

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

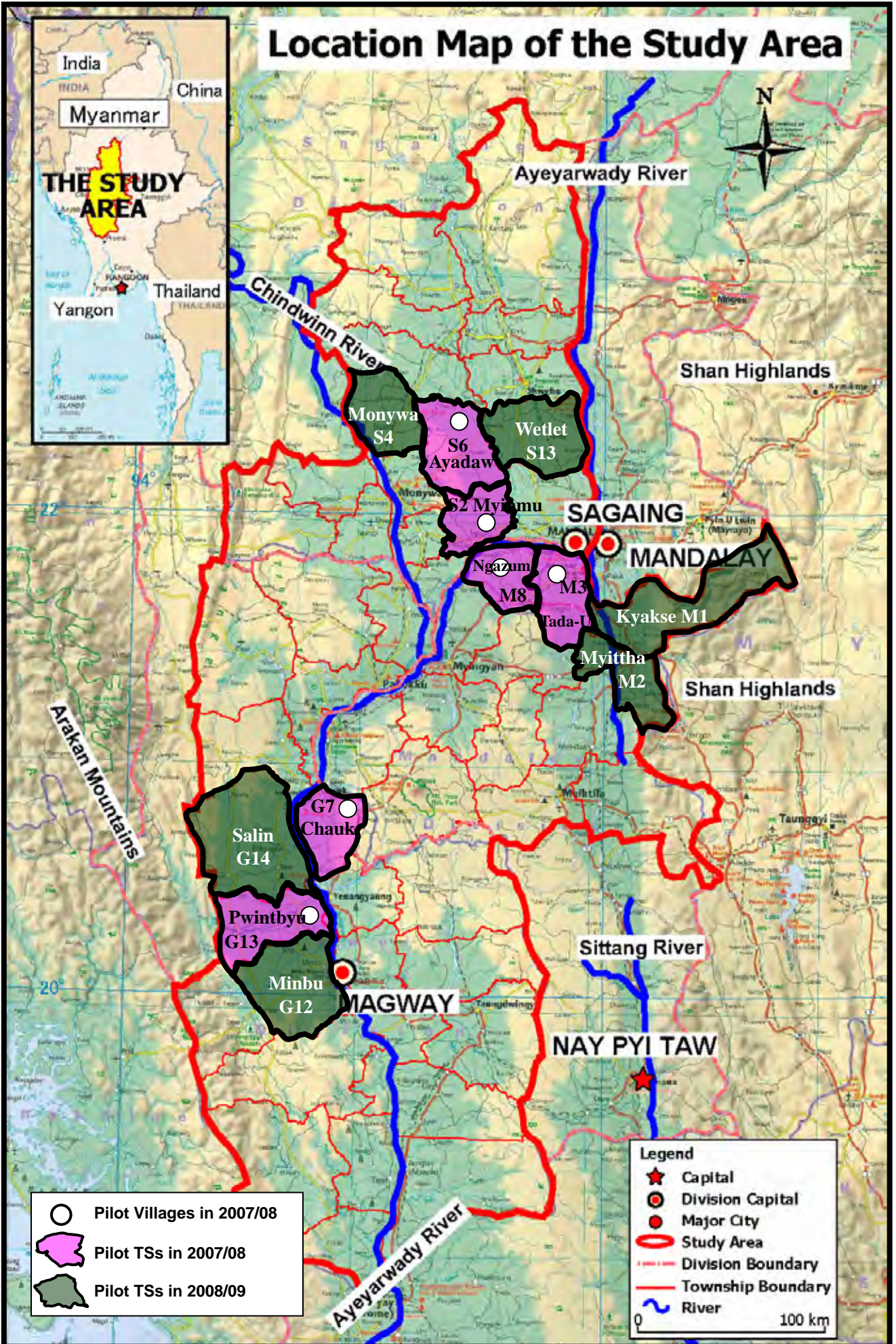
**THE DEVELOPMENT STUDY
ON
SUSTAINABLE AGRICULTURAL
AND
RURAL DEVELOPMENT
FOR
POVERTY REDUCTION PROGRAMME
IN
THE CENTRAL DRY ZONE OF
THE UNION OF MYANMAR**

**FINAL REPORT
(THE PILOT PROJECT)**

AUGUST 2010

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

Location Map of the Study Area



- Pilot Villages in 2007/08
- Pilot TSs in 2007/08
- Pilot TSs in 2008/09

- Legend**
- Capital
 - Division Capital
 - Major City
 - Study Area
 - Division Boundary
 - Township Boundary
 - River
- 100 km

Photos for the Pilot Projects



A Paddy Demonstration Plot under Integrated Crop Management (Pwintbyu TS): Neighbor farmers are invited to see how to make reduced area wet bed nursery, how to grow good seedlings, etc.



Dapog Nursery, One of Improved Paddy Cultivation Methods: *Dapog* nursery can reduce seeds by about 2/3, produce healthy seedlings, and be easy to ferry to the main field, etc.



A Paddy dryer (Ledaing 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.



Two Types Treadle Pumps: Left one can push irrigation water up to over 13m while right one only 5-6 m but very simple structure which can be produced even in their locality.



Tubewell Drilling (Magyi Village): A construction of well is being done by using traditional method. The water is to be used for vegetable irrigation.



Raised Bed Cultivation for Onion (Khaungkawe Village): After the training, a beneficiary started full onion growing by using the knowledge he acquired during the training.



Mushroom cultivation (Legaing Village): Mushroom cultivation does not need farmland but a small space only like house compound. This promotion is therefore meant for landless



Bokashi Compost Making (Magyi Village): In this demonstration of Bokashi making, they use molasses, rice bran, rice vinegar, etc. to facilitate the decomposition process.



Sorghum intercropped with Rice Beans (Ar La Ka Pa Village): Since rice beans can fix atmospheric nitrogen, the sorghum in the left picture has grown well than the conventional one on right.



Goat Raising (Ma Gyi Sauk Village): 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 (Mingan 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.



An Embroidery Training with Equipment Supply (Ma Gyi Sauk Village): Resource persons are training village women who are interested in promoting embroideries.



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.



Guitar Key Production Improvement (Khaungkawe Village): The village has been producing guitar keys and try to improve their products given some new equipment.



Tinsmith and Guitar Key Industry Strengthening (Khaungkawe Village): Provided with some equipment, the villagers produce better products.



A Children's Nutrition Center (North Pabe village): The center has become a rural development center where various kinds of village development activities are carried out.



A Drinking Place (Ar La Ka Pa Village): Every evening about 100 – 150 cattle and goat/ sheep come to this water, and also around 50 HHS depend on this for their domestic water use.



Bio-gas Plant Construction (Khaungkawe Village): They are constructing the first tank wherein cow dung is to produce bio gas to run diesel engine for power generation.



A Diesel Engine Power Generation (Mingan Village): With this power generation, the villagers say they can work additional 3 hours for their stone ware production.



A Primary School (Mingan Village): It was a joint project contributed a lot by the villagers. The children are no longer in need of commuting a far-away school as before.



A Road Station (Village Product Sales Shop: Legaing Village): The villagers sell their products to visitors for nearby famous Pagodas, also improving their rural incomes.



An Improved Cooking Stove (North Pabe Village): The stove can reduce firewood by at least 1/3, and also greatly reduce the risk of fire, which is one of the big concerns of the CDZ population.



A Mid-term Review Workshop: A village representative is now presenting to the floor their activities, difficulties they faced and lessons learned out of overcoming the difficulties.

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ACRONYMS AND ABBREVIATIONS

AED	Agricultural Extension Division
AMD	Agriculture Mechanization Department
ARCPA	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
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 <i>dochakukin</i> as in Japanese)
IRRI	International Rice Research Institute
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

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
MPCE	Myanma Perennial Crop Enterprise
MRTLK	Myanma Rice Trading Leading Committee
MRTSC	Myanma Rice Trading Sub-Committee
MSE	Myanma Sugarcane Enterprise
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
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
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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PREFACE

In 2006, the Study Team drafted a framework of the CDZ Development Plan for poverty reduction. Some of high priority components in this Development Plan have been carried out as pilot projects since early June 2007. The pilot projects were firstly commenced in FY 2007/08 and then additional ones commenced in FY 2008/09. Though the pilot projects have continued till the end of FY 2009/10, the activities in that last financial year were for monitoring and final evaluation only.

This Report elaborates pilot project including basic rationale and mechanism/ institutions of the implementation, status of the target villages thereof, design of the project components, achievements done, evaluation and lessons learnt so far therein etc. The lessons mentioned hereunder are somewhat specific and not yet generalized, coming directly from what were observed during the implementation of the pilot projects. Generalized, or in other words deduced, lessons that can be of good references to in implementing similar projects in other areas and in other opportunities are presented in the Main Report.

CHAPTER 1 INTRODUCTION OF THE PILOT PROJECT

1.1 Rationale of Its Implementation: Limit, How, Preview

The Study has a mandate of formulating an Area Development Plan for poverty reduction in the CDZ. Here, it is envisaged identifying a “limit” of current institutional frame prior to the regular implementation of the formulated Area Development Plan, thereby confirming concrete frame of the implementation and the methodologies, that is so-called “how”. In this context, it is decided to implement the pilot project by selecting higher priority in the Plan formulated as well as what can meet the needs of representative communities in the categorized Study Area. It is also envisaged that its implementation will lead to an indication of “preview” of the Study Area developed.

1.2 Mechanism of the Pilot Project Implementation and Role of Stakeholders

The components of the pilot project are based upon the SW agreed in November 2005 and as a rule selected from the sectors that the CP organizations are responsible for the implementation. That is to say, the components were to be selected from income improvement by means of agriculture, livestock and small-scale (cottage) industries, and also from improvement of living standard, administrative support services etc.

Though education and health sectors are very much important for the area development oriented to poverty reduction, they are not dealt as a direct component because of the over-mandatory of the CP organizations. Similarly, social infrastructure like roads is also essential for accelerating economic activities, though, it is not dealt either because of the limitation of the project cost. Thus, the components were so selected that the inhabitants in the Study Area could mostly implement themselves with technical and minimal financial supports from administrative agencies.

The main players of the above-defined pilot project are the inhabitants and Government staff at TS level who have been appointed as the frontline to support the former. At any rate, the administrative staff at district, divisional and headquarters level are in the position of advisors. Here, the Study Team mainly plays a coordinating role that is needed for joining various sectors concerned in implementing the pilot project, although it gives a part of technical support.

As various lessons are learnt through its implementation, it is also an essential role of the Study Team to arrange “venue” or forum of the stakeholders, that are the villagers and administrative staff concerned, jointly benefiting from these lessons. The Study Team will thereby finalize the Poverty Reduction Development Plan in the CDZ in the light of the learnt lessons, and advise a concrete

institutional system in implementing the said Plan.

1.3 Principle of Selecting Beneficiary: “Public Interest and Pro-Poor”

Many components of the pilot project are mainly based on such interventions as training/recommendation on farming improvement, livestock improvement, promotion of small-scale industries etc by the government extension staff or trainers from outside. Inputs are also provided, for example materials for building demonstration farms, seeds and fertilizers in the case of farming improvement, goats/sheep stocks for livestock improvement, sewing machines for embroidering, tools for masonry works, etc in the case of cottage industries promotion.

The fundamental principle of selecting beneficiaries in providing inputs from outside (JICA Study Team) resides in “public interest” and “pro-poor”. In other words, in so far as “substantial matter” is input, so small matter as it may be, the benefits from the inputs should be as broadly as possible distributed throughout the given villages. All in all, poorer strata should be regarded in the villages. In other words, consideration must be paid to the beneficiary in the form of “pro-poor”.

In that connection, the Study Team does not directly select the beneficiary because the pilot project is implemented in a participatory approach, but follows the principle that “entrusting to the decision-making system in the villages”. In the target villages, the Study Team explains the principle, “public interest” and “pro-poor” to the villagers as a criterion of determining beneficiary (participants in the pilot project) inside the target villages, thus delegating the selection of participants to the village leaders and other stakeholders who regard the selection criteria explained by the Team.

Putting the basic principle on villager’s own decision, it is anticipated that those who have landholders right, or better-off at least are possibly selected as the beneficiary in the agricultural component. If so, the Study Team asks the stakeholders to consider how to expand the scope of beneficiary to other non-participants who also have landholders right from the original beneficiary. In short, the strategy of how to manage expansion and strengthening the outreach of the benefit should not only be considered by the Study Team but also by such stakeholders as the village chairmen, villagers and extension staff in the frontline.

Assuming that the original participants in the pilot project are called “the first generation participants”, the goal is how to hand the benefit down into “the second generation participants”. For instance, in the case of certified seed multiplication pilot project, the Study Team informs the inhabitants their consideration an allowance on free participation of potential successors in the initial training in order to the smooth allocation of the multiplied seed to these of the second generation successors (but initial allocation of seed itself is limited to the selected participants due to the limited availability of the seed). Such institution will also lead to a function of peer monitoring of the first generation participants by other villagers.

The basic principle on “public interest” is also interpreted as how to prevent it from “enclosure” of the benefit. Many donors often organize the beneficiary into groups for the purpose of facilitating disbursement of their funds and raising efficiency of extension, and provide inputs to these groups only. Contrary to what the donors desire, this may foster such enclosure of benefits by these groups.

In the case of supporting particular groups, it is the outsider’s responsibility to explicitly inform the selected groups that they are nothing but an entry of equitable benefit endowment. Also it is responsible for outsiders to make them realize that the benefiting from inputs is always an issue to be considered by the entire village even if donor’s intervention were inevitably limited to a particular beneficiary group in the actual implementation.

Somewhat expensive inputs / equipment are provided in the case of dealing with small-scale industries.

Here, it should be explained to the inhabitants that the establishment of small-scale industries may require two things: one is learnt in the past experiences, difficulty of succeeding in their establishment without a smart leader who can lead the group, and the other is necessity of involving the poor into the group, or including “pro-poor” targets as group members.

In this context, a measure is basically adopted to ask the redemption of all the amount of fund which has been spent for the provision of equipment for small-scale industry promotion in this pilot project. In some cases fee system for using the equipment provided may be applied, of course. It is therefore proposed to use the amortized amounts, or fee paid by the users, as the starting resource of a village development fund. That is to say, it is envisaged that an institutional frame is created so that the first group who received the equipment is to amortize the equivalent amount, or otherwise pays the fee, to the village treasury, from which the second group is to borrow the fund to start another small-scale industrial activity.

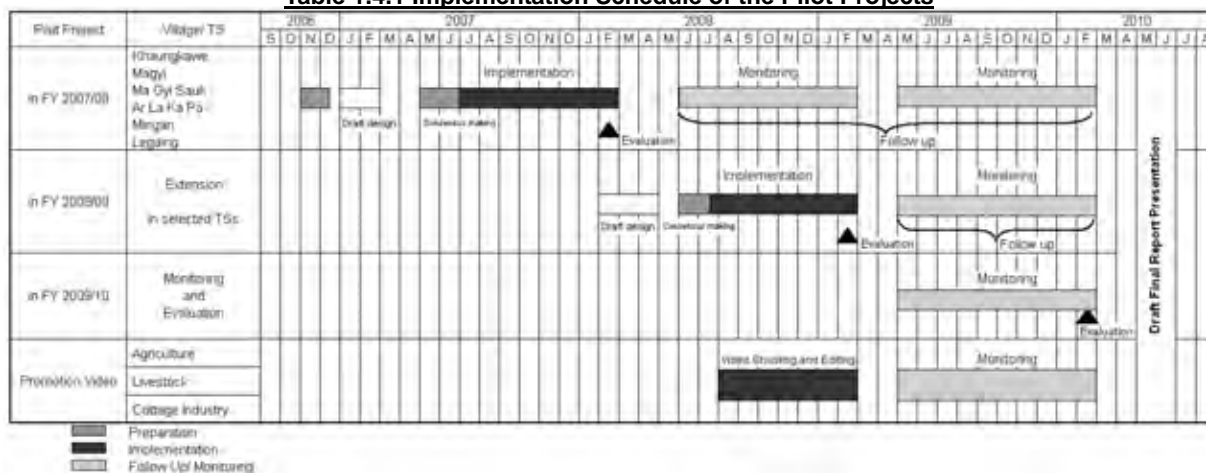
In any case, the JICA Study Team that provides the inputs is to pursue a basic policy of avoiding to foster/ enlarge disparity amongst villagers leaving the poor as it remains. In this connection, however one may say that enlarging disparity may be allowed in the case of development activities like cottage industries where smart business mind is required. We think that such resource allocation system could only be allowed in advanced developing and developed countries equipped with a progressive taxation mechanism in which a part of surplus income is applied to amortize it and socially allocate it to the poor.

Regretfully, development stage of many developing countries including Myanmar has not reached to enable such resource transfer or redistribution. Under such circumstances, consideration should be paid in selecting the beneficiaries at least in a way that “the chance of development should be open to wider population by paying due regard to “public equity and pro-poor”, though it is often the case that the success of a business of course varies with the efforts of individual entrepreneurs.

1.4 Overall Schedule of Pilot Project Implementation

Table 1.4.1 gives the overall schedule of implementing the pilot project. Since the Study period agreed in the Scope of Work terminates in early mid 2010, the implementing total duration of the pilot project is almost 3 years stretching from FY 2007/08 – FY 2009/10. In addition to the pilot projects which started from June 2007 covering first 6 villages, the Study undertook new pilot projects that were launched in FY 2008/09 in a consecutive manner. Then, no addition pilot project was added in FY 2009/10 but the Team together with counterpart personnel was engaged in the monitoring and final evaluation.

Table 1.4.1 Implementation Schedule of the Pilot Projects



In fact, preliminary selection of the project components undertaken in FY 2007/08 was carried out during the period November - December 2006. Then after the completion of design and cost-estimation in Japan, consensus for the FY 2007/08 pilot project was built with the related government officers in June 2007 and also consultation done with the villagers for the pilot plan in each village. Thereafter, the Study Team made a sub-contract with a local consultant that supported the pilot project mainly in logistics. The project activities for the FY 2007/08 pilot project continued to the end of February 2008, and then had undergone monitoring and evaluation stage.

The pilot project in FY 2008/09 started when the Team came back in Myanmar in July 2008. About one and half months were spent on the preparation such as consensus making with the concerned government officers. Upon consensus with the officers, the Team and the counterparts made a series of field visits to relevant villages, and started project mobilization with the concerned TS officers. All the planned project activities of FY 2008/09 pilot project were completed by end of February 2009. In parallel with the implementation of this FY 2008/09 pilot project, the Team engaged themselves in monitoring of the FY 2007/08 pilot project.

FY 2009/10 is the last year for pilot project activities. In fact, no additional projects were implemented but the counterpart personnel with the Team tried to further extend what had been done during the past 2 years, and also engaged them in monitoring and final evaluation. A unique trial in extension was made in this last project year, FY 2009/10. Three (3) kinds of promotion videos were produced in FY 2008/09, covering 3 sectors of agriculture, livestock and cottage industry (for detail see Chapter 7 Extension material Development). These videos were distributed to villages during the end of FY 2008/09. The Team followed up, aside from the impacts of the past 2 years pilot projects, the outcome of the promotion videos.

CHAPTER 2 DESIGNING OF THE PILOT PROJECT

2.1 Basic Approaches of Designing the Pilot Project

As aforementioned, the pilot project was firstly commenced in FY 2007/08 and then some new components were added in FY 2009/10. In designing the pilot project over these 2 years, 2 different approaches were employed. Namely, components of the pilot project in FY 2007/08 have been directly identified through a series of workshops at the concerned village level. Whereas, the components of pilot project 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.

In other words, 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 2008 was provided in a “supply driven” way¹ through the development framework covering whole CDZ.

Table 2.1.1 Methods of designing Pilot Projects and their Advantages / Shortcomings

	Design of Pilot Project in FY 2007/08	Design of Pilot Project in FY 2008/09
Characteristics	The Project has been designed based on the result of PCM problem analysis carried out at village level to solve the extracted problems in this analysis. In other words, its design is formulated in a way of problem solution so that diversified issues (needs) in a particular village can be met. Therefore, the Project is oriented to an approach to integrated rural development.	Development framework has firstly been referred, and the Project was so designed that particular high priority components in the framework (projects and programmes selected in the framework) can be widely implemented. In this regard, the Pilot Project has been designed selecting only major actions of high priority projects taking account of implementation period and cost provision.
Advantages	The Project can meet diversified needs in the village. Moreover, even if certain Pilot components ended up in failure, possibility remains to recover/ improve it with other Pilot activities in the same village. In other words, recovery/ improving options are endogenously available against failure in the target villages (Example of recovery/ improving PP: Provision of micro-financing to local cattle improvement in Legaing Village and Ar La Ka Pa Village, probation of initial capital to mushroom beneficiaries in Legaing Village, etc.).	Because the Project has been designed in conformity with the CDZ development framework, it can contribute to the optimization of resource inputs in the case of developing the entire CDZ. Also, it makes possible to extend the project activities to many other areas by making full use of current government's administrative network. As a result, transaction cost can be minimized (vice versa optimization of resource input). In addition, as similar activities are often put into practices in neighbor villages, high possibility remains in making development and learning through mutual enlightenment among the inhabitants of target villages by their initiatives.
Shortcomings	As the individual project components are designed in a tailor made manner, transaction cost would definitely increase. Commonly, it cannot be implemented unless donors bear the cost for logistics in the form of extra-administrative-cost for the project, or provide its budget as the cost for specific project activities. Also, amount of the input tends to get higher as a result of trying to meet inhabitants' direct needs (because inhabitants' needs are always close to their requests regardless of financial and technical feasibilities), leading often to lowering the sustainability of the planned project.	Many parts of project efforts may be reduced in vain if the contents of the Project do not fit in the context of the project site, as it is implemented in a kind of top-down style (rather, the implementation may cause even troubles for the inhabitants). By this reason, it is desirable to try a pre-test pilot project prior to the scheduled wide-range of implementation. Another drawback is found in difficulty to meet diversified needs of the villages due to its “supply driven” nature.

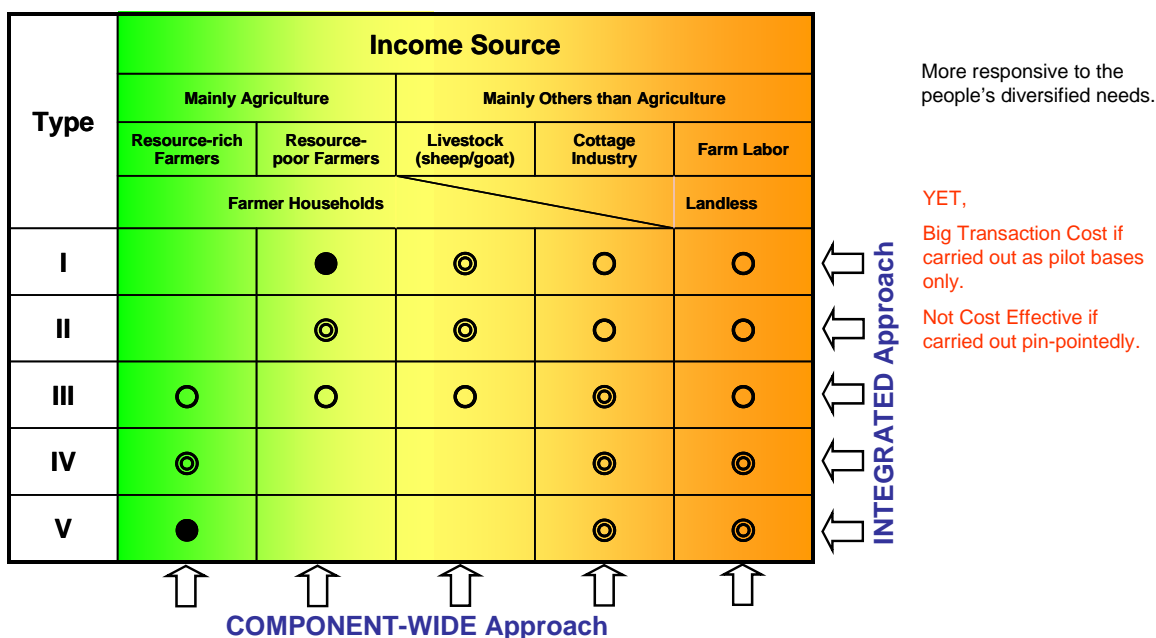
Source: JICA Study Team

Both advantages and drawbacks are found in the design of these two pilot projects as summarized in the table above. Because the pilot project in FY 2007/08 was provided in WS at village level, it can meet diversified needs arising from the villagers concerned. In other words, an integrated rural

¹ In this regard, since the development framework has been formulated through a series of workshops held at Mandalay in which about 80 people, both representatives of the inhabitants and administrative staff concerned, have participated in specifying tasks, developing strategies and determining relative priorities of its component projects, it can be concluded that stakeholders' needs and relative priorities are reflected in the development framework even though they had participated therein as indirect representatives concerning the pilot project implemented.

development approach had been tried in formulating the pilot project. Meanwhile, the pilot project in FY 2008/09 was in a first place directed towards extension for wider coverage of beneficiaries – lateral development. In other words, the pilot project in FY 2008/09 has followed a principle to make full use of extension staff etc for putting particular pilot components into practice in wider areas (more villages).

The structural frame to formulate the pilot projects in FY 2007/08 and FY 2008/09 is now explained referring to Figure 2.1.1 where the relationship between 5 typologies established to characterize the CDZ and corresponding inhabitants dominated in each type are given in a matrix. The CDZ can be classified into type I - V by means of representative natural conditions prevailing over the area. Type I has the most severe natural conditions (little rainfall, poor soils, etc. in terms of agricultural production), whereas Type V is located on the most favorable natural conditions (refer to the discussion of Chapter 4.4.3). On the other hand, the inhabitants are roughly classified based on their major means of livelihood into farmers (well-off farmers and poor ones) and the landless that is subdivided into livestock-oriented, small-scale industry oriented and farm labor oriented ones. Symbols of ●, ⊙ and ○ indicate which social class is predominant in which type, respectively.



Hardly responsive to all the people's diversified needs, YET

It entails less transaction cost, thereby more workable under the present Gvt extension office set-up, if programme content can fit in the specific need by beneficiary.

Figure 2.1.1 Designing of Pilot Project in Two Approaches

In this figure, an integrated rural development approach can be expressed as the lateral movement–simultaneously mobilizing diversified social classes, while a component-wide approach can be explained as the vertical movement of only mobilizing the targeted class/ classes while covering wider area. Namely, an “integrated rural development approach” is defined as “an approach coping with poverty problems in rural areas with multi-facet issues, or as a method of assisting development that is implemented effectively combining plural components aiming at better livelihood of diversified beneficiary inhabitants”.

On the other hand, a “component-wide approach” is termed as “a method of assisting development in which particular or limited development component(s) targeted to particular stratum (strata) of social hierarchy in a rural area or making use of particular resource(s) is/are laterally (two-dimensionally)

deployed utilizing existing means like extension staff”. Actually, the pilot project in FY 2007/08 was designed under the former approach, whereas both approaches were tried to apply to that in FY 2008/09 with the latter having more priority.

The approach by integrated rural development implemented in FY 2007/08 is illustrated as lateral arrows in this figure, and this was also applied to the pilot project in FY 2008/09 but at the same time component-wide approach illustrated as vertical arrows was also applied in the pilot project in FY 2008/09 with higher priority. Here, in the component-wide pilot project, TS extension staff as a front-line was mobilized envisaging wide area expansion of the pilot project. More concretely, training courses were provided for extension staff in which they themselves formulated action plans, thereby pushing the pilot project forward.

2.2 Design of FY 2007/08 Pilot Project

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 mainly related to agriculture, livestock and cottage industries had been identified, summary of which is given in Table 2.2.1 and a problem analysis tree in Ma Gyi Sauk village is given as an example in Figure 2.2.1.

Various causes in agricultural sector are identifiable in this table including: unstable income attributable to erratic crop production quantities, low crop yield due to narrowness of arable acreage, scarcity of irrigation water and insufficient farming techniques, low net profit brought about by various problems such as transportation cost of agro-products. Those in livestock sector identify low profit from livestock rearing owing to high mortality of domestic animals, low reproduction / breeding rate and high transportation cost etc, slow herd building due to lack/ shortage of husbandry skills and low availability of feedstuff. In cottage industries, a host of issues have been identified deriving mainly from limited gain and production quantity as major causative factors.

Table 2.2.1 Summary of Problem Analysis in 6 Target Villages of the Pilot Project

Sector	Direct Causes	Other Major Causes	Village
Agriculture	1. People of Income is unstable.	(1) Crop Production is unstable	Khaungkawe Magyi
	2. Crop yield is low.	(1) Plowing the field is not efficient. (2) Water for agriculture is scarce. (3) Fertile land is decreased. (4) Quality of product is poor. (5) Pest control is deficient. (6) Knowledge about modern agriculture technologies is lack. (7) Improvement skill of seed variety is poor. (8) Crop products are not grown in time. (9) Chemical fertilizer for cultivated field is insufficient. (10) It is difficult to buy pesticide. (11) This area has a low rainfall. (12) There is no technology for renovation of land. (13) Quality of paddy is poor. (14) Irrigation infrastructure is poor.	Khaungkawe Magyi Ma Gyi Sauk Ar La Ka Pa Mingan Legaing
	3. Profit is low.	(1) Transportation cost is high. (2) Quantity of products is low (3) Massive unemployment. (4) Lack of saving culture of resources e.g. money.	Khaungkawe
	4. Quality of crop is poor.		Ma Gyi Sauk.
Livestock	1. Profit is low.	(1) Fuel price is raised. (2) Mortality rate of livestock is high. (3) Reproduction rate of livestock is low. (4) Transportation cost is high. (5) Quantity of products is low.	Khaungkawe

	2. Number of livestock is scarce.	(1) Reproduction rate of livestock is low. (2) Livestock feed is lack. (3) Livestock is in a poor state of health. (4) Breed improvement is inadequate. (5) Mortality rate of Goat is high.	Magyi Ma Gyi Sauk
	3. Animal Products are decreased.	(1) Livestock feed is lack. (2) Number of livestock is scarce. (3) Feeding technology is insufficient. (4) Technology for artificial Insemination of foreign milk cow is poor	Ar La Ka Pa
	4. Crop yield is low	(1) Reproduction rate of livestock is low. (2) Measure for foot and mouth disease is inadequate. (3) Feeding technology is insufficient. (4) Pasture for livestock is decreased. (5) Improved varieties of livestock is scarce.	Mingan Legaing
Cottage Industry	1. Profit is low.	(1) Transportation cost is high. (2) Quantity of products is low. (3) Product Cost is high. (4) Product Price is low. (5) Skills of Weaving are inadequate. (6) Community does not have enough labor. (7) There is no light in the quarry. (8) There are no modern tools and machines. (9) It is difficult to carry raw stones.	Khaungkawe Magyi Mingan
	2. Yield of cottage industry is low.	(1) Weaving and Knitting machines are lack. (2) Raw materials for knitting and weaving are insufficient. (3) Night work is difficult (a power shortage). (4) There are no modern sewing machines. (5) Skills of handicrafts are poor. (6) Raw materials are insufficient. (7) There are no modern machines for cottage industries. (8) Technology for cottage industries is poor. (9) Electricity is limited.	Ma Gyi Sauk Legaing
	3. Product sales are low.	(1) Places to sell products are limited.	Ma Gyi Sauk
Others	1. Income is unstable.	(1) Community has lack of knowledge about expanding market. (2) Job opportunity is lack.	Ar La Ka Pa
	2. Profit is low.	(1) Life expenditure is high.	Legaing

Source: Workshops carried out at village level by JICA Study Team

A WS was held at village level in 2007 (PCM problem analysis) where problems were roughly clarified in terms of agriculture, livestock, small-scale industry and living environment, and pilot project was designed in a way to tackle the clarified problems

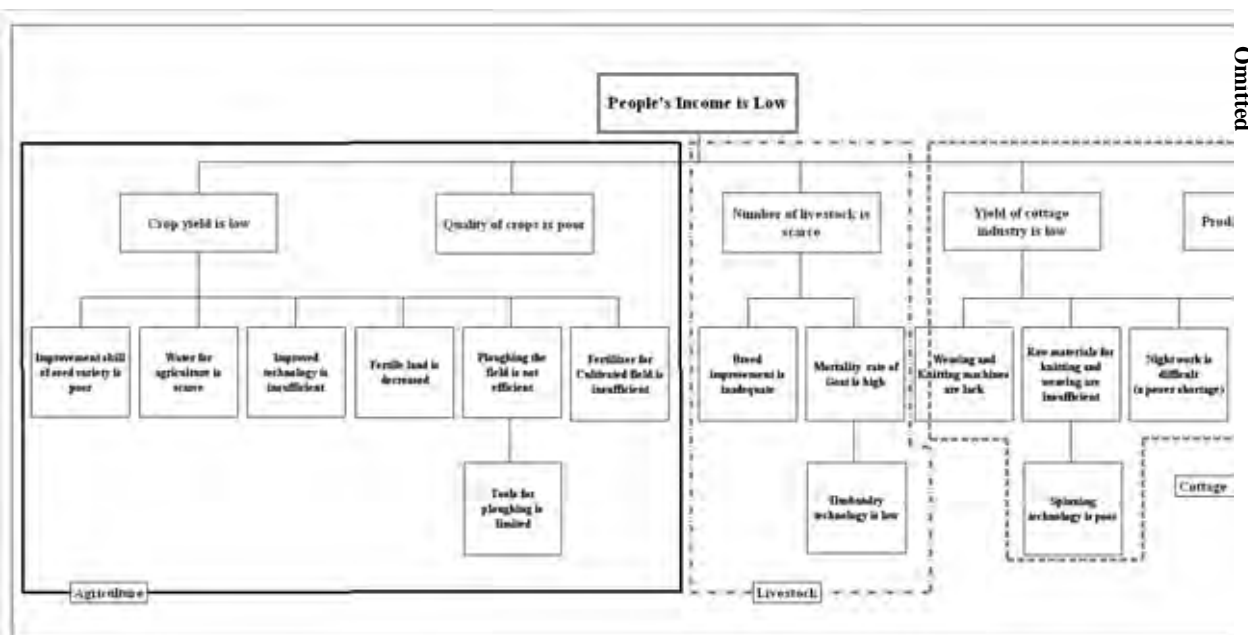


Figure 2.2.1 An Example of Problem Trees established in Ma Gyi Sauk Village

In order to respond to various needs of the inhabitants in the target villages, it is essential to select pertinent components so that they target various types of inhabitants even in a village. That is to say, an integrated rural development project approach is applied to this process of component selection. In selecting components, priority should be attached to what enables poor households to improve their livelihood, those with a system of revolving through which the beneficiary can be expanded what is based on readily practicable skills by which extension to neighboring villages can be expected. Table 2.2.2 gives brief of pilot components for the target 6 villages selected.

Table 2.2.2 Summary of Pilot Project Components commenced in FY 2007/08 by Village

Village	Sector	Components
M3 Khaungkawe	Agriculture	07A1. Raised Bed Cultivation (+ engine pump irrigation) Project 07A4. "Bokashi" Compost Making Promotion Project
	Livestock	07L2. Pro-poor Oriented Goat Revolving Project 07L4. Livestock Feeding Improvement Project 07L7. Animal Housing Improvement (Goat, Pig) Project
	Cottage Industry	07C1. Tinsmith Strengthening Project 07C2. Guitar-Key Strengthening Project 07C4. Weaving Improvement Project (material revolving)
	Living Improvement	07I2. Biogas Generation Project
M8 Magyi	Agriculture	07A1. Raised Bed Cultivation (+ engine pump irrigation) Project 07A2. Improved Seeding Practice Project (seeder introduction) 07A3. Improved Seed Regeneration Project (Chick pea) 07A4. "Bokashi" Compost Making Promotion Project
	Livestock	07L1. Pro-poor Oriented Sheep Revolving Project 07L2. Pro-poor Oriented Goat Revolving Project 07L4. Livestock Feeding Improvement Project 07L7. Animal Housing Improvement (Goat) Project
	Cottage Industry	07C10. Energy Efficient Stove Promotion Project (for Jaggery)*
S6 Ma Gyi Sauk	Agriculture	07A1. Raised Bed Cultivation Project 07A3. Improved Seed Regeneration Project (Chick pea) 07A4. "Bokashi" Compost Making Promotion Project 07A6. Rice-Duck Farming Project
	Livestock	07L1. Pro-poor Oriented Sheep Revolving Project 07L2. Pro-poor Oriented Goat Revolving Project 07L4. Livestock Feeding Improvement Project 07L7. Animal Housing Improvement (Goat) Project
	Cottage Industry	07C3. Embroidery Promotion Project 07C4. Weaving Improvement (Motorized Weaving) Project 07C5. Knitting Promotion Project
S2 Ar La Ka Pa	Agriculture	07A5. Pro-poor Oriented Mushroom Culture Promotion Project
	Livestock	07L4. Livestock Feeding Improvement Project 07L5. Local Cattle Improvement Project** 07L6. Intercropping of Sorghum and Rice Bean Project 07L7. Animal Housing Improvement (Goat, Cattle, Pig and Chicken Housing)
	Cottage Industry	- (firstly rural product sales shop was proposed but cancelled)***
	Living Improvement	07I1. Drinking Water Establishment Project
G7 Mingan	Agriculture	07A4. "Bokashi" Compost Making Promotion Project
	Livestock	07L2. Pro-poor Oriented Goat Revolving Project 07L4. Livestock Feeding Improvement Project 07L6. Intercropping of Sorghum and Rice Bean Project 07L7. Animal Housing Improvement (Goat) Project
	Cottage Industry	07C6. Sandstone Ware Production Improvement Project
	Living Improvement	07I3. Electricity by Diesel Generator Project 07I4. Primary School Construction Project (with Roof Catchment)****
G13 Legaing	Agriculture	07A4. "Bokashi" Compost Making Promotion Project 07A5. Pro-poor Oriented Mushroom Culture Promotion Project
	Livestock	07L3. Pro-poor Oriented Piggery Revolving Project 07L5. Local Cattle Improvement Project** 07L6. Intercropping of Sorghum and Rice Bean Project 07L7. Animal Housing Improvement (Pig) Project
	Cottage Industry	07C7. Road Station (village product sales shop) Project 07C8. Paddy Drier Project (including milling improvement)***** 07C9. Fruit Processing Project*****

*: It was originally a provision of solar cooker. However, the cooker pre-tested could not give enough heat and thereby changed to energy efficient stove for Jaggery making.

- **:
- ***:
- ****:
- *****:

As the agricultural components, it was scheduled to apply raised bed cropping in lowland areas for farmland holders, small-scale irrigation using pumps, vegetable cultivation through small-scale irrigation from wells and certified seed multiplication of pulses. Mushroom culture which does not require any farmland was provided for the landless. Further, compost manure, Bokashi composed, was planned to introduce into farmland coping with recent price hike of chemical fertilizers, or improving soil physical properties.

Livestock related components are chiefly targeted to the landless and smallholders where promotion of goats/ sheep rearing as a role-player of “live bank”, introduction and diffusion of piggery, improved barns were planned. As the components applicable to land holding farmers, introduction of cultivation with rice duck flock, local cattle improvement, cultivation of sorghum and mulberry as fodder targeted to poorer strata including the landless, feeding improvement with molasses mineral block were scheduled.

All the components related to cottage industries are targeted to existing industrial groups, consisting of strengthening and expansion of such industrial activities as tinsmith, guitar key manufacturing, embroidery, knitting, masonry including provision of equipment. Besides, construction of sale depot along the trunk road traversing a village was also scheduled for facilitating sale of village specialty products or those manufactured in small-scale industries. As regards equipment input invested into the components related to cottage industries, it is scheduled to impose users to amortize/ reimburse the equivalent amount, or in a form of rental fee, to the source of village development fund (a village based revolving fund).

As to living condition improving components, a bio-gas power generation (electricity generated by driving diesel engines with methane gas as the fuel evolved from cow-dung) is planned in Khaungkawe Village, and primary school construction was planned in Mingan village. In addition, improved type barns for goats and pigsty were to be provided for demonstrative purpose. It is envisaged to realize living condition improvement by distinctly separating livestock shelter from living space.

2.3 Design of FY 2008/09 Pilot Project

Identification of the pilot project in FY 2008/09 was done basically by considering of the linkage with the development framework of the CDZ established in FY 2007/08. Figure 2.3.1 shows relationship between these components and the development framework.

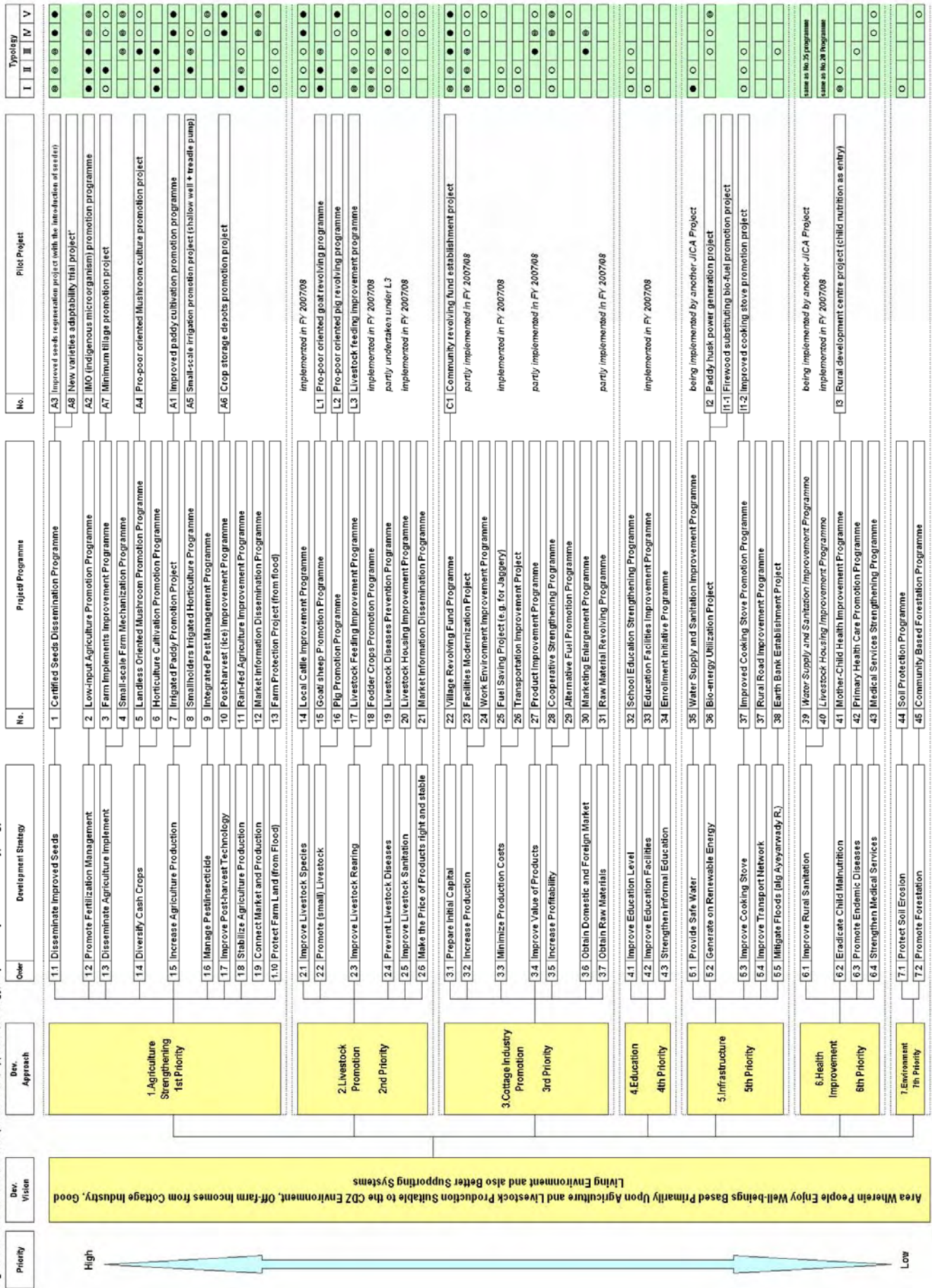
In addition to the relationship with the development framework, the pilot project in FY 2008/09 also considered suggestions from a steering committee held on 13th December 2007. In the Steering Committee held on 13th December 2007, the following opinions were presented on the sites of pilot project implementation, and also desirable additional components to the project, etc.

- 1) As to the sites of the pilot project in the coming fiscal year, the Chairman proposed to concentrate on the on-going 6 TSs rather than escalating the activities into other TS. This is because the

effects of the Project may fade away if the activities are expanded into other areas at current stage where effects of on-going Project activities have not yet fully grasped.

- 2) Seeds of *Jatropha curcus* (Physic nut) are utilizable not only on commercial basis but also as fuel at rural community level. For instance, briquettes are manufactured in India from the seed cake of Physic nut and rice husk by mixing and compressing them, and this can be applied to the CDZ for household cooking fuel.
- 3) In Myanmar, since post-harvest treatment techniques are still on the way to develop, it is necessary to try and verify construction of storage facilities (silo, go-down, etc) with the materials procurable at farmer's level and storing techniques to preserve quality of harvests as well to minimize storage loss.
- 4) As possibility and opportunities are available in the pilot project to conduct test cropping for introducing new crops / varieties, test trials should be performed for the introduction of new strains (for instance, sesame, sunflower, maize, Physic nut, drought resistant rice varieties etc). Though imports of breeders seeds and certified ones are difficult for JICA, the Study Team replied that if seeds are available supplied from DAR, test cropping at the level of the Pilot villages is possible.
- 5) Ruminant livestock are important in the CDZ, and so feeding resources are important for their multiplication and breeding improvement through the Project. While the Study Team carries out intercropping of rice bean with sorghum etc, a member of the Steering Committee suggested in the meeting that seed of *Desmodium* spp and its cropping guideline would be released.

Figure 2.3.1: CDZ Framework: Development Vision, Approach, Strategy, Project Priority in Relation to Typology



● Top priority in the Typology
 ○ Mid priority in the Typology
 ○ Low priority in the Typology

Summarizing above discussions, Table 2.3.1 now gives the selected pilot project components by project type and by component-wide type, followed by brief project description. In implementing the pilot project components of component-wide type its diffusion into wider area is envisaged by the training of extension staff of TS who are placed at the frontline.

Table 2.3.1 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 fodder)*	○		
	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	○		

Remarks : * Minimum tillage cropping promotion and new varieties testing trial can in principle be implemented through component-wide approach. However, implementation of these is planned in limited villages or with project-oriented approach because they have major character of test trials.

08A1. Improved Paddy Cultivation Promotion Programme

Around 30% of farmland in the CDZ is classified into Le Land (i.e., lowland) where paddy is cropped. Since rice constitutes top priority crop product in Myanmar's agricultural sector, paddy cultivation is always preferred not only in irrigated land but also in lowland (in this connection, compulsory paddy cultivation system has nowadays been removed except for irrigated land). Core extension tactics applied to paddy cultivation in Myanmar consist of so-called inputs-oriented paddy cultivation including demarcation of priority areas for paddy cropping, preferential allocation of urea fertilizer produced in state-run factories thereto etc.

The effect of chemical fertilizers to increase crop yields is surely remarkable, but in many lowland areas of the CDZ paddy is cultivated on rain-fed condition. Since agriculture in the CDZ is exposed to unstable climatic conditions, heavy application of farm inputs often leads to higher risk (in drought season harvest can hardly be expected). Although necessity of applying chemical fertilizers is recognized, improvement of paddy cultivation also requires farming oriented approach.

Following activities in terms of paddy cropping improvement to be tried in this programme are considered: 1) improving growth environment in nursery beds making use of paddy husk charcoal, 2)

method of sorting high quality paddy seed, 3) identification of optimum quantity of paddy seed, 4) early transplanting of seedlings into paddy field and optimum transplanting interval, 5) preventive measures against pest damages, 6) post harvest treatment etc. In short, target of extension is placed on yield increase / stabilization with less input application.

08A2. Organic Farming Promotion Programme (with Indigenous Microorganism: IMO)

This is a technique applicable both to paddy field and upland field. Diversified species of bacteria (IMO) exist in natural environment. For example, thick mat-shaped white hyphae observed in bamboo bushes are a cluster of indigenous microorganism. Likewise, when cooked rice is left in wood-shade or in bamboo bushes, mold emerges to gather in a week or two, which is also an indigenous microorganism. If such IMOs are incubated with such substrates as molasses, aerobic bacteria can be proliferated. Making use of such bacteria, a kind of farmyard manure can be prepared. Similarly, bacteria-suspended solution thus prepared can be sprayed onto legume biomass for green manure when it is incorporated into farmland soils so that decomposition of green manure in the soils is facilitated and thus it can contribute to such soil physical improvement as manure is decomposed to form water retentive aggregate.

Hence, organic farming with pertinent use of IMO is a typical input-saving type farming method. While there is a trend in favor of organic farming from food safety point of view in developed world, in Myanmar organic farming enables farmers to stabilize / augment crop yields through proper use of bacteria and other naturally available materials found in natural environment amidst predominance of farmers with poor access to chemical fertilizers. Possibility of saving / dispensing input of chemical fertilizers itself makes farming less risky in drought seasons. At the same time, as such farming improves soil physical properties, farmers can consequently engage in stout farming highly immune to risk of drought etc.

08A3. Improved Seed Regeneration Project (with the introduction of Seeder)

At a workshop inviting village representatives, TS officers, district and divisional officers, 'disseminate improved seeds' was identified as the top most issue under agriculture sector. Likewise, villagers in Magyi and Ar La Ka Pa villages identified degraded seeds (chick pea), as a result of recycling seeds, causing low yield as one of their priority problems. In general, MAS tells farmers to renew seeds at least once in every 3 years. However, no systematic seed regeneration has been practiced at villagers level. They just keep an amount of harvested seeds for next year's seedlings and in some cases they buy seeds from colleague farmers who have produced good yield, implying better quality seeds.

In 2007/08, a pilot project for chick pea seed regeneration was tried in Magyi and Ma Gyi Sauk villages, in which 1st generation beneficiaries who were given certified seeds by JICA are supposed to revolve harvested improved seeds to the 2nd generation beneficiaries in exchange of same weighted conventional seeds, thereby seed regeneration is planned within the village. In Magyi village, a seeder was also tried. Seeder has got merit and demerit. Seeder needs a total 3 days of drafting cattle, instead of conventional 1 day, in order to do not only ploughing but also smoothing of the farm surface, which is demerit. However, with the seeder farmers can save, as an example, chick pea seeds from 14 pyi to 17 pyi per acre, and also can



Sowing by Seeder

expect better yield since the seeds are sown in an equitably distributed way on the farm (the pilot tried in 2007/08 is to harvest chick pea in February, therefore not yet confirmed how much increased as of late January 2008).

The seeder, shown in photo above, was fabricated in one of the pilot villages in 2007/08, proving that seeder can be made in rural villages giving opportunity for many needy farmers. The seeder worked well but need some improvements, reported the user farmers. The seeder could hardly work on heavy soils, and seed dropping pipes were sometimes clogged due mainly to the sticky soil turning back to the tip part of the pipes. Thus improvement is required to further extend. This improvement should be tried in line with (chick pea) seeds regeneration, so that farmers can have better yield.

08A4. Pro-poor Oriented Mushroom Culture Promotion Project

Because mushroom can be raised in house yard and be harvested in two weeks or so, it serves as a precious cash income source for the landless accounting for 40 - 50% of rural population (forming poor strata). In Legaing Village where the Pilot Project in 2007/08 was implemented, villagers have already expanded their sales outlets of mushroom to restaurants in Magway Township and three traders were emerged who deal with collection and sale of mushroom. It has also been practiced in Ar La Ka Pa Village, but here natural edible fungi sprout during the end of rainy season, the harvested mushroom could hardly be sold within the village.



In such cases that sales networks are limited or competition arises from naturally produced edible fungi the promotion of mushroom culture would encounter difficulty, but in any way acquisition of new cash income generating skills with small inputs is highly significant for the landless people. Therefore, this project is implemented in FY 2008/09 too for the sake of poor people who do not have farm lands.

08A5. Small-scale Irrigation (shallow well + treadle pump) Promotion Project

Beneficiaries of this programme are landholder farmers, above all smallholders. In the CDZ, they raise such horticultural crops as vegetables and onions for precious cash income sources by irrigating the plots with treadle pumps during the dry season extending from November to next May. Performances of treadle pump utilization in Myanmar are still few, however, lift irrigation with engine driven pumps have lower financial sustainability under current formidable fuel cost (1 liter of kerosene is equivalent to around US\$ 1). Of course, even with engine pump irrigation it may be possible to raise the sustainability through horticultural production / marketing of vegetables etc. if the site is located nearby townships. However, in rural area it must be better to go with manual pump at least for the moment.

A treadle pump with the simplest structural type can be purchased at around 35,000 Kyats in Myanmar. They have already been introduced preliminarily into Khaungkawe Village in 2007, one of the target villages of the Pilot Project, and trials are still continued to manufacture them by the villagers inside the village. When economy develops to certain extent manually driven treadle pumps usually go out of use (they can be rarely observed nowadays in Thailand and many of their pumps are nowadays

engine-mounted ones), but in Myanmar there is still feasibility of using them at farmers level as means of irrigation. Likewise, if landholder farmers hire the landless people popularly living in rural areas for operating treadle pumps, their employment serves as a created cash-income source for the poor.

Treadle pumps are classified into two large categories. The difference between these lies in whether supply side convey water with pressure. The left side photo shows a conventional treadle pump with a structure that conveys groundwater lifted from a shallow well to evacuate from the delivery side thereof (in other words, pumped-up water must be carried to cropped sites with buckets or watering tins). The right side photo shows an improved type of treadle pump imported from India, the price of which is rather expensive (about US\$ 300\$ / pump) but water can be lifted up totally 12 - 13m above the groundwater surface.



The improved type has a double diaphragm valve fixed (under the cylinder) inside the pump body and thus higher degree of skill is required in its manufacturing process, but now its manufacture is put under trial in Khaungkawe Village (as of January 2008). In 2008, because groundwater stays at lower level, treadle pumps can only be readily operated within the areas where groundwater level stands shallower than 5 - 7m below ground surface and groundwater can thoroughly be obtained from shallow wells (artesian wells), or in the areas along rivers. In such areas small-scale irrigated farming is planned as a component of the Pilot Project targeting at horticultural crop production with treadle pumps.

08A6. Crop Storage Depots Promotion Project

A comment has been presented in the Steering Committee as follows: “In Myanmar post-harvest treatment techniques are still on the way to develop, therefore need arises to construct post-harvest such storage facility as silo, storage depot etc with materials and equipment available at farmer’s level and to test them to verify techniques for preserving post-harvest quality and for minimizing post-harvest losses.” Responding this comment, creation of storage depots is tried that can be constructed at progressive farmers or village level.

The basic structural design for the construction employs elevated floor so that invasion of atmospheric humidity can be avoided and various preventive measures against rats, mold and harmful insects that are originally adhered to harvested products. For example, to be tired are utilization of rice husk vinegar extracted from the process of preparing paddy husk charcoal and bamboo vinegar extracted from the process of providing bamboo charcoal, etc.

08A7. Minimum Tillage Promotion Project (mixed cropping with fodder)

Tillage practices in the CDZ are dependent on draught cattle. Many cases are observed in smallholder farmers who cannot afford to hold draught cattle because keeping a pair of them for a year requires sorghum harvested from 3 acre. On the other hand, even the landless can feed draught cattle for use of their rental leasing though such people constitute minority. In any case, use of draught cattle is essential in the CDZ where farm mechanization has not so far been much progressed, whereas it is not at all easy for smallholder farmers to keep thorough heads of draught animal and therefore

many of them are tilling their land with rented draught cattle etc.

Here, in minimum tillage farming, ploughing is done on the rows necessary to plant or sow, and this can save the time of using draught cattle. Basic concept of minimum tillage farming resides in leaving bulk of crop roots in the soils as they are so that they can decay and supply organic matter thereto and the roots themselves can cultivate the soils. However, how to treat weeds is generally posed as an issue once minimum tillage farming is practiced. Use of fairly heavy doze of herbicides is observed in highly developing - developed countries to cope with this issue, but in Myanmar this solution cannot be applied.

In some cases, mulching is practiced as measures against weeds. In order to control weeds, farmers lay straw and all other crop residues as the materials of mulching, however, crop straw is utilized as fuel for cooking in the CDZ. Thus, since crop residues cannot be used as material for mulching, it is advised to employ intercropping with fodder crops as a substitute for mulching. Since a proposal has been made from a member of the Steering Committee during the explanation of PR2 to supply seed of desmodium, a fodder crop and its cultivation guideline, the test trial of desmodium is considered appropriate to implement simultaneously with the application of minimum tillage farming. As desmodium (refer to photo) is a leguminous crop, it can fix atmospheric nitrogen and because it is fortunately a perennial crop, no need arises from annual ploughing / replanting.



An Example of utilizing Desmodium

Specific ploughs are required to practice minimum tillage farming. A specimen is illustrated in the photo right, but self-manufacturing at the village level would be difficult since forging strength is required for its preparation. To cope with this issue, it is suggested that it is manufactured in the industrial zone in Mandalay City and it is tested in the Pilot Villages. In this connection, minimum tillage farming is deemed as an excellent method in the long run, but usually a few years are required before the remnant root debris left in the soils manifests actual effect of ploughing the soils (until actual effect appears yield may decrease in many cases). Further, even though mixed



A Example of Special Plough for Minimum Tillage

(inter) cropping is practiced, it cannot provide radical solution and the issue of weed control would still remain. Because mixed cropping is currently practiced employing sesame and pigeon pea with staples for instance, there is a concern that substitution of cash crops with fodder ones would not readily be practiced. For this reason, it is considered to carry out a trial of minimum tillage farming in small trial plots of cattle holding farmers where mixed cropping with desmodium can serve as a fodder source.

08A8. New Varieties Adaptability Trial Project

During the Steering Committee on PR2, a desire was appealed in a way “It is desirable in the Pilot Project to carry out trials on the introduction of new varieties (for example, those of sesame, sunflower, maize, Physic nut, drought resistant paddy etc) because the Project provides possibility and

opportunity of arranging test cropping on the introduction of new varieties”. The Study Team replied that although it was difficult to import breeders’ seeds or certified ones, but if seeds were supplied from DAR (Department of Agricultural Research), test cropping at the level of the Pilot villages was possible. It is envisaged to carry out application trials for new crop varieties in the Pilot villages with different natural conditions provided that seeds are supplied from DAR.

In this context, breeding technology has hardly taken place in Myanmar. In the hitherto trials conducted by the Ministry of Agriculture and Irrigation, seeds have been relied on the imports. For example, seeds of pulses have been imported from ICRISAT (India) or in the case of paddy seed, breeder seed has been imported from IRRI (the Philippines). Then, the Ministry multiplies them in its experiment station as certified seed and it is distributed through MAS to contact farmers to identify their adaptability at field level and later they are released to ordinary farmers. The Pilot Project plans to receive seeds of sesame, sunflower, maize, Physic nut, drought resistant paddy etc and to perform adaptability trials in the Pilot Villages with different natural conditions.

08L1. Pro-poor Oriented Goat Revolving Programme

The Pilot project envisages assisting feeding of goats or sheep by poor households, above all the landless. Goats/ sheep have been raised and fed by many farmers in the CDZ, literally serving as a live bank – livestock – because they well adapt to natural conditions in dry areas and they are often sold for cash whenever exigent need for cash arises. The methodology of the programme is mostly based on what was implemented in 2007/08, but it is planned in 2008 to apply the component in a wider area through the extension staff (veterinarians) belonging to LBVD (Livestock Breeding and Veterinary Department). That is to say, this programme is implemented through component-wide approach.

The programme employs a revolving system of offspring as a basis since it aims at recycling of benefits within the implementing villages. In 2007/08 Project, 5 she-goats are provided per beneficiary household that revolves the same heads of female kids to the secondary generation beneficiary. This system was tried in FY 2007/08 pilot project, and the same system is also followed in FY 2008/09 programme. Also, the precondition of receiving the revolving goats/ sheep is to build a barn by oneself. A case was observed in 2007/08 programme in Mingan Village in which a household received goats by constructing a hutch even resorting a debt. To avoid such distortion, an option is proposed allowing beneficiaries to establish a group raising system as actually tried in Ma Gyi Sauk Village by a group of 5 beneficiaries.

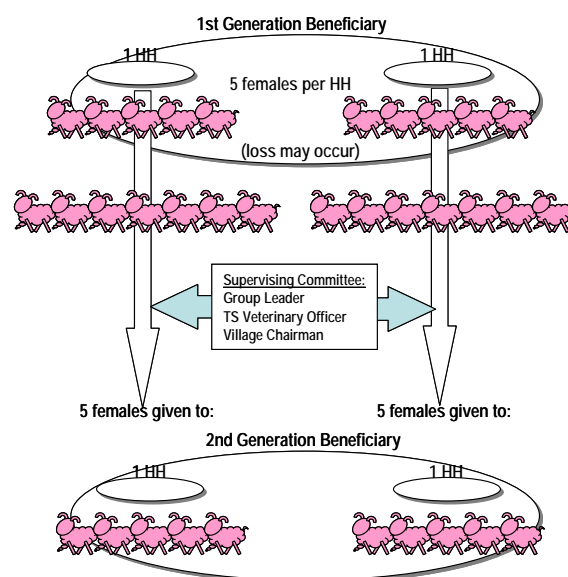


Figure 2.3.2 Revolving System on Goat

In Ma Gyi Sauk Village, 5 beneficiary households established a group building a medium-large-scale barn at a site and catering the herd in a rotation. The barn accommodates in total 25 heads or 5 heads per household where the herd is raised by a collective ownership. When revolving of 25 female kids in total is completed, it is scheduled to divide the total herd into 5, or 5 heads per household with individual ownership. Also, this system can provide the group another benefit, for poor members who could not prepare barns by themselves at the initial stage might have spare time to prepare their own hutches by the completion of revolving, and also the building of barns can be facilitated with the

cash obtained by selling male kids (female ones must be released for revolving purpose).

08L2. Pro-poor Oriented Piggery Revolving Programme

The same concept is applied to this programme as that adopted in the goats/ sheep revolving programme. Namely, piglets are supplied to the poor strata so that they feed them and finally sell them to increase income. In the case of goats/ sheep, offspring is to be revolving, but in this case of piggery, the raised pig must be sold after feeding (or after fattening). So, the basic system of this programme imposes the beneficiary to purchase a piglet for revolving to a second-generation beneficiary by paying a part of cash earned from the sale of raised pig.

This system itself is the same as that has been applied in 2007/08, and this is planned to continue with component-wide approach mobilizing extension staff. As to the target beneficiaries, mostly the landless living in villages in paddy areas are selected as beneficiaries (since grazing land space necessary to pasture goats/ sheep is hardly available in the areas dominated by paddy, it is difficult to introduce goats/ sheep). As income disparity tends to widen between paddy farmers and the landless in villages holding large paddy areas, thus generation of income sources has acutely been desired.

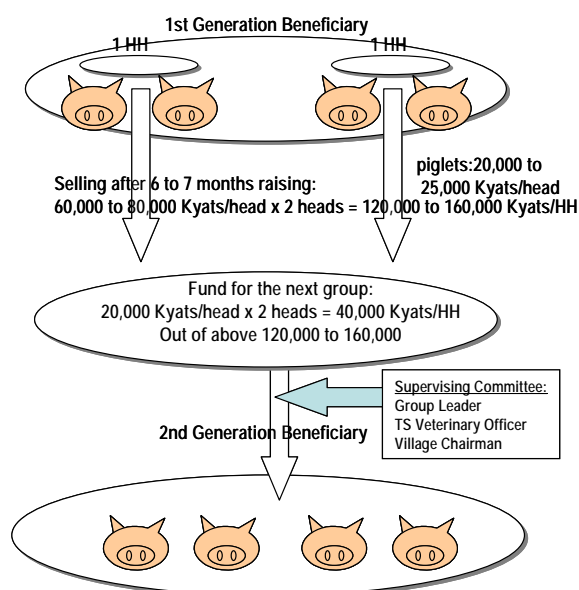


Figure 2.3.3 Revolving System on Pig

08L3. Livestock Feeding Improvement Programme (including molasses block, silo and Ipil Ipil)

This is implemented coupled with goat/ sheep revolving programme. In addition to the training programmed in 2007/08 on how to provide molasses block that is rich in mineral ingredients, two other feeding techniques are combined for extension purpose: these are introduction of trench silo (for storing fodder in a trench that is excavated underground with a size 5m in length x 2m in width x 1m in depth) and of live fence utilizing Ipil Ipil (*Leucaena leucocephala*, a fodder shrub tree with high protein content and its stems are also used for firewood). This is also scheduled to implement with component-wide approach.

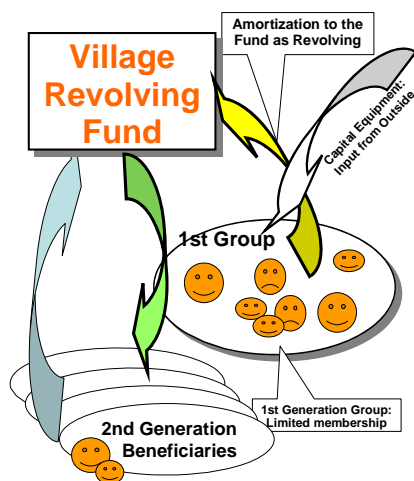
08C1. Village Revolving Fund Establishment Project

In 2007 programme, establishment of village revolving fund in terms of small-scale industry promotion is going on a trial basis. Necessary equipment is supplied to the system of small-scale industry promotion, but the involved members amortize the entire amount of capital fund by means of user rental fee, depositing it as community revolving fund in the village. Because rate of annual inflation ranges 10 - 60% at maximum in Myanmar, it is essential to consider the inflation rate in amortizing the input amount. In currently running system in fiscal 2007, the fund is to entirely be redeemed including the interest rate equivalent to the increment of farm-gate price of rice in Myanmar (refer to the figure in the right showing an example of the concept and case of installment).

This Pilot Project had been under way in 3 villages in fiscal year 2007/08 and this is further additionally implemented. Major target in 2007/08 has been focused on small-scale industry promotion, while in 2008/09 it is considered to elevate the accuracy of the revolving fund system set up with amortized money to the original fund for small-scale industry promotion – namely equivalent to the outcome obtained from the Pilot trial of small-scale industry. Also, in implementing it, with a

view to pioneering a trail to future institutional loan facility*, the Ministry of Cooperatives takes initiative for selecting target villages, small-scale industrial activities and the beneficiaries.

*: In promoting small-scale industries, it is necessary in many cases to assist towards initial investment with substantial amount (for instance 300 - 1,000 thousand yen per village. If small-scale industries should be promoted on wider basis in future, necessity would arise to introduce such institutional loan facility as two-step loan. Many potential beneficiaries can have an access to loan through such facility and it enables to avoid raising the issue of transparency accompanying with the process to select beneficiary (viz. if many are able to secure access to loan, it is getting possible to avoid evolution of transparency problems arising from the process of selecting beneficiaries by few selectors).



Input & Refund	Capital, Kyats	Refund, Kyats	Prevalent Paddy Price, Kyats/Basket	Equivalent to Paddy, In Basket	Balance in Paddy, Basket	Year
Total Cost of Equipment	3,000,000		5,000	600	600	2007
1st refund		300,000	5,500	55	545	
2nd refund		120,000	5,800	21	525	2008
3rd refund		300,000	6,000	50	475	
4th refund		260,000	6,200	42	433	
5th refund		450,000	6,300	71	361	2009
6th refund		520,000	6,500	80	281	
7th refund		460,000	6,900	67	215	
8th refund		620,000	7,200	86	129	2010
9th refund		620,000	9,200	67	61	
10th refund		300,000	9,600	31	30	2011
11th refund		270,000	9,000	30	-0	

Figure 2.3.4 An Example of Revolving Fund on Cottage Input

In 2008, the Study Team was to make the process of establishing revolving fund clear, and at the same time provides guideline, etc. on the reinvestment of amortized fund. It is often pointed out as a financial problem in Myanmar that bank interests are lower than inflation rates. That is to say, credit infrastructure in Myanmar is left undeveloped. When amortized fund is kept in bank deposits, its value would be eroded as time elapses. In order to avoid such a loss, it seems necessary to invest it to purchase such invariable goods as gold, and it reviews such measures along with the above-cited matters.

08I1-1. Firewood Substituting Bio-fuel Promotion Project

08I1-2. Improved Cooking Stove Promotion Project

In the CDZ, firewood, crop residues of sesame and pigeon pea and also cow-dung etc are used as cooking fuel. In many households firewood is purchased, thus contributing to increase of cash expense. Also, cooking stoves are generally open types with low combustion efficiency because they are usually made aligning pieces of brick or stone (refer to photo). In this context, Jatropha (Jatropha curcas, Physic nut) is promoted as bio-fuel in Myanmar. Oil extracted from Jatropha seed can drive diesel engine (if it's processed into methyl-ester), and if the seedcake is pressed, mixed with rice husk and solidified into block shaped briquettes, they can serve as an excellent household fuel for heating and cooking.



Since Jatropha is by nature a slowly growing plant in dry areas, it takes time to bear fruit producing enough oil that can substitute diesel fuel. However, possibility of using its seedcake as a co-product of oil extraction seems high, and therefore it is planned to introduce oil expellers and seedcake presses into village level processing units, thus promoting firewood substitution with bio-fuel.



Seeds of Jatropha

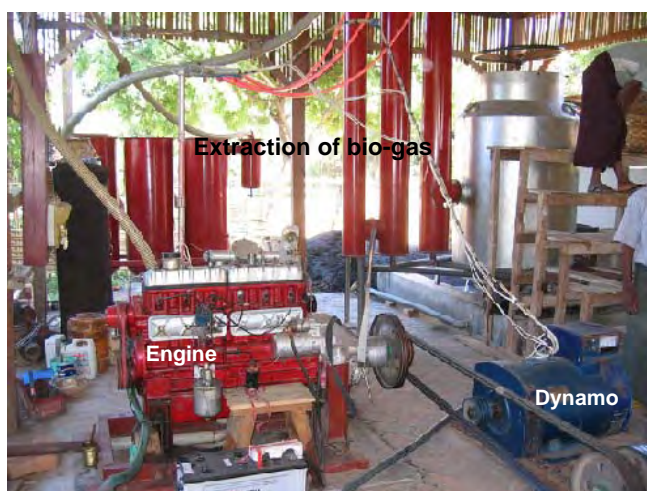


Fuel made of Jatropha seed cake

It is also desirable to improve currently used cooking stoves into those with better fuel efficiency. Improved cooking stoves already introduced in Africa etc are made of good quality clay as locally available material. However, in the case of the CDZ, most soils have been derived from alluvial origin and thus clay contains much organic ingredients. By this reason, it seems difficult to use clay deposited in the CDZ as it is for the material of improved cooking stove. It may therefore be necessary to make such device as utilizing mixture of lime powder that gives cementing effect and soil with less organic matter content.

08I2. Paddy Husk Power Generation Project

Village level power generation is under way in fiscal year 2007/08 in Khaungkawe Village utilizing methane gas evolved from cow-dung. In 2008, it is proposed to employ power generation trial using rice husk as a component of village electrification. Rice husk evolves biogas when it is burnt into husk charcoal and a gasoline engine is driven with this gas to rotate directly connected to a dynamo generator, thus generating power. This is a really feasible project in the villages located in paddy areas because it makes use of biogas evolved from husk. In this context, since generating electricity is limited, it is basically planned to feed electricity lighting up to 1 - 2 fluorescent light with the length of about 30cm (2 feet) per household. By means of village electrification, villagers will be able to extend their time to engage in small-scale industries and keeping longer home working time for school children can also be expected.



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08I3. Children's Nutrition Improvement Center Project

Because thin layer soils predominated with sandy texture are widely distributed along Bago Hills in the CDZ and also annual precipitation is as low as 800 mm or less, crop yields tend to low, leading to an area of higher degree of poverty. Similarly, the area surrounding Bago Hills has low groundwater table at 150 - 200m or below, resulting in difficult water security. Health index of the CDZ (in broader term Burmese) is not so low, but infantile under-nutrition is observed in the area along Bago Hills because of insufficient food intake and occurrence of dysentery attributable to unsanitary water intake. It is proposed in this area to construct a feeding centre targeting undernourished children.

Primary school has been under construction in Mingan Village in fiscal year 2007/08. Poverty rate in Mingan Village marks highest among 6 Pilot Villages where the Project has been under way in 2007/08. Reflecting high degree of poverty many children were found looking slender with low BMI (index expressed as weight / height²), suffering from under-nutrition. At present, alternative measures are considered to establish and manage a feeding centre for undernourished children attached to the primary school, where the schedule matches with the progress of the primary school under construction, or otherwise the centre is built in the village where tubewell has been constructed through on-going JICA water supply technical assistance project.

Mainly trained housewives in the village will manage the feeding centre. Undernourished children would accrue their weight through intake of chicken and vegetables raised by these women and are weaned from feeding in the centre a few months later. Mothers with undernourished children are highly possibly positioned at lower rank in their society. In other words, they have quite possibly

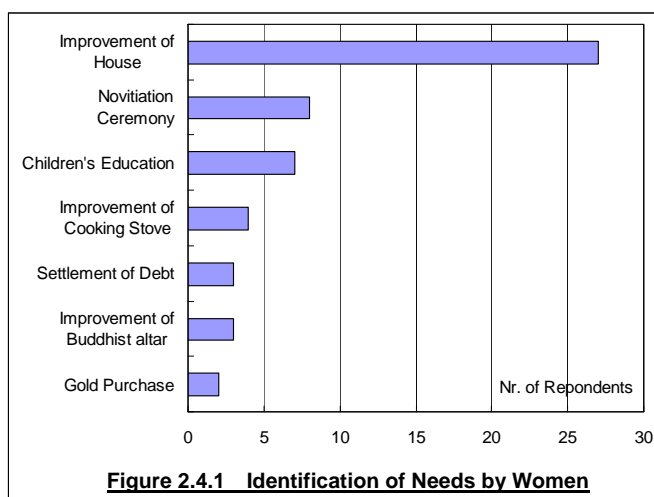
been hesitating their participation in social activities as compared to ordinary housewives. It is required to let these mothers of graduated children from the feeding centre involve into the next stage cycle of managing activities for the centre.

Mothers with passive attitude at first only sending their girls to the centre will engage in the management of the centre for other under-nourished children after their own children graduate from the centre. Thereby capacity development will be achieved in the group of mothers of the poorer strata, and the revolving cycle of this process will generate and facilitate self-development of the community.

2.4 Targeted Beneficiary of the Pilot Project from the Aspect of Gender

The pilot projects in FY 2007/08 as well as in FY 2008/09 are studied from the aspect of beneficiary, namely which of female, male or the whole household should be targeted as major beneficiary. In this context, male in common tends to place economic activities as his principal needs, while in many cases female does not explicitly express her needs. Taking such a difference into account, a separate questionnaire survey was conducted (in September 2008) in 54 households targeting women (wives) of landless households in the villages where the pilot project in FY 2007/08 was implemented, asking them what they like to improve for their households or families².

The result is briefed in Figure 2.4.1. The figure shows that the most acute need arises from repairing/ modifying their houses, followed by celebration ceremony of their children's, for example, entrance to Buddhist priesthood/ nun-hood, one of the religious events to which Burmese attach weight, further followed by education, improvement of cooking furnaces, redemption/ amortization of their debts and so on.



In this connection, repairing/ modifying their houses mainly includes renewal of wall/ roof, or change of roof cover into galvanized iron sheets, additional room building, lifting floor or flooring with wood or concrete (brick), for un-floored/ dirt-floored rooms are inconvenient to sleep (because the floor easily gets wet during rainy season, or visitors such as friends and relatives have to sit on the earth. With regard to education for children, it does not mean primary education (in many cases already fulfilled) but they desire to give them chances for higher education including high school, university etc. Referring to contents of their needs, one may say that their desires are directed to improve economic status in their household account, or improvement of their livelihood though some of them such as cooking fireplace improvement are related to betterment of living style/ conditions.

Table 2.4.1 summarizes target people/ beneficiary of the pilot project in FY 2007/08 by gender, and

² In conducting the interview survey, survey staff at first asked questions of broad sense to the respondents, concerning "being" and "doing", but many of their answers were "never known what to be or what to do". By this reason, questions were changed into limited ones about the respondents households or families in order to identify needs demanded from their surroundings, though the surveyor does not intend to limit women's role to that of household or family members. In this regard, when the role of husband and spouse was asked simultaneously to a couple, the husband might have replied that his role was a leader (or a president) while the wife might have replied that her role was a home affair's minister or might have hesitated without providing any effective reply. Taking all these into account, the respondents were interviewed with new questions on their needs concerning the affairs they want to improve focusing on their households or families, though the questions cover very limited range.

Table 2.4.2 gives that in FY 2008/09 also by gender. Here, one might recall that single household account (purse) maintains a household of Burmese people, and this is under the control of housewife³. Housewives manage any items of routine expenditure, while husbands are to have access to the purses held by their wives whenever they need their conventional expenses (pocket money etc). In the case of the expenditure of sizable amount, wives and husbands decide the expenses in consultation.

Considering all these roles by gender, any benefits from the project (profits in narrower sense) are imputed to a household, but in these table, the benefits are categorized from the aspect of whether the project plans to target its beneficiary on female, male or the household itself. Though there find many cases in which the beneficiary is not necessarily identified, it is understood in general that action of the project related to agricultural activities is targeted at male, that related to animal husbandry and improving life style/ living conditions is directed to household and many of small-scale industry is targeted to female, provided that the following points are taken into consideration.

- 1) Vegetables are cultivated in the pilot project 07A1, leading to increased labor for weeding and harvesting in the case of vegetable production. As female farm laborers are responsible for these practices, vegetable cultivation enables to enlarge their opportunities to be hired. Likewise, women can also operate treadle pumps for use of the pilot project 08A5. This enables to crop vegetables, and this again brings women their additional labor opportunities.
- 2) Goats and swine add household property. Though aged boys and husbands engage in grazing of goat herds, if they are asked whom goats as their property belong to, they reply they are the property of their families. They also reply that a husband never sell his goats without consulting it with his wife (As a Burmese behavior, whenever a household property is sold, Burmese couples always discuss it between them). From this fact, it can be accounted that the pilot projects related to livestock dealing with goats, sheep and piggery target their participants' households.
- 3) The pilot projects related to cottage industry accompany with the plan of establishing village funds. Low-interest loans are to be granted to common villagers including women from the village funds. In 07C8. Paddy Drier Installation and Management Project implemented in 2007, a part the profit from this project provided a low-interest loan to the female participants in mushroom culture.

³ Examples are found where a couple has separate individual account, but in such cases one of the spouses is not Burmese.

Table 2.4.1 Beneficiaries of the Pilot Project in FY 2007/08 by Gender

Sector	Pilot Project	Mainly for			Remarks
		F	M	HH	
Agriculture	07A1. Raised Bed Cultivation	△	○		Employments to female labors
	07A2. Improved Seeding Practice		○		Improvement of conventional practice
	07A3. Chickpea Seed Regeneration		○		ditto
	07A4. "Bokashi" Compost Making		○		ditto
	07A5. Pro-poor oriented Mushroom culture	○	○		Prepared by male, soled by female.
Livestock	07L1. Pro-poor oriented sheep revolving			○	Animal belongs the household as their property
	07L2. Pro-poor oriented goat revolving			○	
	07L3. Pro-poor oriented piggery revolving			○	
	07L4. Livestock feeding improvement			○	Improvement by natural mating
	07L5. Local Cattle Improvement		○		
	07L6. Intercropping of Sorghum & Rice Bean			○	
Cottage	07C1. Tinsmith Strengthening		○		
	07C2. Guitar-Key Strengthening		○		
	07C3. Embroidery Promotion	○			
	07C4. Weaving Improvement	○			
	07C5. Knitting Promotion	○			
	07C6. Sandstone Ware Production Imp't	○	○		
	07C7. Road Station			○	A village project
	07C8. Paddy Drier	△	○		Loan to mushroom cultivator
	07C9. Fruit Processing	○			
Living Improvement	07I1. Drinking Water			○	A village project
	07I2. Biogas Generation			○	ditto
	07I3. Electricity by Diesel Generator			○	ditto
	07I4. Primary School with Roof Catchment			○	ditto

Source: JICA Study Team, Note: 'F', 'M', and 'HH' mean female, male, household.

Table 2.4.2 Beneficiaries of the Pilot Project in FY 2008/09 by Gender

Sector	Pilot Project	Mainly for			Remarks
		F	M	HH	
Agriculture	08A1. Improved paddy cultivation promotion		○		Improvement of conventional practice
	08A2. Organic farming promotion		○		ditto
	08A3. Improved seeds regeneration project		○		ditto
	08A4. Pro-poor oriented Mushroom culture	○	○		Prepared by male, sold by female.
	08A5. Small-scale irrigation promotion project	△	○		Employment to female labors
	08A6. Crop storage depots promotion project			○	A village project
	08A7. Minimum tillage promotion project		○		Improvement of conventional practice
	08A8. New varieties adaptability trial project			○	A village project
Livestock	08L1. Pro-poor oriented goat/ sheep revolving			○	Animal belongs the household as their property
	08L2. Pro-poor oriented piggery revolving			○	
	08L3. Livestock feeding improvement			○	
Cottage	08C1. Village revolving fund				
	Tractor in Ar La Ka Pa village	△	○		Loan expected to female
	Engine weaving in Ma Gyi Sauk village	○			
	Weaving in Magyi village	○			
Living Improvement	08I1-1. Firewood substituting bio-fuel	○			
	08I1-2. Improved cooking stove promotion	○			
	08I2. Paddy husk power generation project			○	
	08I3. Children's nutrition improvement			○	

Source: JICA Study Team, Note: 'F', 'M', and 'HH' mean female, male, household.

CHAPTER 3 TARGET TOWNSHIPS AND VILLAGES FOR PILOT PROJECT

As aforementioned, 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 commenced 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 as many as 12 townships. Figure 3.1.1 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 3.1.1 Pilot Project TSs and Villages

3.1 Townships and Villages for FY 2007/08 Pilot Project

As aforementioned, the selection of the pilot townships and the villages in FY 2007/08 was based on the typology applied to the CDZ. In Chapter 4.4.3 “Typology of the Study Area with the Development Strategies”, 51 TSs located in the Study Area were categorized into 5 types. Based on this, as the first step, the Study Team selected 2 TSs from a division that fell into different category of the five types. These targets consist of Tada-U TS (Type III) and Ngazun TS (Type II) in Mandalay Division, Ayadaw TS (Type IV) and Myinmu TS (Type III) in Sagaing Division and Chauk TS (Type I) and Pwintbyu TS (Type V) in Magway Division. Then, the Study Team selected one village from each TS that is the representative village of the selected type, with the recommendation from TS-MAS staff. Thus, 6 villages were selected for the pilot project, which were commenced in FY 2007/08.

Table 3.1.1 below indicates the outline of the selected 6 villages for the pilot project in FY 2007/08. As to the category of these villages, 2 villages of Khaungkawe Village in Mandalay Division and Ar La Ka Pa Village in Sagaing Division were selected from type III, positioned at the medium poverty index while one village each was selected from other types of I, II, IV and V. Type I has the highest poverty index to which Mingan Village in Magway Division was ranked while Type V has the lowest for which Legaing Village in the same Magway Division was selected.

Table 3.1.1 Outline of Target Villages of the Pilot Project

Target Village (Village/TS/Division)	Type	Outline
Khaungkawe / Tada-U (M3) / Mandalay	III	Located in the outskirts of Mandalay City, 45 minutes by car from the City, populated with 1,400, 144 HH out of the total 242 are farm households, 24 HH running livestock, while others engaged in cottage industries manufacturing copper products. Wider area is covered with heavy clay layers making tillage difficult. In addition, Backwater from Ayeyarwady River very often causes inundation.
Magyi / Ngazun (M8) / Mandalay	II	Located in a remote area from Mandalay City, about 3 hours reach from it by 4 wheel car, populated with 1,460, H200 H out of the total 245 are farm households, thus higher rate of farmers. About 60% of them hold less than 5ac, with annual rainfall totaling around 700mm, thus limiting crop productivity, leading to low crop income.

Ma Gyi Sauk / Ayadaw (S6) / Sagaing	IV	Located near Monywa about 1 hour by car to the south, closer to Mu River hence soils are fertile. Water pumped up from Mu River irrigates paddy. Populated with 1,300 with around 260 HH. Out of which 150 HH are farm household. One outstanding character of the village is in higher rate of well-educated villagers.
Ar La Ka Pa / Myinmu (S2) / Sagaing	III	Located along the trunk road binding local town of Monywa with Mandalay City, populated with 5,200 or so, Out of the total 1,121 HH, about 60% or 640 HH are farm households, cultivating vegetables over alluvial farmland along Ayeyarwady River that are sold to Mandalay City.
Mingan / Chauk (G7) / Magway	I	Located 45 minutes down to the south by car from Nyaung-U, populated with 600 or so in 110 HH. Half of the population relies on stoneware processing, with their crop income remaining at low level due to frequent droughts. Upland predominates.
Legaing / Pwintbyu (G13) / Magway	V	Highway busses stop here on the highway between Mandalay City and Yangon City. Located nearest to famous Kyaung Tawyar pagoda. Populated with about 4,100 in 776 HH. Almost all the farmland is paddy land with about 100% irrigated thus achieving high farm income. A snack named after this village is countrywide well known serving as representative of cottage industries of this village.

Source : JICA Study Team from interview with villager chairmen, etc.

Table 3.1.2 summarizes the profile of target villages of the pilot project in FY 2007/08; population, number of households, that of farm households, ratio of smallholders etc. as well as farmland by land use and rate of irrigated perimeter etc. Mingan Village has the lowest population, 604 (110 HHs), while Ar La Ka Pa Village has the highest, 5,179 (1,121 HH). Mean population per village is found at 2,345, with an average number of households, 450 per village.

The mainstay of all these villages is agriculture, but there found a large variance in the rate of farm households among them. The highest rate of farm households, 82%, is found in Magyi Village, while the lowest, 30%, is recorded in Legaing Village. The mean rate of farm households among 6 target villages is calculated at 51%, approximately equal to that in the entire CDZ.

Table 3.1.2 Basic Data for the Target Villages of the Pilot Project in FY 2007/08

Village	Township	Division	Rainfall	Population	Household	Family Size	Farmers Household	% of HH	Less Than 5 acre HH	% of less than 5 acre HH	Agriculture Land			Average Farm Land, acre	% of Paddy	Irrigated Paddy Area, acre	Irrigation Ratio	% of Upland	Type			
											Upland	Lowland (Paddy)	Kabon							Total		
Khaungkawe	Tada-U	Mandalay	900 - 1,000	1,410	242	5.83	144	60	89	62	1,024	30	200	1,254	8.7	2	0	-	82	III		
Magyi	Nyaung-U	Mandalay	800	1,460	245	5.96	200	82	120	60	2,000	300	-	2,300	11.5	13	0	-	87	II		
Ma Gyi Sauk	Ayadaw	Sagaing	900 - 1,000	1,300	260	5.00	150	58	40	27	592	460	500	1,550	10.4	30	400	0.85	38	IV		
Ar La Ka Pa	Myinmu	Sagaing	800	5,179	1,121	4.62	640	57	200	31	4,952	1,916	747	6,825	10.7	28	0	-	61	III		
Mingan	Chauk	Magway	800	604	110	5.49	54	49	25	46	345	19	-	364	6.7	5	0	-	95	I		
Legaing	Pwintbyu	Magway	1,100 - 1,200	4,119	776	5.31	239	31	108	45	18	1,354	-	1,372	8.8	99	1,354	1.00	1	V		
					Farmers at outside village	239					-	-	-	739		-	739	100	739		1.00	0
					Owners from outside	296					-	-	-	144		2,176	-	2,320	5.9		94	2,176
Total Average	-	-	-	2,345	459	5.11	238	52	582	39	8,141	4,826	1,447	14,414	9.7	33	2,493	0.52	56			

Source: Interviews for Village Chairmen

Farmland is roughly divided into upland and lowland¹, and some villages have fertile tract, "Kain-kyun" that is an alluvium emerging as fluvial water level descends along the basin of Ayeyarwady River and its tributaries. It was found that some villagers in Legaing Village hold their farmland outside of their village, or vice versa; namely, some of the farmland within this village is held by outsiders,. This suggests that land transactions have been made over this area where irrigated paddy land abundantly exists with high land transaction price in the markets.

Farmland area within 6 villages is totaled at 14,414 acre (5,766ha), out of which upland occupies 8,141 acre (3,256ha) and lowland accounts for 4,826 acre (1,930ha). The villages with high rates of upland include, in descending order, Mingan Village (95%), Magyi Village (87%), Khaungkawe Village (82%), Ar La Ka Pa Village (61%). On the other hand, those with high rates of lowland include Legaing Village (99%) and Ma Gyi Sauk Village (62%) where higher irrigated rates are observed in both of these villages. The irrigable rate in Legaing Village reaches 100% and that in Ma

¹ The MAS instructs to crop paddy in lowland whenever there is enough water for paddy. Hence, the area under lowland gives the maximum paddy perimeter in this area.

Gyi Sauk Village is 85%.

As to mean farmland area per farm household, the largest area, 11.5 acre (4.6ha) is found in Magyi Village where an extensive farming has been practiced, followed by Ar La Ka Pa Village and Ma Gyi Sauk Village wherein the area is beyond 10 acre. In contrast, Mingan Village has the narrowest, only 6.7 acre (2.7ha) per farm household where farm production is the smallest of the 6 target villages in the pilot project of FY 2007/08.

In common, wherever agricultural production is intensively performed smaller holding allows a farm to get along, vice versa larger farmland area is required to sustain it wherever extensive farming is conducted. However, there found no interrelation between farming intensity and area of farmland holding in so far as these 6 villages are concerned. This fact implies that vigorous land transactions may have taken place where intensive farming is practicable as observed in Legaing Village, leading to a possibility of farmland aggregation according to the invested capital.

On the contrary to what is mentioned above, the reason why farmland area per farm is narrow in Mingan Village where extensive upland farming is practiced is partly found in a historical fact. It was in the target area of land reform in 1950s though it was incompletely applied from national point of view. Also, it's partly because the farm households have been able to sustain sufficiently themselves with small farmland area before mid 1980s, before the commencement of cheap palm oil imports during which oil crops would have traded with higher unit prices.

The mainstay of 6 target villages in the pilot project of FY 2007/08 is all agriculture. Yet, goats are reared to make up for unstable farming or small-scale industry is actively run in some villages. The following stipulate an outline of livelihood in these 6 villages.

3.1.1 Khaungkawe Village

89 farm households out of the total 144 hold less than 5 acre in this village, leading to higher rate of smallholders, 62%. Here, farmland mostly consists of upland with very limited area under rain-fed paddy land. Soils found in this village contain much clay that makes it hard when they are dried up. Crop roots tend to get rotten during rainy years. Crops including sesame, sunflower, cotton plant, groundnut and chickpea are rotated three times a year.

They are subject to drought, floods and pest damages, recording 5 years of crop failure in the past decade according to interviews to the villagers. Because the village faces a stream, floods take place every year in a tract of 200 acre (80ha) located along the stream where most of farmers manage only a single crop due to floods. Here, because farm income per acre remains low, many farm households are dependent on both cropping and livestock. During the years of poor crop, many farm households work in small-scale industry to supplement short income since farm income remains in the level 25 - 50% of that in ordinary years. Extension workers are active with their frequent visits, once a week.

According to the result of interview to village chairman etc, about 25% of the village households earn income from livestock. Cattle comprise major part of livestock species kept in the village as shown in Table 3.1.3. They consist of castrated draught cattle, indigenous cows for reproducing draft ones and hybrid cows for mainly milking.

Table 3.1.3 Livestock Herds in Khaungkawe Village

Livestock	Head/Birds	HHs Raising
Cattle	750	80
Goats	50	7
Pigs	70	9
Chicken	654	126
Duck	0	0

Source : Interview result by the Study Team

At least a pair of draft cattle is required for drafting tillage, and 80 farm households out of 144 in the village hold the pair. The owners of draft cattle account for 56% and most of them is classified into medium - large landholders with more than 5 acre per household. Since all the land area in the village have already been exploited and hence no room for grazing land for cattle remains. Therefore,

cattle holders feed them with such feedstuff as sorghum, wheat straw, paddy straw, reaped wild grasses and sesame cake (residue of oil extraction from sesame).

Milk is also produced in the village. Many of dairy cow owners belong to medium to large landholders. A long history, 100 years ago as tradition says, is found behind milking. A factory manufacturing condensed milk is found along a road to the village, to which milking workers are observed delivering milk by bicycle every morning. Demand for condensed milk is high, and purchasing price of raw milk ranges 300 - 400 Kyat/viss². Since a lactating cow produce 2viss per day, income of the cow-owner reaches 600 - 800Kyats per day. Comparing this amount with the wage level of a farm laborer, 700 - 1,000Kyats per day, this income is really a substantial one attractively bringing about stable cash income almost throughout a year (with a lactation period of 250days).

In contrast to cattle mainly kept by farm households, the landless and small-scale farm ones chiefly keep goats but only 7 households rear them in this village. The average size of herd of goat comes to 7 heads per household, which is too few to sustain a family since at least a herd of 50 heads is said to be necessary for sustaining it. Yet, almost no expense is needed for rearing herds because they can be grazed on weeds thriving along the national highway throughout the year. Besides, the herd owners can obtain cash by selling them in an exigent period. This it serves as “a live bank” for low-income strata. Since brokers visit villages to collect goats because of their strong demand, their visits are also convenient for the villagers without means of transportation for sale.

Livestock extension workers of TS visit villages wherever such need arises for providing services according to the requests from the villagers as disease treatments and vaccination. On the other hand, regular extension activities such as epizootic prevention and feeding advices are rarely available. Issues of livestock include: 1) cattle died of anthrax for the past 4 years, 2) feed shortage occurs when drought takes place, 3) Low rate of delivery and high mortality of livestock, 4) lack of fund to purchase stocks of goats and other animals for smallholders and the landless.

Many villagers have been engaged in small-scale cottage industries in this Khaungkawe Village. On the occasion of the interview survey to an entrepreneur group, all the respondents of part-time farmers gave a reply “agriculture provides largest portion of our income but we don’t want to discontinue engagement in cottage industries because they are also important sources of our income”.

Table 3.1.4 Cottage Industry in Khaungkawe Village

Small-scale Industry	No. of Household	No. of Employee
Tin Smith	36	180
Guitar Key Production	7	50
Weaving (student bags)	13	80
Rivet Production	14	30
Bamboo Matting	1	28
Black Smith	1	3
Sewing	10	-
Carpenters	10	-
Barber Shops	2	-

Source : Interview result by the Study Team in November 2006

As almost no case among the villagers is observed of changing their vocations from farming to cottage industries, the nature of these industries are considered as “an important insurance” for them. Also, representative cottage industries in the village employ many villagers. During drought periods number of employed in these industries further increases. Though all of such industries as metal works, guitar-key manufacturing as well as weaving require semi-skilled laborers, many of village farmers have acquired such skills, thus serving as a backstop of drought damages.

A tinsmith in which the largest number of households in Khaungkawe Village are engaged and by which the largest number of employees are hired processes tin chiefly by manual labor into buckets

² Viss is a unit of weight in Myanmar; 1viss is equivalent to 1.64kg. In this regard, farm-gate price of raw milk in the target villages of the Pilot Project was 380Kyats/viss as of August 2007. An indigenous cow usually lactates 2viss of milk per day while cross-bred one produces double the amount; 4vissper day.

and container boxes as large as garment cartons. Demand for tin-wares tends to increase in recent years as imported tin boards become readily available and consequent improvement in product quality. On the other hand, according to the entrepreneur group, rate of profits itself haven't much been escalated even if the sales unit prices are raised through the inflation. Likewise, in an example of individually interviewed household, it could actually have completed only 15 container boxes per week out of the subcontracted 70 boxes per week due to lack of fund for purchasing feedstock.

Guitar Key Production (screw nippers at the guitar head to adjust tension of guitar strings) was once earning a big amount as a forerunning brand). However, its sale has in recent years been stunted due to weak competitiveness with imported quality products from China. Moreover, demand for the keys is unstable, and the entrepreneur group deems it as "a business with a bearish trend" in its response to the interview survey. Amidst the preponderant reply saying "business or livelihood with a bullish trend" obtained in this and other villages, this pessimistic view has an outstanding tone. This suggests us that viability of leading cottage industries in this village may undergo an invisible change.

Weaving industry in this village manufactures fabric bags for students with traditional handlooms. All the students studying from primary schools to universities are asked to wear school uniforms in the Union. Stylish, colorful bags stitched with appliqués match with school uniforms thus demand is growing. Weaving enterprises in this village are specialized in single production of bags made of fabric and the size of the demand for such bags can be imagined through the existence of such specialized enterprises. In many cases individual farm households are running weaving as cottage industry, but in an example in this village, a farmer has purchased 13 handlooms with the saving from farming and has been grown in an enterprise employing ladies within the village.

In the course of an interview with key-informants on the comparison of current livelihood status with that prevailed in 30 years ago, it was found that the rate of better-off households was increased from 4% in 30 years ago to 20% at present, that of middle class was also augmented from 9% in 30 years back to 20% at present, meanwhile that of worse-off was decreased from 87% in 30 years ago to 60% at present. As a whole, villagers feel a favorable trend in the economic status of the village. Here, "better-off" is termed as landholder with 20 acre (8ha) or wider (accounting for 15% of the total number respondents) or entrepreneurs of small-scale industries, whereas "worse-off" is meant as the landless laborers on day-to-day piecemeal. Promoted small-scale industries are considered as a reason why the rate of the "better-off" has been in a rising trend.

In the self-evaluation by entrepreneur's group of small-scale industries, most respondents evaluated themselves as "middle" class, and also a significant number of them gave the evaluated result of "worse-off". In this case, "worse-off" was defined as the state of low income and of landless. There found very few entrepreneurs who evaluated themselves as "better-off". All such responses suggest us that the core of the village economy resides in agriculture, and it is the farm households with larger landholding that can earn the largest income. Income acquired from livestock and small-scale industries can hardly be comparable to the income brought about by agriculture.

3.1.2 Magyi Village

Magyi Village is located amidst the CDZ called "heart of dry zone" characterized with climatic dryness. The village is inhabited with 200 farm households, of which 120 are smallholders with less than 5 acre per household, i.e., the rate thereof is as high as 60%. Here, a double cropping has hardly been practiced because of less annual precipitation.

Major crops consist of such considerably drought resistant species as pigeon pea (*cajanus cajan*), cotton, sesame, wheat and chickpea. Drought damages during dry years are severer reflecting lower level of annual rainfall in normal years. 5 drought-stricken years have been experienced in the past

decade, out of which 2 years were without usable harvest. Such frequent drought led to higher rate of indebted households, as the village chairman revealed in the interview survey, reaching about 75%.

During drought years many farm households are engaged in onion cultivation irrigated with well water, in the sale of their livestock, or in casual work in small-scale industries to supplement their income. Possibly because of low farm income per acre, income sources have been diversified to offset damaged farm income with livestock (chiefly goats raising), engagement in cottage industries etc. In this regard, jaggery production has become popular in this village, producing from juice of sugar palm. 60 farm households produce jaggery that hire about 200 villagers thus greatly contributing to income source of the villagers. It has however caused a problem of firewood shortage for processing.

Extension workers render their village services about once in a month. In this village suffering from drought damages so frequent as once in two years, drought has given negative impact on village economy relying mostly to agriculture and also on employment status. A vicious chain is assumed in the course of measures taken against droughts by a cattle holder, who sells draught cattle - tills by draught cattle for lease - suffers from higher production cost - suffers from reduced income. To cope with such adverse state, farm households can no more afford to hire farm laborers, and resort to a grouping system in which mutual collaboration is provided to complete all the farm practices. A typical feature of Magyi Village is a really high rate of farm households to the total village ones, 82%. This means smaller rate of the landless, thus enabling them to create such collaborating system with mutual labor support

According to what has been interviewed to the village key-informants, the proportion of production value from livestock raising occupies 15% of the total, accounting for almost the rate as that from small-scale industries. Table 3.1.5 gives the composition of livestock herds in this village, and 154 households out of the total 200 keep these herds, representing 77%. Originally the cattle holding rate was 100%, but the rate dropped to the current figure as the result of some households that sold the herds to fill up their declined farm income due to droughts.

Table 3.1.5 Livestock Herds in Magyi Village

Livestock	Head/Birds	HHs Raising
Cattle	553	154
Sheep/ Goats	441	21
Pigs	64	46
Chicken	0	0
Duck	0	0

Source : Interview result by the Study Team

Though milk is also produced in the village, it can be interpreted as a co-product from regeneration of draught cattle. Indigenous cows are reared for the major purpose of regenerating draft animals, but they produce milk for lactation, and the surplus milk after feeding offspring is processed into condensed milk. A small-scale factory producing condensed milk at a rate of 40 viss per day has been located in the village where milk is processed. Milk production enables the cow-raising households to earn constant cash at the rate of 400kyat/viss per day. This income source often leads to the cattle holding households ranking themselves their livelihood status as middle class.

Population of goats total at 441 and it can be broken down into around the same number of sheep and goats. Goats have mainly been kept in the households whose income is lower than that of cattle-holding ones, namely smallholders and the landless. It is calculated that a household raises 21 heads of goats on average in Magyi Village. This size of herd is not at all small for the feeding scale to compensate for short income. Sub-contracted herd management and waged labor service for tending grazing herds are also observed along with self-holding.

Under a sub-contracted management, a contractor is entrusted from livestock owners to manage grazing of herds on an annual contract basis and he/she can own 50% of offspring born from entrusted herds based thereon. A household was observed in this village that was once working as a farm laborer but now becoming an owner of 27 heads as of July 2007 by building the herd up starting from offspring received through a contracted management. Only 3 months are allowed for farm laborers

during which they enjoy hiring opportunities, while small-scale industries are not much prosperous. The landless whose major income source is farm labor service cannot afford to buy land due to lack of fund, and this is why goat rearing is the most realistic option to readily acquire auxiliary income.

Employment chances in livestock sub-sector include waged labor service for tending grazing herds in addition to the above-cited sub-contract based herd management. Livestock holders (keeping indigenous cattle and goats) often delegate grazing management of their livestock to others. Boys and girls as well as adults are delegated to take care of their herds everyday by taking them to grazing sites and managing them. They receive a wage of 500Kyat/day as of June 2007. Because most livestock managing laborers are boys, girls and youngsters, they receive cheaper wages than those paid to ordinary farm laborers who receive around 1000Kyats/ day. Grazing sites have been narrowed as compared to the past status as a result of expanded farmland reclamation.

Major small-scale industries in this village comprise jaggery production and also weaving. Other than these, 3 households are engaged in tapestry making, out of these 2 have come from out of the village relying on the skilled labor available in this village. In addition to livestock, these small-scale industries play a complementary role of offering additional income amidst this drought prone village suffering from drought damages once in 2 years. Above all, jaggery production is considered the most important for the village from the aspect of income earning couple with job creation.

Table 3.1.6 Cottage Industries in Magyi Village

Small-scale industry	Number of HH	No. of employed
Jaggery	60	200
Weaving	150	(only a few)
Tapestry	3	100
Condensed Milk	1	4

Source : Interview result by the Study Team in November 2006

Table 3.1.7 shows the result of an interview to 5 villagers engaged in jaggery production. All of the respondents are farmland holders, whose main income source is farming that outweighs income from jaggery. Yet, some of them earn income from jaggery equivalent to about 50 - 60% of their farm income, hence it is thought to play a major role to supplement insufficient and unstable farm income.

Table 3.1.7 Status of Jaggery Farms in Magyi Village

Inhabitant	Annual income from jaggery	Annual farm income	Holding Upland	Holding Paddy land
Unit:	Thousand Kyat	Thousand Kyat	acre	acre
A	150	300	4	4
B	100	350	5	2
C	120	200	5	1
D	20	400	7	5
E	80	300	10	2

Source : Interview result by the Study Team

The jaggery producers have chronically been indebted from their brokers of jaggery, thus their debts, for the average of 5 people, have been amounted to 150 thousand Kyats. The advanced amount from the brokers are used to provide such fixtures as boiling pans and containers, ladders for climbing up sugar palm made of bamboo and firewood for boiling. Owing to this advanced payment, they are obliged to sell the produced jaggery to the brokers. Sales price is fixed at 300 Kyat per viss (can be at 350 Kyat in Mandalay). The rate of margin earned from jaggery was larger 10 years ago than it is now. In spite of the fact that firewood price has now become 20 times as much as that of 10 years back, income from jaggery has been escalated to only 6 times,. This is the reason why they claim disadvantage.

As to weaving industry, most households have installed handlooms at home from long time times to weave *pasoe* for men and *longyis* for women. Presently, cotton lint is spun from harvested cotton balls, then dyed with pigments and woven finally into cloths, and this process has consistently been performed within the village. As a rule, each household receives manufacturing order from brokers to weave what is ordered. This is a cottage industry with family labor, rarely employing people from outside. Villagers engaged in weaving industry report that weaving margin tends to fall down on account of escalating inflation that raises production costs at a rate faster than the increasing rate of

sales amount.

3 improved type handlooms have been installed in the village. According to an interview to the household that keeps 2 handlooms out of these 3, they have 5 family members holding 3 acre of farmland, and they earn principal income from weaving that they have started from 2 years back. These 2 sets of improved type handloom have been rented without any charge from the broker coming from Amarapura Township³, with a system by which all the products woven from them are purchased by the broker in exchange of the lease. Two sisters are operating these handlooms earning a stable gain of 30 thousand Kyat per month or 36 thousand Kyat per annum. From the standpoint of the broker, he has a merit of producing garments with a cheap labor wage.

The above-mentioned household barely earns 100 thousand Kyat per annum or so from farm income. Meanwhile, it cannot rely on any farm income in drought year that could happen once in two years. When drought hits and it fails to earn from farming, it cannot sustain the household by singly 360 thousand Kyat earned from weaving. In this case, the sisters have to work as farm laborers for about 4 months to earn daily food. Even under such critical state, they reply that their livelihood is better-off in comparison with the state before starting their weaving or their off-village labor.

In summary, it is considered that jaggery production and weaving have been engaged from olden times to fill the gap of household balance as a result of instability of farm income brought about by frequently occurring droughts or rainfall vagaries. However, because of unfavorable location of the village, being far from major markets and deteriorated surface transportation, both farmers and entrepreneurs of small-scale industries have basically to rely on brokers for their production and sale. Consequently, villagers make it a rule to be indebted and chronic debts impede them to achieve great leap forward from current limited farm and small-scale industrial production.

About 20% of the villagers are the landless who are occasionally employed as farm laborers. Even smallholders often have to work as farm laborers to offset their meager income level. An interview survey to 4 farm laborers in the village gave a

Table 3.1.8 Results of Interview to Farm Laborers in Magyi Village

Villager	Months of Farm Labor	Months of off-village Labor	Debt amount ,Kyats	Landholding
F	6	6	150,000	No
G	2	5	100,000	Yes
H	6	6	100,000	No
I	3	(catering for cattle)	100,000	Yes

Source : Interview result by the Study Team

result shown in the table right. Out of 4 respondents, 3 have been engaged in off-village wage earning and the rest 1 in cattle rearing within the village (under contracted management with cattle owner). It was also found that 2 landless respondents have been engaged in off-village earnings for 6 months a year. Even landholders were found to do off-village work for 2 months and to rear cattle for offset farm income. In any case, off-village income contribute maximum to livelihood partly because household expense can be dispensed while they go out for off-village works.

3.1.3 Ma Gyi Sauk Village

Viewing the state of infrastructure streamlining in Ma Gyi Sauk Village, a clinic was constructed in 1979, a secondary school was established in 1991, a junior-high school was built in 1997. A trunk road at the section Monywa-Shwebo was completed in 1993, further construction of a pumping station for lifting irrigation water from Mu River was started from 2003 (the work is still under way as of 2007). It is noteworthy that schools and electrification facilities for lighting schools and households have been realized through private contributions from the contributors stemming from this village. This also serves as a driving force to push up the level of village economy. Besides, there are villagers

³ Collection point of small-scale industries located outskirts of Mandalay City where weaving industry has been popularized since dynasty era.

with ambitious spirit of entrepreneurship.

The mainstay of this village is agriculture, and water lifted from Mu River has enabled to irrigate a farm tract of about 400 acres (160ha) since 2003. Current land use is composed of 468 acre under irrigated paddy, 592 acre under upland cropping and 500 acre situated in Kaing (fluvial sandbank in Ayeyarwady River basin). Smallholders below 5 acre per household occupy relatively smaller portion, 40 out of the total 130 households, representing 27%.

Number of farm households in this village augmented from 80 to 130 for the past two decades. It is reported that an issue was posed to outstanding landholders with vast acreage, and their land was later reallocated to many people, thus increasing number of landholders. Land in the village is largely covered with alluvial soils and they are suitable to crop paddy, but they turn compact when dried, also tend to foster root rot when receiving much rainfall.

Owing to the initiation of pumping irrigation, double cropping of paddy is going on. As winter crop, wheat and chickpea are cultivated and in some area triple cropping throughout the year is practiced. Upland area is cropped with double cropping by mixed cropping with sesame, groundnut and pigeon pea. In Kaing, also double cropping is practiced with sesame as summer crop and chickpea and wheat in winter. An interview survey to farm households revealed that drought and flood damages were experienced only twice in the past decade. Damages occurred in upland area but heavy damage without any usable harvest has never experienced so far.

Farm profit per acre is comparatively higher than the levels of other villages, recording 70,000Kyats for upland farming and 100,000Kyats for paddy land. Farmers cultivating upland desire to switch their farming into paddy production because of higher gain per acre in last years. As such, with high crop profitability and producing paddy, farm households rely much of their livelihood on farm income. Yet, paddy yield has been as low as 40 - 50 baskets (2 - 2.6 MT/ha). Many shallow wells have been dug in almost all living quarters in the village, and vegetable production is practiced in a small scale by using the well water.

According to the interviewed results to the village chief, indebted households represent about 50% that is lower level than those in other villages probably thanks to stable crop production. The amount of their debt has not been small, but they seem to be appropriated for schooling fee and disease-treatment fee rather than for living expense in this village judging from higher education level and affordability to cure sickness. Though technical diffusion by extension workers is held about once a month, most farmers learn farming skills from other farmers.

The rate of households dependent on livestock income accounts for around 20%. 210 households hold cattle while the total number of farm households is only 150. It means that even some landless households hold indigenous cattle. Such households generally earn income by leasing their draft cattle to farm households. As to goats, very few households keep them though the total number of heads is large, namely 3 households keeping sheep and 2 keeping goats. It follows that number of heads per stock-holding household is large, implying that some villagers are specialized in livestock feeding. Pigs are not raised in this village because monks prohibited keeping them. However, villagers actually consume pork.

Table 3.1.9 Livestock Herds in Ma Gyi Sauk Village

Livestock	Head/Birds	HHs Raising
Cattle	1,000	210
Sheep	120	3
Goats	100	2
Pigs	0	0
Chicken	0	0
Duck	0	0

Source : Interview result by the Study Team

In these years, heads of sheep are decreasing while those of goats are augmenting, and this is attributable to higher farm-gate prices for goats. Cattle and goats can be served as “live bank” even in this village, and they can be sold for cash to tide over such emergency as severe drought spell or

heavy sickness of family member. Such livestock-holding farmers and the landless can resort to sale of their herds to weaver risks, but it become an essential issue if they lose their herds by epizootic affection. This may be the reason why they are keen to raise issue of animal diseases. Vaccinations have been applied to prevent animal diseases in close collaboration with TS Veterinary office, and owing to this effort, their occurrence has lately been declining.

3 Major small-scale industries in the village are composed of sewing, knitting and weaving. According to information from village key informants, the number of households relying on small-scale industries as their major income source was about 15 a decade ago, but now it counts 40 as a result of improving educational background and other reasons. In consequence with increasing number of households running small-scale industries, economic status of the village becomes well-off.

According to the result of an interview survey with 6 entrepreneurs of sewing, knitting and weaving, all of these respondents replied that demands for their products are growing in recent years with a rising trend of production environment. In addition to rising demand, the effect of recent improvement in road infrastructure for surface transport may provide favorable contribution to their business. All the respondents hold farmland and are engaged in agriculture. Their enterprises are characterized as follows: knitting business providing thick jackets like sweaters can expect income only during winter season; sewing business can sustain small amount of cash income though the scale of enterprise is the smallest of these three textile industries; weaving can expect largest benefit with daily cash income though it requires large amount of initial investment.

Viewing sales targets, either middlemen or the producers can sell their products in the markets by themselves in the case of sewing and knitting, whereas all the households engaged in weaving are wholly relying on middlemen visiting from Amarpura Town. As to debt, there found no households that borrowed money for livelihood sustenance only, but actually almost all the households hold debt for running business.

The debts by those who are engaged in sewing and weaving stem from the brokers who procure feedstuff, while the sources of debts by those who are engaged in knitting are variable from household to household. According to the respondent's self-evaluation, one deems his status as better off and the rest five respondents evaluate their status as middle. In this evaluation, "better-off" is termed as "sufficient fund is available to run the enterprise", and "middle" is defined as "fund to sustain an enterprise is not enough and various kinds of economic activities should be tried out to procure additional fund".

Assessing economic status of small-scale industries, income derived from these industries in this village plays a most important complementary role for farm income as the major player just similar to that found in other villages. In this village, no household has ever switched its vocation from agriculture to small-scale industries while there have been some villagers that have changed their status from per-diem laborers to entrepreneurs of cottage industries though the number is quite few. In the latter case, commonly observed example may follow the process: starting from working as a daily hired laborer employed by an entrepreneur of a small-scale industry, then after acquiring industrial skills and saving some amount of fund, establishing the same kind but his/her own industrial activities.

Table 3.1.10 Cottage Industries in Ma Gyi Sauk Village

Small-scale Industry	No. of Household	No. of Employee
Sewing	30	NA
Knitting	25	NA
Weaving	15	NA
Carpentry	4 teams (20 persons)	NA
Condensed Milk	2	NA
Hair Dressing	1	NA

Source : Interview result by the Study Team

3.1.4 Ar La Ka Pa Village

Ar La Ka Pa Village faces to a trunk road to Mandalay City. The soils in the village consist of 30 % of compact soil, 10 % of acidic soil and the rest including saline soils and sandy ones etc., of which many have such cropping problems as salinity and acidity. 640 households out of the total 1,121 or 55% are farm households that hold 1,916 acre of paddy land and 4,162 acre of upland. The village has suffered from heavy drought damages due to adverse soil conditions with lower annual precipitation in ordinary years, experiencing 2 years of almost complete crop failure, and another 2 years with the harvest only 50% of ordinary year during the last decade. In addition, as the village is facing to a stream, every year it suffers from floods, as well. The activities by extension workers are inert here with their visit to the village only once or so in a year.

A three-crop rotation with sesame, cotton, paddy, chickpea etc in a year is usually practiced here, and the yield levels of these crops are extremely low, for example sesame yields 3 baskets/ acre, paddy 20 baskets / acre, wheat 2 baskets / acre etc. Nevertheless, farmers cultivate vegetables in a relatively fertile tract located along Ayeyarwady River during late monsoon period though the acreage thereof is very limited. This vegetable cropping allows those who have farmland along the river to earn higher income, and some households obtain 70 - 80% of the total farm income from vegetable cropping with exceedingly high unit annual income per acre.

The landless in the village counts 481 households, out of which about 200 are said to obtain major portion of their income from farm labor. 50% of the landless keep livestock but the rest 50% hold neither farmland nor livestock, thus seemingly belonging to the poorest stratum. Major livestock activities include dairy cow, sheep and poultry, which is said to provide 10% of the total village income. Somewhat commercialized type of livestock rearing has been practiced here that is different from farm-yard feeding as observed in other target villages of the pilot project making full use of geographical advantage of being located in between Monywa Town and Mandalay City.

Bovine population consists of draft cattle, indigenous cattle and hybridized dairy cows. Large-scale farm household mainly own hybrid dairy cattle because they are dear. When they grow too old to lactate they are sold to middlemen. Unlike indigenous cattle, no restriction is ruled for slaughtering dairy cows. 3 households are engaged in condensed milk processing that are expanding their production by enlarging their radius of raw milk collection outside of the village to catch up increased demand. More heads of sheep are kept in this village because it is believed more tolerable to adverse climatic conditions prevailing here than goats and this is a typical character of keeping livestock found there. Harvested wool is processed into blankets in Mandalay City and Monywa Town.

Table 3.1.11 Livestock Herds in Ar La Ka Pa Village

Livestock	Head/Birds	HHs Raising
Cattle	1,500	650
Cow	1,700	80
Sheep	400	10
Goats	100	2
Pigs	700	10
Chicken	4,000	400
Quail	10,000	2

Source : Interview result by the Study Team

Active enterprises among small-scale industries in Ar La Ka Pa Village are only confined to 7 households, including 4 households engaged in leather slipper making and 3 engaged in condensed milk manufacturing. In comparison with other 5 target villages, the size of small-scale industries in this village seems tiny in all

Table 3.1.12 Cottage Industries in Ar La Ka Pa Village

Cottage Industry	Number of Engaging HH	No. of Employees
Leather Slipper	4	0
Condensed Milk	3	6
Pottery Production	30	0
Carpentry	5 teams (40 households)	NA
Mason	4 teams (30 households)	NA

Source : Interview result by the Study Team

aspects of components, number of engaging households, that of employees etc. According to some key informants, the amounts of products of slipper manufacturing have increased by 50% in this

decade. Contributing factors fostering this increase include improved quality that expanded demand for the products, and extension of processing facility in parallel with growing demand. The slipper produced in the village has established its brand called “Thein Gabar”. Also, condensed milk manufacturers have grown up with their demand expansion selling their produce with the brand “555”. Besides, porcelain pottery has been run since long time ago, in which 30 households are at present engaged, but its demand is so weak that the number of engaging households is slowly decreasing.

The Study Team conducted a group-interview with the villagers taking advantage of an opportunity of explaining the concept of road shop that is one of the envisaged pilot components in this village, whom are 2 farmers, 1 respondent each from slipper makers, condensed milk manufacturers, weaving enterprise (self employed), farm laborers and school teachers.

Table 3.1.13 Result of a Group Interview in Ar La Ka Pa Village

Occupation	Other Income Sources, Landholding	Why/ When better-off? The reasons? Debts?
Slipper Making	Nothing	Now. Electrification in 1994 allowed to engage in this job, also road improvement in 2000 enabled to easily transport goods. No debt at all.
Casual Laborer (Farming)	Sale of tea produced in Shan Province by wife (major source). Himself engaged in casual labor for about 3 months/year with an annual income of 200 thousand Kyats	Now. Owing to his wife who has been engaged in only one sale business in the village. Indebted.
Farm Household No.1	20 ac. Working for government staff until 2001, then for factory mechanic until 2006	In the past. Better income obtained from mechanic labor in 2006. Now engaged in farming without any other successor. No desire to leave this village though income degraded. Cattle died in 2005. Indebted
Farm Household No.2	10 ac	Now. Owing to varietal diversification and improved transport infrastructure. No debt at all.
Condensed Milk (No hired employee)	Nothing	Now. Business started in 2001. Owing to increased demand. Debt borrowed for running business.
Teacher	Farming (6 Family Members)	In the past. Due to reduced farm income. Debt augmented as the result of failing of new variety cropping. Indebted.
Knitting Enterprise (o hired employee)	Without land. Teaching in a private school	In the past. Due to falling demand for knitting products, also hitherto clients now switched into imported cloths. Indebted.

Source : Interview result by the Study Team in May 2007

Out of which, a farmer and the teacher replied that they reduced their income due to different reasons comparing with their past status of better livelihood than they are now. Among these 7 respondents, 5 have been indebted including a farmer, condensed milk manufacturer, weaving enterprise, farm laborer and teacher (or all the respondents except a farmer and slipper maker). Their debts have generally procured within the village, paying annual interest of 5% in case that they offer collaterals. As regards their self-categorization, all of them defined their criteria as their own assets, income level and whether indebted or not. Employing their criteria, they comprise a better-off (slipper maker), 3 middles (2 farmers, 1 condensed milk manufacturer) and 3 worse-off.

3.1.5 Mingan Village

Mingan Village is considered poorest among 6 target villages of the pilot project. Agriculture as major means of livelihood here as it may be, the village has a peculiarity of reliance by 50% of its income on the processing of sandstone. It has around 150 year’s history behind it, relieving not only smallholders but also landless villagers. Sandstone processing is made in only two villages in the Union, including this and another village in Sagaing Division. This village is a remote farming community about 70 km distant from Nyaung U situated amidst the driest part in the CDZ. Moreover, drought damages may give a great negative impact to villager’s economy since most part of farmland is upland (only 19 acre under rain-fed paddy).

Farmland in Mingan Village is mainly distributed over undulating slope, mostly covered with sandy top-soils, hence with low moisture and nutrient holding capacity resulting in low land productivity. About half of the inhabitants (54 out of 110 households) are farm households engaged in rain-fed

cultivation in upland. A two-crop rotation has been practiced with sesame as early-monsoon crop and pigeon pea and groundnut are intercropped for late-monsoon crops.

Crop income per acre stays at low levels and income sources of a farm household has been diversified ranging from livestock (mostly goat rearing) to small-scale industries (masonry) but anyway per capita income remains low. Droughts hit the village at a frequency of 3 times in a decade, and once it threatens farmers have almost no harvest from their field. Due to these damages it is said that over 90% of the farm households have been indebted. Almost no farm extension activities have been served from extension workers, so farmers have to obtain technical information from other companions.

It is said that the rate of livestock contribution on village economy constitutes of around 15%, where cattle and goats comprise major herds, and pigs and poultry are kept at farmyard in small scale. Farm households holding 5 acre or larger farmland keep draught/ indigenous cattle. Some of them sold draft cattle to start masonry work with sandstone. Such farmers cultivate their land with rented draft animal (5,000Kyat/day).

Table 3.1.14 Livestock Herds in Mingan Village

Livestock	Head/Birds	HHs Raising
Cattle	193	70
Goats	182	6
Pigs	50	50
Chicken	1,027	100
Duck	0	0

Source : Interview result by the Study Team

Several reasons are found why they keep livestock; e.g. 1) for tilling of land, and 2) for supplementing low income attributable to unreliable farm income affected by infertile soils, predominance of hilly tract leading to narrower farmland per household. Also, raising goats and pigs does not require much tending labor for the landless and smallholders, thereby contributing to their economy as effective complementary means to main income source. In this village, examples of successful landless households that gradually created their herds starting from offspring of goats received under contracted herd management are also observable.

Only one and the most important small-scale industry is sandstone masonry related business covering from masonry processing to marketing. Quarrying stone feedstuff from nearby quarries, it is processed into Thanakha grinder or stone furnace and sold in the markets. As shown in Table 3.1.15, the households engaged in stone processing (masonry works) are counted at 80, those playing role of middlemen 5 and those vending stone products 15.

Table 3.1.15 Cottage Industry in Mingan Village

Small-scale Industrial Component	No. of engaged HH
Sandstone Production	80
Sandstone Trading (middlemen)	5
Sandstone Hawking	15

Source : Interview result by the Study Team

Commonly, a mason household covers from quarrying feedstuff to processing into products. Middlemen carry them by automobiles to markets to retail. Vendors carry them to sell at any places in the Country where festivals are held. In some cases, a household plays dual roles like a mason cum a middleman or a mason cum a vendor. In recent years, the income level of those who are engaged in stone products is rising because of escalated demand and boosting sale prices.

The Study Team carried out a group-interview with 6 masons, 2 middlemen and 2 vendors. As summarized in below table, persons who do not have any other income sources than masonry work have mostly been indebted and they evaluate themselves as worse-off. In the cases where plural income sources are available, they deemed themselves as middles even though they are indebted. Out of 6 masons 3 have other income source than masonry, while 5 have fallen in debts. As an example, one free from debt has single income source from masonry, but does not have to borrow money because of only two family members. As to other 5 respondents, they always have debts valued at 100 thousand Kyats per person though the amount varies with time. In most cases, they borrow money from their middlemen who reside in the same village.

Table 3.1.16 Result of a Group Interview in Mingan Village

Occupation	Other Income Sources/ Land	Self-Evaluated Rank & Reasons	Debt	Amount of Debts, Why Indebted? How repaid?
Mason 1	Only masonry	C, Debt	Yes	Always indebted by 100 thousand Kyats from middleman. 7 family members
Mason 2	Masonry, Grocer & Barber	B, Multiple income sources	Yes	Always indebted by 100 thousand Kyats from middleman, but the amount is always variable.
Mason 3	Mason, Video shop, Farming	B, Multiple income sources	Yes	Over 100 thousand Kyats, Children at high school and university.
Mason 4	Only masonry	B, No debt. Not A because of limited income to get along	No	Always free from debt, only 2 family members
Mason 5	Masonry, wife running snack sale in the village	C, Always indebted	Yes	Always indebted by 100 thousand Kyats for sustaining family
Mason 6	Only masonry	C, only income from masonry, Debt	Yes	Always indebted by 100 thousand Kyats with variable amount. Also, affected by quality/ rain.
Vendor 1	Parents run farming (16 ac) himself only, vendor	B, but A if including parents	No	Borrowing money prior to vending trip but it is repayable after festivals
Vendor 2	Masonry and Vending	B, not A because income is limited not to sustain 3 children in school	No	The same as above
Middleman1	Mason and Middleman (President of new Coop.)	C, Debt	Yes	Always indebted at 400 thousand Kyats. Only one earner among 6 family members
Middlema2	Farming, wife as middleman	B, but A if his wife is included	No	Always free from debt

Source: Interview result by the Study Team in July 2007, Note: A=better off, B=Middle, C=Worse-off

One out of two middlemen (president of new cooperative), playing both role of a mason and a middleman, fell into debt worth 400 thousand Kyats, alone to feed 6 family members. On account of this debt he self-evaluated himself as worse-off (as class C). Another middleman is a husband engaged in farming and his wife plays role of middleman, so they are not indebted, hence self-evaluating as better off (as class A). The result of two vendors self-evaluated themselves as “middle (as class B)” because both do not have any debt. From these results, an overall picture can be deduced that vendors are not indebted though occasional borrowing possibly happens, but masons always borrow money from their middlemen.

There are a host of issues in masonry business, including: 1) quarrying is not any more ready, it is increasingly inevitable to excavate deeper to reach the expected quality stone feedstuff, 2) quarrying sites are submerged under elevated groundwater during rain-spells and during submergence period quarrying work is interrupted, 3) transport of stone feedstuff from quarries to village processing sites is not easy owing to weight load, 4) though masonry has over 150 years history behind it, the tools used for masonry works are nothing but cheap hammers and chisels, thus no progress has so far been made for technical aspect.

With these limiting factors, processing of stone takes much time and the production amount is very much limited even if demand for masonry produce were rising. Also, middlemen and vendors are facing such problems as: 1) they don't have enough funds to invest for desired expansion in sale in spite of rising demand, 2) sometimes delivery of stone goods is delayed for the sale in festival sites due to deteriorated road conditions that do not allow them to reach their vehicles loading stone products.

According to information by key-informants, “droughts hit the village at a frequency of once in 2 - 3 years. Consequently, farmers' debts grow. In this occasion they may borrow money in and out of the village, paying interest at 5% with such collateral as jewels, or at 10% without mortgage and the rate of interest is the same inside and outside of the village. If holding land, one can borrow 200 thousand Kyats per acre if the collateral land is fertile, otherwise the ceiling amount of debt is 50 thousand Kyats per acre.

The borrower transfers his/her land as collateral for 4 years and if he/she fails to pay back the

borrowed amount, the landholder's right is transferred from the borrower to the lender. They say that 15 households have so far lost their farmland due to failure in repayment. They thereafter became masons. Here, in the case of losing landholding, farmers do not become day-to-day wage earners but work as mason. This is partly because of very limited opportunities to work as farm laborers in this village, but more because of availability of stone material that can be quarried and this provides an income chance.

3.1.6 Legaing Village

Legaing Village is deemed as leading area of irrigated paddy cropping where farm income accounts for about 70% of the total from the entire economic activities. In fact, 13% of the farm households own power tillers according to the village chairman. Besides, various agro-related industries have been developed in this village including machinery workshops, rice mills, power-tiller hiring service businesses etc, making outstanding contrast to other 5 target villages of the pilot project. Viewing the state of infrastructure, the village has higher standard as compared to other villages:

- 1) A trunk road to Magway City was constructed in 1962.
- 2) Electric feeder line was constructed in 1955, currently enabling to electrify 70 % of village households (electricity is fed to the beneficiary for 24 hours in rainy season per day and 12 hours per day in other seasons).
- 3) Tube wells have been drilled at 80% of village households for feeding domestic water, out of which electric pumps are installed to 20 % (the rest is fed with hand pumps).
- 4) A Rural Health Center, acting as a village health clinic was established as early as 1956. Here, vaccines for polio and measles etc, and refrigerators to store them have been provided through Japanese aid project.
- 5) Two (2) primary schools and one middle school are available in this village, of which the latter will be ranked up to a high school before long. Rates of school enrolment stand at 100% for both primary schools and 90% for middle school, while those of graduation are 75 - 80% of the enrolled students. 100% of the graduated students from the middle school enter into high schools and about 60% of these graduates from it. Further, 20 - 25% of high school graduates enter into universities.

The rate of farm household is as low as 31% or 239 out of the total 776 households in the village. However, all the farmland is under irrigation, including 1,354 acre held by village farm households and 2,176 acre held by those outside the village. Crops are cultivated under 3-crop rotation a year, where commonly practiced is double cropping of paddy and chickpea as a winter crop, or rotation with sesame, irrigated paddy and chickpea in the case of insufficient irrigation water.

Harvests of these crops have been stable without much yearly variance and without serious drought damages. Yield levels per acre are as high as 12 baskets for sesame, 80 baskets for paddy and 15 baskets for chickpea, leading to very high level of farm profit per acre. Therefore, rate of indebtedness is naturally low, around 30% of the households. In the case of debt by farm households, the purposes of their debts are the expenditure for sickness treatment of family members and for education of their children. Also, successful examples can be at times observed in the case of large-scale farm households increasing their incomes by investing to rice milling and piggery, making full use of what they deposited from their annual surplus.

Livestock composition in Legaing Village is tabulated below, showing that farmers mainly keep bovine (draft cattle, indigenous cows and hybrid dairy cows), and some of them also raise goat, sheep and poultry. Livestock raising except for draft cattle is said to have started about 30 years ago. Pigs are kept at a head on average per household, but some keep 50 heads per household, thus piggery and

also poultry partly showing somewhat commercial features. Herds are marketed to Chauk Town, Magway City and Minbu Town.

The reason why heads of sheep exceed those of goats may lie in people's belief that the village has an annual precipitation over 1,000mm wherein sheep is more adaptable to land conditions with high humidity and high soil moisture than goats. Blanket dealers used to visit from Meikhtila Town to collect wool, but now they don't come to buy it and it is now treated as waste. Livestock is grazed on grass fields along roads and harvested farmlands.

Table 3.1.17 Livestock Herds in Legaing Village

Livestock	Head/Birds	HHs Raising
Cattle	1,077	340
Sheep	492	NA
Goats	50	9
Pigs	210	200
Chicken	1,760	530
Duck	150	47

Source : Interview result by the Study Team in June 2007

537 households, or 239 farm households subtracted from the total village households 776, are considered as the landless, and about the half of these or 250 households are said to be farm laborers. Some farm households suffered from water submersion during consecutive years of 2003 - 2005. They became too much indebted due to these flooding damages and lost their farmland owing to their failure in paying back their debts ending up to the landless.

On the contrary, it was identified that some landless households became farmers by purchasing farmland. A group discussion revealed that 25 - 30 landless households have become farmers in the past decade while 70 have become landless from farm households. The landless not only raise sheep and pigs but also some of them purchase farmland by saving their earnings from their wage labor, thus livestock breeding contributes to both livelihood earning and fund creation to become landholders.

Popular components of small-scale industries in the village include: crispy snack making/ vending, machinery repairing, rice milling, electric appliance repairing etc. Table 3.1.18 in the right shows changes in number of households engaged in each of these industries as of 15 years ago and now. Though the numbers are not much, it can be seen that all the industries have increased those who are engaged therein.

Table 3.1.18 Major Industries in Legaing Village

Household	Change in 15 years
Crispy Snack Cake	Increasing from 1 to 7HH
Machinery Repairing	Increasing from 1 to 4HH
Rice Milling	Increasing from 2 to 7HH
Electric Appliance Repairing	Increasing from 0 to 6HH
Small-scale Industry Laborer	Increasing

Source : Interview result by the Study Team in June 2007

A group interview was made to 11 respondents including 3 crispy snack maker/ vendors, 2 day-to-day laborers employed in confectionaries, 2 rice millers, 2 machinery repairers and 2 electric appliances repairers. Among these 11, part-time entrepreneurs with farming are 5 including 2 rice millers, 1 machinery repairer, 1 electric appliances repairer and 1 day-to-day wage laborer. On the other hand, those who have single, full-time income source that is small-scale industrial activity also count 5 inclusive of 3 crispy snack maker/ vendors, 1 machinery repairer, 1 electric appliances repairer and 1 day-to-day wage laborer. In short, all the respondents consist of a half of part-time workers with plural income sources and the rest half of full-time expertise with single income source.

All the interviewed 11 respondents replied that business environment is better now than in the past. The main reasons why they think so include: snack is renowned for taste expanding demand (crispy snack maker), farm mechanization proceeds on (machinery repairer), paddy harvest is boosting (rice miller), improved living standard pushes needs of assembling and repairing TV sets and Video decks (electric appliances repairer) and growing production offers many labor work (day-to-day laborer). Such a profile of growing small-scale industries is considered as a typical crosscut section of development through agricultural impetus that is irrigated paddy cultivation.

The state of debt is summarized in the following Table 3.1.19. No debt was reported from daily wage laborers because one lives along with another occupation, the other has other income source by his

family. Rice millers do not have debt either, possibly because well-off farmers started milling. All others had debts but they were all appropriated for providing operational funds.

Out of these 11 respondents, only one running electric appliance repairing was converted from agriculture. He believes it a good choice enabling him to earn more than farm income and to engage in his favorite vocation. As stated by wage laborers working in confectionery enterprises, wages in snack factories range 1,500 - 2,000 Kyats per diem. This level is quite different from that of farm labor, 500 - 1,000 Kyats per day. The 11 respondents evaluated themselves as “middle” except two respondents from rice milling and machinery repairing who ranked themselves “better-off”.

Table 3.1.19 Result of a Group Interview in Legaing Village

Occupation (Enterprise)	Family labor+ Employers	Whether indebted or not
Crispy snack maker 1	4+1	0 - 300,000 Kyats. Entrusted making, materials procuring from a middleman
Crispy snack maker 2	7+5	200,000 Kyats
Crispy snack maker 3	2+5	1.5 million Kyats for machinery and material procurement. Borrowed from villager at an interest of 5%. It may be redeemed within 3 years
Crispy snack 4 (wage laborer)	-	Not indebted. Debt not experienced.
Crispy snack 5 (wage laborer)	-	Not indebted. Various income sources of family members.
Rice miller 1	0+5	Not indebted.
Rice miller 2	0+4	Not indebted.
Machinery repairer 1	2+2	Now 400,000 Kyats, between 0 -500,000 Kyats mainly for buying materials
Machinery repairer 2	1+4	Ditto
Machinery repairer 1	1+2	Ditto, for procuring spare-parts of machinery
Machinery repairer 2	1+0	Now no debt but in the past at maximum 30,000 Kyats.

Source : Interview result by the Study Team in July 2007

Changing of wealth ranking in the village and defining criteria by key-informants are tabulated below. By these criteria, the rate of households categorized in “better-off” has augmented from 10% in 15 years ago to 15% now. They attributed the main reason of this betterment to the change from single paddy cropping to double or triple cropping of paddy owing to the irrigation. They also accounted the reason of reducing worse-off as increased labor chance for these 15 years from about half a year to around 10 months. The “worse-off” is defined here as the level of income less than 60 thousand Kyats per month that stays higher level than the levels in other villages. In view of such development in irrigated farming and accompanied evolution of agro-related small-scale industries, irrigation played so far in the village economy is considered great.

Table 3.1.20 Result of a Group Interview in Legaing Village

Category	Present (%)	15 years ago (%)	Definition Criteria
Better-off	15	10	Monthly income 100,000 Kyats or more (large landholding farmers with 10 ac or more, rice millers, transporters with pick-ups or busses)
Middle	40	30	Monthly income 60 - 90 thousand Kyats (farmers holding 3 - 10 ac, government staff, small-scale enterprise owners)
Worse-off	45	60	Monthly income 60,000 Kyats or less (wage workers engaged in farm labor)

Source : Interview result by the Study Team in July 2007

In conclusion, industries in this village seem to have developed in the form of agro-related activities like rice milling and agro-machinery repairing supporting the core industry, i.e., agriculture developing with irrigation. Besides, living-related industries like electric appliance repairing have developed keeping pace with rising living standard of the villagers. Further, it is assumed that snack manufacturing that is not categorized either the former or the latter but has existed 40 years back has been thriving with those who are engaged therein as the village becomes well off. This village serves as a typical example, which agricultural development has played a great role to raising new industries, and thereby leading to overall development for the village.

3.2 Townships and Villages for FY 2008/09 Pilot Project

In order for concerned officers to arrive at a consensus on the villages of the pilot project in FY 2008/09, 2 kick-off workshops were held in Mandalay; the first one from June 16 to June 17, 2008 and the other on June 26 and 27, 2008. The workshops invited concerned officers from divisional offices, district offices and township offices covering MAS, LBVD, and Cooperative, including PDC offices at TS level. The first kick-off was meant to introduce the participants the components and activities in the pilot projects in FY 2008/09 and the second kick-off was done to arrive at the consensus for the villages.

3.2.1 First Kick-off Workshop (on June 16 and June 17, 2008)

Since pilot projects in FY 2008/09 were proposed by the JICA Team together with central office counterparts, there should be a need to decide which villages should be selected in carrying out what pilot projects. The first step for this consideration is in fact to set up criteria by which villages where pilot projects were to be introduced were selected. The original criteria were presented by JICA Team and agreed upon by the floor as the villages for the pilot projects in FY 2008/09. Taken into consideration the selection criteria, the township level extension staffs, with the assistance of the facilitator, collectively proposed and agreed upon the detailed selection criteria for the villages by pilot (for detail discussion, refer to Chapter 5.1 Consensus Making on the Components of the FY 2008/09 Pilot Project).

3.2.2 Second Kick-off Workshop (on June 26 and June 27, 2008)

During the 1st Kick-off Workshop, held on June 16 & 17, the participants had an idea of what pilot projects were to be undertaken in FY 2008/09. Upon completion of the 1st kick-off workshop, the relevant TS officers were fielded back to their jurisdictional TS areas to select villages by pilot project with reference to the criteria they had agreed during the 1st kick-off workshop. To report back the villages selected, 2nd kick-off workshop was held on June 26 and June 27, 2008. The township officers together with the district and division level officers had arrived at villages for the pilot projects in FY 2008/09. They clarified and shared basic information about the villages selected, and gained common understandings on all the pilot project activities.

Table 3.2.1 summarizes the base data for the selected villages for pilot projects in FY 2008/09, while Table 3.2.2 shows the villages by pilot project. Now there are total 22 villages where pilot projects were commenced in FY 2008/09, excluding component-wide pilot projects such as 08A1, 08A2, 08L1, 08L2 and 08L3. Amongst the 22 villages, 4 villages are included in those 6 villages which had been undertaken in FY 2007/08. Therefore, newly added villages in FY 2008/08 are 18 in number except the component-wide pilot villages, or otherwise there are total 24 villages undertaken in either FY 2007/08 or FY 2008/09.

From the Table 3.2.1, one may notice the following:

- 1) Population per village ranges from 319 to 5,179 with the average of 1,593 while the number of households is as small as 52 (Pabe South) to as many as 1,121 (Ar La Ka Pa) with the average of 311 households.
- 2) Family size is relatively small since Bamar race runs nucleus family after they have married. The average of the family size is 5.13 ranging from 4.22 (Ga Doe Gine) to 6.52 (Kan Pyuu).
- 3) Their mainstay is basically agriculture and the percentage of the farm households consists of 59% of the whole households, ranging from only 19% (Pabe South) to as much as 82 % (Magyi). One of the characters is that the ratio of farm households varies widely by village as

is shown over CDZ.

- 4) Share of the farm households owing only less than 5 acre is 43 % as average though it ranges widely, e.g. from 7% (Pa Yar Htoo) to 100% (Zee Bwa). Their average farm land arrives at 9.1 acre though the average farm land per farm HH varies widely, ranging from as small as 3.1 acre (Gwe Pin Cho) to as much as over 20 acres (Nga Zin Yine).
- 5) Agricultural lands consist of upland (19,953 acres), lowland (paddy cultivable area, 15,228 acres), and Kain-kyun (3,201 acres), totaling 38,382 acres. The share of the lowland (paddy cultivable area) consists of as much as 40 %. Some of the lowland can enjoy irrigation as 45% of the paddy cultivable areas are actually irrigated.

Table 3.2.1 Summary of the Village Base Data for the Pilot Projects in FY 2008/09

Division	TS	Village	Population	Household	Family Size	Farmer Household	% of FHH	Less than 5 acre HH	% of less than 5 acre HH	Agriculture Land, acre				Average Farm Land, acre	% of Lowland (Paddy)	Irrigated Paddy Area, acre	Irrigation Ratio	% of Upland	Type
										Upland	Lowland (Paddy)	Kainoun	Total						
Mandalay	Tada-U	Thu Nge Daw	3,275	589	5.56	353	85	185	49	2,107	737	0	2,844	7.4	28	285	0.39	74	III
		Na Kyin Hla	725	163	4.45	45	28	30	67	200	9	0	209	4.6	4	0	0.00	95	III
		Nga Zin Yine	934	180	5.19	100	56	60	60	1,459	595	0	2,054	20.5	29	507	0.85	71	III
	Ngazun	Zee Pin Gwe	938	217	4.32	150	89	135	90	0	149	445	594	4.0	25	0	0.00	0	III
		Kan Ma	951	150	6.34	113	75	38	34	392	1,888	0	2,080	18.4	81	0	0.00	19	I
		Magyi	1,460	245	5.96	200	82	120	60	2,000	300	0	2,300	11.5	13	0	0.00	87	I
		Kyauk Ta Lone	1,325	250	5.30	51	20	22	43	0	89	228	315	8.2	28	89	1.00	0	I
Pa Yar Htoo	973	195	4.99	173	89	12	7	0	801	226	827	4.8	73	601	1.00	0	I		
Ar La Ka Pa	5,179	1,121	4.62	640	57	200	31	4,162	1,916	747	6,825	10.7	28	0	0.00	61	III		
Sagaying	Myintu	Hoe Min Gyi Kan	1,222	278	4.38	145	52	114	79	1,801	159	0	1,960	13.5	8	0	0.00	92	III
		Hoe Saung	2,893	523	5.53	391	75	178	46	4,581	1,484	121	6,166	15.8	24	0	0.00	74	III
		Za Yi	1,042	215	4.85	99	46	41	41	96	129	463	700	7.2	18	50	0.38	14	IV
	Ayadaw	Ga Doe Gine	1,088	258	4.22	108	42	85	80	33	24	390	447	4.1	5	24	1.00	7	IV
		Ma Gyi Saik	1,300	260	5.00	150	58	40	27	592	468	500	1,560	10.4	30	88	0.15	38	IV
		Kan Phuu	1,546	237	6.52	116	49	55	47	578	0	0	578	5.0	-	-	-	100	IV
		Pahe (S)	319	52	6.13	10	19	8	80	111	4	0	115	11.5	3	0	0.00	97	I
Chauk	Pahe (N)	707	113	6.26	35	31	20	57	583	1	0	584	16.7	0	0	0.00	100	I	
	Zee Bwa	978	181	5.40	125	69	125	100	790	25	0	805	6.4	3	0	0.00	97	I	
	Gwe Pin Cho	884	130	5.26	81	47	40	86	188	0	0	188	3.1	-	-	-	100	I	
	Legaling	4,119	776	5.31	239	31	108	45	18	1,354	0	1,372	8.8	99	1,354	1.00	1	V	
Pwintbyu	Farmers from outside				296	-	-	-	144	2,176	0	2,320	5.9	94	2,176	1.00	6	V	
	Monie Taw Gyi	1,802	403	4.47	309	77	84	27	71	909	0	980	3.2	93	909	1.00	7	V	
	Kan Zwe	1,577	295	5.35	169	57	63	37	57	1,692	63	1,812	10.7	93	0	0.00	3	V	
Average			1,593	311	5.13	183	49	79	43	831	835	1,333	1,599	9.1	40	309	0.45	48	
Total			35,038	6,932		4,208		1,743		19,953	15,228	3,201	38,382			8,802			

Source: Relevant Village PDCs

Table 3.2.2 Summary of the Villages by Pilot Project in FY 2008/09

Division	District	Township	Village	Code, 08-	Pilot Project
MANDALAY	Kyaukse	Tada-UM3	Zee Pin Gwe	A5	Small-scale irrigation promotion project (shallow well + treadle pump)
			Nga Zin Yine	A3	Improved seeds regeneration project (with introduction of seeder) Chickpea
				I 1,2	Firewood substituting bio-fuel promotion project / Improved cooking stove promotion project
			Thu Nge Daw	L1	Pro-poor oriented goat/ sheep revolving programme
			Na Kyaw Hta	L1	Pro-poor oriented goat/ sheep revolving programme
			16 plots	A8	New varieties adaptability trial project
				A1,2	Improved paddy cultivation promotion programme / Organic farming promotion programme (with IMO)
		L3	Livestock Feeding Improvement Programme (including molasses block, silo and Ipil Ipil etc)		
		Kyaukse M1		A1,2	Improved paddy cultivation promotion programme / Organic farming promotion programme (with IMO)
		Miyittha M2		A1,2	Improved paddy cultivation promotion programme / Organic farming promotion programme (with IMO)
	Myingyan	NgazunM8	Pha Yar Htoo	L2	Pro-poor oriented piggery revolving programme
			Kan Ma	A5	Small-scale irrigation promotion project (shallow well + treadle pump)
				A7	Minimum tillage promotion project (mixed cropping with desmodium)
				L1	Pro-poor oriented goat/ sheep revolving programme
			Magyi	C1	Community revolving fund establishment project (by using amortization of capital invest)
			Kyauk Ta Lone	L1	Pro-poor oriented goat/ sheep revolving programme
				A1,2	Improved paddy cultivation promotion programme / Organic farming promotion programme (with IMO)
12 plots	A8	New varieties adaptability trial project			
	L3	Livestock Feeding Improvement Programme (including molasses block, silo and Ipil Ipil etc)			
SAGAING	Sagaing	MyinmuS2	Ar La Ka Pa	A3	Improved seeds regeneration project (with introduction of seeder) Chickpea
				L1	Pro-poor oriented goat/ sheep revolving programme
				L2	Pro-poor oriented piggery revolving programme
				C1	Community revolving fund establishment project (by using amortization of capital invest)
			Htee Saung	A3	Improved seeds regeneration project (with introduction of seeder) Chickpea
				A7	Minimum tillage promotion project (mixed cropping with desmodium)
			Boe Min Gyi Kin	L1	Pro-poor oriented goat/ sheep revolving programme
		A1,2	Improved paddy cultivation promotion programme / Organic farming promotion programme (with IMO)		
		L3	Livestock Feeding Improvement Programme (including molasses block, silo and Ipil Ipil etc)		
	Monywa	Monywa S4		A1,2	Improved paddy cultivation promotion programme / Organic farming promotion programme (with IMO)
	Monywa	AyadawS6	Ma Gyi Sauk	A3	Improved seeds regeneration project-Paddy
				A6	Crop storage depots promotion project (mainly for paddy)
				C1	Community revolving fund establishment project (by using amortization of capital invest)
			Za Yit	A4	Pro-poor oriented Mushroom culture promotion project
				L1	Pro-poor oriented goat/ sheep revolving programme
			Ga Doe Gine	L2	Pro-poor oriented piggery revolving programme
			Kan Pyuu	I 1,2	Firewood substituting bio-fuel promotion project / Improved cooking stove promotion project
A1,2	Improved paddy cultivation promotion programme / Organic farming promotion programme (with IMO)				
10 plots	A8	New varieties adaptability trial project			
	L3	Livestock Feeding Improvement Programme (including molasses block, silo and Ipil Ipil etc)			
Shwebo	Wetlet S13		A1,2	Improved paddy cultivation promotion programme / Organic farming promotion programme (with IMO)	
MAGWAY	Magway	ChaukG7	North Pabe	I 1,2	Firewood substituting bio-fuel promotion project / Improved cooking stove promotion project
				L1	Pro-poor oriented goat/ sheep revolving programme
				I 3	Children's nutritional improvement center project
			South Pabe	L1	Pro-poor oriented goat/ sheep revolving programme
			Gwe Pin Cho	L1	Pro-poor oriented goat/ sheep revolving programme
			Zee Bwa	A4	Pro-poor oriented Mushroom culture promotion project
				L1	Pro-poor oriented goat/ sheep revolving programme
		A1,2	Improved paddy cultivation promotion programme / Organic farming promotion programme (with IMO)		
	12 plots	A8	New varieties adaptability trial project		
		L3	Livestock Feeding Improvement Programme (including molasses block, silo and Ipil Ipil etc)		
		Minbu G12		A1,2	Improved paddy cultivation promotion programme / Organic farming promotion programme (with IMO)
	Minbu	PwintbyuG13	Legaing	A6	Crop storage depots promotion project (mainly for paddy)
				L1	Pro-poor oriented goat/ sheep revolving programme
			Kan Zwe	L2	Pro-poor oriented piggery revolving programme
			Mon Taw Gyi	I 2	Paddy husk power generation project
				A1,2	Improved paddy cultivation promotion programme / Organic farming promotion programme (with IMO)
			12 plots	A8	New varieties adaptability trial project
	L3	Livestock Feeding Improvement Programme (including molasses block, silo and Ipil Ipil etc)			
	Salin G14		A1,2	Improved paddy cultivation promotion programme / Organic farming promotion programme (with IMO)	
Total	6 townships	22 villages		Of the 22 villages, 4 villages are included in those villages undertaken in FY 2007/08.	

Source: JICA Study Team

CHAPTER 4 FY 2007/08 PILOT PROJECT

This Chapter 4 discusses the pilot projects which were commenced in FY 2007/09. In this fiscal year, an integrated type rural development was tried at 6 villages as aforementioned in the previous sub-chapters. The projects covered mainly 4 sectors as agriculture, livestock, cottage industry and living improvement. Following sessions present what beneficiaries were selected by sector, how consensus making was done with the relevant officers as well as villagers, some changes made during the course of the implementation, activities undertaken and those outputs, current status as of February 2009, etc. Evaluation for the project is to be discussed in Sub-chapters 4.8 & 4.9, and also lessons which have been deduced and thereby can apply to other projects are elaborated in the Main Report.

4.1 Selection of Beneficiary of the Pilot Project of FY 2007/08

Basic rationale of selecting beneficiary of the pilot project resides in “pro-poor” and “public interest” as aforementioned. As a matter of course, those who hold farmland should be selected in the agricultural components. Likewise, consideration should be paid as to involve those who already have some extent of experiences and technical skills in the beneficiary of small-scale industries and livestock rearing. In such a case, villagers categorized in middle class - a part of well-off class may be inevitably selected as target members. Even in this case, the planner should devise a scheme for realizing “public interest/ welfare” in which the implanted techniques can be widely pervasive into many other villagers – including the poor. Following summarize the process and result of selecting the beneficiaries for the pilot project in FY 2007/08 by sector.

4.1.1 Selection of Beneficiary for Agricultural Components

Agricultural components cover small scale irrigation by pumps (in Khaungkawe village), vegetable cultivation through small-scale irrigation (in Khaungkawe village), regeneration / multiplication of chickpea seed coupled with promotion of seeders (in Magyi village, Ma Gyi Sauk village), mushroom culture (in Ar La Ka Pa village and Legaing village), provision of compost manure (in Khaungkawe village, Magyi village, Ma Gyi Sauk village, Mingan village and Legaing village). As to sorghum and mulberry cultivation, since it is planned for the purpose of fodder production, it is classified as a livestock component where extension staff in both MAS and LBVD take part in the implementation.

Pump irrigation scheduled in Khaungkawe village includes provision of portable pumps used along the stream. The component selects 20 participants and gives training to these participants for vegetable production by lift irrigation given such inputs as vegetable seeds and fertilizers. Two times of inputs distribution is planned. The participants provide themselves small-sized reservoirs inside their farmland to which water is conveyed from the stream and then irrigate their plots with watering tins or by gravity.

Each farmer participant starts vegetable cultivation on less than 1 acre and if he/she finds any possibility of extending acreage under vegetables in the following year, he/she does it by him/herself. A responsible person collects fund from each participant equivalent to 10% of income from vegetables to appropriate for group purchase of inputs like fuel of pump, seeds and fertilizers to be used in the following year. Vegetable cultivators in the test plots are limited to the selected 20 participants who suffered from flood damages in their field along the stream, but as far as the accompanied training is concerned, all the farmers who desire the attendance can participate as trainees.

In implementing the component of chickpea production and promotion of seeders in Magyi village, certified seed is distributed to existing 10 lead farmers who are currently engaged in chickpea cropping. After harvesting, they are to revolve the produced seed to other farmers at a same amount given, thereby envisaging the distribution of certified seed throughout the village. Ten (10) seeders

are provided for sowing chickpea. All the farmers in the village are divided into 10 groups, and a seeder is distributed to a group in which a responsible person collect user fee from its users so that the cost of repairing the seeder or its depreciation can be met. All the farmer villagers who want to use the seeder are eligible for using it.

Development of vegetable cultivation using small-scale irrigation is planned in the vegetable cultivation component scheduled in Ma Gyi Sauk village. The component targets 10 farm households and 8 female members who want vegetable cultivation and whose farmlands are irrigable by means of wells or stream. Inputs including vegetable seeds (onions, tomatoes, cabbage etc) and fertilizers are distributed to these participants twice during the cropping season of FY 2007/08, and vegetable cultivation techniques equipped with small-scale irrigation are extended. As to training on the cultivation techniques of vegetables, all the farmers who want to participate can be selected as trainees.

Mushroom culture is scheduled in Ar La Ka Pa village and Legaing village. Materials are distributed to 20 villagers in this component to extend the culture techniques of mushroom production. Mushroom seeds are distributed 3 times and the participants pay the cash equivalent to 10% of the income from mushroom to the group leader to appropriate for the purchase of seed and expansion of production in the next cultivation.

As for technical dissemination training of mushroom, anyone of the villagers who want to participate can join therein. In Ar La Ka Pa village, 5 landless laborers, 6 smallholders with less than 5 acre, 3 medium landholders with 5 - 10 acre and 4 large scale landholders with over 10 acre (in total 20 participants) are provided with the materials for mushroom culture. In Legaing village, 8 landless laborers, 3 smallholders with less than 5 acre, 5 medium landholders with 5 - 10 acre and 4 large scale landholders with over 10 acre (in total 20 participants) participate therein.

Compost manure is tried in 5 villages except for Ar La Ka Pa village. 30 farmers' households are scheduled to receive materials, but the accompanied training are open to any villagers who desire the participation to the training, for the training is scheduled under non-selective system. In selecting participants, major targets are small - medium scale farm households feeling difficulty in purchasing chemical fertilizers with boosting prices. However, soil improvement itself is a common task for all farmers. This is the reason why priority is given to small - medium scale farmers, but regardless of the acreage held by the applicants, even large scale farmers who have interest can join in addition to the initially planned 30 participants.

4.1.2 Selection of the Beneficiary of Livestock Components

Livestock components are proposed as goat revolving promotion (in 5 villages except Legaing village), sheep revolving promotion (in Magyi village and Ma Gyi Sauk village), piggery promotion (in Legaing village), animal housing improvement (in Khaungkawe village, Magyi village, Ar La Ka Pa village and Legaing village), livestock feeding improvement (in 5 villages except Legaing village), introduction of farming with rice duck flock (in Ma Gyi Sauk village), sorghum cultivation intercropped with rice beans (in Ar La Ka Pa village, Mingan village and Legaing village), local cattle improvement (in Ar La Ka Pa village and Legaing village) etc.

The core of poverty reduction measures in Khaungkawe village is goat rearing since it can tolerate to dry climate and can be fed solely on grazing throughout the year. It is scheduled to select 15 households in total from the landless and smallholder farmers with landholding under 5 acre that mostly form the poorest strata. Since some households of these strata already own goats, priority of the selection is given to those who don't own it at present. Also, priority should be given to those who only manage goats on contract basis, most of whom are the landless.

Five (5) heads of stock goats are provided for a household, so the total heads come to 75 per village. The beneficiary household have to hand the same 5 heads of kids (she-goats) out of the offspring born from the received stock over to the secondary beneficiary households such as landless or smallholders in the same village as a revolving resource. The time limit given to the primary beneficiary households is as a rule one year after they got first born kid. The secondary beneficiary households that received 5 heads of stock goats again give the same number of heads (she-goats) to another landless strata or smallholder farmers.

Training on improving livestock feeding is also scheduled in Khaungkawe village, in which 20 livestock holders are selected as trainees regardless of livestock species they keep. In this case, training is to be provided in a non-selective manner to which any villagers who want to join can participate therein. The demonstration sites for improving swine compartments and goat barns are selected from the homestead space in villager's residence so that exhibitiv effect can be expected among villagers. It is scheduled to build 1 pigsty and 1 goat-barn by assembling available materials that can be procured in and around the village and display them as model for extension, thus expecting further dissemination.

In addition to goat rearing, promotion of sheep raising is also planned in Magyi village. This is because there are some villagers who believe that management of sheep is easier than that of goats. Similar to what is planned in Khaungkawe village, the beneficiaries of this component are chiefly selected among the landless and smallholder farmers and it consists of 2 groups each of which includes 15 households of the primary beneficiary.

Number of heads provided for a household is also 5. In total 75 heads of goat and another 75 heads of sheep are provided as input stock per village. The same revolving system of offspring handing is adopted here as applied to Khaungkawe village. Construction of model animal housing is also planned for pigs and goats, for which a site is selected in consultation with the villagers that is suitable for maximizing exhibitiv effect. 20 trainees of the training on improved livestock feeding management are selected from those who own livestock, but any villagers who would like to join the training can participate in it since it is arranged in a non-selective approach.

It is also planned to promote both goats and sheep in Ma Gyi Sauk village where the participants in the provided components are selected among the landless as a principle. As to number of heads to be provided, and the revolving system to be applied are the same as aforementioned Khaungkawe village and Magyi village. This is to say, 5 heads of goats or sheep are allotted to a participant household and the receivers have to supply the same number of goat or sheep heads they received to the secondary beneficiary households.

Also in Ma Gyi Sauk village, training on improvement of livestock feeding is provided to 25 trainees consisting of owners of indigenous cattle, goats and pigs. Farming with rice duck flock is a new trial in the CDZ, and the component selects 12 paddy farmers who showed their interest on this farming method in workshop held at initial planning. Expecting demonstration effect, the site should be chosen along the existing road.

In the component of model cultivation of feed sorghum intercropped with rice beans in Ar La Ka Pa village, 10 participants are to be selected from those who own draft cattle and indigenous one. The site is to be selected along the trunk road where displaying effect can be expected with the consensus of the farmland holder. Since improvement of livestock feeding management is a common issue for all livestock owners regardless of livestock species, 30 trainees of this training component are to be selected from those who own livestock regardless of what species they keep.

Mingan village is situated in a remote and poverty-prone area. Typical poverty reducing measures in

this village in livestock sector are goat rearing. 15 participants are selected principally from the landless to which 5 heads of goat stock are allocated per household in this component. The mechanism to be applied as revolving way of sustenance is the same as that in other pilot villages. Improved barns are also to be built for goats, pigs and cattle in Mingan village but villagers select their sites so that they give effective demonstration.

In the component of training on feeding improvement in Mingan village, 25 trainees are selected from those who own any species of livestock. As to mulberry plantation as a part of feeding improvement component, common households are selected in addition to those holding livestock, because mulberry plant can not only be utilized as feeding material but also it has future potential of multi-purpose usage including paper milling, berry processing and herb preparation. In the component of sorghum cultivation intercropped with rice beans, 10 participants are selected from holders of indigenous cattle who promote the cultivation.

Legaing village is characterized with larger income disparity between farm and off-farm households on account of presence of irrigated paddy land. Most land in the village has already been reclaimed into farmland leaving currently less room for grazing goats. By this reason, local cattle improvement and feed-sorghum cultivation with rice beans are planned as the components for this village. 10 participants are selected among indigenous cattle holders in the component of feed-sorghum cultivation and sorghum is cultivated on the agreed field by the participant landholders.

While cattle holders, or those who are better-off are most probably chosen in the components of local cattle improvement and feed-sorghum cultivation in Legaing village, piggery promotion is provided for poorer villagers to make use of kitchen garbage. In this component 15 participants are selected among the landless and smallholder farmers to whom 2 piglets each are provided. A revolving system is also applicable to this piggery component for other villagers as adopted in the case of goats. However, instead of transferring offspring to secondary beneficiary, the participants in the piggery sell the raised pigs and buy piglings spending a part of their piggery income to revolve them to the secondary beneficiary. In this component, it is also scheduled to establish an improved pigsty at a site, while the site selection is delegated to the concerned villagers.

4.1.3 Selection of the Beneficiary of Small-Scale Industries Components

Small-scale industries have been run in 6 target villages, which local color is fully reflected. The promoting activities for these industries planned in the components of the pilot project are concentrated on the support of existing industrial groups. The support consists of provision of equipment, and trainings to introduce new design into the existing system. In addition, in Legaing village where traffic is heavy, it is planned to construct, manage and maintain a sales depot (similar to road station in Japan) for selling villages' specialty products (at first small scale sales shop was planned in Ar La Ka Pa village too but it was cancelled).

In providing equipment for business for the beneficiary, it is planned to recommend the beneficiary participants to install a village development fund by amortization of the equivalent amount of capital that has initially been provided or otherwise by a form of paying rental fee for the equipment to the fund committee established at the village level. In this case, a fund managing committee composed of village chairman etc. should be established in the village concerned. The committee is to create the fund for which it is scheduled for beneficiary persons to refund the amortized amount equivalent to the value of initially invested capital within an agreed period or to pay an agreed rental fee whenever the beneficiary uses the equipment.

The beneficiary is confined to the primary generation, but this inertia can be sustained and deployed into the secondary and tertiary beneficiary in the same village if the initial input amount is duly

amortized, or otherwise prescribed rental fee is duly paid, for the purpose of revolving it for further granting of fund for the successive beneficiaries. In amortizing the initial cost, inflation may be an issue in Myanmar, but it can be overcome with a revaluation of the amortization, amount of which is pegged or linked to the price of the staple, or rice (actually farm-gate price of paddy).

In Khaungkawe village, the components are focused on 3 kinds of industries with large number of the engaging households and of the employees, namely, guitar key producers, tinsmith processors and weaving entrepreneurs. Possibility of increased employees is anticipated with the support by the project and some of these employees would independently establish new business in the middle term. In this occasion, an influential element arises from access to fund for procuring initial capital in addition to the solid intention of those who want to establish new enterprises. In order to secure the access, the aforementioned revolving fund is schemed in this pilot project.

Principal 3 cottages (sewing, weaving and knitting) in Ma Gyi Sauk village envisage expanding their production and maintaining / ameliorating product quality thereby raising sales profits as well as increasing number of employees. The pilot project sets targets on entrepreneurs of these industries and casual laborers. In this village, higher value addition of the products is expected through improved production processes making full use of higher educational level and enhanced entrepreneurship that are not often observed features in other villages.

Mingan village is located amidst rigorously dry climatic condition that limits the increase in agricultural income. Therefore, an issue has been posed on how effective the traditionally run activities of sandstone processing can increase the villager's income level. Up till now, existing masonry cooperative has not functioned well due to poor economic viability of the members who could only collect 5,000Kyats from 30 members. As a result, liquidation of this cooperative has been applied to the Cooperative Department concerned.

Meanwhile, prior to the initiation of this pilot project in Mingan village, new members have established a cooperative. It has been named "Ahmen Thit" (New Strength), member of which currently counts 110, with an affiliating subscription of 500Kyats per household. Since the earliest 2006, amount of turnover for 4 months comes to around 60 thousand Kyats. The target group of the project includes all interested people in the production and marketing of stone products such as masonry, middlemen, vendors etc in which just created "Ahmen Thit" is made full use thereof.

As concern the pilot project components in Legaing village, small-scale industries including fruit processing, and rice milling are highlighted and target group of the component projects are entrepreneurs of these enterprises. Two pagodas are located in the vicinity of this village (Kyaung Daw Ya and Shwe Set Taw) where festivals are held (4 months for the former, July 28th - October, and 3 months for the latter, January - March). During these festivals, 500 - 1,500/2,000 visitors per day visit Kyaung Daw Ya, while 4,000 - 5,000 people visit Shwe Set Taw on ordinary day and 7,000 - 8,000 people celebrate festival day.

Above-mentioned situation is the reason why creation of "road station", a sales depot for village products, is scheduled and any villagers who have interest in improving income by augmenting sale of their own produced goods and farm produce can be selected as the target group of the component. Conceivable managing system of the road shop includes: 1) Sellers jointly run the shop, 2) A managing committee is organized with the village chairman that contracts with the villagers who want to sell goods in the road shop. In this case, the latter is basically pursued from managerial point of view including hygienic maintenance of the shop.

4.2 Consensus Making on the Components of the FY 2007/08 Pilot Project

4.2.1 Consensus Formation as a Whole

In order for stakeholders to arrive at a consensus on the components of the FY 2007/08 pilot project, a kick-off WS was held. The workshop was held at Mandalay for two days, 6th - 7th June 2007 inviting CPs of the central ministries concerned, stakeholders from MAS, LBVD, and Cooperative Department (CD) in the 3 related divisions, and also those in 6 related TSs and representatives of the scheduled target villages of the Pilot Project.

On the first day of WS, chief CP, the National Project Director, explained the objectives of holding the kick-off WS, background sessions from the previous year, outline of the pilot project components proposed to the target 6 villages etc., then consultation with the attendant stakeholders was made. Upon arriving at a consensus in the workshop, successive consultation sessions at village level were made on the schedule. Major outcomes of Q&A are as follows:



- 1) As regards the creation of “road shop/ station”, permission by Local Authority concerned is required to procure the site for its creation. In order to clear it smoothly, it was decided to invite Peace & Development Commission (PDC) of TS level to the planning WS to be held at the villages concerned.
- 2) Extension staff appointed to each TS are so busy with their duty that it is difficult to follow the proposal of monitoring the progress of the pilot project at the villages and reporting what they monitor at a frequency of once in a day. By this reason, it should be examined to establish a system with rotational services by the related 3 ministries. Also, support from divisions concerned are to be requested wherever need arises, so that related extension staff can sufficiently participate in the pilot activities.
- 3) Though a local consultant takes part in the implementation of the scheduled pilot project on a subcontract basis, its participation is at any rate under an assistant concept. In other words, the major role player should be the villagers concerned and the related government staff, whereas the sub-contractor is mainly responsible for assisting them by providing logistics, by procuring required equipment/ materials etc.

Participants in the second day WS were confined to the stakeholders of the concerned TSs including representatives of villagers in the target villages and the staff of concerned TSs who directly support the participants of the pilot project. Chief CP explained about the project components by village and their implementing systems, implementation schedule etc. to the attendants. After Q&A on this explanation, the participants in WS came to a consensus on all the components of the pilot project scheduled in the 6 target villages. As to the organizational system for implementing the pilot project, responsible persons were selected by sector of each village and a few responsible persons cum coordinators including the village chairmen were also selected.

What has been impressed on the whole during 2-day kick-off WS is the fact that government officers have strong concept of “to supervise”. The discussion in WS was made in Burmese language, but if what was discussed was translated into English, assertion was repeated that it was important to thoroughly “supervise” the process of the pilot project in order to bring fruitful results. It is of course important to attain the targeted fruit, or what is initially decided all right, but the intrinsic nature of the

pilot project is to build and strengthen the capacity of all the stakeholders through the implementation, rather than the accomplishment of the targets.

In other words, it is essential that not only the participating villagers but also the government staff (in particular extension staff at TS level directly involved in the extension activities at village level) can and should perform better in any of the future similar experiences based on what they have done through the pilot project implementation. In this sense, much more important than “supervise” is to “learn” from the pilot implementation.

4.2.2 Consensus Formation and Plan Elaboration at Village Level

Following the kick-off WS held at Mandalay, village level workshops to elaborate the plans and to arrive at consensus were held at the 6 target villages as mentioned below during the period June 8th - 30th. At the same time, action-plan tables by component were prepared by the villagers concerned, and time schedule, anticipated outcomes, responsible persons, inputs etc. were determined:

Khaungkawe Village / Tada-U TS/ Mandalay Division :	June 8 th - 9 th , 2007
Magyi Village / Ngazun TS/ Mandalay Division :	June 12 th - 13 th , 2007
Ma Gyi Sauk Village / Ayadaw TS/ Sagaing Division :	June 16 th - 17 th , 2007
Ar La Pa Ka Village / Myinmu TS/ Sagaing Division :	June 20 th - 21 st , 2007
Mingan Village / Chauk TS/ Magway Division :	June 25 th - 26 th , 2007
Lagaing Village / Pwintbyu TS/ Magway Division :	June 29 th - 30 th 2007

WS at village level were held for 2 days in each village. On the 1st day, village chairman, those who were engaged in agriculture, animal husbandry and small-scale industries, key-informants including the landless (selecting about 5 people from each stratum) were interviewed to collect current information on the entire village. This has identified; 1) such attributive information as vocation/ occupation of key-informants themselves, size of landholding, livestock holding etc., 2) village history and events, 3) industrial changes in agriculture, animal husbandry and small-scale industries, 4) changes in village economy, 5) educational status and 6) health, etc. Those results were summarized in sub-chapter “5.3.1 Townships and Villages for FY 2007/08 Pilot Project”.



Group Interview with Concerned Villagers

On the 2nd day, the participants were divided into groups belonging to the same activity field and group discussions were made, where reconfirmation of information collected on the 1st day was made. Then, collecting all the participants, project components were confirmed and consensus on the components was arrived. During this process, though some minor revisions were made such as alteration from sheep raising to goat raising, change in shallow well digging for the purpose of irrigation to mainly livestock watering, consensus of the villagers concerned



A Village Level WS on the 2nd Day, Cottage CP explains planned activities.

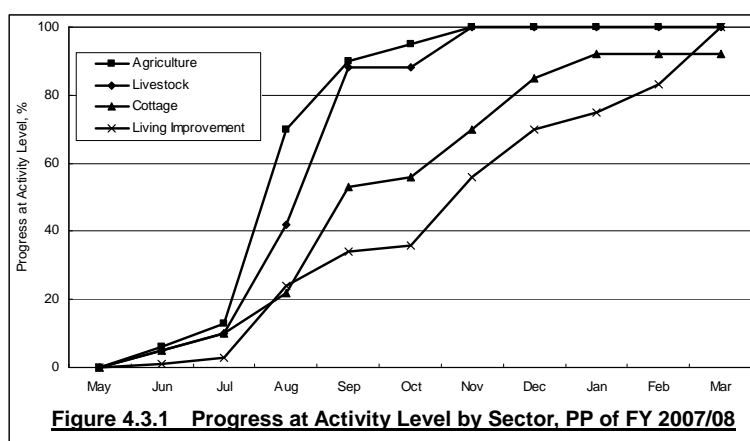
has been reached. After the consensus, members were identified, member lists were provided and those who are responsible for the project implementation were identified.

4.3 Overall Progress and Components Changed

4.3.1 Overall Progress at Activity Level by Sector

Pilot projects started with the kick-off workshop held at Mandalay and also upon consensus making at each of the villages. During early to mid project implementation period, villagers were able to start realizing its commencement of each project in their villages, and some of them had to be reviewed and revised by their group members. Detail specification for equipment under cottage sector had also been discussed many times to agree. Thus, there were several project components taking time to achieve their final decision.

Progress percentage at activity level by sector during FY 2007/08 is illustrated in Figure 4.3.1. Progress at activity level does not necessarily include project operation and maintenance stage. It shows only how much planned project activities have been completed by that time. For example, even if all the agriculture related activities have been finished, final evaluation cannot be



made since we need to wait for harvest. Likewise, even if all the planned project activities have been finished in goat raising component, the evaluation should wait for the revolving of the kid-goat to the 2nd generation beneficiaries being done or not done.

As the figure shows, agriculture components had been progressing almost throughout the period, followed by livestock sector, cottage sector and lastly by living improvement sector. Since cottage sector needed longer lead-time to decide the specification of the equipment and machineries, the progress was slower than that of the agriculture and livestock sectors. Living environment improvement sector needed change in the component like water supply in Mingan village and also construction work took longer time due to the project size bigger than the agriculture and livestock sectors, thereby slower progress. The little progress from September to October was due to a nation-wide demonstration having taken place in that period.

4.3.2 Components Changed

During the course of the implementation, some changes in components had to be done. Following table shows the components which had been changed because:

- 1) One solar cooker out of planned 10 was once fabricated and tried in Magyi village, however necessary heating for jaggery production has not been achieved. Hence remaining 9 solar cookers were cancelled and then changed to construction of an improved energy efficient stove. This new trial was carried out in early February, and therefore the efficiency was checked in the following FY 2008/09.
- 2) Artificial insemination (AI) to improve local cows was scheduled in Ar La Ka Pa village and Legaig village. However, potable LN tank and LN2 were not available in the relevant government offices and also machinery to produce LN2 was out of order. Therefore, AI was

changed to natural mating by providing a bull each to the relevant villages.

- 3) Road shop planned in Ar La Ka Pa was finally cancelled. At first permission was not granted for the construction since the potential construction site was close to a school, possibly hindering school children's study. Then, relevant villagers started thinking the change of the component to, for example, wheat milling station, fruits processing factory, strengthening of hand weaving industry, provision of a tractor, etc. Time had run out within the fiscal year of 2007/08, and this component had been suspended (in FY 2008/09, it was altered to a tractor provision, which is to be revolved as village fund from the amortization of the initial cost).
- 4) Drinking water supply in Mangan village could not be implemented by conventional well construction method since it was noticed that the groundwater existed over 150 – 200 m depth in that area. Therefore the villagers concerned proposed to allocate the construction budget to primary school construction with roof rainwater catchment facility. The construction was commenced in late January 2008.
- 5) In Legaing village, planned trainings on crispy snack production, mechanical workshop and electrical workshop were replaced by construction of a paddy drier and fruit processing training with minimum equipment provision. Initial beneficiaries for the trainings did not show interests by saying just training is not enough but need equipment. Since the villagers concerned needed to dry up summer paddy which is harvested during the onset of rainy season, a paddy drier construction using paddy husk was proposed and granted. Also, fruit processing came in priority since they planned to sell at the road station constructed in the village.

Table 4.3.1 Components Changed for the FY 2007/08 Pilot Project

Village	Sector	Pilot Project Component (original)	Changed Component
Magyi	Cottage Industry	Solar cooker	Improved energy efficient stove
Ar La Ka Pa	Livestock	Artificial insemination	Natural mating
	Cottage	Road Shop	Suspended to FY 2008/09
Mangan	Living Impr't	Drinking water supply	Primary school construction
Legaing	Livestock	Artificial insemination services	Natural mating
	Cottage industry	Group formation and training on crispy snack production, mechanical W/S and Electrical W/S	Paddy drier Fruits processing

Source JICA Study Team

4.4 Pilot Project Implementation for Agriculture Sector

Table 4.4.1 summarizes the agriculture pilot components in FY 2007/08 together with the objectives of the projects. Of the pilot projects, rice-duck farming had to be terminated. This was due to big hike of the fuel cost, more than double having taken place in September in 2007. This finally led to the complete cease of pumping station supplying irrigation water to the paddy field concerned. Therefore, no discussion on rice-duck farming is made hereunder. Following discussion centers on outputs level and also issues arisen through the process of the implementation:

Table 4.4.1 Summary of the Agricultural Pilot Projects with those Objectives

Sector	Component	Village	Pilot Objectives
Agriculture	07A1 Raised-bed Cultivation	Khaungkawe (engine pump)	<ul style="list-style-type: none"> To increase incomes for farm household, especially for small scale farm households, by introducing modern vegetable cultivation technology, that is raised-bed cultivation. To increase employment opportunities for landless farm labors through the promotion of intensive vegetable cultivation.
		Magyi (tubewell) Ma Gyi Sauk (hand pump)	
	07A2 Improved Seeding Practice	Magyi (with seeder)	<ul style="list-style-type: none"> To increase the yield of pulses (chick pea) by introducing an improved seeder together with improved seed. To regenerate degraded seed (chick pea) by introducing improved seed.
	07A3 Improved Seed regeneration	Magyi	<ul style="list-style-type: none"> To regenerate degraded seed (chick pea) by introducing improved seed.
		Ma Gyi Sauk	
	07A4 "Bokashi" Compost Making	Khaungkawe	<ul style="list-style-type: none"> To increase crop yields by introducing an organic farming technology, introduction of Bokashi compost, under the situation that chemical fertilizer price is sharply hiking.
		Magyi	
		Ma Gyi Sauk	
		Mingan Legaing	
	07A5 Mushroom Culture	Ar La Ka Pa	<ul style="list-style-type: none"> To increase incomes for small scale farmers and especially landless villagers by introducing mushroom cultivation, which can be done in their household compound (no need of farm lands).
Legaing			
07A6 Rice-duck Farming	Ma Gyi Sauk	<ul style="list-style-type: none"> To increase paddy yield by introducing rice-duck farming. 	

4.4.1 Outputs from the Pilot Implementation

Outputs have been achieved through planned activities, which are summarized in Table 4.4.2. As the table tells:

- 1) Vegetables under raised-bed farming have been done in 3 villages. Some of the vegetables were destroyed by heavy rainfall. However, there are farmers who continue the raised bed cultivation. Raised bed cultivation in wet areas gives very good results and therefore farmers who have their farmlands in Le (lowland) tend to continue the raised bed but others are not.
- 2) Chick pea cultivated under improved seeding practice and chick pea seed regeneration have been well done in the 2 villages. Users of the new seeder realized the effectiveness from the view point of reduction of the seed amount, about by 30%, as well as reduction of the workload of weeding. The 1st generation beneficiaries all, but one in Ma Gyi Sauk village, revolved the same amount of seed to the committee from which 2nd generation beneficiaries were given the harvested improved seeds. The farmer in Ma Gyi Sauk village lost his harvest due to heavy rainfall thereby he was exempted from the revolving.
- 3) Bokashi compost making has been done in all the planned 5 villages. Beneficiaries were given training of how to make Bokashi compost manure, and thereafter each participant made their own Bokashi compost manure. About two thirds of the compost manure have been used in dry season agriculture where irrigated agriculture is practiced, and the rest were used in the rainy season of 2008/09. However, since there is a difficulty of getting EM concentrate and also due to the

cumbersome work, not many of them continued in FY 2008/09.

- 4) Mushroom cultivation has been completed in the target 2 villages, and output in Legaing village is very good while the one in Ar La Ka Pa village is not much. In the latter village, people can access to naturally grown mushroom, discouraging the cultivator.

Table 4.4.2 Summary of the Outputs by Agricultural Pilot Projects

Sector	Component	Village	Major Outputs from the Pilot Implementation
Agriculture	07A1 Raised-bed Cultivation	Khaungkawe (engine, treadle)	<ul style="list-style-type: none"> 22 farmers learned vegetable cultivation with raised bed cultivation. About 20 farmers applied vegetable cultivation on their fields in FY 2007/08, and onion cultivation in the village expanded from 5 to 20 acres in the same year of FY 2007/08. In FY 2008/09, a total of 18 (11 original members + 7 new ones) practiced the cultivation, and in FY 2009/10 about 15 members continued the cultivation. They all cultivate about 1 acre in average. Also job opportunity was created for a total 140 man-days per one acre vegetable cultivation (e.g. onion) since vegetable cultivation requires a lot of farm casual labors than conventional upland crops.
		Magyi (tubewell)	<ul style="list-style-type: none"> 13 members learned vegetable cultivation together with water saving irrigation method in FY 2007/08, and of them 7 tried the irrigation. They are continuing it in FY 2008/09 and also FY 2008/09. Three farmers constructed 3 tubewells, one each, at their own cost to secure irrigation water, apart from the 3 tubewells provided by the project in FY 2007/08.
		Ma Gyi Sauk (hand well)	<ul style="list-style-type: none"> 14 farmers and one female group learned vegetable cultivation and they all applied the method to their field in FY 2007/08. However, the vegetable field for the women group was totally destroyed by a heavy rainfall. In FY 2008/09, 3 farmers continue the raised bed cultivation and one got a big profit of 300,000 Kyats from growing of 'Gladiolus flower'.
	07A2 Improved Seeding Practice	Magyi	<ul style="list-style-type: none"> About two-thirds of the farmers applied seeder to their field in FY 2007/08, and the provided seeders have been utilized in FY 2008/09 and FY 2009/10. The seeder reduced required amount of seeds by around 30% (from 24 pyi of seeds per acre by broadcasting to 16 pyi of seeds with seeder). They collect a charge of 300 Kyats per day for the use to prepare for maintenance. They collected 6,000 Kyats in FY 2007/08, 6,900 Kyats in FY 2008/09, and 6,700 Kyats in 2009/10.
	07A3 Improved Seed regeneration	Magyi (with seeder)	<ul style="list-style-type: none"> 92 farmers were supplied improved chickpea seed of total 100 baskets in FY 2007/08 and they all cultivated it in about 100 acres farmland. Upon harvesting, they all revolved the same amount of seeds to the 2nd generation beneficiaries. By the end of FY 2008/09, a total of 210 farmers were provided with the seed inclusive of the first 92 beneficiaries, and whole village was already covered with the new chick pea seed. They are still continuing the revolving as of FY 2009/10 in order to change from the provided variety to a new one. From FY 2008/09 harvest, they collect an additional 1 pyi, as an interest, against 1 basket of improved seed provided.
		Ma Gyi Sauk	<ul style="list-style-type: none"> 20 farmers were supplied improved chickpea seed of total 40 baskets and cultivated it on their fields of about 40 acres. Unfortunately one farmer failed to harvest due to heavy rainfall. The remaining 19 members all revolved 2 baskets each. With the above revolved plus an additional seed as interest, another 20 members were given improved seed of 2 baskets each in FY 2008/09. In FY 2009/10, 21 third generation beneficiaries were provided with the revolved seeds and therefore so far a total of 60 farmers were covered, equivalent to about 40% of whole farmers. From FY 2008/09 harvest, they collect an additional 1 pyi, as an interest, against 1 basket of improved seed provided.
	07A4 "Bokashi" Compost Making	Khaungkawe	<ul style="list-style-type: none"> 26 farmers learned and practiced the Bokashi making in FY 2007/08. 2 have accessed MAS TS office for EM concentrate and applied on their farm, and they continued in FY 2008/09 but not in FY 2009/10.
		Magyi	<ul style="list-style-type: none"> 30 farmers learned the Bokashi making, and 50 in total practiced the method in FY 2007/08. However, no one practiced the Bokashi in FY 2008/09 due mainly to difficulty of getting EM concentrate.

		Ma Gyi Sauk	· 30 farmers learned and practiced the Bokashi making. However, no one practiced the Bokashi in FY 2008/09 due mainly to difficulty of getting EM concentrate.
		Mingan	· 33 farmers learned and practiced the Bokashi making in FY 2007/08, however no one continued the Bokashi making in FY 2008/09 due mainly to difficulty of getting EM concentrate.
		Legaing	· 30 farmers learned and practiced the Bokashi making in FY 2007/08 · One farmer produced EM-super Bokashi, a liquid type fertilizer, and sold about 200 bottles in FY 2008/09 at a cost of 600 Kyats per 600 ml bottle (application 1 bottle per acre).
	07A5 Mushroom Culture	Ar La Ka Pa	· 20 farmers learned and practiced the mushroom cultivation in FY 2007/08. · After the project, about 7 – 8 villagers have continued the cultivation in FY 2008/09, and they intermittently continue in FY 2009/10. · One villager continues almost throughout year. He has disseminated mushroom cultivation technology to 2 casual workers from nearby villages and 4 casual workers from his native village.
		Legaing	· 27 farmers learned and 30 in total practiced the cultivation in FY 2007/08. 3 brokers including one beneficiary deal with mushroom for marketing. · In 2008/09, there are about 4 – 6 1st generation beneficiaries who are still practicing mushroom cultivation almost continuously while new 11 members joined the cultivation as 2nd generation beneficiaries by learning the cultivation method through neighbors and relatives. · In FY 2009/10, 2 villagers continue almost throughout year but the others just ceased due to low market price.
	07A6 Rice-duck Farming	Ma Gyi Sauk	· NA (pump for irrigation was suspended therefore paddy was not cultivated in FY 2007/08 rainy season. After that, ducks provided were eaten by wild dogs thereby this project was not realized).

4.4.2 Issues Arisen through the Implementation of Agriculture Pilot Projects

This section summarizes the issues arisen during the implementation of the agriculture pilot components in FY 2007/08. Major issues that could be more generalized toward CDZ development planning and implementation disciplines are described in the Main Report. Hence in this section, rather specific issues in each particular pilot project are summarized:

1) 07A1 Raised bed Cultivation

In Khaungkawe village, 15 beneficiaries have tried cabbage and tomato cultivation at first. The nursery, however, was damaged by unseasonable heavy rain in October 2007. Cabbage nursery was completely destroyed and tomato was continued to cultivate by only 5 beneficiaries. This situation where damages took place on tomato and cabbage is almost same as in Magyi village and Ma Gyi Sauk village. Tomato and cabbage are easily damaged by heavy rainfall, and therefore recommended to cultivate during dry season as far as irrigation water is available.

Instead, onion was started to cultivate in early 2008. Onion is not so susceptible to pest/diseases associated with rain unlike tomato and cabbage. Culinary vegetable like onion may be more recommended as the first step for the beginners. Culinary vegetables are not so perishable, and thereby farmers can more easily handle after harvest. In fact, those who continue the raised bed cultivation in FY 2008/09 and FY 2009/10 are mostly onion cultivator.

In Khaungkawe village, another seven farmers in addition to the original 15 beneficiaries attended



Raised Bed Cultivation for Onion (Khaungkawe Village): After the training, a beneficiary started full onion growing by using the knowledge he acquired during the training.

the training on raised bed cultivation. Of them, 4 to 5 farmers applied the raised bed to their fields. Above this, one each farmer from Kyee Pin village (2 miles away) and Zee Chaung village (4 miles away), and 2 farmers from Zepingwe village (1.5 miles away) came to study the technology of the raised bed cultivation through their relatives or friends in Khaungkawe village. They applied it to their field after the personal training. This shows an example of farmer-to-farmer extension if the technology is in need for them.

One participant in Ma Gyi Sauk village knew an effect of raised bed cultivation which can avoid root rotting under clayey soils with excessive moisture therein. He explained the effect of avoiding the root rotting by raised bed cultivation method to other farmers who came from nearby village. The visiting farmers, at least 2 – 3 farmers, applied the technology to their field during the following rainy season. In fact, the farmers have been cultivating onion already, so that the new technology is a kind of top up practice, which can be easily applied. Here found is farmer-to-farmer extension again.

As for job opportunity, vegetable cultivation can definitely create it for the landless farm labors because as high as 10 times more labor force is necessary to grow vegetables with the raised bed as compared to chickpea cultivation, which is the most popular crop in this area during the season. Usually 10 labors are hired to cultivate chick pea per season per acre while vegetable cultivation with raised bed would need 140 labors per season per acre. Vegetable cultivation was estimated to expand from 5 acres in the previous year to 20 acres in FY 2007/08 in Khaungkawe village and from 2 acres into 12 acres in Ma Gyi Sauk village. This large increase is due to expected price hike of onion¹ in year 2008 and probably due also to the project impact to some extent. The increase would create an additional total of 1,950 labors per season in Khaungkawe village and 1,300 labors per season in Ma Gyi Sauk village.

Increase of onion cultivation must have caused labor shortfall, raising the labor wage on one hand. In Khaungkawe village, wage for male labor was 1,000 Kyats per day before the project commencement and increased to 1,500 Kyats in early 2008. Wage for female labor increased from 600 Kyats to 800 Kyats. In Ma Gyi Sauk village, female labor's wage increased from 1,000 Kyats to 1,300 Kyats though male labor's wage remained the same as of early 2008. This labor wage increase must, to large extent, have been caused by the cultivation expansion driven by expected onion price hike, and raised bed cultivation would have contributed at least to some extent. The hike for the landless farm labors advocates pro-poor development.

As per relevant technologies, the beneficiaries acquired such knowledge through the activities as; 1) they did not use ash as a fertilizer but upon applying ash to the seedbed they recognized the effect owing to the healthy growth of nursery, and 2) they became aware of that irrigation water was reduced by introducing the raised 'bed' cultivation as compared to conventional way.

Another impact appeared in relationship among farmers and also between the farmers and TS MAS staff in charge. Most of the beneficiaries felt that relationship among the farmers became closer than ever before by such reasons as; 1) they have had meeting every week to discuss the problems to solve, and they helped each other to solve the labor shortage of farm works. Farmer beneficiaries also recognized that the extension staff, TS MAS staff, was stimulated his/her activity by the project because they visited the village almost every week to follow up.

The Study Team found following technical problems to solve in future; 1) nursery plant of tomato was severely damaged by bird, which needs the use of net to avoid bird damage, 2) some nurseries of onion had root rotting because of fine soil texture with high moisture, for which nursery should have

¹ In late 2007, onion cultivation in areas where paddy can be cultivated was prohibited by the authority. Therefore onion shortage is expected in early 2008, driving many upland farmers to cultivate onions everywhere over CDZ. However, this finally led to a price fall in 2008 by as much as 50%.

drainage, and 3) water management, or irrigation method, is very important to keep soil aeration under the fine soil texture. At present, almost all the beneficiaries irrigate their field by furrow or basin irrigation method. This method easily induces root rotting if given excessive irrigation water under the fine soil texture condition. To avoid the root rotting, excessive irrigation should be avoided by small amount of water with frequent application or by introduction of sprinkler/ drip irrigation (or otherwise watering can irrigation).

2) 07A2 Improved Seeding Practice with Seeder Introduction

Ninety two (92) participants were selected for the improved seeding practice in Magyi village. They all cultivated chickpea with the improved seed provided by the project and the total planted area reached about 100 acres. The improved seeds applied, ICCV2 and ICCV7, were suitable and the growth was good as compared to the local variety.

Of the 100 acres, about 60 acres were seeded by the seeder provided instead of conventional broadcasting sowing. Some participants could not apply the seeder because of the soil characteristics such as very heavy soil. This type of soil is very popular in and around the village, sharing about 30 % of the total village farm area. The seeder should therefore be improved to cope with such heavy soils, or otherwise conventional broadcasting be applied in such heavy soil areas.



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.

Preparation of the farm land was increased from 1 to 3 days per acre in order to level off their farms so that the seeder can be introduced. Most of the land preparation were done by the beneficiary farmers themselves because they have own draft cattle. Only 10 participants did not have the cattle, who had to rent. Effect of job creation for landless farm labors has, therefore, hardly taken place though the land preparation took longer time.

Weeding activity, on the other hand, was decreased from 10 to 5 day/person/acre owing to the effect of introducing the seeder. With the introduction of seeder, the plants grow by line, facilitating easy weeding. As a result of the implementation, jobs opportunity for landless farm labors could not be created. However, farm income can be expected to increase thanks to the better productivity.

At the beginning of the project, many participants hesitated to use seeder because they were afraid that the cost of leveling field would surpass that of the decreasing of seed rate. However, they found following by comparing fields seeded with seeder and by broad-casting;

- Seeding amount was decreased from 24 pyi to 16 pyi by using seeder,
- Weeding became easy and the labor force was decreased from 10 to 5 day/person/acre,
- Seeding works became easy,
- Plant density became appropriate with the seeder which can expect higher production.

Reduced costs were in fact 3,750 Kyats for the seed (6 x 625 Kyats/pyi) and 5,000 Kyats for the weeding labor (5 x 1,000 Kyats/labor), totaling to 8,750 Kyats while increased cost from additional levelling is 6,000Kyats (3,000 Kyats x 2 days by cattle) as of late 2007. Balance is the reduction of the cost, 2,750 Kyats per acre by the introduction of seeder and also higher yield can be expected. In

fact, the average yield with seeder was recorded at 10.6 baskets per acre while that of without seeder was 9.6 baskets per acre.

3) 07A3 Chickpea Seed Regeneration

Improved seed regeneration 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

Table 4.4.3 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

4.4.3 shows the 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 ICCV95311 seed is concerned, it gave a yield of 13.7 basket/ac (harvested in February 2008).

Improved seed regeneration in Magyi Village was implemented 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 4.4.4.

Table 4.4.4 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 data collected by a sampling survey

Also, the result in Ya is given in Table 4.4.5 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 8.8 basket/ ac was achieved with the input of fertilizer (11.25kg), or less than a third of the input to Le within the project area, in Le outside of the project area.

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 in the calculation is only 4. In

Table 4.4.5 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 data collected by a sampling survey

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. The result under the project seems less performed than that of average year in Ya.

According to the farmer’s view in an interview, either the crop couldn’t absorb nutrients from the applied chemical fertilizer due to meager rainfall during the period after its application, or the fruiting was not sufficient because plants were affected by torrential rain which threatened latter half of plant growth. In any case, it implies that chemical fertilizer usage in Ya land entails risk under CDZ climatic condition.

As for revolving, both villages devised an interest mechanism to compensate some losses taking place in the process of revolving the seeds. They applied an interest of 1 pyi against 1 basket of revolving seeds (1 basket equivalent to 16 pyi, namely 6.25% interest per season). With this interest system, for example, the 2nd generation beneficiaries of Magyi village reached 118 farmers from the 1st generation of 92 farmers while in Ma Gyi Sauk village, 19 first generation beneficiaries (one out of 20 planned beneficiaries failed due to heavy rainfall) increased to 20 second generation beneficiaries.

Thus, in Magyi village, there were already 210 beneficiaries² as of FY 2008/09, the 2nd year of the

² In fact, 1st generation beneficiaries were 92 farmers. With the interest of 6.25%, the number can increase only 6 farmers (92 x 0.0625). Therefore expected total number of 1st and 2nd generation beneficiaries was to 92 + (92x6) = 190. However, since there were only 210 farmers in the village, they just distributed the 1st revolved seeds to all the rest of the farmers in the

pilot project, and this means already whole farmers in the village were covered with the new chick pea seed. They are still continuing this revolving programme as of FY 2009/10. The beneficiaries for FY 2009/10, 3rd generation beneficiaries, are from the 1st and 2nd generation beneficiaries. They intend to change the variety from the provided one to a new one out of the profit of selling a part of harvested 3rd generation seeds. Thus, the seed regeneration in this Magyi village is to continue.

In case of Ma Gyi Sauk village, in fact, the interest was 1 pyi against 1 basket of seed for the first generation beneficiaries as aforementioned, and this was increased to 2 pyi from 2nd generation beneficiaries. The interest of the first 1 pyi each against 1 basket of seed had created one new beneficiary ($19 \times 6.25\% = 1$ additional beneficiary). With the interest of 2 pyi, over 42 baskets were re-collect from the 20 2nd generation beneficiaries. However, due to infestation, waste, and labour charges, only 40 baskets could be distributed to the third generation beneficiaries, therefore 20 3rd generation beneficiaries (2 baskets each per beneficiary).

There are now 60 beneficiaries in total of 1st, 2nd and 3rd generations as of FY 2009/10 including the one of 1st generation beneficiaries, who failed to harvest. Total 60 beneficiaries as of January 2010 are equivalent to about 40% of whole farmers in the Ma Gyi Sauk village. They, except one from the 1st generation beneficiaries, all successfully handed over to the following generation beneficiaries the same amount of seeds plus the interests out of their harvest. Thus, the revolving in Ma Gyi Sauk village will also continue successfully.

4) 07A4 Bokashi Compost Making

Bokashi compost was tried in 5 villages, each 30 farmer trainees per village, divided into 3 groups consisting of 10 trainees each, were provided the training on Bokashi making. Farm households living on prevailing upland farming with unstable rainfall consider risk of input of expensive chemical fertilizers. Under the condition, they are very much interested in Bokashi compost. However, issue is the availability of EM. Bokashi making in this project used EM to facilitate the decomposition process of materials. OEM (original EM) is produced in 4 factories in Myanmar, one of which is located near Mandalay city. Concentrate EM (CEM) is available in a few MAS TS offices only as of FY 2009/10.

In Khaungkawe village, 26 farmers participated and all of them made Bokashi compost during the training. EM concentrate manufactured by MAS in Yangon was used in this training. Farmers have to get EM concentrate from Yangon or Mandalay if they want to continue making Bokashi by themselves. But it will be difficult for them if considering lack of transportation mean and lack of service by TS MAS office for farmers. In fact, only 2 participants made Bokashi by themselves after the training, who could access to CEM in a TS MAS office near Mandalay.

Another issue in Khaungkawe village was the timing of the training pertinent to the availability of raw materials. Raw materials used here were sesame and maize stem (there is no paddy field in this village although paddy straw is better from the view point of easiness of decomposition). When



Bokashi Compost (Khaungkawe Village): Materials were collected in front of the trainer, and now she is demonstrating how to make Bokashi compost manure.

village. Thus, through the 2 times revolving, all the farmers of 210 were covered.

providing training, timing should be taken into consideration because most of the participants had difficulty of arranging enough amount of the materials. Raw materials become available after harvesting season, but the training was programmed before the harvest.

In Magyi village, Bokashi making was the first experience for the villagers though they have heard about Bokashi. 30 participants learned how to make it and in cheaper cost than chemical fertilizers. 50 participants made Bokashi after the training using EM concentrate provided by the project. The issue to be considered is the difficulty in procurement of EM concentrate here too. Proper timing of training is also important to collect enough raw materials.

In Ma Gyi Sauk village, training on Bokashi compost making was conducted inviting 30 farmers and some observers and all of them practiced Bokashi making. After the training, 25 participants have applied Bokashi on their farms. The issue on sustainability is difficulty of getting EM concentrate from MAS office. To date, there are no farmers who made Bokashi by themselves after the training.

In Mingan village, training of Bokashi compost making was done for 33 villagers. Sesame stem was the raw material as rice straw was not available in the village. All the participants made 33 Bokashi heaps by themselves after training using one litre of EM concentrate provided by the project. They have known the effectiveness of Bokashi but issue is again the difficulty of getting EM concentrate from the MAS. MAS Chauk TS office can't, at present, provide the service for them to procure EM concentrate to meet villagers' requirement.

As mentioned above, all the villages except for Legaing stated the difficulty of accessing EM. In Legaing village, it was clarified that EM concentrate is available at Pwyintbyu TS office of MAS. Abundant rice straw is also available in this village, which will help sustainable use of Bokashi compost combined with the availability of EM concentrate. In this village, a unique output came out, which is a production of EM based liquid fertilizer. A farmer produced the EM based liquid fertilizer upon getting EM concentrate from the MAS TS office. He sold about 200 bottles of 600 ml liquid fertilizer for the rainy season of 2008.

For those villages which have difficulty of accessing EM concentrate, Bokashi making by using IMO (indigenous micro organism) may be one of the alternatives. However, IMOs are basically of aerobic bacteria which need regular turn-up of the Bokashi heap during the decomposition process with watering. On the other hand, EM is mostly composed of anaerobic micro-organisms with which regular turning up for aeration is not necessary, just keeping the Bokashi heap covered with plastic sheet in order to prevent drying up until the decomposition process has completed.

5) Mushroom Cultivation

Mushroom cultivation was tried in 2 villages in FY 2007/08, and performance in Ar La Ka Pa village was not much good while that of Legaing village was very good. In Ar La Ka Pa village, 20 beneficiaries have tried the cultivation three times under the project. As shown in the following table, the yields and the return were so low which discouraged them to continue mushroom cultivation.

Table 4.4.6 Yield and Return of Mushroom Cultivation in Ar La Ka Pa Village

Trial	Starting date(2007)	Yield/bed (Viss)	Income/participant(Kyats)
First time	July 12th	5.5	10,175
Second time	August 24th	2.5	3,500
Third time	October 26th	0.5 (damaged by heavy rain)	500

Source: JICA Study Team's interview. Note: A bed is 1.5 x 5 m square.

There was another issue in Ar La Ka Pa village, which is a natural edible fungi sprout during the end of rainy season. During this season, they face difficulty of selling the mushroom with the village.

However, since they have acquired the skill of cultivating mushroom, about 7 - 8 beneficiaries have cultivated mushroom intermittently though they do not cultivate completely in November, December and January as of end 2008 and in FY 2009/10 (equivalent to end of rainy season and in winter high yield cannot be expected).

For individual mushroom cultivation in Ar La Ka Pa village, it is difficult to buy seeds because seeds are sold in Sagaing and Paleik (sometimes mushroom seeds can be bought in Myinmu, nearest town, but they are mostly over-date). U Kyaw Myint, the group leader of mushroom cultivation and also a farm-laborer, to solve this problem, takes responsibility to get seeds from Sagaing or Paleik. The traveling cost is shared among themselves. The normal yield can be 7-10 viss per bed if the bed is looked after very well. However, when seeds were of expired-date the yield was very low and this made more than half of the beneficiaries gave up mushroom cultivation completely.

However, there was a dissemination of the technology of cultivating the mushroom from one of the beneficiaries. U Kyaw Myint, the group leader, disseminated mushroom cultivation technology to 2 casual workers from 'Sub Pan Kone' and 'Ywa Tha Lay' villages (nearby villages) and 4 casual workers from his native village, Nyaung Hla which is about 80 miles away from Ar La Ka Pa (because he visits his native village every year.)

As for Legaing village, average yields during the training were 2.7 viss/ bed, 6.2 viss/bed and 6.1 viss/bed for the 3 trials. Though the yield of the first trial was low, the latter 2 trials showed better yields which motivated the participants to continue the mushroom cultivation on their own. Until late January 2008, another 10 villagers have newly joined in the mushroom cultivation apart from the original 20 project beneficiaries. Of them, 19 cultivators were interviewed for their income. Income from mushroom for about 4-5 months cultivation shared about 10 % of the total annual income. Especially the share of mushroom income in landless is high, 13.5%, as shown in the following table. Therefore mushroom cultivation played an important role for poverty alleviation in Legaing village.



Mushroom cultivation (Legaing Village): Mushroom cultivation does not need farmland but a small space only like house compound. This promotion is therefore meant for landless poor.

Table 4.4.7 Effect on Mushroom Cultivation Income in Legaing Village

Category	No. of HHs	Average family size	Income w/o mushroom (Kyats/head)	Income fr. mushroom (Kyats/head)	Total income (Kyats/head)	Income increasing rate (%)	Mushroom beds/ participant
Landless	8	4.8	84,211	13,153	97,363	13.5	7.5
5acre>	5	4.4	90,909	9,582	100,491	9.5	5.2
5acre<	6	5.7	125,000	8,321	133,321	6.2	4.3
Average	19	4.9	100,532	10,569	111,101	9.5	5.9

Source: JICA Study Team's interviews

In Legaing village positive impacts were also seen as; 1) ten farmers except the beneficiary in the village cultivated mushroom as of January 2008, who were trained by the original beneficiaries, 2) one farmer from Uyin Gyi village and Sam Pye Kyee village visited the Legaing village to study mushroom cultivation, and 3) a key cultivator was invited to Minbu Peace & Development Council to train 15 potential mushroom cultivators in that area (after this training, 3 tried the mushroom cultivation).

Aside from the impacts above in Legaing village, three brokers for mushroom trading were created after starting the project. One is a landless participant from the original beneficiaries, and the other 2 brokers used to sell commodities on which mushroom was added. Emergence of broker from the beneficiaries as well as linkage with other brokers was very effective to expand the mushroom market to Minbu TS and to as far as Magway town. Broker's margin is estimated from 400 to 500 Kyats/viss while average farm gate price was from 1,800 to 2,000 Kyats per viss as at early January 2008. Usually the product are; 10 % for self-consumption, 10 % for selling within the village, and 80 % for outside market such as Magway and Minbu through the brokers.

However, the latest situation in Legaing village as of FY 2009/10 is not so much bright as before. In FY 2009/10, there is only 1 beneficiary in Legaing village and 1 outsider who continued mushroom cultivation with 6 beds per time and 3 beds per time respectively. Most of the beneficiaries are reluctant to culture mushroom due to the higher price of a packet of seeds including hormone and insecticide than last year (last year 5,000 Kyats and now 6,500 Kyats) and the lower price of mushroom than last year (last year 2,000 Kyats per viss and now 1,800 Kyats per viss). So, instead of earning a little profit from mushroom cultivation, most of the beneficiaries temporarily stopped mushroom cultivation as of early 2010.

So far, mushroom beneficiaries found following; 1) horse dung being much better material as the culture medium in cool season, 2) mushroom bed material able to become high quality of manure, 3) suitable methods to avoid the damage of cold weather in winter and heavy rain be practiced, and 4) paper boards as culture medium being the best.

4.4.3 Post Training Evaluation

This section describes evaluations on trainings by participants, which contents are the raised bed cultivation and the improvement of seeding practices on chick pea regeneration. These trainings were all carried out in 2007 under the relevant pilot projects. The former training was carried out in Khaungkawe village and Ma Gyi Sauk village, and the venues of latter one was in Magyi village and Magyi Sauk respectively.

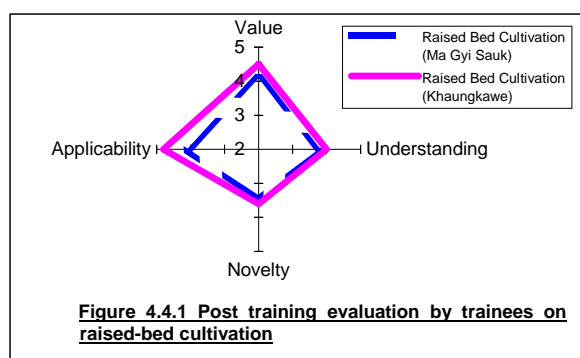
1) Raised-bed Cultivation

The main objective of this training is to transfer knowledge and skills on vegetable production especially for Tomato, Cabbage, and Onion cultivations. Total 22 participants received this training once in Khaungkawe village in the early September 2007, which consisted of 15 trainees and 7 observers. The 15 trainees were trained twice in Ma Gyi Sauk village without observers in the early August 2007 and the middle of September 2007. Following are the result of the post training interview:

1) It was the first time for all the participants of both villages to learn this cultivation method such systematically, and all participants had no experiences of using pesticide and fungicide to vegetables.

2) Instead of low novelty on this training their wishes for applicability of this cultivation count high point shown in Figure 4.4.1.

3) Most participants felt necessity of more training period and practices to learn all procedure of this farming method, and further the participants eagerly desired their technical and knowledge improvement through adequate

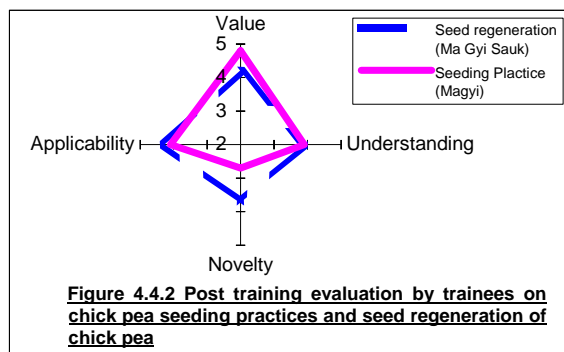


practices in the field.

2) Seeding Practice and Seed Regeneration on Chick Pea

Training on improvement of chick pea seeding method was carried out in Magyi village at the end of October 2007, and seed regeneration practice was held in Magyi and Ma Gyi Sauk villages at the end of October 2007 respectively. Following are the post training interview results:

- 1) The participants in Magyi village had no experience to use seeder for chick pea cultivation and they felt it was so effective reducing wasteful seed casting.
- 2) All the participants for the seeding practice required more techniques improving their practices like this training. In fact, they asked more agronomic trainings to improve their knowledge, technique, and yield of products.



- 3) Despite a fact that the evaluation score of novelty on seeding practice is not so high as 2.7 point shown in Figure 4.4.2, value of training shows nearly full marks of 4.8, and applicability and understanding show also relatively high scores.
- 4) All evaluation scores on seed regeneration training show about 80% (4 points) of full marks, but they stated that they wish to try it on their own.

4.5 Pilot Project Implementation for Livestock Sector

Under livestock sector, 12 pilot components have been carried out in the selected 6 villages as summarized in Table 4.5.1. The table shows pilot components together with the village(s) carried out and also the objectives of each pilot project. Livestock raising such as goat, sheep, and pig by the beneficiaries are still on-going by 1st and 2nd generation.

As of end of January to February 2010, 1,146 kids of goats and 103 sheep kids have been already born and 211 goats have been already handed over to 26 2nd generation beneficiaries and 10 3rd generation beneficiaries under the proposed revolving system and 43 beneficiaries have already fulfilled handover and became real goat owners. Sheep raising in Magyi village is still continuing by 14 members though 5 members in Ma Gyi Sauk village had stopped raising after finishing handover.

As to piggery in Legaing village, 1st generation has also handed over piglets to 24 beneficiaries of 2nd generation through the committee, and now only 2 are still raising 6 pigs as of February 2010 since pig price dropped due to swine flu prevailed over year 2009. The 2nd generation beneficiaries had seriously been affected by the swine flu. Even so, 8 beneficiaries out of 24 are still raising piggery expecting price's recovery.

Table 4.5.1 Summary of the Livestock Pilot Projects with those Objectives

Sector	Component	Village	Pilot Objectives
Livestock	07L1 Sheep raising	Ma Gyi Sauk	<ul style="list-style-type: none"> To increase of income, especially for landless people and small scale farm households, by delivering 5 she-sheep each. To expand sheep raising under the revolving system to other poor stratum
		Magyi	
	07L2 Goat raising	Ma Gyi Sauk	<ul style="list-style-type: none"> To increase of income, especially for landless people and small scale farm households, by delivering 5 she-goats each. To expand goat raising under the revolving system to other poor stratum
		Khaungkawe	
		Magyi	
		Mingan	
	07L3 Pig raising	Legaing	<ul style="list-style-type: none"> To increase of income, especially for landless people and small scale farm households, by delivering 2 piglets each for fattening. To expand pig raising under the revolving system to other poor stratum
	07L4 Improved feeding system	Ar La Ka Pa	<ul style="list-style-type: none"> To train livestock owners about animal care, feeding, disease control etc. To teach livestock owners on how to make UMMB concentrate To improve lack of adequate intake of nutrients for livestock To increase power and productivity of ruminants
		Ma Gyi Sauk	
		Magyi	
		Mingan	
		Khaungkawe	
	07L4 Mulberry production for animal feed	Mingan	<ul style="list-style-type: none"> To increase goat/sheep feed in their locality To teach people on how to cultivate mulberry
	07L5 Local Cattle Improvement	Ar La Ka Pa	<ul style="list-style-type: none"> To improve local cattle/cow by means of natural mating in their locality
Legaing			
07L6 Intercropping of sorghum and rice bean	Ar La Ka Pa	<ul style="list-style-type: none"> To increase sorghum yield and production as animal feed To teach cattle owners on how to cultivate sorghum intercropping with leguminous crop which can enrich soil fertility by rhizobium 	
	Mingan		
	Legaing		
07L7 Improved goat housing	Ar La Ka Pa	<ul style="list-style-type: none"> To expand improved goat housing that is designed considering goat behavior and healthier management. 	
	Magyi		
	Mingan		
	Khaungkawe		
07L7 Improved cattle housing	Ar La Ka Pa	<ul style="list-style-type: none"> To expand improved cattle housing which is good for both human being and cattle in view of environment 	
	Mingan		
07L7 Improved pig housing	Ar La Ka Pa	<ul style="list-style-type: none"> To expand improved pig housing which is good for both human being and pig in view of environment 	
	Khaungkawe		
	Mingan		
	Legaing		
07L7 Improved chicken housing	Ar La Ka Pa	<ul style="list-style-type: none"> To expand improved chicken housing which is good for both human being and chicken in view of bird flu and environment 	

4.5.1 Outputs from the Pilot Implementation

Most of the pilot projects under livestock sector have finished and small animal raising pilot projects are still on going and reached objective level as of February 2010. Several outputs have been observed through implementation, which are summarized in Table 4.5.2. It is considered that of the pilot components, most promising one for the poor is goat raising.

Especially goat raising has already started developing 2nd and 3rd generation. To date, 26 2nd generation and 10 3rd generation beneficiaries were delivered goats, and total goats reached 865 head. 43 beneficiaries have become real goat owners after fulfilling handover. However, 17 beneficiaries (15 in Ma Gyi Sauk, 1 in Magyi, and 1 in Khaungkawe villages) had stopped raising goats after finishing duty of the handover.

The reasons were that it will take long-terms till they can get cash and lack of family member for herding etc. Five beneficiaries of sheep raising in Ma Gyi Sauk has also stopped raising after the handover of 26 sheep, and moved out of the village for migrant work in other areas. However 3 of them bought female cattle for breeding (1), 3 goats (1), and a draft cattle for cultivation service spending goat profit of 120,000 Kyats per member. In the piggery pilot project in Legaing village, the 1st generation has fulfilled their duty to deliver piglets to 24 2nd generation beneficiaries, and 8 beneficiaries of the 2nd generation are now still raising pigs expecting recovery of the pig market, affected by swine flue.

Livestock housing, especially improved goat housing with raised floor was done in 4 villages. Since the model house constructed by the pilot project was expensive, beneficiaries constructed goat housing using locally available materials collected in and around the village at lower price, and some of them organized group for collective management to save investment. As for model houses for cattle, chicken, and pig, livestock owners in every village are not aware of importance of sanitary environment, and do not express their interest because it does not bring them cash income.

Table 4.5.2 Summary of the Outputs by Livestock Pilot Projects

Sector	Component	Village	Major Outputs from the Pilot Implementation
Livestock	07L1 Sheep revolving	Ma Gyi Sauk	· 75 original sheep were delivered to 15 beneficiaries. But 10 members shifted to goat raising on January 2008. Though a group composed of 5 members had been raising but finally they stopped raising sheep after handover 26 head. 3 of them bought 2 cows, 3 goats, and a draft cattle respectively spending 120,000Kyats from sheep raising, and remaining members spent that amount for rice, cooking oil etc.
		Magyi	· 75 original sheep were delivered to 15 beneficiaries and 36 kids were born to date as of beginning of February 2010. It is considered that some beneficiaries had to sell out sheep before handover because of emergency need to purchase rice and medicine etc. But 14 out of 15 are still raising sheep.
	07L2 Goat revolving	Ma Gyi Sauk	· 125 original goats including the ones shifted from sheep raising were delivered to 25 beneficiaries. To date, 15 original beneficiaries had stopped goat raising after fulfilling handover. One of the members got 400,000 Kyats by selling his own goats after handover and could buy 2 milk cows, though he had worked out for migrant work in Yangon. Others spent profit for repairing housing, meal and remittent for relative etc.
		Khaungkawe	· 78 original goats (75 female and 3 male) were delivered to 15 beneficiaries. As of beginning of February 2010, 125 goats and 38 goats are raised by 1 st (14 members) and 2 nd (6 members) generation respectively. It can be said that goat raising has been recovering though many goats had been lost due to diseases from 2007 to 2009.

	Magyi	<ul style="list-style-type: none"> 75 original goats were delivered to 15 beneficiaries in late 2007. Getting at 3rd year, they are still raising 100 goats but handover has not yet been accomplished as of end of January 2010. The reason for slow growth in goat number will be attributed to poor goat quality, poor care for goats, and goat selling before handover which spent for meal and medicine etc.
	Mingan	<ul style="list-style-type: none"> 75 original female goats were delivered to 15 beneficiaries in late 2007. As of January 2010, 1st generation is raising 139 goats after handover 25 goats to 5 2nd generation beneficiaries, who have 38 goats (29 female and 9 male) at present. It is considered that the village committee keeps adherence of the goat revolving system to support the poor.
07L3 Pig revolving	Legaing	<ul style="list-style-type: none"> 30 original piglets were delivered to 15 beneficiaries, and 24 piglets were handed over to 24 beneficiaries of 2nd generation through the committee. As of January 2010, 2 members of 1st generation and 8 members of 2nd generation are still rearing piglets and pigs.
07L4 Feeding Improvement	Ar La Ka Pa	<ul style="list-style-type: none"> 26 to 30 trainees were trained in each village and provided training on improved feeding system. All of them made UMMBs (Urea Molasses Blocks) by themselves and tried it to their ruminants. However, even now UMMBs are not used due mainly to lack of money for raw materials(200 Kyat/block).
	Ma Gyi Sauk	
	Magyi	
	Mingan	
07L4 Mulberry production for animal feed	Mingan	<ul style="list-style-type: none"> All the villagers participated in transplanting of mulberry nurseries and watering. But Mulberry planted beside the pond was completely withered because of lack of irrigation. On the contrary, about 150 Mulberry sticks planted in backyard of individual housing are growing well with more than 3 to 4 m high.
07L5 Local Cattle Improvement	Ar La Ka Pa	<ul style="list-style-type: none"> A breeding bull per village was delivered in late 2007. However, both bull had been changed into new bulls on October 2008 for Legaing, and January 2010 for Ar La Ka Pa villages. To Date, the bull of Legaing village mated with 57 cows and 18 calves were born. Another bull of Ar La Ka Pa is going to mate on coming July 2010. The charge for mating per time is set up at 3,000 Kyat in Legaing, and 5,000 Kyats for Ar La Ka Pa village. The bull of Legaing became famous among farmers because of good quality of calves born.
	Legaing	
07L6 Intercropping of sorghum and rice bean	Ar La Ka Pa	<ul style="list-style-type: none"> 10 cattle owners participated and 7,800 kg/ac of plant volume which is almost 2 times of the conventional method was recorded. But the proposed intercropping has not extended as of February 2010 because farmer gives higher priority on food and cash crops.
	Mingan	<ul style="list-style-type: none"> 10 cattle owners participated and 6,000 kg/ac of plant volume which is 1.5 times of the conventional method was recorded. But farmers are not interested in the proposed intercropping. No one has applied this method even now (February 2010).
	Legaing	<ul style="list-style-type: none"> 10 cattle owners participated and 8,200 kg/ac of plant volume which is 2.0 times of the conventional method was recorded. But farmers did not try to cultivate sorghum and rice bean applying proposed technology because of their low interest. This technology has not extended even now (February 2010).
07L7 Improved goat housing	Ar La Ka Pa	<ul style="list-style-type: none"> One model goat housing was constructed that is extended only among goat raising pilot project beneficiaries.
	Magyi	<ul style="list-style-type: none"> One model housing was constructed, but only 10 housings by beneficiaries themselves were constructed at lower price.
	Mingan	<ul style="list-style-type: none"> One model house was constructed, but only 14 houses by beneficiaries themselves were constructed at lower price using local materials.
	Khaungkawe	<ul style="list-style-type: none"> One model house was constructed, but only 9 houses by beneficiaries themselves were constructed at lower price.
07L7 Improved cattle housing	Ar La Ka Pa	<ul style="list-style-type: none"> One model housing with sandstone brick flooring and thatch roofing was constructed. A beneficiary in Ar La Ka Pa village improved this model cattle housing for more convenience by his own expenses. But no villagers have applied the improved pig housing
	Mingan	
07L7 Improved pig housing	Ar La Ka Pa	<ul style="list-style-type: none"> One model housing each was constructed but no villagers have applied the improved pig housing
	Khaungkawe	
	Mingan	
	Legaing	
07L7 Improved chicken H.	Ar La Ka Pa	<ul style="list-style-type: none"> One chicken housing was constructed but no villagers have applied the improved chicken housing

Table 4.5.3 Status of Goat Raising for FY 2007/08 (as of Jan/Feb 2010)

1 st Generation																				
Division	TS	Villages	Stocks Provided			Stocks Died			Kids Born			Handover			Goats Sold			Current Status		
			F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total
Mandalay	Tada U	Khaungkawe	75	3	78	50	10	60	97	82	179	23	6	29	9	34	43	90	35	125
	Ngazun	Magyi	74	2	76	54	26	80	69	57	126	0	0	0	9	13	22	80	20	100
	Sub-total			149	5	154	104	36	140	166	139	305	23	6	29	18	47	65	170	55
Sagaing	Ayadaw	Ma Gyi Sauk	125	5	130	23	14	37	135	97	232	116	9	125	102	73	175	19	6	25
Magway	Chauk	Mingan	75	0	75	47	31	78	102	74	176	25	0	25	1	8	9	104	35	139
Total			349	10	359	174	81	255	403	310	713	164	15	179	121	128	249	293	96	389
2 nd Generation																				
Division	TS	Villages	Stocks Provided			Stocks Died			Kids Born			Handover			Goats Sold			Current Status		
			F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total
Mandalay	Tada U	Khaungkawe	25	3	28	5	1	6	9	6	15	0	0	0	0	0	0	29	8	37
	Ngazun	Magyi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total			25	3	28	5	1	6	9	6	15	0	0	0	0	0	29	8	37
Sagaing	Ayadaw	Ma Gyi Sauk	75	3	78	9	5	14	40	28	68	50	2	52	0	0	0	56	24	80
Magway	Chauk	Mingan	25	0	25	5	1	6	9	10	19	0	0	0	0	0	0	29	9	38
Total			125	6	131	19	7	26	58	44	102	50	2	52	0	0	0	114	41	155
3 rd Generation																				
Division	TS	Villages	Stocks Provided			Stocks Died			Kids Born			Handover			Goats Sold			Current Status		
			F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total
Mandalay	Tada U	Khaungkawe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ngazun	Magyi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sub-total			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sagaing	Ayadaw	Ma Gyi Sauk	50	2	52	3	1	4	5	6	11	0	0	0	0	0	0	52	7	59
Magway	Chauk	Mingan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total			50	2	52	3	1	4	5	6	11	0	0	0	0	0	0	52	7	59

Source: JICA Study Team

Table 4.5.4 Status of Pig Raising for FY 2007/08 (as of Jan/Feb 2010)

1 st Generation																							
Division	TS	Villages	Original Piglets Provided			Pigs Died			Pigs Sold for revolving			Piglet Born			Matured Pigs newly Bought			Pigs Sold			Current Status		
			F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total
Magway	Pwintbyu	Legaing	17	13	30	7	9	16	14	10	24	36	40	76	3	7	10	34	36	70	1	5	6
Total			17	13	30	7	9	16	14	10	24	36	40	76	3	7	10	34	235	70	1	5	6
2 nd Generation																							
Division	TS	Villages	Original Piglets Provided			Pigs Died			Pigs Sold for revolving			Piglet Born			Matured Pigs newly Bought			Pigs Sold			Current Status		
			F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total	F	M	Total
Magway	Chauk	Legaing	9	15	24	6	6	12	6	10	16	16	21	37	0	0	0	6	12	18	7	8	15
Total			9	15	24	6	6	12	6	10	16	16	21	37	0	0	0	6	12	18	7	8	15

Source: JICA Study Team

Table 4.5.5 Status of Sheep Raising for FY 2007/08 (as of Jan/Feb 2010)

1 st Generation																				
Division	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
Mandalay	Ngazun	Magyi	74	1	75	55	7	62	39	32	71	0	0	0	23	13	36	35	13	48
Sagaing	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

4.5.2 Issues Arisen through the Implementation of Livestock Pilot Projects

This Section summarizes the issues arisen during the implementation of the livestock pilot components. Major issues that could be more generalized toward CDZ development planning and implementation disciplines are described in the Main Report. Hence in this section, rather specific issues in each particular pilot project are summarized:

1) Sheep Raising

In Magyi village, 74 she-sheep and 2 he-sheep were delivered to 15 beneficiaries in late 2007. As of February 2010, 14 beneficiaries are still raising sheep because they believe that sheep are more tolerant than goat and have bigger body size. However, in fact, number of sheep has not been increasing probably due to low quality of original sheep provided, poor management and (hidden) sale before handover. Therefore, even now they cannot hand over sheep according to the revolving system. Entire mortality is about 20% which is quite higher than usual 5 to 10% (in Ma Gyi Sauk village, the mortality rate was nil). It is considered that many beneficiaries may have sold out their sheep to purchase food and medicine etc before handover, which is one of reasons for low growth in sheep population.

In Ma Gyi Sauk village, 25 she-sheep and 1 he-sheep were delivered to 5 beneficiaries in late 2007. As of February 2010, all the beneficiaries had stopped sheep raising after handover of the 26 sheep, and have moved out from the village for migrant work. They could get 120,000 Kyat each by selling 32 sheep after the handover. Three beneficiaries spent that amount to buy 3 goats (1 person), 2 cows (1 person), and a draft cattle (1 person) respectively. Remaining 2 beneficiaries spent for food and other living expenses. They belong to poor strata, and hence could not wait until they will be able to sell their own sheep since it takes about 2 years in case of sheep raising.



U Win Ag 's wife, one of beneficiaries of sheep raising pilot project who had stopped raising after handover but bought 2 cows at 120,000 Kyats from profit of selling sheep.

2) Goat Raising

In Khaungkawe village, 75 she-goats and 3 he-goats were delivered in late 2007 to 15 HHs consisting 13 landless and 2 small-scale farmers. Unfortunately just after delivering goats, animal diseases had caused and 33 head out of 75 original stocks were died. When providing goats in 2007, the village was flooded for more than 3 months, which probably caused various livestock diseases and resulted in higher mortality rate. However, as of beginning of February 2010, 1st generation fulfilled duty of the handover to 6 2nd generation beneficiaries providing them 25 female and 5 male. Now 125 and 38 goats are raised by the 1st generation and 2nd generation beneficiaries respectively. Mortality rate is estimated at 23%, relatively high due to the flood aftermath.

In Magyi village, totally 74 she-goats and 2 he-goats were delivered to 15 beneficiaries in late 2007. But even as of now (February 2010), no handover has been done. Goat population, now 100 head, has rather been reduced compared to 117 head in August 2009. The reason for low growth in number would be attributed to low quality of the original goats, illness, poor management, and (hidden) sale of goats before handover. It is considered that many beneficiaries had to sell out goats for urgent needs for medicine and foods (rice and cooking oil etc). One beneficiary had stopped raising and moved out of the village for migrant work without fulfilling handover, which brought about complaints among the remaining beneficiaries. However, as of February 2010, 1st generation is ready to

handover and 2nd generation has been already nominated by the village committee. Mortality rate is 23.5% though there might be a possibility of reported case of death but in reality sold.

Ma Gyi Sauk village has been considered as one of successful villages in goat raising pilot project but as of February 2020 various changes have been arisen. 15 original beneficiaries out of 25 had stopped raising after handing-over of 125 goats to 2nd generation. Most of them had moved out of the village for migrant work for road construction and other works. They spent profit from goat 60,000 to 100,000 Kyats per member for living expenses such as foods, education, housing, cassette radio and others. One of beneficiaries, who was formerly a farm labour, could earn 400,000 Kyats equivalent to 36% of the poverty line for landless HHs, and spent it to buy 2 milk cows. The remaining 15 original beneficiaries shifted from sheep raising are still raising even after fulfilling the handover. In this village, 3rd generation beneficiaries already developed and now are raising total 59 goats. 2nd generation beneficiaries have now 80 goats as well. Entire mortality rate of this village to date is estimated at 8.9 %.



U Myint San, previously a landless farm labour. He got 400,000Kyats by selling goats, and became a real goat owner.

In Mingan Village, 75 she-goats were delivered to 15 beneficiaries in late 2007, of which 7 members form 3 groups for collective management. As of January 2010, the 1st generation has already handed over 25 goats to 2nd generation of 5 members. Out of 15 members, 2 beneficiaries of 1st generation could become real goat owners after fulfilling the duty of revolving. One of 1st generation beneficiaries was damaged with fire and lost all the goats, and then the beneficiary was again provided with goats and housing. Villagers supported this family by providing 5 goats as 2nd generation beneficiary along with new goat shed, foods and housing too.



U Kyi Myint, landless sand stone worker with 9 family members. Now he is a real goat owner of 25 head.

An additional income generation was observed in every village where goat raising project has been implemented; that is the selling of dung to farmers. In Ma Gyi Sauk village, beneficiaries of goat raising developed new additional income from selling goat dung to raised-bed vegetable cultivators, another pilot component, at 200 Kyats/basket.

In every village where goat raising pilot project has been implemented, all beneficiaries were requested to construct model-typed goat housing with raised floor. However, no beneficiary can afford to construct the model-like one because of financial constraint. Faced with this difficulty, beneficiaries in Mingan, Magyi, Ma Gyi Sauk and Khaungkawe villages constructed their own housing at low cost by utilizing locally available materials, and some of them, like beneficiaries in Ma Gyi Sauk, had constructed goat housing collectively by sharing cost. With locally available materials, the beneficiaries could construct model-like one with raised floor at 27,500 to 30,000 Kyats, which is equivalent to 5,500 to 6,000 Kyats, if sharing among 5 members.

3) Pig Raising

In Legaing village, 30 piglets for fattening, 2 piglets per HH, were delivered in late 2007 to 15 HHs who are landless people. Although 6 piglets died of illness (probably coldness in the winter), remaining 24 piglets could be sold after fully grown. All 15 beneficiaries fulfilled their duty of revolving required money (35,000 Kyats/head). On August 2008, the committee bought 24 piglets to hand over them to 2nd generation beneficiaries. When distributing the piglets, the committee decided to provide one piglet each to save feed cost and risks. Consequently they could increase the number of beneficiaries. The swine flu broken out in April 2009 had affected seriously even in CDZ, and pig market price had sharply dropped. This resulted in discouragement among beneficiaries because of low profitability, especially in the 2nd generation. Therefore, most of 2nd generation beneficiaries had to sell out pigs before fully matured size of 70 to 80 kg per head. Even so, 2 beneficiaries of the 1st generation and 8 beneficiaries in 2nd generation are still raising pigs since pig market price has been improving from early 2010.



U Kyaw Htein's pig farm. He was previously a landless farm worker but now he is a pig breeder who got more income by breeding piglet.

One of the issues of fattening piglets is difference in fattening period, which caused difference in live weight of pigs and selling prices ranging from 60,000 to 140,000 Kyats/head as well. It is learnt that at least 10 months are necessary to fatten piglets to sell them with suitable live body weight to get more profit under the currently feeding conditions.

When providing piglets in this Legaing village, hybrid ones were procured from LBVD pig farm in Pwintbyu TS. For effective fattening, hybrid pig requires quality feeding such as rice bran, broken rice etc, for which beneficiaries have to buy. This resulted in high feeding cost, in other words, lower profitability. Villager says that local breed is much suitable for extensive management with low feeding cost.

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.

4) Improved Feeding System (inclusive of UMMB making)

In Khaungkawe village, 30 trainees participated in the training and all of them practiced urea molasses and mineral blocks (UMMBs) during the training. However, villagers' awareness to nutrition management for ruminants is very low in addition to lack of financial room. Two cattle owners made UMMBs after training by themselves and are interested in UMMB unlike sheep/goat owners who consider that sheep/goat can be fed only on grazing ground. They hardly recognize necessity for protein and minerals which are generally deficit in wild grasses. They also said that ruminants don't like to lick UMMB and some of trainees could not understand what trainer explained in the training due to technical terms. Since UMMB has been confirmed its effectiveness internationally, it is necessary for the livestock farmer to recognize the nutritious UMMB through further training. At present (as of February 2010), no villagers use UMMBs.

In Magyi village, the training covering improved housing for livestock, feeding method including UMMB, herding and disease control were provided to 30 participants and several observers. They said that some participants who have low educational status could not understand some issues what trainer said. They were not so interested in UMMB because of availability of grazing ground which shows low awareness to nutrient for ruminants. However, they also said that UMMB will be useful particularly in rainy season when wild grasses will reduce. But in fact, no one uses UMMBs at this moment as of February 2010.

In Ma Gyi Sauk village, 30 participants were trained and made UMMB individually during the training. All of goats and sheep owned by participants licked UMMBs when fed. It was reported that skin and hair of ruminants became smooth and shining about 10 days after feeding UMMBs. However, they do not use UMMB for both goat and sheep as of February 2010 probably because of financial difficulty even for 200 Kyats per block.



Villagers made UMMBs practically in the UMMB making training (Khaungkawe village).

In Ar La Ka Pa village, the training was done for 30 trainees and all of them made UMMBs during the training. However, they are not so interested in UMMB because of their low awareness on nutrition management for ruminants and lack of money as well. Some trainees could not understand what trainer said and provided manual due to technical terms, which implies necessity for placing emphasis on practical training. One of the participants has known UMMB and explained them about the effectiveness according to his experience during village level workshop held in January 2008. It is once reported that 35 % of ruminants licked UMMBs, but after consuming UMMBs made during the training, nobody uses it as of February 2010.

In Mingan village, the training was done inviting 30 participants. Some trainees could not understand what the trainer said and content of the training material, particularly disease names in English. Feeding of UMMB is the first time for goats and the villagers too and only about 20 % of goats licked UMMBs according to villagers. However, since then no one uses UMMBs until now as

of February 2010 probably due to low interest and lack of money for it.

In sum, 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.

5) Inter-cropping of Sorghum and Rice Bean

In Ar La Ka Pa village, sorghum production intercropped with rice bean showed 7,800 kg/ac, which is almost two times of 4,100 kg/ac of the conventional method, and second highest yield among the 3 villages though once affected by scarce rainfall at flowering stage. However, farmers are not so interested in sorghum production because it does not bring them income different from food crops. Although intercropping of sorghum is the first experience for the farmers in this village, they think that intercropping system of sorghum with rice bean is effective to increase productivity and the soil improvement with nitrogen fixing rice bean. However, it is inferred that sustainability of this component is not so high because of prioritization on cash crops and availability of wheat straw (though nutrient value is low) for cattle. No villagers try this technology as of February 2010.

In Mingan village, intercropping of sorghum and rice bean is the first experience for the villagers. They did not know that leguminous crops such as rice bean and groundnut etc are able to fix atmospheric nitrogen, which is effective to grow plant. 10 members participated in cultivation, sowing and harvesting. Initial growing of sorghum was excellent in spite of driest condition among the 6 villages where pilot project has been implemented. Although sorghum was affected by scarce rain and rat damage, the yield of stem and leaves were eventually recorded at 6,000 kg/ac, which is 1.5 times of the conventional broadcasting method as well as seed yield of 8.7 basket/ac that is higher than 2.5 basket/ac of the conventional method. The averaged diameter of sorghum stem was 0.75 inch compared to 0.48 inch of the sorghum conventionally grown. Therefore, it can be said that the objective of increasing sorghum productivity for cattle was accomplished. In fact, however, the technology has not been extended among villagers as of February 2010 because of low interest by villagers as sorghum for cattle doesn't bring them any income and the technology requires more labor compared to broadcasting method conventionally practiced.



Intercropping of sorghum and rice bean at Mingan village in Chauk TS in which 6,000kg/ac of yield was attained even in driest area.

In Legaing village, conventionally sorghum has been cultivated with broadcasting method. Effectiveness of the implemented intercropping method can be confirmed visually when compared with the conventional method. Sorghum yield with this technology in the village showed the highest among the 3 villages though it was affected by scarce rain. Compared with the conventional method of 4,100 kg/ac, the yield was 8,200 kg/ac. Therefore, it can be said that the objective of increasing sorghum productivity for cattle with intercropping technology was accomplished successfully. However, villagers are not interested in this component because of prioritization on food crop production. No villagers have applied the technology as of February 2010.

6) Local Cattle Improvement

In Ar La Ka Pa village, one bull with 18 months of age was delivered to the group in late 2007. Though the bull could mate with 17 cows by August 2007 and 10 were pregnant, villagers didn't like its body shape as a good breeding bull, and have wanted to purchase new bull since delivery. They could buy a new bull (Thari) at 700,000Kyats in January 2010. The former bull could be sold at 400,000Kyats. Deficit of 300,000Kyats was borrowed from the village fund which was established under one of FY 2008/09 pilot project to which a tractor was provided. Fee for mating has already been decided to charge at 5,000 Kyats/time (formerly 2,000Kyats). The bull is to use for mating on coming July 2010.

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. To date (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.

7) Mulberry Production for Ruminant Feed

Planting mulberry in the flat area of the CDZ is considered probably first case. About 800 mulberry sticks procured from Pyin Oo Lwin were transplanted beside a pond and in compounds by all villagers. About 70 to 80% of nurseries could survive until January 2008. A treadle pump was provided and it was used for watering mulberry at initial stage. But the pipe length from the pond to the nursery site became shorter and shorter along with water level of the pond being receded. Finally villagers gave up irrigating mulberries by the treadle pump, and since then all the mulberry beside the pond was withered completely. On the other hand, 100 to 150 mulberry trees planted in household compounds are still growing well as of January 2010 (see photo).



Mulberry grown in Mingan village, Chauk TS.

8) Cattle and Chicken Improved Housing

Cattle are generally tethered in backyard which is often muddy and insanitation condition for both human and cattle. One model cattle housing was therefore constructed where 5 cattle are kept in Ar La Ka Pa village and one in Mingan village as well. The model houses are still used hygienically in both villages. The beneficiary at Ar La Ka Pa village improved the cattle housing by adding more roof to prevent direct sunshine by his own expenses. However, the dissemination is still difficult due mainly to financial reason and people's unawareness of sanitation. As of February 2010, nobody constructed improved type of cattle housing.

One model chicken housing was constructed in one of Ar La Ka Pa chicken farmers, where more than 10 chicks are reared. But these chicks are also left loose in daytime. Sagaing division, in which Ar La Ka Pa village is located, suffered from avian flu several years ago which had given large damage to local chickens (no human died), but people’s awareness of improving environment is yet to be high. It is considered such improvement should go along with income increase otherwise just improving sanitation condition might not be attainable. As of February 2010, nobody constructed improved type of chicken housing.



Model-typed cattle housing in Ar La Ka Pa village to enclose cattle different from prevailing free range in CDZ.

4.5.3 Post Training Evaluation

This section summarizes trainees’ evaluations on trainings for improved housing for animals such as goat, pig, cattle, and chicken, which were done in villages of Khaungkawe, Magyi, Ar La Ka Pa, Mingan, and Legaing. Housing improvement training was done in each and every village mentioned above and its period was in August 2007. Goat housing improvement training was carried out in villages of Khaungkawe, Magyi, Ar La Ka Pa, Mingan, except Legaing village. Housing improvement training for cattle was held in Ar la Ka Pa village and Mingan village. It was only in Ar La Ka Pa village that the housing improvement training for chicken was conducted.

Evaluation by the participants from Ar La Ka Pa village is relatively low grade in all categories shown in Figure 4.5.1 comparing with those of other villages. Khaungkawe village participants show relatively high applicability of 4.5 points despite their novelty and understanding marks are not so high. A half of the participants out of 12 in Khaungkawe village mentioned that their education level was low to understand this training. Evaluation by Legaing village participants seems to be well balanced except its novelty.

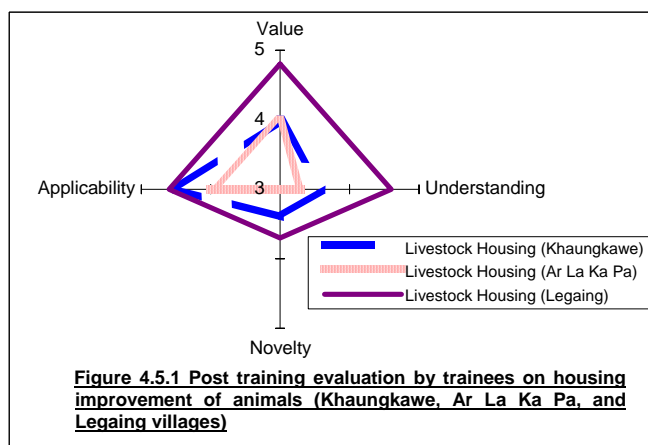


Figure 4.5.1 Post training evaluation by trainees on housing improvement of animals (Khaungkawe, Ar La Ka Pa, and Legaing villages)

Evaluations by Mingan village participants felt high value for the training and high applicability on their own, which is shown in Figure 4.5.2. Magyi village participants evaluated nearly the same score as those of Khaungkawe village except its applicability with not so high points.

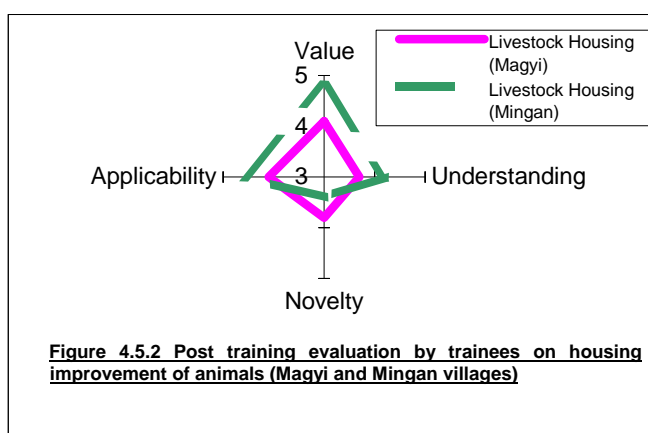


Figure 4.5.2 Post training evaluation by trainees on housing improvement of animals (Magyi and Mingan villages)

It seems to be quite different reaction and opinion from that of agriculture sector trainee, which is aforementioned; the most of trainees have certain experiences of agriculture practices on their own and it makes the participants equalize more than those of livestock sector. Request of longer and continuous training, including training on other kinds of livestock was also raised at each training.

4.6 Pilot Project Implementation for Cottage Sector

Under cottage sector in FY 2007/08, 10 pilot components have been carried out in 6 villages. Table 4.6.1 summarizes the pilot components together with the village(s) carried out and also the objectives of the pilot projects for the cottage sector. Since cottage sector takes longer lead-time, most of the beneficiaries started their own production from early 2008. Following discussion centers on outputs level and also issues arisen through the process of the implementation:

Table 4.6.1 Summary of the Cottage Pilot Projects with those Objectives

Sector	Component	Village	Pilot Objectives
Cottage	07C1 Tinsmith Strengthening	Khaungkawe	· To increase profits from tinsmith production and sales.
	07C2 Guitar-Key Strength'g	Khaungkawe	· To increase profits from guitar-key production and sales.
	07C3 Embroidery Sewing	Ma Gyi Sauk	· To increase profits from sewing production and sales
	07C4 Weaving Improvement	Khaungkawe	· To increase profits from weaving production and sales.
	07C4 Motorized Weaving	Ma Gyi Sauk	· To increase profits from weaving production and sales.
	07C5 Knitting Promotion	Ma Gyi Sauk	· To increase profits from knitting production and sales.
	07C6 Sandstone Ware Production Impr't	Mingan	· To increase profits from sandstone processing and sales.
	Road Shop	Ar La Ka Pa	· To expand the markets of the products of the villages.
	07C7 Road Station	Legaing	· To expand the markets of the products of the villagers.
	07C8 Paddy Drier	Legaing	· To increase quality of pre-monsoon paddy, thereby increase profits from paddy harvested.
07C9 Fruit Processing	Legaing	· To generate incomes from processed food production and sales.	
07C10 Energy Efficient Stove	Magyi	· To save fuel cost for Jaggery making.	

4.6.1 Outputs from the Pilot Implementation

Most of the components under cottage sector had carried out necessary training, provided necessary equipment and machines, and in cases some materials during the FY 2007/08. With these having been finished, the beneficiaries commenced their business operation mostly from early year 2008. Table 4.6.2 summarizes outputs through these activities:

Table 4.6.2 Summary of the Outputs by Cottage Pilot Projects

Sector	Component	Village	Major Outputs from the Pilot Implementation
Cottage	07C1 Tinsmith Strengthening	Khaungkawe	· 60 members learned advanced technology, given a set of machines · They produced 650 pieces of bottom-part a day, however due to material price hike and also prevailing of plastic bucket imported from China, the production came into halt.
	07C2 Guitar-Key Strength'g	Khaungkawe	· 15 members learned advanced technology, given a set of machines. · They started production by using the machines, however faced with Chinese made cheap keys, the production finally came into halt.
	07C3 Embroidery Sewing	Ma Gyi Sauk	· 30 members were organized and 10 members were trained on embroidery technology. · Given 3 set of embroidery sewing machines, they started production and the total net profit for all the members is estimated at around 130,000 Kyats for about 2 years. · Technical transfer was carried out from the original 10 skilled members to other 11 members out of whom 3 came from another village to learn the embroidery technology.

07C4 Weaving Improvement	Khaungkawe	<ul style="list-style-type: none"> 60 members (5 groups x 12 members each) were provided materials for revolving. The loom owners could sell their products to the market directly and so they got more profit, at least 15% more. 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%.
07C4 Motorized Weaving	Ma Gyi Sauk	<ul style="list-style-type: none"> 6 members learned advanced technology from the Sounder Weaving School, given a motorized weaving machine. Up till late 2008, they could weave only 27 longyis, out of which they sold 13 longyis at a net income of 32,500 Kyats. The machines has periodically required maintenance and repair, and a new group started operation from early February 2010.
07C5 Knitting Promotion	Ma Gyi Sauk	<ul style="list-style-type: none"> 50 members (5 groups) were organized for 5 sets of double-layer machines. Given the machines, they started production, and for the total net profit from the knitting machines as of January 2010, it is estimated at about 3.3 million Kyats (equivalent to about 6.6 million Kyats of gross profit) from all the 6 machines (5 provided in FY 2007/08 and one more in FY 2008/09). Originally 5 members were trained for the knitting technology, and this was transferred to as many as 21 members by on-the-job-training.
07C6 Sandstone Ware Production Impr't	Mingan	<ul style="list-style-type: none"> Trollegery, a transportation vehicle with hand-tractor engine, was provided to the cooperative (92 members), and it is used about 8-10 times per month to ferry their sandstone product. From the transportation, the trollegery earns a maximum of about 50,000 Kyats in net per month. As of end January 2010, the net profit is 260,980 Kyats. Besides, the trollegery is utilized for other purposes e.g. ferrying sick person (3 times), agricultural products, stones for primary school construction, etc.
Road Shop	Ar La Ka Pa	<ul style="list-style-type: none"> None (it was cancelled)
07C7 Road Station	Legaing	<ul style="list-style-type: none"> One road station where the villagers can sell their products was constructed. The committee has earned a total 366,000 Kyats from shops and restaurant in the station, and spent 316,460 Kyats till January 2010. the balance as of January 2010 is 49,540 Kyats. By utilizing the income, the committee disbursed some money for village development activities, e.g. donation to night school, provision of stationeries to new primary pupils, etc.
07C8 Paddy Drier	Legaing	<ul style="list-style-type: none"> One paddy drier was constructed to dry up summer paddy, which is harvested during onset of rainy season. 9 trainees learned the advanced technology of operating the paddy drier. In the season of 2008, the paddy dryer dealt with as many as 7,200 baskets (about 60 farmers), which gave the committee a total amount of 125,000 Kyats. Subtracting about 20,000 Kyats required for maintenance and minor repair, the operation committee could keep about 105,000 Kyats as net profit. 8 members learned an advanced technology of milling machine. The milling machine attracts more customers increased by 30%, saves 2 days for maintenance required in every 75 days, and increases the volume of milling paddy by 10%.
07C9 Fruit Processing	Legaing	<ul style="list-style-type: none"> 20 members learned fruit processing including juice making. 5 members started production as business as of early 2008, however this was reduced to only 2 – 3 who do the processing during paddy transplanting period only. Others sometimes practice the processing only during religious occasions and when they received many relatives, friends, etc.
07C10 Energy Efficient Stove	Magyi	<ul style="list-style-type: none"> An energy efficient stove was demonstrated and now in use. The Jaggery producer used to use one cart of pigeon pea stem, 2,000 Kyats/cart, for a total 3 days operation, but 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 (reduced to 67 – 71 % of the time required).

4.6.2 Issues Arisen through the Implementation of Cottage Pilot Projects

This section summarizes the issues arisen during the implementation of the cottage pilot components. Since plural cottage activities were carried out in most of the pilot villages, following discussions are made by village. Major issues that could be more generalized toward CDZ development planning and implementation disciplines are described in the Main Report. Hence in this section, rather specific issues in each particular pilot project are summarized:

1) Khaungkawe Village (07C1, 07C2, 07C4)

Most of the project plans have been implemented although there have been some delays. The main reasons of the delay are; 1) the project has let the beneficiary producers discuss and decide suitable machines, equipment or raw materials to be supplied by the project, and it took considerably long time to mutually agree and conclude, and 2) the workshops to install those machines and equipment needed to be constructed because the ownerships of the machines/ equipment were decided to give the village authorities but not to each of the production groups until they have amortized the initial investment cost. It took also long time to get permission of the construction from the authorities concerned. There are 3 cottage activities carried out in this Khaungkawe village:

1.1) 07C1 Tinsmith Strengthening

There are many villagers engaged in tinsmith, guitar key production and weaving in this Khaungkawe village. For example, 42 owners and 30 labors are engaged in tinsmith, 5 owners and 70 labors for guitar key production, and 14 owners and 76 labors for weaving. Although the leaders of tinsmith, guitar key and weaving producers have all been enthusiastic for the pilot project, there were not many villagers who wanted to follow, except the weaving. The groups of tinsmith and guitar key production were composed only of some of the owners.

For tinsmith strengthening, a training of 149 person-days was administered in October 2007, and a set of bucket making machine was provided. The machine is for about 60 beneficiaries who are engaged in bucket making cottage industry, and they produced about 650 buckets per day for the first 2 months after the commission. However, this project was seriously affected by fuel hike as well as by material price hike by almost 30% towards 2008.

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 can hardly produce such smaller buckets, thereby the production was halted in June 2008 and situation lasted to date.



Tin smith Improvement (Khaungkawe Village): The village has been producing many tin products and the project intended to strengthen their activities.

1.2) 07C2 Guitar-Key Strengthening

As for guitar key production strengthening, a training was provided covering 105 person-days in total, and a set of guitar key production machine was provided. They started the production, 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.

Till October 2008, he has produced total 25 dozens of guitar keys (1,800 pieces). He tried to sell those parts in Yangon, however faced with cheap Chinese made guitar keys (about 60% of what he produced), he failed to sell out. The guitar-key market has been almost totally overwhelmed by China-products since mid 2008. As a result, private-owned guitar-keys production had to be stopped being unable to compete with guitar-key produced by China. Even a guitar-key group leader who had worked for guitar-key production for over 30 years completely stopped his guitar-key production and now he is doing business of grinding pea into powder, setting up an own-brand of pea powder.



Guitar Key Production Improvement (Khaungkawe Village): The village has been producing guitar keys and the project intended to strengthen their activities.

Instead of guitar-keys, to produce screw-driver, bottle-opener, etc. by using those machines provided by the Project was considered. But there were many difficulties such as market, skilful workers, etc. Therefore the activity halted in late October 2008. Under this project, nickel-plating equipment was also provided. This activity was intermittently in use till early 2009 for plating handle parts of tin-boxes, but as of early 2010 it has also ceased due to non-profitability.

1.3) 07C4 Weaving Improvement

The weaving group has received raw material (no machinery provision is planned in this component). 250 lbs of wool, the raw material, were divided for 5 groups, each group procuring 50 lbs of wool. Each group is composed of minimum 12 members and maximum 19 members. Group leaders are hand loom owners and they settle their members' labor-charges according to their piecework.

Previously the hand loom owners had to take raw materials according to the price fixed by employers (brokers) in Mandalay. As a matter of fact, the employers fixed the price of raw materials after they had calculated their investment in the form of loan with interest. Not only that, they did not have an opportunity to look for the market for their products by themselves. What they had to do was they had to accept the price fixed by the employers for their products within the limited period.

After the project had provided those with 250 lbs of wool, they did not need to carry out a system of taking raw materials and returning finished products. 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



Khaungkawe female weavers weaving shoulder-bags with the wool provided by the Project.

their labor charge was raised to 600 Kyats per bag, increased by 20%, as hand loom owners got their profit more than before.

The members mentioned that there are also other advantages in the supply of raw materials for the production; namely, 1) no transportation cost is required to go and buy it, and 2) they are not exploited by middlemen who usually supply raw materials in exchange of providing the products from the weavers. Those positive impacts show that the villagers suffer from the lack of raw material because they cannot afford to buy, and that such assistant would be able to contribute directly to increase their incomes.

2) Ma Gyi Sauk Village (07C3, 07C4, 07C5)

The membership of the participating villagers have increased, fro example to 30 members in embroidery group and 53 members in knitting group, and it has turned out to be much more than expected. The project has supported three main cottage industries in the village; embroidery, knitting and weaving, and all of which are operated by the village women.

The increase in the numbers has both advantages and disadvantages. The main advantage is the expansion of the project effects. When the groups are organized well, the group merits in production as well as marketing activities are expected. On the other hand, conflicts would easily arise as each one or group has different interests. In particular, the use of the machines and equipment as well as the distribution of the profits may easily create uneasiness. The main issue is whether the different groups can be united or at least cooperate each other or not, and therefore they may need to be carefully taken care.

2.1) 07C3 Embroidery in Ma Gyi Sauk Village

For embroidery, there was confusion whether an embroidery machine can be operated with manual or only by motor. The project finally supplied manual embroidery machines. However, the first trainers were mistakenly sent to the village as they could teach only motorized embroidery. The villagers also misunderstood an embroidery machine can work only with motor. The training was consequently suspended for a whole because of the turmoil. Through the second training for the embroidery by different trainers, the villagers came to understand a machine can function manually, and that is more suitable for the village due to the limitation of electricity supply by rice-husk generator available in the village.

The project provided 3 embroidery machines at which each group was established. Each group consisted of 10 members, totaling to 30 memberships. They started production in March 2008. Apart from the orders from villagers on an ad hoc basis, they could produce embroidered pillow-case. Net profit is 280 Kyats per embroidered pillow-case. They can put embroideries on 5 – 6 pillow-cases per day, indicating that one member can fetch about 1,400 – 1,700 Kyats net income per day. This is higher than labor wage in this village usually ranging from 700 – 800 Kyats per day only.

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



A member is now putting embroidery. This can fetch as much as 1,400 – 1,700 Kyats net profit per day, more than that of farm casual labor wage ranging about 700 – 800 Kyats per day.

machines or difficultly for group-leaders to supervise their members (each group had to subscribe 4,500 Kyats monthly (3,500 Kyats for main committee and 1,000 Kyats for work group) as rental for machines).

To solve the problems faced by embroidery groups, meetings were held on 15th March 2009 and on 25th June 2009 under the leadership of the Main Committee. They finally decided the rental fee of the machine at 50 – 200 Kyats per finished embroidery depending on the size (then changed to 150 Kyats per day). With this arrangement, till the end of 2009, the main committee has collected a total 41,600 Kyats while the total net profit for all the members is estimated at around 130,000 Kyats (equivalent to about 170 female farm casual labor-days). To fetch this net profit, they have produced about 400 embroideries, though no exact records available. The profit seems small and this is due mainly to dormant order.

Aside from above net profit, there is one more thing to mention. The project trained 10 members at first. Of them, 2 stopped the embroidery activities soon after they have started the production but the rest of 8 members have continued, though sometimes it was intermittent. They have transferred the technology of embroidery to as many as 11 colleague members. In fact, 3 out of the 11 came from neighbor village to learn the embroidery technology. The transfer was carried out by peer-to-peer training e.g. on the job training. Therefore there are now 21 members who are familiar to embroidery technology in and around the Ma Gyi Sauk village as of now. Though the technology has not been transferred to all the initial 30 members, it was disseminated to 21 members. This pilot was meant to disseminate the embroidery technology to many women, which was actually practiced on the ground.

2.2) 07C4 Weaving in Ma Gyi Sauk Village

For weaving (engine driven), the training at the weaving school which was carried out in October 2007 was appreciated, but the 6 beneficiaries were anxious about machine maintenance as it was not taught by the school. This was taken care by the project in early 2008, through the coordination with the headmaster of another weaving school to make sure for the installation and future maintenance of the weaving machines in the village. Upon completion of the training, 2 engine driven weaving machines were provided, and then they started weaving on a trial basis. Up till late 2008, they had suffered from adjustment of the machines which often needed technicians. Therefore they could weave only 27 longyis, out of which they sold 13 longyis at a net income of 32,500 Kyats.

One more motorized-weaving machine was added in March 2009. The members, now 5 reduced from the original 6 members, carried out weaving activity. In so doing, they faced with one after another mechanical problems with the machines and so the machines were in running conditions and then in broken-down conditions many times. And the members had no adequate experience and skills for the motorized-weaving machines. On 25th June 2009, a meeting was held attended by weaving group and Main Committee members. A mechanic from Monywa was called to repair the machines. Upon the repair, 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).



Engine driven weaving machine installed in Ma Gyi Sauk village, which needed periodical repair, adjustment, and maintenance.

On 20th July 2009, another meeting was held again to lay down the future programmes for 3 machines. According to the dormant situation, the announcement has been made to rent out 3 motorized-weaving machines for a six-month-period agreement with rental of 20,000 Kyats per month for 3 machines, on 15th August 2009. One of the committee members started renting the machine since September 2009. However, due to some mechanical adjustment he had not been able to fully operate the machine till the end January 2010, therefore no rental charge to him to date. The machine started operating in February 2, 2010, and it is expecting to fetch a good income as well as rental income to the committee.

2.3) 07C5 Knitting in Ma Gyi Sauk Village

For knitting, finally 50 memberships came to the 5 knitting machines provided by the Project. The arrangement they devised is that; 1) the 50 members are divided into 5 groups namely 10 sub-membership per group, 2) each group is allocated to a particular machine to establish a sense of responsibility in operation & maintenance, 3) the 10 sub-members take a turn to use the particular machine. Upon tentatively finalizing of the membership, 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 have transferred the technology to their colleague beneficiaries by using the machine together. Thanks to the technical transfer, another 21 members aside from the first 5 members have become able to do knitting with the double-layer deck machine (see photo above).



The lady in the center is the leader of a small group consisting of 10 members. Ladies sitting both sides of her seat are apprentices who receive technical transfer from the leader.

In knitting pilot project, a smart lady came up very soon after the commencement. She used to work as 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 gross of 150,000 Kyats. Subtracting the cost required, a net profit of 30,000 Kyats remained in her hands after 15 days. Average net per-day profit was therefore 2,000 Kyats per day. In fact, if one concentrates on the knitting, she can fetch about 50,000 Kyats net profit per machine per month according to the last 2 years experiences, equivalent to 1,700 - 2,000 Kyats per day depending upon working days.

Besides, there is a lady who earned a net of 1 million Kyats in just 9 months. 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. 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 10 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 (upland) farmland as mortgage.

As for the total net profit from the knitting machines as of January 2010, it is estimated at about 3.3

million Kyats (equivalent to about 6.6 million Kyats of gross profit) from all the 6 machines (5 provided in FY 2007/08 and one more in FY 2008/09). Assuming that there were 200 working days per year, one machine was able to produce about 1,400 Kyats of net profit per day ($3,300,000 / 6 / 400 = 1,400$ Kyats) during the 2 years operation. Members who could do knitting were 5 at the commencement and it was increased to 26. If the total net profit is divided by the average of 15, one typical woman was able to 220,000 Kyats as average for the 2 year (average 110,000 Kyats per year).

In FY 2008/2009, one more double-layer knitting machine was provided. 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. On 25th June 2009, a meeting was held attended by knitting-group members and Main Committee members. Then the programme of hiring out or renting out knitting machines to any interested persons was made known to all villagers. Depending on the response of interested persons, another meeting was held on 20th July 2009.

Afterwards, to study wholesale market, one Main Committee member and one knitting-group member went on a study tour to Zaygyo Market in Mandalay and Wholesale Shops in Pyinoolwin with the help of the Project. On 26th July 2009, knitting-group members and Main Committee members discussed and negotiated about experience gained from the study tour and then laid down the future programmes for knitting industry. From August 2009, all the machines started operating and out of 6 knitting machines, 2 machines were rented out for a six-month period agreement beginning from 1st August 2009 with a rental fee of 6,000 Kyats/month/machine. The 2 rented machines are, as of February 2010, being used by 2 beneficiaries who learnt advanced knitting technology by attending 4 days' training expensed by themselves. The remaining 4 machines are, as of February 2010, used on 200 Kyats rental fee basis per day by anyone as used to be.

3) Mingan Village (07C6 Sandstone Ware Production Improvement)

It was unknown for the committee members whether the trollogy provided to the village can bring economic benefits to them. The committee members intended to increase the profits, as they believed that they had been losing. It was however difficult to raise the service charge as it competes with other trollogies available nearby. Consequently, they thought that the trollogy should carry more products at a time so that it can generate better incomes. To make it possible, they intended to increase its capacity by reinforcing its body.

Taking above into consideration, the committee has improved the trollogy by inching up the height of the body to have more clearance from the ground, putting up wooden frame enabling more loads per transportation. As at beginning of August 2008, the trollogy earned about 300,000 Kyats from which they returned a debt of 100,000 Kyats which had been used to improve the trollogy (they had really struggled in availing of the money for improving the trollogy). Out of the remaining money, 50,000 Kyats was spent on maintenance of the trollogy, and the balance of 150,000 is kept by the committee as of August 2008.

On 6th and 7th June 2009, a meeting to review and revise the trollogy activity was held headed by the Project. At the meeting, the Project suggested villagers to discuss matters leading to overcome the present difficulties e.g. most of the sandstone workers thought that they had little to do with the trollogy and they only knew that it was one of the Cooperatives. The Project again made a field-trip



A trollogy was provided to Mingan village, which ferries not only their sandstone products but also other commodities.

to Mingan village from August 14, 2009 to August 16, 2009. On August 16, 2009, at the presence of Co-op Counterpart and Chauk township Co-op officer and his staff, a new committee was formed.

The new committee manages the trollogy very well and also the income and expenditure is quite open to all the villagers. In fact, the trollogy had ferried sandstone wares a total 37 times till August 15, 2009 under the old committee, and the monthly record under the new committee shows; 9 times for the month of September 2009, 8 times for October, 9 times for November, 8 times for December and 9 times for January 2010. It means the trollogy is nowadays ferrying their products about 8 – 9 times per month as average. The trollogy can be loaded with about 75 Tanakha grinding slabs and about 25 mortars and pestles though depending on the size. Though exact records are not available, it is estimated that so far about 9,000 slabs and 2,000 mortars with pestles may have been marketed by the trollogy at maximum.

Besides, the trollogy is nowadays utilized in not only transporting their products but also transportation of agriculture products, rental services to village retailers for commodities, etc. From these activities, the trollogy can earn a maximum of about 50,000 Kyats in net per month. As of end January, 2010, the balance sheet is shown in the following table, indicating a net income of 260,980 Kyats.

Table 4.6.3 Balance Sheet of Trollogy Committee as at end January, 2010

Date	Source	Income Kyats	Expenditure Kyats	Balance Kyats	Remarks
Feb,08 - Jan,10	Transportation Charges	2,913,200		2,913,200	
	Diesel		988,300	1,924,900	
	Driver & Conductor		663,700	1,261,200	
	Repairing		634,870	626,330	
	General Expenditure		365,350	260,980	
	Total	2,913,200	2,652,220	260,980	

Source: Accounting records of the trollogy committee in Mingan village

Apart from above usage of the trollogy, there were cases that the trollogy was utilized for the sake of villagers or village public activities free of charge. The trollogy was utilized for the reasons below, from which we can know the trollogy is now utilized not only for ferrying their products, the prime objectives, but also for developing the village.

- Ferrying patients: 3 times
- Ferrying construction materials for primary school: 7 times
- Ferrying rice bags and oil for revolving purpose: 1 time
- Ferrying big stones to roadside: 1 time
- For village PDC activities: 1 time
- Ferrying sandstones from quarry to the village: 1 time
- Served for a monk's funeral: 1 time

4) Ar La Ka Pa Village

The road shop planned was eventually not constructed. There had been a worry since the first workshop in this village whether the villagers were really keen to the project. The worry has turned out to be realistic. On this issue, the opinions of 6 villagers, who came to the evaluation meeting in late January 2008 can be summarized as; 1) first reason why the road shop was not constructed is that permission was not given by the authorities concerned on the construction site selected by the villagers, as it belongs to a school, and 2) an effort had continuously been made to find a suitable site along the main road, but had never been successful.

In addition to above, other reasons are as follows: 1) the village is located between two big markets,

Myinmu and Chaung-U, thereby there could be a difficulty to compete them, 2) the village produces mainly common agricultural products such as chick pea but no area-specific products, which they think would not attract many customers, 3) cottage products of the village are only slippers, potteries, water barrels, etc., which villagers think do not attract visitors much, 4) farmers are accustomed to sell their harvests at Myinmu and Chaung-U as they should sell them out as early as possible, for they are worried with possible leftover when they try to sell those here.

At the mid-term evaluation held in December 2007, a request was made to the villagers to discuss in the whole village about alternatives to replace the road shop. Such discussion was not made, but the participants at the mid-term evaluation workshop requested “supply of a weaving machine”. The fact is that only 4 households are engaged in weaving in the village, and one of them started advanced-weaving a year ago under the support of sellers in town. This household has also been providing on-the-job training to 7 women in the village. The request of weaving machine was made with this background. It was examined by the project, but not accepted because the proposal was not from the whole village.

The project plan was a road shop and not a road station (bigger size than shop), intending to make the specifications much simpler and easier for the villagers to handle. Nevertheless, the project could not be realized after all. It should be concluded that the idea of the road shop did not meet their needs. This idea had been confirmed and agreed at each time between the project and the villagers through the series of workshops and discussions. Even at the mid-term evaluation workshop in December 2007, the village leaders mentioned that they would go for the construction. It however has never been materialized.

More attention should have been paid to on what occasions the villagers take risks or challenge. Cottage industry in this village is somewhat less active compared to the other 5 villages. The village might have tendency that new industry is not easily initiated with whatever reasons. For such cases, development efforts should be made in line with the economic activities in which the villagers are currently engaged, by attempting to enlarge its scales or improving its qualities.

5) Legaing Village (07C7, 07C8, 07C9)

Needs of technical assistance for the main cottage industries in the village, such as crispy snack production, mechanic workshop, and electric workshop, were considered high at the planning workshops conducted in 2006. All of them however were not implemented. The main reason was that the villagers actually wanted the supply of the related machines for the individuals while the project proposed them the provision of advanced technology training on which they can improve their products/ services. After all, a training for fruits processing (fruit preservation and juice making) was conducted. Besides, there are 2 pilot projects carried out in this village; road station and paddy dryer.

5.1) 07C7 Road Station

Road Station Committee was formed with 7 members in mid 2007, and the station was opened in February 2008. In addition, an information exchange bill board was put up right in front of the station, showing agricultural information, their activities, etc. The committee divided the road station into two parts - one for 8 small shops and the other for one restaurant. A restaurant was opened on 15th February 2008. For 8 small shops, the committee had tried to get the shopkeepers during the year 2008 and also till mid 2009 (some shopkeepers came and started business but not lasted long).

The restaurant paid an amount of 30,000 Kyats per month as rental fee from February 2008 to May 2009, and the rental fee was reduced to 20,000 Kyats from June 2009 and onward due to sluggish business. The committee by the time of January 2009 collected a total amount of 150,000 Kyats from the restaurant's rental fee (the balance, 150,000 Kyats was due by the restaurant owner). By

using this amount, the committee constructed the entrance road leading to a parking area of the station, and also donated fuel for high school's night study for the final examination (9th and 10th standard students) from October to December 2008.

For interested persons who want to rent small shops from the sales centre were taken on a study tour to successful sales centre in other region. Then the Project and the Sales Centre Committee discussed with 7 interested persons and necessary loans were handed out to them according to their products by entering an agreement to repay the money not later than January 2010. Therefore, at the other part of the sales centre altogether small 7 shops had been opened as of July 2009. Shopkeepers earned profit of maximum 3,000 Kyats to minimum 700 Kyats per day depending on their products. Among those 7 shopkeepers, there included 4 women who did not have any jobs in the past. One of the shopkeepers could buy even a bicycle worth more than 20,000 Kyats.



Road Station established in Legaing village. There are 2 parts inside; where restaurant and thereafter grocery is operated and in the other sides several shopkeepers operate their business.

They collectively contributed voluntary service and donations towards building of 'Travelers Lounge'. The Project, to make the Sales Centre become a well-developed place, got contact with Magway Division Tele Communication Centre and tried to be granted a PCO phone to be kept at the Centre. During the month of July 2009, a CDMA phone was fixed at the Centre after getting a permit from Magway Division Tele Communication Centre. Highway buses, trucks and vehicles on pilgrimage begin to halt in front of the Centre.

However, the restaurant in the road shop finally left on October 15, 2009 due to sluggish business (leaving a due of 166,000 Kyats as the time). Thereafter a grocery shop came in on November 1, 2009, paying same 20,000 Kyats per month as rental fee. There showed up a difficulty, for which highway buses started passing through the road station, attracted by private business shop-owner who sell crispy snack in front of her house. Losing highway busses, some shopkeepers in the station started leaving and as of January 2010, 3 shopkeepers remain and still doing their business. The committee started working hard again to vitalize the road station.

Table 4.6.4 shows the balance of income and expenditure for not only road station but also other cottage activities at the level of main committee in charge of the village fund. In this village, all the income subtracting necessary expenditures is submitted to the main committee for village fund. As shown below, the income from the road shop to the main committee, corresponding to the village fund, shares the biggest portion of 245,000 Kyats in total.

Table 4.6.4 Balance Sheet of the Village Fund in Legaing Village as at end January, 2010

Date	Source	Income	Expenditure	Balance	Remarks
July, 08 - Jan, 10	From Road Shop	245,000		245,000	**
	From Paddy Dryer	105,000		350,000	2007/08 pilot
	From Crop Storage Depot	16,000		366,000	2008/09 pilot
	Printing press charges (voucher)		10,500	355,500	
	Signboard. Book for minutes of meeting		43,810	311,690	
	Loan given to mushroom beneficiaries		33,000	278,690	Village development
	Suggestion-letter box making		4,950	273,740	
	Loan given for buying bull		30,000	243,740	Village development
	Sanitation		1,500	242,240	
	Advertisement for bull (CD + Vinyl)		10,000	232,240	Village development
	Road nearby station		16,500	215,740	
	Paddy drier repairing			86,000	129,740

Repairing pump for Tube-well		19,200	110,540	
Donation for diesel for student		10,000	100,540	Village development
Black board for road shop		41,000	59,540	
Donation to STC* pupils for stationary		10,000		Village development
Total	366,000	316,460	49,540	

Note: * Save the Children, ** Restaurant still has a due of 166,000 Kyats which is not included in the 245,000 Kyats as of January 2010. Source: Accounting Record for the Main Committee, Legaing Village

Out of the income, the main committee so far disbursed a loan to 5 mushroom beneficiaries, as to-be-mentioned under the paddy dryer, another loan for buying bull together with the advertisement of the bull, donated diesel for night school electrification and also made another donation to the pupils of a nursery supported by Save The Children. These are all related to village development. The balance as of end January, 2010 is 49,540 Kyats which may not seem big enough. However, dedicated committee members will make effort to fully utilize the road station as they have shown so far.

5.2) 07C8 Paddy Dryer

By allotting a part of funds for the cancelled trainings, a paddy drier was newly added and constructed beside road station accordingly. Myanmar people prefer once stored rice, not new rice, hence they try to keep harvested rice for a certain period, say minimum 4 months. In fact, newly harvested paddy was 3,500 Kyats per basket as farm gate price while once stored more than 4 months was 5,000 Kyats per basket as at November 2008. The paddy drier is meant to dry harvested pre-monsoon paddy. Since pre-monsoon paddy is harvested in the early monsoon season, they really face a difficulty of drying the paddy (already rain starts falling). They cannot store the harvested paddy because of high moisture, but sell out often at thrown-out price.

The paddy drier started the operation from 2008 monsoon season. User farmers were charged 20 Kyats per basket to dry their wet paddy. In the season of 2008, the paddy dryer dealt with as many as 7,200 baskets (about 60 farmers), which gave the committee a total amount of 125,000 Kyats. Subtracting about 20,000 Kyats required for maintenance and minor repair, the operation committee could keep about 105,000 Kyats as net profit, equivalent to 105 man-day farm casual labor wages. Users were not only from Legaing village but also from neighboring villages. As for user farmer side, milled white rice after going through the drier could fetch about 600 Kyats per bag more than the ones just dried under sunshine (12,500Kyats per bag with paddy dryer and 11,900Kyats dried under sunshine).



Paddy dryer established in Legaing village as a part of pilot project under cottage sector. This can dry 200 baskets of paddy at a time.

In addition, a training of improving rice milling was administered in FY 2007/08. With the technology, the milling machine now 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 through a village fund out to 5 mushroom cultivators, totaling 33,000 Kyats. This is a loan with an interest of 3% per month. This is meant to assist the initial capital investment for the mushroom cultivators starting in October 2008. The interest of 3% per month is much lower than conventional private loans of 5 – 10 % per month.

Beginning from the end of July 2009, the Paddy Drier Committee had been taking necessary measures

such as getting the drier ready for running, doing sanitation work, and doing earthening around the drier for convenience of farmers who get their paddy dried. However, the dryer was not used in 2009 season because dry spell had continued till August in this year 2009 (it was drought year throughout CDZ). Because of the drought, farmers just utilized natural sun-dry in year 2009. Under the usual season, however, the dryer would be utilized since this can bring a lot of profit both to the user farmers and to the dryer committee. Dryer itself is well kept, being ready for operation, as of February 2010.

5.3) 07C9 Fruit Processing

The idea of this fruit processing came actually from the counterpart staff but not from the villagers. Nevertheless, the training received high interests of the village women. The number of the participants increased to 28 although it was limited by 20 (the trainer needed to limit the number of the participants due mainly to hygienic lectures). According to the participants, there were still many more village women interested in such training.

The reasons why they were interested for the fruit processing are the technologies extended to them, close to what the village housewives do everyday, and they felt it could bring them immediate incomes even if it was small. As such, even if any projects are not arisen from the villagers at first, some of them would draw high interest. To attract the villagers, it is considered important that a project should contain technologies with which the villagers feel familiar, and helps them expect to generate income instantly.



Different kinds of processed fruits tried in Legaing village as one of the pilot project. There was a difficulty of getting raw materials.

In November 2007, as mentioned above, 20 women villagers undertook a training of fruit processing. After the training, out of them 5 members started sales on business, including sales in the road station. At the road station, one pack of dried fruit was sold at a price of 40 Kyats. Then, about one year later which is on 25th December 2008, the Project interviewed one of the fruit processing beneficiaries. According to her, after the training had been conducted, 14 beneficiaries intermittently produced fruit jams and sold.

For Legaing village and its around, however, only plum and tamarind were available. Due to the difficulty of getting raw materials and other causes, some stopped jam-making completely. The interviewee (who made fruit-jams and sold about 30 years ago when she was a government servant as a midwife) frankly said that the packing cost (to be able to keep abreast with other famous brands) was more than raw materials' cost. To get raw materials for fruit processing was so difficult that there was no one, excluding one seller at the Road Station, who does fruit processing on business scale. The one has been producing processed fruits till around end 2009 on a business scale, but the sale was not good and finally came to stop.

As of February 2010, there is no one who continues the production on business scale but there are still 2 –3 women who produce it during rice planting period according to order from farmers. Farmers during this period employ many transplanters to whom they have to provide snacks. The processed fruits can be a good one for the transplanters.

6) Magyi Village (07C10 Energy Efficient Stove)

At first, solar cooker on trial was produced by a local industry workman and was supplied to the participants in Magyi village. As a result of the trial it was found that the solar cooker was too weak

in thermal efficiency to get on practical use of Jaggery production. After the trial, improved stove was instead constructed to apply. Heat proved bricks were made by using local clay materials, yellow earth powder, lime, paddy husk charcoal, cement, iron rods, etc, and one energy efficient stove was constructed at a site of Magyi village. The stove was constructed in February 2008, since then it has been used.

The Jaggery 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%). Also, 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 (he reduced to 67 – 71 % of the time required). Though the stove was proved very efficient, the cost of constructing the stove is about 50,000 Kyats, making them difficult to extend this type of energy efficient stove. Therefore no extension by villagers has been made in this pilot project.



An improved stove for Jaggery production. Though it is efficient in energy consumption, it has not been diffused due to the cost.

4.7 Pilot Project Implementation for Living Improvement

Under living improvement sector, 4 pilot components were commenced in 3 villages in FY 2007/08. Table 4.7.1 summarizes the pilot components together with the village(s) carried out and also the objectives of the pilot projects.

Table 4.7.1 Summary of Living Environment Improvement Pilot Projects with those Objectives

Sector	Component	Village	Pilot Objectives
Living Improvement	0711 Drinking Water	Ar La Ka Pa	· To provide clean drinking water for livestock and also for households nearby.
	0712 Biogas Generation	Khaungkawe	· To provide the villagers with electricity by cow-dung biogas generation.
	0713 Electricity by Diesel Generator	Mingan	· To supply electricity to villagers by diesel generator.
	0714 Primary School with Roof Catchment	Mingan	· To increase children's enrollment, and also improve water situation by using roof catchment facilities.

4.7.1 Outputs from the Pilot Implementation

Drinking water started operation in as early as September 2007, followed by electrification by diesel generator in Mingan in December 2007, and bio-gas generation started the test running in late January 2008. The construction of Mingan primary school faced difficulty of getting timbers at that time, and therefore the construction continued into March 2008. Following table summarizes the outputs from the pilot activities.

Table 4.7.2 Summary of the Outputs by Living Environment Improvement Pilot Projects

Sector	Component	Village	Major Outputs from the Pilot Implementation
Living Improvement	0711 Drinking Water	Ar La Ka Pa	<ul style="list-style-type: none"> · One drinking water facility was constructed. · Water tank is managed well by the committee, and the facility was improved by heightening ground level so that small animal (sheep and goats) can drink water easily. · In addition to 70-100 sheep/goats and 50 cattle, 30-50 households use this water tank to get clean water particularly in dry season.
	0712 Biogas Generation	Khaungkawe	<ul style="list-style-type: none"> · 305 households are supplied electricity from the Biogas generator.
	0713 Electricity by Diesel Generator	Mingan	<ul style="list-style-type: none"> · 126 households are provided with electricity at the commencement. · As of January 2010, 105 HHs use electricity and 96 HHs pay the charge (9 are exempted from the payment because they are old).
	0714 Primary School with Roof Catchment	Mingan	<ul style="list-style-type: none"> · One school with temporarily walls was opened on July 1, 2008 with a basement size of 60' x 30'. · A brick water tank was established in which rain water from gutters is stored for the pupils to drink. · The total number of pupils from kindergarten to fourth standard is 58 in FY 2008/09 and 52 in FY 2009/10 respectively. No one out of the school, therefore the enrollment is now 100%.

4.7.2 Issues Arisen through the Implementation of Living Environment Pilot Projects

This section summarizes the issues arisen during the implementation of the pilot components in FY 2007/08. Major issues that could be more generalized toward CDZ development planning and implementation disciplines are described in the Main Report. Therefore, in this section, rather specific issues in each particular pilot project are summarized:

1) 0711 Drinking Water Facility in Ar La Ka Pa Village

Water is pumped up into the water tank 2 times a day. As electricity fee is borne by the VPDC, no charge is imposed on users. As of early 2010, about 50 cattle and 70 to 100 sheep and goats are using this facility to and from grazing ground every day. In addition, a neighboring primary school,

fish vendors, car owners and neighboring household reaching as many as 30 – 50 HHs are also users of the facility.

They presented plans to install roof on the tank to prevent dust and raise ground level for more convenience during a workshop held in February 2008. They put some soils to raise the ground in October 2008, so that animal and people became easy to fetch water (putting roof is not yet done till early 2010). There was an occasion that the motor got out of order in January 2009. To repair the motor, the village main committee decided to spend money from the village fund established with the tractor provision as one of pilot projects in FY 2008/09. The committee disbursed 11,500 Kyats and the motor got repaired in late August. As of early 2010, the motor is in good operation and provides water as it used to be.



Every morning, about 70 – 100 sheep/goat drink water at this water tank. Besides, 30 – 50 households are also dependent on this facility for their domestic water.

2) 0712 Bio-gas Generation in Khaungkawe Village

For Bio-gas plant construction in Khaungkawe village, a letter asking technical assistance to Kyaukse Technical College was sent to the Ministry of Science and Technology around in September 2007. The reply was delayed due to some pre-scheduled activities for them, thereby the construction itself started in November 2007. However, construction was completed in January 2007 and in early February 2008 the test running started.

Originally, the cost of the plant was temporarily estimated for 100 HHs when designed. When implementing this component, villagers strongly requested to expand the coverage from original 100 HHs to the entire household + pagodas, about total 310 lighting points. All villagers paid 1,500 Kyats each for excavation work for 2 tanks to save the construction cost, thereby trying to extend the power supply. As a result of discussion with the contractor, finally 307 places became able to receive electricity and fluorescent light with 15 to 20 Watt.



Construction of the Main Tank (forefront) wherein bio-gas production by cow dung is to be made, and disposal tank (right above) where fermented cow dung is to be discharged. The villagers contributed in the excavation work.

The bio-gas committee was formed on November 9, 2007 and electrification was commenced on February 1, 2008. According to the decision made by the majority, the bio-gas charged each household 600 Kyats per month for a U-shaped fluorescent tube and 1,500 Kyats for TV users per month. Another decision for each household to contribute one basket of cow-dung per week was made, which is used as fuel of the bio-gas generator. Therefore, the committee could earn 180,000 Kyats from electrification and 8,000 Kyats from selling used cow-dung every month.

The committee arranged to spend 70,000 Kyats from that income every month for a generator-operator and 2 money-collectors as their salaries and the rest to spend for maintenance and to save for Village Development Fund. It is learnt that, for April and May 2008, the electricity charge had to be reduced to 500 Kyats per month due to villagers' low income from their business and for the rest months the

charge returned to normal. Although it can be assumed that the committee generally could have saved over 900,000 Kyats, the committee could not have saved any fund up to November 2008. The reason was that the committee had to spend all money for the cost of generator repairing.

The most important problem was unauthorized use of electricity by some villagers. In Khaungkawe village, there were about 20 households who used electricity for TVs. For those households each outlet for TV was arranged. However, some villagers used electricity multiplying from the outlet for some purposes (e.g. battery-charging). Besides, some villagers who paid only for fluorescent tubes also used electricity for some purposes without the knowledge of the committee.

Owing to such unauthorized use of electricity, there brought about fluctuation of voltage and wire short-circuiting, extremely shaking of generator and damage of its base frame, and suddenly stopping of generator. On the part of the rest villagers, they often had to buy new bulbs because their bulbs got burnt owing to the fluctuation of voltage and for some poor villagers they stopped using of electricity. To cope with this problem, the committee installed AC-DC switchboard in September 2008 (TV, cassette, battery-charging inverter, etc. have to use only AC. If there is a sudden change from AC to DC, their inner parts can be burnt. However, tubes and bulbs can be used both for AC and DC).



Generator-operator can cause damage at the place where there is an unauthorized use of electricity by changing from AC to DC when there occurs fluctuation of voltage.

At the end of October 2008, about one month after the installation of the switchboard, the committee told that the bio-gas power generator had been running without any difficulty and that there was no more fluctuation of voltage because there was not an unauthorized use of electricity at all. Given this situation, villagers started paying electricity charge regularly though there are some who have delayed the payment.

Table 4.7.3 summarizes the income and expenditure balance sheets as at end of December 2009. As the table shows, so far the committee has collected 3,555,200 Kyats against expected total of about 4,140,000 Kyats, leading to a collection efficiency of 86%. Adding other incomes, total income so far arrives at 3,890,200 Kyats while the total expenditure is 3,370,465 Kyats. This shows a positive balance of 519,735 Kyats as of end December 2009, entailing the sustainability of the project.

Table 4.7.3 Balance Sheet of Bio-gas Power Generation in Khaungkawe Village

Date	Source	Income, Kyats	Expenditure, Kyats	Balance, Kyats	Remarks
Feb. 2008 - Dec, 2009	Electrification charges	3,555,200		3,555,200	86% collected
	Selling wasted cow-dung	206,000		3,761,200	
	Fine	60,000		3,821,200	
	Selling gravel	69,000		3,890,200	Extra from the construction
	Staff salary		1,758,000	2,132,200	Operator, collector
	Stationary		57,590	2,074,610	
	Maintenance		1,465,425	609,185	
	General		89,450	519,735	
	Total	3,890,200	3,370,465	519,735	

Source: Cash book of the electrification committee in Khaungkawe village

There are of course outcomes from the electrification; children can study even night time thanks to the bright fluorescent light, villagers engaged in cottage production can work even night time, family

members can enjoy chattering in cases with neighbors, etc. Noted here is an appearance of a night school operated voluntarily. A villager started teaching in the manner of a small night school with six kindergarten pupils and five 2nd standard pupils in the mid of May, 2009. The number of pupils grew than that of the school's inception - from 11 to as many as 32 pupils in late 2010. It is open 6 days a week from 6:30 PM to around 8:00 PM. The electrification is really improving the village situation a lot.



Ko Mg Mg Lwin, a night school teacher, teaches his pupils with fullest 'cetana'(good will) without taking any tuition fees from the parents.

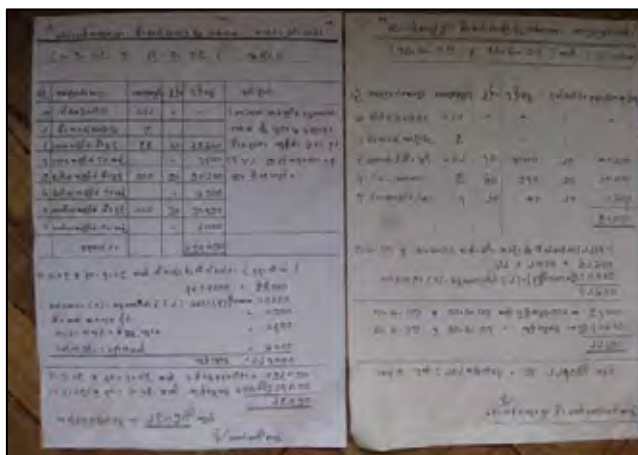
3) Electrification by Diesel Engine in Mingan Village

The diesel engine powered generator was completed in late November 2007, and started providing electricity on December 6, 2007 to all the households in Mingan village. Total number of households as of that time is 126, of which 6 HHs are exempted from paying the electricity fee, that is 50 Kyats per 2 feet fluorescent light per night. These 6 households are all aged villagers, having no income. The committee decided to provide electricity to those elder households even if they cannot afford to pay, and all the villagers agreed for the exemption.

Two months later from the commencement, electricity charge was raised from 50 Kyats to 60 Kyats per night as the generator used more diesel. The committee learnt that there were some who were using electricity for charging batteries without the committee's knowledge. To add to their trouble, the price of diesel went up from 4,000 to 5,000 Kyats per gallon in 2008 and therefore the charge also had to be raised from 60 Kyats to 70 Kyats per night. Up till the end of 2008, owing to such financial difficulties, electrification had to stop intermittently, for about five times in total.

From early 2009, the diesel price got down sharply in parallel with world financial crisis, and as of February 2009, the charge is set at 400 Kyats per week (57 Kyats per night). At the time, 89 HHs use electricity and 82 HHs pay the charge (7 poor HHs are exempted from the payment). Therefore the expected total income per month for the committee is 140,220 Kyats (70 x 82 x 30 days). There were 6 households who used electricity for their TVs and VCDs, and income per month from them can reach about 18,000 – 19,000 Kyats at maximum (charge per TV is 100 Kyats/day, and TV+VVD is 130 Kyats per day, and some watch TVs or VCDs daily and some do not).

Till July 2009, there appeared villagers who do not pay the electricity charge as decided. After learning this, a meeting, attended by all villagers, to discuss and negotiate about village electrification was held on 6 June 2009 in the afternoon. As an outcome from the meeting, they have established a new committee which started the duty from July 2009. Since then, the charge is set at 50 Kyats per night per tube, and collection of electricity fee is almost 100% up to early 2010 when the Team visited the village last time.



Monthly balance sheets of income and expenditure stuck on the wall of VPDC Chairman's home to make known to all villagers.

In fact, the committee posts the balance sheet every month at about 10 places in the village for the transparency purpose (see the photo). Table 4.7.4 table summarizes the income and expenditure of the electrification committee by month and Table 4.7.5 shows the balance to date. As is shown in table 4.7.4, there has been only one villager who has not paid, but otherwise all the villagers are now in very much serious in sustaining the electrification.

Table 4.7.4 Monthly Balance of Mingan Village Electrification (from July to December 2009)

No	Particulars	Unit	July	Aug	Sep	Oct	Nov	Dec	Remarks
1	Households exempted from charge	No.	9	9	9	9	9	9	
2	Households for fluorescence lights	No.	101	98	93	93	95	96	
3	TVs (Color)	No.		6	7	10	11	11	
4	TVs (Black & White)	No.		2	3	2	2	3	
5	Fee of a fluorescence light	Kyats	50	50	50	50	50	50	
6	Fee of a TV (Color)	Kyats	-	100	100	70	70	70	
7	Fee of a TV (Black & White)	Kyats	-	50	50	50	50	50	
8	Income from fluorescence lights	Kyats	140,250	147,000	139,500	125,550	142,500	144,000	
9	Income from TVs	Kyats	13,600	21,000	25,500	21,600	26,100	27,600	
10	Gross income	Kyats	153,850	174,350	169,290	147,150	168,600	176,000	
11	Net Profit	Kyats	29,050	37,850	36,300	63,450	49,100	31,700	due to the engine overhaul
12	Used amount of Diesel (litre)	litre	33	34.5	36.2	29	33	39.1	
13	Expenditure for Diesel	Kyats	99,000	103,500	112,600	87,000	108,900	129,500	
14	Expenditure for Maintenance	Kyats	14,500	23,000	11,350	113,300	-	-	overhaul of the engine
14	Expenditure for Salary & Meeting	Kyats	10,000	10,000	10,000	10,000	10,000	12,500	
15	Expenditure for Stationary	Kyats	1,300	-	750	300	600	2,300	
16	Households who did not pay the charge	No.	-	-	-	-	1	1	

Note: there was an over-hole done for the engine in October 2009, so that the maintenance had cost a lot, thereby fell in net profit in October 2009.

Table 4.7.5 Balance Sheet of Mingan Village Electrification as at January 2010

No	Duration	Item	Income (Kyats)	Expense (Kyats)	Net Profit (Kyats)
Old Committee					
1	Sep 08 - June 09	Collection of Electrification Charges	1,476,050		91,950
2	Sep 08 - June 09	Diesel		1,037,900	
3	Sep 08 - June 09	Maintenance		261,150	
4	Nov 08	Village Development activities		20,000	
5	Feb - June 09	Operator		50,000	
6	Sep 08 - June 09	General Expense (stationary etc)		15,050	
New Committee					
1	July 09 - Dec 09	Collection of Electrification Charges	989,250		
2	July 09 - Dec 09	Diesel		640,500	
3	July 09 - Dec 09	Maintenance		162,150	
4	July 09 - Dec 09	Operator		50,000	
5	July 09 - Dec 09	General Expense (stationary. Etc.)		7,750	128,850
Total			2,465,300	2,244,500	220,800

Source: Electrification Committee, Mingan Village

According to interviews, they are really surprised at the brightness of the fluorescent light than candle which had been used long. With the brightness, the children can study more which pleased the parents as well. Families have become happier than ever before, enjoying chatting under the light, and doing some additional works of producing sandstone wares, a typical cottage industry in this Mingan village. Also, 15 new households have bought TV after the commencement of the electrification. The owners as well as neighbors enjoy TV programmes on health, puzzle, and international news and as a result their scope



Villagers watching a success story (livestock) of the Project on a new TV (in rural area, if one household has a TV, families from its neighborhood come to watch the TV and so propagation of knowledge, general knowledge is easy).

of knowledge became wider and their general knowledge much improved, it is learnt.

For the financial viability, most of the people used to use around 3 candles per night, costing them $50 \times 3 = 150$ Kyats per night, but now only 1 candle is enough. Total cost they have to pay is now 100 Kyats per night, 50 Kyats for the candle + 50 Kyats for the electricity provided 3 hours a night. From this estimation, most of the households are saving 50 Kyats per night as average.

4) Primary School with Roof Catchment

This was a joint project with the villagers, asking their maximum contribution in its construction. To materialize their contribution, a School Committee was formed with 7 members. Under the leadership of it, villagers actively contributed their voluntary services in digging the ground for laying foundation stones, digging holes for toilets, digging for a brick water-tank foundation and so on. They also contributed locally available materials such as stones, sand, water and gravel for school foundation.

To cover the shortfall of the budget, a well-wisher's contribution played a big role in this construction. A well-wisher named Ko Khin Mg Oo, who was born in Mingan village but brought up in Mandalay and now living in Mandalay, donated 150,000 Kyats in cash and 120 bags of cement in kind totaling 810,000 Kyats worth when the school construction work commenced in January 2008. Again on September 13, 2008, after he had raised fund for school construction from his friends, he donated 8 lakh (800,000 Kyats) to the school committee (in that donation, he himself donated 190,000 Kyats so that his total donation would be 10 lakh when added to his first donation 810,000 Kyats). In other words, the village received a total donation of 1,610,000 Kyats (about US\$ 1,300 as of that time) from well-wishers.

The school with temporarily walls was opened on July 1, 2008. The new school building is 60' x 30' and it has a spacious playground in front. The building is roofed with galvanized iron sheets and there are gutters. There is a brick water tank in which rain water from gutters is stored for the pupils to drink. Total number of pupils from kindergarten to fourth standard is 58 at the inception time and it is 52 as of January 2010. There is no one out of school since the inception of the school, thus the enrollment is 100%. There are one headmistress, two assistant teachers and one general worker.



Photo in the left shows the school building with temporary wall wherein the pupils already started studying. Then the villagers contributed a lot, one of the contribution is the wall. They have donated sand stone slabs which have been used as wall materials (see the right photo). The work still continues as of January 2010.

Aside from schooling for the children, construction work of the walls, the unfinished part, had to continue. The committee went on raising fund and the walls were fixed one cell after another. Village chairman, Ko Thet Cho Win, mobilized the villagers on the evening of September 24, 2008, and explained the situation to the villagers and organized them to contribute, as an installment, 25

stones or 3,750 Kyats each (the price of a stone is 150 Kyats) to be able to start wall-making.

Since the budget from the Project was limited, the villagers have had to struggle a lot in contributing their labors, locally available materials, fund-raising, etc. There were disputes amongst the committee members, and maybe between the villagers and committee members as well. The village chairman has been putting his utmost efforts but sometimes looked really stuck. Yet, they have come to almost completion of the school construction as of January 2010. The wall, the last part of the unfinished school building, has been put up to almost half level as of January 2010.

Before the primary school opened, an age-old building in the monastery compound was used as primary school. The school was so far from the village that pupils had to bring their lunch-boxes to school. On the way to and from the school, the pupils had to pass-by a big pond and take a foot-path on one side of which there were big stones on the hill. In fact, in rainy season some stones rolled down and sometimes blocked the foot-path. Parents were very much worried about their children whenever they went to the old school. For very young pupils, their parents had to accompany with them to and from school.

For those reasons, villagers had a burning desire to have a school not far from the village. With the new school now in service, parents are very happy because even their 3-4 year-old children can go to school together with their elder brothers or sisters as pre-kindergarten pupils. Even very poor children, whose parents cannot afford to buy school bags, can now go to the school by carrying their books and notes in hand¹. Besides, there used to be occasions that teachers did not attend as expected because none of the parents could observe the old school. But now teachers are attending very seriously since the new school is located just near the village. 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. They feel quite sure that their children have brighter future.

¹ Previously there were couple number of children who often did not go to school because they did not have school bag. Without school bag, it was very tough work to go to the far school by carrying books in hand.

4.8 Evaluation of FY 2007/08 Pilot Project as at January/ February 2008

Nearing the end of FY 2007/08, the Study Team conducted evaluation as well as appraisal workshops for the pilot projects. At first, evaluation workshops at village level, i.e. with implementers of the pilot projects were carried out from early to late January 2008. Then, an evaluation workshop was held in Mandalay for 3 days from January 30 to February 1, 2008. In fact, some of the activities such as cottage activities just started operation as of early 2008, so that evaluation at this stage is of preliminary. The participants to the workshop are; village leaders engaged in relevant sectors, TS officers, district officers, divisional officers and headquarters officers. Participants are summarized in the following table, and the evaluation at such different level was meant as below:

Table 4.8.1 Participants to the Evaluation Workshops at Village and at Mandalay, Jan/Feb. 2008

Place	Village/ Cadre	WS Date	Participants	Remarks
Village	Khaungkawe	Jan. 7, 2008	49	
	Magyi	Jan. 10, 2008	52	
	Ar La Ka Pa	Jan. 12, 2008	29	
	Ma Gyi Sauk	Jan. 14, 2008	133	
	Mingan	Jan. 18, 2008	101	
	Legaing	Jan. 20, 2008	47	
	Total		410	
At Mandalay	Headquarters Officer	Jan. 30 – Feb. 1, 2008	5	
	Divisional Officer		9	
	District Officer		12	
	Township Officer		17	
	Villagers		24	
	Total		67	
Total			477	

Source: Workshop supported by JICA Study Team

Villagers at Village Level:

Project evaluation; namely, the project itself is evaluated from the view point of sustainability by themselves based upon what they have actually done and also what they are now doing.

Village Leaders and TS Officers at Workshop:

Programme evaluation from the view point of extension; namely, if the project should be worth extended to neighboring villages and to wider areas through extension activities.

District Officers, Divisional Officers and Headquarters Officers:

Programme appraisal from the view point of implementation; namely, if the project should be worth budgeted in line with the ministry's mission/ priorities.

JICA Study Team and counterparts:

Programme appraisal from the view point of poverty reduction; namely, if the project should be worth supported by donor(s) in terms of reducing poverty in CDZ.

Except at the village level workshops, the evaluation and appraisal of the pilot were conducted from the viewpoints of efficiency, effectiveness, impact, relevance and sustainability and the participants voted for marking in a range from 5 as the highest to 1 as the lowest. After the appraisal sessions at Mandalay workshop ended, the Study Team also rated the projects in the same manner of the appraisals including counterparts. The team members rated the projects individually from the five aspects and calculated the aggregate marks.

4.8.1 Project Evaluation at Village Level

At this village level, implementation process was reviewed by relevant project implementers (villagers) and they shared difficulties they have faced, lessons out of solving the problems, way-forward etc. Based on the review, they evaluated the project sustainability in such categories as:

1) we can continue the activities, 2) we cannot continue the activities, and 3) we do not want to continue the activities due to some reasons by themselves by just hand-raising. Tables 4.8.2 – 4.8.5 summarize the evaluation of sustainability by sector and following are pointed out:

1) Agriculture Sector

For the agriculture sector, raised-bed cultivation in Magyi village and Bokashi compost making in Mingan village were given 100% of ‘we cannot continue the activity’. This is because that the raised bed cultivation in Magyi village accompanied a tube well construction which goes beyond the financial capacity of the poor. Though one villager sunk additional 3 tube-wells on his own cost to have enough irrigation water apart from the 3 wells provided by the project, poor villagers think it is beyond their financial capacity, thereby giving such low sustainability in its evaluation.

Bokashi compost tried in the pilot project used EM (effective microorganism) to facilitate the decomposition process under anaerobic condition. EM concentrate can be available through MAS TS offices in some cases but not always. Mingan village is located in a remote area, and far from the TS MAS office. Villagers have a difficulty to go to the TS office and vice versa, meaning technical government officers have hardly visited. Therefore, the villagers think they hardly have accessibility to EM concentrate, giving such low sustainability. This situation about EM concentrate availability takes place in Ma Gyi Sauk village as well, resulting in 54% only in the reply of ‘we can continue’.

Table 4.8.2 Sustainability Evaluation by Villagers for Agriculture Sector, Jan/Feb 2008

Sector	Component	Village	We can continue	We can not continue	We do not want to continue
Agriculture	07A1 Raised-bed Cultivation	Khaungkawe	100% (14)		
		Magyi (tubewell)		100% (5)	
		Ma Gyi Sauk	100% (14)		
	07A2 Improved Seeding Practice	Magyi (w/ seeder)	86% (18)	14% (3)	
	07A3 Improved Seed Regeneration	Ma Gyi Sauk	100% (15)		
	07A4 "Bokashi" Compost Making	Khaungkawe	100% (16)		
		Magyi	100% (24)		
		Ma Gyi Sauk	54% (7)	46% (6)	
		Mingan		100% (17)	
	07A5 Mushroom Culture	Legaing	100% (5)		
		Ar La Ka Pa	50% (3)	25% (1)	25% (1)
		Legaing	100% (13)		
07A6 Rice-duck Farming	Ma Gyi Sauk	NA (terminated due to water non-availability)			

Note: Numbers in parenthesis are the participant numbers who raised hands.

Improved seeding practice with the introduction of an improved seeder tried in Magyi village was given a bit low sustainability, that is 86%. There are clayey soils with high moisture in this area, on which condition the seeder cannot be operated well. Also, the seed dropping pipe was sometimes clogged due mainly to sticky soil turning back to the opening of the pipes. Due maintenance was therefore required. Such situation gave a bit low sustainability in its evaluation.

Mushroom cultivation was tried in 2 villages; namely Ar La Ka Pa village and Legaing village, giving very much different evaluation results between the two. All of the Legaing village beneficiaries said that they can continue the mushroom cultivation, giving 100% sustainability while in Ar La Ka Pa village only half, 50%, of the beneficiaries said they can continue, and a quarter said they cannot and the last quarter of the beneficiaries said they do not want to continue.

The mushroom yield in Ar La Ka Pa, 0.5 – 5.5 viss per bed, was lower than that in Legaing, 2.7 – 6.2 viss per bed during the 3 trials arranged under the project. Beneficiaries' profit in Ar La Ka Pa village was small and felt marginal especially by farmers who can usually get considerable profit out of their farming. Even some landless beneficiaries thought there were ample farm labor works in this village, thereby being engaged in farm labor may be better than mushroom cultivation. In addition,

Ar La Ka Pa beneficiaries could not market the mushroom beyond their village, thereby demand has nose-dived when natural mushroom started shooting near their village. These situation reduced their interest of cultivating mushroom in Ar La Ka Pa village, though among the beneficiaries are still motivated if they could have the experienced maximum yield, 5.5 viss per bed.

2) Livestock Sector

Under livestock sector, such components were given sustainability by all the WS participant beneficiaries as; goat revolving, pig revolving, animal housing improvement, local cattle improvement by natural mating and mulberry cultivation. On the other hand lower sustainability was given to sheep revolving in Ma Gyi Sauk village, livestock feeding improvement including urea molasses block making in all the 5 villages, intercropping of sorghum and rice bean for fodder in all the 3 villages.

Table 4.8.3 Sustainability Evaluation by Villagers for Livestock Sector Jan/Feb 2008

Sector	Component	Village	We can continue	We can not continue	We do not want to continue	
Livestock	07L1 Sheep Revolving	Magyi	100% (13)			
		Ma Gyi Sauk	31% (4)	69% (9)		
	07L2 Goat Revolving	Khaungkawe	100% (11)			
		Magyi	100% (13)			
		Ma Gyi Sauk	100% (13)			
	07L3 Pig Revolving	Mingan	100% (12)			
		Legaing	100% (9)			
	07L4 Livestock Feeding Improvement	07L4 Livestock Feeding Imp. (Mulberry)	Khaungkawe	23% (3)	62% (8)	15% (2)
			Magyi	27% (3)	73% (8)	
			Ma Gyi Sauk	25% (6)	75% (18)	
			Ar La Ka Pa	25% (1)	25% (1)	50% (2)
			Mingan	35% (7)	25% (5)	40% (8)
	07L5 Local Cattle Improvement	Mingan	100% (101)			
	07L6 Intercropping of Sorghum and Rice Beans	Ar La Ka Pa	100% (2)			
		Legaing	100% (6)			
	07L7 Animal Housing Improvement	Ar La Ka Pa	50%* (1)		50%** (1)	
		Mingan			100% (5)	
Legaing			50% (2)	50% (2)		
07L7 Animal Housing Improvement	07L7 Animal Housing Improvement	Khaungkawe	100% (1)			
		Magyi	100% (1)			
		Ar La Ka Pa	100% (12)			
		Mingan	100% (2)			

Note1: Numbers in parenthesis are the participant numbers who raised hands.

Note2: *marked by cattle farmers, ** marked by sheep and goat villagers.

Beneficiaries for the sheep revolving in Ma Gyi Sauk village raised that there is difficulty to get ram to multiply them as compared with goat raising. Also they feel difficulty of keeping the sheep individually due to financial difficulty. Therefore, all the sheep in a group are kept in one of the members compound and taken care of by them rotationally, as a sort of collective ownership. They plan that upon completion of delivering offspring to the 2nd generation beneficiaries, they divide the sheep into individual ownership.

With this above, they are of course supposed to construct their own sheep house, but some poor members still feel difficulty of putting up. This led to the low sustainability of 'only 31% of the beneficiaries whom they can continue'. After a workshop held at village, to solve the difficulty of getting ram and kids as compared to goat rearing group, 2 groups (10 members) decided to change to goat raising gradually. By doing so, they are going to continue goats raising to get more income.

In all the 5 villages where molasses block making as a part of feeding improvement was tried, no village reached to over 40% of sustainability, mostly showing lower than 30%. Majority of the beneficiaries said that they couldn't continue molasses block making and some said they do not want

to continue. The reason behind this low sustainability is that some beneficiaries stated that their animal do not lick the block due probably to unfamiliarness to the animals. Financial difficulty was also raised to get necessary ingredients in places where village is located in remote area. It is estimated to cost them about 3,500 – 4,000 Kyats to make 10 viss (16.5kg) molasses block¹, which can be finished in 2 – 3 weeks by around 10 animals. These reasons gave low mark to the sustainability of this component.

Intercropping sorghum and rice bean cultivation was also marked low in sustainability. The sorghum stems have grown up larger and healthier than those cultivated conventionally, as in the improved yields of 1.5 to 2.0 times more, thanks to the nitrogen fixing effect by the rice bean. However, the bigger stems gave rats an opportunity of easily climbing up the stems and reaching to the tassel ironically. The rats have eaten the tassel, giving very little or no harvest of seeds. In addition, beneficiaries believe that total volume of the plants per acreage is less for the improved cultivation though individual stem has grown up bigger than the conventionally cultivated one. This is because conventional sorghum is cultivated in broadcasting way while the improved one in line planted way.

Another contributor to the low sustainability of sorghum cultivation is the fact that farmers tend to cultivate crops which can give cash rather than just fodder. They are not much interested in cultivating sorghum. Some villages like Ar La Ka Pa and Legaing are relatively abundant for feeding materials from other crops' residual though the nutrient in sorghum is obviously higher. They think farmland should be utilized by crops which give cash rather than being occupied by fodder. All these observations made the improved sorghum cultivation to be not much sustainable except for cattle farmers in Ar La Ka Pa village.

3) Cottage Sector

For cottage sector, generally high marks in sustainability was given though some lower marks appear in such components as sandstone ware production in Mingan village, road station in Legaing village, and fruit processing & juice production in Legaing village. Beneficiaries engaged in sandstone ware were provided a trollogy, 25HP tiller-engine-driven- truck to ferry the sandstone ware from the quarry to the village and then to nearby markets. The trollogy needed some repair and improvement since it should stand up with very heavy load.

After receiving the trollogy, they have inched up the body so that it can carry more load and run on the nearby rural rough roads. So far, till January 2008, they had to borrow 400,000 Kyats for the repair and improvement, which they think is not balanced with the income accruing from the trollogy service to date. Among them, one is the driver of the trollogy, who was not paid as much as he can earn from his sandstone processing. Such difficulties made them give lower sustainability in the sandstone ware improvement component.

As to Road station in Legaing village, 6 % of the WS participants said 'we cannot continue'. They were planning to make jam and sell at the road station. However, since the group suffers from capital shortage to start up jam making business, they replied so. 13% of the WS participants said 'we do not want to continue'. This reply came from farm labor group. Since the road station was not yet opened on that day when the WS was held, sustainability of the component was asked not only the direct beneficiaries but also to all the WS participants. Farm labors who gave that reply of 'we do not want to continue' showed no interest in operating the road station, ended in this result.

Fruit processing & juice production tried in Legaing village was given a reply of 'we do not want to continue' by 33% of the beneficiaries. They think that it is difficult to get some chemical and aromas,

¹ It can last only 2 weeks by around 10 cattle, and 3 weeks by around 10 shoats though it is very much dependent on the local and animal conditions.

and also there are some members who are occupied with daily business. Though they can use the skills for family members in occasions, they do not intend to do it on business scale. Beneficiaries for this component are 28 females, out of whom 7 beneficiaries have already started it as business as of January 2008. Upon opening of the road station, some of them started selling the products there.

Table 4.8.4 Sustainability Evaluation by Villagers for Cottage Sector, Jan/ Feb 2008

Sector	Component	Village	We can continue	We can not continue	We do not want to continue
Cottage Industry	07C1 Tinsmith Strengthening	Khaungkawe	100% (4)		
	07C2 Guitar-Key Strengthening	Khaungkawe	100% (5)		
	07C3 Embroidery Promotion	Ma Gyi Sauk	100% (26)		
	07C4 Weaving Improvement (material)	Khaungkawe	100% (4)		
	07C4 Weaving (Motorized) Promotion	Ma Gyi Sauk	100% (14)		
	07C5 Knitting Promotion	Ma Gyi Sauk	100% (41)		
	07C6 Sandstone Ware Production	Mingan	33% (2)	50% (3)	17% (1)
	07C7 Road Station	Legaing	81% (26)	6% (2)	13% (4)
	Road Shop	Ar La Ka Pa	NA (cancelled)		
	07C8 Paddy Drier	Legaing	100% (5)		
07C9 Fruit Processing	Legaing	67% (8)		33% (4)	
07C10 Energy Efficient Stove	Magyi (Jaggary)	100% (12)			

Note: Numbers in parenthesis are the participant numbers who raised hands.

4) Living Improvement Sector

There are 4 components under this sector, all of which were given of 'we can continue' by all the beneficiaries. This high expression of the sustainability may be explained from 3 aspects. All the components fall in a category of basic need, thereby they think they should operate and maintain the facilities otherwise they would lose the basic need. Secondly, it may be associated with the project nature which entailed certain investment cost.

There could be a tendency, for the beneficiaries who were given certain initial investment, of giving high marks in its evaluation due probably to the commitment to sustain the big investment. Thirdly, since the components were not yet at full level operation as of January 2008 except for the drinking water in Ar La Ka Pa village, they may be showing high commitment towards future, probably resulting in high sustainability in its evaluation.

Table 4.8.5 Sustainability Evaluation by Villagers for Living Improvement Sector, Jan/ Feb 2008

Sector	Component	Village	We can continue	We can not continue	We do not want to continue
Living Improvement	0711 Drinking Water (for Animal & Human)	Ar La Ka Pa	100% (16)		
	0712 Biogas Generation (cow dung)	Khaungkawe	100% (48)		
	0713 Electrification by Diesel Generator	Mingan	100% (101)		
	0714 Primary School w/ Roof Catchment	Mingan	100% (7)		

Note: Numbers in parenthesis are the participant numbers who raised hands.

4.8.2 Project Evaluation and Appraisal at Different Level

On the first day of the workshop held in Mandalay from January 30 to February 1, 2008, the village leaders prepared activity reviews together with problems they have faced, lessons, outputs, etc. Then, the review results were presented on the 2nd and 3rd days to all the participants. Since time was limited, not all the project reviews were presented but major ones only by considering that at least one presentation should be done by each village. After question and answer had been done, all the participants evaluated the projects by 5-aspects by different 3 levels; namely, villagers level, TS officers level, and higher cadres' officer level composed of district, division and headquarters.

1) Agriculture Sector

Table 4.8.6 summarizes the 5-aspect evaluation results in that there is a tendency for the villagers to

give higher marks than government officers in general. This may be common since the villagers are the implementers who are rather proud of their activities while government officers tend to evaluate from some critical points of view. We can see a bit lower marks in such columns as relevance and sustainability, and effectiveness in Raised-bed cultivation rated by the government officers. Also, lower marks appear in effectiveness, relevance and sustainability in Mushroom cultivation rated by the government officers. However, in any case no marks lower than 3 were given.

Though all the participants agreed the efficiency of raised-bed cultivation, difficulty which happened in Magyi village for sinking tube well by themselves to avail of irrigation water may have contributed the lower marks in Raised-bed cultivation. For mushroom cultivation, the participants have got mixed outcomes between Ar La Ka Pa village and Legaing village. Taking more into consideration the outcome of Ar La Ka Pa village which gave lower project performance, Government officers gave a bit lower marks.

On the other hand, higher marks over 4.0 can be seen in such components as improved seeding with new seeder introduction and improved seed regeneration (chick pea), and Bokashi compost making. Since farmers think seed has been degraded, they feel a need to regenerate seed, and so do the government officers. Introduction of seeder which could save seed from 24 pyi to 17 pyi per acre contributed the higher marks as well. For Bokashi, participants gave higher marks faced with high price of chemical fertilizer though the increase of crop production with Bokashi is difficult to confirm in a direct way. At least Bokashi can save money from buying chemical fertilizer, that could be the main reason of the high marks.

Table 4.8.6 5-aspect Evaluation for Agriculture Components by Different Level, Jan/ Feb 2008

Sector	Component	Participants	Efficiency	Effectiveness	Impact	Relevance	Sustainability
Agriculture	07A1 Raised-bed Cultivation (Khaungkawe, Magyi, Ma Gyi Sauk)	Village Leaders	4.0	3.5	3.8	3.8	4.0
		TS Gvt. Officers	4.0	3.5	3.7	3.3	3.4
		Dist, Div, HQs	4.0	3.2	3.5	3.2	3.3
	07A2 Improved Seeding Practice (Magyi), 07A3 Improved Seed Regeneration (Ma Gyi Sauk)	Village Leaders	4.0	4.1	4.0	4.2	4.0
		TS Gvt. Officers	3.9	3.9	4.1	4.5	3.9
		Dist, Div, HQs	4.0	4.0	4.0	4.0	4.0
	07A4 "Bokashi" Compost Making (Mingan, Magyi, Khaungkawe, Ma Gyi Sauk, Legaing)	Village Leaders	4.1	3.9	4.1	3.8	3.9
		TS Gvt. Officers	4.2	4.0	4.0	3.9	3.7
		Dist, Div, HQs	4.1	3.8	4.1	4.0	4.0
	07A5 Mushroom Culture (Ar La Ka Pa, Legaing)	Village Leaders	3.7	3.6	3.6	3.6	3.7
		TS Gvt. Officers	3.7	3.9	3.8	3.4	3.3
		Dist, Div, HQs	3.7	3.4	3.6	3.6	3.8

2) Livestock Sector

Table 4.8.7 shows the evaluation results for livestock sector. The first 2 components, goat/sheep and pig revolving were given higher marks. The latter 2 components, feeding improvement including urea molasses block making and intercropping sorghum and rice bean, however, were given lower marks though no marks lower than 3 were given. These results are very in conformity with what was given in village level workshop in which only sustainability was asked though.

Table 4.8.7 5-aspect Evaluation for Livestock Components by Different Level, Jan/ Feb 2008

Sector	Component	Participants	Efficiency	Effectiveness	Impact	Relevance	Sustainability
Livestock	07L1, L2 Goat and Sheep Revolving (Magyi, Khaungkawe, Ma Gyi Sauk)	Village Leaders	4.0	4.0	4.0	4.1	4.0
		TS Gvt. Officers	3.9	4.0	4.1	4.0	4.1
		Dist, Div, HQs	4.1	4.1	4.0	4.2	4.3
	07L3 Pig Revolving (Legaing)	Village Leaders	4.0	4.0	4.0	4.0	4.0
		TS Gvt. Officers	3.8	4.1	3.6	4.3	4.0
		Dist, Div, HQs	3.5	3.9	3.7	3.8	3.6
	07L4 Feeding Improvement (Mingan, Magyi, Khaungkawe, Ar	Village Leaders	3.8	3.7	3.5	3.6	3.6
		TS Gvt. Officers	3.6	3.1	3.0	3.0	3.0

	La Ka Pa, Ma Gyi Sauk)	Dist, Div, HQs	3.6	3.1	3.3	3.2	3.5
	07L6 Intercropping Sorghum and Rice Bean (Mingan, Ar La Ka Pa, Legaing)	Village Leaders	3.5	3.0	3.0	3.0	3.0
		TS Gvt. Officers	3.3	3.0	3.0	3.1	3.1
		Dist, Div, HQs	3.3	3.1	3.4	3.4	3.1

3) Cottage Sector

Evaluation for cottage sector was done by village and not by each component. For example, there are 3 components such as tinsmith, weaving and guitar key in Khaungkawe village, and upon completion of all the three components the participants evaluated all the 3 components as one; namely as village cottage industry.

Table 4.8.8 shows that cottage sector components were given relatively higher marks, though in some parts there are a bit lower marks. In Ma Gyi Sauk village, government officers were concerned with motorized weaving machines which need fuel as well as technician to prepare for good maintenance and emergency repair. This has contributed to such a bit lower marks. In Mingan village, sustainability of trolley was an issue. Since the trolley is supposed to carry stones, very heavy ones, repair and maintenance cost takes place which at moment sweep away their profit. Efficiency, effectiveness and impact were therefore marked lower by the government officers.

Table 4.8.8 5-aspect Evaluation for Cottage Components by Different Level, Jan/ Feb 2008

Sector	Component	Participants	Efficiency	Effectiveness	Impact	Relevance	Sustainability
Cottage Industry	07C1 Tinsmith Strengthening, 07C2 Guitar-key Strengthening, 07C4 Weaving Improvement (Khaungkawe)	Village Leaders	<u>4.1</u>	<u>4.1</u>	<u>4.1</u>	<u>4.2</u>	<u>4.2</u>
		TS Gvt. Officers	4.0	4.0	4.0	<u>4.1</u>	<u>4.1</u>
		Dist, Div, HQs	3.9	3.9	<u>4.1</u>	<u>4.2</u>	4.0
	07C3 Embroidery, 07C4 Motorized Weaving, 07C5 Knitting Promotion (Ma Gyi Sauk)	Village Leaders	3.9	3.9	3.8	<u>4.2</u>	3.8
		TS Gvt. Officers	<u>3.4</u>	<u>3.3</u>	<u>3.2</u>	3.6	3.7
		Dist, Div, HQs	3.8	3.6	3.8	<u>4.2</u>	<u>4.1</u>
	07C6 Sandstone Ware Production Improvement (Mingan)	Village Leaders	3.5	3.5	3.5	3.9	3.9
		TS Gvt. Officers	3.6	<u>3.2</u>	<u>3.4</u>	3.9	3.9
		Dist, Div, HQs	<u>3.3</u>	<u>3.2</u>	<u>3.4</u>	3.8	3.6
	07C7 Road Station (Legaing)	Village Leaders	<u>4.1</u>	<u>4.2</u>	<u>4.1</u>	<u>4.3</u>	<u>4.2</u>
		TS Gvt. Officers	4.0	4.0	<u>4.1</u>	<u>4.2</u>	<u>4.2</u>
		Dist, Div, HQs	<u>4.2</u>	<u>4.2</u>	<u>4.1</u>	<u>4.2</u>	<u>4.3</u>

4) Living Improvement Sector

Under living improvement sector, only electricity supply in Mingan village was evaluated since other projects had just started the operation and not yet reached the stage of any evaluation as at January 2008. The project gave high marks almost throughout all the aspects and by all the participants. The generator supplies electricity 3 hours per day, which make family life very pleased. Though they have to pay the fuel cost, it can be borne by substituting candles which had been used so far. Payment for fuel is cheaper than candle, about two-thirds as of January 2008.

Table 4.8.9 5-aspect Evaluation for Living Improvement by Different Level, Jan/ Feb 2008

Sector	Component	Participants	Efficiency	Effectiveness	Impact	Relevance	Sustainability
Livelihood	07I3 Electricity Supply by diesel generator (Mingan)	Village Leaders	4.0	4.0	<u>4.1</u>	<u>4.2</u>	4.0
		TS Gvt. Officers	<u>4.2</u>	<u>4.3</u>	<u>4.3</u>	<u>4.1</u>	4.0
		Dist, Div, HQs	4.0	3.9	<u>4.1</u>	<u>4.2</u>	3.8

4.8.3 Project Appraisal by JICA Study Team together with Counterparts

Table 4.8.10 summarizes the evaluation results by JICA Study Team and counterparts as of February 2008. Generally, marks are lower than those rated by villagers and government officers. Aspects given lower than or equal to 3.0 mark are; sustainability of Bokashi, animal housing improvement and

feeding improvement including urea molasses block making. Sorghum with rice bean intercropping and also mulberry promotion as a part of feeding improvement were rated lower throughout almost all the aspects. Under cottage sector, energy efficient stove for Jaggery production in almost all the aspects and sandstone ware production in terms of effectiveness were rated lower. If we see the evaluation by aspect-wide, one may notice that sustainability is given a bit lower marks as compared to other aspects.

On the other hand, pilot components given relatively higher marks are goat revolving tried in 4 villages, weaving improvement in Khaungkawe village, paddy drier in Legaing village, fruit processing in Legaing village, and all the components under living improvement except for drinking water for human and livestock in Ar La Ka Pa village. By aspect-wide, one may notice relevance is given higher marks to some extent as compared with other aspects.

Table 4.8.10 5-aspect Evaluation by JICA Study Team with Counterparts, Jan/ Feb 2008

Sector	Component	Efficiency	Effectiveness	Impact	Relevance	Sustainability
Agriculture	07A1 Raised-bed Cultivation (Khaungkawe, Magyi, Ma Gyi Sauk)	3.2	3.4	3.4	3.8	3.4
	07A2 Improved Seeding w/ Seeder (Magyi),	3.3	3.4	3.1	3.7	3.2
	07A3 Seed Regeneration (Magyi, Ma Gyi Sauk)					
	07A4 "Bokashi" Compost (Mingan, Magyi, Khaungkawe, MGS, Legaing)	3.5	3.3	3.5	3.9	3.0
	07A5 Mushroom Culture (Ar La Ka Pa, Legaing)	3.6	3.4	3.6	3.7	3.1
Livestock	07L1 Sheep Revolving ((Magyi, Ma Gyi Sauk)	3.3	3.5	3.7	3.3	3.3
	07L2 Goat Revolving (Mingan, Magyi, Khaungkawe, Ma Gyi Sauk)	3.6	4.1	3.9	4.0	4.1
	07L3 Pig Revolving (Legaing)	3.6	3.4	3.3	3.7	3.3
	07L4 Feeding Improvement (Mingan, Magyi, Khaungkawe, Ar La Ka Pa, MGS)	3.2	3.1	3.2	3.3	2.3
	07L4 Feeding Improvement (Mulberry Promotion)	2.9	2.8	3.2	3.0	2.7
	07L5 Local Cattle Improvement by Bull Natural Mating (Ar La Ka Pa, Legaing)	3.1	3.5	3.6	3.5	3.5
	07L6 Intercropping of Sorghum and Rice Bean (Mingan, Ar La Ka Pa, Legaing)	2.8	2.7	2.9	3.0	2.2
	07L7 Animal Housing Improvement (Mingan, Magyi, KGW, Ar La Ka Pa)	3.2	3.2	3.1	3.3	2.6
Cottage Industry	07C1 Tinsmith Strengthening (Khaungkawe)	3.3	3.4	3.5	3.8	3.7
	07C2 Guitar-Key Strengthening (Khaungkawe)	3.4	3.3	3.3	3.6	3.6
	07C3 Embroidery Promotion (Ma Gyi Sauk)	3.7	3.7	3.6	3.9	3.6
	07C4 Weaving Improvement (Khaungkawe)	4.0	3.5	3.6	4.1	3.6
	07C4 Motorized Weaving (Ma Gyi Sauk)	3.4	3.5	3.6	3.7	3.5
	07C5 Knitting Promotion (Ma Gyi Sauk)	3.7	3.7	3.6	3.9	3.6
	07C6 Sandstone Ware Production Improvement (Mingan)	3.2	3.0	3.2	3.4	3.2
	07C7 Road Station (Legaing)	3.8	3.8	3.8	3.9	3.5
	07C8 Paddy Drier (Legaing)	3.9	3.8	4.0	4.1	3.8
	07C9 Fruit Processing (Legaing)	3.9	4.2	3.8	3.8	4.2
07C10 Energy Efficient Stove for Jaggery Production (Magyi)	3.0	3.0	3.5	3.0	3.0	
Living Env.	07I1 Drinking Water (Ar La Ka Pa)	3.5	3.6	3.6	3.5	3.3
	07I2 Biogas Generation (Khaungkawe)	4.3	4.4	4.2	4.2	4.0
	07I3 Electrification by Diesel Generator (Mingan)	3.9	4.2	4.3	4.0	3.8
	07I4 Primary School with Roof Catchment Facility (Mingan)	4.5	4.5	4.4	4.3	4.0

4.8.4 Suggestions by Project Evaluation and Appraisal as of February 2008

From above practices of evaluation and appraisal, following may be implied as a mid-term lessons and suggestions as at January/ February 2008:

- 1) All the agriculture components are highly relevant, but in some cases issues arise such as availability of EM concentrate for making Bokashi compost, and affordability of sinking tubewell often required for raised-bed cultivation during summer season. MAS TS offices are primarily responsible for availing of the EM concentrate, so that effort be required at MAS side. From the farmers' side, IMO (indigenous microorganism) farming may be one of the options substituting EM concentrate.
- 2) Sinking tubewell needs investment for not only the tubewell itself but also engine pumping system. Before going to this system, wherever groundwater lies in shallow range treadle pump can be tried

with hand-dug shallow well. Likewise, where stream water is available within a maximum of 5 – 6 m below the farm level, the treadle pump can be used to lift up the water onto farmlands. Treadle pump is operated by manual, reducing the operation cost. This system can be accompanied with the raised-bed cultivation where water is available within a reach.

- 3) Most farmers are in need of getting better quality of seeds. Since seeds are recycled by farmer themselves or by colleague farmers who have produced good harvest, thereby good seeds, degradation has been notified by farmers. Therefore seed regeneration upon procuring of good certified seeds is highly recommended. In this seed regeneration, improved seeder can also be tried as was the case of one of the pilot projects in Magyi village. Seeders can save seed amount as well as weeding works as compared to conventional broad-casting sowing. However, introduction of seeder increases land preparation works, usually from 1 day to 3 days per acre, to smoothen the farm surface, and also seeders can hardly function on very heavy soils. Introduction of seeder should be judged according to the field condition.
- 4) Mushroom cultivation can be a very good income source for landless because no farm land but just only house yard is required for the cultivation, and in 2 weeks they can get the harvest. However, there is a key issue to lead this programme to success, that is the incorporation of traders in the cultivator group or establishment of the linkage with traders. Without marketing mushroom beyond their village, the cultivator would face difficulty soon of getting income. In Legaing village, one of the beneficiaries was a trader dealing with commodities, who went to townships regularly. She just added the mushroom in her sales good, and after that another 2 traders also came in trading the mushroom.
- 5) Under livestock sector, goat, sheep and pig raising especially for the poor people are highly recommended according to the environment in which villages are located. As to area where dryness prevails, goat comes as first option, and then probably sheep. In villages where paddy is very much cultivated, pig raising is recommended from the view point of feed availability.
- 6) Improved livestock housing is of course required from the view point of sanitation improvement both for human and for livestock itself. However, since most of the poor cannot prepare for enough cash, simple structured housing made of locally available materials is recommended. Or, a collective housing which can accommodate a herd of goat/sheep is recommended as seen in Ma Gyi Sauk village.
- 7) Feeding improvement including urea molasses block making was not rated so high. In fact there is a difficulty for rural people to prepare for all the necessary ingredients. However, this component was accompanied with some trainings about livestock diseases, caring and keeping of livestock, etc, which constitutes of an essential part of the knowledge required. Therefore, there is a need to carry out such training in advance of or upon delivering of goats/ sheep inclusive of urea molasses block making.
- 8) Sorghum production is less valued by most of the farmers. Therefore sorghum itself cannot be promoted strongly. However the cultivation method tried under this component was the intercropping with rice beans which can fix atmospheric nitrogen, thereby enriching soils. Since there are many farmers who do not know the effective function of legumes, TS MAS should extend the knowledge. Then when they plant sorghum for the purpose of animal feeds, MAS should recommend to intercrop with rice beans.
- 9) Issue under the cottage industry is how to pay back the investment cost to a village level committee. Under the pilot project, beneficiaries are supposed to pay back equivalent amount of the initial investment for equipment to a main committee set up at the village level, or otherwise

they are supposed to pay rental fee for the equipment to the committee. Fund paid back to the main committee is meant to additionally buy new equipment, to loan out some cash to needy villagers for the purpose of education, medication, etc. Following up for the fund should be done by relevant cooperative officers.

- 10) Components under living improvement are a kind of basic social infrastructure; that is electricity generation, primary school construction, and drinking water supply. These components meet the people's needs, thereby giving high evaluation results. Since there are some villagers who are equipped with mechanical technology/ skills in each village, operation and maintenance of the machineries provided could go well. Issue is the depreciation for the machineries. According to estimation, villagers can bear operation and maintenance costs, however as far as depreciation is concerned it goes beyond the villagers' financial capability.

4.9 Evaluation of FY 2007/08 Pilot Project as at February 2009

Nearing the end of FY 2008/09, the Study Team conducted evaluation workshops for the pilot projects commended in FY 2008/09 and some in FY 2007/08. At first, evaluation workshops at village level were carried out from late January to early February 2009, covering 5 villages where FY 2007/08 pilot projects were commenced (in fact, there are 6 villages, of which Khaungkawe village was excluded from the WS due to limited time) and another 2 villages where FY 2008/09 pilot projects were commenced (Ka Ma village and Pabe North village). Then, an evaluation workshop was held in Mandalay for 3 days from February 9 to 11 2009. Since time was limited and number of pilot projects was enlarged, not all the villages were covered by this evaluation.

In the village level workshop, at first they have reported the current status, their problems and solutions, and achievements they were proud of, and then they went to an evaluation session in terms of sustainability referring to what they have been doing. In Mandalay, they have done the same process of what they had done in their village but evaluation was not carried out. This is because it was meant to share their experiences amongst the villagers and government officers, and also there was not enough time available in the WS. Participants are summarized in the following table:

Table 4.9.1 Participants to the Evaluation Workshops at Village and at Mandalay, Jan/Feb. 2009

Place	Village/ Cadre	WS Date	Participants	Remarks
Village	Ar La Ka Pa	Jan. 26, 2009	22	
	Magyi + Ka Ma (2008/09)	Jan. 28, 2009	50	PP in FY 2008/09
	Mingan	Jan. 30, 2009	65	
	Pabe North	Jan. 31, 2009	82	PP in FY 2008/09
	Legaing	Feb. 2, 2009	23	
	Ma Gyi Sauk	Feb. 5, 2009	80	
	Total			322
At Mandalay	Divisional Officer	Feb. 9 – Feb. 11, 2009	8	
	District Officer		12	
	Township Officer		27	
	Villagers		28	
	Total		75	
Total			397	

Source: Workshop supported by JICA Study Team

4.9.1 Evaluation at Village Level as at February 2009

Evaluation results at 7 villages are summarized by sector in the following tables, e.g. agriculture, livestock and cottage. From these tables, one may notice that most of the pilot projects were rated as sustainable, e.g. 100 % concerned beneficiaries who participated in the evaluation workshop raised hands when they were asked if they could continue. By the way there are 3 pilot projects where we can see lower sustainability in sheep revolving project in Ma Gyi Sauk village, fruit processing project in Legaing village, and community revolving fund in Magyi village (in fact, this is a group revolving

on weaving). The reasons behind are as follows:

- 1) 07L1 Sheep revolving pilot project was tried in 2 villages in 2007; Magyi village and Ma Gyi Sauk village. Since twin-ratio is much lower than that of goat, multiplication takes longer time. In fact, In Ma Gyi Sauk village, there were 6 groups, of which 3 grouped were provided sheep (the rest 3 groups provided with goat). Then 2 of the 3 groups changed to goat in early 2009 after they had realized goat rearing was easier because they could be grazed on almost all plants. As of February 2009, revolving is about to start but 2nd generation beneficiaries do not want to accept the sheep. This situation led to the lower sustainability, rated at no one stating 'we can continue'. Though the beneficiaries, 3 groups, in Magyi village said they could continue, they may start thinking the change.
- 2) For the 07C9 Fruit processing pilot project in Legaing village, the statement was divided by half; 50% (6 persons) can continue and the rest (6 persons) cannot. The reason why half of them cannot continue are; it takes time to be sold, profit is marginal e.g. net 15,000 Kyats per month at maximum, not enough market within the village, difficulties of getting necessary materials in time such as food-color, preservatives (chemicals for preservation) available in big city only, etc.
- 3) On of the 08C1 Community revolving fund establishment projects was tried in Magyi village in FY 2008/09, which provided 5 multiple layer weaving machines to a women weaving group. Their market is in Thailand, whereby traders usually come to buy from Mandalay, who ferry the product as far as the border with Thailand. However, due to the world financial crisis taking place since lat 2008, the market in Thailand shrunk very quickly. At moment, the buyers stopped buying their products and therefore the weavers cannot continue the production. There may be a possibility of changing their market to domestic for a while. However, domestic markets do not need sophisticated design of cloths but simple one, which can be woven by ordinary simple layer machines within shorter time. They may have to wait for the revival of the market in Thailand.

Table 4.9.2 Sustainability Evaluation by Villagers for Agriculture Sector

Sector	Component	Village	We can continue	We can not continue	We do not want to continue
Agriculture	07A1 Raised bed cultivation (irrigation)	Magyi	100% (18)		
	07A2 Improved Seed Regeneration	Magyi (w/ seeder)	100% (31)		
	07A5 Mushroom Culture	Ar La Ka Pa	100% (8)		
		Legaing	100% (10)		
	08A3 Improved Seeds Regeneration	Ma Gyi Sauk	100% (25)		
	08A5 Small-scale Irrigation Promotion	Kan Ma	100% (21)		
	08A7 Minimum Tillage Promotion	Kan Ma	100% (31)		

Note: Numbers in parenthesis are the participant numbers who raised hands.

Table 4.9.3 Sustainability Evaluation by Villagers for Livestock Sector

Sector	Component	Village	We can continue	We can not continue	We do not want to continue
Livestock	07L1 Sheep Revolving	Magyi	100% (19)		
		Ma Gyi Sauk		25% (1)	75% (3)
	07L2 Goat Revolving	Magyi	100% (16)		
	07L5 Local Cattle Improvement	Legaing	100% (12)		
	08L1 Goat Revolving	North Pabe	100% (22)		
		Kan Ma	100% (20)		
Legaing		100% (10)			

Note: Numbers in parenthesis are the participant numbers who raised hands.

Table 4.9.4 Sustainability Evaluation by Villagers for Cottage Sector

Sector	Component	Village	We can continue	We can not continue	We do not want to continue
Cottage Industry	07C3 Sewing Promotion	Ma Gyi Sauk	100% (20)		
	07C4 Motorized Weaving	Ma Gyi Sauk	100% (13)		
	07C5 Knitting Promotion	Ma Gyi Sauk	100% (31)		
	07C6 Sandstone Ware Production	Mingan	100% (26)		
	07C7 Road Station	Legaing	100% (20)		
	07C9 Fruit Processing	Legaing	50% (6)	50% (6)	
	08C1 Community Revolving Fund	Magyi	28% (2)	72% (7)	
Ar La Ka Pa		100% (20)			

Note: Numbers in parenthesis are the participant numbers who raised hands.

4.9.2 Evaluation at Mandalay as at February 2009

As aforementioned, the workshop held at Mandalay from February 9 –11, 2009 did not undertake evaluation as far as village level pilot project was concerned (whereas, extension pilot project commenced in FY 2008/09 only were evaluated (see Chapter 5.11 Evaluation of FY 2008/09 Pilot Project as at February 2009). Instead, the villagers invited, mostly representatives from above-mentioned pilot projects, introduced their current status, problems and solutions, and achievement so far done. Thereafter, the floor was opened for interactive discussions. In fact there were not much interactive discussions amongst the villagers coming from different places, or between the villagers and government extension officers. What was seen during the session was that in many cases divisional officers gave some questions for clarification and also some advices. Following are excerpts of those exchanges:

- 1) Bio-gas Power Plant (cow-dung) established in Khaungkawe had been facing power fluctuation due to illegal use. The villagers finally installed AC-DC converter to eradicate the illegal use. A division officer inquired of how they found out illegal using of electricity and villager replied that it was done by using one fuse for 10 - 15 households at first, and then by using AC-DC switchboard. It is learned that Mingan village, where diesel generator for electricity was installed, is also suffering from power fluctuation. They learned the effectiveness of AC-DC converter, and they said they would also install. In fact, the participants from Mingan village made a study tour to Khaungkawe village to know how it works.
- 2) Concerning treadle pump, a divisional pointed out that the cost for fuel could be reduced by using treadle pump and inquired if there were farmers who imitated to use treadle pump in neighboring areas. The villagers replied so far there had not been. However, knowing the fact that they can substitute as much as 16 gallons of diesel, costing them about 50,000 Kyats as of December 2008, for 1 acre onion cultivation, the participants got interested in very much.
- 3) Unfortunately, the operation for Tinsmith strengthening and Guitar-key strengthening carried out in Khaungkawe village is very dormant or nearly ceased (this was reported by the CP in charge). A participant asked the Project if Japan technology for guitar-key making was going to be used or not. Counterparts answered that improved technology which will be able to compete with China technology was being searched for, but it was difficult to introduce.
- 4) As per Trollergy provided under 07C6 Sandstone Ware Production tired in Mingan village, it was reported there was an offer asking the committee to rent out for 1-year period. The offer was 100,000 Kyats for the rental fee per month, which is in fact bigger than what the committee has so far earned (As of January 2009, they committee save a net profit of 125,000 Kyats only in total). Though the offer looked nice, it was discussed and the committee temporarily decided that they do

not accept the offer. This is because if the trolley were rented out to the private, the trolley would be in ruin in the long run and that they would like to use it for village development activities. Also they think the trolley should be used in emergency case as well, as exemplified there were 2 times the trolley ferried sick person to a hospital of Kyaukpadaung town.

4.10 Evaluation of FY 2007/08 Pilot Project as at February 2010

4.10.1 Evaluation at Village Level as at January 2010

Nearing to the completion of FY 2007/08 and FY 2008/09 Pilot Projects, the Study Team carried out evaluation workshops in 4 pilot project villages. Those 4 villages were chosen on behalf of all villages where pilot projects were carried out, taking into consideration of 5 typologies. Table 4.10.1 shows the name of villages, the number of participants, and the date concerning evaluation workshop. Legaing village falls in type V, North Pabe and Mingan village fall in type I, and Ar La Ka Pa village in type III. The participants to the workshop are beneficiaries representing social strata such as farm households, non-farm households, casual farm labors, village leaders, and committee members.

Table 4.10.1 Participants to the Evaluation Workshops at Villages, Jan. 2010

Place	Village/ Cadre	WS Date	Participants	Remarks
Village	Legaing	Jan. 17, 2010	36	Male:24 Female:8 Gov.:4
	North Pabe	Jan. 20, 2010	54	Male:46 Female:5 Gov.:3
	Mingan	Jan. 20, 2010	57	Male:43 Female:9 Gov.:5
	Ar La Ka Pa	Jan. 25, 2010	56	Male:50 Female:6 Gov.:0
Total			203	Male:163 Female:28 Gov.:12

Source: Workshop supported by JICA Study Team

At this village level, implementation process was reviewed by relevant project implementers (villagers) and they shared difficulties they have faced, lessons out of solving the problems, way-forward etc. Based on the review, they evaluated the project sustainability in such categories as: 1) we can continue the activities, 2) we cannot continue the activities, and 3) we do not want to continue the activities due to some reasons by themselves by just hand-raising. Tables 4.10.2 – 4.10.5 summarize the evaluation of sustainability by sector and following are pointed out:

1) Agriculture Sector

For the agriculture sector, mushroom cultivation in Ar La Ka Pa village was given 100 % of ‘we cannot continue the activity’. This is because the activity is not suitable for casual worker families, since they need everyday income. On the other contrary, in Legaing village there are 100% of ‘we can continue’. Though, it may be difficult to continue if it is not on a manageable scale, according to participants, but the profit under the scale is actually low. As a result, beneficiaries’ profit in Ar La Ka Pa village was small and felt marginal especially by farmers who can usually get considerable profit out of their farming. Even some landless beneficiaries thought there were ample farm labor works in this village; thereby being engaged in farm labor may be better than mushroom cultivation.

One of the activities in improved paddy cultivation promotion programme is the Integrated Crop Management (ICM, one of FY 2008/09 pilot projects), it gives 22 % for ‘we can continue’ and 78 % for ‘we can not continue’. Most of replies are it is difficult to carry out water management, and it has many steps to be carried out. Improved seeds regeneration project is totally 100% for ‘we can continue’. There are some reasons such as the cost can be reduced, there is no difficulty for revolving. Villagers are willing to start revolving seeds for other crops such as sesame, groundnuts, and pigeon pea. Crop storage depot promotion project in Legaing village had 40 % for ‘we can continue’ and 60 % for ‘we cannot continue.’ The depot can be used to store paddy which is to be dried. On the contrary, most farmers are not rich enough to store their paddy at the depot. Therefore, 40 % are ‘we can not continue’.

Table 4.10.2 Sustainability Evaluation by Villagers for Agriculture Sector Jan 2010

Sector	Component	Village	We can continue	We can not continue	We do not want to continue
Agriculture	07A5. Mushroom Cultivation	Ar La Ka Pa		100% (45/45)	
		Legaing	100% (37/37)		
	08A1. Improved paddy cultivation promotion programme	Legaing	22% (2/9)	78% (7/9)	
	08A3. Improved seeds regeneration project	Ar La Ka Pa	100% (45/45)		
	08A6. Crop storage depot promotion project	Legaing	40% (12/30)	60% (18/30)	

Source: Workshop supported by JICA Study Team

2) Livestock Sector

Concerning goat revolving projects, beneficiaries at WS in above 4 villages were saying 'we can continue'. In Legaing village WS participants said that it does not need much capital, goats can be raised by free range, reproduction rate is good. Beneficiaries plan that when revolving, persons having goat raising experiences are to be included in beneficiaries. Pig price has declined sharply since April 2009 due to swine flue. Actually numbers of beneficiaries of pig raising revolving pilot project have been also decreased though some of them are still continuing raising expecting recovery of the price. In spite of swine flue and much negative effectiveness giving to beneficiaries, 100 % of participants answered that we can continue pig raising.

In Ar La Ka Pa village and Legaing village, local cattle improvement were carried out and all participants in WS gave 100 % of 'we can continue'. Because, there are many villagers in Ar La Ka Pa village who are all interested in newly-bought bull, all of them would like to breed cows. They plan that village development committee will provide necessary help to be able to exchange the present bull with a new one if and when necessary in future. A bull-keeper likes taking care of the bull and he always keeps in touch with LBVD staff to get the latest information about animal health care.

In Legaing village, a new bull was purchased by village fund so as to improve breeding condition better (and, in fact, this was followed by Ar La Ka Pa village as well as aforementioned). The bull has already done mating with 57 cows and 18 calves have been born. Among farmers it is said the calves are of good breed and the bull became popular. A bull-keeper is going to keep in touch with LBVD staff in order to take care of the bull more carefully.

Table 4.10.3 Sustainability Evaluation by Villagers for Livestock Sector Jan 2010

Sector	Component	Village	We can continue	We can not continue	We do not want to continue
Livestock	07L2. Goat Raising	Mingan	100% (52/52)		
	07L3. Pig Raising	Legaing	100% (38/38)		
	07L5. Local Cattle Improvement	Ar La Ka Pa	100% (45/45)		
		Legaing	100% (35/35)		
	08L1. Pro-poor oriented goat revolving programme	North Pabe	100% (42/42)		
		Ar La Ka Pa	100% (45/45)		
		Legaing	100% (38/38)		
08L2. Pro-poor oriented piggery revolving programme	Ar La Ka Pa	100% (45/45)			

Source: Workshop supported by JICA Study Team

3) Cottage Sector

There were 100 % of 'we can continue' concerning sandstone ware project. According to participants, not only beneficiaries but also other villagers can improve their village through the trolley. The trolley was used for a transportation to be able to deal with emergency case for

patients as well as to carry sand stone products. Road station was given 37 % of ‘we can continue’ and 63 % of ‘we can not continue’, the project found that most participants judged difficult to continue the project. Some opinions were that committee members have been changed and so it is expected that activities will be more effective. However, some opinions gave that there is weakness in cooperation, there is a village municipal market near the road station and there are not many items which attract the customers at the station.

In connection with paddy drier, it is locally suitable and if there is much rain for summer paddy, the drier must be used without any fail. There were some opinions that the paddy which is dried by the drier has better quality. In Ar La Ka Pa, a lot of participants answered that a tractor is essentially necessary for farmers and it has been successful to some extent by giving 100 % of ‘we can continue’.

Table 4.10.4 Sustainability Evaluation by Villagers for Cottage Sector Jan 2010

Sector	Component	Village	We can continue	We can not continue	We do not want to continue
Cottage	07C6. Sandstone Ware Production Improvement	Mingan	100% (52/52)		
	07C7. Road Station	Legaing	37% (10/27)	63% (17/27)	
	07C8. Paddy Drier	Legaing	100% (32/32)		
	08C1. Community revolving fund establishment project	Ar La Ka Pa	100% (45/45)		

Source: Workshop supported by JICA Study Team

4) Living Environment Improvement Sector

For the living environment improvement sector, most activities are 100 % of ‘we can continue’ except for primary school. On primary school activities in Mingan village, 75 % of concerned participants answered that they can apply for school construction cost from the state to be granted. On the other hand, some said that a large sum of money must be spent to finish construction work and it is difficult to get much money. By saying so, 6 % of participants expressed ‘we cannot continue’. And some participants requested that financial reports to be made known to all villagers.

In North-Pabe village, 120 households out of 132, about 90 % households introduced improved cooking stoves. With a view to preventing fire, this project was carried out in this village, and it is thought that structure of the stove could meet to their demand. Rural development centre (also started as Children’s Nutrition Improvement Center) was carried out in the same village also. According to the participants, positive impacts are not only for nutritional improvement for the beneficiary children but also they learned good behavior such as wash hand, cut nails, and greetings.

Table 4.10.5 Sustainability Evaluation by Villagers for Living Environment Improvement Sector Jan 2010

Sector	Component	Village	We can continue	We can not continue	We do not want to continue
Living Environment Improvement	0711. Drinking Water	Ar La Ka Pa	100% (45/45)		
	0713. Electricity by Diesel Generator	Mingan	100% (52/52)		
	0714. Primary School with Roof Catchment	Mingan	75% (9/12)	25% (3/12)	
	0811-2. Improved cooking stove promotion project, and other Livelihood Improvements	North Pabe	100% (38/38)		
	0813. Rural Development Centre (Children’s nutrition improvement center project as entry)	North Pabe	100% (32/32)		

Source: Workshop supported by JICA Study Team

4.10.2 Evaluation by JICA Team Together with Counterparts as at January 2010

Pilot projects started in FY 2007/08 and FY 2008/09. One to two years have already passed for the pilot projects commenced in FY2007/08, and one year for those which started in FY 2008/09.

Nearing to the completion of FY 2007/08 and FY 2008/09 Pilot Projects, in this session, final evaluation is carried out for FY 2007/08 pilot projects from the view point of 5 aspects – Efficiency, Effectiveness, Impact, Relevance, and Sustainability.

Table 4.10.6 summarizes the evaluation results about FY 2007/ 2008 pilot projects carried out by JICA Study Team, counterparts and national staff as of February 2010. The evaluation was carried out by 3 members of the Study Team (TL, livestock and project management), 4 counterparts in charge of overall management (chief CP), agriculture sector, livestock sector and cottage sector and also 3 national staff who have been monitoring the relevant pilot projects. A form was distributed to all those members and they rated in a range of 1 – 5 by pilot project and by 5-aspect. Thereafter, simple mathematical averages were calculated, which are shown in the following Table 4.10.6:

Table 4.10.6 5-aspect Evaluation of FY 07 /08 Pilot Projects by JICA Study Team with Counterparts, Feb 2010

Sector	Component	Efficiency	Effectiveness	Impact	Relevance	Sustainability
Agriculture	07A1 Raised-bed Cultivation (Khaungkawe, Magyi, Ma Gyi Sauk)	3.1	3.1	3.6	3.1	3.1
	07A2 Improved Seeding w/ Seeder (Magyi)	3.6	3.7	3.3	3.4	3.3
	07A3 Seed Regeneration (Ma Gyi Sauk)	3.9	3.9	3.3	3.6	3.9
	07A4 "Bokashi" Compost (with EM)	3.0	2.6	2.6	3.3	1.7
	07A4 "Bokashi" Compost (with IMO)	3.0	2.7	2.7	3.3	2.1
	07A5 Mushroom Culture (Ar La Ka Pa)	3.1	3.0	2.6	2.4	2.0
	07A5 Mushroom Culture (Legaing)	3.0	3.1	3.4	3.0	3.0
Livestock	07L1 Sheep Revolving (Magyi)	2.9	3.0	2.9	3.4	3.0
	07L1 Sheep Revolving (Ma Gyi Sauk)	2.8	2.8	2.8	3.1	2.4
	07L2 Goat Revolving (Mingan, Magyi, Khaungkawe, Ma Gyi Sauk)	3.5	3.9	3.8	4.1	3.9
	07L3 Pig Revolving (Legaing)	3.2	3.0	3.3	3.9	3.4
	07L4 Feeding Improvement (Mingan, Magyi, Khaungkawe, Ar La Ka Pa, MGS)	2.1	2.1	2.4	3.0	2.1
	07L5 Local Cattle Improvement by Bull Natural Mating (Ar La Ka Pa)	3.3	3.1	3.2	4.0	3.6
	07L5 Local Cattle Improvement by Bull Natural Mating (Legaing)	3.3	3.4	3.3	4.0	3.8
	07L6 Intercropping of Sorghum and Rice Bean (Mingan, Ar La Ka Pa, Legaing)	2.4	2.1	2.1	2.5	1.8
	07L7 Animal Housing Improvement (only housing)	2.6	2.8	2.6	3.1	2.4
	07L7 Animal Housing Improvement (with livestock)	3.3	3.1	3.0	3.3	3.3
Cottage Industry	07C1 Tinsmith Strengthening (Khaungkawe)	1.8	1.6	2.0	2.4	1.5
	07C2 Guitar-Key Strengthening (Khaungkawe)	1.6	1.6	2.0	2.1	1.2
	07C3 Embroidery Promotion (Ma Gyi Sauk)	3.0	3.1	3.5	3.4	3.1
	07C4 Weaving Improvement (Khaungkawe)	3.3	3.4	3.1	3.4	3.1
	07C4 Motorized Weaving (Ma Gyi Sauk)	3.3	3.1	3.3	3.1	3.2
	07C5 Knitting Promotion (Ma Gyi Sauk)	3.5	3.6	3.5	3.6	3.5
	07C6 Sandstone Ware Production Improvement (Mingan)	3.0	3.1	3.6	3.8	3.6
	07C7 Road Station (Legaing)	2.5	2.4	2.7	2.8	2.9
	07C8 Paddy Drier (Legaing)	3.5	3.4	3.5	3.9	3.5
	07C9 Fruit Processing (Legaing)	2.6	2.1	2.5	2.6	2.3
Living Env.	07C10 Energy Efficient Stove for Jaggery Production (Magyi)	2.7	3.0	2.7	3.1	2.9
	07I1 Drinking Water (Ar La Ka Pa)	3.5	3.6	3.5	3.5	3.5
	07I2 Biogas Generation (Khaungkawe)	3.8	3.9	4.0	4.3	4.1
	07I3 Electrification by Diesel Generator (Mingan)	3.6	3.9	4.0	4.3	3.9
	07I4 Primary School with Roof Catchment Facility (Mingan)	3.9	4.1	4.1	4.3	4.0

Source: JICA Study Team

As for agriculture-related pilot projects, out of 5 components, 3 were given average mark. Three pilot projects are raised-bed cultivation, improved seeding with seeder, and seed regeneration. And again out of those 3 components, seed regeneration in Ma Gyi Sauk was highly evaluated. This was because this component was not only directly beneficial and relevant to farmers and small-scale landholders but also there were efficiency, effectiveness, and sustainability. For the rest 2 components, namely, Bokashi compost making and mushroom culture, were given lower than average marks.

For livestock sector, there are altogether 7 components. Among them, goat revolving was given the highest mark reaching up to 4.1 in its relevance. For sheep revolving, it was given lower than that of

goat. According to the above-mentioned table, it can be seen that goat revolving stood first, pig revolving second and sheep revolving third, respectively. Intercropping of sorghum and rice bean component was given the lowest mark among pilot projects. Local cattle improvement by bull natural mating in two villages was given mark higher than average and animal housing improvement was given mark a little lower than average.

For cottage sector, sandstone ware production improvement component was given the highest mark as the component itself was totally relevant to the source of villagers' major income. On the contrary, tinsmith and guitar-key strengthening components were given the lowest mark depending on the present situation of being unable to buy hiking-priced tinplates and being unable to compete with cheaper guitar-key imported from China. Again the second lowest mark was given to fruit processing.

For living environment improvement sector, all components were given marks higher than average. Among them, the mark for 3 components except drinking water reached 4.3 in relevance, representing the highest mark in all components of 4 sectors. In fact, living improvement undertook basic rural infrastructure which are in deed and in need for all the villagers. This situation gave the highest evaluation to those projects.