

DEPARTMENT OF PLANNING
IRRIGATION DEPARTMENT
DEPARTMENT OF AGRICULTURE
MINISTRY OF AGRICULTURE AND IRRIGATION
THE REPUBLIC OF THE UNION OF MYANMAR

**PREPARATORY SURVEY
FOR
INTENSIVE AGRICULTURE
PROMOTION PROGRAM
IN
THE REPUBLIC OF THE UNION OF
MYANMAR**

**FINAL REPORT
(APPENDIXES)**

FEBRUARY 2016

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

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IMPLEMENTATION ARRANGEMENT

APPENDIX I: IMPLEMENTATION ARRANGEMENT

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I.1 JICA Team Members and Counterpart Personnel

I.1.1 JICA Team Members

Mr. Kosei HASHIGUCHI	Team Leader / Irrigation Development
Mr. Fusataka ARAKAWA	Co-leader / Irrigation Development
Mr. Kotaro KIKUCHI	Agricultural Products Processing and Value Chain
Mr. Masakazu KANAMOTO	Agricultural Products Processing Facilities
Ms. Miho HANAMURA	Agriculture Supporting
Mr. Yoji SAWADA	Design / Cost Estimation
Mr. Ryo INOUE	Economic and Financial Analysis
Ms. Rie KITAO	Environmental and Social Consideration
Mr. Shigeru SUGIYAMA	Satellite Image Analysis

I.1.2 Counterpart Personnel

(1) Ministry of Agriculture and Irrigation

1) Irrigation Department (ID)

Mr. Kyaw Myint Hlaing	Director General
Mr. Tint Zaw	Deputy Director General (Lower Myanmar)
Mr. Tint Lwin	Director (Procurement)
Mr. Zaw Win Chit	Director of Design Branch (Lower Myanmar)
Mr. Kyaw Zaw	Director (Planning & Works)
Ms. Khon Ra	Director (Hydrology)
Ms. Myintzu Saw	Director (Investigation)

2) Department of Agriculture (DOA)

Mr. Kyaw Shwe	Director General
Mr. Naing Kyi Win	Deputy Director General
Mr. Aye Ko Ko	Deputy Director General
Mr. Than Kyine	Director (Planning)
Mr. Aung Kyi Thein	Director (Admin)
Mr. Thet Zin Maung	Director (Seed)

3) Department of Agriculture Planning (DAP)

Mr. Tin Htut	Director General
Mr. Kyaw Swe Lin	Deputy Director General
Mr. Maung Ni	Director
Ms. Thander Kyi	Director
Ms. San San Hla	Director

4) Water Resources Utilization Department (WRUD)

Mr. Kyaw Min Oo	Director General
Mr. Htay Lwin	Director (Planning)
Mr. Moe Oo	Director (Admin)

(2) Ministry of Construction**1) Highway Department**

Mr. Aye Tun Maw	Deputy Director (Head Office)
Mr. Aung Myint Oo	Chief Engineer (Ayeyarwady Branch)
Mr. Khine Tun Zaw	Staff Officer (Ayeyarwady Branch)

(3) Ministry of Livestock, Fisheries and Rural Development**1) Department of Rural Development (DRD)**

Mr. Myint Win	Assistant Director (Shwebo District)
Mr. Myo Naing Aung	Director (Mandalay)
Ms. Soe Soe Ohne	Director (Nay Pyi Taw)
Mr. Sa Tint Wai	Deputy Director (Ayeyarwady)
Mr. Hla Myo Aung	Assistant Director (Ayeyarwady)

Person-month Schedule: Preparatory Study on the Programs for Intensive Agriculture Promotion in the Republic of the Union of Myanmar (PIAP)

I.2 Person-Month Input for the Survey

Expertise	Name	Firm	2015												2016		Person-month		
			March	April	May	June	July	August	September	October	November	December	January	February	Field	Home	Total		
In Myanmar	Team Leader/ Irrigation Development	Kosei HASHIGUCHI			29-31	22-27	3-19	27-31	27-28				13-14	21-25			4.97		4.97
	Co-leader/ Irrigation Development	Fusataka ARAKAWA			29-31	27						26-27	24				3.00		3.00
	Agricultural Products Processing and Value Chain	Kotaro KIKUCHI			12-13				1					20			3.80		3.80
	Agricultural Products Processing Facilities	Masakazu KANAMOTO				1	15		1			30					2.50		2.50
	Agriculture Supporting	Miho HANAMURA			29-31	12-15	26		1			15		15			3.00		3.00
	Design / Cost Estimation	Yoji SAWADA							1					20			3.70		3.70
	Economic and Financial Analysis	Ryo INOUE			29-31	13		1					1	15-25			2.30		2.30
	Environmental and Social Consideration	Rie KITAO			29-31	13							4	15			1.40		1.40
In Japan	Team Leader/ Irrigation Development	Kosei HASHIGUCHI																1.90	1.90
	Co-leader/ Irrigation Development	Fusataka ARAKAWA																1.45	1.45
	Agricultural Products Processing and Value Chain	Kotaro KIKUCHI																0.25	0.25
	Design / Cost Estimation	Yoji SAWADA																0.50	0.50
	Economic and Financial Analysis	Ryo INOUE																0.50	0.50
	Environmental and Social Consideration	Rie KITAO																0.50	0.50
	Satellite Image Analysis	Shigeru SUGIYAMA																1.30	1.30
Report and Submission, Total Person-month					△		▲							▲	▲	24.67	6.40	31.07	
			March	April	May	June	July	August	September	October	November	December	January	February					

Legend In Myanmar In Japan
 SCI: SANYU Consultants Inc., JAPAN
 ICR: Inception Report ITR: Interim Report DFR: Draft Final Report FR: Final Report

I.3 Minutes of Meeting And Aide-Memoire

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**MINUTES OF PREPARATORY MEETING
ON
INCEPTION REPORT
OF
PREPARATORY SURVEY
FOR
INTENSIVE AGRICULTURE PROMOTION PROGRAM
IN
THE REPUBLIC OF THE UNION OF MYANMAR**

**DISCUSSED BETWEEN
DEPARTMENT OF PLANNING,
MINISTRY OF AGRICULTURE AND IRRIGATION
AND
JICA PREPARATORY SURVEY TEAM,
JAPAN INTERNATIONAL COOPERATION AGENCY**

Nay Pyi Taw, May 14, 2015



(for Director General)
U Kyaw Swe Lin,
Deputy Director General,
Irrigation Department,
Ministry of Agriculture and Irrigation
(MOAI)



Mr. Kosei HASHIGUCHI
Team Leader
JICA Preparatory Survey Team,
Japan International Cooperation Agency
(JICA)

To conduct the Preparatory Survey for Intensive Agriculture Promotion Program (PIAP), JICA has dispatched a team on 29th April 2015 headed by Mr. Kosei HASHIGUCHI, Sanyu Consultants Inc., for the execution of the Survey, and accordingly the Team commenced series of surveys in Myanmar.

Based on the first-hand surveys conducted in early May 2015, the Team has prepared the Inception Report while JICA Myanmar Office has dispatched an advisory mission for preparatory discussion on the Inception Report, headed by Mr. Kyosuke INADA, Deputy Chief, JICA Myanmar Office. Accordingly, a preparatory meeting for the Inception Report was held on 14th May 2015 at a conference room of Ministry of Agriculture and Irrigation inviting representatives from departments concerned under the Ministry.

At the commencement of the preparatory meeting, U Kyaw Swe Lin welcomed all the participants, and addressed that importance of irrigation in Myanmar from ancient times and expressed his expectation to the Preparatory Survey since the survey is to include assessment of irrigation potential to introduce mechanized and modernized agriculture for productivity increase.

U Kyaw Swe Lin also asked Mr. INADA to deliver an opening remark. Mr. Inada, at first, remarked with an apology that the Chief Representative of JICA Myanmar Office could not attend the meeting, and on behalf of the Chief Representative, he expressed JICA's appreciation on the ministry's collaboration so far rendered and also JICA's intention of implementing the Preparatory Survey.

Then, U Kyaw Swe Lin requested Mr. Hashiguchi to explain the contents of the Inception Report. Mr. Hashiguchi made a greeting to all the participants and continued explaining rationale of promoting intensive agriculture, the approach and the methodology of the survey, ideal contents of the PIAP and implementation arrangement of the survey.

After the explanation by Mr. Hashiguchi, U Kyaw Swe Lin invited the participants to discuss on the Inception Report of PIAP. Main discussions arisen during the preparatory meeting are summarized as follows;

- 1) U Kyaw Swe Lin, DDG of DAP, shows his assent to Mr. Hashiguchi's presentation particularly on importance of agricultural mechanization due to labor shortage, necessity of intensive agriculture promotion including infrastructure development, along the value-chain to increase agricultural income. Then, U Kyaw Swe Lin suggested that Chaung Oo (Pauk Inn) area, groundwater irrigation area, has a high potential to adopt intensive agriculture since the area produces watermelon and mask melon in recent years, in addition to rice, chick pea, and other legumes.


Mr. Hashiguchi replied on the Chaung Oo (Pauk Inn) by clarifying that the area has been already included within the pump irrigation area '1-3 Intensive Irrigated Upland Field Crop Promotion Sub-program'. The team therefore will examine the potential of promoting intensive agriculture in the Chaung Oo (Pauk Inn) area in the succeeding field surveys.

- 2) U Naing Kyi Win, DDG of DOA, asked Mr. Hashiguchi to explain about a slide for the advantage and disadvantage of crops, which compares and indicates production efficiencies of summer paddy, monsoon paddy and winter crops. Then, U Naing Kyi Win pointed out that income and profit from summer paddy exceed that from monsoon paddy though summer paddy needs more irrigation water.

Mr. Hashiguchi clarified that the survey result indicated in the slide was obtained in Bago west area 2 years ago, and he further continued that the crop profitability may differ from place to place and also over years, so that the Team will examine such crop profitability by potential area.

- 3) U Kyaw Swe Lin, DDG of DAP, added that public-private partnership is also important to promote intensive agriculture.

Mr. Hashiguchi agreed upon his comment and continued that the study will put importance on the private sector participation in value-chain development.



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- 4) U Naing Kyi Win, DDG of DOA, asked Mr. Hashiguchi to clarify time frame of the project.

Mr. Hashiguchi explained that this survey does not include implementation of the project components in its scope, and the Survey itself cannot make any commitment on the project implementation. He, however, indicated by saying that the time frame in terms of implementation could be minimum 5 years to, say, 10 years though some components may need more than 10 years implementation.

- 5) U Aung Bo, DD of ID, mentioned that ID is now implementing several loan projects, and suggested the team to formulate new project without any overlapping to the existing projects. U Kyaw Swe Lin, DDG of DAP, showed his opinion that, it is possible to formulate a support infrastructure project to the existing ones if the component is not included in the original plan.

Mr. Hashiguchi expressed his understandings on the issue and promised that the team will survey existing and on-going projects including those ones planned by the World Bank, Asian Development Bank, and Indian government for example, to avoid any overlapping.

- 6) Mr. Kyosuke INADA, Deputy Chief, JICA Myanmar Office, asked Myanmar side to support the survey team, e.g. in collecting data from relevant departments and regional offices, since the team has to complete final screening on the priority areas/ schemes by the early July. U Kyaw Swe Lin, DDG of DAP, replied that a working group should be organized to support the survey team properly and allowed the survey team to make direct contacts with regional level officials.
- 7) Mr. Kenichiro Kobayashi, JICA Expert, said that this meeting is still a preparatory meeting on the Inception Report, and asked when the survey team can hold official kick-off meeting. Both sides agreed that they will arrange the meeting based on schedule of H.E. Minister of MOAI and Chief Representative of JICA Myanmar Office.

Finally, the Chairperson, U Kyaw Swe Lin, delivered a closing remark thanking all the participants for joining this preparatory meeting of Inception Report, and assured collaboration to the team.



Participant List

Ministry of Agriculture and Irrigation

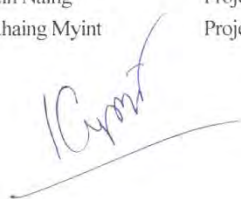
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|-----|-------------------------|--|
| 1. | U Kyaw Swe Lin | Deputy Director General, Department of Planning |
| 2. | U Naing Kyi Win | Deputy Director General, Department of Agriculture |
| 3. | U Tin Maung Aye Htoo | Director, Water Resource Utilization Department |
| 4. | U Aung Bo | Deputy Director, Irrigation Department |
| 5. | Daw Naw Jenny Loo | Deputy Director, Department of Agriculture |
| 6. | U Htay Aung Tint | Staff Officer, Irrigation Department |
| 7. | Daw Nyo Nyo Mar | Staff Officer, Department of Agriculture Planning |
| 8. | U Kyaw Kyaw Oo | District Officer, Department of Agriculture |
| 9. | Daw Ei Ei Theint | Department of Agriculture |
| 10. | Mr. Kenichiro Kobayashi | JICA Expert |

JICA Myanmar Office

- | | | |
|----|-------------------|--|
| 1. | Mr. Kyosuke INADA | Deputy Chief, JICA Myanmar Office |
| 2. | Ms. Yoko YAMAZAKI | Project Formulation Adviser, JICA Myanmar Office |

JICA Survey Team

- | | | |
|----|----------------------|--|
| 1. | Mr. Kosei HASHIGUCHI | Team Leader, JICA Survey Team |
| 2. | Mr. Fusataka ARAKAWA | Co/Team Leader, JICA Survey Team |
| 3. | Mr. Kotaro KIKUCHI | Agribusiness/ Marketing, JICA Survey Team |
| 4. | Ms. Miho HANAMURA | Agriculture Supporting, JICA Survey Team |
| 5. | Mr. Ryo INOUE | Economic/Financial/ Analysis, JICA Survey Team |
| 6. | U Phyto Lin Htun | Project Assistant, JICA Survey Team |
| 7. | U Thaw Zin Naing | Project Assistant, JICA Survey Team |
| 8. | U Aung Khaing Myint | Project Assistant, JICA Survey Team |




**AIDE-MEMOIRE
ON THE INCEPTION REPORT PRESENTATION
FOR PREPARATORY SURVEY
FOR INTENSIVE AGRICULTURE PROMOTION PROGRAM
IN THE REPUBLIC OF THE UNION OF MYANMAR**

Nay Pyi Taw, June 1, 2015

A presentation meeting for the Inception Report on the captioned survey to the Minister of Agriculture and Irrigation was held on 1st June 2015 at a conference room of the Ministry of Agriculture and Irrigation (MOAI) inviting representatives from concerned departments under the Ministry, and Chief Representative of JICA Myanmar Office and his staff. Participants are listed in the attachment and discussions summarized in the following:

1. At the commencement of the meeting, His Excellency Union Minister U Myint Hlaing, delivered an opening remark expressing gratitude from the President of Myanmar and the Minister to JICA's supports, and addressed that importance of agriculture sector in Myanmar. The Minister emphasized that development of agricultural sector could enhance purchasing power of poor farmers, which is quite important for further development of Myanmar. The Minister continued by stressing that the President of Myanmar introduced a policy to develop Nay Pyi Taw as "ASEAN Agricultural Model City", and recognized importance of agricultural mechanization starting from Nay Pyi Taw to the whole nation. Then, the Minister added that the His Excellency was interested in the presentation of the Inception Report, and expressed again sincere thanks to JICA's cooperation.
2. Mr. Keiichiro NAKAZAWA, Chief Representative of JICA Myanmar Office, replied to the Minister that the gratitude from the President and the Minister to JICA's cooperation including 2KR was also grateful for JICA, and JICA well understood how important the development of agriculture sector is in Myanmar. He went on that field survey of the Preparatory Survey for the Intensive Agriculture Promotion Program had already been started by Sanyu Consultants Inc. to identify potential areas. For this purpose, the survey team had initially selected 10 potential sites including Nay Pyi Taw, and would conduct further surveys to select several areas for future project implementation. Mr. NAKAZAWA added that, in addition to the ongoing Irrigation Development Project in Western Bago Region, JICA would like to consider future cooperation in the agriculture sector using its ODA loan and other schemes. He further maintained that as MOAI need to explain the importance of projects to the parliament, JICA also need to be accountable to the Japanese taxpayers.
3. The Minister acceded to Mr. NAKAZAWA's remarks and suggested followings;
 - ✓ Kindly place the highest priority onto the development of Nay Pyi Taw area. MOAI would invite FERD and Ministry of Finance to discuss the survey team's results when the survey reaches a certain point.
 - ✓ Please follow the Presidential order to develop Nay Pyi Taw area as "Green Model City of ASEAN", which includes from production till market development. If the President accepted the survey results, which should include poverty reduction of 8 Townships in Nay Pyi Taw region, the proposed projects could receive full support from MOAI with its all facilities.
 - ✓ It would be a good opportunity in terms of human development if JICA experts work with graduates from Yezin Agriculture University, only one agricultural university in Myanmar, through OJT.
4. Mr. NAKAZAWA expressed his understandings on the importance of Nay Pyi Taw and the policy on

“ASEAN Agricultural Model City”. Yet, he noted that the Preparatory Survey should start with 10 potential sites so far already identified since agricultural sector development should not focus on sole one particular area, but should need to see whole potential sites nationwide. Therefore, he stressed by adding that surveying irrigation and marketing potential in nationwide is quite important.

5. Referring to the presentation of initial findings from the Team Leader of the JICA Survey Team, the Minister mentioned full supports from Directors of MOAI when the project proposal including Nay Pyi Taw area is being formulated, and appointed a Director General as an officer in charge of reporting the results. The Minister then explored that merits of selecting Nay Pyi Taw were; 1) rich in land, water and human resources with favorable climate condition, 2) well developed market linkage by railway, airway and road transportation, 3) infrastructure for value chain development such as electricity to promote “ASEAN Agricultural Model City”.
6. The Minister continued by pointing out that other areas did not have such good investment environment like Nay Pyi Taw, and furthermore cold chain was too early to develop since industries and market infrastructure were still under-developed therein. Then, the Minister suggested the following criteria to select priority areas; 1) sustainable food security, 2) poverty reduction of farmer households, 3) rural development, 4) reduce gap between rural areas and cities, and 5) job opportunity and creation. His Excellency delivered an example of the priority areas that, in addition to Nay Pyi Taw, it could be better to include Magway and Ayeyarwaddy Delta area, since the former was the poorest area, whereas the latter was the most populated area yet still poor area.
7. For a reply to the Minister, Mr. NAKAZAWA showed understandings on Nay Pyi Taw as a priority area and in addition Magway and Ayeyarwaddy Delta able to be other priority areas. He, however, added that since it was necessary to explain to Japanese taxpayers, JICA needs to ask the Preparatory Survey team to start with 10 preliminary selected priority areas, then select 6 areas after a series of field surveys completed, and finally identify the most suitable 3 top priority areas in which intensive agriculture should and could be promoted, based on objective information.
8. The Minister expressed his understandings on why the survey should start with 10 areas, while suggesting the 3 areas, Nay Pyi Taw, Magway, and Ayeyarwaddy Delta, by considering poverty, life expectancy of those residents, malnutrition, and food insecurity. The Minister has now then accepted the approach that other areas could also be possible to select, in addition to Nay Pyi Taw as the highest priority area. The Minister added that it could be selected 3 top priority areas in view of food security, natural disasters and climate change as well. In this connection, His Excellency noted Bago as a high potential area since its rice production is very large. Further, the Minister mentioned that, instead of China and other countries from which Japan imported agricultural products, Myanmar could be a substitution exporter to Japan, which could result in benefits to both countries.
9. The Minister requested JICA to prepare a proposal of 3 top priority areas before President U Thein Sein’s visit to Japan in early July 2015 for Japan-Mekong International meeting. Mr. NAKAZAWA responded that it would be difficult to finish the survey within a month and instead suggested interim results will be reported to the Minister during the survey. The Minister agreed upon the suggestion.

Recorded by Kosei HASHIGUCHI (Mr.)
Team Leader, JICA Survey Team

PARTICIPANT LIST**Ministry of Agriculture and Irrigation**

H.E. U Myint Hlaing	Union Minister, Ministry of Agriculture and Irrigation
Dr. Tin Htut	Director General, Planning Department
U Kyaw Shwe	Director General, Department of Agriculture
U Soe Hlaing	Director General, Department of Agricultural Mechanization
U Kyaw Min Oo	Director General, Water Resource Utilization Department
U Thet Naing Oo	Head of Minister Office
U Tint Zaw	Deputy Director General, Irrigation Department
U Aye Ko Ko	Deputy Director General, Department of Agriculture

JICA Myanmar Office

Mr. Keiichiro NAKAZAWA	Chief Representative, JICA Myanmar Office
Mr. Kyosuke INADA	Senior Representative
Mr. Jun YAMAZAKI	Representative
Ms. Yoko YAMAZAKI	Project Formulation Advisor
Dr. Phyo Thet Lwin	Program Assistant

JICA Survey Team

Mr. Kosei HASHIGUCHI	Team Leader, Irrigation Development
Mr. Fusataka ARAKAWA	Co-Team Leader, Irrigation Development
Mr. Kotaro KIKUCHI	Agribusiness and Food Value Chain Analysis
Mr. Ryo INOUE	Economic and Finance Analysis
Ms. Miho HANAMURA	Agriculture Supporting

**AIDE-MEMOIRE
ON THE INTERIM REPORT PRESENTATION
FOR PREPARATORY SURVEY
FOR INTENSIVE AGRICULTURE PROMOTION PROGRAM
IN THE REPUBLIC OF THE UNION OF MYANMAR**

Nay Pyi Taw, July 28, 2015

A presentation meeting for the Interim Report on the captioned survey to the Minister of Agriculture and Irrigation was held on 28th July 2015 at a conference room of the Ministry of Agriculture and Irrigation (MOAI), inviting representatives from concerned departments under the Ministry, and Chief Representative of JICA Myanmar Office and his staff. Participants are listed in the attachment and discussions summarized in the following:

1. At the commencement of the meeting, His Excellency Union Minister U Myint Hlaing, delivered an opening remark by expressing needs of emergency relief tackling the flood disaster. People in Myanmar are now requiring assistances on; 1) food relief and 2) high-quality rice seed. So far, the government has been supplying rice procured from storages, private sectors, traders and etc to the people.

Regarding the rice seed, since many farmers lost stored high-quality seed due to the flooding, the government is procuring the seed from Seed Processing Plant based in Nay Pyi Taw and the other private companies producing the seed, he added. Since the farmers usually reserve collected paddy seeds by themselves rather than purchasing quality seed, the loss of the paddy seed was serious. The Excellency emphasized that the Intensive Agricultural Promotion Program should have components of; 1) Construction of food storages, 2) Promotion of rice seed production and 3) Establishment of storage facilities of paddy seeds since targets areas of the program have also been devastated by the flood.

His Excellency Union Minister U Myint Hlaing requested establishment of Seed Industry to be integrated into the Program especially in Nay Pyi Taw since the number of production centers of quality seed is now limited around the country. Although there is a facility for paddy seed production and storage in Nay Pyi Taw, it cannot produce enough amount of quality seed. The Excellency mentioned the need of Japan's support on establishment of Seed Industry able to produce quality seed in Nay Pyi Taw area. Furthermore, the Excellency showed expectations of further assistances to storage facilities, cold storages, food processing and packing facilities.

At the direction of President Thein Sein, the government transported necessary tractors and paddy seed to devastated farmers from Nay Pyi Taw after the site visit by the President. The MOAI unfortunately cannot afford to accommodate all the damages of the flooding and the government is also not able to respond to the risks quickly enough. Therefore the Excellency continued that President Thein Sein has already been informed about the Program proposed by JICA and agreed about the importance of facilities to produce high quality paddy seed and introduction of storage facilities.

Finally, his Excellency Union Minister U Myint Hlaing concluded his opening remark by saying that the government puts high priority on schemes introducing agricultural machineries such as tractors through Japanese funds. Agricultural Mechanization Department is now processing bid tender to introduce the machineries by an India loan.

2. Mr. Keiichiro NAKAZAWA, the Chief Representative of JICA Myanmar Office, expressed his gratitude of the fourth-time-meeting within the last four month, and stressed his deepest concern about the people who have suffered from floods. He continued that climate change is one of the hardest issues in the

generation, also adaptation of water management is the key, not only for water-flood area, also dry zone of how to utilize water efficiently. Then, he mentioned about the importance of Intensive Agricultural Promotion Program and explained that JICA Survey Team has already selected four top priority areas considering water resource availability, needs for rehabilitation, productivity of agricultural production, access to market, internal rate of return. He briefly explained the rationale of selecting the four top priority areas. His explanation is as follows:

- 1) Nay Pyi Taw, the capital city and central part between Yangon and Mandalay, is obviously important, and this area is good location for food processing and promoting advanced farming model.
 - 2) Shwebo, the weather condition is suitable for cultivating various crops especially rice, and located on only two hours driving from Mandalay, and also, famous for high-value added rice, yet still, there are needs for new irrigation facilities in this area.
 - 3) Mandalay, is important in terms of agricultural diversification, and also this area is a key of food distribution because this area is located in the center of Upper Myanmar and this area is center of food processing for the Upper.
 - 4) Ayeyarwady is the largest rice production area in Myanmar, therefore, accelerating mechanization, improvement of rice mills, and post harvesting facilities are very important. Ayeyarwady rice is Myanmar's brand rice and strong candidate to rice export foreign countries. Also, this area has high poverty ratio, and therefore irrigation and drainage improvement will benefit the poor farmers.
 - 5) Other areas also possibly have potential; however, we should concentrate some priority areas due to resource constraint. Then, the JICA Survey Team explained more details.
3. The Minister accepted Mr. NAKAZAWA's remarks in the whole, and he mentioned that this proposal is quite comprehensive, but Nay Pyi Taw, the capital, should be added some more programs including seed storage, seed improvement facilities, seed education facilities, and wholesale market to formulate Agricultural Model City of ASEAN.
 4. Referring the presentation of findings from the Team Leader of JICA Survey Team, the Minister commented that Mr. President Thein Sein also focuses on 1) Seed industry, 2) Wholesale market and 3) Facilities for emergency relief (establishing storage of rice seed and food) as Nay Pyi Taw becomes Agricultural Model City of the ASEAN countries. Provided efforts by the MOAI, JICA and JICA Survey Team, the aforementioned objective could be achieved in the future. Therefore, the government and people of Myanmar should clarify their potential and maximize the value of existing resources in order to achieve the goal to supply food to Japan's Markets as well. In addition, he requested JICA Survey Team to examine a further possibility for vision of Nay Pyi Taw as Agricultural Model City since Myanmar has to open export markets accessible to Japan.
 5. In addition, the Excellency explained that the Program and suggestions made by JICA and JICA Survey Team were already shared with the President Thein Sein in the one-hour meeting before the President visited Japan and respective documents were also submitted. In Japan, the President referred to the Program in his speech and issues were discussed. The Minister told that the government shall provide an opportunity to present a final report to be produced by JICA Survey Team directly to the President Thein Sein. The Excellency also proposed that responsible persons from the Myanmar side and the Ministry of Foreign Affairs shall attend the same meeting who are able to collaborate in the implementation of the proposed programs.
 6. Besides, the Excellency asked details of the Program in Nay Pyi Taw indicated in the slide No.9, as:
 - 1) Nay Pyi Taw is the capital of Myanmar and Myanmar is internationally well-known as a nation of agriculture. Development of the capital city is quiet important as the national strategy. The development

should therefore continuously be followed even by next generations.

2) Livelihood of farmers residing in and around Nay Pyi Taw is still vulnerable and there are many households living in poverty. Alleviation of the poverty is also regarded as the national strategy.

7. Referring to the slide No.5, the Excellency requested the team to draw flows from Nay Pyi Taw to the other areas and vice versa. Furthermore, big flows indicating "Best Quality", "International Standard" or "ISO standard" should also be drawn. Additionally, flows exporting to Japan can be expressed with "Sakura color", "To Japan Market" or "Picture of Mt. Fuji. The Excellency continued that we should demonstrate the possibility of the export to Japan from Nay Pyi Taw.
8. The Minister introduced that Kyoka Shokuhin, a Japanese company, is now constructing a dryer able to process 5,000 tons of crops and refrigeration facilities to be opened this September. All the stored vegetables and fruits are to be exported to Japan. Vegetables produced in Shan state are soon to be processed in Nay Pyi Taw and shipped to Japan as well. He also mentioned that Kyoka Shokuhin and the MOAI jointly implemented experimental cultivation in Nay Pyi Taw.
9. Besides, the Excellency introduced a rice milling plant able to process 200 tons of rice established by Mitsui & Co., Ltd and the MAPCO. A brand-name rice is called MJ and plans to be exported to Japan. Thus, the Excellency showed high expectation and strong confidence for exporting crops from Nay Pyi Taw to Japan.

The Minister emphasized that the Program proposed by JICA enables such plans to implement smoothly since they require sustainable production of crops. Excellency added that opening of international markets for exporting is the President's plan and necessary for the development of Nay Pyi Taw.

10. The Excellency proposed that a figure of IRR of Nay Pyi Taw should be higher in the slide No. 6. This is because that 1) there is strong political supports from the government of Myanmar, 2) Since most of population in Nay Pyi Taw are engaged in agriculture and has no alternative jobs, impact of intensive agriculture promotion would be significant, 3) There are twenty-two dams and weirs around Nay Pyi Taw capable to supply enough irrigation water, 4) Electricity is available twenty-four hours a day, 5) Yezin Agricultural University (YAU) is the only institute of higher learning in agriculture in Myanmar and located in Nay Pyi Taw, and 6) There is an agricultural research institution nearby.
11. The Excellency added that the promotion of intensive agriculture in Nay Pyi Taw is quite crucial. Unless the farmers around the capital, Nay Pyi Taw, increase their incomes, other farmers do not become wealthy. Excellency pointed out the reason why the achievement has not accomplished is that 1) there is not enough capital budgets and 2) not enough large markets. Given the implementation of the Intensive Agriculture Promotion Program, the government would tackle such disadvantages and expect future outcomes. If the figure of IRR is small, the program cannot function as a model agriculture city. Therefore, he requested a re-examination of the IRR.
12. Mr. NAKAZAWA acceded the Minister's remarks, yet he remained that IRR is very objective, and therefore the figure should be respected as it is.
14. The Ministry acceded to the Program at Ayeyarwady region and pinpointed that trainings of appropriate agricultural techniques are essential because farmers in the area still practice primitive farming and stick to their belief. For example, the farmers produce rice by direct seeding and do not sort low quality seed from their paddy seed. As a result, it has been observed that 1) the farmers sow excess rice seed, 2) when harvesting, the crop ends up straw, 3) soil degradation occurs on a farm and 4) quality of rice is deteriorated.
15. The Excellency proposed implementation of a pilot project in Nay Pyi Taw so as to demonstrate increase of farmers' income. Demonstration farm would secure farmers' agreements on participation in intensive agriculture. This is highly expected, mentioned by the Excellency.

16. the Excellency mentioned that procurement of unhulled rice for a milling plant, capable to process 200 tons of them, is in fact questioned before the opening of the plant of the MJ rice. Indeed there was an opinion that opening of such a large scale plant is impossible. However, once we opened the plant, we procured necessary amount of the unhulled rice. This is because that, Excellency emphasized, JICA implemented 1) introduction of GAP, 2) consolidation of farm lands, 3) agricultural mechanization and etc. The Excellency particularly pointed out the increase of farmers' income. There were the participant farmers who increased their income by as much as five times. However, the Excellency mentioned that there is still a field people requiring supports such as food processing.
17. The Minister explained that the government has promised to improve the farmers' livelihood residing around Nay Pyi Taw. In detail, Excellency mentioned the farmers' income is targeted to increase by three times after a few years. Given the implementation of the program proposed by JICA, the goal is expected to be achieved earlier. He added that once farmers in rural areas such as Ayeyarwady region observes the demonstration farms practiced by the farmers of Nay Pyi Taw and acknowledge the increase of income led by intensive agriculture, they would be motivated and invest more in their farming.
18. He showed his expectation for the export to Japan by mentioning that market prices in Japan is twenty times as high as those in Myanmar. To meet such a demand, supports by JICA and JICA Survey team are necessary and should be implemented with a focus on Nay Pyi Taw.
19. The Minister briefed development schemes being implemented by the other bilateral and multilateral aids as: 1) Loan by India ExInBnk and 2) Loan by IFAD. The former loan targets establishment of irrigation schemes, agricultural mechanization and consolidation of farm lands and has a budget of 200 million dollars. Of 50,800 acres covered in total, 8,000 acres are in Nay Pyi Taw. The latter includes projects such as consolidation of farmland. Of 60,000 acres being targeted, 12,000 acres are located in Nay Pyi Taw. Since these projects only target consolidation of irrigation schemes and farm land, the program proposed by JICA is comprehensive and differs from such projects, Excellency emphasized.
20. Mr. Nakagawa mentioned that the Survey has 2 phases, in the first stage, the JICA team selected four priority area. Based on this understanding and agreement, JICA would like to ask to proceed 2nd stage. The 2nd stage includes pre-feasibility studies in each of the four priority areas. During pre-feasibility study, JICA team will study IRR again not only Nay Pyi Taw, but also other three areas. JICA team also is to investigate if the project areas include other project areas such as India, World Bank. After the JICA team has completed pre-feasibility study on all four areas, it will be an ideal occasion to make final presentation to the MOAI and high authorities of the government.
21. The Minister said that Bago West Project, a 150 million USD project, had passed one year, during which the Project imported agricultural machineries to Myanmar from Japan. Since Japan's aid finishes within a limited short period of time, the Excellency expects further supports by Japan's ODA. On 6th July, 2015, President Thein Sein visited Japan and appreciated cooperation given by JICA. The following day, he received reply from Japan's side and appreciated such a quick response. The Minister also showed his appreciation for quick responses by JICA Survey Team on the presentation.

Finally, the Excellency concluded that further suggestions on the Intensive Agriculture Promotion Program by the Team are highly appreciated about 1) Seed industry, 2) Seed storage, 3) Processing and 4) Packaging in Nay Pyi Taw. This is because a domestic private sector cannot explore such fields.
22. Mr. NAKAZAWA expressed his gratitude for the Minister's kind words and he promised that they would try their best to facilitate the project. Also, they would show the benefits to farmers as soon as possible.

Recorded by Kosei HASHIGUCHI (Mr.)
Team Leader, JICA Survey Team

PARTICIPANT LIST**Ministry of Agriculture and Irrigation**

H.E. U Myint Hlaing	Union Minister, Ministry of Agriculture and Irrigation
Dr. Tin Htut	Director General, Planning Department
U Kyaw Shwe	Director General, Department of Agriculture
U Soe Hlaing	Director General, Department of Agricultural Mechanization
U Kyaw Min Oo	Director General, Water Resource Utilization Department
U Thet Naing Oo	Head of Minister Office
U Tint Zaw	Deputy Director General, Irrigation Department
Dr. Myo Kywe	Rector, Yezin Agricultural University

JICA Myanmar Office

Mr. Keiichiro NAKAZAWA	Chief Representative, JICA Myanmar Office
Mr. Hiroaki IMAI	Deputy Assistant Director, JICA Head Quarter
Mr. Jun YAMAZAKI	Representative, JICA Myanmar Office
Dr. Phyo Thet Lwin	Program Assistant, JICA Myanmar Office

JICA Survey Team

Mr. Kosei HASHIGUCHI	Team Leader, Irrigation Development
Mr. Ryo INOUE	Economic and Finance Analysis
U Phyo Lin Tun	Project Assistant, JICA Survey Team
Daw Khin Mar Su	Interpreter

**AIDE-MEMOIRE
ON THE BRAINSTORMING MEETING
ON THE REVIEW AND DIRECTION SETTING
FOR MYANMAR AGRICULTURE,
HELD ON DECEMBER 22, 2015**

Nay Pyi Taw, December 22, 2015

Brainstorming Meeting on the Review and Direction Setting for Myanmar Agriculture was opened by a speech of Dr. Tin Htut, Permanent Secretary of MOAI, as follows:

- 1) The Permanent Secretary (PS) expressed that since Myanmar is still a developing country, there are some difficulties and weaknesses in Planning, and Ministry of Agriculture and Irrigation (MOAI) is also in the same condition. The PS mentioned that is why organizing this kind of brainstorming meeting is very important for MOAI and he believes that the meeting will surely bring about profitable results. He further continued that MOAI very much appreciates JICA for assisting and coordinating in this kind of meeting.
- 2) The PS guided that 5-year development plan of Myanmar agriculture sector, attached to the Myanmar 20-year Comprehensive Development Plan must be inputted as the most important tool in this kind of brainstorming meeting by participating young staff of MOAI since the Plan which will be set up by the meeting will be for their future as well. The PS then mentioned that the MOAI should hold a series of brainstorming meetings for example- quarterly by requesting JICA to assist and participate in.
- 3) The PS further indicated necessity of website of MOAI to be smarter than the current one to make the public very much aware about what the MOAI has done, what are on-going activities and what are the future plans. He stressed that, therefore, the MOAI will be able to receive advices, comments and feedback from the public, which will be valuable resources for the way forward stepping onto better condition of MOAI and the Country as well.

Mr. Hashiguchi of JICA Survey team for intensive agriculture promotion shared outcomes from the surveys conducted and delivered a sort of preliminary ideas relating to the development of Myanmar agriculture sector. Presentations were then followed together with related respective presentations by Department of Planning (DOP), Department of Agriculture (DOA), Department of Industrial Crop Development (DICD), Department of Agricultural Research (DAR), Irrigation Department (ID), Agricultural Mechanization Department (AMD), Myanmar Agriculture Development Bank (MADB) and Department of Agriculture Land Management and Statistic (DALMS).

DG of DAR facilitated and requested the participants to set up issues first, which should be prioritized to discuss in the meeting. DG of DAR added that, base on presentation by respective departments, there could be three things which take important place; i.e., 1) Research and Extension, 2) Loan Program, and 3) Farmer Organization Establishment. Then, DDG of DOA (U Naing Kyi Win) mentioned that DOA has also a plan of increasing crop productivity as an additional discussion issue to the presentation by Mr. Hashiguchi. Accordingly, floor was opened for clarification, discussions and agreements as follows:

- 1) DDG of DOA (U Aye KoKo) mentioned that MOAI dose not have GAP certificate and this condition makes Myanmar agriculture products difficult to compete those from other countries in the international market. He further continued that the certificate is the best evidence to show what we have done; and the MOAI needs to have GAP certification.
- 2) DDG of DOA (U Aye Ko Ko) added that one more important thing is the seed industry development. In Myanmar, under the current condition, the government cannot provide nor does DOA produce to cover the amounts of seed demanded by all the farmers. Therefore, DOA is encouraging farmers to produce certified seeds by themselves but still the department is far away from the target. Therefore, assisting and promotion of private sector seed production should be one of the prioritized issues.
- 3) Dr. Win Htut (Director of DALMS) mentioned that information sharing among departments under MOAI is weak, which results in poor coordination in implementing a project which needs more than one department, e.g., land consolidation project. So, Information Technology Improvement within the Ministry is also one of the most important issues to attain closer coordination and smother implementation of that kind of above mentioned project.
- 4) Director of DOA mentioned that MOAI officers should check and study the contents of presentation by JICA team since MOAI has also same targets, e.g., increasing of crop productivity. If the participants think that the contents presented are appropriate, MOAI should consider to follow-up and/or refer to the advices and ideas given by the JICA team.
- 5) DDG of ID mentioned that; there are important issues such as: 1) developing agriculture sector not only in irrigable areas but also in rain-fed areas, 2) risk management relating to targeted market, 3) maintenance of completed projects, 4) capacity building of the departments under MOAI, and 4) sustainability plan for the completed projects, which should also be considered in planning future agricultural development in Myanmar.
- 6) Dr. Win Htut (Director of DALMS) mentioned that, to implement agricultural development activities, the MOAI needs to consider on the geographical view point, thematically and also technically prioritized areas set up in the MCDP
- 7) DDG of DOP invited the advices and comments relating to implementation of Intensive Agriculture in Myanmar. DDG would like to know participants' thinking whether Myanmar needs intensive agriculture or not. And, if the answer is no, DDG would like to receive advices and ideas how Myanmar Agriculture Sector can be developed or promoted without it. (there is no comment from Myanmar side and this issue will be continuously discussed in the next meeting which is intended to hold soon).
- 8) Mr. Hashiguchi explained why Japanese side is now recommending intensive agriculture in Myanmar as; this country is now aiming at promoting labor-intensive industries, to which labor force should be provided from rural areas whereby leaving less number of farm labors, and also shrinking in younger generation had already taken place in Myanmar leading to less working population in Myanmar, especially in rural areas. This situation needs to transform the current Myanmar agriculture, current conventional one, to capital intensive one which requires less labor input. In fact, capital intensive agriculture is not that costly as an example in that the introduction of combine-harvester has reduced farming cost rather than depending on farm labors for harvest (an example in Shwebo).

- 9) DG of DAR and DDG of DOP mentioned that at least one time of internal meeting among MOAI staff should be held before the next plenary meeting, to which JICA will be invited to provide advices and ideas from Japanese side, and JICA advisor, Mr. Kobayashi, could be invited to attend even such internal meetings to cooperate with MOAI officials.
- 10) DDG of DOP mentioned that issues to be discussed internally could be GAP certification, seed industry development, information technology improvement and food value-chain, and small groups will be formed by respective sector to discuss prior to the next plenary meeting. In addition, a group to organize the next meetings will be formed, e.g., a meeting coordination committee, and the DOP will consider and inform when the next meeting should be held. Note that next meeting could be held in DAR temporarily decided.

Meeting closed at 14:00 with closing remarks by Mr. NISHIGATA, Senior Representative, JICA

Recorded by JICA PIAP Team

PARTICIPANT LIST

Ministry of Agriculture and Irrigation

Dr. Tin Htut	Permanent Secretary, Ministry of Agriculture and Irrigation
Dr. Ye Tint Tun	Director General, Department of Agriculture Research
U Kyaw Swe Lin	Deputy Director General, Department of Planning
U Naing Kyi Win	Deputy Director General, Department of Agriculture
U Aye Ko Ko	Deputy Director General, Department of Agriculture
U Tint Zaw	Deputy Director General, Irrigation Department
U Myint Zaw	Deputy Director General, Agricultural Mechanization Department
Daw Khine Zaw Wai	Department of Planning
Dr. Amy Soe	Department of Planning
Daw Thi Thi Aung	Department of Planning
Daw Moe Moe Than	Department of Planning
Daw Yin Yin Nwet	Department of Planning
Dr. Win Pa Pa Soe	Department of Planning
Dr. Thandar Kyi	Department of Planning
U Aung Ko Latt	Department of Planning
U Pyae Phyo Aung	Department of Planning
Daw San San Hla	Department of Planning
Daw Khin Mar Oo	Department of Planning
Daw Aye Aye Than	Department of Planning
U Khaing Htun	Department of Planning
Daw Jue Jue Aung	Department of Planning
Daw Su Hlaing Tint	Department of Planning
Daw San San Lwin	Department of Planning
Daw Khin Thandar Win	Department of Planning
U Myo Tint Tun	Department of Planning
U Mg Ni	Department of Planning
U Aye Min Tun	Department of Planning
Dr. Tin Tin Aung	Department of Planning
U Cho Lay	Irrigation Department
U Tint Lwin	Irrigation Department
U Kyaw Zaw	Irrigation Department
U Zay Yar Oo	Irrigation Department
Daw Sein Nwet	Irrigation Department
U Soe Soe	Agricultural Mechanization Department
U Ye Win Ko	Water Resources Utilization Department
U Han Thein Mg	Water Resources Utilization Department
Dr. Ye Tun Tun	Department of Agriculture Research
Dr. Maung Maung Tar	Department of Agriculture Research
Dr. Tin Ohmar Win	Department of Agriculture Research
Dr. Myat Thaint Ko	Department of Agriculture Research

Dr. Aung Moe Myo Tint	Department of Agriculture Research
Dr. Theingi Myint	Yezin Agricultural University
Daw Myo Sabai Aye	Yezin Agricultural University
Daw Nandar Aye Chan	Yezin Agricultural University
U Sein Hla Tun	Myanma Agricultural Development Bank
Daw Nan Myint	Myanma Agricultural Development Bank
U Tin Sein	Department of Agriculture
U Zaw Htun Myint	Department of Agriculture
U Hla Myint Auung	Department of Agriculture
Daw Phyu Lay Myint	Department of Agriculture
Daw Zin Po Myint	Department of Agriculture
Daw Nu Nu Lwin	Department of Agriculture
Daw Nilar Htike Htike Tin	Department of Agriculture
Daw May Zar Myint	Department of Agriculture
Daw San Kyi	Department of Agriculture
Daw Mar Mar Lwin	Department of Agriculture
Daw Aye Aye Tun	Department of Agriculture
Daw Win Mar Oo	Department of Agriculture
Daw Khin Tint	Department of Agriculture
Daw Naw Jenny Loo	Department of Agriculture
Daw Kyi Kyi Win	Department of Agriculture
Daw Khine Myo Nyein	Department of Agriculture
U Aung Maw	Department of Agriculture
Daw Thu Zar Myint	Department of Agriculture
Daw Lin Lin Thi	Department of Agriculture
Dr. Kay Thi Soe	Department of Agriculture
U Than Kyaing	Department of Agriculture
Daw Than Than Htay	Department of Agriculture
Daw Nilar Aung	Department of Agriculture
Daw Su Mon Shwe	Department of Agriculture
Daw Myint Myint Aye	Department of Agriculture
Daw Nilar Aung	Department of Agriculture
Dr. Nyi Nyi	Department of Agriculture
U Aung Zaw Htwe	Department of Agriculture

Embassy of Japan

Mr. Kazuyoshi SUZUKI Second Secretary

JICA

Mr. Kotaro NISHIGATA Senior Representative, JICA Myanmar Office
 Mr. Hiroaki IMAI Deputy Assistant Director, JICA Head Quarter
 Mr. Jun YAMAZAKI Representative, JICA Myanmar Office
 Mr. Kenichiro KOBAYASHI JICA Advisor

Dr. Phyo Thet Lwin Program Assistant, JICA Myanmar Office

JICA Survey Team (PIAP Project)

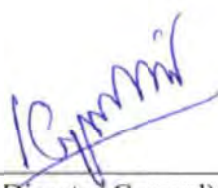
Mr. Kosei HASHIGUCHI Team Leader, Irrigation Development

U Phyo Lin Tun Project Assistant, JICA Survey Team

**MEETING MINUTES
ON
DRAFT FINAL REPORT
OF
PREPARATORY SURVEY
FOR
INTENSIVE AGRICULTURE PROMOTION PROGRAM
IN
THE REPUBLIC OF THE UNION OF MYANMAR**

**DISCUSSED BETWEEN
MINISTRY OF AGRICULTURE AND IRRIGATION
AND
JICA PREPARATORY SURVEY TEAM,
JAPAN INTERNATIONAL COOPERATION AGENCY**

Nay Pyi Taw, January 28, 2016



(for Director General)
U Kyaw Swe Lin,
Deputy Director General,
Department of Planning,
Ministry of Agriculture and Irrigation
(MOAI)



Mr. Kosei HASHIGUCHI
Team Leader
JICA Preparatory Survey Team,
Japan International Cooperation Agency
(JICA)

To conduct the Preparatory Survey for Intensive Agriculture Promotion Program (PIAP), JICA dispatched a team on 29th April 2015 headed by Mr. Kosei HASHIGUCHI, Sanyu Consultants Inc., for the execution of the Survey, and accordingly the Team commenced series of surveys in Myanmar. The JICA team has carried out all necessary works in Myanmar and is coming to the end of the Survey. At this time, therefore, the presentation meeting on the Draft Final Report (DFR) was held on January 28, 2016 at a conference room of Ministry of Agriculture and Irrigation inviting representatives from departments concerned.

The DFR Presentation Meeting was chaired by the Permanent Secretary (PS) of Ministry of Agriculture and Irrigation (MOAI), and he delivered opening speech with special emphasis on context of PIAP will be useful for MOAI in holding a series of brainstorming meetings led by DOP. The PS also mentioned that DFR of PIAP could be one of handing over notes, which are to be transferred to the new Minister of MOAI under the incoming government, and DFR can be utilized by MOAI to work with any type of its affiliated organizations since the study focuses on intensive agriculture promotion and it was done by JICA, one of the most reliable organizations.

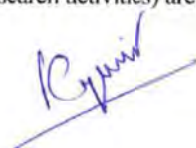
The PS recommended that, considering current situation of agricultural sector in Myanmar, MOAI and its affiliated organizations should focus on the activities relating to research since current research activities of the ministry is still needed to strengthen. In addition to this, the PS requested JICA to focus on extension activities and capacity building of the departments under MOAI as well. The PS mentioned to consider promoting the capacity of the departments especially Department of Agriculture (DOA) since the township level and field staff of the DOA who implement extension services still need to learn more and need to know more to have an effective extension network.

Upon the opening speech by the PS, power point presentation on DFR of PIAP was carried out by Mr. Hashiguchi, the team leader of JICA Survey Team. Following are clarifications, discussions and agreement on the DFR of PIAP:

1. After power point presentation of DFR, the PS remarked the results of the survey and contents of the presentation are very interesting and comprehensive. The PS expressed his appreciation to JICA and the Team, for the efforts of gaining valuable results. The PS said he will surely put the DFR in the list of handing over process to the new minister. The PS requested the Team to provide soft copies of DFR and power point presentation and instructed his staff to prepare to put the DFR in handing over process. The Team replied that they will provide what the PS requested as soon as possible.
2. The PS commented that the DFR should include wider perception of the agro-product markets in Myanmar. The PS said almost all export rice from Myanmar goes to China market and price fluctuation has often occurred due to Chinese traders since they want to buy Myanmar rice at lower price. The PS expressed, as far as he remember, Final Report of the Development Study on Sustainable Agriculture and Poverty Reduction Program in Rural Area in the Central Dry Zone of Myanmar (FR of CDZ Project) funded by JICA also could be an advanced report, which MOAI should utilize.
3. The PS recommended, it would be a good proposal if the DFR of PIAP can be combined with the DFR of CDZ Project since some components of FR of CDZ Project are environmental friendly activities e.g. bio-gas digester, rice husk gas gasifier, etc., which are not included in DFR of PIAP. The PS requested to the Team to provide a soft copy of FR of CDZ project as well since he would like to examine again the framework mentioned in the FR of CDZ Project. The Team replied that they will provide what the PS requested as soon as possible.
4. The PS mentioned to pay more attention on research activities in Myanmar agriculture sector and extension activities of DOA and capacity building of the departments under MOAI. The PS requested to consider upgrading and promoting of Seed Bank rather than Gene Bank, which is one of very useful components for research. The Team replied, although activities directly relating to research or related research components are not included in the DFR, some sub-components relating to research sector are already included in the DFR. Then, the Team explained where and how those sub-components (research activities) are included in



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the DFR by using power point slides.

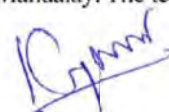
5. The PS requested JICA to consider the program or a project which will be implemented by MOAI staff together with international consultants since he wants the department staff to be smarter by learning how the consultants think, prepare and work. Mr. Kobayashi replied that, by collaborating with Department of Agriculture Research (DAR), JICA has been planning to upgrade Seed Bank, and implement a series of trainings and so on. The PS additionally commented that the activities by DAR or with DAR should be union level but the PS thinks to need some more programs relating to research, which will be participated by any departments under MOAI; especially, such programs which are easy to implement by township and field level staff.
6. Mr. Kobayashi requested to discuss firstly within the MOAI internally regarding final selection of the top priority area(s) out of the four identified under this JICA survey, and inform to JICA. The PS replied MOAI needs to obtain comments from the departments under different ministries such as Department of Rural Development (DRD), Inland Water Transportation Department (IWTD) and High Way Department (HD) as well since some components proposed in the DFR have to be implemented by collaborating with those departments such as road improvement, jetty improvement and so on.
7. Mr. Kobayashi explained that since submission of Final Report of PIAP will be in March, and therefore MOAI is requested to examine the DFR and give comments as fast as possible. The PS agreed to respond within two weeks to JICA (by February 11, 2016). The PS instructed the staff to examine the DFR in more detail and to give feedback on it to JICA. Also, the PS requested his staff to translate at least Executive Summary of the DFR to Myanmar language by sharing amongst the departments under MOAI before submitting DFR to other departments under different ministries. The translation has to be finished by Monday (1st Feb 2016) and DFR will be submitted to DRD, IWTD and HD respectively within the first week of February 2016.

After a series of recommendations, remarks, comments given by the PS, Mr. NISHIGATA, Senior Representative of JICA Myanmar Office, gave thanking remarks to the participants. He appreciated to all of the contribution and supports, and mentioned that JICA will apply the result of this survey for the future project implementation. As for the following discussions with working level staff, he remarked that this is the last chance to make input to the DFR, and therefore, he requested the participants to provide lots of comments for fruitful discussions. Then, the floor was handed over to the Deputy Director General of DOP for further discussions:

8. At the commencement of discussions, the Deputy Director General (DDG) questioned about the detail of Two Step Loan (TSL) project. Mr. Kenichiro Kobayashi, JICA advisor to MOAI, answered that there is already on-going TSL provision to SMEDB (small and medium enterprise development bank), and also preparation of another TSL for agricultural sector had been already done and Japanese government is waiting for a conclusion by the Myanmar government to implement this TSL for agricultural sector. DDG further questioned if there is overlapping of the proposal of Jetty improvement with the responsible ministry's own development plan. Mr. Hashiguchi answered that they have ongoing plan/project for water transportation development that aims at planning whole country's development, therefore, in this PIAP program, minimum level of jetty improvement especially for agriculture produces transaction has been planned.
9. In addition to this, the DDG questioned how to incorporate the action plans in the Myanmar Industrialization Vision and the components of PIAP program. Mr. Kobayashi explained that the action plans were drafted on the view of whole country development point of view and, on the other hand, although the program cannot cover all the ideas, the PIAP program will be responsible for implementations. Mr. Kobayashi also said that the PIAP program focuses on improving agricultural productivity prior to agribusiness promotion taking into account the current situation of agricultural sector in Myanmar. He concluded that the action plans are still under consideration, and therefore, the PIAP program will

incorporate the ideas of the action plans when the PIAP proceeds to the stage of feasibility study.

10. U Naing Kyi Win, Deputy Director General (DDG), Department of Agriculture (DOA), showed his impression on the DFR, and appreciation to JICA and the survey team for their contribution. As a following comment, he emphasized on the importance of establishment of producer's associations. Replying his comment, Mr. Hashiguchi answered that the PIAP program did not include producer's association establishment so far, but it would be better if we could involve such ideas as a part of activities under the component of Supply Chain Enhancement of Rice.
11. U Naing Kyi Win, Deputy Director General (DDG), Department of Agriculture (DOA), expressed his gratitude to JICA and the Team's contribution because he thinks the DFR is very comprehensive, and it shall be very useful material for them. He then suggested to provide credit supports for small farmers because a lot of farmers in Myanmar have faced lack of capital to invest, which make them little usage of agricultural inputs. Mr. Hashiguchi replied that the PIAP program contains loan providing scheme mainly for machineries; and if the scheme supports mid and long term loan administered by MADB, the seasonal loan for purchasing fertilizer could be enlarged by the bank itself. Mr. Kobayashi added his comment suggesting it may be better if MOAI could provide subsidy for small farmers for an extent of time.
12. DDG of DOP showed his consent about the DFR, especially it is very agreeable in terms of necessity of cropping pattern transformation in irrigable areas since the farmers in beneficial areas often do not understand what the desirable cropping pattern is for them. Also, DDG emphasized on the importance of supply chain improvement. He said, according to an estimate, 30% of produced rice in Myanmar is low-quality yellow rice, which results in low price. Therefore, he proposed that the program will include technical assistance components of post harvest techniques at farmer's level. Mr. Hashiguchi, agreed this suggestion, saying that technical assistance of post harvesting techniques at farmer's level will be incorporated to one of the component of the PIAP programs (e.g. value chain improvement component).
13. A participant from Department of Agricultural Mechanization showed his consent to the components such as land consolidation, agricultural machinery station enhancement. However, he mentioned that it is better if establishment of agricultural testing center could be included in Agricultural Machinery Station Enhancement program. Mr. Hashiguchi answered to his comment that the PIAP program did not include such testing center so far, but further surveys should be done in the next stage. And, Mr. Hashiguchi asked how many testing centers should be established in each region. The participant replied that only one or two institution of the agricultural machinery testing center is needed in Myanmar as even China has only two centers in the whole country. Mr. Hashiguchi replied that the team is to include this idea of machinery testing center into the agricultural machinery station enhancement component.
14. A participant from Department of Agriculture (DOA) commented it is better to replace the term of usage of excessive fertilizer by another statement, and the DDG of DOP suggested the "usage of excessive fertilizer" should be "low quality fertilizer". Mr. Hashiguchi replied that the team will change the 'usage' as DDG suggested.
15. A participant from Yezin Agricultural University commented that the productivity of rice in Myanmar marked lowest as compared to those of neighboring countries such as Thailand and Vietnam, in terms of not only land productivity, but also labor productivity, and capital productivity, which imply that the farmers in Myanmar cannot get profit enough. She continued that the quickest way to tackle this problem is to provide quality seed since it has shared only 1% of total seed usage. Mr. Hashiguchi marked that his idea is exactly the same as the Team has been thinking of, and also said that JICA has already implemented a project which aims at promoting quality seeds for farmers. Regarding the PIAP program, Mr. Kobayashi said that quality seed provision will be implemented in Agriculture Extension Strengthen component.
16. A participant from Department of Agricultural Research (DAR) commented that the Team should consider one or two more food processing promotion center than proposing only one in Mandalay. The team replied

they would consider as much as they can taking into account the cost to implement that activity.

17. Mr. Kobayashi mentioned that although it is still uncertain that the succeeded government will cover how many priority areas, the JICA survey team has already selected four priority areas, and if the incoming government accepted the PIAP surveys, implementation arrangement should be discussed since the program covers inter-ministry components.
18. Responding above remark, the participants were preliminary in consent of the implementation arrangement recommended by the Survey where DOP is the coordinating and responsible body for the implementation, but Myanmar's side recommended that such issues should receive comments from not only working level officers, but also from high-ranking officers. Also, they said that it might be better if such components controlled by other departments outside the MOAI, including Highway Department, would be incorporated in their on-going projects implemented by the respective ministries. At the end of discussion, U Kyaw Swe Lin requested participants to receive comments from their supervisors, and give feedback to JICA.

Finally, the Chairperson, U Kyaw Swe Lin, delivered a closing remark thanking all the participants for joining this meeting on Draft Final Report presentation.



PARTICIPANT LIST**Ministry of Agriculture and Irrigation**

Dr. Tin Htut	Permanent Secretary, Ministry of Agriculture and Irrigation
U Kyaw Shwe Lin	Deputy Director General, Department of Planning
U Naing Kyi Win	Deputy Director General, Department of Agriculture
U Hla Myint Aung	Director, Department of Agriculture
U Than Kyaing	Director, Department of Agriculture
U Sein Hla Tun	General Manager, Myanmar Agriculture Development Bank
U Aung Bo	Deputy Director, Irrigation Department
U Htay Aung Tint	Assistant Director, Irrigation Department
U Win Myaing	Department of Agricultural Mechanization
U Khin Maung Kyaw	Department of Agricultural Mechanization
U Soe Soe	Department of Agricultural Mechanization
U Aung Ko Latt	Department of Planning
U Khaine Htun	Department of Planning
Daw Nilar Htike Htike Tin	Department of Agriculture
Daw Nilar Aung	Department of Agriculture
Daw Khin Mar Ye	Department of Agriculture
Dr. Shwe Mar Than	Yezin Agricultural University
Dr. Htay Htay Oo	Yezin Agricultural University
Dr. Nyo Mar Htwe	Yezin Agricultural University
U Win Myint	Department of Agricultural Lands Management and Statistics
U Nyunt Lwin	Department of Agricultural Lands Management and Statistics
U Ko Ko Aung	Department of Agricultural Lands Management and Statistics
Dr. Tun Shwe	Department of Agricultural Research
Daw Kyi Kyi Than	Department of Agricultural Research
Dr. Tin Ohnmar Win	Department of Agricultural Research

JICA

Mr. Kotaro NISHIGATA	Senior Representative, JICA Myanmar Office
Mr. Kenichiro KOBAYASHI	JICA Advisor for MOAI

JICA Survey Team (PIAP Project)

Mr. Kosei HASHIGUCHI	Team Leader, Irrigation Development
Mr. Ryo INOUE	Financial and Economical Analysis
U Phyo Lin Tun	Project Assistant, JICA Survey Team

APPENDIX-II

AGRICULTURE

APPENDIX II: AGRICULTURE

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1. Results of House Hold Survey and Yield Survey

In order to figure out the current agricultural situations of the priority areas, JICA Survey team carried out household questionnaire survey in August – October 2015, covering total 296 samples, which were located 13 TS in the 4 priority areas. Yield survey for the last and average year harvest was also conducted in August – October 2015, covering 412 households in 13 TS which were located in the 4 priority areas. The results of these surveys are as follows.

1.1 Cohort of the Sampled Household Members

The questionnaire survey has identified the cohort of the sampled household members. There found a total of 1,449 people (male: 721, female: 728) in the sampled 296 households, giving an average number of household members of 4.9. The population cohort surveyed is illustrated by age group in Figure 1-1. Clearly bell-shaped trend is shown in this figure. It suggests sharp decrease the number of the young population in the surveyed areas. There may be two reasons for such small number of young population, such as; 1) dissemination of family planning, and 2) migration to urban areas looking for lucrative jobs. This trend, less population in young generations, implies that agricultural mechanization will be in due need in this area near future.

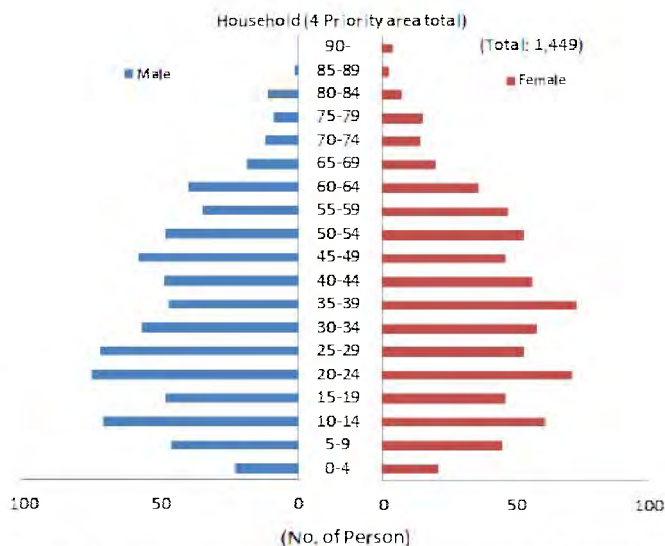


Figure 1-1 Distribution of Population in the 4 Priority Areas
Source: Household survey by JICA Survey Team (2015)

Figure 1-2 shows distribution of out-migrant of the sampled household members. Almost 85% of out-migrant is from 20's to 40's. Furthermore, in all priority areas, some males go abroad such as Malaysia, Singapore and Thailand, and some males and females go to the urban areas like Yangon. By region, the destination of some Out-migrants from Shwebo is border area like Kachin. Out-migrants from Mandalay tend to move around Mandalay region. Out-migrants from Nay Pyi Taw incline to move out around Nay Pyi Taw. Then, Out-migrant from Ayeyarwady usually migrate to Yangon. By gender comparison, a lot of out-migrant males work as manual labors such as masons, carpenters and miners. Out-migrant females tend to work as professional workers like nurses and teachers. Both males and females work as shop clerks and general workers.

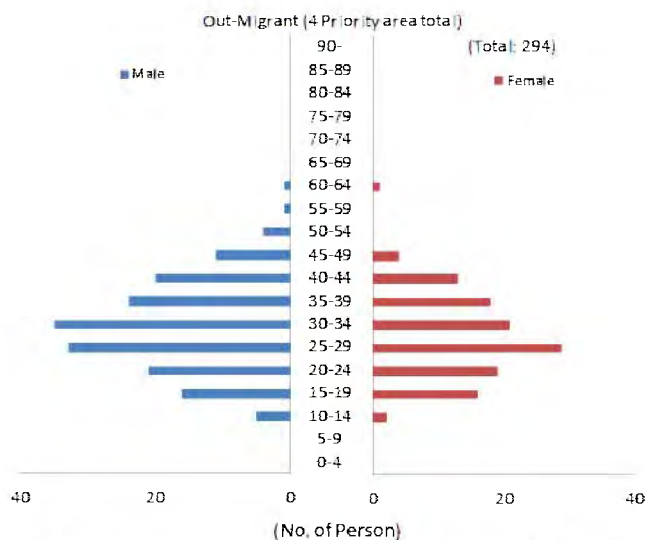


Figure 1-2 Distribution of Out-migrant in the 4 Priority Areas
Source: Household survey by JICA Survey Team (2015)

1.2 Farmland Area per Household

Table 1-1 shows farmland holdings in the 4 priority areas. All the 296 sampled farmers, as a matter of fact, have lowland within the irrigation/drainage scheme, while 74 farmers out of 296 have upland farm. For the lowland, average, maximum and minimum farmland areas per household are 9.3 acre, 100 acre and 1 acre, respectively. Mean farmland area including upland farm per household is estimated at 10.7 acre (4.3 ha).

By region, the average farmlands that a farmer owns are 8.5 acre (3.4 ha), 8.7 acre (3.5 ha), 9.2 acre (3.8 ha) and 17.6 acre (7.1 ha) in Shwebo, Mandalay, Nay Pyi Taw and Ayeyarwady irrigation/drainage area, respectively. Those are, in fact, quite big as compared to the average farmland holdings data provided by DALMS (former SLRD) shown in Table 1-2. Generally, farmers who own irrigation/drainage system in their farmlands tend to own larger farmland than other farmers do, which may be one of the reasons for the differences.

Table 1-1 Farmland Holdings in the 4 Priority Areas (Household Survey)

Region	Items	Lowland	Upland	Others	Total / Average
Shwebo	No. of HH (N=92)	92	26	0	92
	Total Area (Acre)	703.0	77.3	0.0	780.3
	Maximum Area (Acre)	36.0	8.0	0.0	36.0
	Minimum Area (Acre)	1.0	0.8	0.0	1.5
	Average Area (Acre)	7.6	3.0	0.0	8.5 (3.4 ha)
Mandalay	No. of HH (N=80)	80	18	3	80
	Total Area (Acre)	562.8	123.7	13.5	700.0
	Maximum Area (Acre)	35.0	23.0	7.0	35.0
	Minimum Area (Acre)	1.0	1.0	1.5	2.0
	Average Area (Acre)	7.0	6.9	4.5	8.7 (3.5 ha)
Nay Pyi Taw	No. of HH (N=60)	60	29	1	60
	Total Area (Acre)	358.5	196.3	3.0	557.8
	Maximum Area (Acre)	40.0	60.0	3.0	68.0
	Minimum Area (Acre)	1.0	1.0	3.0	1.0
	Average Area (Acre)	6.0	6.8	3.0	9.2 (3.8 ha)
Ayeyarwady	No. of HH (N=64)	64	1	0	64
	Total Area (Acre)	1118.0	6.0	0.0	1124.0
	Maximum Area (Acre)	100.0	6.0	0.0	100.0
	Minimum Area (Acre)	2.0	6.0	0.0	2.0
	Average Area (Acre)	17.5	6.0	0.0	17.6 (7.1 ha)
Total	No. of HH (N=296)	296	74	4	296
	Total Area (Acre)	2742.3	403.2	16.5	3162.0
	Maximum Area (Acre)	100.0	60.0	7.0	100.0
	Minimum Area (Acre)	1.0	0.8	1.5	1.0
	Average Area (Acre)	9.3	5.4	4.1	10.7 (4.3 ha)

Source: Household survey by JICA Survey Team (2015)

Table 1-2 Farmland Holdings in the 4 Priority Areas (DALMS)

Priority Area	Acre/Farmer	Target TS
Shwebo	5.62	Shwebo, Khin-U, Wetlet, Kanbalu, Ye-U, Tabayin, Taze
Mandalay	3.83	Patheingyi, Madaya, Kyaukse, Sintgaing, Myittha, Tada-U, Wudwin
Nay Pyi Taw	3.94	All TS in Nay Pyi Taw Region and Yedashe TS (Bago Region)
Ayeyarwady	8.01	Ayeyarwady Region Total

Source: DALMS (2015)

Figure 1-3 shows average lowland holdings per farmer household in 4 priority areas. The farmers in Ayeyarwady area own the largest lowland farms with an average area of 17.5 acre, almost 3 times larger than that of Nay Pyi Taw with 6.0 acre, while then Shwebo with 7.6 acre and Mandalay with 7.0 acre. This is because there was traditional farmland area in Ayeyarwady, the farmers in this area tend to have larger farmland than other areas. On the other hand, in Nay Pyi Taw area, there is a possibility that the farmers have smaller farmland because of the recent urbanization.

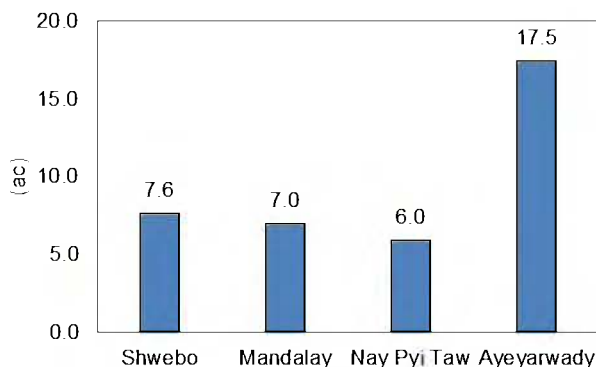


Figure 1-3 Average Lowland per Farmer in the 4 Priority Areas

Source: Household survey by JICA Survey Team (2015)

1.3 Cropping Times per Year in the 4 Priority Area

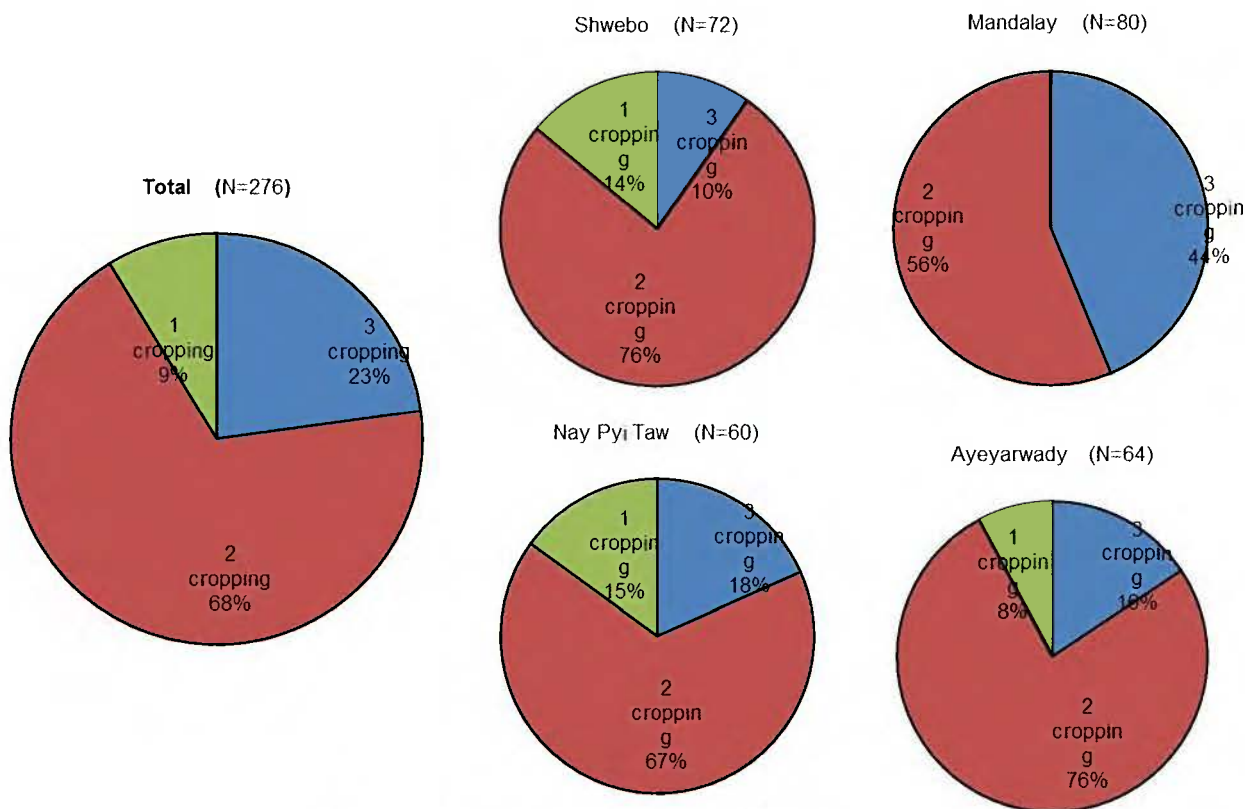


Figure 1-4 Cropping Patterns in the 4 Priority Areas

Source: Household survey by JICA Survey Team (2015)

The Farmers cultivate monsoon paddy, summer paddy, and pulses in the lowland (farmland in irrigation/drainage area). All the farmers cultivate monsoon paddy, while not all the farmers do summer paddy and winter pulses. In fact, summer paddy cultivation is totally dependent on the availability of irrigation water, whereby only the farmers who can access to irrigation water can cultivate the summer paddy. Pulses cultivation depends on the soil property, specifically moisture retention capacity, and the farmer’s interest.

Figure 1-4 and Table 1-3 summarize the number of households with percentage by cropping times per year; namely, how many times of cropping the farmers have carried out in the 4 priority areas. It is found that most of the households in the 4 priority areas carry out double or triple cropping (68%: 189 households). Particularly, 23% (63 households) of the surveyed households in the 4 priority area practice triple cropping.

The percentage of single cropping is only 9% (24 households).

In Mandalay area, all households can cultivate crops twice and more in a year. In particular, Almost 95% of farmers cultivate third times in a year around the Sedawgyi Dam irrigated area. In the other areas, there shows similar tendency of cropping times. The most farmers operate double crops (monsoon paddy + summer paddy or monsoon paddy + pulses or oilseed crops), and the rest farmer cultivate one crop for monsoon paddy or three crops¹.

Table 1-3 Cropping Pattern in the 4 Priority Areas

No. of Cropping	Shwebo		Mandalay		Nay Pyi Taw		Ayeyarwad		Total	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
3 cropping	7	9.7%	35	43.8%	11	18.3%	10	15.6%	63	22.8%
2 cropping	55	76.4%	45	56.3%	40	66.7%	49	76.6%	189	68.5%
1cropping	10	13.9%	0	0.0%	9	15.0%	5	7.8%	24	8.7%
Total	72*	100.0%	80	100.0%	60	100.0%	64	100.0%	276	100.0%

Source: Household Survey by JICA Survey Team (2015)

1.4 Yield in the 4 Priority Areas

JICA survey team conducted a crop yield survey in August – October 2015, covering 412 samples. The result of the yield survey is summarized in the following table. The survey asked farmers the yield in the last crop season (2014-15) and also the average one during the last 4-5 years.

Table 1-4 Yields (bsk/ac) of Crops in the 4 Priority Areas

Season	Crop name	Shwebo		Mandalay		Nay Pyi Taw		Ayeyarwady	
		2015	Ave.	2015	Ave.	2015	Ave.	2015	Ave.
Monsoon	Paddy	61.8	62.7	73.5	73.5	68.3	73.2	63.6	65.3
Summer/Winter	Paddy	76.2	76.4	88.3	88.6	114.4	83.8	85.4	87.3
	Black gram	0.0	0.0	0.0	0.0	11.3	12.6	7.7	9.9
	Green gram	3.0	5.0	0.0	0.0	0.0	0.0	10.0	9.7
	Chickpea	13.0	14.3	9.3	9.3	0.0	0.0	0.0	0.0
	Sesame	7.6	10.0	14.8	15.2	4.8	9.5	0.0	0.0

Source: Household Survey by JICA Survey Team (2015)

For monsoon paddy, Mandalay shows the highest harvest for both last year and average year (last year: 73.5 baskets/acre, average year: 73.5 baskets/acre), followed by Nay Pyi Taw (last year: 68.3 baskets/acre, average year: 73.2 baskets/acre), Ayeyarwady (last year: 63.6 baskets/acre, average year: 65.3 baskets/acre) and lastly Shwebo (last year: 61.8 baskets/acre, average year: 62.7 baskets/acre). According to hearing from a DOA regional officer, some representative varieties in Shwebo and Ayeyarwady were HQV (high quality variety) like a kind of Paw San, which has good taste but low yield comparatively.

For summer paddy planted, the highest yield at last year is marked in Nay Pyi Taw (114.4 baskets/acre), then Mandalay (88.3 baskets/acre), Ayeyarwady (85.4 baskets/acre) and lastly Shwebo (76.2 baskets/acre) respectively². Taking into account of pulses and oil seed crops, black gram cultivating can be observed in

¹ Irrigation canals in Kanbalu TS of Shwebo area were under repair during the survey period, and therefore the farmers in Kanbalu TS (20 samples out of 92 farmers) could not cultivate summer crops as unlike other years. The results of Kanbalu TS were, therefore, removed from this figure. For comparison, the cropping times of Kanbalu TS farmers surveyed (20 farmer households) were; no farmer (0%) do 3 cropping, 8 farmers (40%) do 2 cropping and 12 farmer (60%) do 1 time cropping.

² In recent years, farmers started introducing hybrid rice (Pale Thwe; also known as high yield variety) especially in Nay Pyi Taw, this is one of the reason why the highest yield of summer paddy was shown in Nay Pyi Taw. On the other hand, yield of summer paddy in Shwebo is relatively low as compared with other areas. This is because the irrigation system in Wetlet TS (located in downstream of the Shwebo irrigation area) was not fully functioning for the last 3-4 years, hence farmers have faced water shortage resulting in lower yield. Note that the sample no. in this TS is 29 out of the total 121 samples.

Nay Pyi Taw and Ayeyarwady. Chick pea production can be observed in Shwebo and Mandalay. For sesame, all surveyed area except for Ayeyarwady can cultivate sesame. The highest yield of sesame is shown in Mandalay³. Pulses and oil seed crops area usually produced in winter season using residual moisture, but recently some farmers cultivate those crops in summer season using irrigation water in place of summer paddy.

1.5 Agricultural Input of Fertilizer

Figure 1-5 shows the comparison of volume of applied fertilizer such as urea, compound and TSP. As a whole, the farmers use more fertilizer for monsoon paddy than for summer paddy. The average inputs of urea for monsoon paddy, summer paddy are 1.14 baskets/acre (23.0 kg/ha) and 1.02 baskets/acre (20.5 kg/ha), respectively. The average inputs of compound for monsoon paddy, summer paddy are 1.16 baskets/acre (23.6 kg/ha) and 1.07 baskets/acre (21.7 kg/ha), respectively. The average inputs of TSP for monsoon paddy, summer paddy are 0.83 baskets/acre (16.8 kg/ha) and 0.33 baskets/acre (6.7 kg/ha), respectively. These are quite lower than the ideal condition.

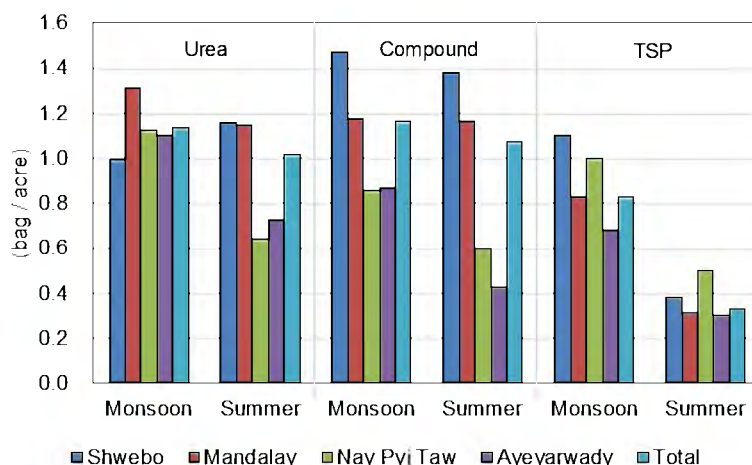


Figure 1-5 Comparison of Agricultural Input in the 4 Priority Areas
Source: Household survey by JICA Survey Team (2015)

1.6 Agricultural Machineries

Percentage of farm households which own agricultural machineries by area is shown in Figure 1-6. In regard to tractor and combine harvester, few numbers of those are identified in the surveyed areas. Almost half (49%) of the target farmers have their own hand tractor. Ayeyarwady area indicates the highest ownership percentage of hand tractor (71.9%), followed by Mandalay (60.0%), Shwebo (39.1%), and lastly Nay Pyi Taw (25.0%). There may be one reason that the rental service of tractor by private company or AMD in Nay Pyi Taw is upper than that of other areas. The owning percentage of thresher is the highest in Ayeyarwady, reached almost 30% while the average ownership percentage of other 3 area is only 6.5%. The ownership percentage of Water Pump and Trawlgyi also show the highest number in Ayeyarwady, 30% and 18.8% respectively.

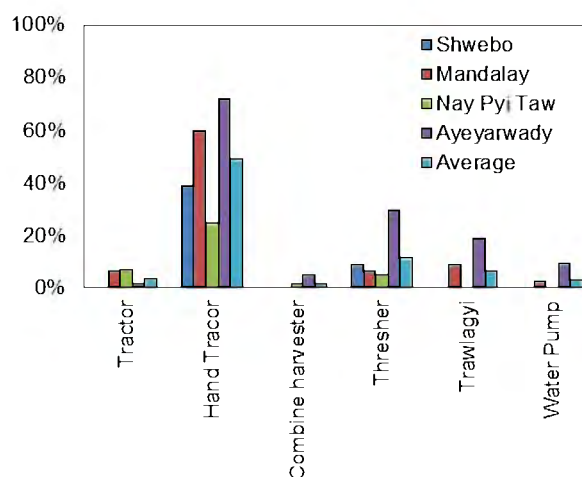


Figure 1-6 Comparison of Agricultural Machineries Ownership in the 4 Priority Areas
Source: Household survey by JICA Survey Team (2015)

Increase of agricultural machineries from 1990 to 2015 for the interviewed households is shown by histogram in Figure 1-7. Most of the machineries were bought in 2000s. The number of the hand tractor was increased smoothly till 2010. The number of tractor was increased greatly from 2013. Especially in

³One reason for this is that the surveyed village in Mandalay was traditional sesame production area.

Ayeyarwady area, purchase of agricultural machineries buying was accelerate after Cyclone Nargis at 2008. It is correspond with the hearing of DOA officer in Ayeyarwady region.

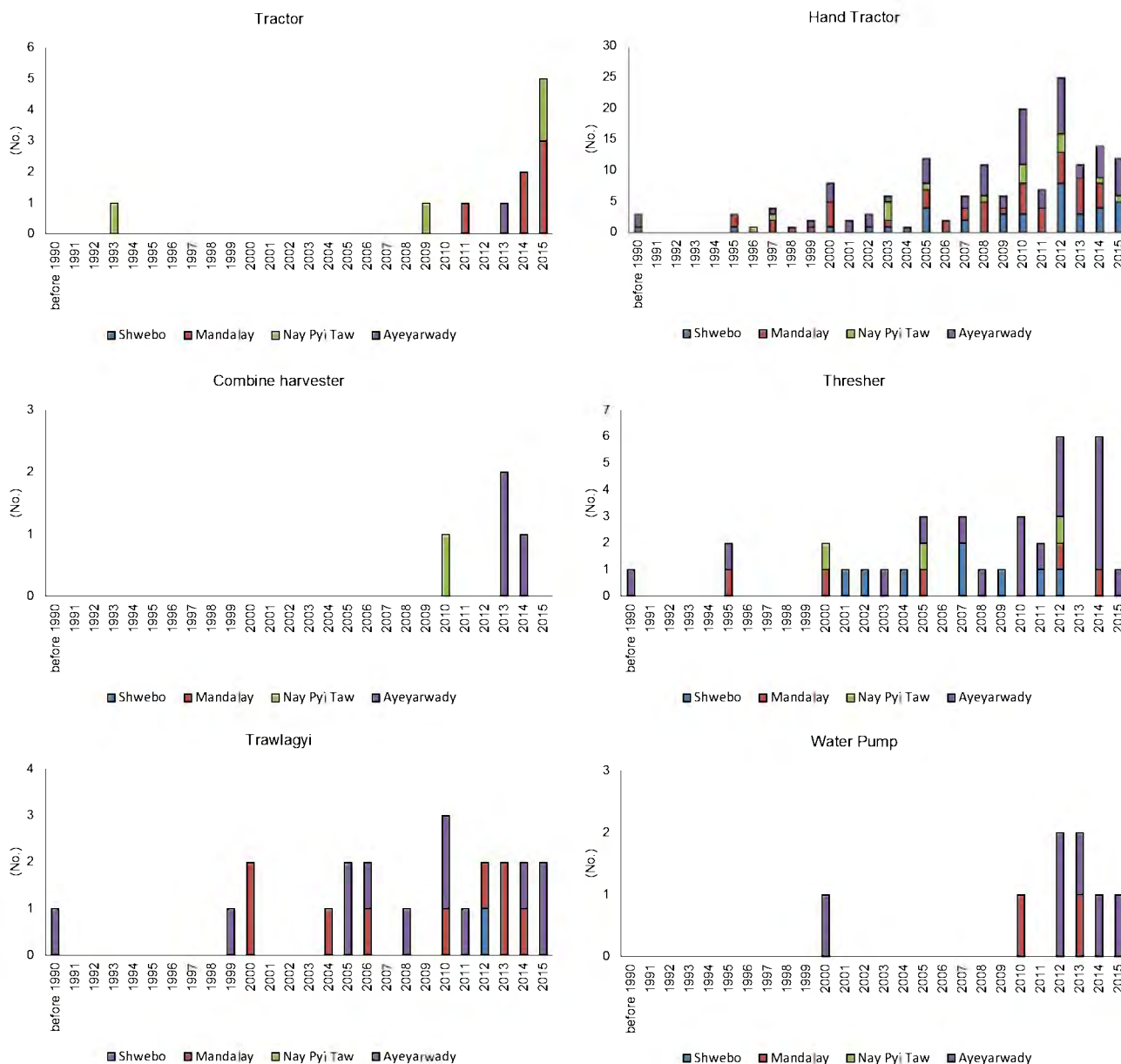


Figure 1-7 Year of Owning Agricultural Machineries in the 4 Priority Areas

Source: Household survey by JICA Survey Team (2015)

1.7 Farmer’s Problems

Agriculture related difficulties in the 4 priority areas are summarized in Figure 1-8. In fact, almost half (48%) of the households surveyed consider that lack of farm labor is one of a major problems of farming. Except for Shwebo, this problem is the most serious issue in Mandalay, Nay Pyi Taw and Ayeyarwady. If the trend of a decline in the number of children and out-migration to urban area continues, it is thought that this problem will become more serious.

Water shortage of irrigation was ranked at second; 38% of the sampled farmers replied it as their one of major problems in their farming. It implies due needs of rehabilitation/ improvement of the irrigation facilities as well as sound operation and water management of the system. Other issues are high cost of agriculture input (29%), unstable rain fall (23%) and low rainfall (23%).

In the areas where many farmers are suffering from water shortage, green gram and sesame are cultivated by using limited water (Shwebo and Nay Pyi Taw). In Ayeyarwady, low or unstable rainfall is not crucial problem for the farmers than other areas relatively. In contrast, most of target farmers said that flood is one of major problems

On the other hand, the number of households which consider lack of draft animal as problem is lowest in Ayeyarwady. One of this reasons may be that most of farmers have their own hand tractor in Ayeyarwady as shown in Figure 1-8. Due to bad or poor conditions of road to market, the farmers in Shwebo regard the bad road condition to the market as a issue more seriously than other areas' farmers do.

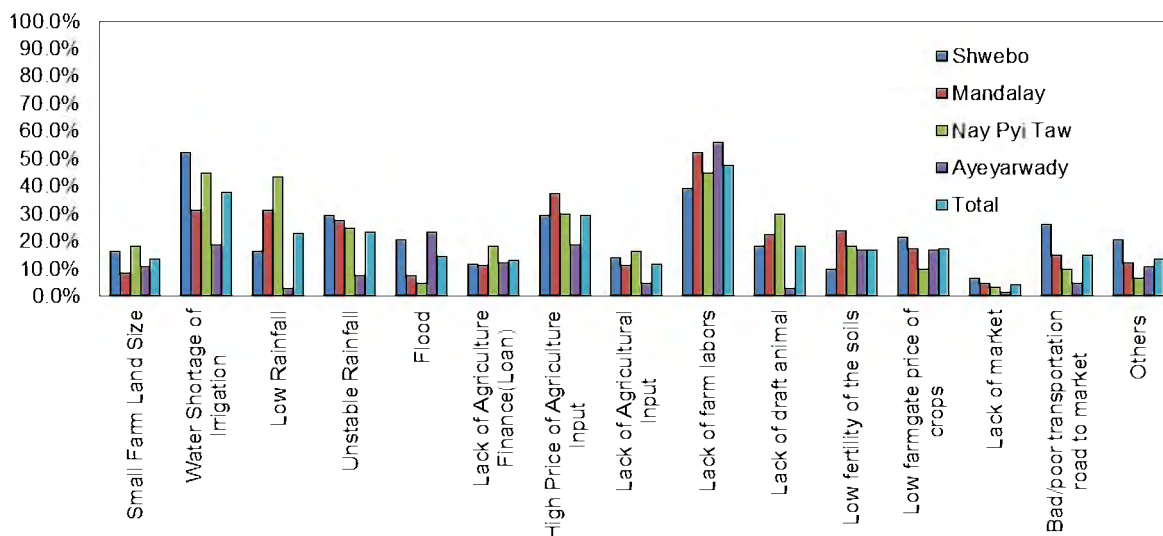


Figure 1-8 Percentage of Agricultural Difficulty / Problem in the Patterns in the 4 Priority Areas

Source: Household survey by JICA Survey Team (2015)

* Others include any kind of problems such as; lack of farm road, lack of land consolidation, lack of good quality seeds, lack of farm machines, danger of snake, pest and disease and lack of training etc.

2. 2011-2014 Production Statement

2.1 Shwebo (3 years average)

Sr.	Crop Name	Township Name	Sown Acre	Harvest Acre	Rate (Basket/acre)	Production(basket)
1	Monsoon Paddy	Shwebo	109,064	109,013	94	10,252,590
		Khin-U	98,139	110,645	88	9,756,995
		Wetlet	136,341	123,822	88	10,897,381
		Kanbalu	142,724	135,157	84	11,287,165
		Ye-U	86,199	103,989	87	9,067,638
		Tabayin	122,817	110,330	92	10,190,952
		Taze	98,252	72,353	81	5,831,887
	Monsoon Paddy	Whole area	793,535	765,309	88	67,284,608
2	Summer Paddy	Shwebo	56,903	56,902	100	5,698,659
		Khin-U	32,695	32,695	92	3,009,440
		Wetlet	28,597	28,597	95	2,703,277
		Kanbalu	18,443	18,414	88	1,612,622
		Ye-U	33,038	33,038	94	3,103,737
		Tabayin	45,106	45,106	93	4,207,175
		Taze	26,030	26,030	87	2,252,691
	Summer Paddy	Whole area	240,811	240,781	94	22,587,601
3	BlackGram	Shwebo	5,282	5,282	19	97,970
		Khin-U				
		Wetlet	1,566	1,566	19	29,606
		Kanbalu	29,211	29,211	18	532,190
		Ye-U	21,170	21,170	19	409,235
		Tabayin	17,022	17,022	18	310,539
		Taze	43,407	43,407	19	805,588
	BlackGram	Whole area	117,659	117,659	19	2,185,128
4	Green gram	Shwebo	4,466	4,466	17	78,093
		Khin-U				
		Wetlet	38,955	38,922	17	644,064
		Kanbalu	83,721	83,721	17	1,438,298
		Ye-U	5,201	5,201	17	85,940
		Tabayin	34,631	34,631	16	552,052
		Taze	15,899	15,899	16	257,608
	Green gram	Whole area	182,874	182,841	17	3,056,055
5	Chick pea	Shwebo	16,183	16,183	24	387,435
		Khin-U				
		Wetlet	51,410	51,410	23	1,165,207
		Kanbalu	3,838	3,838	22	86,222
		Ye-U	9,704	9,704	23	218,553
		Tabayin	16,534	16,534	24	392,046
		Taze	28,219	28,219	25	705,794
	Chick pea	Whole area	125,889	125,889	23	2,955,256
6	Pigeon pea	Shwebo	5,763	5,763	20	117,187
		Khin-U				
		Wetlet	19,587	19,587	20	382,215
		Kanbalu	116,438	116,438	20	2,337,682
		Ye-U	4,779	4,779	19	92,771
		Tabayin	27,161	27,161	19	509,269
		Taze	4,047	4,047	20	79,722
	Pigeon pea	Whole area	177,775	177,775	20	3,518,846

7	Groundnut	Shwebo	15,833	15,833	49	780,140
		Khin-U	57,642	57,642	54	3,088,374
		Wetlet	10,799	10,799	57	610,213
		Kanbalu	97,038	97,038	57	5,489,612
		Ye-U	9,174	9,174	58	527,882
		Tabayin	38,475	38,475	52	2,005,658
		Taze	59,206	59,206	53	3,122,349
		Groundnut	Whole area	288,165	288,165	54
8	Sesame	Shwebo	13,716	13,716	16	223,168
		Khin-U	11,943	11,943	15	177,770
		Wetlet	84,140	84,140	14	1,194,062
		Kanbalu	63,997	63,997	15	929,271
		Ye-U	7,732	7,732	14	104,806
		Tabayin	30,643	30,643	13	413,040
		Taze	2,073	2,073	14	28,327
		Sesame	Whole area	214,244	214,244	14
9	Sunflower	Shwebo	1,108	1,108	27	29,461
		Khin-U	1,814	1,814	26	47,905
		Wetlet	7,320	7,320	26	187,612
		Kanbalu	25,126	25,126	26	648,879
		Ye-U	4,988	4,988	26	129,998
		Tabayin	12,105	12,105	24	289,433
		Taze	8,321	8,321	24	203,278
		Sunflower	Whole area	60,782	60,782	25

Source:DOA(2015)

2.2 Mandalay (3 years average)

Sr.	Crop Name	Township Name	Sown Acre	Harvest Acre	Rate (Basket/acre)	Production(basket)
1	Monsoon Paddy	Patheingyi	26,763	26,763	94	2,506,346
		Madaya	55,168	55,154	91	5,018,864
		Kyaukse	53,489	53,276	92	4,919,619
		Sintgaing	31,387	31,270	93	2,902,821
		Myittha	54,452	54,452	93	5,082,501
		Tada-U	11,892	11,890	89	1,057,712
		Wundwin	76,871	76,871	68	5,242,396
		Monsoon Paddy	Whole area	310,022	309,677	86
2	Summer Paddy	Patheingyi	20,536	20,536	105	2,147,199
		Madaya	43,467	43,467	98	4,239,890
		Kyaukse	18,485	18,485	103	1,895,927
		Sintgaing	8,356	8,356	102	849,693
		Myittha	20,880	20,880	98	2,041,877
		Tada-U	2,604	2,604	95	246,466
		Wundwin	15,672	15,672	90	1,404,112
		Summer Paddy	Whole area	130,000	130,000	99
3	BlackGram	Patheingyi	168	168	13	2,150
		Madaya	3,447	3,447	12	39,849
		Kyaukse				
		Sintgaing				
		Myittha				
		Tada-U				
		Wundwin				

	BlackGram	Whole area	3,614	3,614	12	41,999
4	Green gram	Patheingyi	1,723	1,723	10	16,400
		Madaya	10,160	10,160	12	117,055
		Kyaukse	20,968	20,968	14	303,563
		Sintgaing	10,603	10,603	13	138,361
		Myittha	8,204	8,204	13	107,545
		Tada-U	5,492	5,492	12	64,746
		Wundwin	8,460	8,460	10	85,685
	Green gram	Whole area	65,609	65,609	13	833,355
5	Chick pea	Patheingyi	6,395	6,395	17	111,381
		Madaya	18,108	18,108	18	324,009
		Kyaukse	22,885	22,885	18	414,865
		Sintgaing	10,637	10,637	18	187,212
		Myittha	18,529	18,529	13	232,821
		Tada-U	15,001	15,001	16	233,730
		Wundwin	22,674	22,674	17	379,875
	Chick pea	Whole area	114,231	114,231	16	1,883,893
6	Pigeon pea	Patheingyi	468	468	13	5,855
		Madaya	3,973	3,973	10	41,239
		Kyaukse	2,012	2,012	14	28,621
		Sintgaing	1,315	1,315	14	18,952
		Myittha	1,487	1,487	13	19,746
		Tada-U	9,873	9,873	16	153,553
		Wundwin	2,670	2,670	14	37,547
	Pigeon pea	Whole area	21,797	21,797	14	305,514
7	Groundnut	Patheingyi	3,194	3,194	62	196,816
		Madaya				
		Kyaukse	1,291	1,291	49	63,315
		Sintgaing	1,549	1,549	53	81,965
		Myittha	2,709	2,709	53	142,858
		Tada-U	11,376	11,376	52	589,138
		Wundwin	7,920	7,920	40	313,232
	Groundnut	Whole area	28,039	28,039	49	1,387,325
8	Sesame	Patheingyi	3,453	3,453	11	37,171
		Madaya				
		Kyaukse	33,960	33,960	13	440,922
		Sintgaing	18,153	17,427	12	204,567
		Myittha	41,932	41,932	11	455,791
		Tada-U	51,714	51,714	7	346,270
		Wundwin	49,964	49,964	5	253,470
	Sesame	Whole area	199,177	198,452	9	1,738,191
9	Sunflower	Patheingyi	749	749	23	16,927
		Madaya				
		Kyaukse	12,860	12,860	32	408,356
		Sintgaing	9,558	9,558	31	295,643
		Myittha	2,750	2,750	27	75,311
		Tada-U	23,589	23,589	27	639,996
		Wundwin	1,571	1,571	23	35,723
	Sunflower	Whole area	51,077	51,077	29	1,471,956

Source:DOA(2015)

2.3 Nay Pyi Taw (3 years average)

Sr.	Crop Name	Township Name	Sown Acre	Harvest Acre	Rate (Basket/acre)	Production(basket)
1	Monsoon Paddy	Tatkone	46,552	46,551	87	4,067,132
		Zeyathiri	12,013	12,013	93	1,117,525
		Pobbathiri	11,635	11,635	79	918,090
		Pyinmana	16,111	15,793	91	1,435,745
		Lewe	60,620	60,614	84	5,076,889
		Zabuthiri	1,276	1,276	103	131,602
		Oke Ta Ra Thi Ri	7,028	7,028	79	554,950
		Det Khi Na Thi Ri	7,271	7,271	84	607,866
		Yedashe	81,667	79,688	79	6,334,993
	Monsoon Paddy	Whole area	244,173	241,869	84	20,244,792
2	Summer Paddy	Tatkone	6,120	6,120	87	529,383
		Zeyathiri	4,042	4,042	103	418,062
		Pobbathiri	218	218	118	25,757
		Pyinmana	1,794	1,794	123	220,270
		Lewe	4,150	4,150	91	379,573
		Zabuthiri	492	492	125	61,356
		Oke Ta Ra Thi Ri	157	157	105	16,545
		Det Khi Na Thi Ri	1,449	1,449	113	163,475
		Yedashe	25,991	25,991	85	2,199,777
	Summer Paddy	Whole area	44,412	44,412	90	4,014,197
3	BlackGram	Tatkone	5,362	5,362	18	98,161
		Zeyathiri	6,523	6,522	22	144,398
		Pobbathiri	5,683	5,683	16	93,155
		Pyinmana	11,347	11,332	20	228,862
		Lewe	36,462	36,458	20	716,733
		Zabuthiri	769	769	17	12,972
		Oke Ta Ra Thi Ri	2,059	2,059	17	34,881
		Det Khi Na Thi Ri	2,134	2,134	14	29,502
		Yedashe	9,279	9,239	20	188,097
	BlackGram	Whole area	79,617	79,559	19	1,546,761
4	Green gram	Tatkone	53,788	53,788	18	947,089
		Zeyathiri	1,950	1,939	14	27,631
		Pobbathiri	5,660	5,660	13	75,362
		Pyinmana	3,658	3,570	11	38,085
		Lewe	1,709	1,709	12	19,822
		Zabuthiri	3	3	15	50
		Oke Ta Ra Thi Ri	606	606	12	7,527
		Det Khi Na Thi Ri	0	0		0
		Yedashe	5,716	5,716	20	114,484
	Green gram	Whole area	73,090	72,991	17	1,230,052
5	Chick pea	Tatkone	2,373	2,373	19	46,084
		Zeyathiri	110	108	17	1,851
		Pobbathiri	486	486	16	7,727
		Pyinmana	271	271	14	3,803
		Lewe	242	242	15	3,648

		Zabuthiri	0	0		0
		Oke Ta Ra Thi Ri	0	0		0
		Det Khi Na Thi Ri	0	0		0
		Yedashe	308	308	15	4,623
	Chick pea	Whole area	3,790	3,787	18	67,736
6	Pigeon pea	Tatkone	518	518	15	7,866
		Zeyathiri	83	83	12	1,030
		Pobbathiri	367	367	13	4,872
		Pyinmana	240	240	6	1,510
		Lewe	7	7	12	88
		Zabuthiri	0	0		0
		Oke Ta Ra Thi Ri	12	12	8	93
		Det Khi Na Thi Ri	0	0		0
		Yedashe	35	35	15	531
	Pigeon pea	Whole area	1,262	1,262	13	15,990
7	Groundnut	Tatkone	24,168	24,168	52	1,256,362
		Zeyathiri	1,782	1,782	48	85,303
		Pobbathiri	3,487	3,487	44	154,032
		Pyinmana	955	955	46	44,160
		Lewe	12,653	12,653	52	663,315
		Zabuthiri	11	11	79	890
		Oke Ta Ra Thi Ri	3,390	3,390	44	149,530
		Det Khi Na Thi Ri	394	394	53	20,770
		Yedashe	10,809	10,809	55	597,207
	Groundnut	Whole area	57,651	57,650	52	2,971,569
8	Sesame	Tatkone	15,885	15,885	10	163,367
		Zeyathiri	2,577	2,577	7	17,086
		Pobbathiri	4,978	4,978	6	31,969
		Pyinmana	2,962	2,934	7	19,860
		Lewe	33,060	32,951	8	263,927
		Zabuthiri	105	105	7	767
		Oke Ta Ra Thi Ri	3,448	3,448	7	25,165
		Det Khi Na Thi Ri	1,638	1,638	7	12,265
		Yedashe	15,222	15,222	10	148,893
	Sesame	Whole area	79,874	79,737	9	683,300
9	Sunflower	Tatkone	3,828	3,828	25	95,098
		Zeyathiri	316	316	19	6,064
		Pobbathiri	648	648	20	13,106
		Pyinmana	215	215	11	2,453
		Lewe	815	815	22	17,771
		Zabuthiri	52	52	18	919
		Oke Ta Ra Thi Ri	45	45	22	961
		Det Khi Na Thi Ri	128	128	13	1,659
		Yedashe	185	185	27	5,033
	Sunflower	Whole area	6,232	6,232	23	143,065

Source:DOA(2015)

2.4 Ayeyarwady (3 years average)

Sr.	Crop Name	Township Name	Sown Acre	Harvest Acre	Rate (Basket/acre)	Production(basket)
1	Monsoon Paddy	Tatkone	3,637,975	3,624,059	66	239,574,653
2	Summer Paddy	Tatkone	1,200,863	1,200,863	93	111,667,071
3	BlackGram	Tatkone	1,119,061	1,119,033	13	14,480,300
4	Green gram	Tatkone	189,954	189,954	16	3,040,809
5	Chick pea	Tatkone	4,822	4,822	15	72,130
6	Pigeon pea	Tatkone	4,545	4,545	14	64,463
7	Groundnut	Tatkone	112,284	112,284	60	6,750,698
8	Sesame	Tatkone	24,772	24,772	11	282,441
9	Sunflower	Tatkone	69,420	69,420	18	1,242,334

Source:DOA(2015)

APPENDIX-III

**INFRASTRUCTURE
(IRRIGATION, ROAD, ETC.)**

**APPENDIX III: INFRASTRUCTURE
(IRRIGATION, ROAD, ETC.)**

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1. Irrigation Canal and Drainage Canal

1.1 Irrigation Canal

1.1.1 Shwebo Irrigation Scheme

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
Left Main Canal System (Old Main Canal: O.M.C)						
1	Left Main Canal	50.00	80.50	40.00	12.19	28.00
2	DY (1)	2.27	3.65	4.00	1.22	0.71
3	DY (2)	0.25	0.40	3.00	0.91	0.16
4	DY (3)	0.92	1.48	2.00	0.61	0.23
5	DY (4)	0.61	0.98	3.00	0.91	0.37
6	DY (5)	1.02	1.64	3.00	0.91	0.38
7	DY (6)	2.86	4.60	3.00	0.91	0.30
8	DY (7)	2.86	4.60	3.00	0.91	0.38
9	DO (1)	3.00	4.83	-	-	0.22
101	DO (2)	3.00	4.83	-	-	0.58
11	DY (9)	4.30	6.92	12.00	3.66	2.50
12	DO (3)	3.52	5.67	6.00	1.83	0.96
13	DO (4)	4.02	6.47	7.00	2.13	1.82
14	ThinPayungkyin Canal	1.50	2.42	5.00	1.52	-
15	DO (4-A)	2.00	3.22	10.00	3.05	0.70
16	SSW (7) (Side Spill)	2.60	4.19	10.00	3.05	2.07
17	DO (5)	6.50	10.47	7.00	2.13	3.11
18	LayHtoke Canal	3.88	6.25	10.00	3.05	1.96
19	DO (6)	5.00	8.05	15.00	4.57	0.70
20	DO (6-A)	0.60	0.97	5.00	1.52	0.14
21	DO (7-A)	1.00	1.61	5.00	1.52	0.28
22	DO (7)	3.20	5.15	12.00	3.66	0.84
23	DO (8-A)	1.30	2.09	6.00	1.83	0.56
24	DO (8)	2.80	4.51	15.00	4.57	1.15
25	Tha Yatkan Sluice	5.00	8.05	-	-	-
26	Tha Yatkan DY	5.20	8.37	12.00	3.66	2.52
27	DO (9)	2.50	4.03	10.00	3.05	1.13
28	LaungShae DY	2.84	4.57	10.00	3.05	0.70
29	DO (10)	2.00	3.22	5.00	1.52	5.88
30	YwaThan DY	3.86	6.21	10.00	3.05	125.83
31	SiThar DY	1.56	2.51	8.00	2.44	59.22
32	DO (11)	2.60	4.19	7.00	2.13	15.46

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
33	DO (12)	2.50	4.03	6.00	1.83	20.47
34	DO (13)	2.20	3.54	6.00	1.83	31.02
35	DO (14)	2.00	3.22	-	-	39.73
Right Main Canal System (R.M.C)						
1	Right Main Canal	55.13	88.76	50.00	15.24	51.38
2	DY (1)	4.30	6.92	8.00	2.44	5.10
3	DY (1) Minor (1)	3.60	5.80	6.00	1.83	2.49
4	DY (1) Minor (2)	1.98	3.19	4.50	1.37	1.12
5	Thae Sar Direct Minor	3.00	4.83	5.00	1.52	1.40
6	DY (2)	6.16	9.92	23.00	7.01	9.80
7	DY (2) Minor (1)	4.72	7.60	11.00	3.35	1.68
8	DY (2) Minor (2)	4.02	6.47	12.00	3.66	1.88
9	DY (2) Minor (3)	3.80	6.12	10.00	3.05	1.29
10	DY (2) Minor (4)	3.80	6.12	12.00	3.66	2.04
11	DY (2-A)	4.44	7.15	14.00	4.27	3.36
12	DY (2-A) Minor (1)	2.00	3.22	6.00	1.83	0.45
13	DY (2-A) Minor (1-A)	1.20	1.93	3.00	0.91	0.87
14	DY (2-A) Minor (2)	2.00	3.22	3.00	0.91	0.78
15	DY (2-A) Minor (2-A)	1.40	2.25	6.50	1.98	0.59
16	Kha Pung Kyaing Branch Canal	11.74	18.90	26.00	7.92	15.68
17	DY (1)	6.10	9.82	10.00	3.05	4.62
18	DY (1) Minor (1)	5.20	8.37	8.00	2.44	2.80
19	DY (2)	5.57	8.97	11.00	3.35	5.10
20	DY (2) Minor (1)	3.30	5.31	8.00	2.44	1.40
21	DY (2) Minor (2)	2.27	3.65	6.00	1.83	1.01
22	DY (2) Minor (3)	2.40	3.86	6.00	1.83	0.73
23	DY (3)	5.97	9.61	10.00	3.05	3.92
24	Direct Minor	4.33	6.97	8.00	2.44	1.40
25	Shwegu Direct Minor	2.00	3.22	5.00	1.52	1.12
26	DY (4)	7.15	11.51	18.00	5.49	11.20
27	DY (4) Minor (1)	6.10	9.82	8.00	2.44	2.80
28	DY (4) Minor (1-A)	4.70	7.57	6.50	1.98	0.00
29	DY (4) Minor (2)	6.10	9.82	8.00	2.44	2.80

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
30	DY (4) Minor (2-A)	4.80	7.73	6.50	1.98	-
31	DY (4) Minor (3)	4.35	7.00	8.00	2.44	2.80
32	Direct Minor (1)	4.45	7.16	3.00	0.91	0.84
33	Direct Minor (2)	4.05	6.52	3.00	0.91	0.84
34	Direct Minor (3)	0.60	0.97	5.00	1.52	0.70
35	Direct Minor (4)	0.90	1.45	5.00	1.52	0.98
36	DY (5)	5.90	9.50	5.00	1.52	1.40
37	DY (5-A)	5.18	8.34	7.00	2.13	2.32
38	Direct Minor (5)	13.70	22.06	6.00	1.83	0.84
39	Ma Dine Gyin Canal	2.20	3.54	5.00	1.52	-
40	Ayardaw Extension	24.40	39.28	20.00	6.10	9.40
41	Direct Minor (1)	0.63	1.01	1.00	0.30	0.04
42	Direct Minor (2)	1.19	1.92	2.00	0.61	0.15
43	Direct Minor (3)	0.88	1.42	1.50	0.46	0.11
44	DY (1)	0.97	1.56	3.50	1.07	0.43
45	Direct Minor (4)	0.76	1.22	1.50	0.46	0.08
46	Direct Minor (5)	0.77	1.24	2.75	0.84	0.23
47	DY (2)	1.90	3.06	3.75	1.14	0.47
48	DY (3)	2.20	3.54	4.75	1.45	0.85
49	DY (4)	2.66	4.28	6.00	1.83	1.48
50	Direct Minor (6)	2.49	4.01	2.75	0.84	0.09
51	DY (5)	3.05	4.91	5.00	1.52	1.09
52	DY (6)	2.74	4.41	4.00	1.22	0.64
53	DY (7)	2.59	4.17	3.50	1.07	0.43
54	Direct Minor (7)	1.52	2.45	2.00	0.61	0.16
55	DY (8)	1.70	2.74	3.25	0.99	0.35
56	DY (9)	2.53	4.07	4.75	1.45	0.90
57	Direct Minor (8)	2.02	3.25	3.75	1.14	0.54
58	Direct Minor (9)	1.20	1.93	2.75	0.84	0.22
59	Direct Minor (10)	0.71	1.14	1.00	0.30	0.06
60	Direct Minor (11)	1.84	2.96	3.00	0.91	0.27
61	Direct Minor (12)	1.64	2.64	3.75	1.14	0.41
62	Direct Minor (13)	0.94	1.51	2.00	0.61	0.12
63	Direct Minor (14)	1.50	2.42	3.25	0.99	0.31
64	Budalin Extension Canal	10.16	16.36	20.00	6.10	5.82
65	Beru Branch Canal	4.96	7.99	6.00	1.83	0.73

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
66	Sin Yan Branch Canal	4.86	7.82	6.00	1.83	1.01
67	Direct Outlet	1.80	2.90	3.00	0.91	0.31
68	Direct Minor (1)	2.64	4.25	5.00	1.52	0.92
69	Direct Minor (2)	3.62	5.83	4.00	1.22	0.73
70	Direct Minor (3)	4.16	6.70	6.00	1.83	1.48
71	Direct Minor (4)	4.59	7.39	6.00	1.83	1.37
72	Direct Outlet (2)	1.30	2.09	3.00	0.91	-
73	Direct Outlet (3)	1.64	2.64	3.00	0.91	-
Shwebo Main Canal System (S.M.C)						
1	Shwebo Main Canal	28.68	46.17	100.00	30.48	78.40
2	Direct Minor	0.50	0.81	6.00	1.83	0.39
3	DY (1)	24.70	39.77	34.00	10.36	8.79
4	DY (1), Minor (2)	1.87	3.01	8.00	2.44	0.66
5	DY (1), Minor (3)	0.30	0.48	4.00	1.22	0.20
6	DY (1), Minor (4)	0.68	1.09	8.00	2.44	0.47
7	DY (1), Minor (5)	0.76	1.22	6.00	1.83	0.51
8	DY (1), Minor (6)	0.86	1.38	3.00	0.91	0.08
9	DY (1), Minor (7)	2.00	3.22	7.00	2.13	0.42
10	DY (1-A)	0.80	1.29	7.00	2.13	0.32
11	DY (2)	4.20	6.76	16.00	4.88	1.18
12	DY (2), Minor (1)	1.26	2.03	4.50	1.37	0.13
13	DY (3)	9.47	15.25	22.00	6.71	5.77
14	DY (3), Minor (1)	2.20	3.54	7.00	2.13	0.23
15	DY (3), Minor (1-A)	1.20	1.93	6.00	1.83	0.25
16	DY (3), Minor (1-B)	3.12	5.02	6.00	1.83	0.33
17	DY (3), Minor (2)	6.22	10.01	11.50	3.51	1.55
18	DY (3), Minor (2-A)	0.80	1.29	5.00	1.52	0.30
19	DY (3), Minor (2-B)	1.30	2.09	3.00	0.91	0.20
20	DY (3), Minor (3)	0.80	1.29	6.00	1.83	0.39
21	DY (3), Minor (4)	1.40	2.25	6.00	1.83	0.32
22	DY (3), Minor (5)	2.50	4.03	7.00	2.13	0.68
23	DY (4)	5.90	9.50	23.00	7.01	3.00
24	DY (4), Minor (1)	3.40	5.47	13.00	3.96	0.65
25	DY (4), Minor (1-A)	0.92	1.48	4.00	1.22	0.19
26	DY (4), Minor (2)	1.44	2.32	7.00	2.13	0.49
27	DY (5)	4.54	7.31	9.50	2.90	1.12

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
28	DY (6)	10.56	17.00	16.00	4.88	5.42
29	DY (6), Minor (1)	3.78	6.09	7.00	2.13	0.56
30	DY (6), Minor (1-A)	0.54	0.87	2.50	0.76	0.26
31	DY (6), Minor (1-B)	4.40	7.08	14.00	4.27	1.26
32	DY (6), Minor (2)	5.16	8.31	9.00	2.74	0.84
33	DY (6), Minor (2-A)	0.50	0.81	3.70	1.13	0.11
34	DY (6), Minor (3)	1.86	2.99	6.00	1.83	0.43
35	DY (6-A)	1.57	2.53	6.00	1.83	0.37
36	DY (7)	10.68	17.19	28.00	8.53	5.68
37	DY (7), Minor (2)	4.60	7.41	11.00	3.35	1.08
38	DY (7), Minor (3)	4.72	7.60	7.25	2.21	1.12
39	DY (7), Minor (4)	2.10	3.39	8.50	2.59	0.61
40	DY (7-A)	3.35	5.40	7.00	2.13	0.49
41	DY (8)	8.73	14.06	16.00	4.88	2.14
42	Mode Soe Chone Branch	21.60	34.78	30.00	9.14	14.00
43	MBC DY (1)	2.76	4.44	10.00	3.05	1.12
44	MBC DY (1), Minor (1)	2.57	4.14	5.50	1.68	0.45
45	MBC DY (2)	4.66	7.50	12.00	3.66	1.34
46	MBC DY (3)	16.80	27.05	19.09	5.82	4.62
47	MBC DY (3), Minor (1)	2.34	3.77	3.50	1.07	0.31
48	MBC DY (3), Minor (2)	4.00	6.44	4.00	1.22	0.43
49	MBC DY (3), Minor (3)	0.48	0.77	3.50	1.07	0.20
50	MBC DY (3), Minor (4)	0.37	0.60	3.00	0.91	0.31
51	MBC DY (3), Minor (5)	1.80	2.90	5.00	1.52	0.28
52	MBC DY (3), Minor (6)	1.28	2.06	3.00	0.91	0.17
53	MBC DY (3), Minor (7)	2.40	3.86	9.00	2.74	0.70
54	MBC DY (4)	8.52	13.72	16.00	4.88	2.21
55	MBC DY (4), Minor (1)	1.47	2.37	13.00	3.96	0.49
56	MBC DY (4), Minor (1-A)	0.80	1.29	5.00	1.52	0.18
57	MBC DY (5)	6.46	10.40	10.00	3.05	1.34
58	MBC Direct Minor (1)	1.00	1.62	5.00	1.52	0.27
59	MBC Direct Minor (2)	2.14	3.45	6.50	1.98	0.03
60	Hla Daw Branch Canal	20.10	32.36	36.00	10.97	25.20
61	HDC DY (1)	18.60	29.95	30.00	9.14	12.04
62	HDC DY (1), Minor (1)	6.57	10.58	13.00	3.96	2.41
63	HDC DY (1), Minor (1-A)	1.26	2.03	5.00	1.52	0.34

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
64	HDC DY (1), Minor (1-B)	1.55	2.50	7.50	2.29	0.48
65	HDC DY (1), Minor (2)	4.90	7.89	7.50	2.29	0.92
66	HDC DY (1), Minor (3)	2.65	4.27	5.00	1.52	0.95
67	HDC DY (1), Minor (3-A)	2.00	3.22	8.00	2.44	0.69
68	HDC DY (1), Minor (3-B)	0.50	0.81	5.00	1.52	0.17
69	HDC DY (1), Minor (4)	7.20	11.59	10.00	3.05	1.90
70	HDC DY (1), Minor (5)	2.40	3.86	6.50	1.98	0.73
71	HDC DY (1), Minor (6)	2.94	4.73	5.00	1.52	0.70
72	HBC DY (2)	6.18	9.95	11.00	3.35	1.90
73	HBC DY (2), Minor (1)	4.98	8.02	6.50	1.98	0.87
74	HBC DY (3)	13.54	21.80	26.50	8.08	6.16
75	HBC DY (3), Minor (1)	1.90	3.06	4.00	1.22	0.39
76	HBC DY (3), Minor (2)	2.12	3.41	4.60	1.40	0.28
77	HBC DY (3), Minor (3)	1.94	3.12	5.50	1.68	0.45
78	HBC DY (3), Minor (3-A)	1.26	2.03	3.50	1.07	0.11
79	HBC DY (3), Minor (4)	1.52	2.45	5.00	1.52	0.26
80	HBC DY (3), Minor (5)	4.00	6.44	14.00	4.27	1.46
81	HBC DY (3), Minor (5-A)	2.25	3.62	5.00	1.52	0.36
82	HBC DY (3), Minor (5-B)	2.66	4.28	6.00	1.83	0.37
83	HBC DY (3), Minor (5-C)	0.96	1.55	4.50	1.37	0.22
84	HBC DY (3), Minor (6)	3.61	5.81	5.00	1.52	0.53
85	HBC DY (3), Minor (6-A)	0.80	1.29	4.00	1.22	0.12
86	HBC DY (3), Minor (7)	2.00	3.22	5.50	1.68	0.52
87	HBC DY (3), Minor (7-A)	0.80	1.29	5.00	1.52	0.16
88	HBC DY (3), Minor (8)	3.16	5.09	8.00	2.44	1.01
89	HBC DY (3), Minor (8-A)	1.66	2.67	4.75	1.45	0.45
90	HBC DY (4)	3.40	5.47	15.00	4.57	0.66
91	HBC DY (4), Minor (1)	0.60	0.97	3.50	1.07	0.16
92	HBC DY (5)	10.00	16.10	28.00	8.53	4.40
93	HBC DY (5), Minor (1)	3.56	5.73	6.00	1.83	0.69
94	HBC DY (5), Minor (2)	1.20	1.93	5.00	1.52	0.41
95	HBC DY (5), Minor (3)	1.40	2.25	3.50	1.07	0.35
96	HBC DY (5), Minor (4)	1.50	2.42	5.00	1.52	0.50
97	HBC DY (5), Minor (4-A)	0.82	1.32	3.00	0.91	0.18
98	HBC DY (5), Minor (5)	1.60	2.58	2.50	0.76	0.24
99	HBC DY (5), Minor (6)	1.20	1.93	5.00	1.52	0.39

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
100	HBC DY (5), Minor	0.16	0.26	-	-	-
Ye-U Main Canal System (Y.M.C)						
1	Ye-U Main Canal	44.60	71.81	95.00	28.96	49.00
2	DY (1)	4.60	7.41	10.00	3.05	0.84
3	DY (1) Minor (1)	0.22	0.35	2.50	0.76	0.13
4	DY (3)	3.82	6.15	7.50	2.29	0.68
5	DY (3) Minor (1)	0.50	0.81	2.00	0.61	0.13
6	DY (4)	8.81	14.18	15.00	4.57	3.40
7	DY (4) Minor (1)	3.84	6.18	5.00	1.52	0.74
8	DY (4) Minor (2)	0.84	1.35	5.00	1.52	0.11
9	DY (4-A)	2.82	4.54	6.50	1.98	0.54
10	DY (5)	1.50	2.42	5.00	1.52	0.53
11	DY (6)	0.56	0.90	2.50	0.76	0.24
12	DY (7)	9.58	15.42	16.00	4.88	2.74
13	DY (7) Minor (1)	4.20	6.76	7.00	2.13	0.59
14	DY (7) Minor (2)	1.10	1.77	4.00	1.22	0.19
15	DY (8)	2.16	3.48	4.00	1.22	0.28
16	DY (9)	4.10	6.60	9.00	2.74	1.06
17	DY (9) Minor (1)	1.66	2.67	4.00	1.22	0.22
18	DY (10)	1.04	1.67	3.00	0.91	0.17
19	DY (11)	5.08	8.18	11.00	3.35	2.13
20	DY (11) Minor (1)	1.96	3.16	5.00	1.52	0.43
21	DY (12)	3.68	5.92	8.00	2.44	0.90
22	Minor (1-A)	0.14	0.23	4.00	1.22	0.16
23	DY (13)	1.02	1.64	8.00	2.44	0.36
24	DY (14)	1.40	2.25	3.50	1.07	0.28
25	DY (15)	5.65	9.10	8.00	2.44	1.29
26	DY (15-A)	3.04	4.89	20.00	6.10	0.78
27	DY (16)	3.60	5.80	5.50	1.68	0.52
28	DY (17)	0.90	1.45	3.50	1.07	0.27
29	DY (18)	4.40	7.08	9.00	2.74	1.62
30	DY (18) Minor (1)	3.60	5.80	6.50	1.98	0.56
31	DY (19)	3.74	6.02	5.50	1.68	1.05
32	DY (20)	2.96	4.77	5.50	1.68	0.98
33	DY (21)	2.22	3.57	8.00	2.44	0.81
34	DY (21) Minor (1)	1.28	2.06	1.50	0.46	0.19

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
35	DY (22)	2.22	3.57	6.00	1.83	0.88
36	DY (22) Minor (1)	1.10	1.77	2.50	0.76	0.24
37	DY (22) Minor (2)	0.32	0.52	3.00	0.91	0.20
38	Direct Minor (1)	0.75	1.21	3.00	0.91	0.28
39	DY (23)	1.20	1.93	6.00	1.83	0.51
40	DY (24)	1.80	2.90	18.00	5.49	0.67
41	Direct Minor (2)	0.82	1.32	4.00	1.22	0.17
42	Tail DY	8.20	13.20	26.00	7.92	3.92
43	Tail DY Minor (1)	1.50	2.42	5.00	1.52	0.58
44	New Minor	1.10	1.77	-	-	-
45	Tail DY Minor(2)	1.34	2.16	4.00	1.22	0.22
46	Tail DY Minor (3)	1.28	2.06	5.00	1.52	0.34
47	Ma Ya Kan Branch	19.10	30.75	47.00	14.33	19.60
48	DY (1)	3.84	6.18	7.00	2.13	0.58
49	DY (2)	3.32	5.35	6.00	1.83	0.58
50	DY (3)	3.96	6.38	6.00	1.83	0.69
51	Dy (4)	8.98	14.46	12.00	3.66	1.99
52	DY (4) Minor (1)	2.40	3.86	3.50	1.07	0.29
53	DY (4) Minor (2)	0.79	1.27	1.00	0.30	0.16
54	DY (5)	9.90	15.94	18.50	5.64	3.33
55	Direct Minor (1)	0.90	1.45	4.00	1.22	0.22
56	DY (7)	9.06	14.59	12.00	3.66	2.80
57	DY (9)	5.00	8.05	8.00	2.44	0.78
58	DY (9) Minor (1)	1.20	1.93	4.00	1.22	0.06
59	DY (11)	2.32	3.74	6.00	1.83	0.61
60	DY (12)	2.30	3.70	6.50	1.98	0.45
61	DY (13)	6.10	9.82	16.00	4.88	2.86
62	DY (13) Minor (1)	1.58	2.54	4.00	1.22	0.43
63	DY (13) Minor (2)	3.20	5.15	4.00	1.22	0.90
64	Direct Minor (2)	2.80	4.51	4.00	1.22	0.28
65	Tail DY	8.50	13.69	15.00	4.57	2.27
66	Tail DY Minor (1)	1.58	2.54	2.50	0.76	0.17
67	Tail DY Minor (2)	2.06	3.32	4.00	1.22	0.22

1.1.2 Mandalay Irrigation Scheme

(1) Sedawgyi Irrigation System

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m ³)
		(mile)	(km)	(feet)	(m)	
Mandalay Main Canal System						
1	Mandalay Main Canal	42.20	67.94	63.00	19.20	50.40
2	Seiktha DY	1.00	1.61	3.00	0.91	0.50
3	Nathaphyu DY	3.80	6.12	7.00	2.13	0.50
4	Feeder Cut DY	3.00	4.83	20.00	6.10	6.16
5	Let Kaung Gyi DY	4.40	7.08	12.00	3.66	2.88
6	Let Kaung Gyi (A) DY	1.90	3.06	4.50	1.37	0.81
7	Alebon DY	4.20	6.76	15.00	4.57	2.88
8	Alebon (A) DY	2.20	3.54	4.50	1.37	1.26
9	Htan Bin Gon DY	4.21	6.78	13.00	3.96	2.21
10	Kabe DY	3.86	6.21	11.00	3.35	1.76
11	Lun Daung DY	4.25	6.84	10.00	3.05	2.13
12	Shwetachaung Myaung	25.00	40.25	28.00	8.53	5.60
13	Nanda DY	3.70	5.96	16.00	4.88	3.36
14	Nanda (A) Myaung	3.40	5.47	11.00	3.35	0.98
15	Nanda (B) Myaung	3.40	5.47	8.00	2.44	0.92
16	Kyauk Than But DY	4.70	7.57	10.00	3.05	1.57
17	Patheingyi DY	11.50	18.52	22.00	6.71	5.66
18	Patheingyi (A) Myaung	6.50	10.47	7.00	2.13	1.57
19	Patheingyi (B) Myaung	3.20	5.15	12.00	3.66	1.18
20	Kyone Thwin Myaung	1.00	1.61	7.00	2.13	1.40
21	Yan Kin Taung DY	5.80	9.34	12.00	3.66	2.55
22	Yan Kin Taung (A) Myaung	1.80	2.90	-	-	0.46
23	Yan Kin Taung (B) Myaung	1.70	2.74	10.00	3.05	0.45
24	Ye Gye DY	2.00	3.22	6.00	1.83	0.87
25	(168)Minor Myaung	2.20	3.54	-	-	0.31
26	Wa Gin Gon DY	2.10	3.38	5.30	1.62	0.87
27	Kyauk Mi DY	3.80	6.12	-	-	2.44
28	Kyauk Mi (A) Myaung	1.60	2.58	6.00	1.83	0.32
29	Kyauk Mi (B) Myaung	2.60	4.19	8.00	2.44	0.76
30	Ta Daing She DY	4.80	7.73	-	-	4.20
31	Ta Daing She (A) Myaung	2.40	3.86	17.00	5.18	0.67
32	Ta Daing She (B) Myaung	2.40	3.86	-	-	0.84
33	Ta Moke So DY	6.00	9.66	4.00	1.22	0.98

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m ³)
		(mile)	(km)	(feet)	(m)	
34	Ta Moke So (B) Myaung	1.40	2.25	-	-	0.61
35	Ta Moke So (C) Myaung	6.00	9.66	10.00	3.05	2.45
36	Ta Moke So (C) Minor	4.80	7.73	-	-	0.42
37	Ta Moke So (C) Aku	3.90	6.28	5.00	1.52	-
38	Kin Bet DY	5.90	9.50	-	-	3.25
39	Kin Bet (A)	2.00	3.22	-	-	0.99
40	Kin Bet Minor (1)	2.80	4.51	-	-	0.34
41	Kin Bet Minor (2)	1.50	2.42	-	-	0.59
Yanatha Canal System						
1	Yanatha Canal	13.60	21.90	18.00	5.49	11.20
2	DY (1)	3.70	5.96	3.00	0.91	0.76
3	DY (1/1)	-	-	1.80	0.55	-
4	DY (2)	7.40	11.91	8.00	2.44	1.37
5	DY (3)	1.86	2.99	2.00	0.61	0.25
6	DY (4)	8.20	13.20	12.00	3.66	4.42
7	DY (4/1)	1.97	3.17	1.00	0.30	0.25
8	DY (4/2)	1.60	2.58	2.00	0.61	0.34
9	DY (4/3)	1.09	1.75	3.00	0.91	0.22
10	DY (4/6)	2.76	4.44	3.00	0.91	0.50
11	DY (4/7)	1.96	3.16	2.00	0.61	0.15
12	DY (4/8)	2.76	4.44	3.00	0.91	0.17
13	DY (4/9)	-	-	-	-	-
14	DY (4/10)	-	-	-	-	-
15	DY (5)	1.10	1.77	2.00	0.61	0.29
16	DY (6)	2.40	3.86	5.00	1.52	0.90
17	DY (6/1)	0.65	1.05	1.50	0.46	0.13
18	DY (6/2)	2.06	3.32	2.00	0.61	0.49
19	DY (6/3)	1.00	1.61	2.00	0.61	0.13
20	DY (7)	4.68	7.53	8.00	2.44	1.79
21	DY (7/1)	2.32	3.74	2.50	0.76	0.70
22	DY (7/A)	1.00	1.61	2.50	0.76	0.35
23	DY (7/2)	2.32	3.74	3.00	0.91	1.08
24	RD-16500' Sale Direct Outlet	2.60	4.19	5.00	1.52	0.22

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
Pump (1) Canal System						
1	Gravity Inlet Canal	0.85	1.37	18.00	5.49	6.02
2	Link Canal	2.80	4.51	12.00	3.66	5.10
3	Pump (1) Main Canal	4.90	7.89	8.00	2.44	0.93
4	DY (1)	0.70	1.13	2.00	0.61	0.13
5	DY (2)	0.66	1.06	2.00	0.61	0.05
6	DY (3)	1.06	1.71	2.00	0.61	0.14
7	DY (4)	0.36	0.58	2.00	0.61	0.03
8	DY (5)	0.48	0.77	2.00	0.61	0.02
9	DY (6)	0.44	0.71	2.00	0.61	0.01
10	DY (7)	1.22	1.96	2.00	0.61	0.18
11	DY (8)	3.08	4.96	2.00	0.61	0.18
12	DY (9)	0.98	1.58	2.00	0.61	0.08
13	DY (10)	0.46	0.74	2.00	0.61	0.02
14	DY (11)	0.90	1.45	2.00	0.61	0.08
15	South Tank, South Canal (Area-2)	3.80	6.12	8.00	2.44	1.40
16	Distributy Canal	-	-	-	-	-
17	DY (1)	0.91	1.47	2.00	0.61	0.15
18	DY (2)	0.89	1.43	2.00	0.61	0.24
19	DY (3)	0.76	1.22	2.00	0.61	0.21
20	DY (4)	0.77	1.24	2.00	0.61	0.29
21	DY (5)	0.69	1.11	2.00	0.61	0.08
22	DY (6)	0.73	1.18	2.00	0.61	0.27
23	DY (7)	0.81	1.30	2.00	0.61	0.15

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
24	South Tank, Nouth Canal (Area-2)	2.60	4.19	6.00	1.83	0.96
25	Distributy Canal	-	-	-	-	-
26	DY (1)	0.73	1.18	2.00	0.61	0.11
27	DY (2)	3.21	5.17	2.00	0.61	0.37
28	DY (3)	0.94	1.51	2.00	0.61	0.13
29	Minor	1.70	2.74	2.00	0.61	0.34
Pump (2) Canal System						
1	Pump (2) Main Canal	12.20	19.64	14.00	4.27	3.27
2	DY (1)	0.48	0.77	2.00	0.61	0.10
3	DY (2)	0.64	1.03	2.00	0.61	0.10
4	DY (3)	0.66	1.06	2.00	0.61	0.16
5	DY (4)	0.68	1.09	2.00	0.61	0.05
6	DY (5)	0.74	1.19	2.00	0.61	0.15
7	DY (6)	0.66	1.06	2.00	0.61	0.13
8	DY (7)	0.56	0.90	2.00	0.61	0.06
9	DY (8)	0.54	0.87	2.00	0.61	0.04
10	DY (9)	0.66	1.06	2.00	0.61	0.38
11	DY (10)	1.70	2.74	2.00	0.61	0.39
12	DY (11)	2.37	3.82	2.00	0.61	0.30
13	DY (12)	2.41	3.88	2.00	0.61	0.32
14	DY (13)	2.15	3.46	2.00	0.61	0.09
15	DY (14)	1.87	3.01	2.00	0.61	0.43
16	DY (15)	1.89	3.04	2.00	0.61	0.44
17	DY (16)	2.06	3.32	2.00	0.61	0.15

(2) Zawgyi Irrigation System

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
Ngapyaung Weir Canal System						
1	Nwar Tet Main Canal	3.30	5.31	21.00	6.40	14.84
2	A Htet Lin Zin	3.30	5.31	7.00	2.13	0.98
3	Out Lin Zin Canal	3.50	5.64	12.00	3.66	1.20
4	Nwar Tet Branch Canal	10.60	17.07	37.00	11.28	7.00
5	Thet Yet Cho DY Canal	5.60	9.02	18.00	5.49	1.46
6	Than Khae DY Canal	3.20	5.15	19.00	5.79	0.53

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
7	Tha Lai DY Canal	1.60	2.58	12.00	3.66	0.45
8	Thadar DY Canal	2.00	3.22	5.00	1.52	0.06
9	Ohne Kha Yaing	3.30	5.31	13.00	3.96	0.42
10	Ohne Kha Yaing	0.80	1.29	10.00	3.05	0.28
11	Ka Lai Kyaw DY Canal	3.21	5.17	14.00	4.27	0.81
12	Yay Shar DY Canal	1.22	1.96	3.00	0.91	0.20
13	U Dein Ka Yit DY Canal	3.20	5.15	9.00	2.74	0.50

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
14	Kun Say Main Canal	16.30	26.24	29.00	8.84	5.26
15	Tha Man Da Lin (A) Canal	2.00	3.22	9.00	2.74	0.50
16	Saw Bwar (A) Canal	4.00	6.44	6.00	1.83	0.50
17	Let Pan Chaung (A) Canal	3.00	4.83	5.00	1.52	0.31
18	Kyet Teik (A) Canal	3.00	4.83	6.00	1.83	0.48
19	Sar Taung (A)	3.60	5.80	4.00	1.22	0.20
20	Tha Lai (A)	2.00	3.22	4.00	1.22	0.22
21	Yandeik Canal	2.20	3.54	7.00	2.13	0.34
22	Ngapyauung Canal	8.60	13.85	19.00	5.79	2.80
23	Yay So DY Canal	3.40	5.47	10.00	3.05	0.39
Thindwe Canal System						
1	Thindwe Main Canal(Kyaukse)	13.00	20.93	20.00	6.10	7.84
2	Thindwe Canal(Sintgaing)	1.60	2.58	14.00	4.27	2.41
3	Min Hla (A) Canal	3.00	4.83	6.00	1.83	0.53
4	Mahuyar (A) Canal	3.00	4.83	7.00	2.13	0.34
5	Payin (A) Canal	1.60	2.58	6.00	1.83	0.36
6	Salon Ban (A) Canal	2.60	4.19	14.00	4.27	0.31
7	Shan Kan Canal	5.60	9.02	10.00	3.05	1.68
Minye Weir Canal System						
1	Minye Canal (Kyaukse)	5.40	8.69	32.00	9.75	6.44
2	Minye Canal (Sintgaing)	9.60	15.46	24.00	7.32	3.58
3	Tin Taung DY Canal	4.40	7.08	13.00	3.96	0.42
4	Minor(1)	3.00	4.83	7.00	2.13	0.39
5	Minor(2)	2.00	3.22	7.00	2.13	0.39
6	Minor(3)	2.00	3.22	5.00	1.52	0.22
7	Ta Moak Main Canal	6.60	10.63	48.00	14.63	6.58
8	Kyi Gone (A) Canal	3.00	4.83	9.00	2.74	0.28

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
9	Ta Moak Saw Bwar(A) Canal	3.30	5.31	10.00	3.05	0.42
10	Manaw Yarzar (A) Canal	2.40	3.86	11.00	3.35	0.48
11	Tar Chout (A) Canal	2.00	3.22	8.00	2.44	0.28
12	Tin Boat (A) Canal	3.00	4.83	10.00	3.05	0.28
13	Nan Kaing (A) Canal	1.30	2.09	10.00	3.05	0.36
14	Baw DY Canal	1.40	2.25	14.00	4.27	1.54
15	Taung Ta Moak DY Canal	2.00	3.22	10.00	3.05	0.67
Zeedaw Weir Canal System						
1	Zeedaw Main Canal	6.00	9.66	102.00	31.09	27.13
2	Pa Laik Main Canal	9.50	15.30	47.00	14.33	10.11
3	Left DY Canal	2.70	4.35	20.00	6.10	1.01
4	Monk Paung DY Canal	5.70	9.18	20.00	6.10	1.96
5	Myin Ka Lay (A) Canal	1.20	1.93	6.00	1.83	0.28
6	Sai Pa Lway DY Canal	1.50	2.42	10.00	3.05	0.56
7	Kha Mauk DY Canal	2.30	3.70	7.00	2.13	0.67
8	Nwar Htein DY Canal	0.80	1.29	10.00	3.05	0.48
9	U Shit Pin DY Canal	1.80	2.90	6.00	1.83	0.39
10	Pa Laik Minor Canal	3.70	5.96	13.00	3.96	1.71
11	Myaung Sone Main Canal	5.50	8.86	47.00	14.33	9.72
12	Chaung Laung (A) Canal	0.80	1.29	7.00	2.13	0.31
13	Net Myat(A) Canal	0.80	1.29	7.00	2.13	0.28
14	Ma Uu (A) Canal	2.40	3.86	11.00	3.35	1.29
15	Ka Thae Kone (A) Canal	0.80	1.29	5.00	1.52	0.25
16	Tal Thar (A) Canal	0.80	1.29	6.00	1.83	0.34
17	Net Tha Ye Canal	4.60	7.41	24.00	7.32	2.10
18	That Ka Lal Canal	2.40	3.86	6.00	1.83	0.36
19	Net Mi Canal	7.50	12.08	30.00	9.14	2.63

(3) Kinda Irrigation System

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
Left Main Canal System						
1	DY-1	-	-	2.00	0.61	0.11
2	DY-2	0.04	0.06	2.00	0.61	0.28
3	DY-3 (A)	0.03	0.05	2.00	0.61	0.22

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
4	DY - 3(B)	0.04	0.06	2.00	0.61	0.17
5	DY - 3(C)	0.23	0.37	7.00	2.13	0.84
6	DY - 3(D)	0.06	0.09	2.00	0.61	0.20
7	DY - 4	3.93	6.32	3.00	0.91	0.88

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
8	DY - 5	1.85	2.99	4.00	1.22	1.03
9	DY - 6	3.14	5.05	2.50	0.76	0.77
10	DY - 7	0.02	0.04	5.00	1.52	0.22
11	DY - 8	3.76	6.06	4.50	1.37	0.98
12	DY - 9	0.14	0.22	2.00	0.61	0.49
13	DY - 10	0.98	1.57	2.50	0.76	0.84
14	DY - 11	2.55	4.11	5.00	1.52	1.44
15	DY - 12	3.13	5.03	5.00	1.52	1.51
16	DY - 13	0.68	1.09	2.50	0.76	0.88
17	DY - 14	4.66	7.50	7.00	2.13	2.52
18	DY - 15	4.91	7.91	8.00	2.44	2.56
19	DY - 16	5.89	9.49	6.00	1.83	2.24
20	DY - 17	5.83	9.39	8.00	2.44	2.87
21	DY - 18	5.38	8.66	10.00	3.05	1.75
22	DY - 19	3.99	6.42	10.00	3.05	1.54
23	DY - 20	0.42	0.68	4.00	1.22	0.11
24	DY - 20 (A)	3.40	5.47	10.00	3.05	2.03
25	DY - 21	3.53	5.69	10.00	3.05	1.16
26	DY - 22	1.11	1.78	5.00	1.52	0.81
27	DY - 23	0.87	1.40	5.00	1.52	0.46
28	DY - 24	0.40	0.65	5.00	1.52	0.46
29	DY - 25	2.19	3.53	5.00	1.52	0.70
30	DY - 26	4.11	6.61	4.00	1.22	0.98
31	DY - 27	5.38	8.66	4.00	1.22	1.37
32	DY - 28	0.03	0.05	4.00	1.22	0.46
33	DY - 29	3.79	6.10	6.00	1.83	2.35
34	DY - 29(A)	3.63	5.85	4.00	1.22	0.91
35	DY - 30	10.52	16.94	8.00	2.44	2.59
36	DY - 31	1.64	2.65	4.00	1.22	1.26
37	DY - 32	7.89	12.70	7.00	2.13	2.87
38	DY - 33	3.03	4.88	7.00	2.13	0.91
39	DY - 34	2.73	4.39	4.00	1.22	1.02
Right Main Canal System						
1	Nga Lai Zin Canal	5.20	8.37	68.00	20.73	27.83
2	Dai DY	3.00	4.83	10.00	3.05	0.98
3	Nga Lai Zin DY	9.60	15.46	22.00	6.71	13.55

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
4	Shan Ta Nge DY	2.00	3.22	4.00	1.22	0.50
5	Myin Moet Daw DY	7.00	11.27	10.00	3.05	2.02
6	Myin Moet Daw Minor	1.50	2.42	4.00	1.22	0.48
7	Ohn Mar DY	4.50	7.25	6.00	1.83	0.95
8	Ohn Mar Minor 1	1.30	2.09	5.00	1.52	0.28
9	Ohn Mar Minor 2	0.70	1.13	6.00	1.83	0.48
10	Ohn Mar Minor 3	0.70	1.13	5.00	1.52	0.34
11	Lun Kyaw DY	2.00	3.22	9.00	2.74	0.56
12	Nant Maw DY	1.90	3.06	7.00	2.13	0.28
13	Boan Kwin Minor	1.50	2.42	6.00	1.83	0.31
14	Taung Nyo DY	1.40	2.25	5.00	1.52	0.22
15	Thin Date DY	1.90	3.06	6.00	1.83	0.36
16	Thin Date Minor	0.60	0.97	4.00	1.22	0.25
17	Ka Du DY	3.60	5.80	18.00	5.49	1.29
18	Ngar Ywar Minor	1.00	1.61	6.00	1.83	0.42
19	Thin De Canal	8.80	14.17	18.00	5.49	1.82
20	Pe'Khin DY	3.50	5.64	9.00	2.74	0.90
21	Ngar Ooe Minor	1.40	2.25	9.00	2.74	0.56
22	Shwe Chaung Minor	4.00	6.44	7.00	2.13	0.53
23	Pyauung Pyar Canal	11.70	18.84	40.00	12.19	9.97
24	Koe See DY	1.50	2.42	11.00	3.35	0.81
25	Koe See Minor	0.90	1.45	3.00	0.91	0.08
26	Lat Pan Seik DY	6.30	10.14	18.00	5.49	1.48
27	Lat Pan Seik Minor 1	1.50	2.42	4.00	1.22	0.25
28	Lat Pan Seik Minor 2	1.80	2.90	5.00	1.52	0.45
29	Nyaung Ni Pin DY	1.90	3.06	10.00	3.05	0.36
30	Nyaung Kaing DY	1.80	2.90	4.00	1.22	0.20
31	Sel Nge DY	3.60	5.80	11.00	3.35	0.78
32	Aung Bat San DY	4.90	7.89	15.00	4.57	1.37
33	Khan Tee Minor	3.00	4.83	16.00	4.88	0.62
34	Yay Wun Minor	0.80	1.29	4.00	1.22	0.22
35	Kote Ko Kone DY	1.30	2.09	8.00	2.44	0.36
36	Ngar Ooe DY	0.80	1.29	8.00	2.44	0.14
37	Shan Peik DY	4.00	6.44	13.00	3.96	1.01
38	Taw Myaung DY	2.50	4.03	8.00	2.44	0.56
39	Taw Myaung Minor	-	-	-	-	-

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
40	Pyauung Pyar Minor	-	-	-	-	-

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	

1.1.3 Nay Pyi Taw Irrigation Scheme

(1) Paunglaung Dam Irrigation System

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
1	Right Main Canal	29.26	47.11	10.00	3.05	10.50
2	DY (1)	3.69	5.94	4.50	1.37	1.01
3	DY (1-A)	1.04	1.67	3.50	1.07	0.39
4	DY (2)	1.89	3.04	5.00	1.52	0.39
5	DY (3)	1.70	2.74	3.00	0.91	0.42
6	DY (4)	1.41	2.27	2.25	0.69	0.18
7	DY (4-A)	2.08	3.35	3.00	0.91	0.22
8	DY (5)	1.12	1.80	3.50	1.07	0.54
9	DY (5-A)	0.85	1.37	2.00	0.61	0.17
10	DY (6)	1.38	2.22	4.50	1.37	0.38
11	DY (6-A)	2.90	4.67	3.00	0.91	0.34
12	DY (7)	0.85	1.37	4.00	1.22	0.32
13	DY (7-A)	1.42	2.29	3.50	1.07	0.28
14	DY (8)	2.99	4.81	3.75	1.14	0.46
15	DY (9)	2.31	3.72	5.00	1.52	1.26
16	DY (9-A)	1.42	2.29	4.00	1.22	0.35
17	DY (10)	2.82	4.54	5.00	1.52	1.06
18	DY (10-A)	1.25	2.01	2.75	0.84	0.10
19	DY (12)	0.98	1.58	3.00	0.91	0.20
20	DY (13)	1.52	2.45	3.00	0.91	0.31
21	DY (14)	2.23	3.59	3.00	0.91	0.30
22	DY (15)	0.61	0.98	2.50	0.76	0.15
23	DY (16)	1.53	2.46	3.00	0.91	0.17
24	DY (17)	1.29	2.08	1.50	0.46	0.07
25	DY (18)	0.89	1.43	2.50	0.76	0.16
26	DY (19)	0.66	1.06	2.00	0.61	0.11
27	DY (19-A)	0.47	0.76	1.50	0.46	0.06
28	DY (20)	0.36	0.58	2.00	0.61	0.11
29	DY (22)	0.25	0.40	2.50	0.76	0.18

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
30	DY (22)	0.78	1.26	1.50	0.46	0.04
31	DO (1)	0.70	1.13	2.00	0.61	0.08
32	DO (1-A)	0.11	0.18	2.00	0.61	1.12
33	DO (2)	0.38	0.61	1.50	0.46	0.28
34	DO (3)	1.33	2.14	4.00	1.22	0.43
35	DO (3-A)	0.81	1.30	3.00	0.91	0.14
36	DO (4)	0.51	0.82	1.50	0.46	0.03
37	DO (4-A)	0.38	0.61	1.25	0.38	0.04
38	DO (4-B)	0.30	0.48	1.25	0.38	0.04
39	DO (4-D)	0.68	1.09	1.25	0.38	0.04
40	Left Main Canal	-	-	-	-	-
41	DY (1)	1.27	2.04	2.75	0.84	0.33
42	DY (2)	3.69	5.94	5.50	1.68	1.98
43	DY (3)	2.08	3.35	5.00	1.52	1.06
44	DY (4)	2.18	3.51	3.00	0.91	0.14
45	DY (5)	1.42	2.29	2.75	0.84	0.11
46	DY (6)	1.42	2.29	4.00	1.22	0.33
47	DY (7)	1.89	3.04	3.50	1.07	0.52
48	DY (8-A)	1.06	1.71	3.00	0.91	0.15
49	DY (8-B)	1.14	1.84	2.50	0.76	0.18
50	DY (9-A)	0.68	1.09	3.50	1.07	0.26
51	DY (9-B)	1.97	3.17	4.50	1.37	0.51
52	DY (10)	1.46	2.35	3.75	1.14	0.25
53	DY (11)	1.80	2.90	3.75	1.14	0.36
54	DY (12-A)	1.38	2.22	3.50	1.07	0.15
55	DY (12-B)	1.17	1.88	2.50	0.76	0.12
56	DY (13)	0.91	1.47	3.75	1.14	0.26
57	DY (14)	1.08	1.74	2.00	0.61	0.11
58	DY (15)	1.38	2.22	2.50	0.76	0.21

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
59	DY (16)	1.23	1.98	3.00	0.91	0.20
60	DY (17)	0.91	1.47	3.00	0.91	0.21
61	DY (18)	2.75	4.43	3.50	1.07	0.30
62	DY (19)	0.98	1.58	3.00	0.91	0.16
63	DY (20)	0.80	1.29	2.50	0.76	0.21
64	DO (1)	0.72	1.16	3.00	0.91	0.11
65	DO (1-A)	0.78	1.26	2.50	0.76	0.11
66	DO (2)	0.95	1.53	3.00	0.91	0.11

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
67	DO (2-A)	0.38	0.61	1.30	0.40	0.08
68	DO (2-B)	0.57	0.92	2.00	0.61	0.08
69	DO (3)	0.76	1.22	2.20	0.67	0.03
70	DO (4)	0.28	0.45	1.50	0.46	0.05
71	DO (5-A)	0.40	0.64	1.23	0.37	0.15
72	DO (5-B)	0.98	1.58	2.00	0.61	0.11
73	DO (6)	0.49	0.79	2.50	0.76	0.18
74	DO (7)	0.34	0.55	1.75	0.53	0.11

(2) Yezin Dam Irrigation System

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
1	Right Main Canal	0.68	1.10	14.60	4.45	7.51
2	DY RMC	3.98	6.40	2.00	0.61	0.67
3	Right Canal 1	6.73	10.84	9.25	2.82	2.33
4	Minor 1	0.77	1.24	1.00	0.30	0.17
5	Minor 2	1.02	1.65	2.00	0.61	0.27
6	Minor 3	0.86	1.38	1.50	0.46	0.18
7	Minor 4	1.27	2.04	1.50	0.46	0.19
8	Minor 5	2.54	4.09	2.00	0.61	0.30
9	Minor 6	0.77	1.24	2.00	0.61	0.27
10	Minor 7	0.82	1.32	1.00	0.30	0.14
11	Minor 8	1.17	1.89	1.00	0.30	0.19
12	Minor 9	0.66	1.06	2.25	0.69	0.25
13	Minor 10	0.85	1.37	1.00	0.30	0.21
14	Right Canal 2	6.82	10.97	6.33	1.93	4.51
15	Minor 1	0.97	1.56	2.00	0.61	0.29
16	Minor 2	1.70	2.74	0.75	0.23	0.26
17	Minor 3	1.14	1.83	2.50	0.76	0.30
18	Minor 4	0.83	1.33	1.50	0.46	0.24
19	Minor 5	1.45	2.33	1.50	0.46	0.26
20	Minor 6	0.68	1.10	1.50	0.46	0.28
21	DY- NO 1	2.37	3.81	6.50	1.98	1.28
22	Minor 1	0.70	1.13	3.00	0.91	0.15
23	Minor 2	1.06	1.71	5.00	1.52	0.36

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
24	Minor 3	0.87	1.40	2.00	0.61	0.74
25	DY- NO 2	1.06	1.71	5.00	1.52	0.36
26	Minor 1	0.66	1.07	1.50	0.46	0.09
27	DY- NO 3	4.26	6.86	6.50	1.98	0.98
28	Minor 1	0.76	1.22	1.50	0.46	0.17
29	Minor 2	1.18	1.90	1.50	0.46	0.23
30	Minor 3	0.47	0.76	1.50	0.46	0.11
31	Minor 4	0.38	0.61	1.50	0.46	0.11
32	Left Canal	4.96	7.98	3.67	1.12	1.70
33	Minor 1	0.63	1.01	1.50	0.46	0.10
34	Minor 2	0.72	1.16	1.00	0.30	0.10
35	Minor 3	0.82	1.33	1.50	0.46	0.10
36	Minor 4	0.82	1.33	1.50	0.46	0.10
37	Minor 5	0.98	1.59	2.50	0.76	0.16
38	Minor 6	2.65	4.27	3.00	0.91	0.45
39	Minor 7	1.38	2.23	2.00	0.61	0.27

(3) Sinthe Dam Irrigation System

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
1	Right Main Canal	30.64	49.34	10.00	3.05	8.74
2	DO (1)	0.45	0.73	1.50	0.46	0.10
3	DY (1)	2.49	4.01	3.50	1.07	0.71
4	DO (3)	1.73	2.79	2.50	0.76	0.36
5	DY (2)	6.06	9.76	6.00	1.83	2.52
6	DO (4)	0.68	1.10	2.00	0.61	0.18
7	DY (3)	0.93	1.49	3.50	1.07	0.70
8	DO (5)	2.46	3.96	3.00	0.91	0.42
9	DO (5-A)	0.57	0.91	2.50	0.76	0.29
10	DO (6)	0.76	1.22	1.50	0.46	0.08
11	DO (7)	0.96	1.54	1.50	0.46	0.11
12	DO(8)	0.19	0.30	1.25	0.38	0.07
13	DO (9)	0.47	0.76	1.75	0.53	0.10
14	DO (10)	1.14	1.83	1.50	0.46	0.08
15	DO (11)	0.42	0.67	2.50	0.76	0.22
16	DY (4)	0.88	1.41	2.50	0.76	0.29
17	DO (12)	0.42	0.68	1.50	0.46	0.10
18	DO (13)	1.19	1.92	2.00	0.61	0.14
19	DO (14)	0.38	0.61	1.50	0.46	0.06
20	DO (15)	0.74	1.19	1.50	0.46	0.18
21	DO (16)	0.38	0.61	1.50	0.46	0.21
22	DO (17)	1.25	2.02	2.50	0.76	0.22
23	DO (18)	1.00	1.62	1.50	0.46	0.08
24	DO (19)	0.56	0.90	2.00	0.61	0.22
25	DO (20)	0.74	1.19	2.00	0.61	0.17
26	DY (5)	1.02	1.63	3.00	0.91	0.43

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
27	DO (21)	0.49	0.79	1.50	0.46	0.10
28	DO (22)	0.38	0.61	2.50	0.76	0.27
29	DY (6)	1.91	3.08	2.50	0.76	0.32
30	DO (24)	0.40	0.64	1.50	0.46	0.10
31	DO (26)	0.16	0.26	1.25	0.38	0.08
32	Left Main Canal	10.00	16.10	14.00	4.27	14.00
33	DY (1)	10.00	16.10	7.75	2.36	4.61
34	DO (1)	2.80	4.51	3.50	1.07	0.61
35	DO (2)	2.40	3.86	3.25	0.99	0.48
36	DY (2)	3.16	5.09	5.00	1.52	1.32
37	DY (3)	2.92	4.70	3.50	1.07	0.56
38	DY (4)	1.70	2.74	3.50	1.07	2.14
39	DO (3)	0.66	1.07	1.50	0.46	0.03
40	DO (4)	0.09	0.15	1.50	0.46	0.03
41	DO (5)	0.48	0.78	2.00	0.61	0.07
42	DO (6)	0.48	0.78	2.00	0.61	0.18
43	DO (6-A)	0.64	1.04	1.50	0.46	0.06
44	DO (5)	2.08	3.35	3.50	1.07	2.80
45	DO (7)	1.05	1.68	1.50	0.46	0.09
46	DO (8)	0.24	0.38	1.50	0.46	0.02
47	DO (9)	0.39	0.63	1.50	0.46	0.02
48	DO (10)	0.28	0.46	1.50	0.46	0.01
49	DO (11)	0.35	0.56	1.50	0.46	0.02
50	DO (12)	0.50	0.81	1.50	0.46	0.18
51	DO (13)	0.66	1.07	1.50	0.46	0.23

(4) Ngalik Dam Irrigation System

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
1	Main Canal	12.62	20.32	12.00	3.66	11.51
2	DY (1)	3.94	6.34	6.00	1.83	1.74
3	DY (1)	2.22	3.58	4.00	1.22	0.58
4	DY (2)	3.57	5.75	8.00	2.44	2.48
5	DY (2)	1.01	1.63	3.00	0.91	0.36

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
6	DY (3)	1.42	2.28	5.00	1.52	1.28
7	DY (4)	5.07	8.16	10.00	3.05	5.03
8	DY (4) Minor (1)	0.53	0.85	3.00	0.91	0.41
9	DY (4) Minor (2)	2.81	4.53	5.00	1.52	0.29
10	DY (4) Minor (3)	2.21	3.56	4.00	1.22	0.82

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
11	DY (4) Minor (4)	1.71	2.75	3.50	1.07	0.63
12	DY (4) Minor (5)	0.91	1.46	2.50	0.76	0.33
13	DY (5)	4.62	7.44	3.00	0.91	3.25
14	DY (6)	4.80	7.73	10.00	3.05	5.64

No	Name of Canal	Canal Length		Canal Bed Width		Water Discharge (m3)
		(mile)	(km)	(feet)	(m)	
15	DY (6) Minor (1)	2.46	3.96	6.00	1.83	1.75
16	DY (6) Minor (2)	5.14	8.28	7.50	2.29	2.76
17	DY (7)	1.88	3.03	5.50	1.68	1.42
18	DY (8)	4.24	6.83	7.00	2.13	1.67

1.2 Drainage Canal

1.2.1 Ayeyarwady Irrigation Schem

(1) Shwe Laung Polder

No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
1	Wakema Main Canal	4.52	7.28	62.00	18.90	3.20
2	M.C-1	11.36	18.29	60.00	18.29	2.53
3	M.C-2	2.00	3.22	36.00	10.97	2.32
4	S.1-1	1.00	1.61	14.00	4.27	1.13
5	S.1-2	1.20	1.93	14.00	4.27	0.67
6	S.1-3	0.80	1.29	9.00	2.74	1.07
7	S.1-4	1.00	1.61	39.00	11.89	1.13
8	S.1-5	2.76	4.44	43.00	13.11	1.56
9	S.1-6	7.20	11.59	43.00	13.11	0.95
10	S.1-7	1.80	2.90	16.00	4.88	1.83
11	S.1-8	3.20	5.15	18.00	5.49	1.68
12	S.1-9	2.00	3.22	19.00	5.79	1.49
13	S.1-10	1.20	1.93	12.00	3.66	1.28
14	S.1-11	1.60	2.58	6.00	1.83	1.68
15	S.1-12	1.20	1.93	10.00	3.05	1.92
16	S.1-13	1.20	1.93	10.00	3.05	1.83
17	S.1-14	1.20	1.93	13.00	3.96	2.04
18	S.1-15	2.60	4.19	8.00	2.44	2.22
19	S.1.1-11	0.80	1.29	9.00	2.74	1.31
20	S.2-1	1.40	2.25	15.00	4.57	2.07
21	S.2-2	0.80	1.29	8.00	2.44	0.95
22	S.2-3	0.80	1.29	8.00	2.44	0.89
23	S.D-1	1.20	1.93	9.00	2.74	1.37
24	S.M-1	1.20	1.93	8.00	2.44	1.31

No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
25	S.M-2	1.40	2.25	8.00	2.44	1.37
26	S.M-3	0.40	0.64	8.00	2.44	0.98
27	S.P-1	1.20	1.93	8.00	2.44	1.22
28	T.1-1	1.20	1.93	9.00	2.74	0.98
29	T.1-2	1.20	1.93	9.00	2.74	1.01
30	T.1-3	2.00	3.22	9.00	2.74	1.19
31	T.2-1	1.80	2.90	15.00	4.57	0.73
32	T.2-2	1.80	2.90	9.00	2.74	0.58
33	T.4-1	1.80	2.90	7.00	2.13	0.74
34	T.4-2	1.20	1.93	9.00	2.74	0.73
35	T.5-1	1.20	1.93	12.00	3.66	0.66
36	T.5-2	1.60	2.58	12.00	3.66	1.02
37	T.5-3	1.20	1.93	12.00	3.66	0.90
38	T.5-4	2.00	3.22	14.00	4.27	1.07
39	T.5-5	1.20	1.93	12.00	3.66	0.91
40	T.5-6	1.20	1.93	12.00	3.66	1.11
41	T.6-1	0.80	1.29	9.00	2.74	0.43
42	T.6-2	0.80	1.29	9.00	2.74	0.43
43	T.6-3	0.80	1.29	12.00	3.66	1.31
44	T.6-4	0.80	1.29	10.00	3.05	0.49
45	T.6-5	0.80	1.29	10.00	3.05	0.40
46	T.6-6	1.60	2.58	10.00	3.05	0.91
47	T.6-7	1.00	1.61	8.00	2.44	0.91
48	T.8-1	0.80	1.29	8.00	2.44	1.65

No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
49	T.8 -2	0.80	1.29	8.00	2.44	1.65
50	T.8 -3	0.80	1.29	4.00	1.22	1.71
51	T.8 -4	1.00	1.61	10.00	3.05	1.25
52	L.1-1	1.60	2.58	8.00	2.44	1.04
53	T.M.C	2.20	3.54	70.00	21.34	2.90
54	U.M.C	2.80	4.51	20.00	6.10	2.29
55	Taung U chaung	0.16	0.26	95.00	28.96	2.73
56	Taw ka nut chaung	0.30	0.48	34.00	10.36	2.29
57	Taw ka nut (out fall chanal)	0.04	0.06	52.00	15.85	2.71
58	U gyun (leading chanal)	0.24	0.39	68.00	20.73	3.72
59	U gyun (out fall chanal)	0.24	0.39	58.00	17.68	3.72
60	Ashe Da yin (leading chanal)	0.08	0.13	18.00	5.49	2.74
61	Ashe Da yin(out fall chanal)	0.05	0.08	18.00	5.49	2.13
62	Kyon ka byin (leading chanal)	0.16	0.26	34.00	10.36	3.11
63	Kyon ka byin(out fall chanal)	0.08	0.13	33.00	10.06	2.90
64	Me za li (leading chanal)	0.09	0.14	30.00	9.14	2.74

No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
65	Me za li (out fall chanal)	0.74	1.19	38.00	11.58	2.90
66	Me za li chaung	0.90	1.45	25.00	7.62	2.13
67	Pa ya (leading chanal)	0.96	1.55	25.00	7.62	2.90
68	Pa ya(out fall chanal)	0.55	0.89	20.00	6.10	2.59
69	A lan(leading chanal)	0.06	0.10	11.00	3.35	2.62
70	A lan(out fall chanal)	0.03	0.05	11.00	3.35	3.44
71	Ka leik(leading chanal)	0.30	0.48	11.00	3.35	2.77
72	Ka leik(out fall chanal)	0.80	1.29	12.00	3.66	2.62
73	Ka la(leading chanal)	0.24	0.39	12.00	3.66	3.69
74	Ka la(out fall chanal)	0.60	0.97	13.00	3.96	3.69
75	Kyon pa daw (leading chanal)	0.12	0.19	12.00	3.66	2.44
76	Kyon pa daw (out fall chanal)	0.03	0.05	12.00	3.66	2.13
77	Ta lok taw (leading chanal)	0.08	0.13	12.00	3.66	2.74
78	Ta lok taw (out fall chanal)	0.06	0.10	12.00	3.66	1.98
79	Kyon ka byin chaung	0.80	1.29	12.00	3.66	1.98
80	Kyon ka byin chaung	4.20	6.76	30.00	9.14	2.74

(2) Thonegwa Polder

No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
1	Pandaw Main Canal	10.50	16.91	62.00	18.90	1.83
2	Pandaw Right Canal	4.00	6.44	40.00	12.19	1.83
3	Pandaw Left Canal	4.00	6.44	40.00	12.19	1.83
4	A Lang Taing Yoe Canal	4.00	6.44	42.00	12.80	1.83
5	Phayar Tone Su Canal	1.50	2.42	37.00	11.28	1.83
6	Tone Kyaing	1.50	2.42	42.00	12.80	1.83
7	DY (1) Thonegwa	0.50	0.81	15.00	4.57	1.52
8	DY (2) Thonegwa	0.60	0.97	15.00	4.57	1.52
9	DY (3) Thonegwa	0.70	1.13	15.00	4.57	1.52
10	Pauk Kaing	4.00	6.44	42.00	12.80	1.83
11	Tha Pyay Gone Canal	1.00	1.61	37.00	11.28	1.52
12	Kyauk Canal	1.50	2.42	20.00	6.10	1.52
13	DY (1) Thone Kyaing	1.00	1.61	20.00	6.10	1.52
14	DY (2) Thone Kyaing	1.00	1.61	20.00	6.10	1.52
15	DY (3) Thone Kyaing	1.00	1.61	20.00	6.10	1.52

No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
16	Tha Pyay Gone Cross Canal(1)	0.50	0.81	20.00	6.10	1.52
17	Tha Pyay Gone Cross Canal(2)	0.80	1.29	20.00	6.10	1.52
18	Tha Pyay Gone Cross Canal(3)	1.50	2.42	20.00	6.10	1.52
19	Tha Pyay Gone Cross Canal(4)	0.50	0.81	20.00	6.10	1.52
20	Tha Pyay Gone Cross Canal(5)	0.40	0.64	20.00	6.10	1.52
21	Let Pan Gone Canl	2.00	3.22	20.00	6.10	1.52
22	DY (1) (Kha Naung Taw)	1.10	1.77	20.00	6.10	1.52
23	DY (2) (Kha Naung Taw)	1.10	1.77	20.00	6.10	1.52
24	DY (3) (Kha Naung Taw)	1.10	1.77	20.00	6.10	1.52
25	Ma Yan Kwe	1.90	3.06	20.00	6.10	1.52
26	Let Pan Gone Cross Canal(1)	3.00	4.83	20.00	6.10	1.52
27	Let Pan Gone Cross Canal(2)	2.50	4.03	20.00	6.10	1.52
28	Htan Pin Phyo Canal	7.75	12.48	62.00	18.90	1.83
29	Ngar Pyay Ma Canal	3.00	4.83	15.00	4.57	1.22
30	Ma Nga Yoe Canal	3.30	5.31	15.00	4.57	1.22

No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
31	Kyar Ga Yet Canal	3.00	4.83	15.00	4.57	1.22
32	La Mu Yoe Canal	2.50	4.03	15.00	4.57	1.22
33	Poe Toke Canal	3.20	5.15	15.00	4.57	1.22
34	Baw Kwin Canal	2.10	3.38	15.00	4.57	1.22
35	Mya Han Canal	1.00	1.61	15.00	4.57	1.22
36	Htun Hlaing Canal	1.00	1.61	15.00	4.57	1.22
37	Me Daw Su Canal	1.00	1.61	37.00	11.28	1.83
38	San Pya Canal	1.00	1.61	42.00	12.80	1.83
39	Nga Phal Chaung Canal	1.00	1.61	42.00	12.80	1.83
40	Mya Thein Yoe Canal	4.00	6.44	37.00	11.28	1.83
41	Kan Su Canal	1.25	2.01	37.00	11.28	1.83
42	Phayar Tone Su (A) Canal	1.50	2.42	42.00	12.80	1.83
43	Nway Shwe War Canal	1.70	2.74	15.00	4.57	1.22
44	Aye Chan Nway Canal	1.75	2.82	15.00	4.57	1.22
45	Phayar Thone Su DY Canal	0.75	1.21	15.00	4.57	1.22
46	Nway Shwe War DY Canal	0.60	0.97	15.00	4.57	1.22
47	Aye Chan Nway Dy Canal	0.90	1.45	15.00	4.57	1.22
48	Mya Thein Yoe Set Canal	1.50	2.42	15.00	4.57	1.22
49	Mya Thein Yoe Set Canal DY (1)	1.00	1.61	15.00	4.57	1.22
50	Mya Thein Yoe Set Canal DY (2)	1.25	2.01	15.00	4.57	1.22
51	Communication Canal	2.00	3.22	52.00	15.85	1.83
52	Ma Kyar Yoe Canal	1.00	1.61	42.00	12.80	1.83
53	Ngar Yoe Gyi Canal	3.00	4.83	52.00	15.85	1.83
54	Nwar Lan Canal	2.00	3.22	42.00	12.80	1.83
55	Kyein Chaung Canal	2.50	4.03	42.00	12.80	1.83
56	U Wai Lu Canal	2.00	3.22	42.00	12.80	1.83
57	Sar Phyu Su- Nga gyi Yoe Canal	1.35	2.17	15.00	4.57	1.22
58	Sayar Phyar Canal	0.90	1.45	15.00	4.57	1.22
59	Daw Kyi Cross Canal	2.30	3.70	15.00	4.57	1.22
60	Hta Min Sar Canal	0.50	0.81	15.00	4.57	1.22
61	Kyaik Latt Gyi Canal	12.00	19.32	52.00	15.85	1.83
62	Sa Khan Gyi- Nga Gyi Yoe Canal	3.00	4.83	15.00	4.57	1.22
63	Thaing Chaung	1.00	1.61	15.00	4.57	1.22
64	Sa Khan Gyi- Trow DY Canal	2.00	3.22	15.00	4.57	1.22
65	Thaing Chaung DY Canal	0.60	0.97	15.00	4.57	1.22

No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
66	Ngar Yoe Gyi- Trow Canal	5.40	8.69	32.00	9.75	1.83
67	Kyaik Latt Gyi DY Canal	1.50	2.42	15.00	4.57	1.22
68	Soe Win Canal	0.80	1.29	15.00	4.57	1.22
69	Trow Yoe Haung Canal	2.00	3.22	15.00	4.57	1.22
70	Taung Tin Canal	1.70	2.74	15.00	4.57	1.22
71	Maung Htun Canal	0.60	0.97	15.00	4.57	1.22
72	Pauk Sa Canal	0.50	0.81	15.00	4.57	1.22
73	Htein Daw Canal	1.00	1.61	15.00	4.57	1.22
74	San Paw Canal	2.00	3.22	15.00	4.57	1.22
75	Kalar Gyi Canal	0.28	0.45	15.00	4.57	1.22
76	Pyin Ma Pin Canal	0.30	0.48	15.00	4.57	1.22
77	Say Yoe Canal	0.50	0.81	15.00	4.57	1.22
78	Kywal Lan Canal	1.60	2.58	15.00	4.57	1.22
79	U San Kwunt Canal	2.00	3.22	15.00	4.57	1.22
80	Kyal Lan Lay Canal	0.70	1.13	15.00	4.57	1.22
81	Nyunt Maung Canal	0.80	1.29	15.00	4.57	1.22
82	Lamu Canal	1.00	1.61	15.00	4.57	1.22
83	Nyan Aye Canal	0.80	1.29	15.00	4.57	1.22
84	Sar Phyu Su Canal	1.00	1.61	32.00	9.75	1.52
85	U Lu Aye Canal	1.00	1.61	15.00	4.57	1.22
86	Htein Pin Canal	1.00	1.61	15.00	4.57	1.22
87	Bo The Su Canal	1.30	2.09	15.00	4.57	1.22
88	Kyauk Canal	0.50	0.81	15.00	4.57	1.22
89	Tar Bay Canal	4.00	6.44	15.00	4.57	1.22
90	U Thein Han Canal	1.50	2.42	15.00	4.57	1.22
91	Htan Pin Canal	0.24	0.39	15.00	4.57	1.22
92	A Chan Canal	1.00	1.61	15.00	4.57	1.22
93	Kyone Dar Gyi Sluice Canal	1.00	1.61	32.00	9.75	1.83
94	Sluice Canal	1.50	2.42	15.00	4.57	1.22
95	Kyone Tar Lay Sluice Canal	1.35	2.17	32.00	9.75	1.83
96	Kyone Phar Canal	1.00	1.61	15.00	4.57	1.22
97	Kyone Tar Lay DY (1)	1.00	1.61	15.00	4.57	1.22
98	Kyone Phar DY	1.00	1.61	15.00	4.57	1.22
99	Kyone Tar Lay DY(2)	1.00	1.61	15.00	4.57	1.22
100	Kha Naung Sluice Canal	1.00	1.61	32.00	9.75	1.83

No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
101	Hla Aye Canal	1.40	2.25	15.00	4.57	1.22
102	Tar Bay Canal	3.50	5.64	15.00	4.57	1.22
103	Tar Bay DY(1)	0.80	1.29	15.00	4.57	1.22
104	Tar Bay DY(2)	0.80	1.29	15.00	4.57	1.22
105	Tar Bay DY(3)(4)(5)(6)(7)	1.50	2.42	15.00	4.57	1.22
106	Ngar Gyi Yoe Trow DY(1)(2)	1.10	1.77	15.00	4.57	1.22
107	Tar Bay Canal	0.70	1.13	15.00	4.57	1.22
108	Kayin Chaung	1.60	2.58	20.00	6.10	1.83
109	Tar Bay Canal	1.20	1.93	15.00	4.57	1.22
110	Tar Bay DY Canal	0.80	1.29	15.00	4.57	1.22
111	Kyone Kyeik Canal	1.50	2.42	25.00	7.62	1.52
112	A Gar Canal	3.00	4.83	25.00	7.62	1.52
113	Sakar Lun Canal	4.00	6.44	25.00	7.62	1.52
114	Nyaung Chaung Chaung	2.00	3.22	25.00	7.62	1.52
115	Tha Yaw Wa Sluice Gate Canal	2.50	4.03	84.00	25.60	1.83
116	DY (1)(2)(3)(4)(5)(6)(7)(8)	4.00	6.44	15.00	4.57	1.22

No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
117	Myin Ka Chaung Sluice Gate Canal	0.35	0.56	32.00	9.75	1.83
118	Trow- Myin Ka Chaung Canal	1.00	1.61	15.00	4.57	1.22
119	Kyone Tim Canal	0.60	0.97	37.00	11.28	1.83
120	Kyone Daw Canal	0.75	1.21	32.00	9.75	1.83
121	Pay Chaung Canal	0.40	0.64	32.00	9.75	1.83
122	Tue Myaung Canal	1.00	1.61	32.00	9.75	1.83
123	Tar Bay Canal	2.00	3.22	15.00	4.57	1.22
124	Tar Bay DY(7) Canal	3.00	4.83	15.00	4.57	1.22
125	Hla Aye Canal	1.00	1.61	15.00	4.57	1.22
126	Khin Zaw Canal	0.50	0.81	15.00	4.57	1.22
127	Tin Aye Canal	2.00	3.22	15.00	4.57	1.22
128	Kha Naung Sluice Canal	1.50	2.42	15.00	4.57	1.22
129	Hywe Shein Canal	1.50	2.42	15.00	4.57	1.22
130	Kyar Ga Yet Canal	1.20	1.93	15.00	4.57	1.22
131	Ma U Sue Canal	1.00	1.61	15.00	4.57	1.22
132	Phoc Seik Canal	3.00	4.83	15.00	4.57	1.22

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No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
1	Ka Ka Yan chaung	5.00	8.05	80.00	24.38	3.66
2	name of Drainage Canal	3.50	5.64	40.00	12.19	3.66
3	Ah Nout Thine Chaung	1.00	1.61	20.00	6.10	2.44
4	Chaung Bwe Gyi Chaung	1.50	2.42	60.00	18.29	3.05
5	Ka Na So Chaung	2.00	3.22	20.00	6.10	2.44
6	Kwin Chaung	0.50	0.81	15.00	4.57	2.44
7	Tel Pin Chaung	1.00	1.61	12.00	3.66	2.13
8	Peik Tar Lay Chaung	3.50	5.64	20.00	6.10	1.83
9	Tel Pin Yay Kyaw Chaung	0.50	0.81	12.00	3.66	2.13
10	Ah Shae Thine Chaung	3.00	4.83	40.00	12.19	4.57
11	Ka Zout Chaung	2.00	3.22	40.00	12.19	3.05
12	Bay Pauk Chaung	2.00	3.22	60.00	18.29	4.57
13	Kyat Sin Chaung	2.00	3.22	35.00	10.67	3.05
14	Nant Moe Lin Chaung	2.50	4.03	40.00	12.19	2.44
15	Aung Hlaing Chaung	1.00	1.61	20.00	6.10	1.83

No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
16	Ka Lar Chaung	1.50	2.42	40.00	12.19	2.44
17	Pay Chaung	1.00	1.61	30.00	9.14	4.57
18	Leit Aing Chaung	5.00	8.05	35.00	10.67	4.57
19	Shaw Chaung	1.50	2.42	30.00	9.14	2.44
20	Ka De Par Chaung	2.00	3.22	50.00	15.24	4.57
21	Wel Chaung	2.00	3.22	30.00	9.14	2.44
22	Phoc Kwel Gyi Chaung	6.50	10.47	80.00	24.38	4.57
23	Lat Tan Chaung	4.00	6.44	50.00	15.24	2.44
24	Phoc Kwel Lay Chaung	5.00	8.05	50.00	15.24	3.05
25	Nant Phaw Chaung	3.50	5.64	40.00	12.19	2.44
26	D.C -1	1.33	2.13	8.00	2.44	9.14
27	D. 1-1	0.89	1.43	6.00	1.83	6.10
28	D. 1-2	0.89	1.43	7.00	2.13	0.61
29	D.1-3	0.63	1.01	6.00	1.83	0.61
30	D.1-4	0.83	1.34	8.00	2.44	0.76

No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
31	D.1-5	2.24	3.60	8.00	2.44	0.76
32	D.1-6	1.46	2.35	8.00	2.44	0.91
33	D.C-2	2.27	3.66	8.00	2.44	0.76
34	D.2-1	0.57	0.91	6.00	1.83	0.76
35	D.C-3	1.89	3.04	8.00	2.44	0.76
36	D.3-1	0.95	1.52	6.00	1.83	0.76
37	D.3-2	1.23	1.98	6.00	1.83	0.76
38	Kan Ba Lar Canal	0.57	0.91	6.00	1.83	0.61

No	Name of Canal	Canal Length		Canal Bed Width		Canal Depth (m)
		(mile)	(km)	(feet)	(m)	
39	Ka De Par Canal	0.57	0.91	6.00	1.83	1.22
40	M.C-1	0.57	0.91	30.00	9.14	2.44
41	M.C-2	0.10	0.17	30.00	9.14	3.05
42	M.C-3	0.09	0.15	20.00	6.10	2.44
43	M.C-4	0.12	0.20	40.00	12.19	3.05
44	M.C-5	0.22	0.36	30.00	9.14	3.05
45	M.C-6	0.16	0.26	35.00	10.67	2.44

2. Rural Road and National Road

2.1 Rural Road

2.1.1 Type of Rural Road

No	Townshi	Type & Length of Rural Road (mile)						
		Asphalt Pavement	Concrete Pavement	Gravel Pavement	Kanker Pavement	Laterite Pavement	Earthen Pavement	
1	Shwebo Irrigation Scheme							
1-1	Shwebo		14.10	0.00	79.52	0.00	0.58	144.58
1-2	Khin-U		0.00	0.00	44.80	0.00	6.75	83.50
1-3	Wetlet		17.25	0.00	45.69	0.00	3.25	59.63
1-4	Kanbalu		0.00	0.00	22.95	0.00	0.00	24.63
1-5	Ye-U		0.00	0.00	32.63	0.00	0.00	31.00
1-6	Tabayin		0.00	0.00	27.30	0.00	4.50	1.50
1-7	Taze		3.13	0.00	20.38	0.00	0.00	33.50
2	Mandalay Irrigation Scheme							
2-1	Patheingyi		4.38	0.00	31.23	0.00	2.38	37.67
2-2	Madaya		0.00	0.00	0.00	0.00	0.00	13.99
2-3	Kyaukse		14.58	0.00	33.44	0.00	5.95	70.46
2-4	Sintgaing		0.00	0.00	0.00	0.00	0.00	0.00
2-5	Myittha		21.25	0.00	44.31	0.00	6.88	103.23
2-6	Tada-U		26.96	0.00	30.46	0.00	64.85	64.86
2-7	Wundwin		0.00	0.00	0.00	0.00	0.00	0.00

No	Townshi	Type & Length of Rural Road (mile)					
		Asphalt Pavement	Concrete Pavement	Gravel Pavement	Kanker Pavement	Laterite Pavement	Earthen Pavement
3	Ayeyarwady Irrigation Scheme						
3-1	Hinthada	8.44	20.08	157.50	75.89	0.00	416.25
3-2	Pathein	15.53	16.66	169.93	47.44	0.00	683.13
3-3	Myaungmya	7.14	4.23	125.70	5.73	0.00	276.27
3-4	Maubin	11.35	14.58	180.85	0.00	0.00	164.82
3-5	Pyarpone	3.60	7.51	57.83	0.00	0.00	456.76
3-6	Labutta	3.13	2.06	30.77	1.00	0.00	58.55

2.1.2 Type of Bridge (Rural Road)

No	Township	Type of Bridge (No.)					
		Concrete Bridge	Timber Bridge	Brick bridge	Box Culvert	Iron & Timber Bridge	Suspension Bridge
1	Shwebo Irrigation Scheme						
1-1	Shwebo	96	0	48	0	0	0
1-2	Khin-U	19	18	7	0	0	0
1-3	Wetlet	5	12	0	9	0	0
1-4	Kanbalu	0	0	19	32	0	0
1-5	Ye-U	1	1	0	5	0	0
1-6	Tabayin	0	2	0	6	0	0
1-7	Taze	2	0	5	0	0	0
2	Mandalay Irrigation Scheme						
2-1	Patheingyi	9	13	0	4	0	0
2-2	Madaya	0	2	0	15	0	0
2-3	Kyaukse	15	54	0	38	0	0
2-4	Singgaing	0	0	0	0	0	0
2-5	Myittha	10	51	0	21	0	0
2-6	Tada-U	26	24	0	78	0	1
2-7	Wundwin	0	0	0	0	0	0
3	Ayeyarwady Irrigation Scheme						
3-1	Hinthada	82	122	0	82	28	0
3-2	Pathein	87	176	0	175	0	0
3-3	Myaungmya	48	47	0	70	0	1
3-4	Maubin	62	42	0	103	2	0
3-5	Pyarpone	92	91	0	40	0	1
3-6	Labutta	13	35	0	24	0	0

2.2 National Road (Ayeyarwady Region)

No	Name of Roads	Type & Length of National Road (mile)				
		Asphalt Pavement	Concrete Pavement	Gravel Pavement	Kanker Pavement	Earthen Pavement
1	Yangon-Pathein Road	62.50	-	40.00	-	-
2	Pathein- Ngwesaung Road	20.38	9.13	-	-	-
3	Ngathaingchaung- Gwa Road	22.25	-	-	-	-
4	Maubin- Kyaiklatt Road	20.13	-	-	-	-
5	Kyaiklatt- Pyarpone Road	11.00	-	-	-	-
6	Kyeinpinse- Setkawk- Danuphyu- Zalon	23.50	1.00	12.25	-	-
7	Nyaungdone Bridge asses roa	4.00	-	-	-	-
8	Maubin- Sarmalauk Road	21.38	-	-	-	-
9	Labutta-Myaungmya-Aieme- Kyaungone- Kyonepyaw Road	46.25	-	-	-	-
10	Malawmyaingyun-Hlaingbone-Thitboat-Kwinpauk-Pyinsalu	-	-	-	11.75	60.63
11	Laputta- Thingyangyi-Pyinsalu Road	3.75	-	-	18.63	12.88
12	Laputta(Kyaukpyarlay)- Thonegwa-Oaktwin-Htikesyone Road	10.38	-	-	19.13	32.88
13	Bokalay-Kyeinchaung-Kadonegani Road	9.88	-	-	12.13	19.25
14	Bokalay- Setsan- Htawpaing- Amar	1.00	-	-	7.75	29.88
15	Pyarpone- Kyonegadone- Daw Nyein-Amar Road	10.13	-	-	34.75	6.75
16	Kyonegadone- Setsan Road	-	-	-	15.50	3.63
17	Bokalay- Mawlamyainggyun- Kyonemangay Road	0.38	-	-	11.38	10.75
18	Pathein- Shawpyar- Chaungtha Road	27.75	-	0.13	-	-
19	Pathein Bridge (West Access Road)	6.25	-	-	-	-
20	Pathein Bridge (East Access Road)	0.63	-	-	-	-
21	Pathein- Yankintaung Road	2.50	-	-	-	-
22	Pathein- Shwemyindin- Waryarchaung Road	6.38	-	-	-	-
23	Pathein- Shwemyindin- Tharbaung Road	16.63	-	-	-	-
24	Pathein- Myaungmya Road	17.75	-	-	-	-
25	Setdaungyi(Tharbaung)- Yekyi Road	-	-	10.44	1.25	0.31
26	Kyaunggone- Thonegwa Road	8.00	-	-	-	-
27	Kyaunggone- Pantanaw Road	1.75	-	-	-	-
28	Kyonepyaw- Innma- Thonegwa Road	12.75	-	1.25	0.75	-
29	Hintada- Athoke- Kyonepyaw Road	1.00	-	-	-	-
30	Laymyetnar- Aingthabyu- Ngathainggaung Road	17.00	-	-	-	-
31	Hintada- Athoke- Kyonepyaw Road	39.75	1.50	-	-	-
32	Hintada- Myokwin- Kwinkauk Road	8.13	-	-	-	-
33	Talouthaw- Laymyatnar Road	11.00	-	-	-	-
34	Ngawun Bridge access Road	6.75	-	-	-	-
35	Malatto- Tamalo- Mezali Road	16.38	-	-	-	-
36	Pantanaw- Aingme Road	15.63	-	-	-	-

No	Name of Roads	Type & Length of National Road (mile)				
		Asphalt Pavement	Concrete Pavement	Gravel Pavement	Kanker Pavement	Earthen Pavement
37	Aingme- Daka Road	15.25	-	-	-	-
38	Pantanaw- Dountgyi Road	4.88	-	-	-	0.13
39	Pantanaw- Mingayu- Kyonetani Road	19.50	-	-	-	-
40	Pantanaw- Shwelaung- Wakema Road	36.13	-	-	-	-
41	Pantanaw Entrance Road	0.25	-	-	-	-
42	Nyaungdone- Targwe Road	4.88	-	-	-	-
43	Sarmalauk- Nyaungdone Road	5.63	-	-	-	-
44	Kyeiklatt- Seinhai- Mawlamyainggyun Road	0.50	-	-	21.25	-
45	Daydaye- Kyeiklatt Road	9.38	-	-	-	-
46	Myaungmya- Pamawadi- Ngaputaw Road	1.75	-	-	7.50	-
47	Wakema- Kyonemangay Road	13.63	-	-	-	-
48	Wakema- Aingma Road	-	-	-	9.88	-
49	Wakama by Pass Road	1.63	-	-	-	-
50	Wakema- Mawlamyainggyun Road	-	-	-	0.88	4.00
51	Labutta- Aingme- Kyonepyaw Road	59.50	1.13	-	-	-
52	Labutta- Shansu- Kyonemangay Road	2.13	-	-	2.88	16.25
53	Mawlamyainggyun- Kyonemangay Road	1.00	-	4.75	2.75	0.88
54	Mawlamyainggyun- Bokalay Road	-	-	-	3.00	-
55	Kyaukkalat- Pyinkayaing- Chaungwa Road	11.13	-	-	-	-
56	Kyoneku Village Entrance Road	12.00	-	-	-	-
57	Ngayokkaungtaung- Ngayokaung Road	-	-	-	17.75	-
58	Pathein- Monywa Road	135.38	-	-	-	-
59	Hintada- Daunggyi- Danaphyu Road	12.75	-	-	-	-
60	Hintada- Songone- Myanaung Road	64.88	0.38	-	-	-
61	Myanaung- Kyankhin Road	4.38	-	-	-	-
62	Kyankhin- Betye Road	7.63	1.00	-	-	-
63	Danaphyu- Thauggyi Road	24.25	-	-	-	-
64	Khebaung Bridge Access Road	2.75	-	-	-	-
65	Maubin- Twantay Road	15.13	-	-	-	-
66	Kyunhtike- Yonedaut- Taungbogyi Road	-	-	7.00	-	-
67	Pathein- Thalatkar- Mawtinsoun Road	96.00	-	-	-	-
68	Pathein- Ngaputaw Road	19.63	-	-	0.63	-
69	Pyarpone- Bokalay Road	19.25	-	0.50	-	-
70	Daydaye- Pyarpone Road	15.75	-	-	-	-
71	Wakema- Kangyi Road	10.25	-	-	-	-
72	Maubin- Shwetaungmaw- Mawlamyainggyun Road	44.75	-	-	-	-
73	Neikban- Aingto- Aingtabyu Road	0.75	-	-	12.25	-

No	Name of Roads	Type & Length of National Road (mile)				
		Asphalt Pavement	Concrete Pavement	Gravel Pavement	Kanker Pavement	Earthen Pavement
74	Kyankhin By Pass Road	-	1.63	-	0.38	-
75	Zalon- Pyinmagone- Shansu Road	-	-	-	13.50	-
76	Thaunggyi-Dykepyat Road	-	-	-	4.25	10.25
77	Inpin- Letpankwin- Nyaungchayhtauk Road	-	-	-	-	12.00
78	Zalon- Kautkat Road	-	-	-	6.69	3.27
79	Laymyetnar- Katthu- Pandaw Road	-	-	-	7.00	-
80	No(1) Enterance Road	-	-	-	2.88	-
81	No(2) Enterance Road	-	-	-	2.25	-
82	Pathein By Pass Road	-	1.56	-	3.31	-
83	Hintada By Pass Road	2.13	-	-	-	-
84	Bomyathun Road, Hintada Township	2.00	0.38	-	-	-
85	Mezalgone- Kywalzin Road	-	-	2.50	-	8.00
86	Ingapu- Nyaungkyo Road	3.00	2.13	-	10.38	-
87	Shwedaungsu cross Road	0.49	0.22	-	-	-
88	Pyarpone Township By Pass Road	0.31	-	0.81	-	-
89	Kyonekadone - Phonegyithaung Road	-	6.88	-	-	-

APPENDIX-IV

**CONSULTANT TOR, SCHEDULE, AND
COST ESTIMATION**

**APPENDIX IV: CONSULTANT TOR, SCHEDULE,
AND COST ESTIMATION**

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1. Terms of Reference for Consulting Services

The Consultant shall provide the engineering services for the implementation of the Project as described in these TOR. The services by the Consultant include, but not necessarily limited to, all the works including detailed design, procurement assistance and construction supervision as detailed below. Site surveys including topographical and geological surveys will be undertaken directly by ID or its designated engineers based on the survey work plan to be prepared by the Consultant.

1.1 Detailed Design

The Consultant shall carry out the following works:

- 1) review and verify all available primary and secondary data;
- 2) prepare a survey work plan that specifies necessary survey items, methodology, manpower and time allocation and submit it to Irrigation Department;
- 3) check and verify the results of all the required engineering surveys and investigations such as topographical survey, hydrological survey, geotechnical survey and material availability survey, which have been conducted by the engineers dispatched by the Irrigation Department to the Consultant team;
- 4) prepare detailed work plan, progress reports and implementation schedule for the Project to ensure effective monitoring and timely project outputs, and regularly update the same;
- 5) prepare detailed design of all the Project components in sufficient detail to ensure clarity and understanding by the Irrigation Department, contractors and other relevant stakeholders. All the designs must be in conformity with the Myanmar Standards when available or with the appropriate international standards. The detailed design shall cover all the components of Shwebo, Mandalay, Nay Pyi Taw and Ayeyarwady irrigation systems such as rehabilitation of main and distributaries canals including repairing and construction of lining works, inspection Road, hydraulic structures along the canals including turn-out, siphon, check structure, head regulator and drop, building for maintenance activities, and other related works. In addition, the detailed design shall also cover national road and rural road (including bridges). The detailed design shall, as a minimum, include i) drawings for all facilities, ii) detailed cost estimates, iii) necessary calculations to determine and justify the engineering details for the Project, and iv) associated documents including detailed specifications, bill of quantities (BQ), implementation schedule for the Project. Such detailed specifications will contain those in relation to i) quality control of materials and workmanship, ii) safety, and iii) protection of the environment,

The Consultant must do all calculation works of all hydraulic structures, canal lining designs, etc. The Consultant shall be in charge of setting up design criteria and design framework, designing of general plans/sections/elevations, and complete draft drawings of all hydraulic structures. All design calculations, design criteria and design framework shall be prepared in a report and submitted to the ID.

- 6) prepare detailed specifications, bill of quantities (BQ) and tender drawings/documents to be incorporated into Bidding Documents. Such detailed specifications shall contain those in relation to; i) quality control of materials and workmanship, ii) safety, and iii) protection of the environment.

1.2 Procurement Assistance

1.2.1 Assistance in Pre-Qualification (PQ) of Contractors

The Consultant shall:

- 1) define PQ criteria in terms of technical and financial requirements, capacity and/or experience taking into consideration the technical features of the Project;
- 2) prepare PQ documents in accordance with the latest version of Standard Prequalification Documents under Japanese ODA Loans;
- 3) assist the Irrigation Department in PQ announcement, addendum/corrigendum, and clarifications to the applicants' queries;
- 4) evaluate PQ applications in accordance with the criteria set forth; and
- 5) prepare a PQ evaluation report for approval of the PQ evaluation committee.

1.2.2 Assistance in Engagement of Contractors and Suppliers

The Consultant shall:

- 1) prepare bidding documents in accordance with the latest version of Standard Bidding Documents under Japanese ODA Loans for Procurement of Works together with all relevant specifications, drawings and other documents;
- 2) assist the Irrigation Department in issuing bid invitation, conducting pre-bid conferences, issuing addendum/corrigendum, and clarifications to bidders' queries;
- 3) evaluate bids in accordance with the criteria set forth in the bidding documents. In such evaluation, the Consultant shall carefully examine if the bidder's technical proposal included all information as required, such as site organization, mobilization schedule, method statement, construction schedule, safety plan, and met such requirements as set forth in applicable laws and regulations, specifications and other parts of the bidding documents;
- 4) prepare a bid evaluation report for approval of the bid evaluation committee;
- 5) assist the Irrigation Department in contract negotiation by preparing agenda and facilitating negotiations including preparation of minutes of negotiation meeting; and
- 6) prepare a draft and final contract agreement.

1.3 Construction Supervision

The Consultant shall perform all the duties as required for supervising construction of all the project components during the construction period. The Consultant shall supervise the rehabilitation and construction of the 4 irrigation Schemes in Shwebo, Mandalay, Ney Pyi Taw and Ayeyarwady, which include preparatory and earth works of main and distributaries canals, repairing and construction of lining works, inspection road, hydraulic structures such as turn-out, siphon, check structure, head regulator and drop, buildings for maintenance activities, and other related works.

However, for the national & rural road rehabilitation and improvement works including bridge construction, which will be implemented during construction period, the engineers dispatched by ID will be primarily responsible for supervising the road construction work. Nevertheless, the Consultant shall assist ID or its engineers in supervising the construction works as may be required.

All the construction works will be carried out by force account. Namely, Construction Circle and/or

MDBW will be mobilized as the party quite similar position to the Contactor, who is to carry out the construction works, while the head office of the Irrigation Department will act as quite similar position to the Employer. In carrying out the construction work under the force account arrangement, FIDIC MDB Harmonized Edition (2010) complemented with the Specific Provisions as included in the Standard Bidding Documents under Japanese ODA Loans for Procurement of Works will be applied to the civil works. In this context, the Consultant shall:

- 1) act as the Engineer to execute construction supervision and contract administration services in accordance with the power and authority delegated by the head office of Irrigation Department;
- 2) provide assistances to the head office of Irrigation Department concerning variations and claims, which are to be ordered/issued at the initiative of the head office of the ID;
- 3) issue the commencement order to the Construction Circle and/or MDBW (Note that this provision not applied to 4 irrigation schemes, which are to commence prior to the deployment of the Consultant);
- 4) provide recommendations to the Irrigation Department for acceptance of the Contractor's performance security, advance payment security and required insurances in case that contractor(s) is employed;
- 5) review and approve the proposals submitted by the contractors and/or Construction Circle and/or MDBW which include a work program, method statements, material sources, and manpower and equipment deployment. In light of Section 3.03 of Guidelines for the Employment of Consultants under Japanese ODA Loans (April 2012), the Consultant shall pay attention, in particular, to whether such proposals meet the safety requirements set forth in the applicable laws and regulations, the specifications or other parts of the contract;
- 6) explain and/or adjust ambiguities and/or discrepancies in the Contract Documents and issue any necessary clarifications or instructions to the contractors and/or Construction Circle and/or MDBW;
- 7) review, verify and further detail the design of the works, approve the contractors' and/or Construction Circle and/or MDBW's working drawings and, if necessary, issue further drawings and/or give instructions to the Contractor and/or Construction Circle and/or MDBW;
- 8) carry out field inspections on the contractor's and/or Construction Circle and/or MDBW's setting-out to ensure that the works are carried out in accordance with the drawings and other design details;
- 9) regularly monitor physical and financial progress against the milestones as per the contract and/or construction schedule so as to ensure completion of the works in time;
- 10) supervise the works so that all the requirements will be met by the contractors and/or Construction Circle and/or MDBW, including those in relation to; i) quality of the works, ii) safety, and iii) protection of the environment. In light of Section 3.03 of Guidelines for the Employment of Consultants under Japanese ODA Loans (April 2012), the Consultant shall confirm that an accident prevention officer proposed by contractor and/or Construction Circle and/or MDBW is duly assigned at the project site(s) and that construction works are carried out according to the requirements set forth in the applicable laws and regulations, the specifications or other parts of the contract. If the Consultant recognizes any questions regarding the safety measures including the ones mentioned above, the Consultant shall require the contractors and/or Construction Circle and/or MDBW to take appropriate remedies;

- 11) Assist Construction Circle and/or MDBW to carry out monitoring on environment and social impacts which may be caused by the construction works, and examine if negative environmental impacts have taken place and they were well handled and settled or not, and if not well handled, recommend necessary actions to meet the regulations and rules relative to environmental and social issues;
- 12) supervise field tests, sampling and laboratory test to be carried out by the contractors and/or Construction Circle and/or MDBW;
- 13) inspect the construction method, equipment to be used, workmanship at the site, and attend shop inspection and manufacturing tests in accordance with the specifications;
- 14) examine and quantify contractors' work output, and endorse the request for payment from the contractor and recommend the ID to issue payment certificates to the contractor such as interim payment certificates and final payment certificate as specified in the contract if it is found adequate. (Note that as per the works carried out by Construction Circle and/or MDBW, do the same and issue Performance Certificate);
- 15) coordinate the works among different organizations working for the Project, if any;
- 16) modify the designs, technical specifications and drawings, relevant calculations and cost estimates as may be necessary in accordance with the actual site conditions, and issue variation orders (including necessary actions in relation to the works performed by other contractors working for other projects, if any);
- 17) carry out timely reporting to the ID for any inconsistency in executing the works and suggesting appropriate corrective measures to be applied;
- 18) inspect, verify and determine claims issued by the Irrigation Department and/or the contractors in accordance with the technical specifications of civil works in Myanmar or other related International Specifications;
- 19) perform the inspection of the works and to issue certificates such as the Taking-Over Certificate, Performance Certificate as specified in the civil works contract. (Note that for the works undertaken by Construction Circle and/or MDBW, only the Performance Certificate will be issued upon the approval of final inspection by the ID, while if defects are noted, instruct Construction Circle and/or MDBW to rectify the works);
- 20) supervise testing and commissioning of all facilities completed;
- 21) for the works carried out by the contractors, provide periodical and/or continuous inspection services during defects liability period (Defect Notification Period defined in FIDIC Conditions of Contract), and if any defects are noted, instruct the contractors to rectify where they are necessary; and
- 22) check and certify as-built drawings submitted by the contractors and/or Construction Circle and/or MDBW, and prepare and submit technical reports to the Irrigation Department.

1.4 Disbursement Management

The Consultant shall assist the ID in processing payment and disbursement to the contractors by carrying out the following works:

- 1) confirm the rehabilitation schedule and disbursement schedule according to on-going situation;

- 2) confirm the rehabilitation area to be carried out according to the rehabilitation plan not only on drawings but also at the site;
- 3) confirm the monthly progress of rehabilitation based on the plan and site situation;
- 4) check necessary documents including contractor's invoices or request for payment, and if corrections needed, advise ID or the contractors to rectify them,
- 5) assist ID to prepare requests for disbursement from JICA; and
- 6) assist ID in reporting to JICA on financial status of the Project at such interval as required.

For smooth implementation of the disbursement management work, the ID head-office will dispatch suitable number of staff/experts per each of the irrigation Schemes under rehabilitation.

1.5 Assistance for Water Management Improvement and Establishment of Water Users Associations

The Consultant shall conduct the following works:

- 1) review the present situation and practice of water management in terms of dam reservoir operation, check gate operation installed along the main canals, distribution at the entrance of all the distributaries canals, and man-power allocation for gate operation, etc.;
- 2) review the farmers organization engaged in irrigation water management, and examine the collection of irrigation service fee, and explore the reason of the low collection ratio;
- 3) estimate irrigation water requirements at each distributaries canal level, and summate the requirements at the main canal level with reference to the proposed cropping patterns;
- 4) establish dam operation and canal rules based on probability of inflow volume, rainfall, and water requirement estimated based on the recommended cropping patterns;
- 5) establish a man-power allocation plan including allotment of gate keepers, watchmen, etc.;
- 6) propose sound structure of water users association (WUA), which may be established at distributaries canal level, and also the procedure of how to organize the beneficiary famers into such organization;
- 7) estimate and recommend ID the sound range of irrigation service fee, which can cover the expenses of operation and maintenance required for sustaining the irrigation systems;
- 8) conduct trainings on irrigation water management and WUA's establishment to famers in pilot area(s);
- 9) establish model WUA in pilot area(s) with the cooperation of ID; and
- 10) coordinate and cooperate with the consultants separately engaged under a JICA financed piggy back technical assistance program, which aims to develop the capacity of the WUA, and to introduce and strengthen Participatory Irrigation Management (PIM) concept and techniques.

(2) Shwebo Irrigation Scheme

【Agriculture Extension Strengthening, Irrigation Rehabilitation, Land Consolidation, FMR Improvement】

Year Month	1st Year			2nd Year			3rd Year			4th Year			5th Year			6th Year			Total (Month)																
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9		10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1
Kindat Diversion Dam (Kinda Weir)	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48																
				1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1																						
Right Main Canal (RMC)	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48																
				1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1																						
Left Main Canal (Old Main Canal, OMC)	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48																
				1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1																						
Kabo Weir	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48																
				1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1																						
Ye-U Main Canal (YMC)	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48																
				1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1																						
Shwebo Main Canal (SMC)	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48																
				1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1																						
Land Consolidation	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48																
				1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1																						
Canal Inspection Road	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48																
				1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1																						
Rural Road	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48																
				1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1																						
Agricultural Extension Strengthening	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48																
				1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1			1 1 1 1 1 1 1 1 1 1 1 1 1 1																						

(3) Mandalay Irrigation Scheme

【Agriculture Extension Strengthening, Irrigation Rehabilitation, Land Consolidation, FMR Improvement】

Year Month	1st Year			2nd Year			3rd Year			4th Year			5th Year			6th Year			Total (Month)																
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9		10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1
Sedawgyi Irrigation System	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			12 (month)			60																
Zawgyi Irrigation System	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			12 (month)			60																
Kinda Irrigation System	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			12 (month)			60																
Land Consolidation	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			12 (month)			60																
Canal Inspection Road	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			12 (month)			60																
Rural Road	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			12 (month)			60																
Agricultural Extension Strengthening	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			12 (month)			60																

(4) Ney Pyi Taw Irrigation Scheme

【Agriculture Extension Strengthening, Irrigation Rehabilitation, Land Consolidation, FMR Improvement】

Year Month	1st Year			2nd Year			3rd Year			4th Year			5th Year			6th Year			Total (Month)																
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9		10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1
Paunglaung Dam Irrigation System	0 (month)			12 (month)			12 (month)			12 (month)			0 (month)			0 (month)			36																
Yezin Dam Irrigation System	0 (month)			12 (month)			12 (month)			12 (month)			0 (month)			0 (month)			36																
Sinte Dam Irrigation System	0 (month)			12 (month)			12 (month)			12 (month)			0 (month)			0 (month)			36																
Ngalaik Dam Irrigation System	0 (month)			12 (month)			12 (month)			12 (month)			0 (month)			0 (month)			36																
Land Consolidation	0 (month)			12 (month)			12 (month)			12 (month)			0 (month)			0 (month)			36																
Canal Inspection Road	0 (month)			12 (month)			12 (month)			12 (month)			0 (month)			0 (month)			36																
Rural Road	0 (month)			12 (month)			12 (month)			12 (month)			0 (month)			0 (month)			36																
Agricultural Extension Strengthening	0 (month)			12 (month)			12 (month)			12 (month)			0 (month)			0 (month)			36																

(5) Ayeyarwady Irrigation Scheme

【Agriculture Extension Strengthening, Polder and Drainage Improvement, Land Consolidation, FMR Improvement】

Year Month	1st Year			2nd Year			3rd Year			4th Year			5th Year			6th Year			Total (Month)					
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9		10	11	12	1	2
Shwe Laung Polder	0 (month)			12 (month)			12 (month)			12 (month)			6 (month)			0 (month)			42					
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1		
Thonegwa Polder	0 (month)			6 (month)			12 (month)			12 (month)			0 (month)			0 (month)			30					
				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						
Bitued (4) Polder	0 (month)			0 (month)			12 (month)			0 (month)			0 (month)			0 (month)			12					
							1	1	1	1	1	1												
Kyun Nyo Gyi Island	0 (month)			0 (month)			0 (month)			12 (month)			6 (month)			0 (month)			18					
										1	1	1	1	1	1	1	1	1						
Kyaunggon Flood Plain	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48					
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1		
Sinchaunghaung Drain in Thabaung Township	0 (month)			6 (month)			0 (month)			0 (month)			0 (month)			0 (month)			6					
				1	1	1	1	1	1															
Drainage in Thabyekan-Theingon Area	0 (month)			0 (month)			6 (month)			0 (month)			0 (month)			0 (month)			6					
							1	1	1	1	1	1												
Land Consolidation	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48					
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1		
Rural Road	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48					
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1		
Regional Road (Highway Department)	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48					
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1		
Agricultural Extension Strengthening	0 (month)			12 (month)			12 (month)			12 (month)			12 (month)			0 (month)			48					
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1		

3. Manning Schedule for the Consulting Services / Expert

(1) Shwebo Irrigation Scheme

【Agriculture Extension Strengthening, Irrigation Rehabilitation, Land Consolidation, FMR Improvement】

Position	1st Year			2nd Year			3rd Year			4th Year			5th Year			6th Year			Total (month)																											
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9		10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3									
Consulting Services (Detailed Design)																																														
A	1		1	1	1																																					7				
A	2		1	1	1	1																																						5		
A	3					1	1	1	1	1	1																																	6		
A	4					1																																						2		
A	5																																											3		
A	6					1	1	1	1	1	1																																	5		
A	7									1	1	1																																3		
A	8																																											3		
B	1		1	1	1	1	1	1	1	1	1	1																																11		
B	2		1	1	1	1	1	1	1	1	1	1																																11		
B	3		1	1	1	1	1	1	1	1	1	1																																11		
B	4		1	1	1	1	1	1	1	1	1	1																																11		
B	5		1	1	1	1	1	1	1	1	1	1																																11		
B	6		1	1	1	1	1	1	1	1	1	1																																11		
B	7		1	1	1	1	1	1	1	1	1	1																																11		
B	8		1	1	1	1	1	1	1	1	1	1																																11		
B	9		1	1	1	1	1	1	1	1	1	1																																11		
Consulting Services (Construction Supervision)																																														
A	9																																													0
A	10																																													29
A	11																																												23	
A	12																																												20	
A	13																																												13	
B	10																																												13	
B	10																																												44	
B	11																																												44	
B	12																																												44	
B	13																																												44	
B	14																																												44	
B	15																																												44	
B	16																																												33	
B	17																																												44	
B	18																																												44	
B	19																																												44	
B	20																																												44	
B	20																																												44	
Consulting Services (Agricultural Extension Strengthening)																																														
A	14																																													24
B	21																																													44
B	22																																												44	
B	23																																												44	
B	24																																												44	
B	25																																												44	
	[Total of Pro-A]						34																																						156	
	[Total of Pro-B]																																													792
	[Total of Pro-A+Pro-B]						133																																							948

Position	1st Year												2nd Year												3rd Year												4th Year												5th Year												6th Year												Total (month)
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
C 1 Secretary-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	55					
C 2 Secretary-2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	55																
C 3 Secretary-3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	55																
C 4 Secretary-4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
C 5 Office Boy-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	55																
C 6 Office Boy-2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	55																
c 7 Supporting Staff (Agronomist)-1												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
c 8 Supporting Staff (Agronomist)-2												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
c 9 Supporting Staff (Agronomist)-3												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
c 10 Supporting Staff (Agronomist)-4												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
c 11 Supporting Staff (Agronomist)-5												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
c 12 Supporting Staff (Agronomist)-6												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
c 13 Supporting Staff (Agronomist)-7												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
c 14 Supporting Staff (Agronomist)-8												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
c 15 Supporting Staff (Agronomist)-9												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
c 16 Supporting Staff (Agronomist)-10												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
c 17 Supporting Staff (Agronomist)-11												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
c 18 Supporting Staff (Agronomist)-12												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
c 19 Supporting Staff (Agronomist)-13												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
c 20 Supporting Staff (Agronomist)-14												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
C 21 Supporting Staff (Agronomist)-15												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	44																
[Total of Supporting Staff]	55												231												231												231												0												979												
Grand Total	188												437												437												437												428												0												1,927

(4) Ayeyarwady Irrigation Scheme

【Agriculture Extension Strengthening, Polder and Drainage Improvement, Land Consolidation, FMR Improvement】

Position	1st Year												2nd Year												3rd Year												4th Year												5th Year												6th Year												Total (month)
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
Consulting Services (Detailed Design)																																																																									
A 1 Engineer (Irrigation)-1		1	1	1	1							1	1	1	1									1	1	1	1																				26																										
A 2 Engineer (Irrigation)-2		1	1	1	1								1	1	1	1									1	1	1	1																				18																									
A 3 Engineer (Environmental)			1	1																					1	1																						4																									
A 4 Engineer (Cost Estimation)													1	1	1	1																																8																									
A 5 Engineer (Land Consolidation)				1	1	1	1																					1	1	1	1																		16																								
A 6 Engineer (Rural Road)					0.5	1																					0.5	1																				6																									
A 7 Engineer (Regional Road)																																																6																									
B 1 Local Engineer (Irrigation)-1		1	1	1	1	1	1	1	1	1	1																																					44																									
B 2 Local Engineer (Irrigation)-2		1	1	1	1	1	1	1	1	1	1																																					44																									
B 3 Local Engineer (Land Consolidation)		1	1	1	1	1	1	1	1	1	1																																					44																									
B 4 Local Engineer (Rural Road)		1	1	1	1	1	1	1	1	1	1																																					44																									
B 5 Local Engineer (Regional Road)		1	1	1	1	1	1	1	1	1	1																																					44																									
Consulting Services (Construction Supervision)																																																																									
A 8 Construction Supervision (Irrigation)																																																	25																								
A 9 Construction Supervision (Land Consolidation)																																																	17																								
A 10 Construction Supervision (Road)																																																	12																								
B 6 Construction Supervision (Irrigation)																																																	44																								
B 7 Construction Supervision (Land Consolidation)																																																	44																								
B 8 Construction Supervision (Road)																																																	44																								
Consulting Services (Agricultural Extension Strengthening)																																																																									
A 11 Agronomist/Agro-economist																																																	24																								
B 9 Agronomist/Agro-economist (Local)-1																																																	44																								
B 10 Agronomist/Agro-economist (Local)-2																																																	44																								
B 11 Agronomist/Agro-economist (Local)-3																																																	44																								
[Total of Pro-A]	25												37												43												36												21												0	162											
[Total of Pro-B]	55												121												121												121												66												0	484											
[Total of Pro-A+Pro-B]	80												158												164												157												87												0	646											
Staff																																																																									
C 1 Secretary-1		1	1	1	1	1	1	1	1	1	1																																							55																							
C 2 Secretary-2		1	1	1	1	1	1	1	1	1	1																																								55																						
C 3 Secretary-3		1	1	1	1	1	1	1	1	1	1																																								55																						
C 4 Secretary-4																																																		44																							
C 5 Office Boy-1		1	1	1	1	1	1	1	1	1	1																																							55																							
C 6 Office Boy-2		1	1	1	1	1	1	1	1	1	1																																						55																								
c 7 Supporting Staff (Agronomist)-1																																																	44																								
c 8 Supporting Staff (Agronomist)-2																																																	44																								
c 9 Supporting Staff (Agronomist)-3																																																	44																								
c 10 Supporting Staff (Agronomist)-4																																																	44																								
c 11 Supporting Staff (Agronomist)-5																																																	44																								
c 12 Supporting Staff (Agronomist)-6																																																	44																								
c 13 Supporting Staff (Agronomist)-7																																																	44																								
c 14 Supporting Staff (Agronomist)-8																																																	44																								
c 15 Supporting Staff (Agronomist)-9																																																	44																								
[Total of Supporting Staff]	55												165												165												165												165												0	715											
Grand Total	135												323												329												322												252												0	1,361											

4. Cost of Components

4.1 Agriculture Extension Strengthening

(1) Project Cost for Demonstration Farm (Shwebo Area)

For Production	Production Cost (Kyat/acre)	Size of Demo Farm (acre)	No. of Demo Farm in TS	No. of TS/ Priority Area	Years	Total Cost (in Kyat)	Total Cost (in JPN)
Monsoon paddy	268,955	10	20	7	4	1,506,145,200	176,218,988
Summer Paddy	237,548	10	20	7	4	1,330,266,000	155,641,122
Pulses (Chickpea)	85,688	10	20	7	4	479,850,000	56,142,450
Sub-total						3,316,261,200	388,002,560
For Logistics, Training and Extension	Unit Price	No. of Unit			Years	Total Cost (in Kyat)	Total Cost (in JPN)
Pickup	30,000,000	4			all year use	120,000,000	14,040,000
Fuel for 1 Pickup/year	700,000	4			4	11,200,000	1,310,400
Motorbike	1,500,000	35			all year use	52,500,000	6,142,500
Fuel for 1 Motorbike/year	210,000	35			4	29,400,000	3,439,800
Field School	15,000,000	56			all year use	840,000,000	98,280,000
Training	60,480,000				4	241,920,000	28,304,640
Extension Materials	43,725,000				all year use	43,725,000	5,115,825
Sub-total						1,338,745,000	156,633,165
Total						4,655,006,200	544,635,725

(2) Project Cost for Demonstration Farm (Mandalay Area)

For Production	Production Cost (Kyat/acre)	Size of Demo Farm (acre)	No. of Demo Farm in TS	No. of TS/ Priority Area	Years	Total Cost (in Kyat)	Total Cost (in JPN)
Monsoon paddy	299,474	10	10	7	5	1,048,157,250	122,634,398
Summer Paddy	315,132	10	10	7	5	1,102,962,000	129,046,554
Pulses (Chickpea)	87,671	10	10	7	5	306,846,750	35,901,070
Sub-total						2,457,966,000	287,582,022
For Logistics, Training and Extension	Unit Price	No. of Unit			Years	Total Cost (in Kyat)	Total Cost (in JPN)
Pickup	30,000,000	4			all year use	120,000,000	14,040,000
Fuel for 1 Pickup/year	700,000	4			5	14,000,000	1,638,000
Motorbike	1,500,000	35			all year use	52,500,000	6,142,500
Fuel for 1 Motorbike/year	210,000	35			5	36,750,000	4,299,750
Field School	15,000,000	35			all year use	525,000,000	61,425,000
Training	60,480,000				5	302,400,000	35,380,800
Extension Materials	27,825,000				all year use	27,825,000	3,255,525
Sub-total						1,078,475,000	126,181,575
Total						3,536,441,000	413,763,597

(3) Project Cost for Demonstration Farm (Nay Pyi Taw Area)

For Production	Production Cost (Kyat/acre)	Size of Demo Farm (acre)	No. of Demo Farm in TS	No. of TS/ Priority Area	Years	Total Cost (in Kyat)	Total Cost (in JPN)
Monsoon paddy	251,093	10	4	9	3	271,179,900	31,728,048
Summer Paddy	275,064	10	4	9	3	297,069,120	34,757,087
Pulses (Black gram)	242,700	10	4	9	3	262,116,000	30,667,572
Sub-total						830,365,020	97,152,707
For Logistics, Training and Extension	Unit Price	No. of Unit			Years	Total Cost (in Kyat)	Total Cost (in JPN)
Pickup	30,000,000	3			all year use	90,000,000	10,530,000
Fuel for 1 Pickup/year	700,000	3			3	6,300,000	737,100
Motorbike	1,500,000	45			all year use	67,500,000	7,897,500
Fuel for 1 Motorbike/year	210,000	45			3	28,350,000	3,316,950
Field School	15,000,000	11			all year use	165,000,000	19,305,000
Training	77,760,000				3	233,280,000	27,293,760
Extension Materials	9,540,000				all year use	9,540,000	1,116,180
Sub-total						599,970,000	70,196,490
Total						1,430,335,020	167,349,197

(4) Project Cost for Demonstration Farm (Ayearwady Area)

For Production	Production Cost (Kyat/acre)	Size of Demo Farm (acre)	No. of Demo Farm in TS	No. of TS/ Priority Area	Years	Total Cost (in Kyat)	Total Cost (in JPN)
Monsoon paddy	203,135	15	38		4	463,146,660	54,188,159
Summer Paddy	223,295	15	38		4	509,111,460	59,566,041
Pulses (Black gram)	157,877	15	38		4	359,958,420	42,115,135
Sub-total						1,332,216,540	155,869,335
For Logistics, Training and Extension	Unit Price	No. of Unit			Years	Total Cost (in Kyat)	Total Cost (in JPN)
Pickup	30,000,000	4			all year use	120,000,000	14,040,000
Fuel for 1 Pickup/year	700,000	4			4	11,200,000	1,310,400
Motorbike	1,500,000	18			all year use	27,000,000	3,159,000
Fuel for 1 Motorbike/year	210,000	18			4	15,120,000	1,769,040
Field School	15,000,000	15			all year use	225,000,000	26,325,000
Training	30,240,000				4	120,960,000	14,152,320
Extension Materials	11,925,000				all year use	11,925,000	1,395,225
Sub-total						531,205,000	62,150,985
Total						1,863,421,540	218,020,320

4.2 Irrigation Rehabilitation, Land Consolidation, FMR Improvement

(1) Project Cost for Shwebo Irrigation Scheme (1/2)

Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)	Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)
Shwebo Irrigation Scheme					4. Kabo Head Works				
1. Kindat Head Works					(1) Repairing of Gate System	1	set	1,000,000,000	1,000,000,000
(1) Repairing of Spillway	1	unit	400,000,000	400,000,000	Sub-total				1,000,000,000
Sub-total				400,000,000					
2. Left Main Canal System (Old Main Canal: O.M.C)					5. Shwebo Main Canal System (S.M.C)				
2 -1. Left Main Canal (Old Main Canal: O.M.C)					5 -1. Shwebo Main Canal (S.M.C)				
(1) Earth Work (by Machine)	17,000	sud	4,500	76,500,000	(1) Unsilting and Bank Raising (by Machine)	14,000	sud	4,000	56,000,000
(2) Canal Lining Work	53,000	ft	100,000	5,300,000,000	(2) Canal Lining Work	26,000	ft	100,000	2,600,000,000
(3) Construction of Bridge	3	unit	35,000,000	105,000,000	(3) Construction of Bridge	2	unit	45,000,000	90,000,000
(4) Repair of Direct Outlet	20	unit	3,000,000	60,000,000	(4) Repair of Direct Outlet	20	unit	3,000,000	60,000,000
(5) Repair of Head Regulator	3	unit	70,000,000	210,000,000	(5) Repair of Head Regulator	3	unit	80,000,000	240,000,000
(6) Construction of Spillway	4	unit	80,000,000	320,000,000	(6) Indirect Construction Cost	1	set		456,900,000
(7) Indirect Construction Cost	1	set		910,725,000	5 -2. DY Canal of S.M.C				
2 -2. DY Canal of O.M.C					(1) Canal Lining Work	106,000	ft	45,000	4,770,000,000
(1) Canal Lining Work	132,000	ft	45,000	5,940,000,000	(2) Repair of Drop Structure	20	unit	7,000,000	140,000,000
(2) Repair of Drop Structure	30	unit	7,000,000	210,000,000	(3) Indirect Construction Cost	1	set		736,500,000
(3) Indirect Construction Cost	1	set		922,500,000	Sub-total				9,149,400,000
Sub-total				14,054,725,000					
3. Right Main Canal System (R.M.C)					6. Ye-U Main Canal System (Y.M.C)				
3 -1. Right Main Canal (R.M.C)					6 -1. Ye-U Main Canal (Y.M.C)				
(1) Unsilting and Bank Raising (by Machine)	46,000	sud	4,000	184,000,000	(1) Unsilting and Bank Raising (by Machine)	14,000	sud	4,000	56,000,000
(2) Canal Lining Work	106,000	ft	100,000	10,600,000,000	(2) Canal Lining Work	26,000	ft	100,000	2,600,000,000
(3) Construction of Bridge	5	unit	45,000,000	225,000,000	(3) Construction of Bridge	5	unit	45,000,000	225,000,000
(4) Repair of Direct Outlet	20	unit	3,000,000	60,000,000	(4) Repair of Direct Outlet	20	unit	3,000,000	60,000,000
(5) Repair of Head Regulator	3	unit	80,000,000	240,000,000	(5) Repair of Head Regulator	3	unit	90,000,000	270,000,000
(6) Repair of Retaining Wall	1	set	50,000,000	50,000,000	(6) Indirect Construction Cost	1	set		481,650,000
(7) Indirect Construction Cost	1	set		1,703,850,000	6 -2. DY Canal of Y.M.C				
3 -2. DY Canal of R.M.C					(1) Canal Lining Work	132,000	ft	45,000	5,940,000,000
(1) Canal Lining Work	211,000	ft	45,000	9,495,000,000	(2) Repair of Drop Structure	20	unit	7,000,000	140,000,000
(2) Repair of Drop Structure	40	unit	7,000,000	280,000,000	(3) Indirect Construction Cost	1	set		912,000,000
(3) Indirect Construction Cost	1	set		1,466,250,000	Sub-total				10,684,650,000
Sub-total				24,304,100,000					
					7. Land Consolidation				
					(1) Land Consolidation	4,000	ha	3,800,000	15,200,000,000
					Sub-total				15,200,000,000

(1) Project Cost for Shwebo Irrigation Scheme (2/2)

Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)	Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)
8. Canal Inspection Road					9. Rural Road				
(1) Asphalt Pavement for Left Main Canal	80	mile	105,000,000	8,400,000,000	Asphalt Pavement for Rural Road	40	mile	125,000,000	5,000,000,000
(2) Gravel Pavement for Right Main Canal	60	mile	40,000,000	2,400,000,000	Gravel Pavement for Rural Road	60	mile	40,000,000	2,400,000,000
					Bridge (L=100ft(30m))	5	unit	160,000,000	800,000,000
					Sub-total				8,200,000,000
					Total				93,792,875,000
Sub-total				10,800,000,000					

(2) Project Cost for Mandalay Irrigation Scheme (1/3)

Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)	Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)
Mandalay Irrigation Scheme					1 -5. Canal Water Level Control Structure				
1. Sedawgyi Irrigation System					(1) Modification of Check Gate (MC)	5	unit	10,000,000	50,000,000
1 -1. Sedawgyi Weir (Sedawgyi Dam System)					(2) Repair of Check Structure (MC)	5	unit	7,700,000	38,500,000
(1) Gate & Manual Operation System	1	set	10,220,000,000	10,220,000,000	(3) Repair of Check Structure (DY Canal)	41	unit	7,500,000	307,500,000
1 -2. Pump Station (Sedawgyi Dam System)					(4) Repair of Head Regulator (DY Canal)	24	unit	11,000,000	264,000,000
(1) Pump & Operation System	3	set	1,085,000,000	3,255,000,000	(5) Indirect Construction Cost	1	set		99,000,000
1 -3. Mandalay Main Canal of Sedawgyi Dam					1 -6. Maintenance Road of Canal (Sedawgyi Dam)				
(1) Earth Work (by Machine)	175,000 (495,250)	sud (m3)	5,000	875,000,000	(1) R.C.C Bridge of Mandalay Main Canal	8	unit	45,000,000	360,000,000
(2) Slope Protection with Gabion	4,000	nos	80,000	320,000,000	(2) Guard Post & Fence	2,000 (610)	ft (m)	335,000	670,000,000
(3) Canal Lining Work	40,000 (12,192)	ft (m)	185,000	7,400,000,000	(3) Indirect Construction Cost	1	set		154,500,000
(4) Repair of Slope Protection	15,000 (4,572)	ft (m)	100,000	1,500,000,000	1 -7. Drainage Canal & Structure				
(5) Repair of Direct Outlet	30	unit	3,330,000	99,900,000	(1) Excavation for Drainage Canal (by Machine)	150,000 (424,500)	sud (m3)	5,000	750,000,000
(6) Repair of Aqueduct Bridge	1	unit	100,000,000	100,000,000	(2) Repair of Drainage Syphon	5	unit	15,000,000	75,000,000
(7) Indirect Construction Cost	1	set		1,544,235,000	(3) Canal Drainage Culvert (CDC)	4	unit	60,000,000	240,000,000
1 -4. DY Canal of MMC (Sedawgyi Dam)					(4) Indirect Construction Cost	1	set		159,750,000
(1) Canal Lining Work	100,000 (30,480)	ft (m)	80,000	8,000,000,000	1 -8. Observation & Maintenance Facility				
(2) Repair of Drop Structure	16	unit	10,000,000	160,000,000	(1) Auto Water Level Reading & Rain Gauge	5	unit	10,000,000	50,000,000
(3) Repair of Direct Outlet	148	unit	2,700,000	399,600,000	(2) Gate Operator's House	20	unit	5,000,000	100,000,000
(4) Construction of Box Culvert	30	unit	34,000,000	1,020,000,000	Sub-total				39,648,925,000
(5) Indirect Construction Cost	1	set		1,436,940,000					

(2) Project Cost for Mandalay Irrigation Scheme (2/3)

Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)	Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)
2. Zawgyi Irrigation System					2 -5. Drainage Facility				
2 -1. Head Works (Zawgyi Dam System)					(1) Construction of Sidespill (MC)	2	unit	30,000,000	60,000,000
(1) Installation of Minye Weir Gate Leaf	1	set	15,000,000	15,000,000	(2) Construction of Tailwater Structure (MC)	2	unit	15,000,000	30,000,000
(2) Repair of Nga Pyaung weir floor	1	set	178,000,000	178,000,000	(3) Gate Leaf of Tailwater Structure (MC)	5	unit	1,900,000	9,500,000
(3) Repair of Thin Dwe weir floor	1	set	132,000,000	132,000,000	(4) Construction of Canal Drainage Culvert	1	unit	100,000,000	100,000,000
(4) Installation of Naung Khan Weir Gate Leaf	1	set	18,000,000	18,000,000	(5) Indirect Construction Cost	1	set		29,925,000
					Sub-total				17,168,327,500
2 -2. Reservoir (Water Tank)					3. Kinda Irrigation System				
(1) Unsilting of Min Hla Tank (by Machine)	542,000	sud	3,900	2,113,800,000	3 -1. Head Works (Kinda Dam System)				
	(1,533,860)	(m3)			(1) Unsilting of Kinda Weir (by Machine)	250,000	sud	4,835	1,208,750,000
(2) Unsilting of Sun Ye Tank (by Machine)	656,000	sud	1,800	1,180,800,000	(2) Unsilting of Nat Hlwe Weir (by Machine)	60,000	sud	4,750	285,000,000
	(1,856,480)	(m3)			(3) Construction of Mezabintha Weir	1	set	400,000,000	400,000,000
2 -3. Main Canal of Zawgyi Dam					(4) Repair of Htongyi Weir	1	set	50,000,000	50,000,000
(1) Slope Protection (Kyaukse Township)	24,210	sud	225,000	5,447,250,000					
	(68,514)	(m3)			3 -2. Main Canal of Kinda Dam				
(2) Slope Protection (Singaing Township)	13,020	sud	90,000	1,171,800,000	(1) Canal Resectioning Work (by Machine)	80,000	sud	4,500	360,000,000
	(36,847)	(m3)				(226,400)	(m3)		
(3) Gate Leaf of Turn Out	6	nos	6,250,000	37,500,000	(2) Unsilting and Bank Raising (by Machine)	195,000	sud	3,850	750,750,000
(4) Repair of Drop Structure	10	nos	15,200,000	152,000,000		(551,850)	(m3)		
(5) Repair of Direct Outlet	255	nos	4,000,000	1,020,000,000	(3) Slope Protection	8,000	sud	225,000	1,800,000,000
(6) Indirect Construction Cost	1	set		1,174,282,500		(22,640)	(m3)		
					(4) Canal Lining Work (Brick)	75,000	ft	150,000	11,250,000,000
2 -4. DY Canal of MC (Zawgyi Dam)						(22,860)	(m)		
(1) Slope Protection (Kyaukse Township)	5,400	sud	225,000	1,215,000,000	(4) Canal Resectioning & Lining Work (Brick)	25,000	ft	154,500	3,862,500,000
	(15,282)	(m3)				(7,620)	(m)		
(2) Slope Protection (Singaing Township)	16,920	sud	90,000	1,522,800,000	(5) Construction of Bridge	4	unit	33,000,000	132,000,000
	(47,884)	(m3)			(6) Construction of Syphon	1	unit	211,000,000	211,000,000
(3) Gate Leaf of Turn Out	8	nos	1,475,000	11,800,000	(7) Repair of Direct Outlet	49	unit	6,000,000	294,000,000
(4) Repair of Drop Structure	6	nos	18,700,000	112,200,000	(8) Repair of Drop Structure	2	unit	40,000,000	80,000,000
(5) Repair of Direct Outlet	219	nos	4,000,000	876,000,000	(9) Indirect Construction Cost	1	set		2,811,037,501
(6) Indirect Construction Cost	1	set		560,670,000					

(2) Project Cost for Mandalay Irrigation Scheme (3/3)

Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)	Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)
3 -3. DY Canal of MC (Kinda Dam)					4. Land Consolidation				
(1) Slope Protection	5,000	sud	225,000	1,125,000,000	(1) Land Consolidation	3,000	ha	3,800,000	11,400,000,000
	(14,150)	(m3)			Sub-total				11,400,000,000
(2) Canal Lining Work (Brick)	50,000	ft	90,000	4,500,000,000					
	(15,240)	(m)			5. Canal Inspection Road & Rural Road				
(3) Repair of Direct Outlet	232	unit	6,000,000	1,392,000,000	(1) Canal Inspection Road				
(4) Repair of Drop Structure	52	unit	8,317,300	432,499,600	1) Asphalt Pavement for MMC	60.00	mile	107,800,000	6,468,000,000
(5) Indirect Construction Cost	1	set		1,117,424,940	Maintenance Road of MMC (Sedawgyi Dam):L=60.0mile	(96.60)	(km)		
3 -4. Canal Water Level Control Structure					2) Gravel Pavement for DY Canal	40.00	mile	27,000,000	1,080,000,000
(1) Construction of Check Drop (MC)	3	unit	33,000,000	99,000,000	Maintenance Road of DY (Sedawgyi Dam):L=40.0mile	(64.40)	(km)		
(2) Construction of Check Structure (MC)	1	unit	150,000,000	150,000,000	3) Kanker (Gravelly Soil) Pavement for MC	17,850	sud	30,000	535,500,000
(3) Construction of Head Regulator (MC)	5	unit	69,800,000	349,000,000	Maintenance Road of MC (Zawgyi Dam): L=56.35mile	(50,516)	(m3)		
(4) Construction of Head Regulator (DY)	9	unit	33,830,000	304,470,000	4) Kanker (Gravelly Soil) Pavement for DY	1,980	sud	30,000	59,400,000
(5) Gate Leaf of Head Regulator	12	nos	1,700,000	20,400,000	Maintenance Road of DY (Zawgyi Dam): L=6.25mile	(5,603)	(m3)		
(6) Indirect Construction Cost	1	set		138,430,500	(2) Rural Road				
3 -5. Drainage Facility					1) Asphalt Pavement for Rural Road	35	mile	120,000,000	4,200,000,000
(1) Construction of Drainage Canal (by Machine)	32,200	sud	1,980	63,756,000	2) Gravel Pavement for Rural Road	70	mile	30,000,000	2,100,000,000
	(91,126)	(m3)			2) Bridge (L=40ft(12m))	0	unit	80,000,000	0
(2) Construction of Canal Drainage Culvert	1	unit	200,000,000	200,000,000	4) Bridge (L=100ft(30m))	35	unit	160,000,000	5,600,000,000
(3) Construction of Sidespill	1	unit	60,000,000	60,000,000	Sub-total				20,042,900,000
(4) Indirect Construction Cost	1	set		48,563,400	Total				121,755,734,441
Sub-total				33,495,581,941					

(3) Project Cost for Nay Pyi Taw Irrigation Scheme (1/2)

Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)	Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)
Nay Pyi Taw Irrigation Scheme					2 -2. 3rd DY Canal of RMC (Yezin Dam)				
1. Paunglaung Dam Irrigation System					(1) Canal Lining Work (Stone Masonry)	101,950	ft	20,000	2,039,000,000
1 -1. Right Main Canal of Paunglaung Dam					(31,074)	(m)			
(1) Earth Work (by Machine)	24,000	sud	4,500	108,000,000	(2) Indirect Construction Cost	1	set		611,700,000
	(67,920)	(m3)	1,590						
(2) Canal Lining Work (Stone Masonry)	18,200	ft	80,000	1,456,000,000	2 -3. 3rd DY Canal of LMC (Yezin Dam)				
	(5,547)	(m)	262,467		(1) Canal Lining Work (Stone Masonry)	24,580	ft	20,000	491,600,000
(3) Indirect Construction Cost	1	set		469,200,000	(7,492)	(m)			
1 -2. 2nd DY Canal of RMC (Paunglaung Dam)					(2) Indirect Construction Cost	1	set		147,480,000
(1) Canal Lining Work (Stone Masonry)	6,700	ft	44,000	294,800,000					
	(2,042)	(m)	144,357		Sub-total				3,698,500,000
(2) Indirect Construction Cost	1	set		88,440,000	3. Sinthe Dam Irrigation System				
1 -3. 3rd DY Canal of RMC (Paunglaung Dam)					3 -1. Sinthe Rubber Weir (Sinthe Dam System)				
(1) Canal Lining Work (Stone Masonry)	4,600	ft	30,000	138,000,000	(1) Preparatory Work	1	set	99,300,000	99,300,000
	(1,402)	(m)			(2) Labor Camp & Material Store	1	set	56,600,000	56,600,000
(2) Indirect Construction Cost	1	set		41,400,000	(3) Concrete Structure	1	set	1,011,000,000	1,011,000,000
1 -4. Left Main Canal of Paunglaung Dam					(4) Gate & Operation System	1	set	1,969,200,000	1,969,200,000
(1) Earth Work (by Machine)	25,000	sud	4,944	123,600,000	3 -2. Left Main Canal of Sinthe Dam				
	(70,750)	(m3)			(1) Canal Resectioning Work (by Machine)	45,000	ft	3,275	147,375,000
(2) Canal Lining Work (Stone Masonry)	23,800	ft	97,000	2,308,600,000	(13,716)	(m)			
	(7,254)	(m)			(2) Canal Lining Work (Stone Masonry)	44,000	ft	43,300	1,905,200,000
(3) Indirect Construction Cost	1	set		729,660,000	(13,411)	(m)			
1 -5. 2nd DY Canal of LMC (Paunglaung Dam)					(3) Construction of Spill Out / Spill Out	4	unit	7,525,000	30,100,000
(1) Canal Lining Work (Stone Masonry)	10,000	ft	35,000	350,000,000	(4) Repair of Drop Structure	1	unit	7,500,000	7,500,000
	(3,048)	(m)			(5) Indirect Construction Cost	1	set		627,052,500
(2) Indirect Construction Cost	1	set		105,000,000	3 -3. 2nd DY Canal of LMC (Sinthe Dam)				
Sub-total				6,212,700,000	(1) Canal Resectioning Work (by Manual)	90,500	ft	655	59,277,500
					(27,584)	(m)			
2. Yezin Dam Irrigation System					(2) Canal Lining Work (Stone Masonry)	5,000	ft	23,000	115,000,000
2 -1. 2nd DY Canal of RMC (Yezin Dam)					(1,524)	(m)			
(1) Canal Lining Work (Stone Masonry)	10,480	ft	30,000	314,400,000	(3) Repair of Drop Structure	5	unit	7,100,000	35,500,000
	(3,194)	(m)			(4) Indirect Construction Cost	1	set		62,933,250
(2) Indirect Construction Cost	1	set		94,320,000					

(3) Project Cost for Nay Pyi Taw Irrigation Scheme (2/2)

Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)	Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)
3 -4. 3rd DY Canal of LMC (Sinthe Dam)					4 -4. Land Consolidation Area (Ngalaik Dam)				
(1) Canal Resectioning Work (by Manual)	105.600	ft	393	41,500,800	(1) Farm Access Box Culvert	16	unit	18,363,800	293,820,800
	(32,187)	(m)			(2) Earth Work for Farm Road	15,000	sud	70,585	1,058,775,000
(2) Canal Lining Work (Stone Masonry)	7,000	ft	13,000	91,000,000		(42,450)	(m3)		
	(2,134)	(m)			(3) Construction of Brick Canal	160,000	ft	16,353	2,616,480,000
(3) Indirect Construction Cost	1	set		39,750,240		(48,768)	(m)		
3 -5. Maintenance Road of Canal (Sinthe Dam)					(4) Unsilting for Drainage Canal	30,000	sud	3,275	98,250,000
(1) Construction of R.C.C Bridge of LMC	6	unit	9,250,000	55,500,000		(84,900)	(m3)		
(2) Construction of R.C.C Bridge of 2nd DY	4	unit	6,150,000	24,600,000	(5) Indirect Construction Cost	1	set		1,220,197,740
	(8,915)	(m3)			Sub-total				6,293,159,015
(3) Indirect Construction Cost	1	set		24,030,000	5. Land Consolidation				
Sub-total				6,402,419,290	(1) Land Consolidation	1,000	ha	3,800,000	3,800,000,000
4. Ngalaik Dam Irrigation System					Sub-total				3,800,000,000
4 -1. Nga Laik Main Canal of Ngalaik Dam					6. Canal Inspection Road & Rural Road				
(1) Canal Lining Work (Stone Masonry)	8,500	ft	15,679	133,271,500	(1) Canal Inspection Road				
	(2,591)	(m)			1) Gravel Pavement for LMC	3,150	sud	45,000	141,750,000
(2) Indirect Construction Cost	1	set		39,981,450	Maintenance Road of Canal (Sinthe Dam): L=0.975 mile	(8,915)	(m3)		
4 -2. 2nd DY Canal of MC (Ngalaik Dam)					2) Asphalt Pavement for Canal	20	mile	125,000,000	2,500,000,000
(1) Canal Lining Work (Stone Masonry)	3,625	ft	32,414	117,500,750		(32.20)	(km)		
	(1,105)	(m)			(2) Rural Road				
(2) Repair of Direct Outlet	6	unit	4,000,000	24,000,000	1) Asphalt Pavement for Rural Road	20	mile	125,000,000	2,500,000,000
(3) Indirect Construction Cost	1	set		42,450,225		(32.20)	(km)		
4 -3. 3rd DY Canal of MC (Ngalaik Dam)					2) Gravel Pavement for Rural Road	40	mile	43,000,000	1,720,000,000
(1) Canal Lining Work (Stone Masonry)	24,875	ft	20,052	498,793,500		(64.40)	(km)		
	(7,582)	(m)			(3) Bridge (L=40ft(12m))	0	unit	80,000,000	0
(2) Indirect Construction Cost	1	set		149,638,050	(4) Bridge (L=100ft(30m))	15	unit	160,000,000	2,400,000,000
					Sub-total				9,261,750,000
					Total				35,668,528,305

4.3 Polder and Drainage Improvement, Land Consolidation, FMR Improvement

(1) Project Cost for Ayeyarwady Irrigation Scheme (1/2)

Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)	Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)
Ayeyarwady Irrigation Scheme					5. Kyaunggon Flood Plain (Drainage Improvement)				
1. Shwe Laung Polder (Polder and Drainage Improvement)					(1) Unsilting for Drainage Canal (by Machine)				
(1) Polder Embankment	156,000	sud	6,000	936,000,000	(2) Indirect Construction Cost	2,009,300	sud	3,500	7,032,550,000
(2) Kanker Pavement of Polder Embankment	25,900	sud	30,000	777,000,000		1	set		703,255,000
(3) Unsilting for Drainage Canal (by Machine)	595,650	sud	3,500	2,084,775,000	Sub-total				7,735,805,000
(4) Repair of Sluice Gate	12	unit	10,000,000	120,000,000	6. Sinchaunghaung Drain in Thabaung Township (Drainage Improvement)				
(5) Construction of New Sluices	2	unit	800,000,000	1,600,000,000	(1) Unsilting for Drainage Canal (by Machine)				
(6) Construction of New Check Gate	1	unit	150,000,000	150,000,000	(2) Indirect Construction Cost	74,800	sud	3,500	261,800,000
(7) Construction of Guard House	2	unit	20,000,000	40,000,000		1	set		26,180,000
(8) Indirect Construction Cost	1	set		570,777,500	Sub-total				287,980,000
Sub-total				6,278,552,500	7. Rehabilitation in Thabyekan-Theingon Area (Drainage Improvement)				
2. Thonegwa Polder (Polder and Drainage Improvement)					(1) Rehabilitation of Sluice Gates				
(1) Polder Embankment	183,000	sud	6,000	1,098,000,000	(2) Unsilting for Drainage Canal (by Machine)	96,600	sud	3,500	338,100,000
(2) Kanker Pavement of Polder Embankment	30,500	sud	30,000	915,000,000	(3) Indirect Construction Cost	1	set		69,810,000
(3) Repair of Sluice Gate	16	unit	10,000,000	160,000,000	Sub-total				767,910,000
(4) Unsilting for Drainage Canal (by Machine)	535,556	sud	3,500	1,874,446,000	Total Protected Area= 90,119.40 ha				
(5) Indirect Construction Cost				404,744,600	Total Project Cost of Irrigation Facilities= 23,649.9 million kyat				
Sub-total				4,452,190,600	8. Land Consolidation				
3. Bitud (4) Polder (Polder and Drainage Improvement)					(1) Land Consolidation				
(1) Polder Embankment	59,200	sud	6,000	355,200,000		4,000	ha	3,800,000	15,200,000,000
(2) Construction of Shaw Chaung Sluice	3	unit	150,000,000	450,000,000	Sub-total				15,200,000,000
(3) Ripaire of Sluice Gate and Accessories	4	unit	5,000,000	20,000,000	9. Rural Road				
(4) Unsilting for Drainage Canal (by Machine)	216,400	sud	3,500	757,400,000	(1) Concrete Pavement for Rural Road				
(5) Indirect Construction Cost				158,260,000		40	mile	120,000,000	4,800,000,000
Sub-total				1,740,860,000		100	mile	50,000,000	5,000,000,000
4. Kyun Nyo Gyi Island (Polder and Drainage Improvement)						25	unit	160,000,000	4,000,000,000
(1) Polder Embankment	113,300	sud	6,000	679,800,000	Sub-total				13,800,000,000
(2) Kanker Pavement of Polder Embankment	7,700	sud	30,000	231,000,000					
(3) Construction of Kye Chaung Sluice	3	unit	150,000,000	450,000,000					
(4) Unsilting for Drainage Canal (by Machine)	231,100	sud	3,500	808,850,000					
(5) Indirect Construction Cost				216,965,000					
Sub-total				2,386,615,000					

(1) Project Cost for Ayeyarwady Irrigation Scheme (2/2)

Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)	Name of Irrigation Facility	Quantity	Unit	Unit Price (MMK)	Construction Cost (MMK)
10. Regional Road									
(1) Raising Road for Flood Protection (Asphalt Pavement)									
1) Polder Embankment	79,600	sud	6,000	477,600,000					
2) Asphalt Pavement	20	mile	190,000,000	3,800,000,000					
(2) Widening of the Road	7	mile	62,500,000	437,500,000					
(3) Upgrading to Asphalt Pavement	31	mile	125,000,000	3,875,000,000					
(6) Bridge									
1) Bridge (L=100ft(30m))	3	unit	160,000,000	480,000,000					
2) Bridge (L=165ft(50m))	2	unit	270,000,000	540,000,000					
3) Bridge (L=230ft(70m))	2	unit	380,000,000	760,000,000					
4) Bridge (L=660ft(200m))	1	unit	1,100,000,000	1,100,000,000					
Sub-total				11,470,100,000					
Total				64,120,013,100					

4.4 Agricultural Machinery Station Enhancement

(1) Shwebo, Nay Pyi Taw and Ayeyarwady Areas

No.	Description	Figure	Unit Price (kyat)	Item price (kyat)	Item price (Jyen)	Item price (US\$)
1	Tractor (70HP, w/ rotary)	30 set	48,000,000 /set	1,440,000,000	168,480,000	1,399,335.55
2	Tractor (90HP, w/ rotary)	25 set	58,000,000 /set	1,450,000,000	169,650,000	1,409,053.16
3	Combine Harvester	10 set	38,000,000 /set	380,000,000	44,460,000	369,269.10
4	Transplanter	2 set	7,000,000 /set	14,000,000	1,638,000	13,604.65
Sub-total				3,284,000,000	384,228,000	3,191,262
5	Attachment (ridger, dozer, deep plow, etc.)	LS	5 %	164,000,000	19,188,000	159,368.77
6	Spare parts	LS	5 %	164,000,000	19,188,000	159,368.77
Sub-total				328,000,000	38,376,000	318,737.54
7	Transportation Ree	LS	1 set	3,000,000	351,000	2,915.28
Sub-total				3,000,000	351,000	2,915.28
Total				3,615,000,000	422,955,000	3,512,915.28

(2) Cost Estimation on Agricultural Machinery Testing Center (Nay Pyi Taw only)

Item No.	Equipment Name	Major Technical Specifications	Quantity	CIF Price at Yangon (JPY)	Remarks	Target Machineries				
						Hand Tractor	4-Wheel Tractor	Combine Harvester	Trolleygi	Diesel Engine
1	PTO Dynamometer with Joint & Necessary Materials	120kW	1 set	59,000,000	For PTO Output Test	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Axle Dynamometer (for Left and Right Wheels) with Joint & Necessary Materials	170kW	1 set	89,000,000	For Engine Output Test at Final Gear Axles	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Engine Dynamometer with Engine Table, Joint & Necessary Materials	120kW	1 set	30,000,000	For Engine Output Test at Crank Shaft	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	Cooling Tower with Water Pump and Plumbing Materials	500lit/min	1 set	42,000,000	For Cooling Dynamometers by shared usage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	Dynamometer Car	30kN·m	1 set	63,000,000	For Traction Power Test	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Truck Scale	15ton	1 set	12,000,000	For Structure Diaglose	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	Measurement and Tool Kits		1 set	20,000,000	For Water and Dust Protection and Other Tests	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Total				315,000,000	Facility improvement costs are not included.					

4.5 Flood Monitoring System Establishment

(1) Shwebo Area (Sagaing)

unit:JPY

Item	Unit Price	Qty	Amount	Remarks
Central Control Room	10,000,000	1	10,000,000	Maintenance office
Remote Monitoring Room	5,000,000	1	5,000,000	Dam Site
Remote Monitoring System	5,000,000	1	5,000,000	Hidro Branch Office
CCTV	3,000,000	2	6,000,000	Dam Site
Rain Gausing Station (C.A.)	2,000,000	6	12,000,000	Catchment Area (C.A.)
Water Level Station (C.A.)	2,000,000	6	12,000,000	Catchment Area (C.A.)
Water Level Station	2,000,000	2	4,000,000	Thapanzeik Dam
	2,000,000	1	2,000,000	Kindat Diversion Dam
	2,000,000	1	2,000,000	Kabo Weir
	2,000,000	15	30,000,000	R.M.C
	2,000,000	5	10,000,000	O.M.C
	2,000,000	11	22,000,000	S.M.C
2,000,000	7	14,000,000	Y.M.C	
Total			134,000,000	

(2) Ayeyarwady Area

Shwe Laung Polder (Ayeyarwady)

unit:JPY

Item	Unit Price	Qty	Amount	Remarks
Central Control Room	10,000,000	1	10,000,000	Maintenance office
Remote Monitoring Room	5,000,000	1	5,000,000	Polder Site
Remote Monitoring System	5,000,000	1	5,000,000	Hidro Branch Office
Water Level Station	2,000,000	24	48,000,000	Existing Sluice Gate
	2,000,000	2	4,000,000	New Sluice Gate
Total			72,000,000	

Tonegwa Polder (Ayeyarwady)

unit:JPY

Item	Unit Price	Qty	Amount	Remarks
Remote Monitoring Room	5,000,000	1	5,000,000	Polder Site
Water Level Station	2,000,000	24	48,000,000	Existing Sluice Gate
Total			53,000,000	

4.6 Plant Breeding Enhancement

	Unit	Qty.	Foreign Portion		Local Portion		Combined Total JPY
			(JPY)		MMK		
			Rate	Amount	Rate	Amount	
A Consulting Service / Expert							
1 Professional (A)	M/M	80	2,400,000	192,000,000	0	0	192,000,000
2 Professional (B)	M/M	352	200,000	70,400,000	0	0	70,400,000
3 Supporting Staffs	M/M	528	0	0	700,000	369,600,000	43,243,200
Subtotal of A				262,400,000		369,600,000	305,643,200
B Project Cost							
1 International Airfare		16	200,000	3,200,000		0	3,200,000
2 Domestic Airfare		144		0		0	0
3 Domestic Travel				0		0	0
3 Accommodation Allowance	Month	80	360,000	28,800,000		0	28,800,000
ditto (Local)	Month	352		0	2,000,000	704,000,000	82,368,000
4 Vehicle Rental	Month	144	400,000	57,600,000		0	57,600,000
5 International Communications	M/M	80		0	10,000	800,000	93,600
6 Domestic Communications	M/M	960		0	3,000	2,880,000	336,960
7 Office Supply	M/M	960		0	3,000	2,880,000	336,960
8 Office Furniture and Equipment	M/M	960		0	5,000	4,800,000	561,600
9 Report Preparation	Month	80		0	15,000	1,200,000	140,400
10 Rehabilitation for Laboratory							
10.1 Seed Bank and Information Buildings	set	1		0	1,500,000,000	1,500,000,000	175,500,000
10.2 Administration, Research and Training Building	set	1		0	1,500,000,000	1,500,000,000	175,500,000
10.3 Net House Facilities	set	1		0	1,500,000,000	1,500,000,000	175,500,000
10.4 Garage Facilities	set	1		0	600,000,000	600,000,000	70,200,000
10.5 Others (Generator Building, etc.)	set	1		0	600,000,000	600,000,000	70,200,000
10.6 Indirect Cost	set	1		0	1,425,000,000	1,425,000,000	166,725,000
11 Equipment							
11.1 Introduction Laboratory	set	1	60,000,000	60,000,000		0	60,000,000
11.2 Evaluation Laboratory	set	1	60,000,000	60,000,000		0	60,000,000
11.3 Preservation Laboratory	set	1	60,000,000	60,000,000		0	60,000,000
11.4 Isolation Laboratory	set	1	50,000,000	50,000,000		0	50,000,000
11.5 Seed Bank Center	set	1	50,000,000	50,000,000		0	50,000,000
11.6 Information Center	set	1	50,000,000	50,000,000		0	50,000,000
11.7. Training Center	set	1	50,000,000	50,000,000		0	50,000,000
11.8 Division's Annex	set	1	30,000,000	30,000,000		0	30,000,000
11.9 Storage	set	1	30,000,000	30,000,000		0	30,000,000
11.10 Administration Sector	set	1	30,000,000	30,000,000		0	30,000,000
11.11 Transportation Fee	set	1	8,700,000	8,700,000		0	8,700,000
12 Training (3rd Country)							
	set	2	30,000,000	60,000,000		0	60,000,000
Subtotal of B				628,300,000		7,841,560,000	1,545,762,520
Total				890,700,000		8,211,160,000	1,851,405,720

4.7 Jetty Improvement

(1) Improvement of jetty facility in Shwebo

No.	Description	Figure	Unit Price (kyat)	Figure converted	Unit Price (kyat)	Item Price (kyat)	Item Price (JPY)	Item Price (USD)
1	Open space	0.6 acres	20,000 /ft ²	2,428.1 m ²	215,280 /m ²	522,724,812	61,158,803	507,963.48
2	Shade	0.6 acres	23,000 /ft ²	2,428.1 m ²	247,572 /m ²	601,133,534	70,332,624	584,158.00
3	Warehouse; 2 partitions with ventilation system	0.4 acre	28,000 /ft ²	1,618.7 m ²	301,392 /m ²	487,876,492	57,081,550	474,099.25
4	Jetty	0.2 acre	60,000 /ft ²	809.4 m ²	645,840 /m ²	522,724,812	61,158,803	507,963.48
5	Floating platform 400m ²	0.8 set	200,000,000 /set	1.0 set	200,000,000 /set	200,000,000	23,400,000	194,352.16
6	Office	200.0 m ²	27,000 /ft ²	500.0 m ²	290,628 /m ²	145,314,000	17,001,738	141,210.45
7	Toilet	1.0 set	7,000,000 /set	1.0 set	7,000,000 /set	7,000,000	819,000	6,802.33
8	Approach Road; 8meter width	100.0 m	800,000 /m	100.0 m	800,000 /m	80,000,000	9,360,000	77,740.86
9	Tube well: water supply	1.0 set	2,400,000 /set	1.0 set	2,400,000 /set	2,400,000	280,800	2,332.23
10	Water Tank (Tower)	1.0 set	8,000,000 /set	1.0 set	8,000,000 /set	8,000,000	936,000	7,774.09
11	Gutters: drainages with septic tank	1.0 set	2,400,000 /set	1.0 set	2,400,000 /set	2,400,000	280,800	2,332.23
12	Power receiving unit with backup power generation system	1.0 set	24,000,000 /set	1.0	24,000,000 /set	24,000,000	2,808,000	23,322.26
13	Pallet	200.0 sheets	50,000 sheets	200.0 sheets	50,000 sheets	10,000,000	1,170,000	9,717.61
14	Crane 5ton	1.0	80,000,000	1.0	80,000,000	80,000,000	9,360,000	77,740.86
15	Fork-Lift: 2.5ton	3.0 units	30,000,000 /unit	3.0 units	30,000,000 /unit	90,000,000	10,530,000	87,458.47
16	Hand-fork-lift: 2ton gasoline engine	10.0 set	1,000,000 /set	10.0 set	1,000,000 /set	10,000,000	1,170,000	9,717.61
17	Miscellaneous: floor painting, guide board, furniture, PC and office goods	1.0 set	16,000,000 set	1.0 set	16,000,000 set	16,000,000	1,872,000	15,548.17
Total						2,809,573,651	328,720,117	2,730,233.53

(2) Improvement of jetty facility in Mandalay

No.	Description	Figure	Unit Price (kyat)	Figure converted	Unit Price (kyat)	Item Price (kyat)	Item Price (JPY)	Item Price (USD)
1	Open space	1.0 acres	20,000 /ft ²	4,046.9 m ²	215,280 /m ²	871,208,021	101,931,338	846,605.80
2	Shade	1.0 acres	23,000 /ft ²	4,046.9 m ²	247,572 /m ²	1,001,889,224	117,221,039	973,596.67
3	Warehouse; 2 partitions with ventilation system	0.6 acre	28,000 /ft ²	2,428.1 m ²	301,392 /m ²	731,814,737	85,622,324	711,148.87
4	Jetty	0.2 acre	60,000 /ft ²	809.4 m ²	645,840 /m ²	522,724,812	61,158,803	507,963.48
5	Floating platform 400m ²	1.2 set	200,000,000 /set	1.0 set	200,000,000 /set	200,000,000	23,400,000	194,352.16
6	Office	200.0 m ²	27,000 /ft ²	500.0 m ²	290,628 /m ²	145,314,000	17,001,738	141,210.45
7	Toilet	1.0 set	7,000,000 /set	1.0 set	7,000,000 /set	7,000,000	819,000	6,802.33
8	Approach Road; 8meter width	100.0 m	800,000 /m	100.0 m	800,000 /m	80,000,000	9,360,000	77,740.86
9	Tube well: water supply	1.0 set	3,600,000 /set	1.0 set	3,600,000 /set	3,600,000	421,200	3,498.34
10	Water Tank (Tower)	1.0 set	12,000,000 /set	1.0 set	12,000,000 /set	12,000,000	1,404,000	11,661.13
11	Gutters: drainages with septic tank	1.0 set	3,600,000 /set	1.0 set	3,600,000 /set	3,600,000	421,200	3,498.34
12	Power receiving unit with backup power generation system	1.0 set	36,000,000 /set	1.0	36,000,000 /set	36,000,000	4,212,000	34,983.39
13	Pallet	200.0 sheets	50,000 sheets	200.0 sheets	50,000 sheets	10,000,000	1,170,000	9,717.61
14	Crane 5ton	1.0	80,000,000	1.0	80,000,000	80,000,000	9,360,000	77,740.86
15	Fork-Lift: 2.5ton	3.0 units	30,000,000 /unit	3.0 units	30,000,000 /unit	90,000,000	10,530,000	87,458.47
16	Hand-fork-lift: 2ton gasoline engine	10.0 set	1,000,000 /set	10.0 set	1,000,000 /set	10,000,000	1,170,000	9,717.61
17	Miscellaneous: floor painting, guide board, furniture, PC and office goods	1.0 set	24,000,000 set	1.0 set	24,000,000 set	24,000,000	2,808,000	23,322.26
Total						3,829,150,795	448,010,643	3,721,018.63

(3) Improvement of jetty facility in Patheingyi

No.	Description	Figure	Unit Price (kyat)	Figure converted	Unit Price (kyat)	Item Price (kyat)	Item Price (JPY)	Item Price (USD)
1	Open space	0.8 acres	20,000 /ft ²	3,237.5 m ²	215,280 /m ²	696,966,417	81,545,071	677,284.64
2	Shade	0.8 acres	23,000 /ft ²	3,237.5 m ²	247,572 /m ²	801,511,379	93,776,831	778,877.34
3	Warehouse; 2 partitions with ventilation system	0.5 acre	28,000 /ft ²	2,023.4 m ²	301,392 /m ²	609,845,615	71,351,937	592,624.06
4	Jetty	0.2 acre	60,000 /ft ²	809.4 m ²	645,840 /m ²	522,724,812	61,158,803	507,963.48
5	Floating platform 400m ²	1.0 set	200,000,000 /set	1.0 set	200,000,000 /set	200,000,000	23,400,000	194,352.16
6	Office	200.0 m ²	27,000 /ft ²	500.0 m ²	290,628 /m ²	145,314,000	17,001,738	141,210.45
7	Toilet	1.0 set	7,000,000 /set	1.0 set	7,000,000 /set	7,000,000	819,000	6,802.33
8	Approach Road; 8meter width	100.0 m	800,000 /m	100.0 m	800,000 /m	80,000,000	9,360,000	77,740.86
9	Tube well: water supply	1.0 set	3,000,000 /set	1.0 set	3,000,000 /set	3,000,000	351,000	2,915.28
10	Water Tank (Tower)	1.0 set	10,000,000 /set	1.0 set	10,000,000 /set	10,000,000	1,170,000	9,717.61
11	Gutters: drainages with septic tank	1.0 set	3,000,000 /set	1.0 set	3,000,000 /set	3,000,000	351,000	2,915.28
12	Power receiving unit with backup power generation system	1.0 set	30,000,000 /set	1.0	30,000,000 /set	30,000,000	3,510,000	29,152.82
13	Pallet	200.0 sheets	50,000 sheets	200.0 sheets	50,000 sheets	10,000,000	1,170,000	9,717.61
14	Crane 5ton	1.0	80,000,000	1.0	80,000,000	80,000,000	9,360,000	77,740.86
15	Fork-Lift: 2.5ton	3.0 units	30,000,000 /unit	3.0 units	30,000,000 /unit	90,000,000	10,530,000	87,458.47
16	Hand-fork-lift: 2ton gasoline engine	10.0 set	1,000,000 /set	10.0 set	1,000,000 /set	10,000,000	1,170,000	9,717.61
17	Miscellaneous: floor painting, guide board, furniture, PC and office goods	1.0 set	20,000,000 set	1.0 set	20,000,000 set	20,000,000	2,340,000	19,435.22
Total						3,319,362,223	388,365,380	3,225,626.08

4.8 Market Improvement (District level)

(1) Cost for Market Improvement (1 unit)

No.	Work Description	Unit	Quantity	Unit Price (kyat)	Total (kyat)
1. Market					
1-1	Earth Work	m3	1,500.00	1,400	2,100,000
1-2	Base Concrete	m3	3,000.00	60,100	180,300,000
1-3	Concrete(Superstructure)	m3	50.00	106,000	5,300,000
1-4	Superstructure				
(1)	H-Steel (200*200)	ton	40.00	650,000	26,000,000
(2)	H-Steel (100*100)	ton	51.20	650,000	33,280,000
(3)	Roof (Iron Sheet, Corrugated)	m2	10,000.00	13,000	130,000,000
1-5	Equipment / Facilities	set	1	40,000,000	40,000,000
1-6	Machinery(Hand-fork-lift: 2ton)	unit	3	10,000,000	30,000,000
1-7	Re-location Fee (1,300 rooms)	Nos.	1,300	60,000	78,000,000
				Total	524,980,000
Direct Construction Cost (A)					524,980,000
Indirect Construction Cost (B = A * 15%)					78,747,000
C = A + B					603,727,000
Consultant Fee (D = C * 3%)					18,111,810
Price Escalation (E = C * 3%)					18,111,810
Physical Contingency (F = C * 5%)					30,186,350
Grand Total Cost (G = C + D + E + F)					670,136,970
					670.14 million kyat
					78.41 million JPY

(2) Quantity for Market Improvement (1 unit)

Item	Calculation	Quantity	Unit	Remark
1. Market	Area= 7.41 Acre= 30,000 m2 (Wholesale Market & Open Space) Area= 2.47 Acre= 10,000 m2 (Wholesale Market)			
(1) Earth Work	10,000 * 0.15 =	1,500	m3	
(2) Base Concrete	10,000 * 0.30 =	3,000	m3	100 % of Wholesale Market
(3) Concrete (Superstructure)	Room Name Nos. Area			
	Wholesale warehouse : 100 * 20 * 30 = 60,000	sq-ft= 5,580.00	m2	
	Restaurant : 16 , 10 * 46 = 7,360	sq-ft= 684.48	m2	
	Grocery/ vegetables : 1,080 , 6 * 6 = 38,880	sq-ft= 3,615.84	m2	
	Meat/ fish : 120 , 6 * 7 = 5,040	sq-ft= 468.72	m2	
	Total 111,280	sq-ft= 10,349.04	m2	
	100.00 * 4 * (0.25 * 0.50) =	50.00		Wall
	Total	50.00	m3	
(4) Superstructure				
1) H-Steel (200*200)	5.0 * 160 * 0.050	40.00	ton	Column
2) H-Steel (100*100)	8.0 * 320 * 0.020	51.20	ton	Roof
3) Roof (Iron Sheet, Corrugated)		10,000	ton	
(1) Base Concrete	0 * 0.20 =	0	m3	100 % of Wholesale Market
(2) Re-location Fee (1,300 rooms)		1,300	Nos.	

4.9 Wholesale Market Development (New)

No.	Description for each market	Figure	Unit Price (kyat)	Figure converted	Unit Price (kyat)	Item Price (kyat)	Item price (Jyen)	Item Price (US\$)
1	Open space	2.5 acres	20,000 /ft ²	10,117.2 m ²	215,280 /m ²	2,178,020,052	254,828,346	2,116,514.50
2	Shade	1.6 acres	23,000 /ft ²	6,475.0 m ²	247,572 /m ²	1,603,022,758	187,553,663	1,557,754.67
3	Warehouse; 2 partitions with ventilation system	0.4 acre	28,000 /ft ²	1,618.7 m ²	301,392 /m ²	487,876,492	57,081,550	474,099.25
4	Warehouse; 3 partitions with refrigerating unit	0.4 acre	39,000 /ft ²	1,618.7 m ²	419,796 /m ²	679,542,256	79,506,444	660,352.52
5	Office	500.0 m ²	27,000 /ft ²	500.0 m ²	290,628 /m ²	145,314,000	17,001,738	141,210.45
6	Middlepersons' offices 9x15ft	150.0 offices	2,400,000 /office	150.0 offices	2,400,000 /office	360,000,000	42,120,000	349,833.89
7	Canteen 160seats	2,500.0 ft ²	18,000 /ft ²	232.3 m ²	193,752 /m ²	44,998,902	5,264,872	43,728.17
8	Toilet	1.0 set	8,000,000 /set	1.0 set	8,000,000 /set	8,000,000	936,000	7,774.09
9	Approach Road: 8meter width	100.0 m	800,000 /m	100.0 m	800,000 /m	80,000,000	9,360,000	77,740.86
10	Tube well: water supply	1.0 set	5,500,000 /set	1.0 set	5,500,000 /set	5,500,000	643,500	5,344.68
11	Water Tank (Tower)	1.0 set	10,000,000 /set	1.0 set	10,000,000 /set	10,000,000	1,170,000	9,717.61
12	Gutters: drainages with septic tank	1.0 set	3,000,000 /set	1.0 set	3,000,000 /set	3,000,000	351,000	2,915.28
13	Power receiving unit with backup power generation system	1.0 set	4,000,000 /set	1.0	4,000,000 /set	4,000,000	468,000	3,887.04
14	Pallet	600.0 sheets	50,000 sheets	600.0 sheets	50,000 sheets	30,000,000	3,510,000	29,152.82
15	Plastic container	12,000.0 pcs	3,000 /pc	12,000.0 pcs	3,000 /pc	36,000,000	4,212,000	34,983.39
16	Fork-Lift: 2.5ton motor drive	3.0 units	45,000,000 /unit	3.0 units	45,000,000 /unit	135,000,000	15,795,000	131,187.71
17	Hand-fork-lift: 2ton	9.0 set	1,000,000 /set	9.0 set	1,000,000 /set	9,000,000	1,053,000	8,745.85
18	Miscellaneous: price information board, floor painting, guide board, furniture, PC and office goods	1.0 set	35,000,000 set	1.0 set	35,000,000 set	35,000,000	4,095,000	34,011.63
Total						5,854,274,460	684,950,112	5,688,954.42

4.10 Supply Chain Improvement of Rice

	Unit	Qty.	Foreign Portion		Local Portion		Combined Total	
			(JPY)		(MMK)			
			Rate	Amount	Rate	Amount	JPY	
A Consulting Service / Expert								
1	Professional (A)	M/M	155	2,400,000	372,000,000	0	0	372,000,000
2	Professional (B)	M/M	220	200,000	44,000,000	0	0	44,000,000
3	Supporting Staffs	M/M	165	0	0	600,000	99,000,000	11,583,000
Subtotal of A					416,000,000		99,000,000	427,583,000
B Project Cost								
1	International Airfare	trip	30	200,000	6,000,000		0	6,000,000
2	Domestic Airfare		125		0		0	0
3	Domestic Travel				0		0	0
2	Accommodation Allowance	Month	155	360,000	55,800,000		0	55,800,000
		Month	220		0	2,000,000	440,000,000	51,480,000
		Month	165		0		0	0
3	Vehicle Rental	Month	125	400,000	50,000,000		0	50,000,000
4	Office Rental	Month	60		0	1,000,000	60,000,000	7,020,000
5	International Communications	M/M	155		0	20,000	3,100,000	362,700
6	Domestic Communications	M/M	60		0	5,000	300,000	35,100
7	Office Supply	M/M	60		0	50,000	3,000,000	351,000
8	Office Furniture and Equipment	set	1		0	5,000,000	5,000,000	585,000
9	Report Preparation	Month	55		0	15,000	825,000	96,525
10	Training (Domestic)	set	1		0	500,000,000	500,000,000	58,500,000
11	Training (3rd Country)	set	1	25,000,000	25,000,000		0	25,000,000
12	Equipment	set	1	30,000,000	30,000,000		0	30,000,000
Subtotal of B					166,800,000		1,012,225,000	285,230,325
Total					582,800,000		1,111,225,000	712,813,325

4.11 Value Chain Enhancement of Vegetables & Fruits

	Unit	Qty.	Foreign Portion		Local Portion		Combined Total (JPY)
			(JPY)		(MMK)		
			Rate	Amount	Rate	Amount	
A Consulting Service / Expert							
1 Professional (A)	M/M	125	2,400,000	300,000,000	0	0	300,000,000
2 Professional (B)	M/M	165	200,000	33,000,000	0	0	33,000,000
3 Supporting Staffs	M/M	165	0	0	600,000	99,000,000	11,583,000
Subtotal of A				333,000,000		99,000,000	344,583,000
B Project Cost							
1 International Airfare	trip	25	200,000	5,000,000		0	5,000,000
2 Domestic Airfare		96.6667		0		0	0
3 Domestic Travel				0		0	0
2 Accommodation Allowance	Month	125	360,000	45,000,000		0	45,000,000
	Month	165		0	2,000,000	330,000,000	38,610,000
	Month	165		0		0	0
3 Vehicle Rental	Month	96.6667	400,000	38,666,667		0	38,666,667
4 Office Rental	Month	60		0	1,000,000	60,000,000	7,020,000
5 International Communications	M/M	125		0	20,000	2,500,000	292,500
6 Domestic Communications	M/M	60		0	5,000	300,000	35,100
7 Office Supply	M/M	60		0	50,000	3,000,000	351,000
8 Office Furniture and Equipment	set	1		0	5,000,000	5,000,000	585,000
9 Report Preparation	Month	55		0	15,000	825,000	96,525
10 Training (Domestic)	set	1		0	300,000,000	300,000,000	35,100,000
11 Training (3rd Country)	set	1	15,000,000	15,000,000		0	15,000,000
12 Equipment	set	1	20,000,000	20,000,000		0	20,000,000
Subtotal of B				123,666,667		701,625,000	205,756,792
Total				456,666,667		800,625,000	550,339,792

4.12 Food Processing Industry Promotion

	Unit	Qty.	Foreign Portion		Local Portion		Combined Total (JPY)
			(JPY)		(MMK)		
			Rate	Amount	Rate	Amount	
A Consulting Service / Expert							
1 Professional (A)	M/M	145	2,400,000	348,000,000	0	0	348,000,000
2 Professional (B)	M/M	165	200,000	33,000,000	0	0	33,000,000
3 Supporting Staffs	M/M	165	0	0	600,000	99,000,000	11,583,000
Subtotal of A				381,000,000		99,000,000	392,583,000
B Project Cost							
1 International Airfare	trip	30	200,000	6,000,000		0	6,000,000
2 Domestic Airfare		103.333		0		0	0
3 Domestic Travel				0		0	0
2 Accommodation Allowance	Month	145	360,000	52,200,000		0	52,200,000
	Month	165		0	2,000,000	330,000,000	38,610,000
	Month	165		0		0	0
3 Vehicle Rental	Month	103.333	400,000	41,333,333		0	41,333,333
4 Office Rental	Month	60		0	1,000,000	60,000,000	7,020,000
5 International Communications	M/M	145		0	20,000	2,900,000	339,300
6 Domestic Communications	M/M	60		0	5,000	300,000	35,100
7 Office Supply	M/M	60		0	50,000	3,000,000	351,000
8 Office Furniture and Equipment	set	1		0	5,000,000	5,000,000	585,000
9 Report Preparation	Month	55		0	15,000	825,000	96,525
10 Training (Domestic)	set	1		0	500,000,000	500,000,000	58,500,000
11 Equipment	set	1	150,000,000	150,000,000		0	150,000,000
Subtotal of B				249,533,333		902,025,000	355,070,258
Total				630,533,333		1,001,025,000	747,653,258

4.13 Dissemination of Advanced Farming Technologies

	Unit	Qty.	Foreign Portion		Local Portion		Combined Total
			(JPY)		(MMK)		
			Rate	Amount	Rate	Amount	(JPY)
A Consulting Service / Expert							
1 Professional (A)	M/M	116	2,400,000	278,400,000	0	0	278,400,000
2 Professional (B)	M/M	132	200,000	26,400,000	0	0	26,400,000
3 Supporting Staffs	M/M	132	0	0	600,000	79,200,000	9,266,400
Subtotal of A				304,800,000		79,200,000	314,066,400
B Project Cost							
1 International Airfare	trip	20	200,000	4,000,000		0	4,000,000
2 Domestic Airfare		82.6667		0		0	0
3 Domestic Travel				0		0	0
2 Accommodation Allowance	Month	116	360,000	41,760,000		0	41,760,000
	Month	132		0	2,000,000	264,000,000	30,888,000
	Month	132		0		0	0
3 Vehicle Rental	Month	82.6667	400,000	33,066,667		0	33,066,667
4 Office Rental	Month	60		0	1,000,000	60,000,000	7,020,000
5 International Communications	M/M	116		0	20,000	2,320,000	271,440
6 Domestic Communications	M/M	60		0	5,000	300,000	35,100
7 Office Supply	M/M	60		0	50,000	3,000,000	351,000
8 Office Furniture and Equipment	set	1		0	5,000,000	5,000,000	585,000
9 Report Preparation	Month	55		0	15,000	825,000	96,525
10 Training (Domestic)	set	1		0	300,000,000	300,000,000	35,100,000
11 Training (3rd Country)	set	1	15,000,000	15,000,000		0	15,000,000
12 Equipment	set	1	40,000,000	40,000,000		0	40,000,000
Subtotal of B				133,826,667		635,445,000	208,173,732
Total				438,626,667		714,645,000	522,240,132

4.14 Plant Protection Enhancement

No.	Description for each market	Figure	Unit Price (kyat)	Figure Converted	Unit Price (kyat)	Item Price (kyat)	Item Price (Jyen)	Item Price (US\$)
Mandalay laboratory [new construction]								
1	Open space at Mandalay or a border station	0.3 acres	20,000 /ft ²	1,214.1 m ²	215,280 /m ²	261,362,406	30,579,402	253,981.74
2	Containers 40ft for Phoshine fumigation at Mandalay or a border station	6.0 units	15,000,000 /unit	6.0 units	15,000,000 /unit	90,000,000	10,530,000	87,458.47
3	Warehouse; 2partitions with refrigerating unit for Phosphine Fumigants at Mandalay or border station	0.3 acre	28,000 /ft ²	1,214.1 m ²	301,392 /m ²	365,907,369	42,811,162	355,574.44
4	Gutters: drainages with septic tank	1.0 set	3,000,000 /set	1.0 set	3,000,000 /set	3,000,000	351,000	2,915.28
5	Power receiving unit with backup power generation system	1.0 set	30,000,000 /set	1.0	30,000,000 /set	30,000,000	3,510,000	29,152.82
6	Hand-fork-lift: 2ton	3.0 set	1,000,000 /set	3.0 set	1,000,000 /set	3,000,000	351,000	2,915.28
7	Fork-lift 2.5ton gasoline engine	1.0 units	30,000,000 /unit	1.0	30,000,000	30,000,000	3,510,000	29,152.82
7	Tube well: water supply	1.0 set	5,000,000 /set	1.0 set	5,000,000 /set	5,000,000	585,000	4,858.80
8	Office/ laboratory room	2,000.0 m ²	27,000 /ft ²	2,000.0 m ²	290,628 /m ²	581,256,000	68,006,952	564,841.79
9	Approach Road: 6meter width	100.0 m	600,000 /m	100.0 m	600,000 /m	60,000,000	7,020,000	58,305.65
10	Water Tank (Tower)	1.0 set	10,000,000 /set	1.0 set	10,000,000 /set	10,000,000	1,170,000	9,717.61
11	Devices for pesticide residue							
	High-performance liquid chromatograph-mass spectrometer	1.0 set	660,000,000 /set	1.0 set	660,000,000 /set	660,000,000	77,220,000	641,362.13
	Gas chromatography-mass spectrometer	2.0 sets	330,000,000 /set	2.0 set	330,000,000 /set	660,000,000	77,220,000	641,362.13
	Peripheral devices	1.0 set	220,000,000 /set	1.0 set	220,000,000 /set	220,000,000	25,740,000	213,787.38
	Reagents and spare parts	1.0 set	110,000,000 /set	1.0 set	110,000,000 /set	110,000,000	12,870,000	106,893.69
12	Aflatoxin analysis							
	High-performance liquid chromatograph-mass spectrometer	1.0 set	660,000,000 /set	1.0 set	660,000,000 /set	660,000,000	77,220,000	641,362.13
	Atomic absorption spectrophotometer	1.0 set	220,000,000 /set	1.0 set	220,000,000 /set	220,000,000	25,740,000	213,787.38
	Spectrophotometer	1.0 set	110,000,000 /set	1.0 set	110,000,000 /set	110,000,000	12,870,000	106,893.69
	Peripheral devices	1.0 set	220,000,000 /set	1.0 set	220,000,000 /set	220,000,000	25,740,000	213,787.38
	Reagents and spare parts	1.0 set	100,000,000 /set	1.0 set	100,000,000 /set	100,000,000	11,700,000	97,176.08
14	Laboratory devices							
	Refrigerator	2.0 units	60,000,000 /unit	2.0 set	60,000,000 /set	120,000,000	14,040,000	116,611.30
	Inverted microscope	2.0 units	7,000,000 /unit	2.0 set	7,000,000 /set	14,000,000	1,638,000	13,604.65
	Incubator	4.0 units	22,000,000 /unit	4.0 set	22,000,000 /set	88,000,000	10,296,000	85,514.95
	Water distillation device	2.0 units	6,000,000 /unit	2.0 set	6,000,000 /set	12,000,000	1,404,000	11,661.13
	Draft chamber	2.0 units	18,000,000 /unit	2.0 set	18,000,000 /set	36,000,000	4,212,000	34,983.39
	Autoclave unit	2.0 sets	11,000,000 /unit	2.0 set	11,000,000 /set	22,000,000	2,574,000	21,378.74
15	Fumigation devices							
	Fumigation Chamber (30M ³)	2.0 units	550,000,000 /unit	2.0 set	550,000,000 /set	1,100,000,000	128,700,000	1,068,936.88
	Fumigation Chamber (1M ³)	2.0 units	180,000,000 /unit	2.0 set	180,000,000 /set	360,000,000	42,120,000	349,833.89
	Peripheral devices	1.0 set	200,000,000 /set	1.0 set	200,000,000 /set	200,000,000	23,400,000	194,352.16
16	Vapor heat treatment							
	Vapor heat treatment device	2.0 units	350,000,000 /unit	2.0 set	350,000,000 /set	700,000,000	81,900,000	680,232.56
	Peripheral devices	1.0 set	200,000,000 /set	1.0 set	200,000,000 /set	200,000,000	23,400,000	194,352.16
Sub-total						7,251,525,775	848,428,516	7,046,748.47
Yangon laboratory [renovating/ extending]								
17	Renovating existing building	1,000.0 ft ²	10,000 /ft ²	92.9 m ²	107,640 /m ²	9,999,756	1,169,971	9,717.37
18	Devices for pesticide residue							
	High-performance liquid chromatograph-mass spectrometer	1.0 set	660,000,000 /set	1.0 set	660,000,000 /set	660,000,000	77,220,000	641,362.13
	Gas chromatography-mass spectrometer	2.0 sets	330,000,000 /set	2.0 set	330,000,000 /set	660,000,000	77,220,000	641,362.13
	Peripheral devices	1.0 set	220,000,000 /set	1.0 set	220,000,000 /set	220,000,000	25,740,000	213,787.38
	Reagents and spare parts	1.0 set	110,000,000 /set	1.0 set	110,000,000 /set	110,000,000	12,870,000	106,893.69
19	Aflatoxin analysis							
	High-performance liquid chromatograph-mass spectrometer	1.0 set	660,000,000 /set	1.0 set	660,000,000 /set	660,000,000	77,220,000	641,362.13
	Atomic absorption spectrophotometer	1.0 set	220,000,000 /set	1.0 set	220,000,000 /set	220,000,000	25,740,000	213,787.38
	Spectrophotometer	1.0 set	110,000,000 /set	1.0 set	110,000,000 /set	110,000,000	12,870,000	106,893.69
	Peripheral devices	1.0 set	220,000,000 /set	1.0 set	220,000,000 /set	220,000,000	25,740,000	213,787.38
	Reagents and spare parts	1.0 set	100,000,000 /set	1.0 set	100,000,000 /set	100,000,000	11,700,000	97,176.08
13	Laboratory devices							
	Refrigerator	2.0 units	5,500,000 /unit	2.0 set	5,500,000 /set	11,000,000	1,287,000	10,689.37
	Inverted microscope	2.0 units	17,000,000 /unit	2.0 set	17,000,000 /set	34,000,000	3,978,000	33,039.87
	Incubator	4.0 units	22,000,000 /unit	4.0 set	22,000,000 /set	88,000,000	10,296,000	85,514.95
	Water distillation device	2.0 units	6,000,000 /unit	2.0 set	6,000,000 /set	12,000,000	1,404,000	11,661.13
	Draft chamber	2.0 units	18,000,000 /unit	2.0 set	18,000,000 /set	36,000,000	4,212,000	34,983.39
	Autoclave unit	2.0 sets	11,000,000 /unit	2.0 set	11,000,000 /set	22,000,000	2,574,000	21,378.74
Sub-total						3,172,999,756	371,240,971	3,083,396.77
Pest inspection [major laboratory/ district stations/ border stations]								
14	Stereoscopic microscope with camera	15.0 sets	7,000,000 /set	15.0 set	7,000,000 /set	105,000,000	12,285,000	102,034.88
15	Peripheral devices	15.0 sets	2,500,000 /set	15.0 set	2,500,000 /set	37,500,000	4,387,500	36,441.03
Sub-total						142,500,000	16,672,500	138,475.91
Total						10,567,025,531	1,236,341,987	10,268,621.16

4.15 Cost of Components in Priority Area

4.15.1 Summary of Cost of Components in Priority Area

Priority Area	Priority Level	Cost of Components					
		(million Kyats)			(million JPY)		
Shwebo Area	A	24,270			2,840		
	B	145,863	(A+B)	(A+B+C)	17,066	(A+B)	(A+B+C)
	C	5,179	170,133	175,312	606	19,906	20,511
Mandalay Area	A	151,426			17,717		
	B	50,015	(A+B)	(A+B+C)	5,852	(A+B)	(A+B+C)
	C	23,025	201,441	224,466	2,694	23,569	26,263
Nay Pyi Taw Area	A	37,841			4,427		
	B	48,980	(A+B)	(A+B+C)	5,731	(A+B)	(A+B+C)
	C	5,895	86,820	92,715	690	10,158	10,848
Ayeyarwady Area	A	35,476			4,151		
	B	81,572	(A+B)	(A+B+C)	9,544	(A+B)	(A+B+C)
	C	8,180	117,047	125,228	957	13,695	14,652

4.15.2 Cost of Components in 4 Priority Areas

(1) Cost of Components in Shwebo Area

Rank	Component	Items of Expenditure									Type of Potential ODA Scheme			Remark
		Currency	Project Cost	Price Escalation	Physical Contingency	Consulting Service / Expert	Interest during Construction	Administration Cost	Compensation Fee	Total	Loan (Project)	Technical Cooperation Project	Grant Aid	
I. Component for Productivity Increase														
A	1. Agriculture Extension Strengthening	(million MMK)	4,615	1,113	414	2,557	2	870	0	9,572	9,572			
		(million JPY)	540	130	48	299	0	102	0	1,120	1,120			
II. Component for Agribusiness Promotion														
A	9. Farm-to-Market Road (FMR) Improvement (Old Main Canal)	(million MMK)	5,320	1,011	346	590	2	727	0	7,996	7,996			
		(million JPY)	622	118	40	69	0	85	0	935	935			
A	15. Supply Chain Improvement of Rice	(million MMK)	2,438	305	305	3,655	0	0	0	6,702		6,702		
		(million JPY)	285	36	36	428	0	0	0	784		784		
Sub-total (A)		(million MMK)								24,270	17,568	6,702	0	
		(million JPY)								2,840	2,055	784	0	
I. Component for Productivity Increase														
B	2. Irrigation Rehabilitation	(million MMK)	59,593	11,030	3,735	4,083	21	7,844	0	86,306	86,306			
		(million JPY)	6,972	1,290	437	478	2	918	0	10,098	10,098			
B	4. Land Consolidation	(million MMK)	15,200	2,834	968	1,330	5	2,033	0	22,371	22,371			
		(million JPY)	1,778	332	113	156	1	238	0	2,617	2,617			
B	5. Agricultural Machinery Station Enhancement	(million MMK)	3,615	181	181	181	0	0	0	4,157	4,157			
		(million JPY)	423	21	21	21	0	0	0	486	486			
II. Component for Agribusiness Promotion														
B	9. Farm-to-Market Road (FMR) Improvement (without Old Main Canal)	(million MMK)	13,680	2,599	890	1,518	5	1,869	0	20,560	20,560			
		(million JPY)	1,601	304	104	178	1	219	0	2,406	2,406			
B	19. Plant Protection Enhancement	(million MMK)	10,567	528	528	845	0	0	0	12,469			12,469	
		(million JPY)	1,236	62	62	99	0	0	0	1,459			1,459	
Sub-total (B)		(million MMK)								145,863	133,394	0	12,469	
		(million JPY)								17,066	15,607	0	1,459	
I. Component for Productivity Increase														
C	7. Flood Monitoring System Establishment	(million MMK)	1,111	56	56	56	0	0	0	1,278	1,278			
		(million JPY)	130	7	7	7	0	0	0	150	150			
II. Component for Agribusiness Promotion														
C	10. Jetty Improvement	(million MMK)	2,810	140	140	140	0	0	0	3,231	3,231			
		(million JPY)	329	16	16	16	0	0	0	378	378			
C	11. Market Improvement (District level), 1 unit	(million MMK)	604	18	30	18	0	0	0	670	670			
		(million JPY)	71	2	4	2	0	0	0	78	78			
Sub-total (C)		(million MMK)								5,179	5,179	0	0	
		(million JPY)								606	606	0	0	
Total (A+B)		(million MMK)								170,133	150,962	6,702	12,469	
		(million JPY)								19,906	17,663	784	1,459	
Total (A+B+C)		(million MMK)								175,312	156,141	6,702	12,469	
		(million JPY)								20,511	18,268	784	1,459	

Cost of Components (Two-step loan program)

Rank	Component	Items of Expenditure									Remark
		Currency	Project Cost	Price Escalation	Physical Contingency	Consulting Service / Expert	Interest during Construction	Administration Cost	Compensation Fee	Total	
A	6. Agricultural Machinery Dissemination (TSL)	(million MMK)								42,735	
		(million JPY)								5,000	
A	14. Small and Medium Agro-enterprise Promotion (TSL)	(million MMK)								42,735	
		(million JPY)								5,000	
Total		(million MMK)								85,470	
		(million JPY)								10,000	

(2) Cost of Components in Mandalay Area

R e s o u r c e	Component	Items of Expenditure									Type of Potential ODA Scheme			Remark
		Currency	Project Cost	Price Escalation	Physical Contingency	Consulting Service / Expert	Interest during Construction	Administration Cost	Compensation Fee	Total	Loan (Project)	Technical Cooperation Project	Grant Aid	
I. Component for Productivity Increase														
A	2. Irrigation Rehabilitation	(million MMK)	90,313	18,608	5,710	5,270	38	11,990	0	131,928	131,928			
		(million JPY)	10,567	2,177	668	617	4	1,403	0	15,436	15,436			
II. Component for Agribusiness Promotion														
A	17. Food Processing Industry Promotion	(million MMK)	3,035	320	320	3,355	0	0	0	7,029		7,029		
		(million JPY)	355	37	37	393	0	0	0	822		822		
A	19. Plant Protection Enhancement	(million MMK)	10,567	528	528	845	0	0	0	12,469			12,469	
		(million JPY)	1,236	62	62	99	0	0	0	1,459			1,459	
Sub-total (A)		(million MMK)								151,426	131,928	7,029	12,469	
		(million JPY)								17,717	15,436	822	1,459	
I. Component for Productivity Increase														
B	1. Agriculture Extension Strengthening	(million MMK)	3,504	980	340	2,309	2	713	0	7,849	7,849			
		(million JPY)	410	115	40	270	0	83	0	918	918			
II. Component for Agribusiness Promotion														
B	9. Farm-to-Market Road (FMR) Improvement	(million MMK)	20,043	4,300	1,344	2,542	9	2,823	0	31,062	31,062			
		(million JPY)	2,345	503	157	297	1	330	0	3,634	3,634			
B	10. Jetty Improvement	(million MMK)	3,829	191	191	191	0	0	0	4,404	4,404			
		(million JPY)	448	22	22	22	0	0	0	515	515			
B	15. Supply Chain Improvement of Rice	(million MMK)	2,438	305	305	3,655	0	0	0	6,702		6,702		
		(million JPY)	285	36	36	428	0	0	0	784		784		
Sub-total (B)		(million MMK)								50,015	43,314	6,702	0	
		(million JPY)								5,852	5,068	784	0	
I. Component for Productivity Increase														
C	4. Land Consolidation	(million MMK)	11,400	2,442	773	1,609	5	1,622	0	17,851	17,851			
		(million JPY)	1,334	286	90	188	1	190	0	2,089	2,089			
II. Component for Agribusiness Promotion														
C	16. Value Chain Enhancement of Vegetables & Fruits	(million MMK)	1,759	235	235	2,945	0	0	0	5,174		5,174		
		(million JPY)	206	28	28	345	0	0	0	605		605		
Sub-total (C)		(million MMK)								23,025	17,851	5,174	0	
		(million JPY)								2,694	2,089	605	0	
Total (A+B)		(million MMK)								201,441	175,241	13,731	12,469	
		(million JPY)								23,569	20,503	1,607	1,459	
Total (A+B+C)		(million MMK)								224,466	193,092	18,905	12,469	
		(million JPY)								26,263	22,592	2,212	1,459	

Cost of Components (Two-step loan program and Wholesale Market Establishment)

R e s o u r c e	Component	Items of Expenditure									Type of Potential ODA Scheme		Remark
		Currency	Project Cost	Price Escalation	Physical Contingency	Consulting Service / Expert	Interest during Construction	Administration Cost	Compensation Fee	Total	Two-Step Loan	Overseas Investment and Loan	
B	6. Agricultural Machinery Dissemination (TSL)	(million MMK)								42,735	42,735		
		(million JPY)								5,000	5,000		
A	11. PPP Wholesale Market Establishment (Mandalay)	(million MMK)								64,103		64,103	
		(million JPY)								7,500		7,500	
B	13. Small and Medium Agro-enterprise Promotion (TSL)	(million MMK)								42,735	42,735		
		(million JPY)								5,000	5,000		
Total		(million MMK)								149,573	85,470	64,103	
		(million JPY)								17,500	10,000	7,500	

(3) Cost of Components in Nay Pyi Taw Area

Rank	Component	Items of Expenditure									Type of Potential ODA Scheme			Remark
		Currency	Project Cost	Price Escalation	Physical Contingency	Consulting Service / Expert	Interest during Construction	Administration Cost	Compensation Fee	Total	Loan (Project)	Technical Cooperation Project	Grant Aid	
I. Component for Productivity Increase														
A	1. Agriculture Extension Strengthening	(million MMK)	1,453	333	145	1,120	1	305	0	3,356	3,356			
		(million JPY)	170	39	17	131	0	36	0	393	393			
A	2. Irrigation Rehabilitation (Paunglaung Dam)	(million MMK)	6,212	1,043	400	737	2	839	0	9,233	9,233			
		(million JPY)	727	122	47	86	0	98	0	1,080	1,080			
A	8. Plant Breeding Enhancement	(million MMK)	13,212	661	661	2,612	0	0	0	17,145			17,145	
		(million JPY)	1,546	77	77	306	0	0	0	2,006			2,006	
II. Component for Agribusiness Promotion														
A	9. Farm-to-Market Road (FMR) Improvement (Paunglaung Dam)	(million MMK)	2,137	359	138	271	1	291	0	3,196	3,196			
		(million JPY)	250	42	16	32	0	34	0	374	374			
A	18. Dissemination of Advanced Farming Technologies	(million MMK)	1,779	223	223	2,684	0	0	0	4,910		4,910		
		(million JPY)	208	26	26	314	0	0	0	574		574		
Sub-total (A)		(million MMK)								37,841	15,785	4,910	17,145	
		(million JPY)								4,427	1,847	574	2,006	
I. Component for Productivity Increase														
B	2. Irrigation Rehabilitation (Yezin Dam, Sinthe Dam, Ngalaik Dam)	(million MMK)	16,394	2,753	1,055	1,945	5	2,215	0	24,366	24,366			
		(million JPY)	1,918	322	123	228	1	259	0	2,851	2,851			
B	5. Agricultural Machinery Station Enhancement (cum Machine Testing Center)	(million MMK)	6,307	315	315	315	0	0	0	7,253	7,253			
		(million JPY)	738	37	37	37	0	0	0	849	849			
II. Component for Agribusiness Promotion														
B	9. Farm-to-Market Road (FMR) Improvement (Yezin Dam, Sinthe Dam, Ngalaik Dam)	(million MMK)	7,125	1,198	461	904	2	969	0	10,659	10,659			
		(million JPY)	834	140	54	106	0	113	0	1,247	1,247			
B	15. Supply Chain Improvement of Rice	(million MMK)	2,438	305	305	3,655	0	0	0	6,702		6,702		
		(million JPY)	285	36	36	428	0	0	0	784		784		
Sub-total (B)		(million MMK)								48,980	42,278	6,702	0	
		(million JPY)								5,731	4,947	784	0	
I. Component for Productivity Increase														
C	4. Land Consolidation	(million MMK)	3,800	651	255	652	1	536	0	5,895	5,895			
		(million JPY)	445	76	30	76	0	63	0	690	690			
Sub-total (C)		(million MMK)								5,895	5,895			
		(million JPY)								690	690			
Total (A+B)		(million MMK)								86,820	58,064	11,612	17,145	
		(million JPY)								10,158	6,793	1,359	2,006	
Total (A+B+C)		(million MMK)								92,715	63,958	11,612	17,145	
		(million JPY)								10,848	7,483	1,359	2,006	

Cost of Components (Two-step loan program and Wholesale Market Establishment)

Rank	Component	Items of Expenditure									Type of Potential ODA Scheme		Remark
		Currency	Project Cost	Price Escalation	Physical Contingency	Consulting Service / Expert	Interest during Construction	Administration Cost	Compensation Fee	Total	Two-Step Loan	Overseas Investment and Loan	
B	6. Agricultural Machinery Dissemination (TSL)	(million MMK)								42,735	42,735		
		(million JPY)								5,000	5,000		
C	13. Wholesale Market Development (New)	(million MMK)	5,854	293	293	293	0	0	0	6,732		6,732	
		(million JPY)	685	34	34	34	0	0	0	788		788	
B	14. Small and Medium Agro-enterprise Promotion (TSL)	(million MMK)								42,735	42,735		
		(million JPY)								5,000	5,000		
Total		(million MMK)								92,202	85,470	6,732	
		(million JPY)								10,788	10,000	788	

(4) Components in Ayeyarwady Area

Rank	Component	Items of Expenditure									Type of Potential ODA Scheme			Remark
		Currency	Project Cost	Price Escalation	Physical Contingency	Consulting Service / Expert	Interest during Construction	Administration Cost	Compensation Fee	Total	Loan (Project)	Technical Cooperation Project	Grant Aid	
I. Component for Productivity Increase														
A	1. Agriculture Extension Strengthening	(million MMK)	1,880	553	215	1,870	1	452	0	4,971	4,971			
		(million JPY)	220	65	25	219	0	53	0	582	582			
II. Component for Agribusiness Promotion														
A	9. Farm-to-Market Road (FMR) Improvement	(million MMK)	20,993	3,891	1,320	1,515	7	2,773	6	30,505	30,505			
		(million JPY)	2,456	455	154	177	1	324	1	3,569	3,569			
Sub-total (A)		(million MMK)								35,476	35,476	0	0	
		(million JPY)								4,151	4,151	0	0	
I. Component for Productivity Increase														
B	3. Polder and Drainage Improvement	(million MMK)	23,650	3,697	1,542	3,486	9	3,237	0	35,621	35,621			
		(million JPY)	2,767	432	180	408	1	379	0	4,168	4,168			
B	4. Land Consolidation	(million MMK)	15,200	2,850	979	1,533	5	2,056	0	22,623	22,623			
		(million JPY)	1,778	333	115	179	1	241	0	2,647	2,647			
B	5. Agricultural Machinery Station Enhancement	(million MMK)	3,615	181	181	181	0	0	0	4,157	4,157			
		(million JPY)	423	21	21	21	0	0	0	486	486			
II. Component for Agribusiness Promotion														
B	15. Supply Chain Improvement of Rice	(million MMK)	2,438	305	305	3,655	0	0	0	6,702		6,702		
		(million JPY)	285	36	36	428	0	0	0	784		784		
B	19. Plant Protection Enhancement	(million MMK)	10,567	528	528	845	0	0	0	12,469			12,469	
		(million JPY)	1,236	62	62	99	0	0	0	1,459			1,459	
Sub-total (B)		(million MMK)								81,572	62,401	6,702	12,469	
		(million JPY)								9,544	7,301	784	1,459	
I. Component for Productivity Increase														
C	7. Flood Monitoring System Establishment	(million MMK)	1,111	56	56	56	0	0	0	1,278	1,278			
		(million JPY)	130	7	7	7	0	0	0	150	150			
II. Component for Agribusiness Promotion														
C	10. Jetty Improvement	(million MMK)	3,319	166	166	166	0	0	0	3,817	3,817			
		(million JPY)	388	19	19	19	0	0	0	447	447			
C	11. Market Improvement (District level), 5 unit	(million MMK)	3,019	18	30	18	0	0	0	3,085	3,085			
		(million JPY)	353	2	4	2	0	0	0	361	361			
Sub-total (C)		(million MMK)								8,180	8,180	0	0	
		(million JPY)								957	957	0	0	
Total (A+B)		(million MMK)								117,047	97,877	6,702	12,469	
		(million JPY)								13,695	11,452	784	1,459	
Total (A+B+C)		(million MMK)								125,228	106,057	6,702	12,469	
		(million JPY)								14,652	12,409	784	1,459	

Cost of Components (Two-step loan program)

Rank	Component	Items of Expenditure									Remark
		Currency	Project Cost	Price Escalation	Physical Contingency	Consulting Service / Expert	Interest during Construction	Administration Cost	Compensation Fee	Total	
A	6. Agricultural Machinery Dissemination (TSL)	(million MMK)								42,735	
		(million JPY)								5,000	
A	14. Small and Medium Agro-enterprise Promotion (TSL)	(million MMK)								42,735	
		(million JPY)								5,000	
Total		(million MMK)								85,470	
		(million JPY)								10,000	

APPENDIX-V

PROJECT EVALUATION

APPENDIX V: PROJECT EVALUATION

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1. PROJECT EVALUATION

Financial and economic analyses aim at comparing project cost-benefits and evaluating development projects in a tangible way. Generally, evaluation by financial analysis gives relevance of the proposed project from the viewpoint of project agency and it is calculated by market prices. On the other hand, economic evaluation is made with economic prices to estimate the effect of the benefits at national and regional levels derived from the project.

1.1 Condition, Methodology and Evaluation Cases

1.1.1 Purpose of Evaluation

The purpose of financial evaluation is to assess the benefit of a particular project from an individual economy standpoint, while economic evaluation assesses the project in terms of its contribution to the national economy as a whole. In order to examine the proposed program components in terms economic viability, internal rate of return (EIRR) in economic terms is employed in most cases. However, it is noted that financial basis viability is examined in case of market and rice miller since they should be basically operated by a private entity. In addition, farm budget analysis is also conducted in order to know how much benefit a typical farmer can obtain out of the implementation of components.

1.1.2 Methodology of Evaluation

On the basis of project benefit and cost comparison for the two cases of (i) Current Situation without project FW/O) and (ii) rehabilitation means future with project FW), the economic viabilities of the projects are examined in terms of net present value (NPV), and internal rate of return (IRR).

1.1.3 Evaluation Criteria

a) Interpretation of Future without Project Case

It is assumed that the present conditions will keep status without project.

b) Project Life

Referring to other similar projects in the irrigation/agriculture sector, the economic life of the project for irrigation rehabilitation, land consolidation, and farm road rehabilitation is designed at 30 years. It means that economic evaluations are encoded over these periods considering the initial investments and also operation and maintenance costs to be accrued.

By referring to similar projects, the project life of wholesale is set at 20 years. On the other hand, the project life of small and medium agro-enterprise promotion is set at 7 years.

c) Project Benefit and Cost

Under financial evaluation, project benefit and cost are expressed in terms of market prices (financial prices). Economic evaluation, on the other hand, eliminates transfer payment, export duty, port and handling charges, wholesale margin and application of respective conversion factors. Moreover, project benefit and cost are based on October 2015 year prices.

e) Opportunity Cost of Capital

The opportunity cost of capital in Myanmar is not established yet; however, a range of 12% to 15% can be applied as a reference opportunity cost of capital with reference to practices that the World Bank, ADB, and JICA have done so far in the sector of irrigation/agriculture development in the world. In this economic evaluation, EIRR should therefore be at least more than 12% and targeted at 15% or more, or otherwise the investment cannot be justified. On the other hand, for the financial evaluation, the current interest ratio in private banks is around 13%, and therefore 15% is selected as discount ratio.

f) Foreign Exchange Rate

In the evaluation, the foreign exchange rate of 1 Kyats = 0.117 JPY is applied as of October 2015.

g) Labor

Nominal wages are used for financial evaluation. Under economic evaluation, on the other hand, (i) skilled labor is 1.0 and (ii) unskilled labor is 0.6.

h) Standard Conversion Factor (SCF)

Conversion factors are applied to estimate economic costs/prices, or border prices from the financial market ones. Note that conversion factors are not standardized in Myanmar, so that a SCF which was employed in “Feasibility Study on the Yangon – Mandalay Rail Improvement Project” is applied in this economic evaluation (i.e. 0.88).

i) Operation and Management Cost

a. Major three components: For operation and management cost of major three components, following percentages of total costs are applied;

Operation and Maintenance cost	Irrigation Rehabilitation	Land Consolidation	Road Rehabilitation
	2.0 %	1.0 %	2.0 %

b. Wholesale Market Rehabilitation: Current operation and management (O&M) cost is 111.8 million Kyats, and incremental operation and management fee is assumed to be 1.0% of the total capital investment, 6.7 million Kyats, and accordingly the total planned O&M cost is set at 118.5 million Kyats per annum.

c. Small and Medium Agro-enterprise Promotion: O&M cost is composed of energy cost (electricity, stream, diesel, and gasifier), minor maintenance fee, and large maintenance fee (replacing rollers, for example). The annual operation and maintenance fee is about 11.5 million Kyats, or 14.4% of total cost. Therefore, the O&M cost is set at 15% of the total investment cost.

1.2 Cases for Project Evaluation**1.2.1 Cases for Agricultural Extension Strengthening + Irrigation Rehabilitation**

The project economic variability for irrigation rehabilitation together with agricultural extension strengthening. In total, 4 cases (Base 0' – Base 2) are undertake;

Base 0': It considers only yield increase of monsoon and summer paddy with the project investment. It is assumed that yields will increase up to the midpoints of between the current yields and practically expected ones. Practically expected yields have been set from the data reported by regional DOA officers in charge of the extension area of the target irrigation systems.

Base 0: with rehabilitation and better reservoir operation, there should be an extra irrigation water to be availed. Thanks to this, there is an opportunity of enlarging summer paddy cultivation. In Base 0, we consider not only yield increase, but also area expansion of summer paddy based on the water availability. Note that since monsoon paddy is planted almost over the whole irrigable area, no expansion of monsoon paddy should be undertaken.

Base 1: The newly generated irrigation water is now utilized in expanding winter pulses (chick pea and black gram). The area expansion of pulses is supposed to be three times larger than that of summer paddy estimated in Base 0. This is because irrigation requirement of summer paddy is usually three times more than that of pulses.

Base2: It is based on the same assumption as at Base 0 case, but now, we assume that 10% of the summer paddy area is diversified to sesame. It is also assumed that the area expansion of sesame is three times larger than the original summer paddy area to be changed to the sesame from the same reason above.

The following Table 5.1 shows the basic conditions for agricultural extension strengthening and irrigation rehabilitation.

Table 5.1 Basic Conditions of Agricultural Extension Strengthening + Irrigation Rehabilitation

Title	Shwebo	Mandalay	Nay Pyi Taw	Nay Pyi Taw	Ayeyarwady
Area Increase					
Monsoon Paddy (acre)					
Current	485,456	253,295	44,051	44,051	178,154
Base 0'	485,456	253,295	67,945	44,051	178,154
Base 0	485,456	253,295	67,945	44,051	195,969
Base 1	485,456	253,295	67,945	44,051	-
Base 2	485,456	253,295	67,945	44,051	-
Summer Paddy (acre)					
Current	274,086	138,644	22,619	22,619	96,381
Base 0'	274,086	138,644	33,335	22,619	96,381
Base 0	327,181	194,593	38,548	28,718	106,019
Base 1	274,086	138,644	33,335	22,619	-
Base 2	294,463	175,134	34,693	25,846	-
Pulses Increment (acre)					
Current	0	0	0	0	0
Base 0'	0	0	0	0	0
Base 0	0	0	0	0	0
Base 1	159,286	167,850	15,640	18,297	4,508
Base 2	98,154	58,378	11,564	8,615	16,396
Production Increase					
Monsoon Paddy					
Current (basket/acre)	63.0	74.0	73.0	73.0	65.0
Planned (basket /acre)	69.0	89.5	86.5	86.5	72.5
Potential (basket /acre)	75.0	105.0	100.0	100.0	80.0
Percentage (%)	110.0	121.0	118.0	118.0	112.0
Summer Paddy					
Current (basket /acre)	82.0	89.0	84.0	84.0	87.0
Planned (basket /acre)	98.5	104.5	102.0	102.0	98.5
Potential (basket /acre)	115.0	120.0	120.0	120.0	110.0
Percentage (%)	120.0	117.0	121.0	121.0	113.0
Pulses					
Current (basket /acre)	14.0	9.0	13.0	13.0	10.0
Planned (basket /acre)	17.0	14.5	16.5	16.5	15.0
Potential (basket /acre)	20.0	20.0	20.0	20.0	20.0
Percentage (%)	121.0	161.0	127.0	127.0	150.0
Sesame					
Current (basket /acre)	10.0	9.0	10.0	10.0	N.A
Planned (basket /acre)	12.5	12.0	15.0	15.0	N.A
Potential (basket /acre)	15.0	15.0	20.0	20.0	N.A
Percentage (%)	125.0	133.0	150.0	150.0	N.A
Farmgate Price (Financial)					
Monsoon Paddy (kyat/ basket)	7,327	6,078	4,826	4,826	5,253
Summer Paddy (kyat/ basket)	4,562	5,602	5,313	5,313	4,195
Pulses (kyat/ basket)	11,786	23,926	27,938	27,938	27,295
Sesame (kyat/ basket)	23,630	47,952	36,167	36,167	N.A
Farmgate Price (Economic)					
Monsoon Paddy (kyat/ basket)	6,448	5,349	4,247	4,247	4,623
Summer Paddy (kyat/ basket)	4,015	4,930	4,675	4,675	3,692
Pulses (kyat/ basket)	10,372	21,055	24,585	24,585	24,020
Sesame (kyat/ basket)	20,794	42,198	31,827	31,827	N.A
Net Profit Ratio (Financial)					
Monsoon Paddy (%)	61.2	55.6	52.5	52.5	60.3

Title	Shwebo	Mandalay	Nay Pyi Taw	Nay Pyi Taw	Ayeyarwady
Summer Paddy (%)	57.7	57.9	58.9	58.9	59.2
Pulses (%)	65.4	72.9	69.3	69.3	77.5
Sesame (%)	63.7	68.8	71.1	71.1	N.A
Net Profit Ratio (Economic)					
Monsoon Paddy (%)	58.0	52.0	48.6	48.6	57.1
Summer Paddy (%)	54.9	55.1	56.2	56.2	56.5
Pulses (%)	56.4	65.8	63.9	63.9	73.6
Sesame (%)	57.4	63.4	66.1	66.1	N.A

Note: Area increase is calculated by JICA Survey Team based on Dam Operation Data provided by ID Maintenance Office

Note: Yields increases to the midpoints of between the current yields and practically expected ones. Current yield is based on the result of farmer's household survey conducted by JICA Survey Team (2015). Expected yield have been assumed based on the data reported by regional DOA officers in charge of the irrigation area.

*1 Pulses means Chick Pea in Shwebo and Mandalay, also Black Gram in Nay Pyi Taw and Ayeyarwady.

1.2.2 Cases for Land Consolidation

There are two kind of benefits the Team supposed as for land consolidation, namely, farming cost reduction and yield increase. Farming costs per acre are calculated in each working schedules by with/without land consolidation. Then, we compare the total farming costs between with/without land consolidation in each represent crops i.e. monsoon paddy, summer paddy, and black gram. On the other hand, the degree of yield increases are based on the questionnaires result interviewed to model farmers in Nay Pyi Taw¹ as indicated in the following table.

The following Table 5.2 shows the basic conditions for land consolidation.

Table 5.2 Basic Condition of Land Consolidation

Title	Shwebo	Mandalay	Nay Pyi Taw	Ayeyarwady
Targeted Area for Land Consolidation				
Monsoon Paddy (acre)				
Targeted Area	40,000	30,000	10,000	50,000
After Land Consolidation	36,800	27,600	9,200	46,000
Planting Ratio (%)	100	100	100	100
Summer Paddy (acre)				
Targeted Area	27,760	18,000	6,000	32,800
After Land Consolidation	25,539	16,560	5,520	30,176
Planting Ratio (%)	69.4	60.0	60.0	65.6
Pulses/Sesame (acre)				
Targeted Area	5,774	22,890	1,998	21,100
After Land Consolidation	5,312	21,059	1,838	19,412
Planting Ratio (%)	20.8	76.3	33.3	42.2
Production Increase				
Monsoon Paddy				
Current (basket/acre)	63.0	74.0	73.0	65.0
Potential (basket /acre)	74.3	87.3	86.1	76.7
Percentage (%)	118.0	118.0	118.0	118.0
Summer Paddy				
Current (basket /acre)	76.0	89.0	84.0	87.0
Potential (basket /acre)	90.4	105.9	100.0	103.5
Percentage (%)	119.0	119.0	119.0	119.0
Pulses/Sesame				
Current (basket /acre)	14.0	9.0	13.0	10.0

¹JICA Study Team (2014): “Preparatory Survey for the Project for Rehabilitation of Irrigation Systems”, Final Report

Title	Shwebo	Mandalay	Nay Pyi Taw	Ayeyarwady
Potential (basket /acre)	16.4	10.5	15.2	11.7
Percentage (%)	117.0	117.0	117.0	117.0

Source: JICA Survey Team.

Note1: Planting Ratio (%) is calculated by JICA Survey Team based on the result of household survey.

Note2: Percentage of production increase is referenced from JICA Study Team (2014): "Preparatory Survey for the Project for Rehabilitation of Irrigation Systems", Final Report.

1.2.3 Case for Road Rehabilitation

The benefit of road rehabilitation is estimated by calculating how much transportation cost is reduced with improvement of road conditions. The total transportation cost is composed of fuel costs, loading/ unloading cost, and traveling personnel costs. With the roads rehabilitation, loading capacity improvement, transportation speed improvement, and reduction of unit fuel charges are expected. Considering these factors, the JICA team has calculated the difference of total transportation costs between with/without the roads rehabilitation. To collect basic information, the team has conducted a field survey in Pauk Myaing village, Nay Pyi Taw.

To identify the number of beneficiaries of the project, the Team estimated the total amount of paddy transportation related to model road. Table 5.3 show the calculation.

Table 5.3 Estimation of Transportation Amount around the Model Road

No. of Farmer HH in a typical village	No. of village that has used this road	Yield per acre in NPT		Average acre per farmer HH in NPT		Share % of paddy Production			Transportation amount (basket)		
		MP (basket /acre)	SP (basket /acre)	MP (basket /acre)	SP (basket /acre)	Consumption (%)	Sell (%)	Seed (%)	MP (basket /acre)	SP (basket /acre)	Total
82	19	73	84	6.0	2.5	20.0	72.0	8.0	491,331	235,570	726,90

Source: JICA Survey Team.

Table 5.4 shows the basic conditions road rehabilitation which is summarized by pavements

Table 5.4 The Basic Conditions of Road Rehabilitation.

Type of Vehicles	Fuel Charges		Personnel Charges		Speed (km/hour)	Load capacity (basket)
	Financial	Economic	Financial	Economic		
	Unit Cost (Kyats/km)	Unit Cost (Kyats/km)	Cost per hour	Cost per hour		
Animal Cart (Earthen)	0.0	0.0	4,000	2,400	10.0	30
Animal Cart (Gravel)	0.0	0.0	4,000	2,400	10.0	30
Animal Cart (Asphalt)	0.0	0.0	4,000	2,400	10.0	30
Trolleygi (Earthen)	1250.0	1100.0	4,000	2,400	10.0	50
Trolleygi (Gravel)	1041.7	916.7	4,000	2,400	13.5	65
Trolleygi (Asphalt)	833.3	733.3	4,000	2,400	17.0	80
Small and Medium Truck (Earthen)	625.0	550.0	4,000	2,400	10.0	100
Small and Medium Truck (Gravel)	520.9	458.3	4,000	2,400	16.0	125
Small and Medium Truck (Asphalt)	416.7	366.7	4,000	2,400	22.0	150

Source: JICA Survey Team

1.3 Project Cost

The project cost is subdivided into two portions, i.e., foreign currency (F/C) and local currency (L/C), where L/C portion is converted into economic price by applying SCF. Following show the composition of the project costs. Total Project cost including construction cost (skilled labor, unskilled labor, and other materials), indirect cost (construction cost and administration cost), physical contingency, and price contingency (referred as price escalation).

Table 5.5 Financial and Economic Cost of Irrigation Facilities (Shwebo)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	24,433.1	24,433.1	48,866.2	24,433.1	21,501.1	45,934.2
Labor	595.9	10,130.8	10,726.7	595.9	8,462.2	9,058.1
Skilled Labor	298.0	5,959.3	6,257.3	298.0	5,959.3	6,257.3
Unskilled Labor	298.0	4,171.5	4,469.5	298.0	2,502.9	2,800.9
Consulting Services	3,673.2	1,023.5	4,696.7	3,673.2	900.7	4,573.9
Administration Cost	0.0	7,844.1	7,844.1	0.0	6,902.8	6,902.8
Base Cost	28,702.3	43,431.4	72,133.7	28,702.3	37,766.8	66,469.0
Physical Contingency	1,288.3	2,223.3	3,511.6	1,435.1	1,888.3	3,323.5
Base Cost + Physical Contingency	29,990.6	45,654.8	75,645.3	30,137.4	39,655.1	69,792.5
Price Escalation	1,929.0	8,710.8	10,639.7			
Total	31,919.5	54,365.5	86,285.1	30,137.4	39,655.1	69,792.5

Source: JICA Survey Team.

Table 5.6 Financial and Economic Cost of Agricultural Extension (Shwebo)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	1,892.3	1,892.3	3,784.6	1,892.3	1,665.2	3,557.5
Labor	46.2	784.6	830.8	46.2	655.4	701.5
Skilled Labor	23.1	461.5	484.6	23.1	461.5	484.6
Unskilled Labor	23.1	323.1	346.2	23.1	193.8	216.9
Consulting Services	1,741.0	1,326.6	3,067.5	1,741.0	1,167.4	2,908.4
Administration Cost	0.0	870.0	870.0	0.0	765.6	765.6
Base Cost	3,679.4	4,873.5	8,552.9	3,679.4	4,253.6	7,933.0
Physical Contingency	124.7	143.5	268.2	184.0	212.7	396.7
Base Cost + Physical Contingency	3,804.2	5,017.0	8,821.2	3,863.4	4,466.3	8,329.7
Price Escalation	186.7	562.2	748.9			
Total	3,990.9	5,579.2	9,570.1	3,863.4	4,466.3	8,329.7

Source: JICA Survey Team.

Table 5.7 Financial and Economic Cost of Irrigation Facilities (Mandalay)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	37,028.3	37,028.3	74,056.5	37,028.3	32,584.9	69,613.1
Labor	903.1	15,353.2	16,256.3	903.1	12,824.4	13,727.6
Skilled Labor	451.6	9,031.3	9,482.8	451.6	9,031.3	9,482.8
Unskilled Labor	451.6	6,321.9	6,773.5	451.6	3,793.1	4,244.7
Consulting Services	4,754.6	1,373.6	6,128.2	4,754.6	1,208.7	5,963.3
Administration Cost	0.0	11,990.0	11,990.0	0.0	10,551.2	10,551.2
Base Cost	42,686.0	65,745.0	108,431.0	42,686.0	57,169.2	99,855.2
Physical Contingency	1,968.4	3,449.3	5,417.7	2,134.3	2,858.5	4,992.8
Base Cost + Physical Contingency	44,654.4	69,194.3	113,848.7	44,820.3	60,027.7	104,848.0
Price Escalation	3,243.3	14,797.8	18,041.2			
Total	47,897.7	83,992.1	131,889.8	44,820.3	60,027.7	104,848.0

Source: JICA Survey Team.

Table 5.8 Financial and Economic Cost of Agricultural Extension (Mandalay)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	1,436.8	1,436.8	2,873.5	1,436.8	1,264.3	2,701.1
Labor	35.0	595.7	630.8	35.0	497.6	532.6
Skilled Labor	17.5	350.4	367.9	17.5	350.4	367.9
Unskilled Labor	17.5	245.3	262.8	17.5	147.2	164.7
Consulting Services	1,741.2	1,044.8	2,786.0	1,741.2	919.4	2,660.6
Administration Cost	0.0	713.3	713.3	0.0	627.7	627.7
Base Cost	3,213.0	3,790.5	7,003.6	3,213.0	3,309.1	6,522.1
Physical Contingency	95.5	111.5	207.0	160.7	165.5	326.1
Base Cost + Physical Contingency	3,308.5	3,902.1	7,210.6	3,373.7	3,474.5	6,848.2
Price Escalation	157.3	478.5	635.8			
Total	3,465.8	4,380.6	7,846.4	3,373.7	3,474.5	6,848.2

Source: JICA Survey Team.

Table 5.9 Financial and Economic Cost for Irrigation Facilities (Nay Pyi Taw)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	9,268.8	9,268.8	18,537.6	9,268.8	8,156.5	17,425.3
Labor	226.1	3,843.2	4,069.2	226.1	3,210.2	3,436.2
Skilled Labor	113.0	2,260.7	2,373.7	113.0	2,260.7	2,373.7
Unskilled Labor	113.0	1,582.5	1,695.5	113.0	949.5	1,062.5
Consulting Services	2,369.6	683.2	3,052.8	2,369.6	601.2	2,970.8
Administration Cost	0.0	3,053.9	3,053.9	0.0	2,687.4	2,687.4
Base Cost	11,864.4	16,849.0	28,713.4	11,864.4	14,655.3	26,519.7
Physical Contingency	484.8	824.1	1,308.9	593.2	732.8	1,326.0
Base Cost + Physical Contingency	12,349.2	17,673.1	30,022.3	12,457.6	15,388.1	27,845.7
Price Escalation	652.6	2,918.0	3,570.6			
Total	13,001.8	20,591.2	33,592.9	12,457.6	15,388.1	27,845.7

Source: JICA Survey Team.

Table 5.10 Financial and Economic Cost for Agricultural Extension (Nay Pyi Taw)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	595.7	595.7	1,191.5	595.7	524.2	1,120.0
Labor	14.5	247.0	261.5	14.5	206.3	220.9
Skilled Labor	7.3	145.3	152.6	7.3	145.3	152.6
Unskilled Labor	7.3	101.7	109.0	7.3	61.0	68.3
Consulting Services	894.2	411.3	1,305.5	894.2	361.9	1,256.1
Administration Cost	0.0	305.0	305.0	0.0	268.4	268.4
Base Cost	1,504.4	1,559.0	3,063.5	1,504.4	1,360.9	2,865.3
Physical Contingency	38.9	44.1	83.1	75.2	68.0	143.3
Base Cost + Physical Contingency	1,543.4	1,603.2	3,146.6	1,579.7	1,429.0	3,008.6
Price Escalation	52.4	156.3	208.7			
Total	1,595.8	1,759.5	3,355.3	1,579.7	1,429.0	3,008.6

Source: JICA Survey Team.

Table 5.11 Financial and Economic Cost for Irrigation Rehabilitation (Nay Pyi Taw, Reference Case)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	6,721.6	6,721.6	13,443.1	6,721.6	5,915.0	12,636.6
Labor	163.9	2,787.0	2,950.9	163.9	2,328.0	2,491.9
Skilled Labor	82.0	1,639.4	1,721.4	82.0	1,639.4	1,721.4
Unskilled Labor	82.0	1,147.6	1,229.6	82.0	688.6	770.5
Consulting Services	2,520.0	611.5	3,131.5	2,520.0	538.2	3,058.1
Administration Cost	0.0	2,305.7	2,305.7	0.0	2,029.0	2,029.0
Base Cost	9,405.5	12,425.8	21,831.3	9,405.5	10,810.1	20,215.6
Physical Contingency	354.3	594.5	948.8	470.3	540.5	1,010.8
Base Cost + Physical Contingency	9,759.8	13,020.3	22,780.1	9,875.8	11,350.6	21,226.4
Price Escalation	476.9	2,105.2	2,582.1			
Total	10,236.7	15,125.5	25,362.2	9,875.8	11,350.6	21,226.4

Source: JICA Survey Team.

Table 5.12 Financial and Economic Cost for Agricultural Extension (Nay Pyi Taw, Reference Case)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	385.5	385.5	770.9	385.5	339.2	724.7
Labor	9.4	159.8	169.2	9.4	133.5	142.9
Skilled Labor	4.7	94.0	98.7	4.7	94.0	98.7
Unskilled Labor	4.7	65.8	70.5	4.7	39.5	44.2
Consulting Services	144.5	35.1	179.6	144.5	30.9	175.4
Administration Cost	0.0	132.2	132.2	0.0	116.4	116.4
Base Cost	539.4	712.6	1,252.0	539.4	619.9	1,159.3
Physical Contingency	20.3	34.1	54.4	27.0	31.0	58.0
Base Cost + Physical Contingency	559.7	746.7	1,306.4	566.4	650.9	1,217.3
Price Escalation	27.4	120.7	148.1			
Total	587.1	867.4	1,454.5	566.4	650.9	1,217.3

Source: JICA Survey Team.

Table 5.13 Financial and Economic Cost for Irrigation Rehabilitation (Ayeyarwady)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	9,696.5	9,696.5	19,392.9	9,696.5	8,532.9	18,229.4
Labor	236.5	4,020.5	4,257.0	236.5	3,358.3	3,594.8
Skilled Labor	118.2	2,365.0	2,483.2	118.2	2,365.0	2,483.2
Unskilled Labor	118.2	1,655.5	1,773.7	118.2	993.3	1,111.5
Consulting Services	3,332.9	642.7	3,975.7	3,332.9	565.6	3,898.6
Administration Cost	0.0	3,237.4	3,237.4	0.0	2,848.9	2,848.9
Base Cost	13,265.9	17,597.1	30,863.0	13,265.9	15,305.7	28,571.6
Physical Contingency	766.1	586.3	1,352.3	663.3	765.3	1,428.6
Base Cost + Physical Contingency	14,032.0	18,183.4	32,215.3	13,929.2	16,071.0	30,000.2
Price Escalation	1,131.2	2,265.2	3,396.4			
Total	15,163.2	20,448.5	35,611.7	13,929.2	16,071.0	30,000.2

Source: JICA Survey Team.

Table 5.14 Financial and Economic Cost for Agricultural Extension (Ayeyarwady)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	770.9	770.9	1,541.9	770.9	678.4	1,449.4
Labor	18.8	319.7	338.5	18.8	267.0	285.8
Skilled Labor	9.4	188.0	197.4	9.4	188.0	197.4
Unskilled Labor	9.4	131.6	141.0	9.4	79.0	88.4
Consulting Services	1,406.8	816.4	2,223.2	1,406.8	718.4	2,125.2
Administration Cost	0.0	451.8	451.8	0.0	397.6	397.6
Base Cost	2,196.6	2,358.8	4,555.3	2,196.6	2,061.4	4,258.0
Physical Contingency	50.8	58.5	109.3	109.8	103.1	212.9
Base Cost + Physical Contingency	2,247.4	2,417.2	4,664.6	2,306.4	2,164.5	4,470.9
Price Escalation	76.1	229.0	305.1			
Total	2,323.5	2,646.3	4,969.7	2,306.4	2,164.5	4,470.9

Source: JICA Survey Team.

Table 5.15 Financial and Economic Cost for Land Consolidation (Shwebo)

Component	Financial Cost		
	FC	LC	Total
Other Material	729.14	729.14	1,458.3
Labor	17.78	302.33	320.1
Skilled Labor	8.89	177.84	186.7
Unskilled Labor	8.89	124.49	133.4
Consulting Services	146.9	31.2	178.2
Administration Cost	0.0	237.9	237.9
Base Cost	893.8	1,300.6	2,194.4
Physical Contingency	38.4	66.3	104.8
Base Cost + Physical Contingency	932.3	1,366.9	2,299.2
Price Escalation	57.6	260.0	317.5
Total	989.9	1,626.9	2,616.8

Source: JICA Survey Team.

Table 5.16 Financial and Economic Cost for Land Consolidation (Mandalay)

Component	Financial Cost		
	FC	LC	Total
Other Material	546.86	546.86	1,093.7
Labor	13.34	226.75	240.1
Skilled Labor	6.67	133.38	140.0
Unskilled Labor	6.67	93.37	100.0
Consulting Services	178.8	39.1	217.9
Administration Cost	0.0	189.8	189.8
Base Cost	739.0	1,002.5	1,741.5
Physical Contingency	29.1	50.9	80.0
Base Cost + Physical Contingency	768.1	1,053.4	1,821.5
Price Escalation	47.9	218.5	266.4
Total	816.0	1,272.0	2,087.9

Source: JICA Survey Team.

Table 5.17 Financial and Economic Cost for Land Consolidation (Nay Pyi Taw)

Component	Financial Cost		
	FC	LC	Total
Other Material	182.29	182.29	364.6
Labor	4.45	75.58	80.0
Skilled Labor	2.22	44.46	46.7
Unskilled Labor	2.22	31.12	33.3
Consulting Services	72.6	13.7	86.3
Administration Cost	0.0	62.7	62.7
Base Cost	259.3	334.3	593.6
Physical Contingency	9.5	16.2	25.7
Base Cost + Physical Contingency	268.9	350.5	619.3
Price Escalation	12.8	57.4	70.2
Total	281.7	407.9	689.6

Source: JICA Survey Team.

Table 5.18 Financial and Economic Cost for Land Consolidation (Ayeyarwady)

Component	Financial Cost		
	FC	LC	Total
Other Material	729.14	729.14	1,458.3
Labor	17.78	302.33	320.1
Skilled Labor	8.89	177.84	186.7
Unskilled Labor	8.89	124.49	133.4
Consulting Services	176.7	28.3	205.0
Administration Cost	0.0	240.6	240.6
Base Cost	923.6	1,300.3	2,223.9
Physical Contingency	38.4	66.3	104.8
Base Cost + Physical Contingency	962.0	1,366.7	2,328.7
Price Escalation	57.6	260.0	317.5
Total	1,019.6	1,626.6	2,646.2

Source: JICA Survey Team.

Table 5.19 Financial and Economic Cost for Inspection Road (Shwebo)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	4,212.0	4,212.0	8,424.0	4,212.0	3,706.6	7,918.6
Labor	216.0	2,160.0	2,376.0	216.0	1,728.0	1,944.0
Skilled Labor	108.0	1,080.0	1,188.0	108.0	1,080.0	1,188.0
Unskilled Labor	108.0	1,080.0	1,188.0	108.0	648.0	756.0
Consulting Services	951.4	269.5	1,220.9	951.4	237.2	1,188.5
Administration Cost	0.0	1,458.6	1,458.6	0.0	1,283.5	1,283.5
Base Cost	5,379.4	8,100.0	13,479.4	5,379.4	6,955.2	12,334.6
Physical Contingency	233.5	402.9	636.4	269.0	347.8	616.7
Base Cost + Physical Contingency	5,612.9	8,503.0	14,115.8	5,648.3	7,303.0	12,951.3
Price Escalation	349.6	1,578.6	1,928.2			
Total	5,962.4	10,081.6	16,044.1	5,648.3	7,303.0	12,951.3

Source: JICA Survey Team.

Table 5.20 Financial and Economic Cost for Rural Road (Shwebo)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	3,198.0	3,198.0	6,396.0	3,198.0	2,814.2	6,012.2
Labor	164.0	1,640.0	1,804.0	164.0	1,312.0	1,476.0
Skilled Labor	82.0	820.0	902.0	82.0	820.0	902.0
Unskilled Labor	82.0	820.0	902.0	82.0	492.0	574.0
Consulting Services	951.4	269.5	1,220.9	951.4	237.2	1,188.5
Administration Cost	0.0	1,136.8	1,136.8	0.0	1,000.4	1,000.4
Base Cost	4,313.4	6,244.3	10,557.7	4,313.4	5,363.8	9,677.2
Physical Contingency	177.3	305.9	483.2	215.7	268.2	483.9
Base Cost + Physical Contingency	4,490.6	6,550.2	11,040.9	4,529.0	5,632.0	10,161.0
Price Escalation	265.4	1,198.6	1,464.0			
Total	4,756.1	7,748.8	12,504.9	4,529.0	5,632.0	10,161.0

Source: JICA Survey Team.

Table 5.21 Financial and Economic Cost for Inspection Road (Mandalay)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	3,175.7	3,175.7	6,351.5	3,175.7	2,794.6	5,970.4
Labor	162.9	1,628.6	1,791.4	162.9	1,302.9	1,465.7
Skilled Labor	81.4	814.3	895.7	81.4	814.3	895.7
Unskilled Labor	81.4	814.3	895.7	81.4	488.6	570.0
Consulting Services	1,152.2	337.2	1,489.4	1,152.2	296.7	1,448.9
Administration Cost	0.0	1,174.7	1,174.7	0.0	1,033.8	1,033.8
Base Cost	4,490.7	6,316.2	10,807.0	4,490.7	5,428.0	9,918.8
Physical Contingency	177.5	311.0	488.5	224.5	271.4	495.9
Base Cost + Physical Contingency	4,668.2	6,627.2	11,295.5	4,715.3	5,699.4	10,414.7
Price Escalation	292.4	1,334.2	1,626.6			
Total	4,960.7	7,961.5	12,922.1	4,715.3	5,699.4	10,414.7

Source: JICA Survey Team.

Table 5.22 Financial and Economic Cost for Rural Road (Mandalay)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	4,641.0	4,641.0	9,282.0	4,641.0	4,084.1	8,725.1
Labor	238.0	2,380.0	2,618.0	238.0	1,904.0	2,142.0
Skilled Labor	119.0	1,190.0	1,309.0	119.0	1,190.0	1,309.0
Unskilled Labor	119.0	1,190.0	1,309.0	119.0	714.0	833.0
Consulting Services	1,154.1	337.2	1,491.3	1,154.1	296.7	1,450.8
Administration Cost	0.0	1,648.2	1,648.2	0.0	1,450.4	1,450.4
Base Cost	6,033.1	9,006.4	15,039.5	6,033.1	7,735.3	13,768.4
Physical Contingency	259.4	454.5	713.9	301.7	386.8	688.4
Base Cost + Physical Contingency	6,292.5	9,460.9	15,753.4	6,334.8	8,122.0	14,456.8
Price Escalation	427.4	1,949.8	2,377.2			
Total	6,719.8	11,410.7	18,130.6	6,334.8	8,122.0	14,456.8

Source: JICA Survey Team.

Table 5.23 Financial and Economic Cost for Inspection Road (Nay Pyi Taw)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	1,030.3	1,030.3	2,060.6	1,030.3	906.6	1,936.9
Labor	52.8	528.4	581.2	52.8	422.7	475.5
Skilled Labor	26.4	264.2	290.6	26.4	264.2	290.6
Unskilled Labor	26.4	264.2	290.6	26.4	158.5	184.9
Consulting Services	549.4	116.7	666.1	549.4	102.7	652.1
Administration Cost	0.0	387.8	387.8	0.0	341.3	341.3
Base Cost	1,632.5	2,063.1	3,695.7	1,632.5	1,773.3	3,405.8
Physical Contingency	56.6	96.3	153.0	81.6	88.7	170.3
Base Cost + Physical Contingency	1,689.2	2,159.4	3,848.6	1,714.2	1,862.0	3,576.1
Price Escalation	76.3	341.0	417.3			
Total	1,765.4	2,500.4	4,265.9	1,714.2	1,862.0	3,576.1

Source: JICA Survey Team.

Table 5.24 Financial and Economic Cost for Rural Road (Nay Pyi Taw)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	2,581.8	2,581.8	5,163.6	2,581.8	2,272.0	4,853.8
Labor	132.4	1,324.0	1,456.4	132.4	1,059.2	1,191.6
Skilled Labor	66.2	662.0	728.2	66.2	662.0	728.2
Unskilled Labor	66.2	662.0	728.2	66.2	397.2	463.4
Consulting Services	549.4	116.7	666.1	549.4	102.7	652.1
Administration Cost	0.0	871.5	871.5	0.0	766.9	766.9
Base Cost	3,263.6	4,894.0	8,157.6	3,263.6	4,200.8	7,464.4
Physical Contingency	142.0	241.3	383.3	163.2	210.0	373.2
Base Cost + Physical Contingency	3,405.6	5,135.3	8,540.9	3,426.8	4,410.8	7,837.6
Price Escalation	191.1	854.5	1,045.6			
Total	3,596.7	5,989.8	9,586.5	3,426.8	4,410.8	7,837.6

Source: JICA Survey Team.

Table 5.25 Financial and Economic Cost for Rural and Regional Road (Ayeyarwady)

(million Kyat)

Component	Financial Cost			Economic Cost		
	FC	LC	Total	FC	LC	Total
Other Material	9,855.3	9,855.3	19,710.7	9,855.3	8,672.7	18,528.0
Labor	505.4	5,054.0	5,559.4	505.4	4,043.2	4,548.6
Skilled Labor	252.7	2,527.0	2,779.7	252.7	2,527.0	2,779.7
Unskilled Labor	252.7	2,527.0	2,779.7	252.7	1,516.2	1,768.9
Consulting Services	1,386.2	354.2	1,740.4	1,386.2	311.7	1,697.9
Administration Cost	0.0	3,304.7	3,304.7	0.0	2,908.1	0.0
Land Acquisition	0.0	35.7	35.7	0.0	31.4	0.0
Base Cost	11,746.9	18,604.0	30,350.9	11,746.9	15,967.2	24,774.5
Physical Contingency	546.3	942.8	1,489.1	587.3	798.4	1,385.7
Base Cost + Physical Contingency	12,293.2	19,546.7	31,840.0	12,334.3	16,765.5	29,099.8
Price Escalation	818.0	3,693.8	4,511.7			
Total	13,111.2	23,240.5	36,351.7	12,334.3	16,765.5	29,099.8

Source: JICA Survey Team.

1.4 Project Benefit

1.4.1 Project Benefit of Agricultural Extension Strengthening + Irrigation Rehabilitation

The benefit is derived as net benefit increase after irrigation rehabilitation evaluated in economic terms, which is shown in Table 5.26 – A.5.43.

Table 5.26 Calculation of Net Benefit for Base Case 0', Shwebo

Title	1. Shwebo					
	Current			Planned		
	Monsoon Paddy	Summer Paddy	Chick Pea	Monsoon Paddy	Summer Paddy	Chick Pea
Cultivated Area, acre	485,456	274,086	0	485,456	274,086	0
Yield, basket/acre	63.0	82.0	14.0	69.0	98.5	17.0
Total Yield, 1000 basket	30,584	22,475	0	33,496	26,997	0
Financial Price, Kyat/basket	7,327	4,562	11,786	7,327	4,562	11,786
Economic Price, Kyat/basket	6,448	4,015	10,372	6,448	4,015	10,372
Profit Ratio, Financial (%)	61.2	57.7	65.4	61.2	57.7	65.4
Profit Ratio, Economic (%)	58.0	54.9	56.4	58.0	54.9	56.4
Net Financial Profit per season, million Kyat	137,142	59,160	0	150,200	71,064	0
Net Economic Profit per season, million Kyat	114,379	49,540	0	125,270	59,508	0
			Benefit	10,890	9,968	0
			Total		20,858	

Source: JICA Survey Team.

Table 5.27 Calculation of Net Benefit for Base Case 0, Shwebo

Title	1.Shwebo						
	Current			Planned			
	Monsoon	Summer	Chick Pea	Monsoon	Summer	Chick Pea	
	Paddy	Paddy		Paddy	Paddy		
Cultivated Area, acre	485,456	274,086	0	485,456	327,181	0	
Yield, basket/acre	63.0	82.0	14.0	69.0	98.5	17.0	
Total Yield, 1000 basket	30,584	22,475	0	33,496	32,227	0	
Financial Price, Kyat/basket	7,327	4,562	11,786	7,327	4,562	11,786	
Economic Price, Kyat/basket	6,448	4,015	10,372	6,448	4,015	10,372	
Profit Ratio, Financial (%)	61.2	57.7	65.4	61.2	57.7	65.4	
Profit Ratio, Economic (%)	58.0	54.9	56.4	58.0	54.9	56.4	
Net Financial Profit per season, million Kyat	137,142	59,160	0	150,200	84,830	0	
Net Economic Profit per season, million Kyat	114,379	49,540	0	125,270	71,036	0	
				Benefit	10,890	21,496	0
				Total		32,386	

Source: JICA Survey Team.

Table 5.28 Calculation of Net Benefit for Base Case 1, Shwebo

Title	1.Shwebo						
	Current			Planned			
	Monsoon	Summer	Chick Pea	Monsoon	Summer	Chick Pea	
	Paddy	Paddy		Paddy	Paddy		
Cultivated Area, acre	485,456	274,086	0	485,456	274,086	159,286	
Yield, basket/acre	63.0	82.0	14.0	69.0	98.5	17.0	
Total Yield, 1000 basket	30,584	22,475	0	33,496	26,997	2,708	
Financial Price, Kyat/basket	7,327	4,562	11,786	7,327	4,562	11,786	
Economic Price, Kyat/basket	6,448	4,015	10,372	6,448	4,015	10,372	
Profit Ratio, Financial (%)	61.2	57.7	65.4	61.2	57.7	65.4	
Profit Ratio, Economic (%)	58.0	54.9	56.4	58.0	54.9	56.4	
Net Financial Profit per season, million Kyat	137,142	59,160	0	150,200	71,064	20,873	
Net Economic Profit per season, million Kyat	114,379	49,540	0	125,270	59,508	15,841	
				Benefit	10,890	9,968	15,841
				Total		36,699	

Source: JICA Survey Team.

Table 5.29 Calculation of Net Benefit for Base Case 2, Shwebo

Title	1.Shwebo						
	Current			Planned			
	Monsoon	Summer	Sesame	Monsoon	Summer	Sesame	
	Paddy	Paddy		Paddy	Paddy		
Cultivated Area, acre	485,456	274,086	0	485,456	294,463	98,154	
Yield, basket/acre	63.0	82.0	10.0	69.0	98.5	12.5	
Total Yield, 1000 basket	30,584	22,475	0	33,496	29,005	1,227	
Financial Price, Kyat/basket	7,327	4,562	23,630	7,327	4,562	23,630	
Economic Price, Kyat/basket	6,448	4,015	20,794	6,448	4,015	20,794	
Profit Ratio, Financial (%)	61.2	57.7	63.7	61.2	57.7	63.7	
Profit Ratio, Economic (%)	58.0	54.9	57.4	58.0	54.9	57.4	
Net Financial Profit per season, million Kyat	137,142	59,160	0	150,200	76,349	18,469	
Net Economic Profit per season, million Kyat	114,379	49,540	0	125,270	63,934	14,645	
				Benefit	10,890	14,394	14,645
				Total		39,929	

Source: JICA Survey Team.

Table 5.30 Calculation of Net Benefit for Base Case 0', Mandalay

Title	2.Mandalay					
	Current			Planned		
	Monsoon Paddy	Summer Paddy	Chick Pea	Monsoon Paddy	Summer Paddy	Chick Pea
Cultivated Area, acre	253,295	138,644	0	253,295	138,644	0
Yield, basket/acre	74.0	89.0	9.0	89.5	104.5	14.5
Total Yield, 1000 basket	18,744	12,339	0	22,670	14,488	0
Financial Price, Kyat/basket	6,078	5,602	23,926	6,078	5,602	23,926
Economic Price, Kyat/basket	5,349	4,930	21,055	5,349	4,930	21,055
Profit Ratio, Financial (%)	55.6	57.9	72.9	55.6	57.9	72.9
Profit Ratio, Economic (%)	52.0	55.1	65.8	52.0	55.1	65.8
Net Financial Profit per season, million Kyat	63,343	40,022	0	76,610	46,993	0
Net Economic Profit per season, million Kyat	52,136	33,518	0	63,056	39,356	0
	Benefit			10,920	5,838	0
	Total			16,758		

Source: JICA Survey Team.

Table 5.31 Calculation of Net Benefit for Base Case 0, Mandalay

Title	2.Mandalay					
	Current			Planned		
	Monsoon Paddy	Summer Paddy	Chick Pea	Monsoon Paddy	Summer Paddy	Chick Pea
Cultivated Area, acre	253,295	138,644	0	253,295	194,593	0
Yield, basket/acre	74.0	89.0	9.0	89.5	104.5	14.5
Total Yield, 1000 basket	18,744	12,339	0	22,670	20,335	0
Financial Price, Kyat/basket	6,078	5,602	23,926	6,078	5,602	23,926
Economic Price, Kyat/basket	5,349	4,930	21,055	5,349	4,930	21,055
Profit Ratio, Financial (%)	55.6	57.9	72.9	55.6	57.9	72.9
Profit Ratio, Economic (%)	52.0	55.1	65.8	52.0	55.1	65.8
Net Financial Profit per season, million Kyat	63,343	40,022	0	76,610	65,958	0
Net Economic Profit per season, million Kyat	52,136	33,518	0	63,056	55,239	0
	Benefit			10,920	21,721	0
	Total			32,641		

Source: JICA Survey Team.

Table 5.32 Calculation of Net Benefit for Base Case 1, Mandalay

Title	2.Mandalay					
	Current			Planned		
	Monsoon Paddy	Summer Paddy	Chick Pea	Monsoon Paddy	Summer Paddy	Chick Pea
Cultivated Area, acre	253,295	138,644	0	253,295	138,644	167,850
Yield, basket/acre	74.0	89.0	9.0	89.5	104.5	14.5
Total Yield, 1000 basket	18,744	12,339	0	22,670	14,488	2,434
Financial Price, Kyat/basket	6,078	5,602	23,926	6,078	5,602	23,926
Economic Price, Kyat/basket	5,349	4,930	21,055	5,349	4,930	21,055
Profit Ratio, Financial (%)	55.6	57.9	72.9	55.6	57.9	72.9
Profit Ratio, Economic (%)	52.0	55.1	65.8	52.0	55.1	65.8
Net Financial Profit per season, million Kyat	63,343	40,022	0	76,610	46,993	42,454
Net Economic Profit per season, million Kyat	52,136	33,518	0	63,056	39,356	33,721
	Benefit			10,920	5,838	33,721
	Total			50,479		

Source: JICA Survey Team.

Table 5.33 Calculation of Net Benefit for Base Case 2, Mandalay

Title	2.Mandalay					
	Current			Planned		
	Monsoon Paddy	Summer Paddy	Sesame	Monsoon Paddy	Summer Paddy	Sesame
Cultivated Area, acre	253,295	138,644	0	253,295	175,134	58,378
Yield, basket/acre	74.0	89.0	9.0	89.5	104.5	12.0
Total Yield, 1000 basket	18,744	12,339	0	22,670	18,302	701
Financial Price, Kyat/basket	6,078	5,602	47,952	6,078	5,602	47,952
Economic Price, Kyat/basket	5,349	4,930	42,198	5,349	4,930	42,198
Profit Ratio, Financial (%)	55.6	57.9	68.8	55.6	57.9	68.8
Profit Ratio, Economic (%)	52.0	55.1	63.4	52.0	55.1	63.4
Net Financial Profit per season, million Kyat	63,343	40,022	0	76,610	59,364	23,127
Net Economic Profit per season, million Kyat	52,136	33,518	0	63,056	49,716	18,754
			Benefit	10,920	16,198	18,754
			Total		45,872	

Source: JICA Survey Team.

Table 5.34 Calculation of Net Benefit for Base Case 0', Nay Pyi Taw

Title	3.Nay Pyi Taw					
	Current			Planned		
	Monsoon Paddy	Summer Paddy	Black Gram	Monsoon Paddy	Summer Paddy	Black Gram
Cultivated Area, acre	44,051	22,619	0	67,945	33,335	0
Yield, basket/acre	73.0	84.0	13.0	86.5	102.0	16.5
Total Yield, 1000 basket	3,216	1,900	0	5,877	3,400	0
Financial Price, Kyat/basket	4,826	5,313	27,938	4,826	5,313	27,938
Economic Price, Kyat/basket	4,247	4,675	24,585	4,247	4,675	24,585
Profit Ratio, Financial (%)	52.5	58.9	69.3	52.5	58.9	69.3
Profit Ratio, Economic (%)	48.6	56.2	63.9	48.6	56.2	63.9
Net Financial Profit per season, million Kyat	8,148	5,946	0	14,890	10,640	0
Net Economic Profit per season, million Kyat	6,638	4,992	0	12,130	8,933	0
			Benefit	5,492	3,941	0
			Total		9,433	

Source: JICA Survey Team.

Table 5.35 Calculation of Net Benefit for Base Case 0, Nay Pyi Taw

Title	3.Nay Pyi Taw					
	Current			Planned		
	Monsoon Paddy	Summer Paddy	Black Gram	Monsoon Paddy	Summer Paddy	Black Gram
Cultivated Area, acre	44,051	22,619	0	67,945	38,548	0
Yield, basket/acre	73.0	84.0	13.0	86.5	102.0	16.5
Total Yield, 1000 basket	3,216	1,900	0	5,877	3,932	0
Financial Price, Kyat/basket	4,826	5,313	27,938	4,826	5,313	27,938
Economic Price, Kyat/basket	4,247	4,675	24,585	4,247	4,675	24,585
Profit Ratio, Financial (%)	52.5	58.9	69.3	52.5	58.9	69.3
Profit Ratio, Economic (%)	48.6	56.2	63.9	48.6	56.2	63.9
Net Financial Profit per season, million Kyat	8,148	5,946	0	14,890	12,305	0
Net Economic Profit per season, million Kyat	6,638	4,992	0	12,130	10,331	0
			Benefit	5,492	5,339	0
			Total		10,831	

Source: JICA Survey Team.

Table 5.36 Calculation of Net Benefit for Base Case 1, Nay Pyi Taw

Title	3.Nay Pyi Taw					
	Current			Planned		
	Monsoon	Summer	Black Gram	Monsoon	Summer	Black Gram
	Paddy	Paddy		Paddy	Paddy	
Cultivated Area, acre	44,051	22,619	0	67,945	33,335	15,640
Yield, basket/acre	73.0	84.0	13.0	86.5	102.0	16.5
Total Yield, 1000 basket	3,216	1,900	0	5,877	3,400	258
Financial Price, Kyat/basket	4,826	5,313	27,938	4,826	5,313	27,938
Economic Price, Kyat/basket	4,247	4,675	24,585	4,247	4,675	24,585
Profit Ratio, Financial (%)	52.5	58.9	69.3	52.5	58.9	69.3
Profit Ratio, Economic (%)	48.6	56.2	63.9	48.6	56.2	63.9
Net Financial Profit per season, million Kyat	8,148	5,946	0	14,890	10,640	4,995
Net Economic Profit per season, million Kyat	6,638	4,992	0	12,130	8,933	4,053
			Benefit	5,492	3,941	4,053
			Total		13,487	

Source: JICA Survey Team.

Table 5.37 Calculation of Net Benefit for Base Case 2, Nay Pyi Taw

Title	3.Nay Pyi Taw					
	Current			Planned		
	Monsoon	Summer	Sesame	Monsoon	Summer	Sesame
	Paddy	Paddy		Paddy	Paddy	
Cultivated Area, acre	44,051	22,619	0	67,945	34,693	11,564
Yield, basket/acre	73.0	84.0	10.0	86.5	102.0	15.0
Total Yield, 1000 basket	3,216	1,900	0	5,877	3,539	173
Financial Price, Kyat/basket	4,826	5,313	36,167	4,826	5,313	36,167
Economic Price, Kyat/basket	4,247	4,675	31,827	4,247	4,675	31,827
Profit Ratio, Financial (%)	52.5	58.9	71.1	52.5	58.9	71.1
Profit Ratio, Economic (%)	48.6	56.2	66.1	48.6	56.2	66.1
Net Financial Profit per season, million Kyat	8,148	5,946	0	14,890	11,075	4,449
Net Economic Profit per season, million Kyat	6,638	4,992	0	12,130	9,298	3,640
			Benefit	5,492	4,306	3,640
			Total		13,438	

Source: JICA Survey Team.

Table 5.38 Calculation of Net Benefit for Base Case 0', Nay Pyi Taw (Reference)

Title	3.Nay Pyi Taw (Reference)					
	Current			Planned		
	Monsoon	Summer	Black Gram	Monsoon	Summer	Black Gram
	Paddy	Paddy		Paddy	Paddy	
Cultivated Area, acre	44,051	22,619	0	44,051	22,619	0
Yield, basket/acre	73.0	84.0	13.0	86.5	102.0	16.5
Total Yield, 1000 basket	3,216	1,900	0	3,810	2,307	0
Financial Price, Kyat/basket	4,826	5,313	27,938	4,826	5,313	27,938
Economic Price, Kyat/basket	4,247	4,675	24,585	4,247	4,675	24,585
Profit Ratio, Financial (%)	52.5	58.9	69.3	52.5	58.9	69.3
Profit Ratio, Economic (%)	48.6	56.2	63.9	48.6	56.2	63.9
Net Financial Profit per season, million Kyat	8,148	5,946	0	9,653	7,219	0
Net Economic Profit per season, million Kyat	6,638	4,992	0	7,864	6,061	0
			Benefit	1,226	1,069	0
			Total		2,295	

Source: JICA Survey Team.

Table 5.39 Calculation of Net Benefit for Base Case 0, Nay Pyi Taw (Reference)

Title	3.Nay Pyi Taw (Reference)					
	Current			Planned		
	Monsoon	Summer	Black Gram	Monsoon	Summer	Black Gram
	Paddy	Paddy		Paddy	Paddy	
Cultivated Area, acre	44,051	22,619	0	44,051	28,718	0
Yield, basket/acre	73.0	84.0	13.0	86.5	102.0	16.5
Total Yield, 1000 basket	3,216	1,900	0	3,810	2,929	0
Financial Price, Kyat/basket	4,826	5,313	27,938	4,826	5,313	27,938
Economic Price, Kyat/basket	4,247	4,675	24,585	4,247	4,675	24,585
Profit Ratio, Financial (%)	52.5	58.9	69.3	52.5	58.9	69.3
Profit Ratio, Economic (%)	48.6	56.2	63.9	48.6	56.2	63.9
Net Financial Profit per season, million Kyat	8,148	5,946	0	9,653	9,166	0
Net Economic Profit per season, million Kyat	6,638	4,992	0	7,864	7,696	0
			Benefit	1,226	2,704	0
			Total		3,930	

Source: JICA Survey Team.

Table 5.40 Calculation of Net Benefit for Base Case 1, Nay Pyi Taw (Reference)

Title	3.Nay Pyi Taw (Reference)					
	Current			Planned		
	Monsoon	Summer	Black Gram	Monsoon	Summer	Black Gram
	Paddy	Paddy		Paddy	Paddy	
Cultivated Area, acre	44,051	22,619	0	44,051	22,619	18,297
Yield, basket/acre	73.0	84.0	13.0	86.5	102.0	16.5
Total Yield, 1000 basket	3,216	1,900	0	3,810	2,307	302
Financial Price, Kyat/basket	4,826	5,313	27,938	4,826	5,313	27,938
Economic Price, Kyat/basket	4,247	4,675	24,585	4,247	4,675	24,585
Profit Ratio, Financial (%)	52.5	58.9	69.3	52.5	58.9	69.3
Profit Ratio, Economic (%)	48.6	56.2	63.9	48.6	56.2	63.9
Net Financial Profit per season, million Kyat	8,148	5,946	0	9,653	7,219	5,847
Net Economic Profit per season, million Kyat	6,638	4,992	0	7,864	6,061	4,744
			Benefit	1,226	1,069	4,744
			Total		7,040	

Source: JICA Survey Team.

Table 5.41 Calculation of Net Benefit for Base Case 2, Nay Pyi Taw (Reference)

Title	3.Nay Pyi Taw (Reference)					
	Current			Planned		
	Monsoon	Summer	Sesame	Monsoon	Summer	Sesame
	Paddy	Paddy		Paddy	Paddy	
Cultivated Area, acre	44,051	22,619	0	44,051	25,846	8,615
Yield, basket/acre	73.0	84.0	10.0	86.5	102.0	15.0
Total Yield, 1000 basket	3,216	1,900	0	3,810	2,636	129
Financial Price, Kyat/basket	4,826	5,313	36,167	4,826	5,313	36,167
Economic Price, Kyat/basket	4,247	4,675	31,827	4,247	4,675	31,827
Profit Ratio, Financial (%)	52.5	58.9	69.3	52.5	58.9	69.3
Profit Ratio, Economic (%)	48.6	56.2	63.9	48.6	56.2	63.9
Net Financial Profit per season, million Kyat	8,148	5,946	0	9,653	8,249	3,233
Net Economic Profit per season, million Kyat	6,638	4,992	0	7,864	6,926	2,624
			Benefit	1,226	1,934	2,624
			Total		5,783	

Source: JICA Survey Team.

Table 5.42 Calculation of Net Benefit for Base Case 0', Ayeyarwady

Title	4.Ayeyarwady					
	Current			Planned		
	Monsoon Paddy	Summer Paddy	Black Gram	Monsoon Paddy	Summer Paddy	Black Gram
Cultivated Area, acre	178,154	96,381	0	178,154	96,381	0
Yield, basket/acre	65.0	87.0	10.0	72.5	98.5	15.0
Total Yield, 1000 basket	11,580	8,385	0	12,916	9,494	0
Financial Price, Kyat/basket	5,253	4,195	27,295	5,253	4,195	27,295
Economic Price, Kyat/basket	4,623	3,692	24,020	4,623	3,692	24,020
Profit Ratio, Financial (%)	52.5	58.9	69.3	52.5	58.9	69.3
Profit Ratio, Economic (%)	48.6	56.2	63.9	48.6	56.2	63.9
Net Financial Profit per season, million Kyat	31,936	20,718	0	35,620	23,458	0
Net Economic Profit per season, million Kyat	26,018	17,398	0	29,019	19,699	0
			Benefit	3,002	2,301	0
			Total		5,303	

Source: JICA Survey Team.

Table 5.43 Calculation of Net Benefit for Base Case 0, Ayeyarwady

Title	4.Ayeyarwady					
	Current			Planned		
	Monsoon Paddy	Summer Paddy	Black Gram	Monsoon Paddy	Summer Paddy	Black Gram
Cultivated Area, acre	178,154	96,381	0	195,969	106,019	0
Yield, basket/acre	65.0	87.0	10.0	72.5	98.5	15.0
Total Yield, 1000 basket	11,580	8,385	0	14,208	10,443	0
Financial Price, Kyat/basket	5,253	4,195	27,295	5,253	4,195	27,295
Economic Price, Kyat/basket	4,623	3,692	24,020	4,623	3,692	24,020
Profit Ratio, Financial (%)	52.5	58.9	69.3	52.5	58.9	69.3
Profit Ratio, Economic (%)	48.6	56.2	63.9	48.6	56.2	63.9
Net Financial Profit per season, million Kyat	31,936	20,718	0	39,183	25,803	0
Net Economic Profit per season, million Kyat	26,018	17,398	0	31,922	21,668	0
			Benefit	5,905	4,270	0
			Total		10,175	

Source: JICA Survey Team.

1.4.2 Project Benefit of Land Consolidation

The benefit is derived as the difference of net profit with/without land consolidation. Yield increase, cost reduction, total gross profit increase, total cost reduction, and their economic conversion are summarized as below;

Table 5.44 Financial and Economic Benefit of Land Consolidation (Shwebo)

Title	1.Shwebo					
	Current			Planned		
	Monsoon Paddy	Summer Paddy	Chick Pea	Monsoon Paddy	Summer Paddy	Chick Pea
Cultivated Area, acre	40,000	27,760	5,774	36,800	25,539	5,312
Yield, basket/acre	63.0	76.0	14.0	74.3	90.4	16.4
Financial Farmgate Price , Kyat/basket	7,327	4,922	11,786	7,327	4,922	11,786
Economic Farmgate Price , Kyat/basket	6,448	4,331	10,372	6,448	4,331	10,372
Financial Gross Profit per ac, Kyat/acre	461,601	374,072	165,004	544,396	444,949	193,290
Economic Gross Profit per ac, Kyat/acre	406,224	329,156	145,208	479,086	391,522	170,101
Financial Cost per ac, Kyat/acre	276,500	286,600	174,000	257,500	267,600	159,000
Economic Cost per ac, Kyat/acre	183,120	195,368	125,960	196,920	208,168	121,160
Financial Gross Profit , million Kyat	18,464.0	10,384.2	952.7	20,033.8	11,363.6	1,026.8
Economic Gross Profit , million Kyat	16,249.0	9,137.4	838.4	17,630.4	9,999.2	903.6
Total Financial Gross Profit Increase , million Kyat	-	-	-	1,569.7	979.4	74.0
Total Economic Gross Profit Increase , million Kyat	-	-	-	1,381.4	861.8	65.2
Financial Total Cost , million Kyat	11,060.0	7,956.0	1,004.7	9,476.0	6,834.3	844.6
Economic Total Cost , million Kyat	7,324.8	5,423.4	727.3	7,246.7	5,316.4	643.6
Total Financial Cost Reduction, million Kyat	-	-	-	1,584.0	1,121.7	160.1
Total Economic Cost Reduction, million Kyat	-	-	-	78.1	107.0	83.7

Source: JICA Survey Team.

Table 5.45 Financial and Economic Benefit of Land Consolidation (Mandalay)

Title	2.Mandalay					
	Current			Planned		
	Monsoon Paddy	Summer Paddy	Black gram	Monsoon Paddy	Summer Paddy	Black gram
Cultivated Area, acre	30,000	18,000	22,890	27,600	16,560	21,059
Yield, basket/acre	74.0	89.0	9.0	87.3	105.9	10.5
Financial Farmgate Price , Kyat/basket	6,078	5,602	23,926	6,078	5,602	23,926
Economic Farmgate Price , Kyat/basket	5,349	4,930	21,055	5,349	4,930	21,055
Financial Gross Profit per acre, Kyat/acre	449,772	498,578	215,334	530,609	593,252	251,223
Economic Gross Profit per acre, Kyat/acre	395,826	438,770	189,495	466,968	522,087	221,078
Financial Cost per acre, Kyat/acre	276,500	286,600	174,000	257,500	267,600	159,000
Economic Cost per acre, Kyat/acre	183,120	195,368	125,960	196,920	208,168	121,160
Financial Gross Profit , million Kyat	13,493.2	8,974.4	4,929.0	14,644.8	9,824.2	5,290.5
Economic Gross Profit , million Kyat	11,874.8	7,897.9	4,337.5	12,888.3	8,645.8	4,655.6
Total Financial Gross Profit Increase , million Kyat	-	-	-	1,151.7	849.8	361.5
Total Economic Gross Profit Increase , million Kyat	-	-	-	1,013.5	747.9	318.1
Financial Total Cost , million Kyat	8,295.0	5,158.8	3,982.9	7,107.0	4,431.5	3,348.3
Economic Total Cost , million Kyat	5,493.6	3,516.6	2,883.2	5,435.0	3,447.3	2,551.5
Total Financial Cost Reduction, million Kyat	-	-	-	1,188.0	727.3	634.5
Total Economic Cost Reduction, million Kyat	-	-	-	58.6	69.4	331.7

Source: JICA Survey Team.

Table 5.46 Financial and Economic Benefit of Land Consolidation (Nay Pyi Taw)

Title	3.Nay Pyi Taw					
	Current			Planned		
	Monsoon Paddy	Summer Paddy	Black Gram	Monsoon Paddy	Summer Paddy	Black Gram
Cultivated Area, acre	10,000	6,000	1,998	9,200	5,520	1,838
Yield, basket/acre	73.0	84.0	13.0	86.1	100.0	15.2
Financial Farmgate Price , Kyat/basket	4,826	5,313	27,938	4,826	5,313	27,938
Economic Farmgate Price , Kyat/basket	4,247	4,675	24,585	4,247	4,675	24,585
Financial Gross Profit per acre, Kyat/acre	352,298	446,292	363,194	415,519	531,300	424,658
Economic Gross Profit per acre, Kyat/acre	310,031	392,700	319,605	365,667	467,500	373,692
Financial Cost per acre, Kyat/acre	276,500	286,600	174,000	257,500	267,600	159,000
Economic Cost per acre, Kyat/acre	183,120	195,368	125,960	196,920	208,168	121,160
Financial Gross Profit , million Kyat	3,523.0	2,677.8	725.7	3,822.8	2,932.8	780.6
Economic Gross Profit , million Kyat	3,100.3	2,356.2	638.6	3,364.1	2,580.6	686.9
Total Financial Gross Profit Increase , million Kyat	-	-	-	299.8	255.0	54.9
Total Economic Gross Profit Increase , million Kyat	-	-	-	263.8	224.4	48.3
Financial Total Cost , million Kyat	2,765.0	1,719.6	347.7	2,369.0	1,477.2	292.3
Economic Total Cost , million Kyat	1,831.2	1,172.2	251.7	1,811.7	1,149.1	222.7
Total Financial Cost Reduction, million Kyat	-	-	-	396.0	242.4	55.4
Total Economic Cost Reduction, million Kyat	-	-	-	19.5	23.1	29.0

Source: JICA Survey Team.

Table 5.47 Financial and Economic Benefit of Land Consolidation (Ayeyarwady)

Title	4.Ayeyarwady					
	Current			Planned		
	Monsoon Paddy	Summer Paddy	Black Gram	Monsoon Paddy	Summer Paddy	Black Gram
Cultivated Area, acre	40,000	26,240	16,880	36,800	24,141	15,530
Yield, basket/acre	65.0	87.0	10.0	76.7	103.5	11.7
Financial Farmgate Price , Kyat/basket	5,253	4,195	27,295	5,253	4,195	27,295
Economic Farmgate Price , Kyat/basket	4,623	3,692	24,020	4,623	3,692	24,020
Financial Gross Profit per acre, Kyat/acre	341,445	364,965	272,950	402,905	434,183	319,352
Economic Gross Profit per acre, Kyat/acre	300,495	321,204	240,200	354,584	382,122	281,034
Financial Cost per acre, Kyat/acre	276,500	286,600	174,000	257,500	267,600	159,000
Economic Cost per acre, Kyat/acre	183,120	195,368	125,960	196,920	208,168	121,160
Financial Gross Profit , million Kyat	13,657.8	9,576.7	4,607.4	14,826.9	10,481.5	4,959.4
Economic Gross Profit , million Kyat	12,019.8	8,428.4	4,054.6	13,048.7	9,224.7	4,364.3
Total Financial Gross Profit Increase , million Kyat	-	-	-	1,169.1	904.8	352.0
Total Economic Gross Profit Increase , million Kyat	-	-	-	1,028.9	796.3	309.8
Financial Total Cost , million Kyat	11,060.0	7,520.4	2,937.1	9,476.0	6,460.1	2,469.2
Economic Total Cost , million Kyat	7,324.8	5,126.5	2,126.2	7,246.7	5,025.3	1,881.6
Total Financial Cost Reduction, million Kyat	-	-	-	1,584.0	1,060.3	467.9
Total Economic Cost Reduction, million Kyat	-	-	-	78.1	101.1	244.6

Source: JICA Survey Team.

1.4.3 Project Benefit of Farm Road Rehabilitation

According to the survey, current vehicles that farmers use are animal cart (about 10% of total), trollegyi (about 20%), and small and medium truck (about 70%). With earthen pavement, animal cart can carry 30 baskets of paddy in one time, while it is 50 baskets and 100 baskets for trollegyi and small/medium truck.

The number of vehicles shows how many vehicles must be needed to carry all of transportation amount. It is difficult to estimate the transportation distance in each village, then the average transportation distance is assumed the midpoint of whole road (i.e. 2.8 km). For round trip, the total transportation distance becomes double, then it is 5.2 km, which equivalent to the length of the road. From transportation distance and the average speed that the Team assumed from the survey, operating time per vehicle is calculated.

The transportation cost of a vehicle is composed of fuel charges, loading/unloading cost, and traveling personnel expenses. Firstly, fuel charge is the product of transportation distance, unit fuel cost, and the number of vehicles. Secondly, loading/unloading cost is the product of loading/unloading time per unit, the number of required labors per unit, and the number of vehicles. Lastly, travel personnel expense is the product of the number of labor per unit, operating time per unit, and wage per hour and the number of transportation. Comparing the cost of total transportation with/without project, the net benefit per mile is calculated.

For more detail, Table 5.48a - Table 5.48c summarized the calculation process in the case of gravel pavement, while Table 5.49a - Table 5.49c summarized in the case of asphalt pavement.

Table 5.48a Economic Benefit of Road Rehabilitation (Comparing between Earthen and Asphalt Pavement) (1/3)

Type of Vehicles	Transportation amount (basket) ①	Percentage of vehicle (%) ②	Load capacity (basket) ③	Number of Vehicles ④ (①×②÷③)	Transportation Distance (km) ⑤	Speed (km/hour) ⑥	Operating Time (hour) ⑦ (⑤÷⑥)
Animal Cart (current)	726,900	10	30	2,424	5.6	10.0	0.56
Animal Cart (planned)	726,900	10	30	2,424	5.6	10.0	0.56
Trollegyi(current)	726,900	20	50	2,908	5.6	10.0	0.56
Trollegyi(planned)	726,900	20	80	1,818	5.6	17.0	0.33
Small and Medium Truck (current)	726,900	70	100	5,089	5.6	10.0	0.56
Small and Medium Truck (Planned)	726,900	70	150	3,393	5.6	22.0	0.25

Source: JICA Survey Team

Table 5.48b Economic Benefit of Road Rehabilitation (Comparing between Earthen and Asphalt Pavement) (2/3)

Type of Vehicles	Fuel Charges		Loading / Unloading				
	Unit Cost (Kyats/ km)	Total Fuel Charges (Million)	Time for Loading / Unloading	Number of labor per one time	Total Times (hour)	Cost per hour	Total Labor Charges (Million)
	⑧	⑨ (④×⑤×⑧)	⑩	⑪	⑫ (④×⑩×⑪)	⑬	⑭ (⑫×⑬)
Animal Cart (current)	0.0	0.0	0.83	3	6,035.8	2,400	14.5
Animal Cart (planned)	0.0	0.0	0.83	3	6,035.8	2,400	14.5
Trolleygi(current)	1,100.0	17.9	1.25	5	18,175.0	2,400	43.6
Trolleygi(planned)	733.3	7.5	1.25	5	11,362.5	2,400	27.3
Small and Medium Truck (current)	550.0	15.7	1.50	8	61,068.0	2,400	146.6
Small and Medium Truck (Planned)	366.7	7.0	1.50	8	40,716.0	2,400	97.7

Source: JICA Survey Team

Table 5.48c Economic Benefit of Road Rehabilitation (Comparing between Earthen and Asphalt Pavement) (3/3)

Type of Vehicles	Traveling Personnel Expenses				Total	
	Labor for transportation	Total Times (hour)	Cost per hour	Total Labor Charges (Million Kyat)	Current Total (Million Kyat)	Planned Total (Million Kyat)
	⑮	⑯ (④×⑦)	⑰	⑱ (⑮×⑯×⑰)	⑲ (⑨+⑭+⑱)	⑳ (⑨+⑭+⑱)
Animal Cart (current)	1	1,357.4	2,400	3.3	17.8	-
Animal Cart (planned)	1	1,357.4	2,400	3.3	-	17.8
Trolleygi(current)	1	1,628.5	2,400	3.9	65.4	-
Trolleygi(planned)	1	599.9	2,400	1.4	-	36.2
Small and Medium Truck (current)	1	2,849.8	2,400	6.8	169.1	-
Small and Medium Truck (Planned)	1	848.3	2,400	2.0	-	106.7
All Vehicles					252.3	160.7
Benefit					91.6	

Source: JICA Survey Team

Table 5.49a Benefit of Road Rehabilitation (Comparing between Earthen and Gravel Pavement, Economic) (1/3)

Type of Vehicles	Transportation amount (basket)	Percentage of vehicle (%)	Load capacity (basket)	Number of Vehicles	Transportation Distance (km)	Speed (km/hr)	Operating Time (hr)
	①	②	③	④ (①×②÷③)	⑤	⑥	⑦ (⑤÷⑥)
Animal Cart (current)	726,900	10	30	2,424	5.6	10.0	0.56
Animal Cart (planned)	726,900	10	30	2,424	5.6	10.0	0.56
Trolleygi(current)	726,900	20	50	2,908	5.6	10.0	0.56
Trolleygi(planned)	726,900	20	65	2,237	5.6	13.5	0.41
Small and Medium Truck (current)	726,900	70	100	5,089	5.6	10.0	0.56
Small and Medium Truck (Planned)	726,900	70	125	4,071	5.6	16.0	0.35

Source: JICA Survey Team

Table 5.49b Benefit of Road Rehabilitation (Comparing between Earthen and Gravel Pavement, Economic) (2/3)

Type of Vehicles	Fuel Charges		Loading / Unloading				
	Unit Cost	Total Fuel	Time for	Personnel	Total Times	Cost per	Total Labor
	(Kyats/ ⑧	Charges ⑨ (④×⑤×⑧)	Loading / ⑩	Charge ⑪	(hour) ⑫ (④×⑩×⑪)	hour ⑬	Charges ⑭ (⑫×⑬)
Animal Cart (current)	0.0	0.0	0.83	3	6,035.8	2,400	14.5
Animal Cart (planned)	0.0	0.0	0.83	3	6,035.8	2,400	14.5
Trollegyi(current)	1,100.0	17.9	1.25	5	18,175.0	2,400	43.6
Trollegyi(planned)	916.7	11.5	1.25	5	13,981.3	2,400	33.6
Small and Medium Truck (current)	550.0	15.7	1.50	8	61,068.0	2,400	146.6
Small and Medium Truck (Planned)	458.3	10.4	1.50	8	48,852.0	2,400	117.2

Source: JICA Survey Team

Table 5.49c Benefit of Road Rehabilitation (Comparing between Earthen and Gravel Pavement, Economic) (3/3)

Type of Vehicles	Traveling Personnel Expenses				Total	
	Personnel	Total Times	Cost per hour	Total Labor	Current	Planned
	Charge ⑮	(hour) ⑯ (④×⑦)	⑰	Charges ⑱ (⑯×⑰)	Total ⑲ (⑨+⑭+⑱)	Total ⑳ (⑨+⑭+⑱)
Animal Cart (current)	1	1,357.4	2,400	3.3	17.8	-
Animal Cart (planned)	1	1,357.4	2,400	3.3	-	17.8
Trollegyi(current)	1	1,628.5	2,400	3.9	65.4	-
Trollegyi(planned)	1	917.2	2,400	2.2	-	47.3
Small and Medium Truck (current)	1	2,849.8	2,400	6.8	169.1	-
Small and Medium Truck (Planned)	1	1,424.9	2,400	3.4	-	131.0
All Vehicles					252.3	196.1
Benefit					56.2	

Source: JICA Survey Team

The result of this calculation is summarized as Table 5.50. In economic terms, the cost reduction per mile is 26.17 in the case of asphalt pavement rehabilitation, and it is 16.06 in the case of gravel pavement rehabilitation.

Table 5.50 Benefit of Road Rehabilitation (Summary)

Title	Financial	Economic
① Total length of the model road (km):	5.6	5.6
② Total Benefit of the model road, Asphalt Pavement (Million Kyat/5.6km):	142.5	91.6
③ Total Benefit of the model road, Gravel Pavement (Million Kyat/5.6km):	87.5	56.2
④ Benefit per mile, Asphalt Pavement (Million Kyat/mile):	40.71	26.17
⑤ Benefit per mile, Gravel Pavement (Million Kyat/mile):	25.00	16.06

Source: JICA Survey Team

1.5 Farm and Farmers Economy

To explore the change with project at the level of farmer household, we should establish a model farmer's farm budget. To know the model farm budget, a typical average farmer's agricultural income should be estimated. In the project economic analysis as discussed before, current net agricultural benefit and the benefit with project (both in financial term) have been estimated at the level of irrigation system, and the present and with-project benefits can further be calculated by the priority areas.

Table 5.51 Gross Profit by Crop and By Position per Farmer Household

Crops and Positions		% of household	Area Harvested	Yield	Production	Farm Gate Price	Gross Profit
		(%)	(Acre)	(Basket/Acre)	(Basket)	(Kyat/Basket)	(Kyat)
Monsoon	Shwebo	100	7.45	63	469	7,327	3,438,927
	Mandalay	100	6.28	74	464	6,078	2,822,319
Paddy	Nay Pyi Taw	100	5.93	73	433	4,826	2,090,301
	Ayeyarwady	100	13.80	65	897	5,253	4,711,941
Summer	Shwebo	69	3.45	76	262	4,922	1,290,548
	Mandalay	60	3.45	89	307	5,602	1,720,094
Paddy	Nay Pyi Taw	60	2.40	84	202	5,313	1,071,101
	Ayeyarwady	66	8.10	87	705	4,195	2,956,217
Pulses (Black	Shwebo	21	0.08	14	1	11,786	12,375
Gram, Chick	Mandalay	76	2.13	9	19	23,926	457,585
	Nay Pyi Taw	35	1.03	13	13	27,938	375,300
Pea)	Ayeyarwady	42	3.23	10	32	27,295	882,538
Sesame	Shwebo	21	1.30	10	13	23,630	307,190
	Mandalay	76	2.13	9	19	47,952	917,082
	Nay Pyi Taw	35	0.87	10	9	36,167	313,447
	Ayeyarwady	N.A	N.A	N.A	N.A	N.A	N.A

Source: Questionnaire Household Survey, JICA Survey Team

Table 5.52 Gross Profit by Crop per Acre/Ha by Position

Crops and Positions		% of household	Production		Farm Gate Price	Gross Profit	
		(%)	(Basket/acre)	(Basket/ha)	(Kyat/Basket)	(Kyat/acre)	(Kyat/ha)
Monsoon	Shwebo	100	63	156	7,327	461,592	1,140,634
	Mandalay	100	74	183	6,078	449,748	1,111,368
Paddy	Nay Pyi Taw	100	73	180	4,826	352,268	870,485
	Ayeyarwady	100	65	161	5,253	341,421	843,682
Summer	Shwebo	69	76	188	4,922	374,046	924,300
	Mandalay	60	89	220	5,602	498,567	1,232,004
Paddy	Nay Pyi Taw	60	84	208	5,313	446,280	1,102,798
	Ayeyarwady	66	87	215	4,195	364,956	901,837
Pulses (Black	Shwebo	21	14	35	11,786	165,000	407,730
Gram, Chick	Mandalay	76	9	22	23,926	215,331	532,102
	Nay Pyi Taw	35	13	32	27,938	363,192	897,479
Pea)	Ayeyarwady	42	10	25	27,295	272,955	674,495
Sesame	Shwebo	21	10	25	23,630	236,303	583,926
	Mandalay	76	9	22	47,952	431,570	1,066,448
	Nay Pyi Taw	35	10	25	36,167	361,667	893,710
	Ayeyarwady	N.A	N.A	N.A	N.A	N.A	N.A

Source: Questionnaire Household Survey, JICA Survey Team

Table 5.53 Cost of Input for Cultivation per Household

Particulars	Area Harvested	Seed	Urea	Compound	TSP	Compost	Insecticide	Fungicide	Total
	(Acre)	(Kyat)	(Kyat)	(Kyat)	(Kyat)	(Kyat)	(Kyat)	(Kyat)	(Kyat)
Monsoon Paddy									
Shwebo	7.5	93,941	133,246	183,920	23,055	10,594	15,558	7,530	467,844
Mandalay	6.3	101,370	176,859	164,481	11,138	32,525	10,571	24,286	521,230
Nay Pyi Taw	5.9	65,992	127,170	96,221	5,993	16,205	40,428	14,391	366,399
Ayeyarwady	13.8	74,150	257,366	212,431	118,985	12,348	44,430	29,372	749,082
Summer Paddy									
Shwebo	3.5	37,199	82,471	79,899	13,051	9,494	6,849	2,254	231,218
Mandalay	3.5	46,875	105,003	106,583	8,876	3,019	6,975	10,559	287,890
Nay Pyi Taw	2.4	54,237	63,333	49,494	0	1,907	17,521	5,889	192,382
Ayeyarwady	8.1	84,791	256,269	225,949	88,354	13,444	48,638	22,167	739,612
Pulses (Black Gram, Chick Pea)									
Shwebo	0.1	900	0	0	0	0	488	0	1,388
Mandalay	2.1	24,988	0	770	0	0	4,409	1,120	31,288
Nay Pyi Taw	1.0	20,826	0	904	0	0	14,989	0	36,719
Ayeyarwady	3.2	15,229	4,737	0	2,851	0	15,623	3,592	42,031
Sesame									
Shwebo	1.3	6,225	14,586	15,559	0	0	8,292	6,846	51,508
Mandalay	2.1	18,519	30,511	44,530	1,859	4,177	9,652	2,102	111,349
Nay Pyi Taw	0.9	6,813	361	0	0	1,156	0	0	8,330
Ayeyarwady	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	0

Source: Questionnaire Household Survey, JICA Survey Team

Table 5.54 Cost of Input for Cultivation per Acre/Ha by Position

Particulars	Seed	Urea	Compound	TSP	Compost	Insecticide	Fungicide	Total	
	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat / ha)
Monsoon Paddy									
Shwebo	12,609	17,885	24,687	3,095	1,422	2,088	1,011	62,798	155,179
Mandalay	16,155	28,185	26,212	1,775	5,183	1,685	3,870	83,065	205,260
Nay Pyi Taw	11,122	21,433	16,217	1,010	2,731	6,814	2,425	61,753	152,596
Ayeyarwady	5,373	18,650	15,394	8,622	895	3,220	2,128	54,281	134,134
Summer Paddy									
Shwebo	10,782	23,905	23,159	3,783	2,752	1,985	653	67,020	165,612
Mandalay	13,587	30,436	30,894	2,573	875	2,022	3,061	83,446	206,203
Nay Pyi Taw	22,599	26,389	20,622	0	795	7,300	2,454	80,159	198,080
Ayeyarwady	10,468	31,638	27,895	10,908	1,660	6,005	2,737	91,310	225,635
Pulses (Black Gram, Chick Pea)									
Shwebo	12,000	0	0	0	0	6,500	0	18,500	45,715
Mandalay	11,759	0	363	0	0	2,075	527	14,724	36,383
Nay Pyi Taw	20,154	0	875	0	0	14,506	0	35,534	87,809
Ayeyarwady	4,710	1,465	0	882	0	4,832	1,111	12,999	32,123
Sesame									
Shwebo	4,788	11,220	11,968	0	0	6,379	5,266	39,621	97,907
Mandalay	8,715	14,358	20,955	875	1,966	4,542	989	52,400	129,484
Nay Pyi Taw	7,861	417	0	0	1,333	0	0	9,611	23,750
Ayeyarwady	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A

Source: Questionnaire Household Survey, JICA Survey Team

Table 5.55 Labor and Outsourcing Costs per Household (1/2)

Particulars	Area	Land	Plowing	Soil	Seeding	Transplanting	Fertilizer	Pesticide/	Herbicide
	Harvested	cleaning		Plugging			application	fungicide	application
	(Acre)	(Kyat)	(Kyat)	(Kyat)	(Kyat)	(Kyat)	(Kyat)	(Kyat)	(Kyat)
Monsoon Paddy									
Shwebo	7.45	41,241	90,867	49,606	9,279	265,441	4,148	2,124	736
Mandalay	6.28	14,970	104,632	48,733	6,278	174,259	5,228	2,945	745
Nay Pyi Taw	5.93	12,745	114,743	50,443	14,201	68,455	7,077	3,227	1,486
Ayeyarwady	13.80	21,340	170,595	74,425	12,882	197,185	5,306	28,656	0
Summer Paddy									
Shwebo	3.45	18,069	31,786	20,178	11,577	51,086	11,991	1,115	548
Mandalay	3.45	3,361	84,616	37,806	3,604	107,573	3,610	2,349	602
Nay Pyi Taw	2.40	10,906	40,874	18,565	7,026	31,566	2,407	1,273	2,709
Ayeyarwady	8.10	10,410	72,688	25,120	43,109	4,219	13,334	8,698	0
Pulses (Black Gram, Chick Pea)									
Shwebo	0.08	0	928	0	0	0	0	0	0
Mandalay	2.13	980	27,055	2,680	545	0	106	21	0
Nay Pyi Taw	1.03	1,033	14,340	8,714	775	0	155	663	0
Ayeyarwady	3.23	882	37,021	21,580	838	0	88	2,410	353
Sesame									
Shwebo	1.30	97	4,156	0	39	0	24	24	0
Mandalay	2.13	6,227	40,527	13,021	4,504	0	2,184	3,130	0
Nay Pyi Taw	0.87	0	5,994	4,622	867	0	0	0	0
Ayeyarwady	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A

Source: Questionnaire Household Survey, JICA Survey Team

Table 5.56 Labor and Outsourcing Costs per Household (2/2)

Particulars	Weeding	Harvesting	Threshing	Transportation	Drying/packing	Transportation	Water Fee	Total
	(Kyat)	(Kyat)	(Kyat)	(Farm to dry yard) (Kyat)	(Kyat)	(to market) (Kyat)	(Kyat)	(Kyat)
Monsoon Paddy								
Shwebo	43,712	234,682	79,228	33,078	3,401	3,931	6,489	867,964
Mandalay	66,620	201,899	69,310	21,167	8,426	439	5,914	731,564
Nay Pyi Taw	97,259	157,088	63,404	24,105	377	2,225	9,977	626,811
Ayeyarwady	27,791	374,801	74,240	66,551	13,759	23,065	29,165	1,119,760
Summer Paddy								
Shwebo	9,445	102,292	35,624	14,905	2,454	2,163	1,906	315,142
Mandalay	31,637	102,031	40,382	14,659	2,433	365	1,884	436,913
Nay Pyi Taw	35,349	59,912	21,146	9,230	524	960	5,274	247,721
Ayeyarwady	23,802	116,343	36,531	32,679	4,388	22,995	51,858	466,174
Pulses (Black Gram, Chick Pea)								
Shwebo	0	1,125	600	150	0	94	0	2,897
Mandalay	0	36,440	16,096	2,871	2,945	3,173	0	92,913
Nay Pyi Taw	2,583	32,761	8,899	5,170	1,702	1,736	52	78,583
Ayeyarwady	0	69,333	16,618	5,231	941	858	0	156,152
Sesame								
Shwebo	11,348	25,207	10,032	3,311	3,304	2,025	433	60,001
Mandalay	25,745	45,528	22,039	4,132	1,546	2,831	3,223	174,635
Nay Pyi Taw	4,333	21,667	32,861	8,667	2,167	1,156	0	82,333
Ayeyarwady	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A

Source: Questionnaire Household Survey, JICA Survey Team

Table 5.57 Labor and Outsourcing Costs per Acre/ Ha (1/2)

Particulars	Land cleaning	Plowing	Soil Pudding	Seeding	Transplanting	Fertilizer application	Pesticide/ fungicide	Herbicide application
	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)
Monsoon Paddy								
Shwebo	5,536	12,197	6,658	1,246	35,630	557	285	99
Mandalay	2,386	16,674	7,766	1,000	27,770	833	469	119
Nay Pyi Taw	2,148	19,339	8,502	2,393	11,537	1,193	544	250
Ayeyarwady	1,546	12,362	5,393	933	14,289	384	2,076	0
Summer Paddy								
Shwebo	5,237	9,213	5,849	3,356	14,808	3,476	323	159
Mandalay	974	24,526	10,958	1,045	31,181	1,046	681	175
Nay Pyi Taw	4,544	17,031	7,735	2,928	13,152	1,003	530	1,129
Ayeyarwady	1,285	8,974	3,101	5,322	521	1,646	1,074	0
Pulses (Black Gram, Chick Pea)								
Shwebo	0	12,375	0	0	0	0	0	0
Mandalay	461	12,732	1,261	256	0	50	10	0
Nay Pyi Taw	1,000	13,877	8,433	750	0	150	642	0
Ayeyarwady	273	11,450	6,674	259	0	27	745	109
Sesame								
Shwebo	75	3,197	0	30	0	19	19	0
Mandalay	2,931	19,071	6,127	2,120	0	1,028	1,473	0
Nay Pyi Taw	0	6,917	5,333	1,000	0	0	0	0
Ayeyarwady	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A

Source: Questionnaire Household Survey, JICA Survey Team

Table 5.58 Labor and Outsourcing Costs per Acre/ Ha (2/2)

Particulars	Weeding	Harvesting	Threshing	Transportation (Farm to dry yard)	Drying/ packing	Transportation (to market)	Water Fee	Total	
	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat / ha)
Monsoon Paddy									
Shwebo	5,867	31,501	10,635	4,440	457	528	871	116,505	287,895
Mandalay	10,617	32,175	11,045	3,373	1,343	70	942	116,584	288,089
Nay Pyi Taw	16,392	26,475	10,686	4,063	63	375	1,682	105,642	261,051
Ayeyarwady	2,014	27,160	5,380	4,823	997	1,671	2,113	81,142	200,509
Summer Paddy									
Shwebo	2,738	29,650	10,326	4,320	711	627	553	91,345	225,723
Mandalay	9,170	29,574	11,705	4,249	705	106	546	126,641	312,942
Nay Pyi Taw	14,729	24,963	8,811	3,846	218	400	2,198	103,217	255,059
Ayeyarwady	2,939	14,363	4,510	4,034	542	2,839	6,402	57,552	142,217
Pulses (Black Gram, Chick Pea)									
Shwebo	0	15,000	8,000	2,000	0	1,250	0	38,625	95,446
Mandalay	0	17,148	7,575	1,351	1,386	1,493	0	43,724	108,045
Nay Pyi Taw	2,500	31,704	8,612	5,003	1,647	1,680	50	76,048	187,921
Ayeyarwady	0	21,443	5,139	1,618	291	265	0	48,295	119,340
Sesame									
Shwebo	8,730	19,390	7,717	2,547	2,542	1,558	333	46,155	114,053
Mandalay	12,115	21,425	10,371	1,944	727	1,332	1,517	82,181	203,077
Nay Pyi Taw	5,000	25,000	37,917	10,000	2,500	1,333	0	95,000	234,753
Ayeyarwady	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A

Source: Questionnaire Household Survey, JICA Survey Team

Table 5.59 Net Profit from Farming per Household

Crops and Positions		% of household	Area Harvested	Gross Profit	Total Cost of Input	Cost of Labor & Outsource	Total Net Profit	Net Profit Ratio
		(%)	(Acre)	(Kyat)	(Kyat)	(Kyat)	(Kyat)	(%)
Monsoon Paddy	Shwebo	100	7.5	3,438,927	467,844	867,964	2,103,119	61.2
	Mandalay	100	6.3	2,822,319	521,230	731,564	1,569,525	55.6
	Nay Pyi Taw	100	5.9	2,090,301	366,399	626,811	1,097,091	52.5
	Ayeyarwady	100	13.8	4,711,941	749,082	1,119,760	2,843,099	60.3
Summer Paddy	Shwebo	69	3.5	1,290,548	231,218	315,142	744,188	57.7
	Mandalay	60	3.5	1,720,094	287,890	436,913	995,291	57.9
	Nay Pyi Taw	60	2.4	1,071,101	192,382	247,721	630,998	58.9
	Ayeyarwady	66	8.1	2,956,217	739,612	466,174	1,750,431	59.2
Pulses (Black Gram, Chick Pea)	Shwebo	21	0.1	12,375	1,388	2,897	8,091	65.4
	Mandalay	76	2.1	457,585	31,288	92,913	333,384	72.9
	Nay Pyi Taw	35	1.0	375,300	36,719	78,583	259,999	69.3
	Ayeyarwady	42	3.2	882,538	42,031	156,152	684,355	77.5
Sesame	Shwebo	21	1.3	307,190	51,508	60,001	195,681	63.7
	Mandalay	76	2.1	917,082	111,349	174,635	631,098	68.8
	Nay Pyi Taw	35	0.9	313,447	8,330	82,333	222,784	71.1
	Ayeyarwady	N.A	N.A	N.A	N.A	N.A	N.A	N.A

Source: Questionnaire Household Survey, JICA Survey Team

Table 5.60 Net Profit from Farming per Acre/ Ha

Crops and Positions		% of household	Gross Profit	Total Cost of Input	Cost of Labor & Outsource	Total Net Profit		Net Profit Ratio
		(%)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat/acre)	(Kyat / ha)	(%)
Monsoon Paddy	Shwebo	100	461,592	62,798	116,505	282,288	697,560	61.2
	Mandalay	100	449,748	83,065	116,584	250,100	618,019	55.6
	Nay Pyi Taw	100	352,268	61,753	105,642	184,873	456,838	52.5
	Ayeyarwady	100	341,421	54,281	81,142	205,998	509,038	60.3
Summer Paddy	Shwebo	69	374,046	67,020	91,345	215,680	532,965	57.7
	Mandalay	60	498,567	83,446	126,641	288,480	712,859	57.9
	Nay Pyi Taw	60	446,280	80,159	103,217	262,904	649,660	58.9
	Ayeyarwady	66	364,956	91,310	57,552	216,093	533,985	59.2
Pulses (Black Gram, Chick Pea)	Shwebo	21	165,000	18,500	38,625	107,875	266,569	65.4
	Mandalay	76	215,331	14,724	43,724	156,884	387,674	72.9
	Nay Pyi Taw	35	363,192	35,534	76,048	251,609	621,749	69.3
	Ayeyarwady	42	272,955	12,999	48,295	211,661	523,032	77.5
Sesame	Shwebo	21	236,303	39,621	46,155	150,527	371,965	63.7
	Mandalay	76	431,570	52,400	82,181	296,989	733,887	68.8
	Nay Pyi Taw	35	361,667	9,611	95,000	257,056	635,207	71.1
	Ayeyarwady	N.A	N.A	N.A	N.A	N.A	N.A	N.A

Source: Questionnaire Household Survey, JICA Survey Team

1.6 Tables of Project Evaluation

Following compare the cost per acre with/without land consolidation. The cost is composed of labor cost, machine cost, and other input cost (e.g. fertilizer, pesticide). Table 5.61 – Table 5.66 show the cost in financial terms, while Table 5.67 – Table 5.72 show the cost in economic terms.

Table 5.61 Cost per acre for Monsoon Paddy without Land Consolidation

Without Land Consolidation									
Working Title	Working Methods	Labor Cost			Machine Cost			Other Input Cost (Kyat/acre)	Total Cost (Kyat/acre)
		Num. Labor	Unit Cost (Kyat/acre)	Total Labor Fee (Kyat/acre)	Nos	Unit Cost (Kyat/acre)	Total Machine Cost(Ks/ac)		
Renovation Levee	Manual Labor	3	4,000	12,000					12,000
Ploughing	Manual Labor	3	5,000	15,000					15,000
Hallowing	Manual Labor	2	5,000	10,000					10,000
Levelling	Animal Draught	2	6,000	12,000					12,000
Broadcasting	Manual Labor	1	4,000	4,000				8,000	12,000
Weedicide spraying	Manual Labor	1	4,000	4,000				10,000	14,000
Fertilizer Application	Manual Labor	1	4,000	4,000				11,500	15,500
Pesticide spraying	Manual Labor	1	4,000	4,000				5,000	9,000
Weedicide	Manual Labor	1	4,000	4,000				4,000	8,000
Weeding	Manual Labor	5	4,000	20,000					20,000
Fertilizer Application	Manual Labor	1	4,000	4,000				11,500	15,500
Fertilizer Application	Manual Labor	1	4,000	4,000				11,500	15,500
Harvesting	Manual Labor	15	3,333	50,000					50,000
Drying	Manual Labor	6	4,000	24,000					24,000
Threshing	Manual Labor	6	4,000	24,000					24,000
Transportation	Animal Cart	4	5,000	20,000					20,000
Total, 1,000 Kyat				215,000			-	61,500	276,500

Source: Based on the result of the questionnaire conducted by JICA study Team at Lat Pan Kha Hla village, Nay Pyi Taw.

Table 5.62 Cost per acre for Monsoon Paddy with Land Consolidation

With Land Consolidation									
Working Title	Working Methods	Labor Cost			Machine Cost			Other Input Cost (Kyat/acre)	Total Cost (Kyat/acre)
		Num. Labor	Unit Cost (Kyat/acre)	Total Labor Fee (Kyat/acre)	Nos	Unit Cost (Kyat/acre)	Total Machine Cost (Kyat/acre)		
Renovation Levee	Manual Labor	3	4,000	12,000					12,000
Ploughing	Tractor				1	20,000	20,000		20,000
Hallowing	Tractor				1	15,000	15,000		15,000
Levelling	Animal Draught	2	6,000	12,000					12,000
Broadcasting	Manual Labor	1	4,000	4,000				8,000	12,000
Weedicide spraying	Manual Labor	1	4,000	4,000				10,000	14,000
Fertilizer Application	Manual Labor	1	4,000	4,000				11,500	15,500
Pesticide spraying	Manual Labor	1	4,000	4,000				5,000	9,000
Weedicide	Manual Labor	1	4,000	4,000				4,000	8,000
Weeding	Manual Labor	5	4,000	20,000					20,000
Fertilizer Application	Manual Labor	1	4,000	4,000				11,500	15,500
Fertilizer Application	Manual Labor	1	4,000	4,000				11,500	15,500
Harvesting	Combine				1	45,000	45,000		45,000
Drying	Manual Labor	6	4,000	24,000					24,000
Threshing	Thresher				1	10,000	10,000		10,000
Transportation	Animal Cart	2	5,000	10,000					10,000
Total, 1,000 Kyat				106,000			90,000	61,500	257,500

Source: Based on the result of the questionnaire conducted by JICA study Team at Lat Pan Kha Hla village, Nay Pyi Taw.

Table 5.63 Cost per acre for Summer Paddy without Land Consolidation

Without Land Consolidation									
Working title	Working Methods	Labor Cost			Machine Cost			Other Input Cost (Kyat/acre)	Total Cost (Kyat/acre)
		Num. Labor	Unit Cost (Kyat/acre)	Total Labor Fee (Kyat/acre)	Nos	Unit Cost (Kyat/acre)	Total Machine Cost (Kyat/acre)		
Renovation Levee	Manual Labor	3	4,000	12,000					12,000.0
Ploughing	Manual Labor	3	5,000	15,000			-		15,000.0
Hallowing	Manual Labor	2	5,000	10,000			-		10,000.0
Levelling	Animal Draught	2	6,000	12,000					12,000.0
Broadcasting	Manual Labor	1	4,000	4,000				30,000	34,000.0
Weedicide spraying	Manual Labor	1	4,000	4,000				10,000	14,000.0
Fertilizer Application	Manual Labor	1	4,000	4,000				13,200	17,200.0
Pesticide spraying	Manual Labor	1	4,000	4,000					4,000.0
Weedicide	Manual Labor	1	4,000	4,000				4,000	8,000.0
Weeding	Manual Labor	5	4,000	20,000				13,200	33,200.0
Fertilizer Application	Manual Labor	1	4,000	4,000				13,200	17,200.0
Fertilizer Application	Manual Labor	1	4,000	4,000					4,000.0
Harvesting	Manual Labor	15	3,333	50,000					50,000.0
Drying	Manual Labor	3	4,000	12,000					12,000.0
Threshing	Manual Labor	6	4,000	24,000					24,000.0
Transportation	Animal Cart	4	5,000	20,000					20,000.0
Total, 1,000 Kyat				203,000			-	83,600.0	286,600.0

Source: Based on the result of the questionnaire conducted by JICA study Team at Lat Pan Kha Hla village, Nay Pyi Taw.

Table 5.64 Cost per acre for Summer Paddy with Land Consolidation

With Land Consolidation									
Working title	Working Methods	Labor Cost			Machine Cost			Other Input Cost (Kyat/acre)	Total Cost (Kyat/acre)
		Num. Labor	Unit Cost (Kyat/acre)	Total Labor Fee (Kyat/acre)	Nos	Unit Cost (Kyat/acre)	Total Machine Cost (Kyat/acre)		
Renovation Levee	Manual Labor	3	4,000	12,000					12,000.0
Ploughing	Tractor				1	20,000	20,000		20,000.0
Hallowing	Tractor				1	15,000	15,000		15,000.0
Levelling	Animal Draught	2	6,000	12,000					12,000.0
Broadcasting	Manual Labor	1	4,000	4,000				30,000	34,000.0
Weedicide spraying	Manual Labor	1	4,000	4,000				10,000	14,000.0
Fertilizer Application	Manual Labor	1	4,000	4,000				13,200	17,200.0
Pesticide spraying	Manual Labor	1	4,000	4,000					4,000.0
Weedicide	Manual Labor	1	4,000	4,000				4,000	8,000.0
Weeding	Manual Labor	5	4,000	20,000				13,200	33,200.0
Fertilizer Application	Manual Labor	1	4,000	4,000				13,200	17,200.0
Fertilizer Application	Manual Labor	1	4,000	4,000					4,000.0
Harvesting	Combine				1	45,000	45,000		45,000.0
Drying	Manual Labor	3	4,000	12,000					12,000.0
Threshing	Thresher				1	10,000	10,000		10,000.0
Transportation	Animal Cart	2	5,000	10,000			-		10,000.0
Total, 1,000 Kyat				94,000			90,000	83,600.0	267,600.0

Source: Based on the result of the questionnaire conducted by JICA study Team at Lat Pan Kha Hla village, Nay Pyi Taw.

Table 5.65 Cost per acre for Pulses with Land Consolidation

Working title	Without Land Consolidation								
	Working Method	Labor Cost			Machine Cost			Other Input Cost (Kyat/acre)	Total Cost (Kyat/acre)
		Num. Labor	Unit Cost (Kyat/acre)	Total Labor Fee (Kyat/acre)	Nos	Unit Cost (Kyat/acre)	Total Machine Cost (Kyat/acre)		
Ploughing	Animal Draught	4	5,000	20,000				-	20,000.0
Hallowing	Animal Draught	1	5,000	5,000				-	5,000.0
Seed Broadcasting	Manual Labor	1	4,000	4,000		-		-	4,000.0
Pesticide spray	Manual Labor	1	4,000	4,000		-		36,000.0	40,000.0
Fertilizer spray	Manual Labor	1	4,000	4,000		-		26,000.0	30,000.0
Harvesting	Manual Labor	10	4,000	40,000		-		-	40,000.0
Husking / Threshing	Thresher				1	15,000	15,000	-	15,000.0
Transportation	Animal Cart	4	5,000	20,000					20,000.0
Total, 1,000 Kyat				77,000.0			15,000.0	62,000.0	174,000.0

Source: Based on the result of the questionnaire conducted by JICA study Team at Lat Pan Kha Hla village, Nay Pyi Taw.

Table 5.66 Cost per acre for Pulses with Land Consolidation

Working title	With Land Consolidation								
	Working Method	Labor Cost			Machine Cost			Other Input Cost (Kyat/acre)	Total Cost (Kyat/acre)
		Num. Labor	Unit Cost (Kyat/acre)	Total Labor Fee (Kyat/acre)	Nos	Unit Cost (Kyat/acre)	Total Machine Cost (Kyat/acre)		
Ploughing	Tractor				1	15,000	15,000	-	15,000.0
Hallowing	Animal Draught	1	5,000	5,000		-		-	5,000.0
Seed Broadcasting	Manual Labor	1	4,000	4,000		-		-	4,000.0
Pesticide spray	Manual Labor	1	4,000	4,000		-		36,000.0	40,000.0
Fertilizer spray	Manual Labor	1	4,000	4,000		-		26,000.0	30,000.0
Harvesting	Manual Labor	10	4,000	40,000		-		-	40,000.0
Husking / Threshing	Thresher				1	15,000	15,000	-	15,000.0
Transportation	Animal Cart	2	5,000	10,000					10,000.0
Total, 1,000 Kyat				57,000.0			30,000.0	62,000.0	159,000.0

Source: Based on the result of the questionnaire conducted by JICA study Team at Lat Pan Kha Hla village, Nay Pyi Taw.

Table 5.67 Economic Cost per acre for Monsoon Paddy without Land Consolidation

Working Title	Without Land Consolidation								Total Cost (Kyat/acre)
	Working Method	Labor Cost			Machine Cost			Other Input Cost (Kyat/acre)	
		Num. Labor	Unit Cost (Kyat/acre)	Total Labor Fee (Kyat/acre)	Nos	Unit Cost (Kyat/acre)	Total Machine Cost (Kyat/acre)		
Renovation Levee	Manual Labor	3	2,400	7,200					7,200
Ploughing	Manual Labor	3	3,000	9,000			-		9,000
Harrowing	Manual Labor	2	3,000	6,000			-		6,000
Levelling	Animal Draught	2	3,600	7,200					7,200
Broadcasting	Manual Labor	1	2,400	2,400				7,040	9,440
Weedicide spraying	Manual Labor	1	2,400	2,400				8,800	11,200
Fertilizer Application	Manual Labor	1	2,400	2,400				10,120	12,520
Pesticide spraying	Manual Labor	1	2,400	2,400				4,400	6,800
Weedicide	Manual Labor	1	2,400	2,400				3,520	5,920
Weeding	Manual Labor	5	2,400	12,000					12,000
Fertilizer Application	Manual Labor	1	2,400	2,400				10,120	12,520
Fertilizer Application	Manual Labor	1	2,400	2,400				10,120	12,520
Harvesting	Manual Labor	15	2,000	30,000					30,000
Drying	Manual Labor	6	2,400	14,400					14,400
Threshing	Manual Labor	6	2,400	14,400					14,400
Transportation	Animal Cart	4	3,000	12,000					12,000
Total, 1,000 Kyat				129,000			-	54,120	183,120

Source: Based on the result of the questionnaire conducted by JICA study Team at Lat Pan Kha Hla village, Nay Pyi Taw

Table 5.68 Economic Cost per acre for Monsoon Paddy with Land Consolidation

Working Title	With Land Consolidation								Total Cost (Kyat/acre)
	Working Method	Labor Cost			Machine Cost			Other Input Cost (Kyat/acre)	
		Num. Labor	Unit Cost (Kyat/acre)	Total Labor Fee (Kyat/acre)	Nos	Unit Cost (Kyat/acre)	Total Machine Cost (Kyat/acre)		
Renovation Levee	Manual Labor	3	2,400	7,200					7,200
Ploughing	Tractor				1	17,600	17,600		17,600
Harrowing	Tractor				1	13,200	13,200		13,200
Levelling	Animal Draught	2	3,600	7,200					7,200
Broadcasting	Manual Labor	1	2,400	2,400				7,040	9,440
Weedicide spraying	Manual Labor	1	2,400	2,400				8,800	11,200
Fertilizer Application	Manual Labor	1	2,400	2,400				10,120	12,520
Pesticide spraying	Manual Labor	1	2,400	2,400				4,400	6,800
Weedicide	Manual Labor	1	2,400	2,400				3,520	5,920
Weeding	Manual Labor	5	2,400	12,000					12,000
Fertilizer Application	Manual Labor	1	2,400	2,400				10,120	12,520
Fertilizer Application	Manual Labor	1	2,400	2,400				10,120	12,520
Harvesting	Combine Harvester				1	39,600	39,600		39,600
Drying	Manual Labor	6	2,400	14,400					14,400
Threshing	Thresher				1	8,800	8,800		8,800
Transportation	Animal Cart	2	3,000	6,000					6,000
Total, 1,000 Kyat				63,600			79,200	54,120	196,920

Source: Based on the calculation by JICA Survey Team.

Table 5.69 Economic Cost per acre for Summer Paddy without Land Consolidation

Working Title	Working Method	Without Land Consolidation							Total Cost (Kyat/acre)
		Labor Cost			Machine Cost			Other Input Cost (Kyat/acre)	
		Num. Labor	Unit Cost (Kyat/acre)	Total Labor Fee (Kyat/acre)	Nos	Unit Cost (Kyat/acre)	Total Machine Cost (Kyat/acre)		
Renovation Levee	Manual Labor	3	2,400	7,200					7,200.0
Ploughing	Manual Labor	3	3,000	9,000			-		9,000.0
Harrowing	Manual Labor	2	3,000	6,000			-		6,000.0
Leveling	Animal Draught	2	3,600	7,200					7,200.0
Broadcasting	Manual Labor	1	2,400	2,400				26,400	28,800.0
Weedicide spraying	Manual Labor	1	2,400	2,400				8,800	11,200.0
Fertilizer Application	Manual Labor	1	2,400	2,400				11,616	14,016.0
Pesticide spraying	Manual Labor	1	2,400	2,400					2,400.0
Weedicide	Manual Labor	1	2,400	2,400				3,520	5,920.0
Weeding	Manual Labor	5	2,400	12,000				11,616	23,616.0
Fertilizer Application	Manual Labor	1	2,400	2,400				11,616	14,016.0
Fertilizer Application	Manual Labor	1	2,400	2,400					2,400.0
Harvesting	Manual Labor	15	2,000	30,000					30,000.0
Drying	Manual Labor	3	2,400	7,200					7,200.0
Threshing	Manual Labor	6	2,400	14,400					14,400.0
Transportation	Animal Cart	4	3,000	12,000					12,000.0
Total, 1,000 Kyat				121,800			-	73,568.0	195,368.0

Source: Based on the calculation by JICA Survey Team.

Table 5.70 Economic Cost per acre for Summer Paddy with Land Consolidation

Working Title	Working Method	With Land Consolidation							Total Cost (Kyat/acre)
		Labor Cost			Machine Cost			Other Input Cost (Kyat/acre)	
		Num. Labor	Unit Cost (Kyat/acre)	Total Labor Fee (Kyat/acre)	Nos	Unit Cost (Kyat/acre)	Total Machine Cost (Kyat/acre)		
Renovation Levee	Manual Labor	3	2,400	7,200					7,200.0
Ploughing	Tractor				1	17,600	17,600		17,600.0
Harrowing	Tractor				1	13,200	13,200		13,200.0
Leveling	Animal Draught	2	3,600	7,200					7,200.0
Broadcasting	Manual Labor	1	2,400	2,400				26,400	28,800.0
Weedicide spraying	Manual Labor	1	2,400	2,400				8,800	11,200.0
Fertilizer Application	Manual Labor	1	2,400	2,400				11,616	14,016.0
Pesticide spraying	Manual Labor	1	2,400	2,400					2,400.0
Weedicide	Manual Labor	1	2,400	2,400				3,520	5,920.0
Weeding	Manual Labor	5	2,400	12,000				11,616	23,616.0
Fertilizer Application	Manual Labor	1	2,400	2,400				11,616	14,016.0
Fertilizer Application	Manual Labor	1	2,400	2,400					2,400.0
Harvesting	Combine Harvester				1	39,600	39,600		39,600.0
Drying	Manual Labor	3	2,400	7,200					7,200.0
Threshing	Thresher				1	8,800	8,800		8,800.0
Transportation	Small Truck	Animal Cart	2	5,000			-		5,000.0
Total, 1,000 Kyat				55,400			79,200	73,568.0	208,168.0

Source: Based on the calculation by JICA Survey Team.

Table 5.71 Economic Cost per acre for Pulses without Land Consolidation

Working Title	Without Land Consolidation								
	Working Method	Labor Cost			Machine Cost			Other Input Cost	Total Cost
		Num. Labor	Unit Cost (Kyat/acre)	Total Labor Fee (Kyat/acre)	Nos	Unit Cost (Kyat/acre)	Total Machine Cost (Kyat/acre)		
Ploughing	Animal Draught	4	3,000	12,000				-	12,000.0
Hallowing	Animal Draught	1	3,000	3,000				-	3,000.0
Seed Broadcasting	Manual Labor	1	2,400	2,400		-		-	2,400.0
Pesticide spray	Manual Labor	1	2,400	2,400		-		31,680	34,080.0
Fertilizer spray	Manual Labor	1	2,400	2,400		-		22,880	25,280.0
Harvesting	Manual Labor	10	2,400	24,000		-		-	24,000.0
Husking / Threshing	Thresher				1	13,200	13,200	-	13,200.0
Transportation	Animal Cart	4	3,000	12,000					12,000.0
Total, 1,000 Kyat				46,200.0			13,200.0	54,560.0	125,960.0

Source: Based on the calculation by JICA Survey Team.

Table 5.72 Economic Cost per acre for Pulses with Land Consolidation

Working Title	With Land Consolidation								
	Working Method	Labor Cost			Machine Cost			Other Input Cost	Total Cost
		Num. Labor	Unit Cost (Kyat/acre)	Total Labor Fee (Kyat/acre)	Nos	Unit Cost (Kyat/acre)	Total Machine Cost (Kyat/acre)		
Ploughing	Tractor				1	13,200	13,200	-	13,200.0
Hallowing	Animal Draught	1	3,000	3,000		-		-	3,000.0
Seed Broadcasting	Manual Labor	1	2,400	2,400		-		-	2,400.0
Pesticide spray	Manual Labor	1	2,400	2,400		-		31,680	34,080.0
Fertilizer spray	Manual Labor	1	2,400	2,400		-		22,880	25,280.0
Harvesting	Manual Labor	10	2,400	24,000		-		-	24,000.0
Husking / Threshing	Thresher				1	13,200	13,200	-	13,200.0
Transportation	Animal Cart	2	3,000	6,000					6,000.0
Total, 1,000 Kyat				34,200.0			26,400.0	54,560.0	121,160.0

Source: Based on the calculation by JICA Survey Team.

APPENDIX-VI

ENVIRONMENT

APPENDIX VI: ENVIRONMENT

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1. Size and Type of Project Required IEE and EIA

No.	Type of Investment Project	Size Required IEE	Size Required EIA	Reference
Special investment project				
1.	The projects approved by the President or union parliament or union cabinet	-	Any size	
Project for developing energy sector				
2.	Hydro power project	Capacity – 1 and above megawatt and, under 15 megawatt and under 20,000,000 cubic meter of full storage and under 400 hectares of dam area	Capacity –15 and above megawatt or 20,000,000 and above cubic meter of full storage and under 400 and above hectares of dam area	
3.	Electrification factory by atomic energy	-	Any size	
4.	Electrification factory by natural gas or biogas energy	Capacity – 5 and above megawatt, under 50 megawatt	Capacity – 50 and above megawatt	*1
5.	Electrification factory by coal energy	Capacity – above 1 and under 10 megawatt	Capacity – 10 and above megawatt	*1
6.	Electrification factory by waste energy	Capacity – 50 and above megawatt		*2
7.	Electrification factory by geo thermal energy	Capacity – 5 and above megawatt, under 50 megawatt	Capacity – 50 and above megawatt	*3
8.	Electrification factory by combine energy (gas and thermal)	Capacity – 5 and above megawatt, under 50 megawatt	Capacity – 50 and above megawatt	
9.	Electrification factory by geo thermal energy (different type from number 4,5,6,7 and 8)	Capacity – 5 and above megawatt, under 50 megawatt	Capacity – 50 and above megawatt	*1
10.	Electrification factory by wind energy	Capacity – 5 and above megawatt, under 50 megawatt	Capacity – 50 and above megawatt	*4
11.	Electrification factory by solar energy	Capacity – 50 and above megawatt	Any project required EIA defined by the ministry	
12.	Onshore oil and natural gas test-finding by vibration	Any sizes		
13.	Onshore oil and natural gas test-mining	-	Any sizes	
14.	Mining onshore oil and natural gas and its all necessary activities concerned such as joining pipe-lines, transporting, storing	-	Any sizes	*5
15.	Offshore oil and natural gas test-finding by vibration	Any sizes		
16.	Offshore oil and natural gas test-mining		Any sizes	
17.	Mining offshore oil and natural gas and its all necessary activities concerned such as joining pipe-lines, transporting, storing	-	Any sizes	*6
18.	Oil and natural gas production factory (LPG, Mo Gas, asphalt, kerosene, diesel, gasoline, nylon asphalt, sulfur and intermediate products e.g. Propane/propylene mixtures, virgin naphtha, middle distillate and vacuum distillate for the petrochemical industry)	-	Any sizes	*7
19.	Refining natural gas and production of methane, Naphtha, gasoline, kerosene, diesel, wax, lubes)	-	Any sizes	*8
20.	Production liquefied natural gas	-	Any sizes	*9
21.	Kerosene and natural gas transportation camp	-	Any sizes	*10
22.	Construction Kerosene or natural gas container	Storage capacity - Under 10,000 volume ton of Kerosene and Under 2,500 volume ton of natural gas	Storage capacity - 10,000 and above volume ton of Kerosene and 2,500 and above volume ton of natural gas	

No.	Type of Investment Project	Size Required IEE	Size Required EIA	Reference
23.	Distribution of Kerosene and natural gas (connecting pipe line)	Under 10 Kilometer	10 and above 10 Kilometer	*11
24.	Fuel station including LPG and CNG filling station	Storage capacity - under 10,000 liters	Any project required EIA defined by the ministry	*12
25.	Production petroleum based organic chemicals	-	Any sizes	*13
26.	Installation 115 and above Kilowatt under 230 Kilowatt electrification line	30 and above Kilometer	Any project required EIA defined by the ministry	*14
27.	Installation 230 and above Kilowatt electrification line	Any sizes	Any project required EIA defined by the ministry	
28.	Electrification sub-station (230 and 500 KV)	4 and above hectare		*14
29.	Crop and industrial crop production	200 and above hectare and under 500 hectare	500 and above hectare	*15
30.	Seasonal crop production (cereals, pulses, roots, tubers, oil-bearing crops, fiber crops, vegetables and fodder crops)	500 and above and under 3,000 hectare	3,000 and above hectare	*16
31.	Livestock breeding (e.g. cow, buffalo, horse, goat, sheep and other animal)	500 and above and under 3,000 numbers	3,000 and above numbers	*17
32.	Chicken, duck and bird breeding	- Chicken, duck and turkey (500 and above and under 20,000 number) - Big type of bird with long neck and legs (50 and above and under 200 number) - Quill (25,000 and above and under 100,000 number)	- Chicken, duck and turkey (20,000 and above number) - Big type of bird with long neck and legs (200 and above number) - Quill (100,000 and above number)	*18
33.	Pig breeding	2,000 and above and under 5,000 number	5,000 and above number	*17
34.	Fish and shrimp breeding in river and pond	10 and above and under 25 hectare	25 and above hectare	*19
35.	Fish breeding in sea and coastline	1 and above hectare and under 100 hectare	100 and above hectare	*20
36.	Pearl oyster breeding and pearl production	50 and above and under 200 hectare	200 and above hectare	
37.	Wildlife breeding and protection	Any sizes	Any project required EIA defined by the ministry	
38.	Reptile breeding	- Crocodile, animal with hard skin, 4 short hands and legs and long tail and python (under 1,000 number) - Snake and other reptiles (under 5,000 number)	- Crocodile, animal with hard skin, 4 short hands and legs and long tail and python (1,000 and above number) - Snake and other reptiles (5,000 and above number)	
39.	Timber production	Under 500 hectares	500 and above hectare	*21
40.	Forest conservation by time limitation	Under 10,000 hectare	10,000 and above hectare	
41.	Irrigation System	100 and above and under 5,000 hectare	5,000 and above hectare	*21
Good Manufacturing				
Food and Beverage Manufacturing				
42.	Construction of butchery for meat production (Bull, pig, sheep and other)	Meat production (15 and above and under 50 ton per day)	Meat production (50 and above ton per day)	*22, *23
43.	Meat manufacturing factor (chicken, duck and bird)	Meat production (15 and above and under 50 ton per day)	Meat production (50 and above ton per day)	*22, *23
44.	Fishery (fish, crustaceans, gastropods, cephalopods, and Bivalves, includes by products such as fish oil and fish meals)	15 and above and under 75 ton per day	50 and above ton per day	*24, *25
45.	Food and beverage (value added food and beverage production from bull, buffalo, pig, goat, chicken and bird, vegetable and fruit)	Production (10 and above and under 20 ton per day)	Production (20 and above ton per day)	*26

No.	Type of Investment Project	Size Required IEE	Size Required EIA	Reference
46.	Milk and milky product (procedure from raw material to finished product)	200 and above ton per day (calculation base on annual production volume)	-	*27, *28
47.	Manufacturing animal feed	Product – 100 and above ton and under 300 ton (under 600 ton if factory run at most 90 days per year)	Product – 300 and above ton (600 and above ton if factory run at most 90 days per year)	*29
48.	Vegetable oil manufacturing	Product – 100 and above ton and under 300 ton (under 600 ton if factory run at most 90 days per year)	Product – 300 and above ton (600 and above ton if factory run at most 90 days per year)	*30, *29
49.	Manufacturing food contained carbohydrate	Product – 100 and above ton and under 300 ton (under 600 ton if factory run at most 90 days per year)	Product – 300 and above ton (600 and above ton if factory run at most 90 days per year)	*29
50.	Manufacturing raw material from cereal crop (such as rice , wheat, maize, coffee, bean, chili powder)	Product – 100 and above ton and under 300 ton (under 600 ton if factory run at most 90 days per year)	Product – 300 and above ton (600 and above ton if factory run at most 90 days per year)	*29
51.	Installation of monosodium glutamate manufacturing factory	50 and above ton and under 500 ton per day	100 and above ton per day	
52.	Sugar manufacturing factory	Product – 100 and above ton and under 300 ton (under 600 ton if factory run at most 90 days per year)	Product – 300 and above ton (600 and above ton if factory run at most 90 days per year)	*31, *29
53.	Alcohol, wine and beer manufacturing factory	Production – 50,000 and above and under 300,000 litter (under 600,000 litter if factory run at most 90 days per year)	Production – 300,000 and above litter (600,000 and above litter if factory run at most 90 days per year)	
54.	Beverage other than alcohol (such as soda, juice)	20,000 and above litter per day	Any project required EIA defined by the ministry	
55.	Ice production factory	500 and above and under 2,000 ton	2,000 and above ton per day	
56.	Purified drinking water and bottle manufacturing factory	100,000 and above litter per day	Any project required EIA defined by the ministry	
57.	Tobacco and tobacco used product manufacturing	1 and above and under 15 ton per day	15 and above ton per day	
58.	Textile and garment manufacturing (including cloths, cotton fiber, cotton fiber imitation and so on)	Any sizes	Any project required EIA defined by the ministry	*32
59.	Washing, dying, re-dying	1 and above and under 10 ton	10 and above ton	*33
60.	Leather based product production (Leather imitation, hand bag, attaché case, shoes)	1,000 ton and above ton per year	Any project required EIA defined by the ministry	
61.	Tanning factory	Finished product – under 12 ton per day	Finished product – 12 and above ton per day	*34, *35
Timber based Products				
62.	Sawmill and Manufactured Wood Products Production	Sawmills – 3,000 and above and under 50,000 cubic meter (raw) per year Manufactured wood product production – 1,000 and above and under 15,000 cubic meter per year	Sawmills –50,000 and above cubic meter (raw) per year Manufactured wood product production –15,000 and above cubic meter per year	*36
63.	Wood Board and Particle-based Products Production	Under 600 cubic meter or under 420 ton	600 and above cubic meter and 420 and above ton per day	*37, *29
64.	Pulp and Paper milling	Pulp – 20 and above and under 50 ton per day	50 and above ton per day	*38, *29
65.	Painting and printing by matter dissolved organic	Usage amount of matter dissolved organic – 6 and above and under 150 Kilogram	Usage amount of matter dissolved organic – 150 and above Kilogram or 200 and above ton per year	*39, *40, *29
Chemical				
66.	Large volume inorganic compounds manufacturing and coal tar distillation	-	Any sizes	*41, *42
67.	Petroleum-based polymer production	-	Any sizes	*43

No.	Type of Investment Project	Size Required IEE	Size Required EIA	Reference
68	Coal Refinery (production of coal from natural gas, fuel and liquid gas)		Any sizes	*44
69	Chemical fertilizer production		Any sizes	*45, *46, *47
70	Production, formulation, and packaging of different kinds of pesticides		Any sizes	*48
71	Production of Oleo chemical (Production of biodiesel from Fatty acid, Glycerin, vegetables, animal oils)		Any sizes	*49
72	Formulation of Pharmaceutical and bio technology	Less than 50 ton per year	More than 50 ton per year	*50
73	Production of other organic chemicals		Any sizes	*51
74	Production of other inorganic chemicals		Any sizes	*52
75	Production of other chemicals(e.g. Paint, ink, polishing oil, soap bar, detergent powder, perfume, firework and chemical uses for photography)	5 to 10 ton per day	More than 10 ton per day	
76	Production of explosive materials		Any sizes	
77	Production of fire extinguisher and	Any sizes	Any the projects that were considered to be determined IA by ministry	
78	Production and filling of Carbon dioxide and production of industrial used liquid gas	1000 to 3000 ton per year	More than 3000 ton per year	
79	Production of glass, glass fiber or mineral fiber	Any sizes	Any the projects that were considered to be determined IA by ministry	*53, *54
80	Production of ceramic, earthenware and porcelain and sanitary materials	More than 100 ton for Any ceramic and earthen ware More than 10000 ton for porcelain	Any the projects that were considered to be determined IA by ministry	*55
81	Cement and lime factory	10 to 30 tons per hour for cement and 20 to 50 tons per day for lime	Above 30 tons per hour for cement and above 50 tons per day for lime	*56
82	Lava production	Any sizes	Any the projects that were considered to be determined IA by ministry	
83	Production of construction support material and raw material	30000 to 50000 tons per year	Above 50000 tons per year	
84	Production of nylon asphalt	Less than 100 tons per day	Above 100 tons per day	*57
	Minerals, Machinery and Electrical devices			
85	Smelting and refining for fundamental metals (Production and refinery of Lead, Zinc, Copper, Nickel and Aluminum by melting fundamental metals)	Smelting for less than 20 tons metal other than iron Smelting of less than 4 tons per day for minerals other than lead and Cadmium	Smelting of metals above 20 tons per day other than iron Smelting of metals above 4 tons other than Lead and Cadmium	*58, *59
86	Production of raw iron, raw materials and strong steel from Ore and pieces of minerals	Under 2.5 tons per hour	Under 2.5 tons per hour	*60, *61

No.	Type of Investment Project	Size Required IEE	Size Required EIA	Reference
87	Smelting Factory (Smelting of Iron, Steel, non-iron Aluminums, Copper, Lean, Nickel, Tin, Magnesium and Titanium based minerals)	Production of iron under 20 tons per day Production of metals under 20 tons other than iron Production of metals under 4 tons other than Lead and Cadmium	Production of iron above 20 tons per day Production of metals above 20 tons other than iron Production of metals above 4 tons other than Lead and Cadmium	*62, *63
88	Smelting of non-iron metals, smithy and goldsmith	5 to 20 tons of production per day	20 tons and above of production	
89	Shipyards and building of ships	Under 1 hectare of service area and 20000 tons of ship weight	Above 1 hectare of service area or 20000 tons of ship weight	
90	Production, repairing and setting up of train and other railway materials		Above 100 attachments per year	
91	Production of metals, plastic, fiber and rubber materials (Production of mineral, plastic, fiber and rubber materials to use in every steps of industrial works)	Above 1000 square meter of production area Uses of soluble organic material more than 6 kg per hour	Any the projects that were considered to be determined IA by ministry	*64
92	Production of Rubber and rubber materials (different kinds of glue)	Above 2000 tons per year	Any the projects that were considered to be determined IA by ministry	
93	Production of different kinds of vehicles tires	Above 5000 square meters of production area or Uses of soluble organic material more than 6 kg per hour	Any the projects that were considered to be determined IA by ministry	
94	Production of semi-conductor and other electrical devices (semi-conductor, printed circuit boards-PCBs, Printed Wiring Assemblies- PWAs, buffer materials, electro- magnet materials)	Above 5000 square meter of production area or Uses of soluble organic materials above 6 kg per hour	Any the projects that were considered to be determined IA by ministry	*65
95	Production of electrical devices, domestic uses electrical devices (Computer, communication devices, cooking, washing, food processor, cleaning, air conditioners, private and public uses electronic materials, laboratory materials, electric motor and electric bulbs and lamps)	Above 5000 square meter of production area or Uses of soluble organic materials above 6 kg per hour	Any the projects that were considered to be determined IA by ministry	
96	Factory for battery and electrical storage	Under 3000 tons per year	Above 3000 tons per year	
97	Factory for Machinery, Vehicles and Spare parts	Above 5000 square meters of production area or Uses of soluble organic materials above 6 kg per hour	Any the projects that were considered to be determined IA by ministry	
98	Fixing factory for auto mobiles and motor cycles	Above 5000 square meters of production area and Uses of soluble organic material above 6 kg per hour	Any the projects that were considered to be determined IA by ministry	
99	Production factory for Auto mobile spare parts, accessories and engine	Above 5000 square meters of production area and Uses soluble organic material above 6 kg per hour	Any the projects that were considered to be determined IA by ministry	
100	Auto mobile workshops	Above 5000 square meters of effective area		
101	Destroying of old vehicles	Under 10 auto mobiles Under 50 motor cycles	Above 10 auto mobile Above 50 motor cycles	
102	Production of weapons		Any sizes	
103	Releasing of wastes that cannot affect to the environment	Burying under 10 tons Wastes 25000 tons per day Other wastes 50 tons per day	Burying above 10 tons Wastes above 25000 tons Other wastes above 50 tons	*66, *67, *68

No.	Type of Investment Project	Size Required IEE	Size Required EIA	Reference
104	Burning of wastes that cannot affect to the environment	Under 3 tons per hour	Above 3 tons per hour	*66, *67, *68
105	Recycling and reuse from the wastes that cannot affect to the environment	Under 50 tons per day	Above 50 tons per day	*66, *67, *68
106	Releasing of wasted that can affected to the environment		Any sizes	*66
107	Recycling and reuse from the waste that can affect to the environment	Under 10 tons per day	Above 10 tons per day	*66, *68, *69
108	Waste water treatment plant- centralized system		Any sizes	*70
109	Building the collecting system for waste water	Drainage 1 to 10 kilometers length	Above 10 kilometers length drainage	*70
Water Distribution				
110	Development of underground water for industry, agriculture or urban water distribution	Under 4500 cubic meter per day	Above 4500 cubic meter per day	*70
Infrastructure and Service Development Project				
111	Dam or water reservoirs	Under 15 meter height Under 400 hectare of storage capacity	Above 15 meter height or Above 400 hectare of storage capacity	
112	Earth filling of lake, river, stream and canal that can be negative effect to the environment	Under 50 hectares	Above 50 hectares	
113	Other large civil service works (Construction of river and sea retaining wAny, offshore sea water protection)	Under 2 kilometers length and under 25 hectare of area	Above 2 kilometers length and above 25 hectare of area	
114	Removing sandbank	Under 500000 tons	Above 500000 tons	
115	Maintaining of river way (controlling of water surface and water volume)		Any sizes	
116	Shipment transportation (Transportation and maintenance for cargo and passenger)	Any sizes	Any the projects that were considered to be determined IA by ministry	*71
117	Building harbor (Harbor, port and warehouse for loading and passenger ships)	Under 25 hectares	Above 25 hectares	*72
118	Building and development of industrial zone		Any sizes	
119	Building hospitals	Any sizes	Any the projects that were considered to be determined IA by ministry	*73
120	Building cemetery (To bury, burn or others)	Any sizes		
121	Hotels and Tourisms	80 to 200 hotel rooms and 4000 to 10000 square meters of area or 200000 to 500000 square meters of area	Above 200 hotel rooms and above 10000 square meters of area or 500000 square meter of area	*74
122	Golf Court	9 holes court	18 holes court	
Transportation				
123	Train and electric rail (Building, maintenance and those are the basic of railway transportation)	Under 5 kilometers of length	Above 5 kilometers length	*75
124	Roped vehicle	Under 0.5 kilometers length	Above 0.5 kilometers length	
125	Airport and airplane runway	Under 2100 meter runway	Above 2100 meter runway	*76, *77, *78

No.	Type of Investment Project	Size Required IEE	Size Required EIA	Reference
126	Building bridge, river bridge and arches	200 meters to 2 kilometers	Above 2 kilometers	
127	Upgrading bridge, river bridge and arches	Above 300 meters	Any the projects that were considered to be determined IA by ministry	
128	Building tunnel	Under 1 kilometer length	Above 1 kilometer	*79
129	Building new high way (Building or expansion according to the ASEAN standards)	2 to 50 kilometers length	Above 50 kilometers	*80, *81
130	Building other roads (Building or expansion of roads for Regions, States, Districts and Townships)	50 to 100 kilometers of length	Any the projects that were considered to be determined IA by ministry	*82
131	Upgrading roads (Upgrading the and expanding roads till it can use Any seasons)	Above 50 kilometers	Any the projects that were considered to be determined IA by ministry	
Mining				
132	Getting rock, pebble and sand from river or sea	1000 to 50000 cubic meter per year	Above 5000 cubic meter	*83, *84
133	Production of construction, ceramic and earthen used materials (aggregates, lime stone, slate, clay, alabaster, moonstone, sand stone, gneiss rock (granite), White clay, bentonite, quartz and quartzite)	200 to 100000 tons per year	Above 200 tons per year or Above 100000 tons per year	*85, *86
134	Industrial Mining and Purification (Barite, Fluoride, Phosphate, Potash, Salt, Soda ash, asbestos)	Under 200 acres of production area and Under 100000 tons of ore per year	Above 200 acres of production area or Above 100000 tons of ore per year	*86, *87
135	Production of iron and non-iron metals, precious metals other than gold (iron, gray element Manganese, Silver, Copper, Tin, Antimony, Lead, Nickel, Zinc, Chromium, etc. and other precious metals)	Under 50 acres of production area and under 50000 tons per year of production	Above 50 acres of production area and above 50000 tons per year of production	*86, *87
136	Refining of ore without using hazardous chemicals	Under 50000 tons per year of production	Above 50000 tons per of production	
137	Refining of ore by using hazardous chemicals	Under 25000 tons per year of production	Above 25000 tons per year of production	
138	Production and refining of gold without using hazardous chemicals	Under 200 acres	Above 200 acres	
139	Production and refining of gold by using hazardous chemicals	Under 200 acres of production area and under 25000 tons per year of production	Above 200 acres of production area and above 25000 tons per year of production	
140	Production of coal from upper layer and underground	Under 10000 tons of production per year	Above 100000 tons of production per year	*86, *87
141	Metal mining including sand (ilmenite, garnet, titanium, monazite)	1000 to 50000 cubic meter per year	Above 50000 cubic meter per year	*88, *86

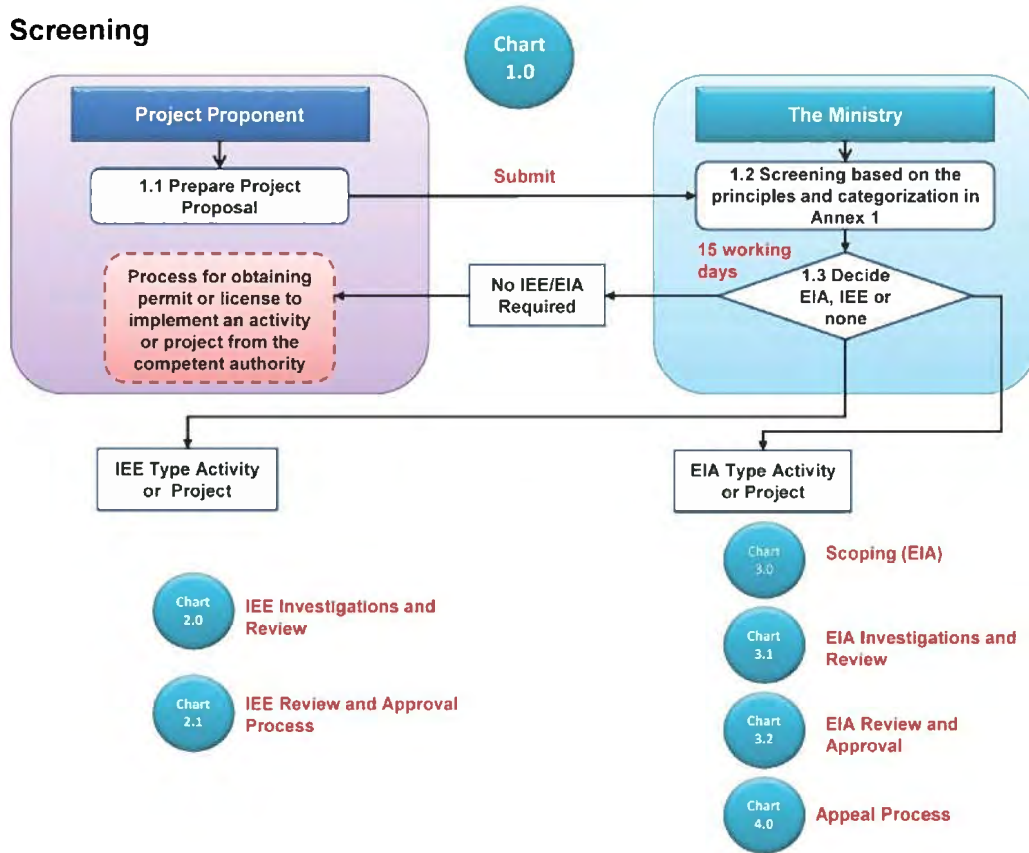
Remarks

- 1 The projects required IEE shall be conducted IEE for all component of the project.
- 2 The projects required EIA shall be conducted EIA for all component of the project.
- 3 This "Description Size and Type of Project Required IEE and EIA" developed by referring to Environmental Conservation , Health and Disaster reduction guideline of International Financial Cooperation of World Bank.

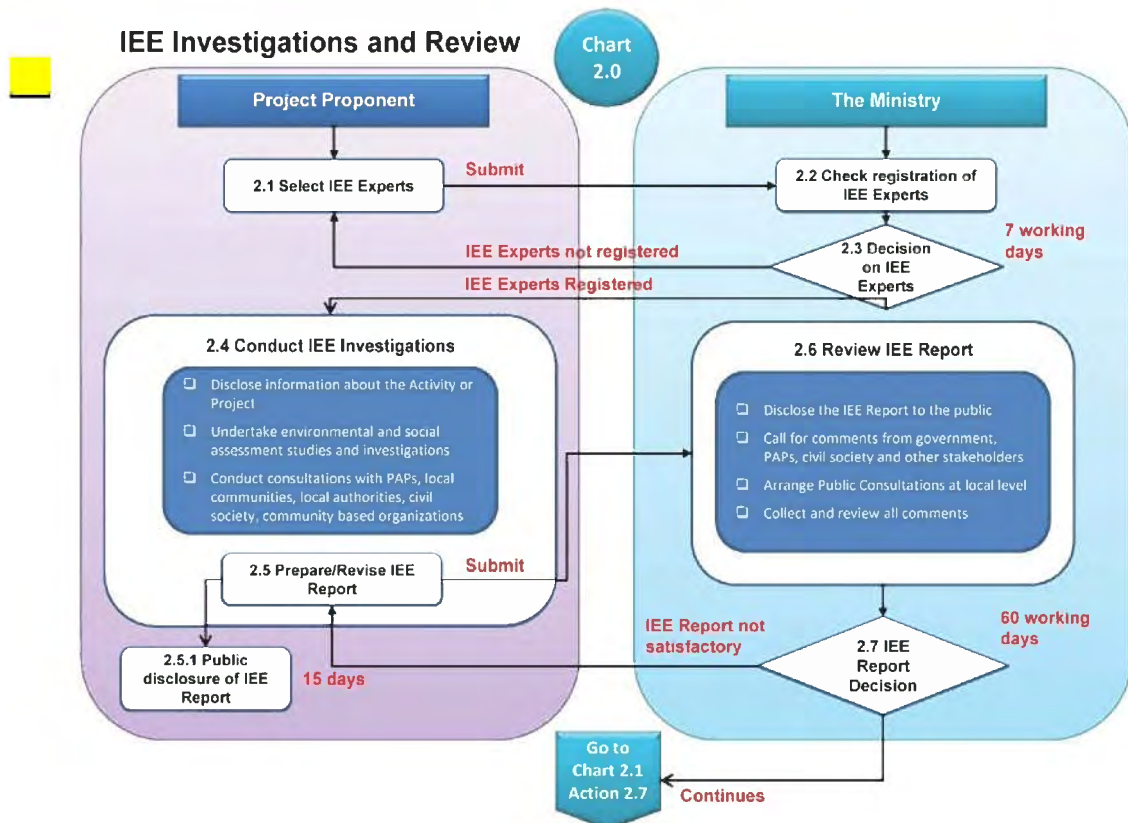
*1: IFC Thermal Power Plant	*38: IFC Pulp and Paper Mills	*70: IFC Water and Sanitation
*2: IFC Waste Management Facilities	*39: IFC Printing	*71: IFC Shipping
*3: IFC Geothermal Power	*40: IPPC 2008 Annex 1: 6.7	*72: IFC Ports, Harbors and Terminals
*4: IFC Wind Energy, The Philippines, EMB	*41: IFC Large volume Inorganic Compounds Manufacturing and Coal Tar Distillation	*73: IFC Health Care Facilities
*5: IFC Onshore Oil and Gas Development	*42: IPPC 2008 Annex 1: 6.8	*74: IFC Tourism and Hospitality Development
*6: IFC Offshore Oil and Gas Development	*43: IFC Petroleum-based Polymers Manufacturing	*75: IFC Railways
*7: IFC Petroleum Refining	*44: IFC Coal Processing	*76: IFC Airport
*8: IFC Natural Gas Processing	*45: IFC Nitrogenous Fertilizer Manufacturing	*77: EBRD
*9: IFC liquefied Natural Gas (LNG) Facilities	*46: IFC Phosphate Fertilizer manufacturing	*78: EUEIA Directive 2011
*10: IFC Crude Oil and Petroleum Product Terminals	*47: IPCC 2008 Annex 1:4:3	*79: The Philippines EMB IEE < 1 km
*11: IFC Gas distribution systems	*48: IFC Pesticide Manufacturing Formulation and Packaging	*80: The Philippines EMB IEE < 2-20 km
*12: IFC Retail Petroleum Networks	*49: IFC Oleo Chemicals Manufacturing	*81: EU 2011: EIA Any Sizes
*13: IFC Large Volume	*50: IFC Pharmaceuticals and Biotechnology Manufacturing Vietnam 2006	*82: The Philippines EMB IEE < 2-20 km
*14: IFC Electric Power Transmission and Distribution	*51: IPCC 2008 Annex 1:4.1	*83: Vietnam: EIA > 5000 m ³ /a
*15: IFC Plantation Crop Production	*52: IPCC 2008 Annex 1:4.2	*84: LAO PDR: IEE 1000- 50000m ³ /a
*16: IFC Annual Crop Production	*53: IFC Glass Manufacturing	*85: IFC Construction Material Extraction
*17: IFC Mammalian Livestock Production	*54: IPCC 2008 Annex 1:3.3 (melting capacity >20 t/d)	*86: The Philippines, EMB EIA ≥75000 t/a
*18: IFC Poultry Production	*55: IFC Ceramic Tile and Sanitary Ware manufacturing (Typical Production levels for Ceramic manufacturing Facilities vary from 10 to 50 tons/day for fine ceramic and 450 to 500 tons/day for ceramic tiles)	*87: IFC Mining
*19: IFC Aquaculture	*56: IFC Cement and Lime Manufacturing	*88: UK Dredging EIA ≥100000 t/a
*20: The Philippines, EMB	*57: IFC Petroleum Refinery	
*21: IFC Forest Harvesting Operation	*58: IFC Base Metal Smelting and Refining	
*22: IFC Meat Processing	*59: IPPC 2008 Annex 1:2.5	
*23: IPPC 2008 Annex 1: 6.4 (a)	*60: IFC Integrated Steel Mills	
*24: IFC Fish Processing	*61: IPCC 2008 Annex 1:2.2	
*25: IPPC 2008 Annex 1:6.4 (b)	*62: IFC Foundries IPPC 2008	
*26: IFC Food and Beverage Processing	*63: Annex 1:2.4 and 2.5 (b)	
*27: IFC Dairy Processing	*64: IFC Metal, Plastic and Rubber Products Manufacturing	
*28: IPPC 2008 Annex 1: 6.4 (c)	*65: IFC Semiconductors and other Electronics Manufacturing	
*29: Danish: Environmental Permitting Decree	*66: IFC Waste Management Facilities	
*30: IFC Vegetable Oil Processing	*67: IPPC 2008 Annex 1:5.3 and 5.4	
*31: IFC Sugar Manufacturing	*68: DK: Environmental Permitting Decree	
*32: IFC Textile Manufacturing	*69: IPPC 2008 Annex 1:5.1	
*33: IPPC 2008 Annex 1: 6.2		
*34: IFC Tanning and Leather Finishing		
*35: IPPC 2008 Annex 1:6.3		
*36: IFC Sawmilling and Manufactured Wood Products		
*37: IFC Board and Particle-based Products		

2. Procedure of EIA / IEE

Screening

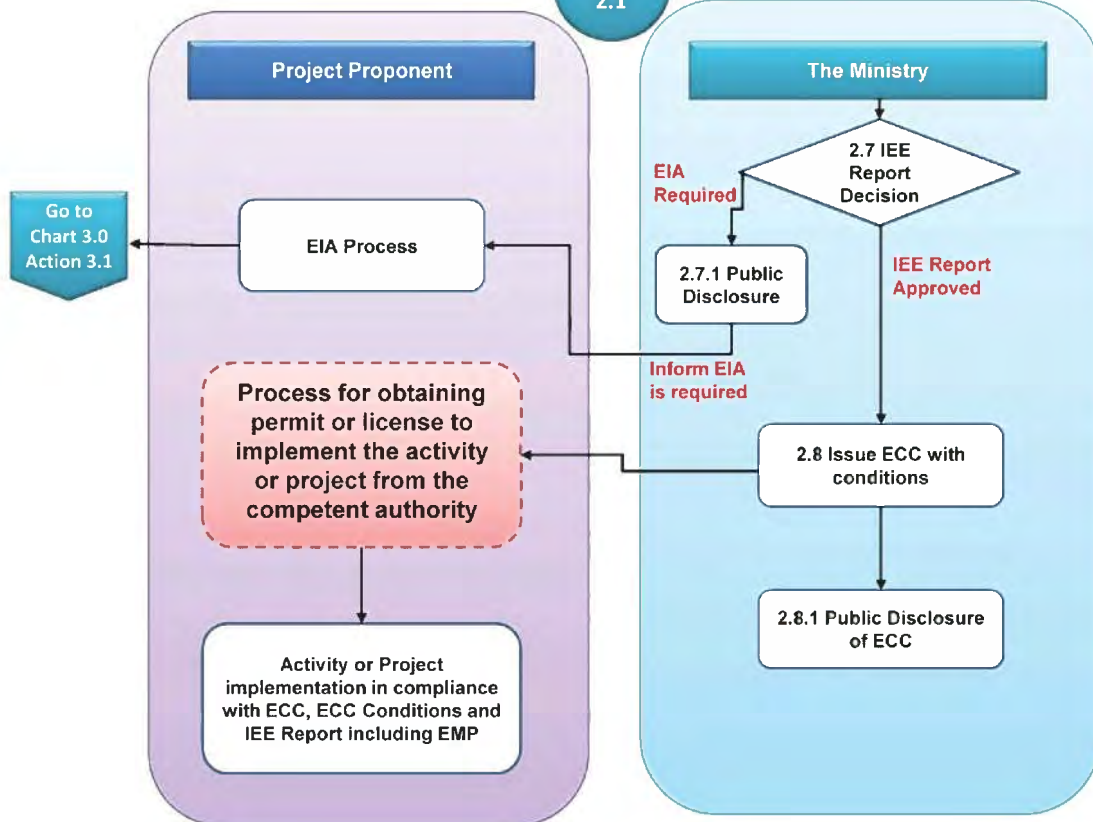


IEE Investigations and Review



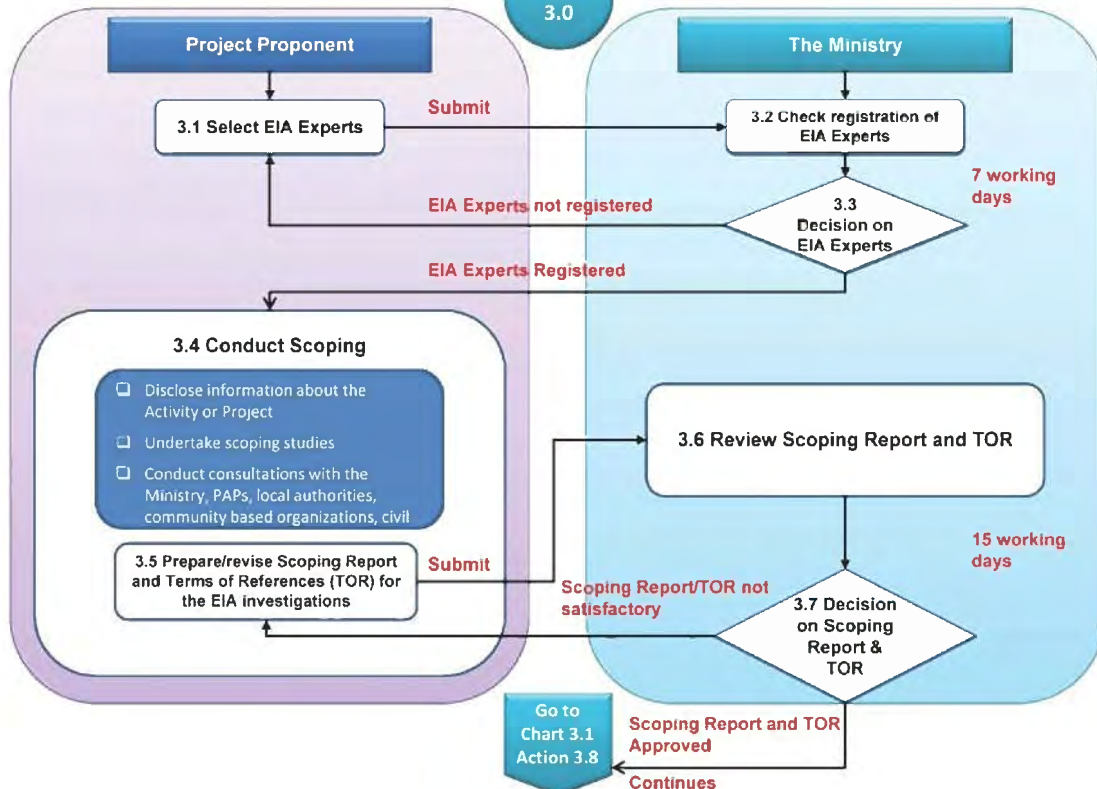
IEE Review and Approval

Chart 2.1



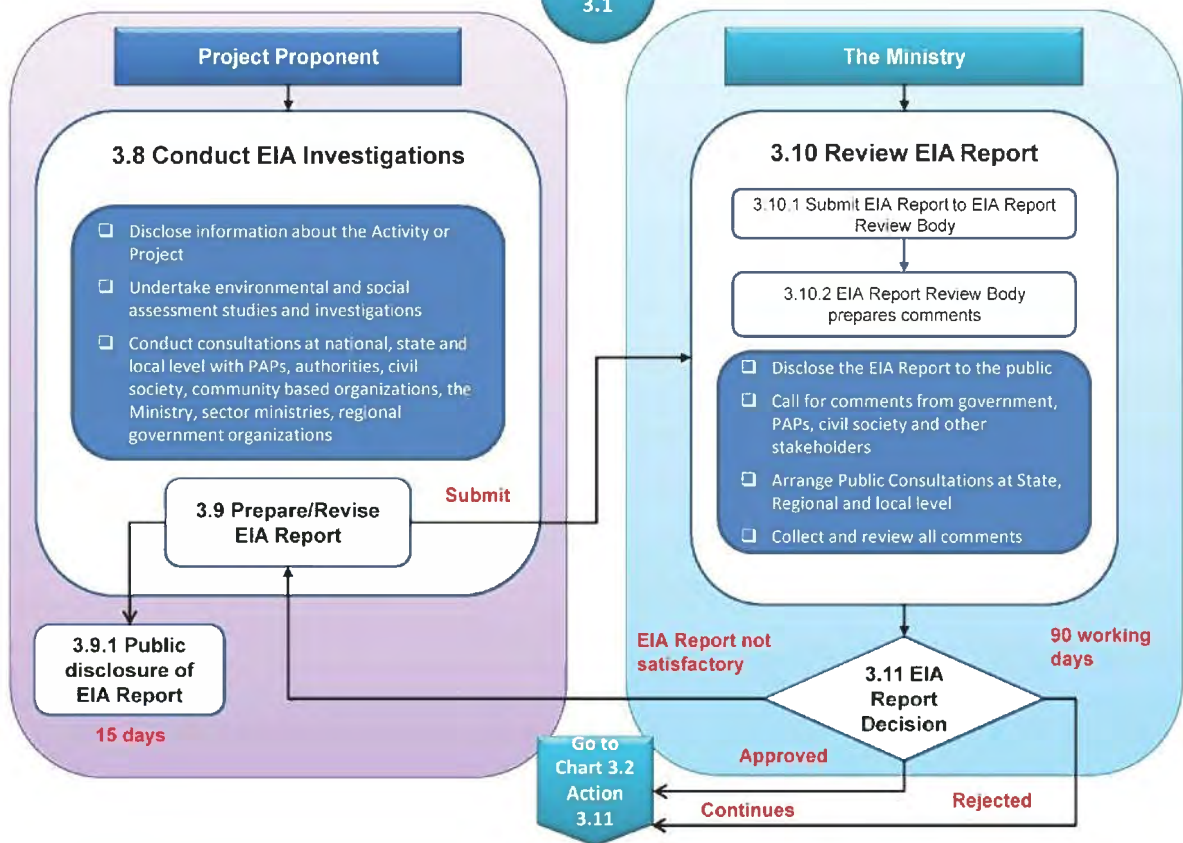
Scoping (EIA)

Chart 3.0



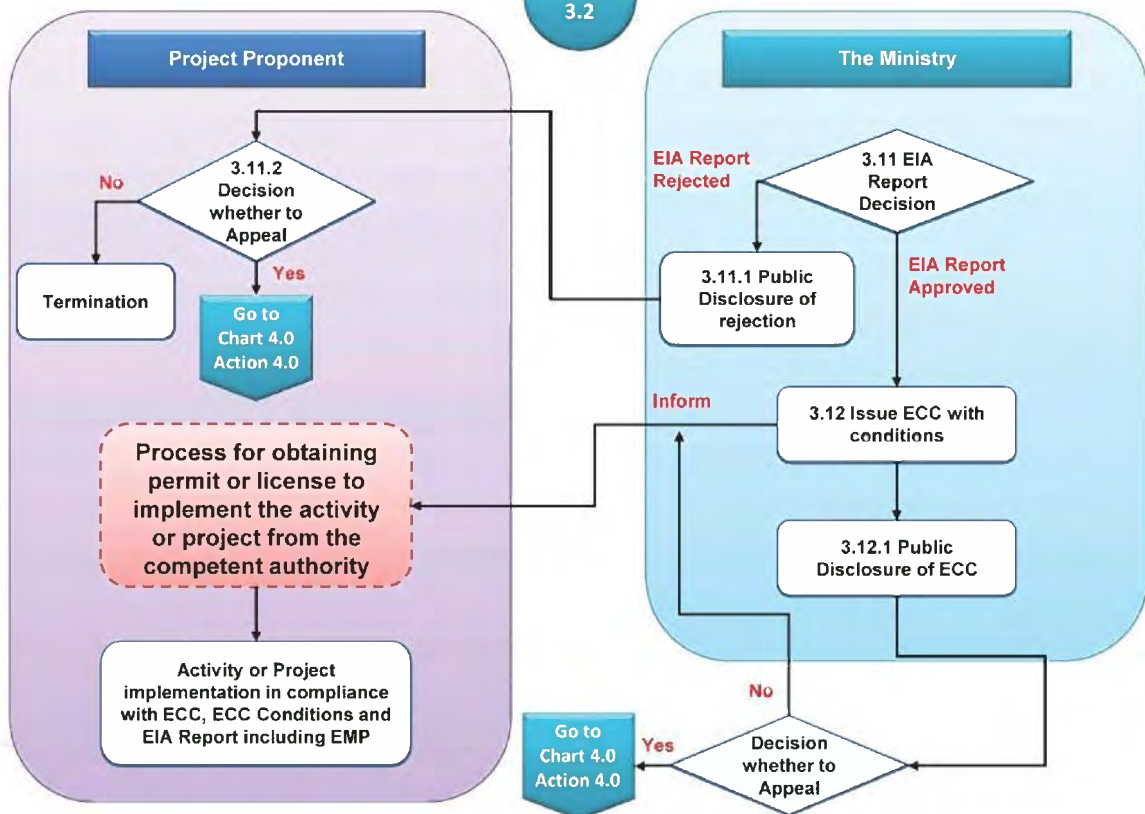
EIA Investigations and Review

Chart 3.1



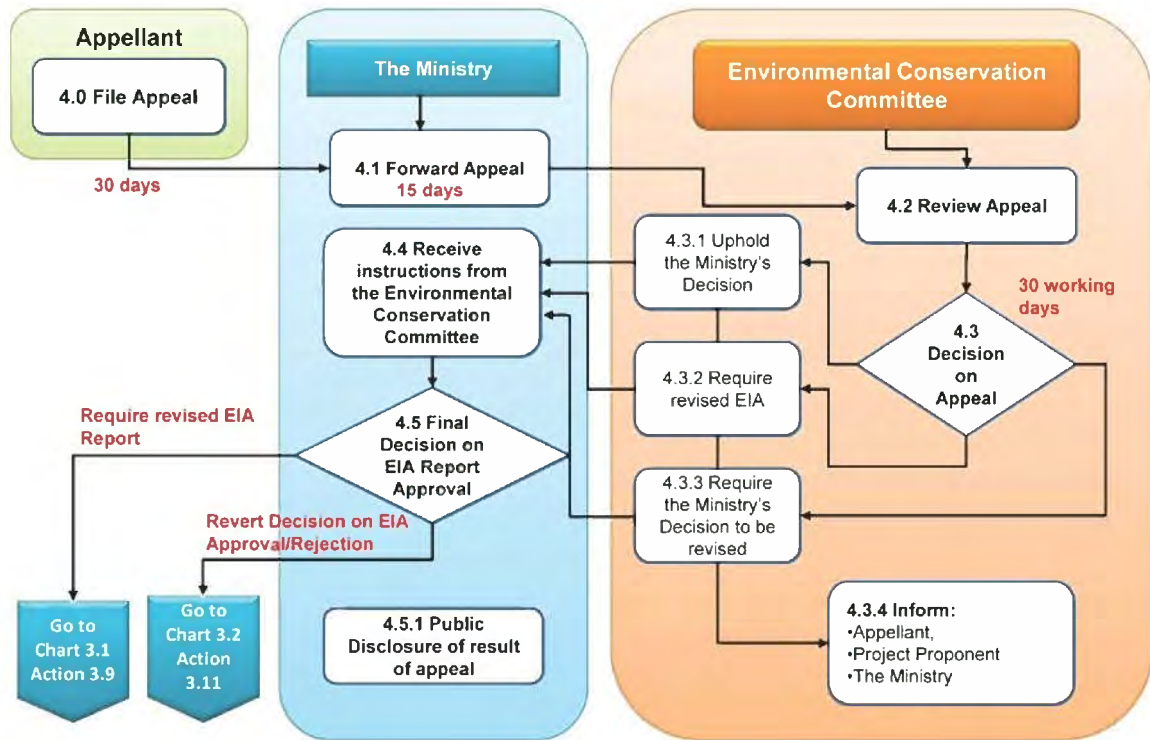
EIA Review and Approval

Chart 3.2



Appeal Process

Chart 4.0



Source: Policy, International Relations, Training and Research Division, Environmental Conservation Department, MOECAP

3. Scoping Result

Table 1 Scoping for “Agricultural Extension Strengthening”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	D	D	The Component will demonstrate agricultural techniques to promote intensive agriculture, therefore, air pollution by the Component is not expected.
2. Water Pollution	D	D	No impact of water pollution can be caused.
3. Waste	D	D	No waste is generated.
4. Soil Contamination/ Salinization	D	D	No soil contamination is generated.
5. Noise and Vibration	D	D	No noise/ vibration are expected.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is resulted from the Component.
9. Protected Area	D	D	No damage to protected area is expected.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the Components will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the Components will take place.
14. Land Acquisition	D	D	Land acquisition is not necessary.
15. Cultural Heritage	D	D	There is no cultural heritage in and around the sites.
16. Landscape	D	D	No change of landscape is resulted from the Component.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	Upgrading of agricultural techniques can contribute to improvement of livelihood in the area.
19. Local Economy	D	B ⁺	Improvement of agricultural techniques can contribute to production increase, which leads to development of local economy.
20. Existing Social Infrastructures and Services	D	D	No negative impact on existing social infrastructures and services is anticipated.
21. Misdistribution of Benefit and Damage	D	D	Any farmers can access to the demonstration plots, and no biased distribution of benefits and damages are caused by the Component.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children's rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	D	D	No impact such as infectious diseases is expected.
27. Accidents	D	D	No accident is expected during the operation period.
28. Global Warming	D	D	No global warming by the Component is anticipated.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Table 2 Scoping for “Polder and Drainage Improvement”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	B ⁻	D	Construction period: With regard to rehabilitation works, heavy machinery and trucks are supposed to emit exhaust gas and to generate dust, and a little serious degree of air pollution would take place. Operation period: Once offered for use, no air pollution arises.
2. Water Pollution	B ⁻	D	Construction period: Accompanying with rehabilitation works, turbid water may occur in the drainages. Operation period: Once offered for use, no water pollution arises.
3. Waste	B ⁻	D	Construction period: Wastes and scraps (mostly excavated soils and bricks of existing facilities) are expected. Operation period: Once offered for use, no waste is generated.
4. Soil Contamination/ Salinization	D	D	Construction period: Oil leakage from construction vehicles is expected, however, the extent is negligible. Operation period: Once offered for use, no soil contamination is generated
5. Noise and Vibration	B ⁻	D	Construction period: Transport of materials by heavy machinery and trucks takes place toward the construction sites. Though serious noise / vibration are not generated from these activities, consideration should be paid when the heavy machinery and trucks pass through the living quarters. Operation period: Once offered for use, no noise/ vibration are expected.
6. Ground Subsidence	D	D	Since no groundwater lifting is planned in the Component, no land subsidence will be caused.
7. Offensive Odor	D	D	Since the Component deals with irrigation water supply, no cause of odor is resulted from the construction work and operation period either.
8. Bottom Sediment	D	D	No erosion of river bottom is caused.
9. Protected Area	D	D	There is no protected area in and around the site.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	Since this Component deals with rehabilitation of existing facilities, no topographical and geographical change by the works will be caused, whereby no impact is expected.
13. Involuntary Resettlement	D	D	Since the Component deals with rehabilitation of existing facilities, no resettlement by the works will take place.
14. Land Acquisition	D	D	Construction period: It is planned to expand embankment, however, it is within government owned plot, and the Component will not cause land acquisition. Operation period: After the work completion, no impact is expected.
15. Cultural Heritage	D	D	There is no cultural heritage in and around the sites.
16. Landscape	D	D	Since the Component covers rehabilitation works for the existing facilities, no change of landscape is expected.
17. The Poor, Indigenous and Ethnic People	D	D	It is confirmed that there are no ethnic minority people's residential areas in the priority areas according to the ID and DOA official personnel concerned.
18. Livelihood	D	B ⁺	Construction period: No adverse effect is caused. Operation period: Improvement of the facilities enables to extend cultivation period, which result in stable farming.

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
19. Local Economy	D	B ⁺	Construction period: No negative impact is anticipated. Operation period: Improvement of the facilities enables to operate stable farming, which result in development of local economy.
20. Existing Social Infrastructures and Services	D	D	No damage to existing infrastructure is expected.
21. Misdistribution of Benefit and Damage	D	D	Since nobody is damaged by the Component, no misdistribution of benefit and damage is anticipated.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact or change on water use right is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children's rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	B ⁻	D	Construction period: Potential risk of infectious diseases, such as TB and HIV/AIDS, may arise, since there will be big number of labors coming together to the construction sites. Operation period: No impact is expected.
27. Accidents	B ⁻	D	Construction period: Potential risk of accidents would arise from the Component such as possibility of traffic accidents by vehicles of the construction work. Operation period: No accident is expected during the operation period
28. Global Warming	D	D	No global warming by the Component is anticipated.

Table 3 Scoping for “Agricultural Machinery Station Enhancement”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	D	D	The Component will install agricultural machines at machinery stations, therefore, air pollution by the Component is not expected.
2. Water Pollution	D	D	No impact of water pollution can be caused.
3. Waste	D	D	No waste is generated.
4. Soil Contamination/ Salinization	D	D	No soil contamination is generated.
5. Noise and Vibration	D	D	No noise/ vibration are expected.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is resulted from the work, and operation period either.
9. Protected Area	D	D	No damage to any protected areas is expected by the Component.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the works will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the Component will take place.
14. Land Acquisition	D	D	Land acquisition is not necessary.
15. Cultural Heritage	D	D	There is no cultural heritage in and around the sites.
16. Landscape	D	D	No change of landscape is resulted from the Component.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	Promotion of agricultural mechanization can contribute to efficient farming, which leads to improvement of livelihood in the area.
19. Local Economy	D	B ⁺	Promotion of agricultural mechanization can contribute to productivity improvement, and finally to development of local economy.
20. Existing Social Infrastructures and Services	D	D	No negative impact on existing social infrastructures and services is anticipated.
21. Misdistribution of Benefit and Damage	D	D	Any farmers can access to the machinery stations, and no biased distribution of benefits and suffering takes place from the Component.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children’s rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	D	D	No impact such as infectious diseases is expected.
27. Accidents	D	D	No accident is expected during the operation period.
28. Global Warming	D	D	No global warming by the Component is anticipated.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Table 4 Scoping for “Agricultural Machinery Dissemination”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	D	D	The Component will demonstrate agricultural machines to promote agricultural mechanization, therefore, air pollution by the Component is not expected.
2. Water Pollution	D	D	No impact of water pollution can be caused.
3. Waste	D	D	No waste is generated.
4. Soil Contamination/ Salinization	D	D	No soil contamination is generated.
5. Noise and Vibration	D	D	No noise/ vibration are expected.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is resulted from the Component.
9. Protected Area	D	D	There is no protected area in and around the sites.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the works will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the works will take place.
14. Land Acquisition	D	D	Land acquisition is not necessary.
15. Cultural Heritage	D	D	There is no cultural heritage in and around the sites.
16. Landscape	D	D	No change of landscape is resulted from the work.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	Promotion of agricultural mechanization can contribute to reduction in farming time and on-time cultivation, which results in improvement of livelihood in the area.
19. Local Economy	D	B ⁺	Promotion of agricultural mechanization can contribute to efficient farming which results in development of local economy.
20. Existing Social Infrastructures and Services	D	D	No negative impact on existing social infrastructures and services is anticipated.
21. Misdistribution of Benefit and Damage	D	D	The Component will demonstrate new machines and everybody can access to the demonstration site. Therefore, no biased distribution of benefits and damages are caused.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children’s rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	D	D	No impact such as infectious diseases is expected.
27. Accidents	D	D	No accident is expected during the operation period.
28. Global Warming	D	D	No global warming by the Component is anticipated.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Table 5 Scoping for “Flood Monitoring System Establishment”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	D	D	The Component will establish flood monitoring systems, and air pollution by the Component is not expected.
2. Water Pollution	D	D	No impact of water pollution can be caused.
3. Waste	D	D	No waste is generated.
4. Soil Contamination/ Salinization	D	D	No soil contamination is generated.
5. Noise and Vibration	D	D	No noise/ vibration are expected.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is caused by the Component.
9. Protected Area	D	D	No damage to protected area is anticipated.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the Component will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the Components will take place.
14. Land Acquisition	D	D	Land acquisition is not necessary.
15. Cultural Heritage	D	D	There is no cultural heritage in and around the sites.
16. Landscape	D	D	No change of landscape is resulted from the Component.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	This system will be effective to minimize natural disaster in the future and useful for stable farming, which results in livelihood improvement.
19. Local Economy	D	B ⁺	This system will be effective to minimize natural disaster in the future and useful for stable farming, which is beneficial for local economy.
20. Existing Social Infrastructures and Services	D	D	No negative impact on existing social infrastructures and services is anticipated.
21. Misdistribution of Benefit and Damage	D	D	Everybody can enjoy the output of the system, namely, flood control. Therefore, no biased distribution of benefits and damages is caused.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children's rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	D	D	No impact such as infectious diseases is expected.
27. Accidents	D	D	No accident is expected during the operation period.
28. Global Warming	D	D	No global warming by the Component is anticipated.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Table 6 Scoping for “Jetty Improvement”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	B ⁻	D	Construction period: With regard to rehabilitation works, heavy machinery and trucks are supposed to emit exhaust gas and generate dust, and a little serious degree of air pollution would take place. Operation period: Once offered for use, no air pollution arises.
2. Water Pollution	B ⁻	D	Construction period: Accompanying with rehabilitation works, turbid water may be caused. Operation period: Once offered for use, no water pollution is caused.
3. Waste	B ⁻	D	Construction period: Wastes and scraps (mostly excavated soils and bricks of existing facilities) are expected. Operation period: Once offered for use, no waste is generated.
4. Soil Contamination/ Salinization	D	D	Construction period: Oil leakage from construction vehicles is expected, however, the extent is negligible. Operation period: Once offered for use, no soil contamination is generated
5. Noise and Vibration	B ⁻	D	Construction period: Transport of materials by heavy machinery and trucks takes place toward the construction sites. Though serious noise / vibration are not generated from these activities, consideration should be paid when the heavy machinery and trucks pass through the living quarters. Operation period: Once offered for use, no noise/ vibration are expected.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is caused by the Component.
9. Protected Area	D	D	No damage to protected area is expected.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the Component will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the Components will take place.
14. Land Acquisition	D	D	Land acquisition is not necessary.
15. Cultural Heritage	D	D	There is no cultural heritage in and around the sites.
16. Landscape	D	D	No change of landscape is resulted from the Component.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	The Component can reduce time and cost for loading and increase labor's safety, which is profitable for livelihood.
19. Local Economy	D	B ⁺	The Component will reduce distribution cost of water transportation, and it can activate local economy.
20. Existing Social Infrastructures and Services	D	D	Even during the improvement of jetty, it is possible to use other places for loading. No negative impact on existing social infrastructures and services is anticipated.
21. Misdistribution of Benefit and Damage	D	D	Everybody can access to the jetties, therefore, no biased distribution of benefits and damages is caused.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children's rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	B ⁻	D	Construction period: Potential risk of infectious diseases, such as TB and HIV/AIDS, may arise, since there will be big number of labors coming together to the construction sites. Operation period: No impact is expected.

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
27. Accidents	B ⁻	D	Construction period: Potential risk of accidents would be caused by the Component such as possibility of traffic accidents by vehicles of the construction work. Operation period: No accident is expected during the operation period.
28. Global Warming	D	D	No global warming by the Component is anticipated.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Table 7 Scoping for “Market Improvement”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	B ⁻	D	Construction period: With regard to rehabilitation works, heavy machinery and trucks are supposed to emit exhaust gas and to generate dust, and a little serious degree of air pollution would take place. Operation period: Once offered for use, no air pollution arises.
2. Water Pollution	D	D	No water pollution is caused.
3. Waste	B ⁻	D	Construction period: Wastes and scraps are expected. Operation period: No waste is expected after the improvement completion.
4. Soil Contamination/ Salinization	D	D	Construction period: Oil leakage from construction vehicles is expected, however, the extent is negligible. Operation period: Once offered for use, no soil contamination is generated.
5. Noise and Vibration	B ⁻	D	Construction period: Transport of materials by heavy machinery and trucks takes place toward the construction sites. Though serious noise / vibration are not generated from these activities, consideration should be paid when the heavy machinery and trucks pass through the living quarters. Operation period: Once offered for use, no noise/ vibration are expected.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is caused by the Component.
9. Protected Area	D	D	No damage to protected area is expected.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the Component will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the Components will take place.
14. Land Acquisition	D	D	During the renovation of the market, the market function should be transferred to another site temporarily, however, the area can be provided by the City Development Committees. Land acquisition is not necessary.
15. Cultural Heritage	D	D	There is no cultural heritage in and around the sites.
16. Landscape	D	D	No change of landscape is resulted from the Component.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	The Component installs cold storage, improves sanitary conditions, and alleviates crowded markets, which is useful for activation of existing markets. Therefore, the Component is beneficial for livelihood of the users.
19. Local Economy	D	B ⁺	The Component can activate existing markets and it can

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
			contribute to development of local economy.
20. Existing Social Infrastructures and Services	B ⁻	D	Construction period: During renovation of the market, the function should be transferred to another site temporarily, which is inconvenient for the users. Operation period: No impact is expected.
21. Misdistribution of Benefit and Damage	D	D	Everybody can access to the markets. Therefore, no biased distribution of benefits and damages is caused.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children's rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	B ⁻	D	Construction period: Potential risk of infectious diseases, such as TB and HIV/AIDS, may arise, since there will be big number of labors coming together to the construction sites. Operation period: No impact is expected.
27. Accidents	B ⁻	D	Construction period: Potential risk of accidents would be caused by the Component such as possibility of traffic accidents by vehicles of the construction work. Operation period: No accident is expected during the operation period.
28. Global Warming	D	D	No global warming by the Component is anticipated.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Table 8 Scoping for “PPP Wholesale Market Establishment (Mandalay)”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	B ⁻	D	Construction period: With regard to rehabilitation works, heavy machinery and trucks are supposed to emit exhaust gas and to generate dust, and a little serious degree of air pollution would take place. Operation period: Once offered for use, no air pollution arises.
2. Water Pollution	D	D	No water pollution is caused.
3. Waste	B ⁻	D	Construction period: Wastes and scraps are expected. Operation period: No waste is expected after the improvement completion.
4. Soil Contamination/ Salinization	D	D	Construction period: Oil leakage from construction vehicles is expected, however, the extent is negligible. Operation period: Once offered for use, no soil contamination is generated.
5. Noise and Vibration	B ⁻	D	Construction period: Transport of materials by heavy machinery and trucks takes place toward the construction sites. Though serious noise / vibration are not generated from these activities, consideration should be paid when the heavy machinery and trucks pass through the living quarters. Operation period: Once offered for use, no noise/ vibration are expected.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is caused by the Component.
9. Protected Area	D	D	No damage to protected area is anticipated.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the Component will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the Components will take place.
14. Land Acquisition	D	D	Land acquisition is not necessary.
15. Cultural Heritage	D	D	There is no cultural heritage in and around the sites.
16. Landscape	D	D	No change of landscape is resulted from the Component.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	The Component will promote export of agricultural products, and increase in transaction amount of vegetables and fruits, which results in improvement of livelihood.
19. Local Economy	D	B ⁺	The Component promotes dialogue between the government sector and the private sector to enhance “one stop service function” of the wholesale market. It means that it is beneficial for local economy.
20. Existing Social Infrastructures and Services	D	D	No negative impact on existing social infrastructures and services is anticipated.
21. Misdistribution of Benefit and Damage	D	D	Everybody can access to the markets. Therefore, no biased distribution of benefits and damages is caused.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children’s rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	D	D	No impact such as infectious diseases is expected.
27. Accidents	D	D	No accident is expected during the operation period.
28. Global Warming	D	D	No global warming by the Component is anticipated.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Table 9 Scoping for “Wholesale Market Development (New)”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	B ⁻	D	Construction period: With regard to rehabilitation works, heavy machinery and trucks are supposed to emit exhaust gas and to generate dust, and a little serious degree of air pollution would take place. Operation period: Once offered for use, no air pollution arises.
2. Water Pollution	D	D	No water pollution is caused.
3. Waste	B ⁻	D	Construction period: Wastes and scraps are expected. Operation period: No waste is generated.
4. Soil Contamination/ Salinization	D	D	Construction period: Oil leakage from construction vehicles is expected, however, the extent is negligible. Operation period: Once offered for use, no soil contamination is generated
5. Noise and Vibration	B ⁻	D	Construction period: Transport of materials by heavy machinery and trucks takes place toward the construction sites. Though serious noise / vibration are not generated from these activities, consideration should be paid when the heavy machinery and trucks pass through the living quarters. Operation period: Once offered for use, no noise/ vibration are expected.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is caused by the Component.
9. Protected Area	D	D	No damage to protected area is expected.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the Component will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the Components will take place.
14. Land Acquisition	B ⁻	D	Construction period: Since the Component will construct a new market, land acquisition will be necessary. Operation period: Once offered for use, no issue is expected.
15. Cultural Heritage	D	D	There is no cultural heritage in and around the sites.
16. Landscape	D	D	No change of landscape is resulted from the Component.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	The Component will construct a new market equipped with cold storage, and alleviate crowded markets. It is useful for activation of existing markets, thus, it is beneficial for livelihood for the users.
19. Local Economy	D	B ⁺	The Component can activate local economy by establishment of a new market.
20. Existing Social Infrastructures and Services	D	D	No negative impact on existing social infrastructures and services is anticipated.
21. Misdistribution of Benefit and Damage	D	D	Everybody can access to the markets. Therefore, no biased distribution of benefits and damages is caused.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children's rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	B ⁻	D	Construction period: Potential risk of infectious diseases, such as TB and HIV/AIDS, may arise, since there will be big number of labors coming together to the construction sites. Operation period: No impact is expected.

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
27. Accidents	B ⁻	D	Construction period: Potential risk of accidents would be caused by the Component such as possibility of traffic accidents by vehicles of the construction work. Operation period: No accident is expected during the operation period.
28. Global Warming	D	D	No global warming by the Component is anticipated.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Table 10 Scoping for “Small and Medium Agro-enterprise Promotion (Two Step Loan)”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	D	D	The Component will support enterprises by development of loan program based on users' needs, which results in no air pollution.
2. Water Pollution	D	D	No impact of water pollution can be caused.
3. Waste	D	D	No waste is generated.
4. Soil Contamination/ Salinization	D	D	No soil contamination is generated.
5. Noise and Vibration	D	D	No noise and vibration is generated.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is caused by the Component.
9. Protected Area	D	D	No damage to protected area is expected.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the Component will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the Components will take place.
14. Land Acquisition	D	D	Land acquisition is not necessary.
15. Cultural Heritage	D	D	There is no cultural heritage in and around the sites.
16. Landscape	D	D	No change of landscape is resulted from the Component.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	The Component will assist enterprises for improvement of value chain, which can improve their income of the people concerned.
19. Local Economy	D	B ⁺	The Component can activate local economy by support of enterprises.
20. Existing Social Infrastructures and Services	D	D	No negative impact on existing social infrastructures and services is anticipated.
21. Misdistribution of Benefit and Damage	D	D	The Component targets small and medium enterprises, and nobody is damaged by the Component, therefore, no misdistribution of benefit and damage.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children's rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	D	D	No impact such as infectious diseases is expected.
27. Accidents	D	D	No accident is expected during the operation period.
28. Global Warming	D	D	No global warming by the Component is anticipated.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Table 11 Scoping for “Supply Chain Improvement of Rice”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	D	D	The Component will promote certified seeds, nurturing business mind in traders and millers and establish partnership among stakeholders. It means that air pollution is not caused by the Component.
2. Water Pollution	D	D	No impact of water pollution can be caused.
3. Waste	D	D	No waste is generated.
4. Soil Contamination/ Salinization	D	D	No soil contamination is generated.
5. Noise and Vibration	D	D	No noise and vibration is generated.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is caused by the Component.
9. Protected Area	D	D	No damage to protected area will arise.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the Component will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the Components will take place.
14. Land Acquisition	D	D	Land acquisition is not necessary.
15. Cultural Heritage	D	D	There is no cultural heritage in and around the sites.
16. Landscape	D	D	No change of landscape is resulted from the Component.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	The Component will improve quality of rice, reduce in production cost, distribution loss and transaction cost, which results in improvement of livelihood of people who deal with rice production and sale.
19. Local Economy	D	B ⁺	The Component will improve productivity and quality of rice in the area, which leads to activate local economy.
20. Existing Social Infrastructures and Services	D	D	No negative impact on existing social infrastructures and services is anticipated.
21. Misdistribution of Benefit and Damage	D	D	Everybody can access to the markets. Therefore, no biased distribution of benefits and damages is caused.
22. Social Institutions	D	D	No negative impact on social institutions is expected
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children’s rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	D	D	No impact such as infectious diseases is expected.
27. Accidents	D	D	No accident is expected during the operation period
28. Global Warming	D	D	No global warming by the Component is anticipated

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Table 12 Scoping for “Value Chain Enhancement of Vegetables and Fruits”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	D	D	The Component aims at improvement in vegetables and fruits distribution and processing. It means that air pollution is not caused by the Component.
2. Water Pollution	D	D	No impact of water pollution can be caused.
3. Waste	D	D	No waste is generated.
4. Soil Contamination/ Salinization	D	D	No soil contamination is generated.
5. Noise and Vibration	D	D	No noise and vibration is generated.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is caused by the Component.
9. Protected Area	D	D	There is no protected area in and around the sites.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the Component will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the Components will take place.
14. Land Acquisition	D	D	Land acquisition is not necessary.
15. Cultural Heritage	D	D	There is no cultural heritage in and around the sites.
16. Landscape	D	D	No change of landscape is resulted from the Component.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	The Component aims at quality improvement of vegetables and fruits, reduction in production cost, distribution loss, and transaction cost, which can improve their income.
19. Local Economy	D	B ⁺	The Component can improve productivity and quality of vegetables and fruits, which is beneficial for local economy.
20. Existing Social Infrastructures and Services	D	D	No negative impact on existing social infrastructures and services is anticipated.
21. Misdistribution of Benefit and Damage	D	D	Everybody can access to the markets. Therefore, no biased distribution of benefits and damages is caused.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children’s rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	D	D	No impact such as infectious diseases is expected.
27. Accidents	D	D	No accident is expected during the operation period.
28. Global Warming	D	D	No global warming by the Component is anticipated.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Table 13 Scoping for “Food Processing Industry Promotion”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	D	D	The Component will promote food processing businesses through dissemination of relevant technologies, therefore, air pollution is not caused by the Component.
2. Water Pollution	D	D	No impact of water pollution can be caused.
3. Waste	D	D	No waste is generated.
4. Soil Contamination/ Salinization	D	D	No soil contamination is generated.
5. Noise and Vibration	D	D	No noise and vibration is generated.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is caused by the Component.
9. Protected Area	D	D	No damage to protected area is expected.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the Component will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the Components will take place.
14. Land Acquisition	D	D	Land acquisition is not necessary.
15. Cultural Heritage	D	D	There is no cultural heritage in and around the sites.
16. Landscape	D	D	No change of landscape is resulted from the Component.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	The Component will increase farm income through promotion of food processing business. Therefore, it is beneficial for livelihood.
19. Local Economy	D	B ⁺	The Component can activate local economy by increase of farm income.
20. Existing Social Infrastructures and Services	D	D	No negative impact on existing social infrastructures and services is anticipated.
21. Misdistribution of Benefit and Damage	D	D	Nobody will be damaged by the Component. Therefore, no biased distribution of benefits and damages is caused.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children’s rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	D	D	No impact such as infectious diseases is expected.
27. Accidents	D	D	No accident is expected during the operation period.
28. Global Warming	D	D	No global warming by the Component is anticipated.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Table 14 Scoping for “Dissemination of Advanced Farming Technologies”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	D	D	The Component will increase farm income through promotion of lowland vegetable production by advanced farming technologies, therefore, air pollution is not caused by the Component.
2. Water Pollution	D	D	No impact of water pollution can be caused.
3. Waste	D	D	No waste is generated.
4. Soil Contamination/ Salinization	D	D	No soil contamination is generated.
5. Noise and Vibration	D	D	No noise and vibration is generated.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is caused by the Component.
9. Protected Area	D	D	No impact on protected area is expected.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the Component will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the Components will take place.
14. Land Acquisition	D	D	Land acquisition is not necessary.
15. Cultural Heritage	D	D	No impact on cultural heritage is anticipated.
16. Landscape	D	D	No change of landscape is resulted from the Component.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	The Component will increase farm income through promotion of lowland vegetable production. Therefore, it is profitable for livelihood.
19. Local Economy	D	B ⁺	The Component can activate local economy by promotion of lowland vegetable production.
20. Existing Social Infrastructures and Services	D	D	No negative impact on existing social infrastructures and services is anticipated.
21. Misdistribution of Benefit and Damage	D	D	Nobody will be damaged by the Component. Therefore, no biased distribution of benefits and damages is caused.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children's rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	D	D	No impact such as infectious diseases is expected.
27. Accidents	D	D	No accident is expected during the operation period.
28. Global Warming	D	D	No global warming by the Component is anticipated.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Table 15 Scoping for “Enhancement of Plant Protection Function”

Environmental Parameters	Evaluation		Reason
	Construction period	Operation period	
1. Air Pollution	D	D	The Component will enhance plant protection function, therefore, air pollution is not caused by the Component.
2. Water Pollution	D	D	No impact of water pollution can be caused.
3. Waste	D	D	No waste is generated.
4. Soil Contamination/ Salinization	D	D	No soil contamination is generated.
5. Noise and Vibration	D	D	No noise and vibration is generated.
6. Ground Subsidence	D	D	No land subsidence takes place.
7. Offensive Odor	D	D	No cause of odor is resulted from the Component.
8. Bottom Sediment	D	D	No erosion of river bottom is caused by the Component.
9. Protected Area	D	D	No impact on protected area is expected.
10. Ground Water	D	D	Use of ground water is not planned.
11. Hydrological Situation	D	D	No hydrological situation for existing rivers and drainages will be changed by the Component.
12. Topography and Geographical Features	D	D	No topographical and geographical change by the Component will be caused.
13. Involuntary Resettlement	D	D	No resettlement by the Components will take place.
14. Land Acquisition	D	D	Land acquisition is not necessary.
15. Cultural Heritage	D	D	No impact on cultural heritage is anticipated.
16. Landscape	D	D	No change of landscape is resulted from the Component.
17. The Poor, Indigenous and Ethnic People	D	D	No impact on the poor, indigenous and ethnic minority people is expected.
18. Livelihood	D	B ⁺	The Component enhances quality improvement of products, reduce residual pesticide in agricultural products, and promote export, which leads to activation of agricultural products trade. Therefore, it is profitable for livelihood.
19. Local Economy	D	B ⁺	The Component can activate local economy by export promotion and capacity development of PDD, which will result in improvement of local economy.
20. Existing Social Infrastructures and Services	D	D	No negative impact on existing social infrastructures and services is anticipated.
21. Misdistribution of Benefit and Damage	D	D	Nobody will be damaged by the Component. Therefore, no biased distribution of benefits and damages is caused.
22. Social Institutions	D	D	No negative impact on social institutions is expected.
23. Water Usage or Water Rights and Rights of Common	D	D	No impact on water use is anticipated.
24. Gender	D	D	No gender issue is caused by the Component.
25. Children Rights	D	D	Children's rights are not spoiled by the Component.
26. Hazards (Risk), Infectious Diseases such as HIV/AIDS	D	D	No impact such as infectious diseases is expected.
27. Accidents	D	D	No accident is expected during the operation period.
28. Global Warming	D	D	No global warming by the Component is anticipated.

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

APPENDIX-VII

**PDM AND PO (FOR TECHNICAL
COOPERATION PROJECTS)**

APPENDIX VII: PDM AND PO (FOR TECHNICAL COOPERATION PROJECTS)

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1. Project Design Matrix (PDM) for Technical Cooperation Projects

1.1 Supply Chain Improvement of Rice

Project / Title	Supply Chain Improvement of Rice				
Target Groups	Farmers, Brokers, Millers, Traders, Exporters, MRF				
Collaborators	MRF (MRIA, MFA, etc.), MFSPEA, Myanmar-Japan Center				
Implementing Agency	MOAI (DOA, AMD, PPD)				
Period of Project	1 st	2 nd	3 rd	4 th	5 th
Project Site	Shwebo	Mandalay	Nay Pyi Taw	Ayeyarwady	
	○	○	○	○	
Project Purpose: To improve productivity and quality of rice through improving efficiency of rice supply chain					
Rationale: The intensive agriculture program contains improvement of production infrastructure such as irrigation rehabilitation, land consolidation and FMR improvement. To maximize effects of the each component, supply chain improvement of rice, as a soft component of the intensive agriculture promotion program, is significantly important.					
Expected Outputs			Development Indicators		
<ol style="list-style-type: none"> Establishment of partnership among stakeholders Productivity improvement in rice production Productivity improvement in rice distribution and processing 			<ul style="list-style-type: none"> Number of meetings of stakeholders, and agreements with private companies Percentage of farmers who use certified seeds:10% Numbers of trainings of appropriate use of fertilizers and pesticides, post-harvest management Increase of estimated quality of rice :10% 		
Major Activities in Line with Expected Outputs			Inputs		
<p><Output1> 1-1. Identification of target stakeholders 1-2. Need assessment of the target stakeholders 1-3. Promotion of dialogue among the stakeholders</p> <p><Output2> 2-1. Promotion of introducing certified seeds 2-2. Promotion of appropriate use of fertilizers and pesticides 2-3. Improvement of post-harvest management of farmers</p> <p><Output3> 3-1. Nurturing business mind in traders and millers 3-2. Promotion of kaizen in the milling and distribution process 3-3. Improvement of rice quality for export</p>			<p><u>The Myanmar Side</u></p> <ul style="list-style-type: none"> Office Space Running cost such as Electricity and Water Support staff Logistics of field operation Trainings <p><u>The Japanese Side</u> <Dispatch of Experts> Experts : 155 M/M National : 220 MM <Provision of equipment></p> <p><Third Country/In Country></p> <p><Local Cost shared by Japanese side></p>		
Project Risks: Since the Component aims at improving the supply chain through non-structural measure, no negative impact is anticipated.					

1.2 Value Chain Enhancement of Vegetables and Fruits

Project / Title	Value Chain Enhancement of Vegetables and Fruits				
Target Groups	Farmers, Brokers, Processors, Traders, Exporters, MFFVPEA				
Implementing Agency	MOAI (DOA, AMD, and PPD), Mandalay Fruit, Flower, Vegetable Producers and Exporters Association (MFFVPEA)				
Collaborators	UMFCCI, Doe Kwin Farm (DOA in Pyin Oo Lwin), Vegetable and Fruits Research Development Center (Yangon)				
Period of Project	1 st	2 nd	3 rd	4 th	5 th
Project Site	Shwebo	Mandalay	Nay Pyi Taw	Ayeyarwady	
Project Purpose: To Improve productivity and quality of vegetables and fruits through enhancement of the value chain					
Rationale: Vegetable and fruits production could hardly receive enough support from the government. As a result, productivity of vegetables and fruits production is still low, and quality is not the exception either, and therefore there are lots of issues to tackle.					
Expected Outputs			Development Indicators		
<ol style="list-style-type: none"> 1. Establishment of partnership among stakeholders 2. Productivity improvement in vegetables and fruits production 3. Improvement in vegetables and fruits distribution and processing 			<ul style="list-style-type: none"> • Number of meetings of stakeholders, and agreement with private companies • Increase of yield of vegetables and fruits : 10% • Numbers of trainings of appropriate use of fertilizers and pesticides, post-harvest management • Increase of distribution method: 10% • Numbers of market matchings: to be decided 		
Major Activities in Line with Expected Outputs			Inputs		
<p><Output1> 1-1. Identification of target stakeholders 1-2. Need assessment of the target stakeholders 1-3. Promotion of dialogue among the stakeholders</p> <p><Output2> 2-1. Promotion of introducing quality seeds 2-2. Improvement of soil condition 2-3. Promotion of appropriate use of fertilizers and pesticides. 2-4. Promotion of irrigated upland farming 2-5. Demonstration of mechanized farming 2-6. Improvement of post-harvest management of farmers.</p> <p><Output3> 3-1. Nurturing business mind of traders and processors 3-2. Improvement of distribution method 3-3. Identification of stable buyers 3-4. Improvement of quality of fruits for export</p>			<p><u>The Myanmar Side</u></p> <ul style="list-style-type: none"> • Office Space • Running cost such as Electricity and Water • Support staff • Logistics of field operation • Trainings <p><u>The Japanese Side</u> <Dispatch of Experts> Experts : 125 M/M National : 165 MM</p> <p><Provision of equipment></p> <p><Third Country/In Country></p> <p><Local Cost shared by Japanese side></p>		
Project Risks: Since it is not structural measure, no negative impact is anticipated.					

1.3 Food Processing Industry Promotion

Project / Title	Food Processing Industry Promotion				
Target Groups	Entrepreneurs, Farmers, Processors, Traders				
Implementing Agency	Postharvest Technology Training Centre (PTTC)				
Collaborators	Mandalay Fruit, Flower, Vegetable Producers and Exporters Association (MFFVPEA) Myanmar Food Processors and Exporters Association (MFPEA) MCDC, UMFCCI, Myanmar-Japan Center Small and Medium-sized Industrial Development Bank (SMIDB)				
Period of Project	1 st	2 nd	3 rd	4 th	5 th
Project Site	Shwebo	Mandalay	Nay Pyi Taw	Ayeyarwady	
<p>Project Purpose: To promote food processing businesses through dissemination of relevant technologies at a center (to be established in Postharvest Technology Training Centre, Mandalay).</p> <p>Rationale: Food industry is one of the most promising industry in Myanmar. At present, most manufacturing activities are agro-based, which is counted at as much as 63% of registered industries. However, in actual situation, the industry is still infant level in terms of technologies and market share.</p>					
Expected Outputs			Development Indicators		
<ol style="list-style-type: none"> 1. Establishment of Food Processing Technology Center 2. Establishment of partnership among stakeholders 3. Development of service program of the Food Processing Technology Center 4. Provision of service to Entrepreneurs 			<ul style="list-style-type: none"> • Number of food processing centers • Number of partnership agreement with private companies • Number of service program for food processing technologies • Number of services provided to private companies 		
Major Activities in Line with Expected Outputs			Inputs		
<p><Output1> 1-1. Construction of Food Processing Technology Center 1-2. Procurement of food processing equipment 1-3. Establishment of management system of the Food Processing Technology Center</p> <p><Output2> 2-1. Identification of target stakeholders 2-2. Need assessment of the target stakeholders 2-3. Establishment of partnership among stakeholders</p> <p><Output3> 3-1. Development of service menu of the Food Processing Technology Center 3-2. Development of training method and training materials</p> <p><Output4> 4-1. Provision of service to Entrepreneurs by administering a series of training 4-2. Monitoring and feed backing of project activities</p>			<p><u>The Myanmar Side</u></p> <ul style="list-style-type: none"> • Office Space • Running cost such as Electricity and Water • Support staff • Logistics of field operation • Trainings <p><u>The Japanese Side</u></p> <p><Dispatch of Experts> Experts : 145 M/M National : 165 MM</p> <p><Provision of equipment></p> <p><Third Country/In Country></p> <p><Local Cost shared by Japanese side></p>		
<p>Project Risks: The Component will deal with technical improvement of food packaging, sanitation, value-added products and so on together with equipment procurement, no negative impact is anticipated.</p>					

1.4 Dissemination of Advanced Farming Technologies

Project / Title	Dissemination of Advanced Farming Technologies				
Target Groups	Upland farmers, Vegetable growers				
Implementing Agency	DOA				
Collaborators	Yezin Agriculture University, ID, AMD				
Period of Project	1 st	2 nd	3 rd	4 th	5 th
Project Site	Shwebo	Mandalay	Nay Pyi Taw	Ayeyarwady	
Project Purpose: To increase farm income through promotion of lowland vegetable production by advanced farming technologies					
Rationale: Nay Pyi Taw is the national capital of Myanmar with full of greens, and located in the middle of Yangon-Mandalay national highway. Therefore, it is expected a display effect of advanced farming technologies since many domestic and foreign people come and go, and pass through.					
Expected Outputs			Development Indicators		
<ol style="list-style-type: none"> Establishment of demonstration centers in the strategic locations. Identification of advanced technology Promotion of display and extension of intensive production of lowland vegetables and fruits Promotion of market oriented lowland vegetable production by small-scale farmers Promotion of mechanized rice farming 			<ul style="list-style-type: none"> No. of demonstration centers Number of identified advanced technologies Number of display of lowland vegetables Number of vegetables marketed Percent of farm machineries used in paddy production 		
Major Activities in Line with Expected Outputs			Inputs		
<p><Output1> 1-1. Survey for strategic locations of demonstration centers 1-2. Establishment of demonstration centers <Output2> 2-1. Identification of advanced technology for demonstration purpose base on farmers' needs and taking into account future prospects. 2-2. Developing demonstration method with preparing demonstration materials. <Output3> 3-1. Introduction of mechanized farming, 3-2. Introduction of upland irrigation method, 3-3. Introduction of horticulture development including greenhouse farming, tunnel cultivation, hydroponics, vermin-culture and organic farming. <Output4> 4-1. Introduction of market oriented approach, 4-2. Promotion of pump/ sprinkler irrigation, 4-3. Promotion of advanced farming technologies to meet market demand, 4-4. Improvement of packing method, 4-5. Introduction of value adding technologies. <Output5> 5-1. Promotion of mechanized rice farming 5-2. Promotion of land consolidation, drainage system, proper water management 5-3. Promotion of advanced rice production method and modernized milling and storing facilities.</p>			<p><u>The Myanmar Side</u></p> <ul style="list-style-type: none"> Office Space Running cost such as Electricity and Water Support staff Logistics of field operation Trainings <p><u>The Japanese Side</u> <Dispatch of Experts> Experts : 116 M/M National : 132 MM <Provision of equipment></p> <p><Third Country/In Country></p> <p><Local Cost shared by Japanese side></p>		
Project Risks: Since the Component aims at technical improvement of farmers in a modern agriculture, no adverse effect is anticipated.					

2. Plan of Operation for Technical Cooperation Projects

2.1 Supply Chain Improvement of Rice

14. Supply Chain Improvement of Rice																																																												
Activities	1st year			2nd year			3rd year			4th year			5th year																																															
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Output 1. Establishment of partnership among stakeholders																																																												
1-1. Identification of target stakeholders																																																												
1-1-1. Collecting detail information on supply chain stakeholders																																																												
1-1-2. Establishment of selection criteria of target stakeholders																																																												
1-1-3. Selection of target stakeholders																																																												
1-2. Need assessment of the target stakeholders																																																												
1-2-1. Conducting baseline survey of target stakeholders																																																												
1-2-2. Conducting needs assessment of target stakeholders																																																												
1-2-3. Identification of supporting mechanism of stakeholders' needs																																																												
1-3. Promotion of dialogue among the stakeholders																																																												
1-3-1. Organizing forum of supply chain stakeholders																																																												
1-3-2. Identification of role of stakeholders in the supply chain enhancement																																																												
1-3-3. Holding periodical dialogue among the stakeholders																																																												
Output 2. Productivity improvement in rice production																																																												
2-1. Promotion of introducing certified seeds																																																												
2-1-1. Reconfirm issues on current farming practices																																																												
2-1-2. Development of farm improvement plan																																																												
2-1-3. Dissemination of certified seed of rice																																																												
2-1-4. Development of collaboration system among stakeholders using certified seeds																																																												
2-2. Promotion of appropriate use of fertilizers and pesticides																																																												
2-2-1. Development of list of appropriate fertilizers and pesticides																																																												
2-2-2. Development of guideline of appropriate use of fertilizers and pesticides																																																												
2-2-3. Promotion of appropriate use of fertilizers and pesticides																																																												
2-3. Improvement of post-harvest management of farmers																																																												
2-3-1. Development of improved post-harvest management handbook																																																												
2-3-2. Dissemination of the improved post-harvest management handbook																																																												
Output 3. Productivity improvement in rice distribution and processing																																																												
3-1. Nurturing business mind in traders and millers																																																												
3-1-1. Reconfirm of current issues of trading and milling of rice																																																												
3-1-2. Development of training program of traders and millers																																																												
3-1-3. Provision of training to traders and millers																																																												
3-2. Promotion of kaizen in the milling and distribution process																																																												
3-2-1. Introducing Kaizen practice in the trading and milling of rice																																																												
3-2-2. Organizing Kaizen workshop to selected traders and millers																																																												
3-2-3. Conducting periodical monitoring to the selected traders and millers																																																												
3-3. Improvement of rice quality for export																																																												
3-3-1. Enhancement of plant protection of rice																																																												
3-3-2. Provision of certification to quality rice for export																																																												

2.3 Food Processing Industry Promotion

Activities	1st year												2nd year												3rd year												4th year												5th year												
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Output 1. Establishment of Food Processing Technology Center																																																													
1-1. Construction of Food Processing Technology Center																																																													
1-1-1. Establishment of project implementation committee																																																													
1-1-2. Development of Plan for Food Processing Center																																																													
1-1-3. Conducting Feasibility Study and Detail Design																																																													
1-1-4. Construction of Food Processing Technology Center																																																													
1-2. Procurement of food processing equipment																																																													
1-2-1. Conducting needs survey for processing equipment																																																													
1-2-2. Identification of processing equipment																																																													
1-2-3. Procurement of processing equipment																																																													
1-3. Establishment of management system																																																													
1-3-1. Development of management system																																																													
1-3-2. Establishment of management organization																																																													
Output 2. Establishment of partnership among stakeholders																																																													
2-1. Identification of target stakeholders																																																													
2-2-1. Collecting detail information on food processing stakeholders																																																													
2-2-2. Identifying food processing stakeholders																																																													
2-2. Need assessment of the target stakeholders																																																													
2-2-1. Conducting needs assessment of target stakeholders																																																													
2-2-2. Identification of supporting mechanism of stakeholders' needs																																																													
2-3. Establishment of partnership among stakeholders																																																													
2-3-1. Identification of role of stakeholders in the value chain enhancement																																																													
2-3-2. Holding periodical dialogue among the stakeholders																																																													
Output 3. Development of service program of the Food Processing Technology Center																																																													
3-1. Development of service menu of the Food Processing Technology Center																																																													
3-1-3. Identification of service menu																																																													
3-1-2. Development of service program of the food processing technology center																																																													
3-2. Development of training method and training materials																																																													
3-2-1. Development of training methods																																																													
3-2-2. Development of training materials																																																													
Output 4. Provision of service to Entrepreneurs																																																													
4-1. Provision of service to Entrepreneurs by administering a series of training																																																													
4-2. Monitoring and feed backing of project activities																																																													

