation Plant (Conceptual Design only)

7.2 One-point Illustrations

Following illustrations show some examples prepared by TS extension officers who participated in the relevant trainings held on October 2008. They chose activities to be illustrated by themselves, and presented them after completion, and then some modifications were conducted according to suggestions by other participants. Example of left hand side shows how to make IMO Bokashi and the right one illustrates how to construct an improved goat house, an elevated housing.

IMO Making

Improved Goat Housing

Some MAS TS offices have made some additional illustration-based extension materials. An example is Kyaukse TS, which portrayed the process of how to make rice husk charcoal on a big vinyl sheet (see the photo left). Aside from the example, Magway divisional office ordered a computer shop to print out an summarized ICM (integrated crop management) technology on a paddy growing

calendar. The divisional office distributed such big extension material to all the TS MAS offices in the division. Such technologies were the ones undertaken during the training, and extended to farmers with their own creative extension materials.

The illustration shows the process of how to make rice husk charcoal, which was made by Kyaukse TS MAS.

Magway divisional office ordered such big paddy growing calendar showing ICM technologies, and distributed to all 23 TS offices.

7.3 Promotion Videos

Technical videos were prepared to extend success stories to common villagers. It is generally observed even in rural areas that people enjoy watching TV/Video at teashop even early morning. Therefore, the technical videos were made taking into consideration those village's behaviors to extend technologies and activities and to show them some advanced technologies. The video covers three sectors of agriculture, livestock and cottage industry, all of which are based on real success stories of villagers. The stories, in fact real stories, are briefed in the following:

7.3.1 Agriculture Video (How to Conquer mother-in-law)

The video introduces one of advanced farmer (U Win Htay) cultivating paddy on the outskirts of Mandalay. One day, a man (U Bay Lu Wa) came to see him who left the village 10 years ago and came back to the village, and he was surprised to see improved economy of U Win Htay, and enquired him the reason for success. U Win Htay replied that he learnt improved technologies from MAS and applied those technologies in his paddy cultivation. After that he became rich within the period of 4 - 5 years.

U Win Htay explained that his paddy cultivation method was not conventional but improved technologies through use of EM Bokashi systematically. He explained his friend that he could harvest paddy at 120 to 140 baskets per acre as compared to 50 to 80 baskets per acre by applying 130 to 150 baskets of EM Bokashi per acre.

U Win Htay's paddy filed where young seedlings of 18-day-old as well as 2 to 3 plants per hill and spacing of 9" x 6" or 12" x 8" were tired.

Bokashi making method and its formula are explained in the video, and if EM concentrate is not available IMO (Indigenous Microorganism) Bokashi is also usable instead of EM Bokashi.

At the same time U Win Htay tells U Bay Lu Wa that it was not enough by knowing how to use Bokashi and it was also necessary to select quality seeds for

growing seedling. How to select matured seeds is also demonstrated in the video. U Win Htay also recommends transplanting young seedlings of 18-day-old as well as 2 to 3 plants per hill and spacing of 9" x 6" or 12" x 8".

U Bay Lu Wa was satisfied and told U Win Htay that he would try to technologies learnt from U Win Htay in his paddy cultivation to obtain high yield because he was always scolded by his mother-in-law for low yield of paddy from his paddy field. The video ends saying "You too, going to cultivate paddy systematically like him?"

U Bay Lu Wa was satisfied and tells the audiences that "You too, going to cultivate paddy systematically?"

7.3.2 Livestock Video (Destiny concerning marriage caused by goats)

The video starts from the interview to Dr. Set Shwin, Deputy Director, LBVD, Mandalay Division. He explains about advantage of raising goats in CDZ. Namely, goat is the most suitable animal to be raised because it is weather resistant. Comparing with other animals, goat raising is very suitable for the poor, and there were many poor people who became prosperous after raising goats. Herding can be done easily because there are pastures with natural vegetation in CDZ.

Ko Zaw Zaw and Ma Cho are interviewed for their real success story for goat rearing.

Following the interview, Ko ZawZaw, successful man of goat raising and the hero of this story, explains his history to date. He lost parents when he was 7 years old, and he could not rely on elder brothers. He has to do odd jobs to live by himself. He took goats from his uncle to raise them on contract basis in which he could receive half of the kids born. He made efforts to increase his goats and finally he became a real goat owner.

The video is proceeding as a love story of Ko Zaw Zaw and Ma Cho. Ma Cho urged Ko Zaw Zaw to look for a stable job to earn regular income and save money for their marriage. Her mother wanted her to marry a tamarind broker from a city. She tells him that Tar Tee, a villager from a neighboring village, could marry his girlfriend after raising goats as an entrusted goat raiser. Tar Tee was also an orphan like him. Ko Zaw Zaw saw the light and decided to raise goats.

Pho Nyi visited Ko Zaw Zaw and saw many goats. He was told by Ko Zaw Zaw that goat raising was very profitable

In his village there was a rich man who owned many goats but he did not have any herdsman. Ko Zaw Zaw asked a rich man for 5 goats to be raised. He had already got 10 goats from other 2 goat owners. He was entrusted by the rich man for his 5 goats. One of the 5 goats he took from the rich man died of disease. He consulted with Vet- doctor to diagnose goats. But the rich man thought that Ko Zaw Zaw did not look after the goats enough. Consequently, the rich man took his own goats from Ko Zaw Zaw. Ma Cho was worried about the rest goats. Dr. San Htun Oo, secretary of Upper Myanmar

Livestock Breeding League, explained to Ko Zaw Zaw about the diseases which goats suffer and how to cure of those diseases.

After Dr. had been explained, Ko Zaw Zaw promised the doctor that he would raise goats with raised-floor, do sanitation work systematically and get his goats vaccinated. Ko Zaw Zaw said that he started raising goats with raised-floor after meeting with LBVD. And he kept the goat housing clean and herded the goats to get enough feedstuffs. Therefore, goats become healthier and reproduction rate increased from 1 - 2 to 3 kids.

Ko Zaw Zaw's friend Pho Nyi who worked in a city returned to the village because he could not save any money although he worked there for two years. Pho Nyi visited Ko Zaw Zaw and saw many goats. He was told by Ko Zaw Zaw that goat raising was very profitable if it was done carefully and systematically. He told Ko Zaw Zaw to help him to be an entrusted goat raiser like Ko Zaw Zaw. Pho Nyi explained Ma Cho's mother that the tamarind broker was just a womanizer. Ko Zaw Zaw also told he would be mother-in-law that he would look after her as his own mother and all his goats were for marrying Ma Cho. Ko Zaw Zaw and Ma Cho were given consent to marry by Ma Cho's mother. They felt very happy. The video ends saying “You too, going to raise goats like them?”

7.3.3 Cottage Video (Left and Right)

The title, left and right, means that the right one could not go on a trip without the left one like left and right slippers. And basic consideration of this video is that Success can be achieved if you are honest and diligent. The hero (Ko Tun Naing) of this story is a man who succeeded in slipper manufacturing. He was born in very poor family with many family members. When he was 7 years old his uncle took him to his house to give chance to study and teach him slipper making. When he was 12, he has already become skilful in slipper making. Tough he wants to be an engineer he has to give up dream because of weak education. Consequently, he decided to be an independent slipper maker but he has no property to invest slipper making when he got married.

When I was young, I wanted to become an engineer. But I was weak in education. I failed in the matriculation examination four times and then I gave up schooling. I tried to understand everything concerning slipper making including its market. To date, I have worked traditional slipper making continuously. When we got married, we did not have anything of our own. He went to a shop to ask shop owner to let him buy raw materials on credit. Owner told him he may accept his request if he manufacture slippers with his uncle’s successful brand name 'Thein Ka Bar' illegally. But Ko Tun Naing refused owner’s offer. Then he lapsed into lack of money to purchase raw materials for slipper making. He needs 250,000Kyats but has only 50,000Kyats.

The hero (Ko Tun Naing) of this story is a man who succeeded in slipper manufacturing, and now interviewed with his family for his story.

One day his friend visited him and told him that his friends may help him by lending 100,000Kyats without interest. Ko Tun Naing went to one of shop owner to ask to let him buy raw materials on credit but the money was to be settled on an agreed date. The shop owner accepted his request, and then he started doing their own business of traditional slipper making. His wife helped him selling waste materials of products.

The couple tried to find shops in Mandalay who can sell their new brand 'Engine' slippers. Though

most of the shop owners refused to sell his products due to unknown brand name, but finally they found a shop who can sell his slippers on the condition of payment-on-delivery being paid according to the number of slippers sold. They agreed the condition.

Ko Tun Naing and his wife are asking a shop to place their product of the slippers.

But they were still in trouble of lack of money to purchase raw materials, and his wife proposed to borrow money from village cooperative. The cooperative admitted to lend him 100,000 Kyats because he is known as a conscientious business man in the village. Wholesaler at Mandalay also admitted payment later to understand his ardor to slipper making. Here, the caption says that if you keep your promise, you will win the trust of others. Then his business has been well under way and by keeping promise and regarding individual employees. When he knew his wife was in the family way, he wished for twin, like left and right slippers, a girl and a boy.

CHAPTER 8 CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

Taking into account the points outlined below, this Study concludes that the implementation of the Development Plan presented in this Report would be the most appropriate comprehensive approach in reducing the poverty in the Central Dry Zone (CDZ). This is because the Plan according to the priorities made by all the concerned stakeholders would coordinate actions/ projects at a sectoral as well as area levels and make balance each other amongst all the 51 townships in the CDZ. The Government should therefore embark on the CDZ development guided by the Development Plan. Other divisions/states in the Union would also benefit from this Study by introducing the new approach of formulating the area and sector-wise development programmes centering on poverty reduction.

1) The Development Plan has incorporated voices of all cadres of stakeholders; divisional officers, district officers and township officers, all of whom are from the relevant 3 ministries, and village members and leaders, local authorities e.g. TS PDC, etc. The stakeholders have worked not only in analyzing CDZ situation but also throughout the process of planning, exercising consensus making all the time. Situation analysis was also carried out mainly from quantitative point of view wherever data were available. Then, the results facilitated the stakeholders to well understand where the CDZ stood and how it looked like in comparison with other parts of the Union as well as with other countries, e.g. ASEAN countries. Exercising the participatory approach has contributed to making the Development Plan comprehensive and also responsive to the needs from the different cadres of stakeholders.

2) Development framework presented in this Report can be a very guide when the concerned 3 ministries try to carry out development activities in the CDZ because the framework provides with concrete development components, those priorities by sector and by area (township) at which what projects should be carried out. In addition, any organizations which work in CDZ can refer to the framework from which they can know where to carry out their development intervention with what priority. In this way, the frameworks can also work as a development platform where all the concerned development partners can make concerted efforts. The framework guides the development stakeholders to the most needy people as prioritized and leads to avoidance of misallocation of funds to activities that are not a priority, thereby accelerating CDZ development as a whole.

8.2 Recommendations

During the process of undertaking this development study and implementation of the pilot projects, the Study Team encountered a number of issues that led to the recommendations presented below. However, as is the case with continuous processes, these recommendations are by no means exhaustive and may need to be changed or modified, depending upon the prevailing condition. Nevertheless, it is believed that the ones covered here constitute a broader spectrum on which the implementation of the Development Plan will have to be pursued:

For the Government:

1) The agriculture practiced in the CDZ is in fact somewhat bipolarized. Along Ayeyarwady river, there are lots of Le (lowland) which enable paddy cultivation and also irrigated paddy fields wherein the farmers can enjoy good harvest as expected. On the other hand, agriculture practiced in Ya (upland), especially along Bago Hills side, is affected by its unstable rainfall both in terms of volume and pattern. Under the former condition, straight-forward growth could be achieved

corresponding to how much s/he has invested if one desires so. Under the latter condition, farming practices should automatically center on low-input agriculture. On top of this, the government officers, especially TS MAS officers, should be able to provide with the extension services which can pursue risk hedged development apart from what has been practiced that is for the straight-forward increase of product.

2) If a farmland is blessed with irrigation system, there is a proportional relationship between input and harvest until it reaches a threshold. However, upland agriculture totally depends on natural rainfall which does not behave as expected by human beings. For example, in areas along the Bago Hills, farmers cannot expect normal harvest over 3 years according to interviews. Here, under this condition, inputting of chemical fertilizer automatically entails risks, very often making them insolvent debtor. In upland areas dependent on rainfall, people should exercise risk-hedged livelihood activities and also try to diversify their livelihood. Diversifying of their livelihood is due required apart from their mainstay of agriculture; e.g. combined with livestock rearing, cottage activities. MAS extension staff at TS level should therefore be linked up with other TS level government offices of LBVD, Cooperative, etc.

3) From an angle of rural development aspect, many measures in Myanmar have centered almost all on the improvement of agriculture, especially of rice. This in turn resulted in not centering on landless people, leaving them out of the sight of development. Poorer people can be found in the landless. There are rarely institutional or project measures to improve the welfare of the landless people, especially farm casual labors. Some projects targeting landless people should therefore be put in place. Through the experiences from pilot projects, we recommend for the landless people such projects as mushroom cultivation which can be practiced in house yard, goat revolving, pig revolving, promotion of vegetable cultivation which can create a lot of farm casual labor works, and cottage activities for example weaving, knitting, embroidery, etc.

4) Aside from the above measures to raise the livelihood of the landless people, in any case, however, one may say that there comes already a time of introducing institutional measures, e.g. distribution of welfare through progressive taxation system, reform of land taxation system, etc. It is recommended that the government revise the land tax rate which is not consequential as it is only 5 Kyats/ac for good farmlands and as little as 1 Kyats/ac for infertile farmlands. Though it is not always the case, wealthier people can be found in farmers while the poorer people in landless as is shown by poverty ratios; 33% for the former and 55% for the latter and 75% for farm casual labors (the poorest). Therefore, upon the institutional arrangement of land tax revision, re-distribution of wealth from the farmers to the landless people can be tried.

5) In the Union, instruction from the top to the bottom, that is village level, is very much efficiently done through the line of PDCs established at all the levels of state, division, district, township, and village tract. There is a regular monthly meeting at each level of the PDCs including technical officers as well as village chairmen in case of TS PDC where instructions are straight forwardly delivered to the bottom. Turning to the ground where extension activities take place, there is a difficulty of getting feedback from the ground and therefore forwarding it to the upper authorities. What is required for the extension officers is to report if the pre-set numerical targets have been achieved or not and not to report the process itself of how the targets have been achieved (or not achieved). The closer we go to the ground, the more important the process of achieving the targets becomes. Officers should try to get as much as feedback from the ground.

6) The role of women in the Study Area is so important that they engage in domestic financial management for daily life, small animal rearing, fodder management for large animals. For the distribution of property left (farmland as major one), women have equal share to men, so that

sometimes farmland given to a woman from her parents when she marries is bigger than the one the husband receives from his parents. This point indicates that rural development cannot go without women's involvement or consent. However, it is frequently observed that women do not like discussion and they stand behind men (normally their husband) and outside. Therefore, it needs to take into consideration: 1) do not make decision immediately in the meeting and take the issue back home first, 2) do not let them hurry in decision making even when the opinions differed, and 3) ask both husband and wife to participate in development activities.

7) In some of the cottage pilot projects, technical transfer from the skilled members to un-skilled ones was tried. For example, input from a pilot project comprised 5 knitting machines and training course only. Only 5 trainees were trained in the knitting techniques using double decker knitting machines. The initial members in the knitting group counted as many as 52, and other members except for the 5 trained people have received technical transfer of knitting by sitting at the side of trained ladies or the first generation and by practicing knitting work together with them. During the 2 years' operation, 21 colleague members have mastered the technology in this way. Same arrangement was made in embroidery group where 11 colleague members were transferred necessary technologies. In fact, there is certain level of unemployment in rural areas of CDZ. To improve this situation, it should acutely be necessary to provide project designs in which technical transfer is made to as many member-participants as possible to ensure their means of livelihood.

8) Under cottage sector pilot project as well village electrification project, there was a trial to establish village revolving fund. The logic is that necessary equipment is supplied to the system of cottage industry promotion, but the involved members are supposed to amortize the amount of capital fund or have to pay user rental fee to the main committee established at the village level. Also, the electricity charge paid by the villagers are collected at the committee in charge which is established at the village level, whereby it can work as village fund. This trial has been tried in 7 villages under pilot project, and several outcomes were observed; 1) low-interest loan provided to mushroom cultivation beneficiaries, 2) replacement of old breeding bull by proving top up fund, 3) repair of a motor for domestic water facility, etc. This kind of village fund in fact works as safety net in the village, and therefore project which is to provide certain investment should always try to establish such system.

9) A pilot project disseminated improved cooking stoves in 4 villages. Outcome differed very much from village to village. About 120 households out of total 140 households in North Pabe village have adopted such improved stove. On the other hand, in other villages it has not. One village is accessible to a cheap pre-fabricated stove and the other is located in an area accessible to abundant firewood in and around the village, and therefore they are not interested in firewood saving stove at least at this time. Also water is relatively much available as accessible to small lakes, reducing the risk of catching fire. Villagers who live in firewood scarce areas and also in fire-risky areas accepted the improved stove very much. Thus even if technology itself is good, whether or not it works depends on the context where people make living. In implementing a project, such local context should always be considered.

10) Under cottage sector, there were 2 pilot projects which were very dormant in operation or have ceased the operation. These are Tinsmith Strengthening Project and Guitar key Strengthening Project in Khaungkawe village. At first the beneficiaries in tinsmith and guitar key production were hit by fuel price hike having taken place in year 2008. They could hardly fetch any profit with fuel costing them over 4,000 Kyats per gallon. Though the fuel cost became cheap in later days, unfortunately material costs have not become cheap. For the guitar key strengthening, apart from the material cost hike, cheap Chinese-made guitar keys started coming to Myanmar

sometime since the mid of year 2007. They tried to compete with the Chinese made guitar keys by improving the quality using equipment provided by the pilot project, but finally came into halt. Same situation has, but to lesser extent, happened on tinsmith for metal bucket. The bucket has lost competitiveness against imported cheap plastic bucket. If there is competition to be expected with products which can be produced cheaply, e.g. Chinese made guitar key, there should be due consideration in strengthening such cottage industry.

For Donors:

1) This Study presented 2 development frameworks; 1) one for development from macro point of view and 2) the other for development from village level point of view (micro). In putting the latter approach into implementation, there should be a coordinating team as JICA study team undertook in implementing pilot projects covering different sectors. This kind of team may be set up by concerted efforts by the concerned ministries, or otherwise with a help of external organization. Given this kind of task team, comprehensive development intervention at village level dealing with different livelihoods can be realized. For this purpose, donors may consider to undertake the development with the latter development framework. The frame starts with people's different livelihoods to which workable development components are presented. Donors especially engaged in rural development can accelerate their activities with the framework reflecting the people's livelihoods.

2) When carrying out development interventions based upon above village level development framework, there should be of course strategic collaboration with the activities conducted under the macro development framework. Very simple example can be given in Certified Seeds Dissemination Programme, Paddy Cultivation Improvement Programme, etc. Project carried out based on village level framework may establish demonstration farms to which other villagers can also be invited to see specific technologies. In this way, those programmes carried out under macro framework can be benefited. In sum, demonstration farms should be not only for those benefited by latter approach, micro frame based approach, but also for those covered by macro frame based programme.

3) Under pilot projects, a series of training courses were arranged inviting MAS and LBVD officers. The training courses undertook not only lectures and practices but also peer-peer learning. These training opportunities are very important and therefore in future not only the 2 organizations but also others, e.g. MICDE in charge of industrial crops, should be considered. During the trainings administered, there were sessions wherein they listed problems and constraints they have faced in their jurisdictional areas and exchanged how they have solved or why these have not yet been solved. Through these sessions they exchanged their experiences, which we believe enriched their capability as extension worker. When we carry out workshop, we very often can find similar situation. In workshop there is no chairman but only facilitator. Facilitator does not govern the floor but just facilitates exchange of opinions, exchange of views, on which participants themselves try to find a way by learning each other. Teaching is in fact important in a training session, but at the same time donors can arrange a venue wherein the participants can learn each other whereby themselves. Learning peer-peer is a crucial reciprocal opportunity to develop the capacity of officers, for which donors can contribute to arrange.