

ANNEX E: IRRIGATION AND DRAINAGE SUBSECTOR

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ANNEX E IRRIGATION AND DRAINAGE SUBSECTOR

E.1 Questionnaire Survey of WUA

E.1.1 Background

After the dissolution of Shirkats, the Water Users Associations (WUAs) had been established in order to succeed the property of the internal irrigation and drainage system and maintenance machinery. The WUAs were give authority and responsibility to manage the system by their budget.

The establishment of WUAs was started in 2002 and a total 129 WUAs has been established in Karakalpakstan till 2007. In the Study Area, which consists of 11 districts, it was started in 2003 and 90 WUAs have been established, of which 91% was established till 2005. Most of WUAs in the Study Area are young organizations and they have only 3 to 5 years experience of managing their organization. The number of WUAs by district and irrigation system is shown in Tabel-1.

Establishment of WUAs (Number of WUA)

	2002	2003	2004	2005	2006	2007	Total
Karakalpakstan	16	20	32	43	15	3	129
Study Area	0	19	28	35	5	3	90

Source: Lower Amudarya Basin Irrigation System Department

E.1.2 Objectives

In order to obtain information of the present situation of WUAs in the Study Area, a questionnaire survey was carried out as well as a series of interview survey. The survey was conducted for the purpose to figure out the present situation of WUAs by the profiles including their organization, irrigation system and other asset, activities which they carried out actually, financial situation, etc. as well as to clarify the problems and difficulties which they face at moment.

E.1.3 Methodlogy

The questionnaire survey of WUA was carried from May to June of 2008. The survey was conducted by Delivery and Collect with cooperation of the irrigation system departments and the district WUAs.

E.1.4 Result of Survey

(1) Basic Characteristics of WUAs

Before conducting the survey, the basic characteristics of WUAs in Karakalpakstan and the Study Area were assessed based on the existing information supplied by LABM. The basic characteristics are summarized in the Table-2. The scale of WUA is characterized by the number of members and territorial area. From the number of members, the WUAs in Beruni and Kungrad district is categorized into mid-large to large scale, and KShumanay and Kanlikul are small. The other districts are middle to mid-small. According to the crop area in their territory, Chimbay, Karauzyak, Kungrad are large, Bernie, Kegeily and Shumanay are mid-large, and the others are mid-small to small. Nukus district is characterized by its variety of scale of WUAs from both of members and territory.

(2) Result of Collection of Questionnaires

As a result, 70 WUAs replied their answers among a total of 90 WUAs in the Study Area. The number of answers and the occupancy rate of answering WUA are shown bellow.

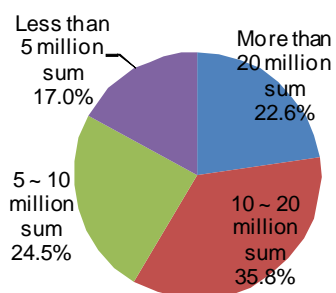
Result of Questionnaire to WUAs (Number of WUA)

Irrigation System	PN	KB	Kizketken-Kegeyli		Kuwanish jarma		Suwenli					Total
District	Beruni	Nukus	Kegeyli	Chimbay	Karauzyak	Takhtakupyr	Kodjeyli	Shumanay	Kanlikul	Kungrad	Muynak	
Total WUA	9	10	8	11	7	7	15	6	9	6	2	90
Answered	6	8	0	10	7	3	15	6	9	6	0	70
Rate	67%	80%	0%	91%	100%	43%	100%	100%	100%	100%	0%	78%

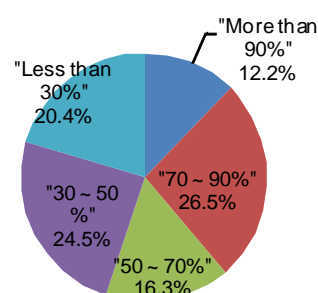
* PN: Pakhtaarna-Nayman Irrigation System, KB: Kattagar-Bozataw Irrigation System

(3) Financial Situation and Water Fee Collection

WUAs have the duty to prepare their own business plan before beginning each fiscal year. According to the questionnaire survey, the budget of the business plan varies from 8,768,000 Sums to 54,262,000 Sums, of which the average was 15,172,000 Sums in 2007. Those business plans are characterized by the great part of the budget is composed by staff salary in general. The staff salary composes more than 70% of total budget in 39% of WUAs and 41% of WUAs have 30 to 70% of the share.



Budget of Business Plan in 2007



Share of Staff Salary in Business Plan in 2007

Budget of Business Plan in 2007 (Number of WUA)

Irrigation System	PN	KB	KK	Kuwanish jarma		Suwenli				Total	
District	Beruni	Nukus	Chimbay	Karauzyak	Takhtakupyr	Kodjeyli	Shumanay	Kanlikul	Kungrad		
More than 20 million sum	1	0	0	1	0	0	6	0	4	12	22.6%
10 ~ 20 million sum	2	2	2	5	0	5	0	1	2	19	35.8%
5 ~ 10 million sum	2	1	4	0	0	3	0	3	0	13	24.5%
Less than 5 million sum	1	0	2	0	1	5	0	0	0	9	17.0%
subtotal	6	3	8	6	1	13	6	4	6	53	100%
no answer	0	5	2	1	2	2	0	5	0	17	
Total	6	8	10	7	3	15	6	9	6	70	

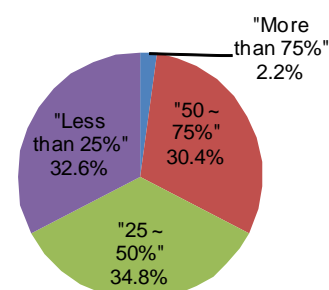
* PN: Pakhtaarna-Nayman, KB: Kattagar-Bozataw m, KK: Kizketken- Kegeyli

Share of Staff Salary in WUA's Business Plan in 2007 (Number of WUA)

Irrigation System	PN	KB	KK	Kuwanish jarma		Suwenli				Total	
District	Beruni	Nukus	Chinbay	Karauzya k	Takhtaku pyr	Kodjeyli	Shumanay	Kanlikul	Kungrad		
More than 90%	2	0	0	2	0	2	0	0	0	6	12.2%
70 ~ 90%	2	0	2	3	0	5	0	1	0	13	26.5%
50 ~ 70%	2	2	1	0	0	1	0	2	0	8	16.3%
30 ~ 50 %	0	1	3	0	0	4	1	0	3	12	24.5%
Less than 30%	0	0	1	0	0	1	5	0	3	10	20.4%
subtotal	6	3	7	5	0	13	6	3	6	49	100%
no answer	0	5	3	2	3	2	0	6	0	21	
Total	6	8	10	7	3	15	6	9	6	70	

* PN: Pakhtaarna-Nayman, KB: Kattagar-Bozataw m, KK: Kizketken- Kegeyli

WUAs are independent organizations and they have to cover the budget for their activity by water fee charged to water users principally. However, the average ratio of the collected water fee of the WUAs was 36.7% in 2007. As shown below, one third of WUAs collected water fee from less than 25% of their member farmers and another one third collected 25 to 50%. It is sometimes difficult to cover even the staff salary with this level of fee collection and it is hard to maintain the canal/collector systems properly by their own budget.



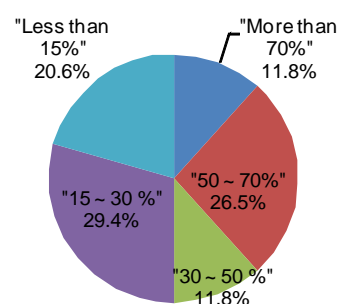
Ratio of Water Fee Collection in 2007

Ratio of Collected Water Fee of WUA in 2007 (Number of WUA)

Irrigation System	PN	KB	KK	Kuwanish jarma		Suwenli				Total	
District	Beruni	Nukus	Chinbay	Karauzya k	Takhtaku pyr	Kodjeyli	Shumanay	Kanlikul	Kungrad		
More than 75%	0	0	0	0	0	0	0	1	0	1	2.2%
50 ~ 75%	1	2	2	4	3	1	0	0	1	14	30.4%
25 ~ 50%	2	0	3	1	0	8	0	0	2	16	34.8%
Less than 25%	2	1	1	1	0	1	6	2	1	15	32.6%
subtotal	5	3	6	6	3	10	6	3	4	46	100%
no answer	1	5	4	1	0	5	0	6	2	24	
Total	6	8	10	7	3	15	6	9	6	70	

* PN: Pakhtaarna-Nayman, KB: Kattagar-Bozataw m, KK: Kizketken- Kegeyli

As a result of low collection of water fee from members, WUA's activity is limited due to lack of its financial budget. Among the answering of WUAs, half of WUAs could actually expensed less than 30% of their business plans and only 12% of WUAs expensed more than 70% of the plan.



Ratio of Actual Expense to Business Plan in 2007

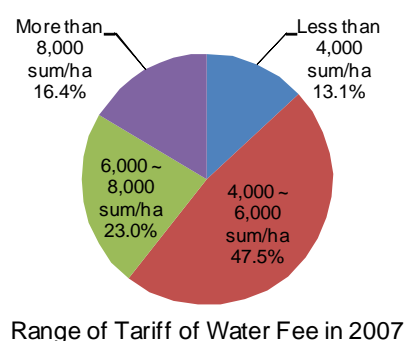
Ratio of Actual Expense to Business Plan in 2007 (Number of WUA)

Irrigation System	PN	KB	KK	Kuwanish jarma		Suwenli				Total	
District	Beruni	Nukus	Chimbay	Karauzya k	Taktaku pyr	Kodjeyli	Shumanay	Kanlikul	Kungrad		
More than 70%	1	1	1	0	1	0	0	0	0	4	11.8%
50 ~ 70%	1	1	0	2	0	0	0	4	1	9	26.5%
30 ~ 50 %	1	0	0	2	0	0	0	0	1	4	11.8%
15 ~ 30 %	3	1	1	2	0	1	0	0	2	10	29.4%
Less than 15%	0	0	0	0	0	0	6	0	1	7	20.6%
subtotal	6	3	2	6	1	1	6	4	5	34	100%
no answer	0	5	8	1	2	14	0	5	1	36	
Total	6	8	10	7	3	15	6	9	6	70	

* PN: Pakhtaarna-Nayman, KB: Kattagar-Bozataw m, KK: Kizketken- Kegeyli

(4) Type of Charging Water Fee

There are two kinds of tariff system in KR to charge water fee. The first is the water fee charged by cropped area and applying unified price to all crops, which varies from 2,140 to 11,200 Sums/ha by WUAs. The majority of WUAs in KR applies this tariff system. The average tariff of water fee charged by cropped area is 5,809 Sums/ha. Approximately half of WUAs applies the tariff of 4,000~6,000 Sums/ha. The tariff becomes higher than that using gravity system in WUAs that utilize pump to withdraw and deliver water.



The second is the water fee charged by water volume applied to crops, which the tariff varies by WUAs. The sample of Kattagar arna WUA of Nukus District shows 0.441 Sums/m³. It must be noted that the water fee is charged by water volume calculated by irrigation norms by crops and planned cropping area and that is not charged to actual delivered volume of water. In this case, sometimes, the converted water fee calculated with tariff and norms by crop types, which is 1,620~6,700 Sums/ha by crops, is applied in order to simplify the administrative procedure. According to the questionnaire survey, 61 WUAs applies the water fee charged by cropped area and 3 WUAs applies charged by water volume.

In addition to the water fee according to the water use, WUA can charge a membership fee to members. The membership fee is prescribed in the regulation of WUA, which shall be charged to new members when they joined to WUA.

Range of Tariff of Water Fee in 2007 (Number of WUA)

Irrigation System	PN	KB	KK	Kuwanish jarma		Suwenli				Total	
District	Beruni	Nukus	Chimbay	Karauzya k	Takhtaku pyr	Kodjeyli	Shumanay	Kanikul	Kungrad		
Less than 4,000 sum/ha	0	0	0	0	3	4	0	1	0	8	13.1%
4,000 ~ 6,000 sum/ha	2	1	10	3	0	7	1	2	3	29	47.5%
6,000 ~ 8,000 sum/ha	0	2	0	0	0	3	3	5	1	14	23.0%
More than 8,000 sum/ha	4	1	0	0	0	0	2	1	2	10	16.4%
subtotal	6	4	10	3	3	14	6	9	6	61	100%
Charge by ha, by crops (1,620 ~ 6,700 sum/ha)	1			2						3	
subtotal	7	4	10	5	3	14	6	9	6	64	
No answer										6	
Total										70	

* PN: Pakhtaarna-Nayman, KB: Kattagar-Bozataw m, KK: Kizketken- Kegeyli

(5) WUA's Capacity to Maintain Canal/Collector System

Lack of construction machinery to repair and dig canals is considered as an obstacle for WUAs to maintain canal/collector system. Most WUA utilizes machinery which *Shirkats* used for canal maintenance as well as canal/collector itself when *Shirkat* were dissolved. Among the answers of the WUA, 40 WUAs have at least one machine for canal maintenance which is still working. The number of WUA possessing excavator, bulldozer and tractor is 31, 27 and 34 respectively. Among them, machine that becomes malfunctioning because they are getting old are 16, 15 and 19 and machines not functioning are 7, 4 and 5 respectively. The condition of machines of WUA is considered seriously poor and it causes poor condition of the internal canal/collector system.

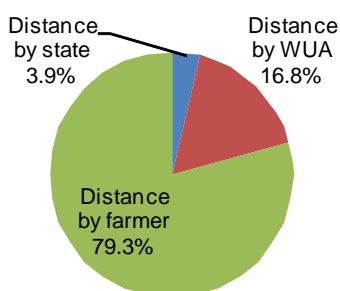
WUA's Machinery for Canal Maintenance (Number of WUA)

Irrigation System	PN	KB	KK	Kuwanish jarma		Suwenli				Total	
District	Beruni	Nukus	Chimbay	Karauzya k	Takhtaku pyr	Kodjeyli	Shumanay	Kanikul	Kungrad		
WUA possessing Excavator	2	5	3	3	1	4	3	7	3	31	
problem in function	0	2	3	0	1	4	3	3	0	16	
not in use	2	2	0	0	0	0	0	2	1	7	
WUA possessing Bulldozer	1	3	3	3	0	6	3	6	2	27	
problem in function	0	1	3	2	0	4	3	2	0	15	
not in use	0	1	0	0	0	0	0	2	1	4	
WUA possessing Tractor	2	3	3	3	0	8	5	6	4	34	
problem in function	0	1	3	2	0	6	5	2	0	19	
not in use	1	2	0	0	0	0	0	2	0	5	
WUA possessing Vehicle	3	2	1	2	0	2	1	3	0	14	
problem in function	0	1	1	0	0	2	0	1	0	5	
not in use	2	1	0	0	0	0	0	0	0	3	

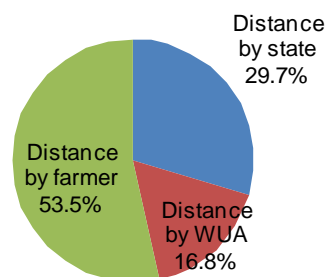
* PN: Pakhtaarna-Nayman, KB: Kattagar-Bozataw m, KK: Kizketken- Kegeyli

(6) Record of Canal and Collector Maintenance by WUA

Even the responsibility for maintaining internal canal and collector system is belong to WUA, it is difficult for WUA to maintain the system by themselves due to financial and technical difficulty. As a result, a large part of the maintained work is conducted by contribution of farmers as well as support from the state. According to the questionnaire survey, only 17% of total distance was maintained by WUA for both of internal canal and collector.



Maintenance of Internal Canal in 2007



Maintenance of Internal Collector in 2007

Distance of Maintained Internal Canal in 2007

Irrigation System	PN	KB	KK	Kuwanish jarma		Suwenli				Total	
District	Beruni	Nukus	Chinbay	Karauzya k	Takhtaku pyr	Kodjeyli	Shumanay	Kanlikul	Kungrad		
Distance by state (km)	22	0	3.2	9	0	3.7	0	1.3	0	39.2	3.9%
Distance by WUA (km)	46.1	27.1	16	50.5	6	6	0	18	0	169.7	16.8%
Distance by farmer (km)	22	113.5	78.4	93	43	148.7	103.8	138	60.7	801.1	79.3%
Total distance maintained (km)										1,010	100%

* PN: Pakhtaarna-Nayman, KB: Kattagar-Bozataw m, KK: Kizketken- Kegeyli

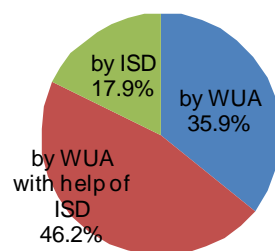
Distance of Maintained Internal Collector in 2007

Irrigation System	PN	KB	KK	Kuwanish jarma		Suwenli				Total	
District	Beruni	Nukus	Chinbay	Karauzya k	Takhtaku pyr	Kodjeyli	Shumanay	Kanlikul	Kungrad		
Distance by state (km)	32	8	82.4	16	0	2	0	42.6	22.3	205.3	29.7%
Distance by WUA (km)	17.5	12	36	5.5	6	0	0	23	16.5	116.5	16.8%
Distance by farmer (km)	12	21.7	37.8	3	16	40.6	95.7	64.7	78.4	369.9	53.5%
Total distance maintained (km)										691.7	100%

* PN: Pakhtaarna-Nayman, KB: Kattagar-Bozataw m, KK: Kizketken- Kegeyli

(7) Water Use Planning by WUA

WUA makes a contract on water distribution with the Irrigation System Department (ISD) for each irrigation system, as well as makes contracts with members. WUA is required to coordinate water use contracts with members including cultivation plan, preparation of irrigation schedule and water distribution plan in prior to contract with ISD. Those schedule and plan are formulated based on the calculation of water demand applying norms of irrigation by crops and by soil conditions, which are set up by ISDs. Among the answers of the WUAs, which were 39 in total, 32 WUAs formulated the plan by themselves (equivalent to 82% of total), while the remaining 18% of WUAs did not have ability for planning by themselves and completely rely on ISD to prepare it. Even in for those that formulated the plan by themselves, 18 WUAs needed the support and coordination of ISD to make it.



Irrigation Schedule and Distribution Plan in 2007

Formulating Irrigation Schedule and Distribution Plan (Number of WUA)

Irrigation System	PN	KB	KK	Kuwanish jarma		Suwenli				Total	
District	Beruni	Nukus	Chinbay	Karauzayak	Takhtaku pyr	Kodjeyli	Shumanay	Kanlikul	Kungrad		
by WUA	0	3	4	0	0	0	6	1	0	14	35.9%
by WUA with help of ISD	3	2	0	1	3	7	0	1	1	18	46.2%
by ISD	1	0	0	0	0	3	0	1	2	7	17.9%
sub total										39	100%
no answer										31	
Total										70	

* PN: Pakhtaarna-Nayman, KB: Kattagar-Bozataw m, KK: Kizketken- Kegeyli

E.2 Case Study of WUA

(1) General of the Case Study of WUA

In order to assess the detail situations of WUA, a series of case study of WUA was conducted with selected WUAs. The case study was conducted by the combination of kick off meeting, field survey of selected canal system, workshop with members and wrap up meeting in each WUA. After survey, tentative improvement plans for selected canal system was formulated for the purpose of obtaining cost information for action plan. The general information on WUAs targeted by the case study is as below:

Name of WUA	Kattagar arna WUA	Suwshi WUA
District	Nukus	Chimbay
Established year	2005	2003
Number of members (2008)	103	111
Cropped are in 2007:	1,997	2,398
- Cotton (ha)	73	785
- Wheat (ha)	628	120
- Orchard and vineyard (ha)	25	20
- Vegetables (ha)	134	22
- Other crops(ha)	978	119
- Tamarka (ha)	160	376
Total length of internal canal (km)	110	74
of which concrete canal (km)	13	0
Number of WUA staff	10	6
Construction machinery belong to WUA	Excavator (1) - not in use Tractor (1) - not in use Mini-excavator (1) - not in use, can be repaired	Tractor (1) - in use Bulldozer (1) - not in use

Among the WUA territory, 2 irrigation blocks were selected from each WUA and detailed field works were conducted to assess the condition of canal systems and necessary renovation or improvement during the case study. The selected irrigation blocks are as below:

Name of WUA	Kattagar arna WUA		Suwshi WUA	
Name of irrigation block	Katraban canal	Maxism canal	Kazakhasha canal	Ismail saga canal
Area covered by the canal	500	250	175	139
Number of members	22	-	5	5
Length of canal (km)	21	9.8	19.5	15.4
of which concrete canal (km)	13	0	0	0
Main or inter-farm canal	Kattagr canal	October canal /Dawlet jap canal	Utemurat canal	Kegeili main canal

(2) Kattagar arna WUA

Kattagr arna WUA is located in Nukus District and is characterized by large occupation of wheat and vegetables and comparatively smaller occupation cotton cultivation. In total, 1,997 ha were cultivated in 2007. It has 103 members of WUA and all of them are *fermer*. Even the WUA supplies water to *tamarka* users, they are not considered as member of WUA. However, fixed amount of water service fee is charged to *tamarka* users, which counts 90 users.

1) Condition of Canal System and Maintenance Work

Katraban irrigation block is considered as an advanced irrigation block equipped with concrete flume and slues gates. However, among the 26 existing slues gate, only 5 are in use and remaining 21 are necessary to be replaced due to damage or lost of gear and spindle equipment. Those gates were installed in the Soviet Era and have not been renovated during *shirkat* and WUA period. Even though the condition of canal is much better than the average of the study area owing to the concrete flume, the water management in the system faces inconvenient due to malfunctioning of gates. Because gate equipment is essential to fulfill proper water management in the canal system, a constant and low price supply of the spare parts, i.e., gear and spindle, is desired.

On the other hand, Maxsim irrigation block is an average canal system with earth where slues gates are not equipped for diversion to terminal canals or farms. Due to reducing of water level of the connected inter-farm canal, that is Daulet zip canal, approximately 200ha among the total of 250ha faces difficulty to take water. WUA members using this canal are considering installing a check gate in the inter-farm canal to rise up water level in the canal. Even though they have already given permission to construct the check gate by ISD and *Hakimiyat*, however, they do not have certain funding resources so far. The difficulty of water taking-in is caused by both of the topographic condition of farms and the reduction of water level in canal caused by reducing flow discharge due to shrinkage of irrigation area. This problem is not observed only in the Maxsim irrigation block but also widely observed in the study area. Installation of check gate will contribute to improve water management and reducing cost for water use by avoiding usage of pump.

Participation of members to maintain canal and facility is popular in the association. Contribution of members is limited to hand work and their collective activity is limited in their own group based on small canal. This group work is not a regular activity with any plan or program and is organized by group leader in case of need.

2) Water Management and WUA Staff

Kattagar arna WUA has 10 permanent staffs, of which 6 are waterman who has a responsibility to operate a certain irrigation block. One waterman manages approximately 300 ha in average in this WUA. Waterman goes around on foot and his/her coverage is considered rather too large. The inspection of canal system is once a two to three days where it is easy to access and once per one to two weeks for the place far away, that is considered not enough for proper water management. In order to improve water management, both of increasing number of waterman and equipping transportation to waterman are indispensable.

At present, WUA administration believes that they are able to manage irrigation system well if the facilities are repaired or renovated. However, it is considered that the current activity of WUA is not enough to improve operation and maintenance of canal system and it is necessary to increase inspection and introduce accurate operation based on monitoring, even after renovation of facilities. WUA is also necessary to have proper business plan including mid and long term plan for maintaining facilities, as well as concrete revenue.

3) Water Service Fee and Budget of WUA

In the Kattagar arna WUA, 44 % of irrigated land takes water from the canal which uses pump at the intake from the inter-farm canal. The irrigation service fee of the WUA is principally amount-basis tariff, which is set as 0.441 sum/ha in 2008, while the area-basis tariff by crop converted based on the irrigation norm is applied from the practical reason. The tariff for major crops are 7,232 sum/ha for wheat, 8,158 sum/ha for cotton, 13,349 sum/ha for rice, and 10,098 sum/ha for vegetables. The extra fee for pump operation is charged to the irrigated area using pump water.

According to the actual expense in 2007, half of the budget was expensed to pump operation and

maintenance. A 460 thousand Sum was expensed to the canal maintenance, however, it occupies significantly small part of necessary work amount. Most of canal maintenance work is conducted by ad hoc payment or delivery of material and contribution by manpower of members. Those works are organized by irrigation block or group by certain distance of canal, and WUA does not coordinate among block or group currently. Thus, the level of maintenance and condition of canal becomes different by block or group depending on the financial capacity of members.

The necessary cost for appropriate WUA activity is estimated 10,362 sum/ha for gravity area and 18,832 sum/ha for pump area.

Actual Expense and Necessary Cost for WUA Activity of Kattagar arna WUA

(Unit: Sum)

Items	Actual Expense in 2007	Necessary Cost for WUA Activity
1. Salary and personal expense	6,989,000	12,500,000
2. Production expense		
2.1 Digging/cleaning internal canal	460,000	4,115,000
2.2 Fuel and electricity for pump operation	6,437,000	6,437,000
2.3 Pump maintenance	1,427,000	
3. Others		1,000,000
Total	15,313,000	24,052,000
per hector	9,008	14,148
per hector for gravity area	4,382	10,362
per hector for pump irrigation	12,852	18,832

(3) Suwshi WUA

Suwshi WUA, which is located in Chimbay District, is originated in cotton *shirkat* and it has large cotton cultivation. In total, 2,398 ha were cultivated in 2007. The WUA has 1 VCC and 2 Area Committees (Makan-kenes) as well as 111 *farmers* as a member of WUA. It supplies drinking and irrigation water to approximately 600 *tamarka* users, who are belonging to VCC and Area Committees. Use for *tamarka* occupies approximately 13 % of total water amount distributed by WUA.

1) Condition of Canal System and Maintenance Work

All distance of the internal canal of the WUA is earth canal and sluice gate for diverting water to terminal canal or farms is not equipped except for the intake at the inter-farm canal. The operation of water distribution is conducted by burying canal with wooden board and breast work at the culvert pipe or division point by hand work. In this WUA, there are many farms with higher elevation, where it is necessary to dam up water level in the canal to take water, due to topographic condition. The operation of canal system in such area takes a lot of effort and time, and it is difficult to fulfill appropriate operation on time. In addition, water measurement facilities are not installed in the canal system. Due to the condition of infrastructure, it is difficult to operate canal system properly. In order to increase accuracy of canal operation and improving water distribution activity, it is required to install check gate to lift up water level, sluice gate for diversion and water measurement facility as well as cleaning and digging canal to recover adequate canal section.

Due to low collection of water service fee, WUA is not able to have a budget for maintenance work of canal system. Canal maintenance is basically conducted by ad hoc payment or provision of material by members. In the most of cases, construction machinery is provided by ISD with free of charge and only fuel and personal expense of operator are charge to ad hoc payment of members. Members contribute to the maintenance work by hand works as well. This kind of maintenance work is usually conducted by irrigation block or smaller distance of canal. In the WUA, *tamarka* users (*dehkans*) also participate to the canal maintenance work in general. *Tamarka* users are organized to participate to the maintenance work by *Aul* under the instruction of VCC and they contribute by their hand work and a

part of payment. Because of this manner of the maintenance work, it is impossible to maintain systematically based on the mid-long term plan and the work becomes on a patchwork basis so far. In addition, the works taking cost such as reconstruction of water facilities are tend to be avoided. In this situation, it is difficult to maintain the function of the canal system properly.

2) Water Management and WUA Staff

The WUA is not able to employ necessary waterman, who will inspect and operate irrigation block in the field, due to lack of budget. In the case that WUA cannot keep enough watermen by themselves, ISD sends its staffs to WUA as operator of the system according to the request through *Hakimiyat*. The number of staff to be dispatched is a minimum to operate the irrigation system and is not enough for proper and accurate operation. Furthermore, ISD staffs dispatched serve concurrently with their original job, thus, they sometimes cannot go for operation on time and difficult to stay there for necessary period. It makes operation of the system difficult. In the case of Suwshi WUA, while it is said that it 13 watermen are necessary to operate the whole system properly, 12 watermen had been appointed until 2007, of which 4 belong to WUA and 9 were dispatched from ISD, and it was decreased to 10 watermen on 2008, of which 1 is from WUA and 9 are from ISD. That means operation of canal system of the WUA relies fully on support from ISD. To a greater or less extent, the situation is observed popularly in the study area, and it is considered that it is one of the obstacles to WUA to become self-reliant entity.

3) Water Service Fee and Budget of WUA

Suwshi WUA collected water service fee of 4,804 thousand sum, which was equivalent to 45 % of business plan (10,677 thousand sum) in 2006. In 2007, the collection was 6,538 thousand sum, which was 74 % of the business plan (8,815 thousand sum). The actual expenditure of WUA activity is basically equivalent with the amount of water service fee collection.

According to the business plan of 2007, staff salary was counted in the amount only for 3 persons. The cost for canal maintenance was not counted while pump operation and maintenance was included. The business plan is considered not enough to operate water management appropriately. Furthermore, WUA is not able to fulfill even this business plan due to low collection ratio of water service fee so far. Current tariff of water service fee of Suwshi WUA is 4,000 sum/ha, which is fixed tariff for cropped area, and cost for maintaining canal facilities, even that is not enough to maintain function, is burdened by ad hoc payment by members. As mentioned above, in order to improve operation and maintenance, it is required to appoint necessary number of staffs for operation and to maintain facilities by the regular budget based on the certain maintenance plan. The annual cost for necessary WUA activities is estimated 26,170 thousand sum as shown below, which is equivalent to tariff of 10,904 sum/ha. In order to fulfill proper water management, it is required to consider both with the increasing collection ratio of water service fee and the setting up appropriate business plan including tariff system based on annual and mid-long term plan including.

Business Plan, Actual Expense and Necessary Cost for WUA Activity of Suwshi WUA

(Unit: Sum)

Items	Business Plan in 2007	Actual expense in 2007	Necessary Cost for WUA Activity
1. Salary and personal expense	2,843,700		16,250,000 3 administration and 10 watermen
2. Production expense			
2.1 Digging/cleaning internal canal			6,720,000 2,800 sum/ha x 2,400 ha
2.2 Fuel and electricity for pump operation	2,200,000		2,200,000
2.3 Pump maintenance	2,730,500		
3. Others	1,041,000		1,000,000
Total	8,815,200	6,537,900 74%	26,170,000
per hector	3,673	2,724	10,904

(4) Sample of Improvement Plan

Based on the field survey and discussion with WUA administration, the improvement plan of certain irrigation blocks was prepared as a sample for assessing work amount of the study area, as shown in Fig. E.2.1 to Fig.E.2.4. The cost of the improvement plan was estimated as of September 2008 is shown in Table-E.2.3 to Table-E.2.6, as summarized below. The result of cost estimation for these blocks was used in estimating project cost of Action Plan.

Summary of Cost on Improvement of Irrigation System

Unit: Sum

Canal Name	Cropped Area (ha)	Improvement of Canal			Structures			Implementation cost		
		Cost	Cost / ha	=US\$	Cost	Cost / ha	=US\$	Cost	Cost / ha	=US\$
Kotraban Canal	500	19,539,000	39,078	29	30,649,000	61,298	46	50,188,000	100,376	75
Maksim Canal	250	13,234,000	52,936	39	53,807,000	215,228	161	67,041,000	268,164	201
Kazakhasha Canal	175	32,593,000	186,245	140	35,685,000	203,914	153	68,278,000	390,160	293
Ismail Saga Canal	139	27,761,000	199,719	150	29,308,000	210,848	158	57,069,000	410,568	308
Average	1,064	93,127,000	87,525	65	149,449,000	140,459	105	242,576,000	227,984	170
		⇒	88,000		⇒	140,000		⇒	228,000	
After considering price escalation from 2008 to 2			107,360			170,800			278,160	

Canal Name	Cropped Area (ha)	Design Cost			Shandur Cost				
		Cost	Cost / ha	=US\$	Number	No./ ha	Cost	Cost / ha	=US\$
Kotraban Canal	500	5,019,000	10,038	7	54	0.11	4,536,000	9,072	6
Maksim Canal	250	6,704,000	26,816	20	39	0.16	3,276,000	13,104	9
Kazakhasha Canal	175	6,838,000	39,074	29	32	0.18	2,688,000	15,360	11
Ismail Saga Canal	139	5,707,000	41,057	30	44	0.32	3,696,000	26,589	19
Average	1,064	24,268,000	22,808	17	169	0.16	14,196,000	13,342	10
		⇒	23,000				⇒	13,000	
After considering price escalation from 2008 to 2			28,060					15,860	

Table-E.2.1 Number of WUAs by Management Department of Irrigation System

District	Irrigation System						Number of WUA
	Pakhtaarna-Nayman	Kattagar-B ozataw	Mangit-Nazarkhan	Kizketken-Kegeyli	Suwenli	Kwanish-jarma	
Beruni	9	0	0	0	0	0	
Nukus	0	9	0	3	0	1	
Kegeily	0	0	0	7	0	1	
Chimbay	0	0	0	11	0	0	
Karauzyak	0	0	0	1	0	7	
Takhtakupyr	0	0	0	0	0	7	
Khodjeyli	0	0	0	0	15	0	
Shumanay	0	0	0	0	6	0	
Kanlikul	0	0	0	0	9	0	
Kungrad	0	0	0	0	6	0	
Muynak	0	0	0	0	2	0	
Study Area Total (11 districts)	9	9	0	22	38	16	90
Turtkul	12	0	0	0	0	0	
Ellikkala	12	0	0	0	0	0	
Amudarya	0	0	15	0	0	0	
Karakalpakstan Total	33	9	15	22	38	16	129

*: As of January 1, 2008

Source: Lower Amudarya Basin Irrigation System Department

Table-E.2.2 Basic Characteristics of WUAs in Karakalpakstan and Study Area

	Karakalpakstan	Study Area	Beruni	Nukus	Kegeyli	Chimbay	Karauzyak	Takhtakupyr	Khodjevli	Shumanay	Kanlikul	Kungrad	Muynak
Number of WUAs	129	90	9	10	8	11	7	7	15	6	9	6	2
Number of Members													
Small: <50	51	35	0	2	4	5	0	4	8	4	6	0	2
Middle: 50 - 100	53	35	2	3	4	4	5	3	7	2	2	3	0
Large: >100	25	20	7	5	0	2	2	0	0	0	1	3	0
Classification			large	various	mid-sma ll	mid-sma ll	middle	mid-sma ll	mid-sma ll	small	small	mid-lar ge	small
Crop Area in Cropping Plan of 2008													
Small: <1500 ha	22	17	0	5	0	2	0	1	4	0	3	0	2
Middle: 1500 - 3000 ha	61	33	5	2	4	2	0	4	10	3	3	0	0
Large: >3000 ha	46	40	4	3	4	7	7	2	1	3	3	6	0
Classification			mid-lar ge	various	mid-larg e	large	large	middle	middle	mid-lar ge	mid-sm all	large	small
Ratio of Cotton and Wheat in Cropping Plan of 2008													
Small: <50%	69	58	0	10	3	10	7	4	9	3	6	6	0
Middle: 50 - 75%	50	28	9	0	5	0	0	2	6	3	3	0	0
Large: >75%	10	4	0	0	0	1	0	1	0	0	0	0	2
Classification			high	mid	high	low	mid-low	various	mid-hig h	mid-hig h	various	middle	high
Number of Staffs													
Significantly insuf.: 1 - 4	29	25	0	1	8	1	0	5	3	0	3	2	2
Insufficient: 5 - 7	50	39	0	7	0	10	3	1	2	6	6	4	0
Sufficient: 8-	49	25	9	2	0	0	4	0	10	0	0	0	0
Classification			Suf.	Insuf.	Insuf.	Insuf.	Suf.	Insuf.	Suf.	Insuf.	Insuf.	Insuf.	Insuf.

*: As of January 1, 2008

Source: Lower Amudarya Basin Irrigation System Department

Table-E.2.3 Cost Estimation of Tentative Improvement Plan of Kotraban Canal System

Cropped area: 500 ha

No.	Items	Description	Unit	Quantity	Unit Price	Cost	Remarks
1.	Improvement of Internal Earth Canal	Middle size 2.70 m ³ /m	m	5,850	1,585	9,272,250	
2.	Improvement of Internal Earth Canal	Small size 0.30 m ³ /m	m	2,150	882	1,896,300	
3.	Repairing of Concrete Flume Canal	Cover by concrete B 0.30 x H 0.50	m	100	24,238	2,423,800	
4.	Repairing of Pump	Replacement of damaged parts	no.	2	300,000	600,000	
5.	Replacement of Existing Gate	Big size	no.	0	980,000	0	
6.	Replacement of Existing Gate	Middle size	no.	16	500,000	8,000,000	
7.	Replacement of Existing Gate	Small size	no.	9	420,000	3,780,000	
8.	Installation of New Gate	800 x 800	no.	4	500,000	2,000,000	
9.	Installation of New Gate	Stoplog	no.	1	10,000	10,000	
10.	Installation of Gate Structure	Type I	no.	1	1,972,472	1,972,472	
11.	Installation of Gate Structure	Type II	no.	0	622,065	0	
12.	Installation of Gate Structure	Type III	no.	1	1,632,897	1,632,897	
13.	Installation of Gate Structure	Type IV (Shandur type)	no.	1	84,000	84,000	
14.	Installation of Check Gate	2000 x 2000	no.	0	4,824,022	0	
15.	Installation of Check Gate	1500 x 1500	no.	0	3,532,651	0	
16.	Construction of Hydro-post	Middle size	no.	4	591,300	2,365,200	
17.	Construction of Hydro-post	Small size	no.	2	323,150	646,300	
18.	Construction of Hydro-post	For concrete flume	no.	23	10,000	230,000	
Sub-total (1)						34,913,219	
	Miscellaneous	(1) x 15 %				5,236,982	
Direct cost-total (2)						40,150,201	
Indirect cost (3)						(2) x 25 %	10,037,550
Implementation Cost Total (4)						(2)+(3)	50,187,751
Survey and Design Cost (5)						(4) x 10 %	5,018,775
Project Cost						(4)+(5)	55,206,526
19.	Installation of Division Box	For inlet of field with staff gage	no.	54	84,000	4,536,000	

Table E.2.4 Cost Estimation of Tentative Improvement Plan of Maksim Canal System

Cropped area: 250 ha

No.	Items	Description	Unit	Quantity	Unit Price	Cost	Remarks
1.	Improvement of Internal Earth Canal	Middle size 2.70 m ³ /m	m	800	1,585	1,268,000	
2.	Improvement of Internal Earth Canal	Small size 0.30 m ³ /m	m	9,000	882	7,938,000	
3.	Repairing of Concrete Flume Canal	Cover by concrete B 0.30 x H 0.50	m	0	24,238	0	
4.	Repairing of Pump	Replacement of damaged parts	no.	1	300,000	300,000	
5.	Replacement of Existing Gate	Big size	no.	0	980,000	0	
6.	Replacement of Existing Gate	Middle size	no.	0	500,000	0	
7.	Replacement of Existing Gate	Small size	no.	0	420,000	0	
8.	Installation of New Gate	800 x 800	no.	5	500,000	2,500,000	
9.	Installation of New Gate	Stoplog	no.	21	10,000	210,000	
10.	Installation of Gate Structure	Type I	no.	3	1,972,472	5,917,416	
11.	Installation of Gate Structure	Type II	no.	1	622,065	622,065	
12.	Installation of Gate Structure	Type III	no.	8	1,632,897	13,063,176	
13.	Installation of Gate Structure	Type IV (Shandur type)	no.	3	84,000	252,000	
14.	Installation of Check Gate	2000 x 2000	no.	1	4,824,022	4,824,022	
15.	Installation of Check Gate	1500 x 1500	no.	0	3,532,651	0	
16.	Construction of Hydro-post	Middle size	no.	5	591,300	2,956,500	
17.	Construction of Hydro-post	Small size	no.	21	323,150	6,786,150	
18.	Construction of Hydro-post	For concrete flume	no.	0	10,000	0	
Sub-total (1)						46,637,329	
	Miscellaneous	(1) x 15 %				6,995,599	
Direct cost-total (2)						53,632,928	
Indirect cost (3)						(2) x 25 %	13,408,232
Implementation Cost Total (4)						(2)+(3)	67,041,160
Survey and Design Cost (5)						(4) x 10 %	6,704,116
Project Cost						(4)+(5)	73,745,276
19.	Installation of Division Box	For inlet of field with staff gage	no.	39	84,000	3,276,000	

Table E.2.5 Cost Estimation of Tentative Improvement Plan of Kazakhsha Canal System

Cropped area: 175 ha

No.	Items	Description	Unit	Quantity	Unit Price	Cost	Remarks
1.	Improvement of Internal Earth Canal	Middle size 2.70 m ³ /m	m	7,850	1,585	12,442,250	
2.	Improvement of Internal Earth Canal	Small size 0.30 m ³ /m	m	11,600	882	10,231,200	
3.	Repairing of Concrete Flume Canal	Cover by concrete B 0.30 x H 0.50	m	0	24,238	0	
4.	Repairing of Pump	Replacement of damaged parts	no.	0	300,000	0	
5.	Replacement of Existing Gate	Big size	no.	2	980,000	1,960,000	
6.	Replacement of Existing Gate	Middle size	no.	0	500,000	0	
7.	Replacement of Existing Gate	Small size	no.	0	420,000	0	
8.	Installation of New Gate	800 x 800	no.	6	500,000	3,000,000	
9.	Installation of New Gate	Stoplog	no.	9	10,000	90,000	
10.	Installation of Gate Structure	Type I	no.	2	1,972,472	3,944,944	
11.	Installation of Gate Structure	Type II	no.	0	622,065	0	
12.	Installation of Gate Structure	Type III	no.	3	1,632,897	4,898,691	
13.	Installation of Gate Structure	Type IV (Shandur type)	no.	5	84,000	420,000	
14.	Installation of Check Gate	2000 x 2000	no.	0	4,824,022	0	
15.	Installation of Check Gate	1500 x 1500	no.	1	3,532,651	3,532,651	
16.	Construction of Hydro-post	Middle size	no.	7	591,300	4,139,100	
17.	Construction of Hydro-post	Small size	no.	9	323,150	2,908,350	
18.	Construction of Hydro-post	For concrete flume	no.	0	10,000	0	
Sub-total (1)						47,567,186	
	Miscellaneous	(1) x 15 %				7,135,077	
Direct cost-total (2)						54,702,263	
Indirect cost (3)		(2) x 25 %				13,675,565	
Implementation Cost Total (4)		(2)+(3)				68,377,828	
Survey and Design Cost (5)		(4) x 10 %				6,837,782	
Project Cost		(4)+(5)				75,215,610	
19.	Installation of Division Box	For inlet of field with staff gage	no.	32	84,000	2,688,000	

Table E.2.6 Cost Estimation of Tentative Improvement Plan of Ismail Canal System

Cropped area: 139 ha

No.	Items	Description	Unit	Quantity	Unit Price	Cost	Remarks
1.	Improvement of Internal Earth Canal	Middle size 2.70 m ³ /m	m	8,150	1,585	12,917,750	
2.	Improvement of Internal Earth Canal	Small size 0.30 m ³ /m	m	7,250	882	6,394,500	
3.	Repairing of Concrete Flume Canal	Cover by concrete B 0.30 x H 0.50	m	0	24,238	0	
4.	Repairing of Pump	Replacement of damaged parts	no.	0	300,000	0	
5.	Replacement of Existing Gate	Big size	no.	0	980,000	0	
6.	Replacement of Existing Gate	Middle size	no.	0	500,000	0	
7.	Replacement of Existing Gate	Small size	no.	0	420,000	0	
8.	Installation of New Gate	800 x 800	no.	3	500,000	1,500,000	
9.	Installation of New Gate	Stoplog	no.	17	10,000	170,000	
10.	Installation of Gate Structure	Type I	no.	3	1,972,472	5,917,416	
11.	Installation of Gate Structure	Type II	no.	2	622,065	1,244,130	
12.	Installation of Gate Structure	Type III	no.	0	1,632,897	0	
13.	Installation of Gate Structure	Type IV (Shandur type)	no.	9	84,000	756,000	
14.	Installation of Check Gate	2000 x 2000	no.	0	4,824,022	0	
15.	Installation of Check Gate	1500 x 1500	no.	1	3,532,651	3,532,651	
16.	Construction of Hydro-post	Middle size	no.	3	591,300	1,773,900	
17.	Construction of Hydro-post	Small size	no.	17	323,150	5,493,550	
18.	Construction of Hydro-post	For concrete flume	no.	0	10,000	0	
Sub-total (1)						39,699,897	
	Miscellaneous	(1) x 15 %				5,954,984	
Direct cost-total (2)						45,654,881	
Indirect cost (3)		(2) x 25 %				11,413,720	
Implementation Cost Total (4)		(2)+(3)				57,068,601	
Survey and Design Cost (5)		(4) x 10 %				5,706,860	
Project Cost		(4)+(5)				62,775,461	
19.	Installation of Division Box	For inlet of field with staff gage	no.	44	84,000	3,696,000	

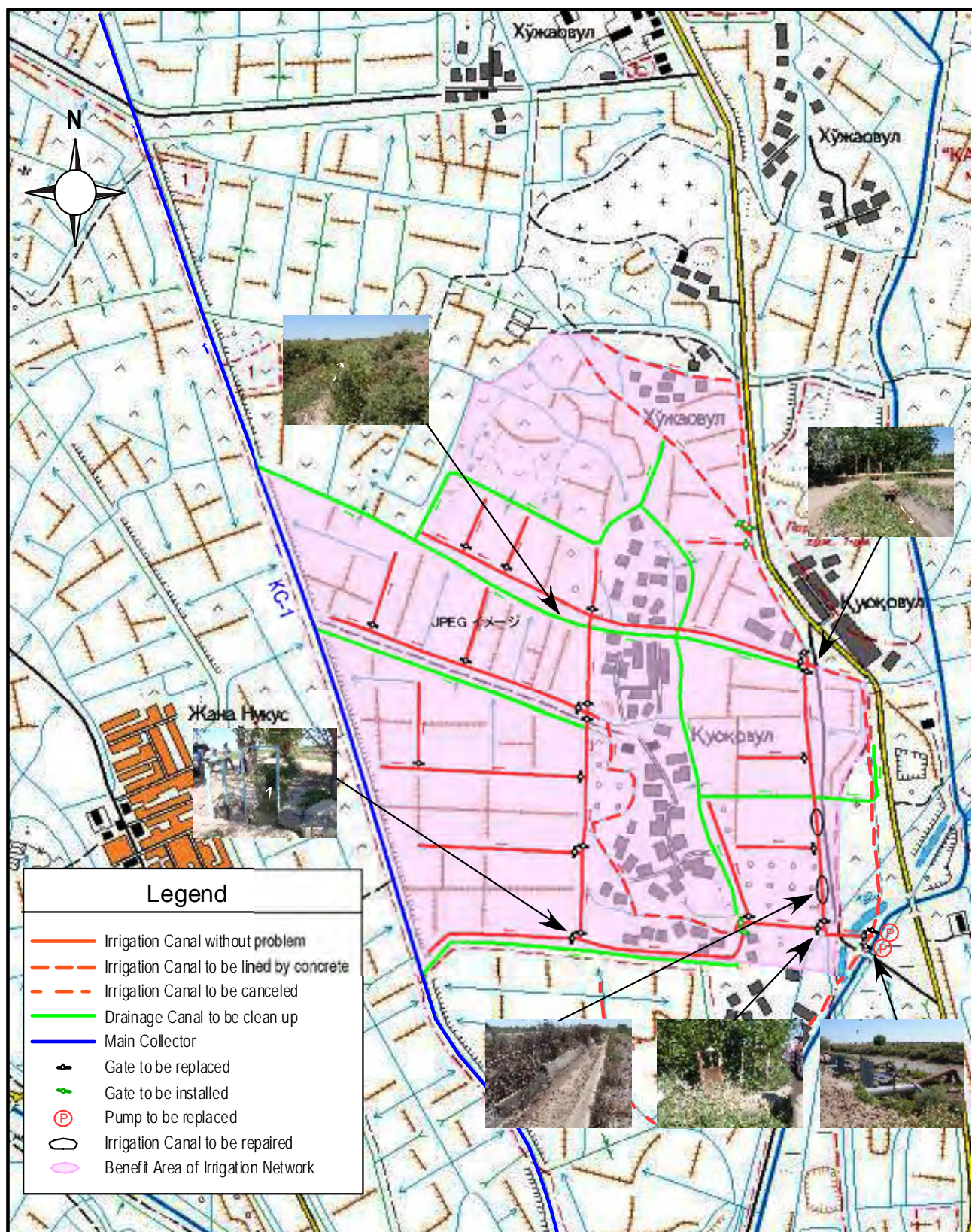


Fig. E.2.1 Improvement Plan for Irrigation and Drainage Network on Kotraban Canal System in Kattagar Ama WUA

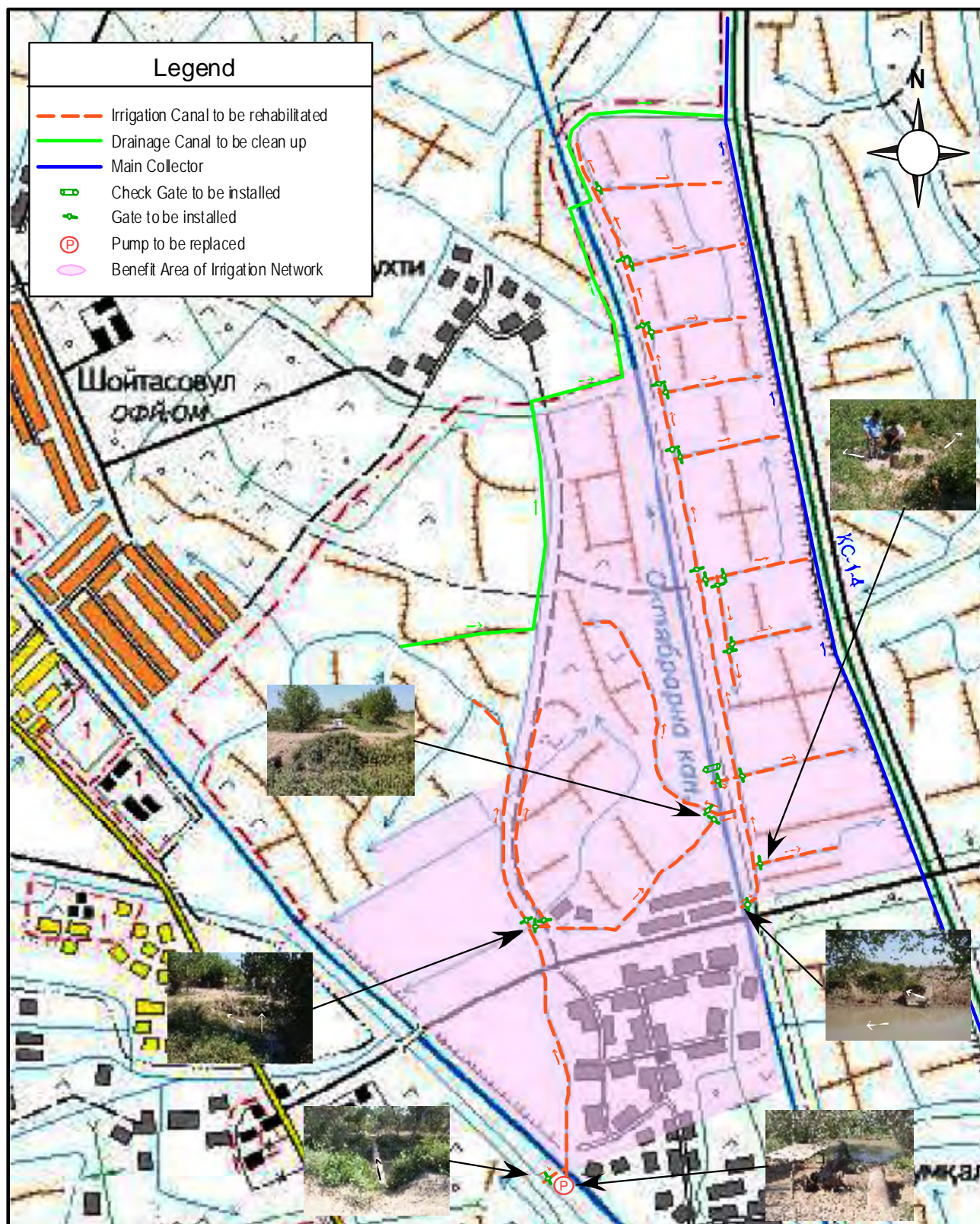


Fig. E.2.2 Improvement Plan for Irrigation and Drainage Network on Maksim Canal System in Kattagar Arna WUA

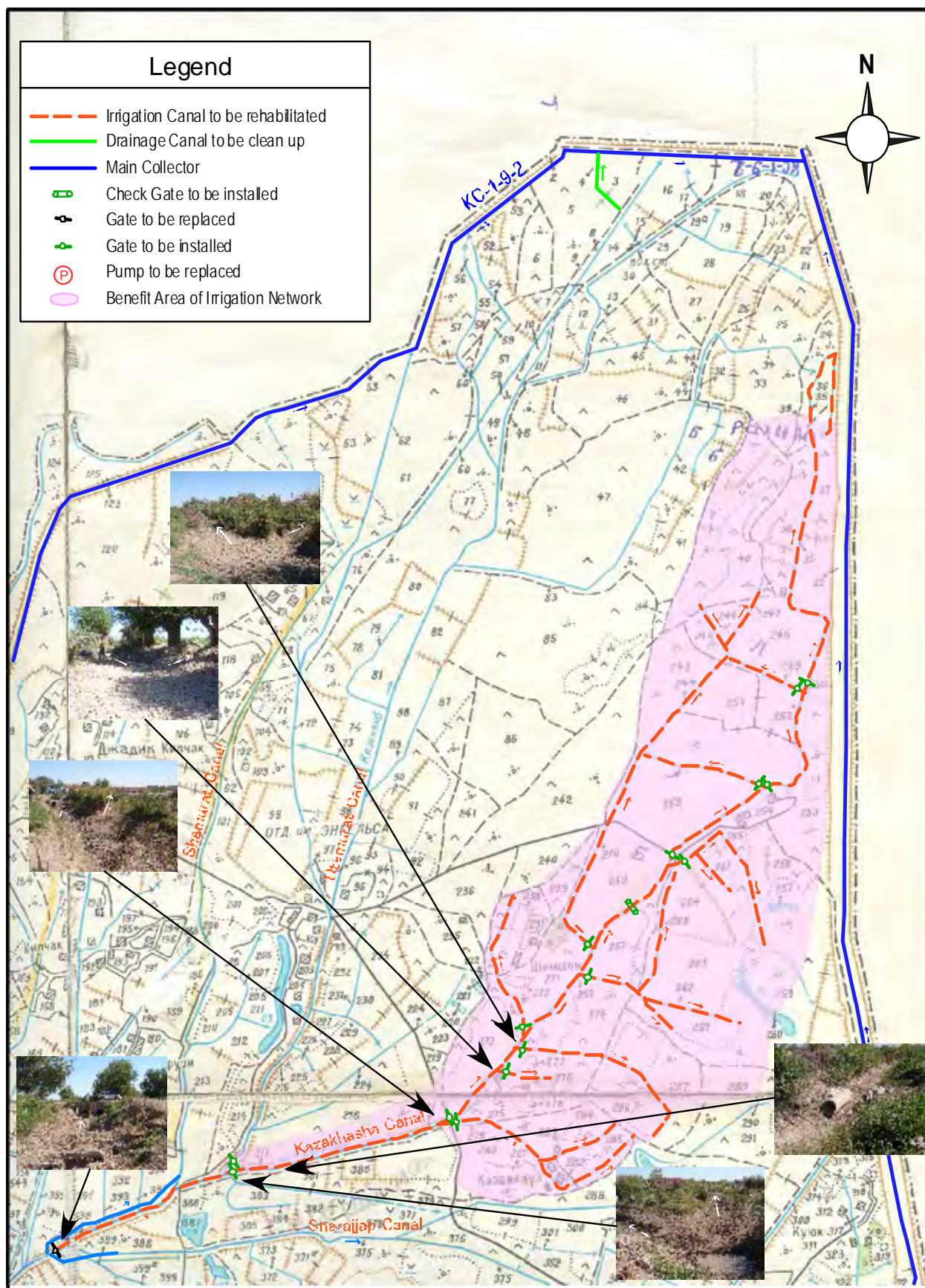


Fig. E.2.3 Improvement Plan for Irrigation and Drainage Network on Kazakhasha Canal System in Suwshi WUA

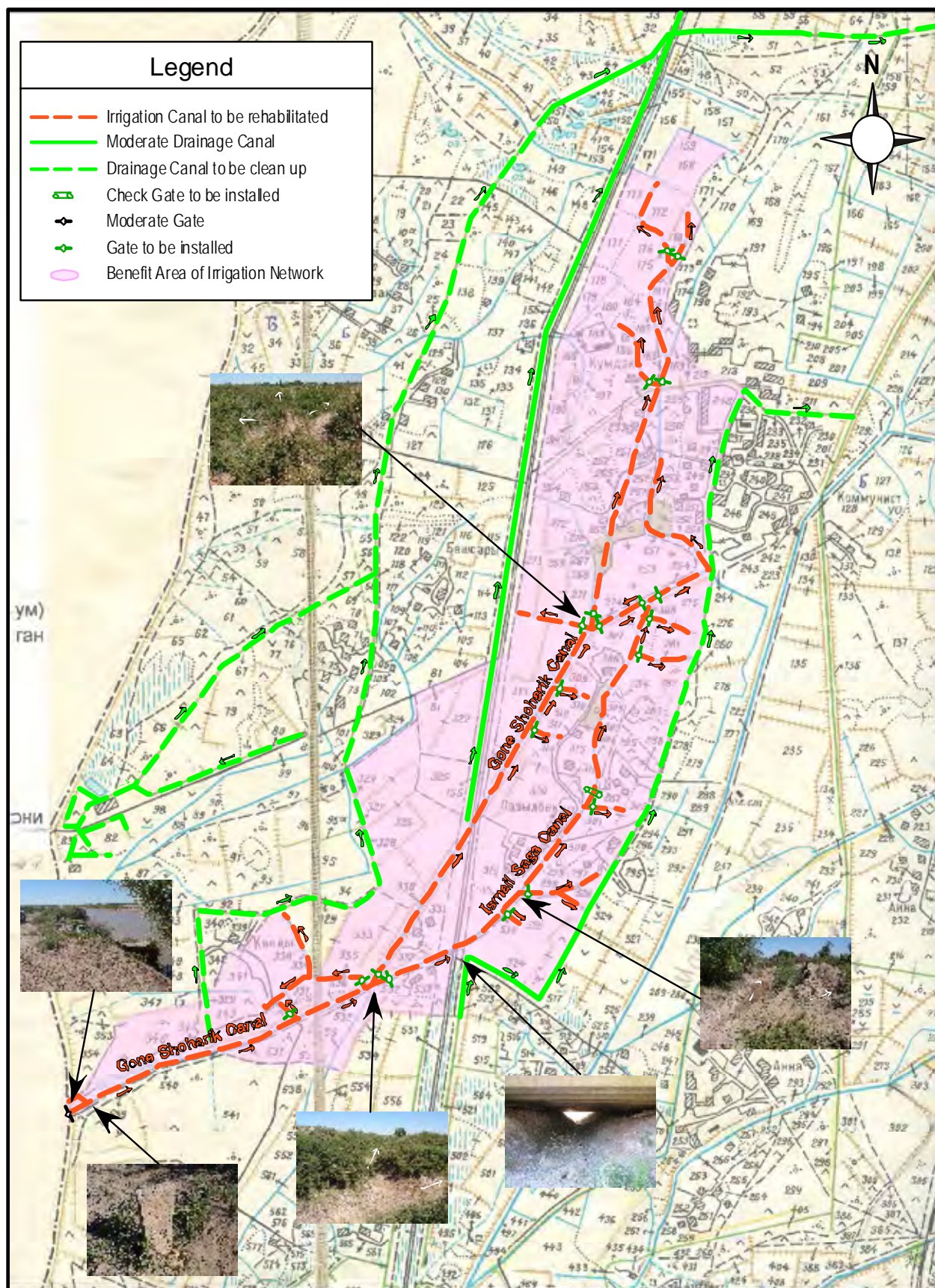
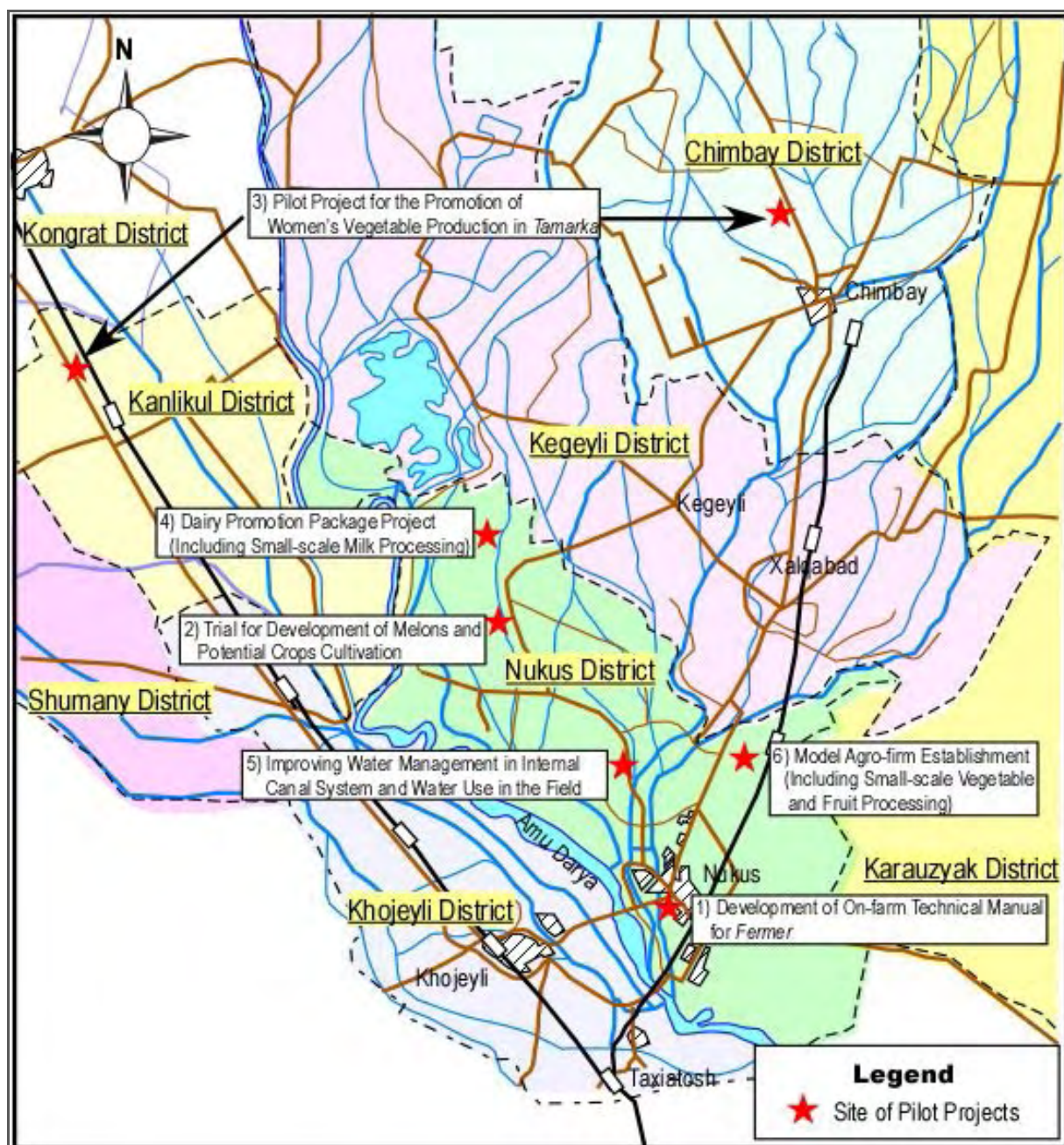


Fig. E.2.4 Improvement Plan for Irrigation and Drainage Network on Ismail Saga Canal System in Suwshi WUA

ANNEX-F VERIFICATION STUDY

Location of Pilot Projects

F.1	Pilot Projects for Verification of the Draft Action Plan.....	F - 1
F.2	Development of On-farm Technical Manual for Farmers	F - 6
F.3	Trial for Development of Melons and Potential Crop Cultivation	F - 12
F.4	Promotion of Women's Vegetable Production in Tamarka.....	F - 27
F.5	Dairy Promotion Package.....	F - 38
F.6	Improving Water Management in Internal Canal and Water Use in the Field	F - 58
F.7	Model Agro-firm Establishment.....	F - 85
F.8	Environmental and Social Consideration	F - 127
F.9	Issues found during the Implementation of Pilot Projects.....	F - 131
	Attachment F.1 Conclusion of SCNP for Improvement of Irrigation System ..	F - 139
	Attachment F.2 Conclusion of SCNP for Milk Processing in Kerder.....	F - 141
	Attachment F.3 Conclusion of SCNP for Small-scale Agro-processing	F - 144
	Attachment F.4 Conclusion of SCNP for Drainage Improvement.....	F - 147



Location Map of Pilot Projects

ANNEX F: VERIFICATION STUDY

F.1 Pilot Projects for Verification of the Draft Action Plan

F.1.1 Objectives of Pilot Project Implementation

The objectives of selecting and implementing Pilot Projects are to identify various constraints and obstacles, as well as measures to overcome such difficulties and improve the function / effect of the activities through actual implementation of the Activities of the Action Plan. Such findings from the implementation of Pilot Projects will be fed back to the Action Plan in order to formulate a more comprehensive and realizable Master Plan for Regional Development in Karakalpakstan.

F.1.2 Criteria for Activities to be verified through Pilot Projects

Prior to the preparation of candidate Pilot Projects, each activity of the draft Action Plan was examined and items which should be verified were identified. Based on the importance and whether such items can be verified through Pilot Project schemes, activities to be implemented in Pilot Projects were selected for the formulation of Candidate Pilot Projects.

Taking into regard the general features and limitations of Pilot Projects/Schemes, criteria for selecting activities for the candidate Pilot Projects were set as follows:

- (1) Items that can be verified within the time span of Pilot Projects
- (2) Items that require actual implementation of activities to verify its appropriate function / effect
- (3) Items that can be verified through implementation of activities in relevantly small scales
- (4) Activities that do not require institutional reforms

F.1.3 Selection of Pilot Projects for Verification Study

Base on the above mentioned Criteria, 9 projects were selected as candidate verification studies (Table F.1.1). These were further merged to formulate the following six (6) Pilot Projects.

- (1) Development of On-farm Technical Manual for *Fermer*
- (2) Trial for Development of Melons and Potential Crops Cultivation
- (3) Pilot project for the promotion of Women's Vegetable Production in *Tamarka*
- (4) Dairy Promotion Package Project (including small-scale milk processing)
- (5) Improving Water Management in Internal Canal System and Water Use
- (6) Model Agro-firm Establishment (including small-scale vegetable and fruit processing)

F.1.4 Implementation Structure

Besides the implementation structure of the seven individual Pilot Projects, a structure for coordination of these projects shall be established under the government of Karakalpakstan, which will also become the foundation for the implementation of the Action Plan after the completion of this Study.

Under the administrative structure of Karakalpakstan, the Council of Ministers of Karakalpakstan is the coordination and decision making body for all development activities of the Republic. Particularly in regard that the *Hakimiyat*, which are the Government Body closest to the local residents, belong directly under the Council of Ministers, the Agricultural section of the Council of Ministers shall be the central body for implementation.

The Pilot Projects, as well as the Action Plan, shall be implemented under coordination of relevant agencies under the secretariat headed by the deputy minister of the MAWR of Karakalpakstan.

Development Sub-sector	Main Organization	Supporting Government Agencies	Other Supporting Organizations such as NGOs
Crop Production	MAWR	<i>Hakimiyat</i> , Scientific Production Center for Agriculture(SCA), State Agriculture University, Agriculture College, Department of Vocational Higher-education, Quarantine Office	<i>Farmers' Association</i> , MTP, other NGOs
Livestock	Animal husbandry department of MAWR	Animal husbandry department of MAWR, <i>Hakimiyat</i> , SRI	<i>Farmers' Association</i>
Fisheries	Fisheries section of MAWR	State Committee for Nature Protection, Academy of Science	Fisheries Association
Irrigation & Drainage	Irrigation & Drainage section of MAWR	LABM, ISD, SEMW, HME	SANIIRI
Marketing & Distribution	Economic section of MAWR	Ministry of Foreign Economic Relations, Investments & Trade, Animal husbandry department of MAWR, <i>Hakimiyat</i> , Ministry of Architecture and Construction, Security Office, Quarantine Office	Chamber of Commerce, <i>Farmers' Association</i> , <i>Dehkan Bazaar Association</i>
Agro-processing	Economic section of MAWR	<i>Hakimiyat</i> , Animal husbandry department of MAWR	<i>Farmers' Association</i> ,
Improvement of Agricultural Support	Council of Ministers, MAWR	<i>Hakimiyat</i> , State Agriculture University, Agriculture College	
Cross cutting	Council of Ministers, Ministry of Finance	Ministry of Economy, Statistics Department, <i>Hakimiyat</i> ,	NGO

Note: All organizations are that of Karakalpakstan, unless specifically noted

F.1.5 Guidance and Monitoring System of the Verification Study

(1) The Study Team

The Study Team together with Karakalpakstan counterparts implemented the pilot projects of verification Study in both direct and in-direct manners from set up, guidance, monitoring, and evaluation of the projects. Due to the short stay period of the Study Team members during the implementation of projects in Karakalpakstan, and in order to considering the continuity of the similar project implementation under the Master Plan and Action Plan of the Regional Development, the Study Team contracted organizations, consultants, and/or NGO of Karakalpakstan for the direct support and guidance to the stakeholders of pilot projects.

Also, the Study Team deployed the representative of the Study Team to coordinate and monitoring with sub-contractors and communication with the Study Team in Japan during mid of June to Mid of September 2009.

(2) Sub-contractors of Karakalpakstan

As stated above, the Study Team appointed sub-contractors for supports, guidance, construction and other services to the pilot projects under the supervision of the Study Team. Selections of sub-contractors were conducted based on the procurement procedure of JICA. Sub-contractors and their major activities of each pilot project are as follows:

Pilot Project	Main Activities	Sub-contractor
Development of On-farm Technical Manual for <i>Fermer</i>	Management of manual preparation, editing, printing and extension of manual	Normative Research Center, Karakalpakstan
Trial for Development of Melons and Potential Crops Cultivation	Trial cultivation of melons and other permissive crops together with demonstration to farmers	Karakalpak Branch of Rice Institute, Nukus
Promotion of Women's Vegetable Production In <i>Tamarka</i>	Technical guidance, and inputs supply, monitoring of women's vegetable cultivation	Business Women Association in Karakalpakstan "Tadbirkor Ayol"
Dairy Promotion Package	Guidance, training, material supply and monitoring	<i>Farmers' Association</i> in the Republic of Karakalpakstan

Improving Water Management in Internal Canal System and Water Use in the Field	Survey, design, technical specification and cost estimate of irrigation system rehabilitation works	Karakalpak Branch of “UzGIP”
	Consultation and monitoring services rehabilitation works and training WUA	SANIIRI, Karakalpak Branch
	Rehabilitation works of irrigation system on earth canals and equipment together with WUA equipment	Kattagar-Bozataw Irrigation System Department
	Rehabilitation of hydraulic facilities and concrete and earth canal of irrigation system	Magistral Story Service Co.
Model Agro-firm Establishment	Guidance, training and support of processing equipment and business plan of new agro-firm	Karakalpakstan Republic “Business Incubator” Ltd.

F.1.6 Supporting of Relevant Institutions, Organizations for the Pilot Projects Implementation

The structure for coordination of these pilot projects shall be established under the Government of Karakalpakstan, which will also become the foundation for the implementation of the Action Plan after the completion of this Study.

Under the administrative structure of Karakalpakstan, the Council of Ministers of Karakalpakstan is the coordination and decision making body for all development activities of the Republic. Particularly in regard that the *Hakimiyats*, which are the Government Body closest to the local residents, belong directly under the Council of Ministers, the Agricultural section of the Council of Ministers shall be the central body for implementation.

The Pilot Projects, as well as the Action Plan, are to be implemented under coordination of relevant agencies under the secretariat headed by the deputy minister of the MAWR of Karakalpakstan.

Development Sub-sector	Main Organization	Supporting Government Agencies	Other Supporting Organizations such as NGOs
Crop Production	MAWR	<i>Hakimiyat</i> , Scientific Production Center for Agriculture, State Agriculture University, Agriculture College, Department of Vocational Higher-education, Quarantine Office	<i>Fermers' Association</i> , MTP, other NGO
Livestock	Animal husbandry department of MAWR	Animal husbandry department of MAWR, <i>Hakimiyat</i> , SRI	<i>Fermers' Association</i>
Fisheries	Fisheries section of MAWR	State Committee for Nature Protection, Academy of Science	Fisheries Association
Irrigation & Drainage	Irrigation & Drainage section of MAWR	LABM, ISD, SEMW, HME	SANIIRI
Marketing & Distribution	Economic section of MAWR	Ministry of Foreign Economic Relations, Investments & Trade, Animal husbandry department of MAWR, <i>Hakimiyat</i> , Ministry of Architecture and Construction, Security Office, Quarantine Office	Chamber of Commerce, <i>Fermers' Association</i> , <i>Dehkan Bazaar Association</i>
Agro-processing	Economic section of MAWR	<i>Hakimiyat</i> , Animal husbandry department of MAWR	<i>Fermers' Association</i> ,
Improvement of Agricultural Support	Council of Ministers, MAWR	<i>Hakimiyat</i> , State Agriculture University, Agriculture College	
Cross cutting	Council of Ministers, Ministry of Finance	Ministry of Economy, Statistics, <i>Hakimiyat</i> ,	NGO

Note: All organizations are that of Karakalpakstan, unless specifically noted

F.1.7 Methodology for Pilot Project Evaluation

(1) Methodology for Pilot Project Evaluation

Evaluation of verification study projects (hereinafter referred to “Pilot Projects”) was conducted based on the results of 1) projects monitoring of Pilot Projects which conducted from in March 2009 to October 2010, 2) performance evaluation in participatory workshops and 3) results of interview surveys. The viewpoints to evaluate the Pilot Projects will be: 1) relevance, 2) effectiveness, 3) efficiency, 4) impact and 5) sustainability. The results of evaluation through these viewpoints were comprehensively examined and the conclusion of evaluation will be extracted.

On the course of the Pilot Project implementation started in March 2009, the interim evaluation conducted in September 2009 and the final evaluation conducted in October 2010.

Evaluation items for Interim and Final Evaluation

Item of Evaluation	Interim Evaluation	Final Evaluation
Confirmation of actual results	●	●
Confirmation of implementation process	●	●
5 Evaluation viewpoints of DAC		
Relevance	●	●
Effectiveness	○	●
Efficiency	●	●
Impact	△	○
Sustainability	△	○

Notes) ● Verified based on the Study.

○ Verified based on the expectation as of the evaluation.

△ Verified according to necessity and possibility.

(2) Evaluation of Items to be verified

The Pilot Projects were formulated to verify the proposed Master Plan and Action Plan of the Regional Development in Karakalpakstan (draft) which described in the Interim Report issued in December 2008. Objectives and items to be verified for each pilot project are set in the Implementation Plan of Pilot Project issued in January 2009. The interim evaluation was conducted for the pilot projects and their verification items as described in Progress Report (3) in October 2009. In This Progress Report (4), the final evaluation of the Pilot Projects is described combining with the interim evaluation of Progress Report (3). Only the final evaluation results are presented hereinafter in the Report.

(3) DAC Criteria for Evaluating Development Assistance

One of the evaluation methodologies to be conducted based on the criteria for evaluation of development assistance set by DAC (Development Assistance Committees) of OECD. They are described as follows:

Viewpoints of DAC Criteria
<p>[1] Relevance</p> <p>The extent to which the aid activity is suited to the priorities and policies of the target group, recipient and donor.</p> <p>In evaluating the relevance of a program or a project, it is useful to consider the following questions:</p> <ul style="list-style-type: none"> • To what extent are the objectives of the program still valid? • Are the activities and outputs of the program consistent with the overall goal and the attainment of its objectives? • Are the activities and outputs of the program consistent with the intended impacts and effects? <p>Suitableness of the activity as a project under Japanese ODA will be considered by examining whether the outcomes / directionality of the project match the needs of the beneficiaries and government development strategies.</p>
<p>[2] Effectiveness</p> <p>A measure of the extent to which an aid activity attains its objectives.</p> <p>In evaluating the effectiveness of a program or a project, it is useful to consider the following questions:</p> <ul style="list-style-type: none"> • To what extent were the objectives achieved / are likely to be achieved? • What were the major factors influencing the achievement or non-achievement of the objectives? <p>Assessment will be done on whether the results of the project were as expected, and whether such results were due to the implementation of the project or not. Together with this, effects of external factors will also be examined.</p>

[3] Efficiency

Efficiency measures the outputs -- qualitative and quantitative -- in relation to the inputs. It is an economic term which signifies that the aid uses the least costly resources possible in order to achieve the desired results. This generally requires comparing alternative approaches to achieving the same outputs, to see whether the most efficient process has been adopted.

When evaluating the efficiency of a program or a project, it is useful to consider the following questions:

- Were activities cost-efficient?
- Were objectives achieved on time?
- Was the program or project implemented in the most efficient way compared to alternatives?

The amount of input will be compared with the level of accomplishment of the project goal. Assessment will be done on whether more efficient approaches were applicable to bear the same results. Since economic analysis does not apply to all types of projects, appropriateness of the input cost may also be examined by comparing them with similar projects implemented by the recipient country or other donor organizations.

[4] Impact

The positive and negative changes produced by a development intervention, directly or indirectly, intended or unintended. This involves the main impacts and effects resulting from the activity on the local social, economic, environmental and other development indicators. The examination should be concerned with both intended and unintended results and must also include the positive and negative impact of external factors, such as changes in terms of trade and financial conditions.

When evaluating the impact of a program or a project, it is useful to consider the following questions:

- What has happened as a result of the program or project?
- What real difference has the activity made to the beneficiaries?
- How many people have been affected?

The impact of the projects will be examined through the achievement of higher objectives (further goals that are in the directionality of the project, but those that cannot be achieved by the project alone). At the same time, both positive and negative impacts together with other external factors (impact of events other than the project) will be analyzed.

[5] Sustainability

Sustainability is concerned with measuring whether the benefits of an activity are likely to continue after donor funding has been withdrawn. Projects need to be environmentally as well as financially sustainable.

When evaluating the sustainability of a program or a project, it is useful to consider the following questions:

- To what extent did the benefits of a program or project continue after donor funding ceased?
- What were the major factors which influenced the achievement or non-achievement of sustainability of the program or project?

In case the activities of the project are expected to continue after the withdrawing of the donor. Sustainability will be analyzed based on the ability to provide continuous input in terms of organization and technology. Relevant items such as state policy, social / cultural / environmental issues will also be examined at this time.

(4) Project Management and Quality Control

In the Pilot Projects, the Study Team made sub contract with local consultants and NGO to monitor and support the pilot projects implementation. In addition, two local contractors were contracted to implement the rehabilitation of irrigation and drainage facilities, in Karakalpakstan.

For the implementation of Master Plan and Action Plans to be formulated in the Study, the capability of local contractors/NGOs are to be verified together with capability of stakeholders, source of finance of Government administration and private sectors.

(5) Implementation Schedule of Verification Study

Most of pilot projects were delayed because of several reasons such as poor management and financial capability of sub-contractors, the banking system of Uzbekistan for contract payment, etc.

Planned and actual implementation schedule of work items of pilot projects are shown in Table F.1.2.

F.2 Development of On-farm Technical Manual for Farmer

F.2.1 Implementation Plan

(1) Objectives

A technical manual for practical use in the field will be prepared based on technical information from / discussions with the Scientific Production Center for Agriculture, State Agriculture University, and Agriculture College, with the MAWR working as the secretariat. The selection of target crops for the manual will be finalized taking into regard the needs of farmers (excluding wheat and cotton.)

(2) Items to be verified

- Coordination system to ensure a smooth implementation of joint works to develop the manual by concerned agencies
- Validity of training to teachers of district agricultural colleges to deepen their understanding of the manual and to refresh their teaching ability
- Appropriate technical level of the manual to *farmers*

(3) Activities and method for implementation

- To develop the manual in Karakalpak language by inter-agency working committee
- To train teachers of district agricultural colleges who are going to give a lecturer in the training seminars. 5 days training will be given to 22 teachers of district agricultural colleges (2 teachers/district from the target districts)
- To distribute the manual to all *farmers* participated in the training seminars. 10,000 copies of the manual will be prepared and distributed in total
- To give a lecture to *farmers* about on-farm technologies based on the manual in the training seminars
- To evaluate the project activities in order to collect necessary information for the verification

(4) Activities and Implementing Body

Activities	Implementation Bodies
Set up an inter-agency working group	Council of Ministers, MAWR, Scientific Production Center for Agriculture, State Agriculture University, Department of Vocational Higher-education, <i>Farmers'</i> Association, the Study Team
Editorial meetings of the manual	MAWR, Scientific Production Center for Agriculture, State Agriculture University, <i>Farmers'</i> Association
Preparation of manuscripts of the manual	MAWR, Scientific Production Center for Agriculture, State Agriculture University
Editing the manual	MAWR, Scientific Production Center for Agriculture, State Agriculture University
Printing and binding the manual	MAWR
Training of the teachers	MAWR, Scientific Production Center for Agriculture, State Agriculture University, Department of Vocational Higher-education
<i>Farmer</i> Training Seminars (to be organized by Uzbekistan Govt. with its own budget)	MAWR, Agriculture College, <i>Farmers'</i> Association
Evaluation (collecting information)	Council of Ministers, MAWR, SCA, State Agriculture University, the Study Team

(5) Implementation Schedule

The original implementation schedule planned in the Implementation Plan, together with the actual implementation period of the activities, are indicated in Table F.2.1

(6) Relevant Components of the Action Plan

- 121: Improvement of Agricultural Extension Service to *Farmer*

(7) Expected Benefit and Measures for Extension

- To activate annual *farmer* training seminars at district level though providing practical information on practical farming technology

- To provide *farmers* a close reference material on practical farming technology
- To improve capability of teachers of District Agricultural Collages through training how to utilize the developed technical manual in the annual *farmer* training seminars

(8) Possible Risks and Risk Management

Possible Risks	Risk Management
Developed technical manual will not be utilized in the ongoing annual <i>farmer</i> training seminars	Person in charge of the training seminars in the Council of Ministries shall be involved in the development of on-farm technical manual as a member of inter- agency working committee

(9) Monitoring and Evaluation

Items to be Verified	Data to be Collected	Data Collection Method
Smooth implementation of joint works to develop the manual by concerned agencies	Participation and contribution of members to the inter-agency working committee	Minutes of discussions of the meetings
	Leadership of secretariat (MAWR of Karakalpakstan)	Interviews to members of the inter-agency working committee
Validity of training to teachers of district agricultural collages	Evaluation by the teachers after the training	Questionnaire survey to all teachers trained
Appropriate technical level of the manual to <i>farmers</i>	Evaluation by <i>farmers</i> participated in the annual <i>farmer</i> training seminars	Questionnaire survey to sample <i>farmers</i>

(10) Feedback of Monitoring Results

The most appropriate implementation structure of the action plan of “Improvement of Agricultural Extension Service to *Farmers*” and technical level of the on-farm technical manual shall be reexamined according to the results of evaluation when the final report will be compiled.

(11) Possible Post Pilot Project

A successive project to develop on-farm technical manuals in Karakalpak language will be implemented by the Government of Karakalpakstan with its own budget.

F.2.2 Process of the Pilot Project

The pilot project has been carried out in accordance with the following process (also refer to Table E.2.1).

(1) To set up inter-agency working committee

The Deputy Minister of Agriculture and Water Resources (MAWR) of Karakalpakstan appointed the following persons to the members of inter-agency working committee to develop the manual in the first editorial meeting on March 18th, 2009.

No	Name	Position	Office
1	Prof. M. Ibragimov	Director	Nukus Agricultural College
2	Mr. K. Bekbergenov	Director	Normative Research Centre, Karakalpakstan
3	Mr. M. Kurbaniazov	Head of Economic Department	Ministry of Agriculture and Water Resources (MAWR), Karakalpakstan
4	Mr. K. Saparnyazov	Agriculture Specialist	Council of Ministers, Karakalpakstan
5	Mr. K. Reipnazarov	Assistant Designer	State Publishing House, Karakalpakstan

(2) To organize editorial meetings of the manual

The members of inter-agency working committee and other personnel concerned gathered seven times for preparation of a draft manual. The date and major topics discussed are shown below.

No	Date	Major Subjects Discussed
1	Mar. 18, 09	Inauguration of the inter-agency working committee and work schedule
2	Apr. 5, 09	Chapters of the Manual
3	Apr. 15, 09	Contents of the chapters and nomination of the draft writers
4	June 23, 09	Progress of the draft making

5	July 30, 09	Progress of the draft making and editing the draft
6	Oct. 1, 09	Confirmation of the final draft and preparation of agriculture college teachers' training
7	Oct. 5, 09	Confirmation of printing schedule and preparation of agriculture college teachers' training

(3) To prepare manuscripts of the manual

Manuscript preparation work started from May 1st, 2009, and all writers submitted their first manuscripts by the third week of August, 2009.

(4) To edit the manual

Contents of the manuscripts were carefully examined by members of the inter-agency working committee. The contents were also checked by third-party scientists, Prof. Toreniyazov E.Sh., Director of Nukus Branch School of Tashkent State University of Agriculture and Mr. Khojametov, S.J., Chairman of Plant Protection Centre, Karakalpakstan. The final draft was approved by the inter-agency working committee on October 1st, 2009.

(5) To print and bind the manual

Immediately after internal procedures of MAWR, the work had proceeded to the printing and binding process. The manual was completed and delivered from a printing company on December 28th, 2009. An official receipt of the manual was issued by MAWR on March 26th, 2010 after confirming the delivery of the manual to the concerned districts for distribution to *farmers*.

(6) To train teachers of district agricultural colleges

A five-days training was held to make teachers of district agricultural colleges familiar with the developed manual. The teachers were expected to have an opportunity to train *farmers* with the manual in the following annual *farmer* training seminars. MAWR and the contractor worked on preparation of the teacher's training. After the training, trainees were requested to fill-in a simple questionnaire for the evaluation.

- Period: February 9 – 13, 2010
- Venue: Nukus Agricultural College
- Topic: Cultivation of vegetables and gourds in Karakalpakstan
- Trainees: 23 teachers from 11 districts
- Trainers:

No	Name	Position	Office
1	Prof. M. Ibragimov	Director	Nukus Agricultural College
2	Mr. K. Bekbergenov	Director	Normative Research Centre, Karakalpakstan
3	Mr. M. Kurbaniazov	Head of Economic Department	Ministry of Agriculture and Water Resources (MAWR), Karakalpakstan
4	Mr. E. Toreniyazov	Director	Tashkent State University of Agriculture, Nukus
5	Mr. A. Nurhodzhaeva	Teacher	Nukus Agricultural College
6	Mr. B. Jolibekov	Representative	The Study Team
7	Mr. K. Niyazymbetov	Head	Bio-humus Farm

(7) To give a lecture in farmer training seminars

Annual *farmer* training seminars at district level held by the Council of Ministers were scaled down this year due to budgetary constraint. A simple field-day was organized by each district office (*Hakimiyat*) before major planting season, instead of the seminars. Therefore, the trained teachers could not have an opportunity to show results of the training in the seminars.

(8) To make evaluation

The Study Team made an evaluation after completion of the training to district agricultural college teachers and delivery of the manual to *farmers*.

Items to be Verified	Data to be Collected	Data Collection Method
Smooth implementation of joint works to develop the manual by concerned agencies	Participation and contribution of members to the inter-agency working committee	Minutes of discussions of the meetings
	Leadership of secretariat (MAWR of Karakalpakstan)	Interviews to members of the inter-agency working committee
Validity of training to teachers of district agricultural colleges	Evaluation by the teachers after the training	Questionnaire survey to all teachers trained
Appropriate technical level of the manual to <i>farmers</i>	Evaluation by <i>farmers</i> in the target area	Questionnaire survey to 111 sample <i>farmers</i> from 11 districts (May, 2010)

F.2.3 Outcomes and Achievement

(1) Smooth implementation of joint works to develop the manual by concerned agencies

There is no big problem or trouble during the implementation so far. All works to prepare the manual and the training of district agricultural college teachers were carried out accordingly under supervision of the inter-agency working committee. Editorial meetings of the inter-agency working committee were organized timely with the leadership of MAWR and the contractor who has been hired by the Study Team to facilitate this pilot project. The minutes of meetings were also taken every time after the meetings.

(2) Validity of training to teachers of district agricultural colleges

The participated teachers were satisfied with the training and all participants understood almost 100% of the contents of the manual according to their self-evaluation. They also evaluated that technical level of the manual was acceptable to general farmers in Karakalpakstan. All participants were confident that they can teach the contents of the manual to farmers, except the subject of eggplant growing. The followings are suggestions made by the participants.

- This kind of seminar should be held at district level, since introduced technology in the manual is useful in the condition of Karakalpakstan
- Contents of the training should be modified in accordance with the local condition of each district. The condition of the northern districts is particularly different from other districts
- A new training method experienced in foreign countries shall be applied

(3) Appropriate technical level of the manual to farmers

Farmers' self-evaluation result about understanding the manual showed higher score (Very well or fair) in all subjects of the manual. Relatively higher educational background of farmers could contribute the result. While there was a certain percentage of farmers who did not read the contents for every subject, many farmers read only selective subjects based on their own interest. Degree of understanding could be influenced by the farmers interest.

More than 50% of farmers found new technologies/ideas "Very much" or "Much" in every subject of the manual. Also, more than 50% of farmers answered that technologies described in the manual were "Very much" or "Much" useful/applicable except for the subjects of "Advantage of using mulch for vegetables" and "How to grow Onion". The subject which farmers were interested in the most is "How to grow Potato". This year's government potato promotion campaign must have a great influence on the result. Subjects on popular crops among Karakalpakstan farmers, i.e. tomato, melon and water-melon, had a higher score of farmers' interest.

Many farmers were asking to introduce more advanced technology, academic information and scientific data, as well as they were asking to introduce simpler and more applicable technologies to the local condition. They are anxious to have much information from the manual. Many farmers also commented that the manual should be written with easier terminology understandable to farmers and be attached more pictures, drawings, figures, tables, etc. for easy understanding. Though the manual was prepared on visually oriented principle for easy understanding, many farmers actually demanded easier description and editing. Many farmers appreciated that the manual was written in Karakalpak,

since this is the first full-scale technical manual on agriculture written in the local language.

Other farmers' comments were dominated by positive one, e.g. "They want to apply the introduced technology to their actual farming", "They want to have the similar manual on other topics, such as pests and diseases control, wheat and cotton, livestock, etc. based on their interest".

F.2.4 Problems and Issues encountered during Implementation

The only problem was that annual *farmer* training seminars at district level held by the Council of Ministers had scaled down this year due to budgetary constraint. This pilot project expected that the seminars could be a good occasion to disseminate the contents of the manual to *farmers* through trained district agricultural college teachers. If the annual seminars were carried out as usual, more contents of the manual could be effectively disseminated among *farmers*.

F.2.5 Evaluation of Pilot Project

(1) Items to be Verified by the Pilot Project

1) Coordination system to ensure a smooth implementation of joint works to develop the manual by concerned agencies

The inter-agency working group functions without big trouble. All works were smoothly carried out under the leadership of MAWR. MAWR is capable of managing the coordination system to develop an agricultural technical manual.

2) Validity of training to teachers of district agricultural colleges to deepen their understanding of the manual and to refresh their teaching ability

All participated teachers have understood the contents of the manual almost 100% according to their self-evaluation and they are confident to teach the contents to farmers after the training, except one subject of growing eggplant. It is concluded that the training is very effective in enhancing the teachers' ability, so that they will be ready to play a role in teaching the contents to farmers.

3) Appropriate technical level of the manual to farmers

The result of questionnaire survey to farmers implies that the manual was prepared according to farmers' technical ability. The trained district agricultural college teachers also evaluated that technical level of the manual was acceptable to general farmers in Karakalpakstan. However, the manual will be edited in easier style, since many farmers commented that the manual should be written with easier terminology understandable to farmers and be attached more pictures, drawings, figures, tables, etc. for easy understanding.

(2) Evaluation at Viewpoints of DAC Criteria

1) Relevance

The Government of Uzbekistan has organized annual farmer training seminars at district level during off-agriculture season, though the seminars were scaled down this year due to budgetary constraint. The seminars basically cover all farmers every year. Since low technical ability of farmers is one of the reasons of low productivity of agriculture, the Government is seriously concerned with improvement of farmers' technical level. Especially, transition from cooperative farming system to individual farmer system has spotlighted the importance of each individual farmers technical abilities. The project approach to address the issue of farmers' ability is relevant to the Government concern.

In order to realize the Master Plan's basic policy, i.e. "Development of Market Oriented Agriculture on Sustainable Basis", it is desirable to promote crop diversification rather than concentration on cotton and wheat production. Improvement of farmers' technical level is indispensable to promote the crop diversification, as well.

2) Effectiveness

This pilot project has clear objective aiming at improving farmers' technical level in the target area

through providing not only the developed technical manual in Karakalpak language but also lectures given by trained agricultural college teachers in the annual farmer training seminars. Synergistic effect of the both inputs could lead effective dissemination of farming technology in the manual among farmers.

3) Efficiency

Since agencies concerned to the implementation of the pilot project are also working for the annual farmer training seminars, it is expected that the agencies could share the farmers' needs and could make necessary coordination arrangements without big trouble. Full utilization of the existing implementation system of the annual farmer training seminars could contribute to the efficient implementation.

Also, Karakalpak language used in the manual could lead farmers to smooth understanding of the contents. The developed manual is the first coherence technical manual of agriculture written in Karakalpak language.

4) Impact

It is expected that agricultural productivity will increase in the target area through improvement of farmers' technical level. In addition, the agricultural extension system confirmed by the pilot project could be developed to a nationwide system.

5) Sustainability

The Government of Uzbekistan has organized the annual farmer training seminars. The pilot project implies that farmers could be given more effective training in the seminars with a minimal additional budget. However, the seminars were scaled down this year due to budgetary constraint. This fact suggests a gloomy prospect of the effective implementation of the project on sustainable basis.

Once the manual was distributed to farmers, they could refer it whenever they need it. Since a technical manual targeting farmers, especially written in the local language, is not well developed in Karakalpakstan, the distribution of the manual could contribute to sustainable improvement of farmers' technical ability.

F.2.6 Lessons Learned

An applicable on-farm technical manual targeting farmers can be developed by local human resources in Karakalpakstan, if the Government appropriates a necessary budget for the project.

Trained district agricultural college teachers might be valuable resources for activating agricultural extension, if they are strategically mobilized for the extension by the Government. Since every district has an agricultural college in general, the college, in cooperation with MAWR, can be a window of the agricultural extension to farmers.

F.2.7 Necessity of Modification on the Draft Action Plan

There is doubt expecting the annual farmer training seminars at district level as a reliable tool to disseminate contents of the developed manual to farmers under the present situation. An alternative tool which will be able to work without a huge additional budget on sustainable basis should be incorporated into the action plan.

Also, a practical system which makes good use of resources of district agricultural colleges in agricultural extension shall be designed.

F.2.8 Follow-up of the Pilot Project

Though the developed on-farm technical manual was distributed to *farmers*, they did not have an opportunity to be explained the contents systematically due to scaled down of the annual *farmer* training seminars. It is recommended that each district agricultural college shall organize an alternative technical seminar since they have teachers who are familiar with the manual.

F.3 Trial for Development of Melons and Potential Crops Cultivation

F.3.1 Implementation Plan

(1) Objectives

Production technologies for development of melons and dissemination of the technologies to Agro-firms are examined. Some crops which are going to be introduced to Agro-firms as a potential crop are also produced for trial.

Objectives of the pilot project are to verify priority technologies which need to be researched and possibility of technical extension to Agro-firms by researchers of the Scientific Production Centre for Agriculture.

(2) Items to be Verified

- Priority production technologies to be researched and developed for promotion of melons
- Adaptability of the potential crops for local conditions
- Possible extension approach to bridge research institute and the Agro-firm for promotion of melons

(3) Activities and Method of Implementation

- Cultivation of candidate varieties of melons for pre-trial of variety
- Cultivation of melons with candidate production technologies to be developed (Raising seedling, mulching, tunnel, manuring)
- Cultivation of candidate crops for trial
- Technical extension to Taqirkol Agro-firm in Nukus (field day on trial field and demonstration)
- Demonstration cultivation on farmer's field (a member of the Agro-firm)

(4) Activities and Implementing Body

Activities	Implementation Bodies
Discussion with the Centre for implementation plan	Scientific Production Center for Agriculture, MAWR
Field preparation (1.0 ha)	Scientific Production Center for Agriculture
Trial cultivation in experimental field	Scientific Production Center for Agriculture
Demonstration cultivation in farmer's field (0.1 ha)	Scientific Production Center for Agriculture
Field day	Scientific Production Center for Agriculture, <i>Fermer</i> of Demonstration Plot, Agro-firm
Evaluation	Scientific Production Center for Agriculture, the Study Team, MAWR

(5) Implementation Schedule

The original implementation schedule planned in the Implementation Plan, together with the actual implementation period of the activities, are indicated in Table F.2.1

(6) Relevant components of the action plan

- 151: Research and development of melons and apple
- 411: Joint marketing by farmers' group

(7) Expected Benefit and Measures for Extension

- To increase a possibility of long-term project arrangement by the Government for the further research activities through presenting convincing information collected
- To stimulate *farmers'* interest in production of melons and other new crops
- To develop an interchange of experience between *farmers* and researchers in Scientific Production Centre for Agriculture, Karakalpakstan

(8) Possible Risks and Risk Management

Possible Risks	Risk Management
Irrigation water shortage due to drought	A trial experimental plot shall be located in the place where irrigation water is easily available
Damage by fruits flies	Possible measures to control fruits flies shall be taken through exchanging information with GTZ who carries out fruits flies control project in Karakalpakstan
Less participation of <i>farmers</i> in technical extension activities	Timing of <i>farmers</i> ' activities such as a field day shall be carefully planned, so that the activities do not disturb <i>farmers</i> ' own farming activities

(9) Monitoring and Evaluation

Items to be Verified	Data to be Collected	Data Collection Method
Priority production technologies to be researched and developed	Data from trial production (crop condition, harvesting time, production)	Trial production
Adaptability of potential crops for local conditions	Data from trial production (crop condition, production)	Trial production
Possible extension approach to bridge research institute and Agro-firms	Number of participated <i>farmer</i>	Observation
	Satisfaction of <i>farmers</i> with the extension works	Questionnaire to <i>farmers</i>
	Acceptance of new technology and crops by <i>farmers</i>	Questionnaire to <i>farmers</i>

(10) Feedback of Monitoring Results

Monitoring result of the first year's activities shall be feedback for reviewing the second year's activities. As well as, monitoring result of the second year's activities shall be feedback for finalizing the concerned action plan in the final report.

(11) Possible Post Pilot Project

A joint-research project as suggested in action plan "Research and Development of Melons and Apple" shall be implemented in cooperation with a donor.

F.3.2 Process of the Pilot Project

The pilot project was carried out for 2 years in accordance with the following process. Although trial cultivation was carried out in both years, demonstration cultivation was carried out in only the 2nd year.

The process and the schedule are shown below.

Activities in 2009	2009						
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
1) Field preparation							
2) Trial cultivation in experimental field							
1. Trial of raising seedling and transplanting							
2. Trial of tunnel and mulch							
3. Trial of mulch material							
4. Trial of fertilizer dose							
5. Trial of melon varieties							
6. Trial of potential crops							
3) Field day							
4) Evaluation							

Activities in 2010	2010						
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
1) Field preparation		■					
2) Trial cultivation in experimental field							
1. Trial of forcing cultivation with transplanting		■	■	■	■	■	
2. Trial of tunnel and mulch		■	■	■	■	■	
3. Trial of open field cultivation with transplanting		■	■	■	■	■	
4. Trial of plant protection		■	■	■	■	■	
5. Trial of simple irrigation		■	■	■	■	■	
6. Trial of optimum sowing time of seedling		■	■				
7. Trial of potential crops		■	■	■	■	■	
3) Demonstration cultivation in farmer's field		■	■	■	■	■	
4) Field day			▲			▲	
5) Evaluation							■

(1) Field Preparation

1) Trail Cultivation

About 1 ha of land on the premises of experimental field of Karakalpak Branch of Uzbek Scientific Research Institute for Rice was allocated for the trial cultivation in the 1st and 2nd year of the pilot project. The land were plowed and leveled by tractor. Compost was spread to the field during the field preparation at the rate of 2 ton/ha. The field was divided into small plots (mainly 2m x 10m for a plot). Field preparation works were completed according to sowing time. Field layout plan, inputs procurement plan and working plan were also confirmed during the field preparation period. The inputs materials except seeds were procured within Karakalpakstan.

2) Demonstration Cultivation

About 0.2 ha of land on farmer's field in Taqirkol VCC, Nukus District was allocated for the demonstration cultivation in the 2nd year of the pilot project. The land was prepared as same as the trial cultivation by the farmer under guidance of the researcher. The necessary input materials for the demonstration cultivation were provided by the pilot project and the farmer prepared the land by himself.

(2) Trial Cultivation in Experimental Field

The plan of trial cultivation was designed to verify possibility of the cultivation technologies for melon and potential crops which are not popular in Karakalpakstan.

1) Trial of raising seedling for open field cultivation of melon

A trial was made to raise melon seedlings under a plastic tunnel in 2009 and 2010, since direct sowing is an only practice for melon growers in Karakalpakstan.

In 2009, Gurbek variety was used for the trial. Seeding in seedling pots in a tunnel was made in the early April. However, germination did not occur even after 10 days. Then, re-seeding was made in the middle of April with new nursery soil. Good germination was observed in the second seeding. The seedlings were acclimated to the open condition and transplanted to the main field in the late May, 2009. Black plastic film was used in some plots in the main field as mulch. After the transplanting, the main field were managed as same as normal cultivation method in Karakalpakstan. The melon was harvested from the early to middle of August.

In 2010, Gurbek and Jambulsha were used for the trial. Seeding in seedling pots in a tunnel was made in the middle of April. The seedlings were acclimated to the open condition and transplanted to the main field in the middle of May. Tunnel and mulch were not used in the main field for the trial. The management of main field was followed the normal cultivation in Karakalpakstan. The Gurbek variety was harvested in the early to middle of August. The Jambulsha variety was harvested from the early July to the early August.

2) Trial of raising seedling plus forcing cultivation for early harvesting of melon

A trial was made to raise melon seedlings under a plastic tunnel and transplant them to the main field which had a plastic tunnel during the early growing stage in 2010.

Gurbek variety was used for the trial. Seeding in seedling pots under a plastic tunnel was made in the middle of April. The seedlings were transplanted under a plastic tunnel in the main field in the early May. After the transplanting, the plastic tunnel was removed in the middle of May. The main field was managed as same as normal cultivation method in Karakalpakstan. The melon was harvested from the middle to late July.

3) Trial of direct sowing with tunnel and plastic mulch for early harvesting of melon

A trial was made to force melon by growing it under a plastic tunnel during the early growing stage in 2009 and 2010, since the same practice is popular among farmers for forcing seedlings of tomato and some other vegetables in Karakalpakstan.

The trial was made in two cases, tunnel with mulch and without mulch, in 2009. Gurbek variety was used for the trial, and seeding was made directly in the main field covered by tunnels of transparent plastic film in the early April. Black plastic film was used for mulch in some plots covered by the tunnel. Lower germination rate was observed in the case of with mulch. A complementary seeding was, therefore, made in the early May. The tunnel was removed in the middle of May, since the ambient temperature had reached above the sufficient level. The main field was managed as same as normal cultivation method in Karakalpakstan. The melon was harvested from the late July to early August.

The trial was made in three cases, tunnel with mulch, only tunnel and only mulch, in 2010. Gurbek and Jambulsha varieties were used for the trial. The seeding was made directly in the main field in the middle of April. Transparent plastic film was used for mulch. Holes were made in the mulch for growing the seedlings after the germination, the middle of May. Temperature in the tunnel was controlled by opening and closing the tunnel to acclimate the seedlings to the open condition and then the tunnels were removed in the middle of May. The main field was managed as same as normal cultivation method in Karakalpakstan. Gurbek variety was harvested from the late July to early August. Jambulsha variety was harvested from the late June to early August.

4) Comparison of mulch materials for melon

A trial was made to confirm effectiveness of four (4) mulching materials, i.e. black plastic film, wheat straw, rice husk and wood chips, for melon cultivation in 2009.

Gurbek variety was used for the trial, and seeding was made directly in main field in the early April. A complementary seeding was made in the late April. The main field was managed as same as normal cultivation method in Karakalpakstan. The melon was harvested from the early to middle of August.

5) Comparison of application dose of fertilizer for melon

A trial was made to confirm applicability of fertilizer standards of Karakalpakstan to several varieties from different origins in 2009. The three (3) different varieties, Gurbek from Karakalpakstan, Ichi Kizil Kruglopodnaya from Tashkent and Gurlan from Khorezm were used for the trial. The three (3) different fertilizer dosages, the standard, +15% of the standard and -10% of the standard were compared for each variety in the trial.

Seeding of all varieties was made directly in the main field in the late April. The management of main field except the fertilizer dosage was followed normal cultivation method in Karakalpakstan. Gurbek was harvested from the early to middle August. Ichi Kizil Kruglopodnaya was harvested from the middle to late August. Gurlan was harvested in the late August.

6) Trial of melon varieties

A trial was made to confirm and compare adoptability of several melon varieties to the northern Karakalpakstan in 2009. Seven (7) varieties were used for the trial.

Seeding of all varieties was also made directly in main field in the late April. The management of main field was followed normal cultivation method in Karakalpakstan.

No	Variety	Origin	Nature	Harvest Time
1	Gurbek	Karakalpakstan		Early to Late August
2	Sari Kawn	Karakalpakstan	Yellow	Late August
3	Kis Kawn	Karakalpakstan	Winter melon	Late August
4	Jambulsha	Karakalpakstan	Early variety	Middle to Late July
5	Alakama	Khorezm and Southern Karakalpakstan	Winter melon	Late August
6	Ichi Kizil Kruglopodnaya	Tashkent		Middle to Late August
7	Gurlan	Khorezm		Middle to Late August

7) Trial of plant protection of melon

A trial was made to compare different plant protection technologies for melon in 2010. The four different varieties, Gurbek, Ichi Kizil Kruglopodnaya, Biyshek and Gurlan, were used for the trial. The four different plant protection technologies; usual chemicals, biological, mixed (usual chemical and biological) and net, were compared for each variety in the trial.

Seeding of all varieties was made directly in the main field in the late April. For the biological plant protection, natural enemies were scattered to the field once in a week. For the plant protection by net, the melon fruits were covered by fine net one by one after flowering. The management of main field except the plant protection was followed normal cultivation method in Karakalpakstan.

Gurbek and Ichi Kizil Kruglopodnaya were harvested from the early to middle of August. Biyshek and Gurlan were harvested in the late August.

8) Trial of simple irrigation technology to melon

A trial was made to examine effectiveness of pot-drip irrigation technology to melon cultivation in 2010. The four different varieties, Gurbek, Ichi Kizil Kruglopodnaya, Biyshek and Gurlan were used for the trial.

The seeding of all varieties was made directly in the main field in the late April. The management of main field except irrigation was followed normal cultivation method in Karakalpakstan. The pot-drip irrigation technology was applied after germination. The plastic bottles which had small holes in the bottom were set with supporters near each plant. Water was poured on the top of bottle and flowed out from the holes in the bottom to surface of soil. The water was poured once in every 3 or 4 days.

The Gurbek and Ichi Kizil Kruglopodnaya were harvested from the early to middle of August. Biyshek and Gurlan were harvested in the late August.

9) Trial of optimum sowing timing for raising melon seedling

A trial was made to examine optimum sowing timing for raising vigorous melon seedlings in a tunnel in 2010.

Gurbek variety was used for the trial and seeding was made 4 times, once a week from the late March to the late April. All seeds were sown in seedling pots and raised in a tunnel. Temperature in the tunnel was controlled by opening and closing the tunnel. Water was applied to the pots to keep the moisture of soil. The germination rates and growth of the seedlings were observed.

10) Trial of potential crops

A trial was made to confirm possibility to grow several crops in the northern Karakalpakstan in 2009 and 2010. The seeding time by the crops are shown below.

No	Crops	Seeding Time in 2009	Seeding Time in 2010
1	Indian spinach	Early April	Late April
2	Okra	Early April	Late April
3	Squash	Early April	-
4	Dill	Early May	-
5	Coriander	Early May	-
6	Haricot	Middle May	Late April
7	Eggplant	Middle May	-
8	Patisson	Middle May	Late April
9	Lettuce	Middle May	-
10	Celery	Middle May	-
11	Charlotte	Middle May	-
12	Soybean	Late April	Late April
13	Lentil	Late April	-
14	Chickpea	Late April	-
15	Oat	Late April	-
16	Barley	Late April	-
17	Rye	Late April	-
18	Radish	-	Late April
19	Sunflower	-	Late April

(3) Demonstration Cultivation in Farmer's Field

Demonstration cultivation was made to demonstrate melon cultivation technology to farmers and to examine the implementation procedures by the researchers in 2010. The four varieties of melon, Gurbek, Jambulsha, Ichi Kizil Kruglopodnaya and Biyshek, were used for the demonstration. The four kinds of cultivation methods, tunnel plus transparent vinyl mulch, only tunnel, only transparent vinyl mulch and normal cultivation (no tunnel and no mulch) were applied for each variety.

All seeding was made directly in the field in the middle of April. The tunnel and mulch were set immediately after the seeding. In case of the plots set mulch, holes were made to grow the seedlings after germination, the early May. The vinyl mulch was kept until end of the cultivation. Temperature in the tunnel was controlled by opening and closing the tunnel and the tunnel was removed in the middle of May. Other cultivation management was followed normal cultivation method in Karakalpakstan.

Gurbek was harvested from the middle of July to early August. Jambulsha was harvested from the middle of June to the early August. Ichi Kizil Kruglopodnaya was harvested from middle of July to the middle of August. Biyshek was harvested from the middle to late August.

(4) Field-Day

During the pilot project, twice of field-day in a season, in total 4 times of field-day, were held in order to share information of the trial and demonstration cultivation among the farmers and researchers concerned.

In the field-days, the participants visited trial and demonstration fields and observed the crops. At the same time, the researchers explained objectives and results of each trial cultivation. After the explanation, the participants asked questions and the researchers answered them. At the end of each field-day, questionnaire were distributed and collected to collect participants opinions and suggestions. The field-days were shown below.

No	Date	Place	Participants
1	May 30, 2009	Trial field	Members of Agro-firm in Nukus District
2	Aug. 31, 2009	Trial field	Farmers from Nukus, Kegeily, Khodjeyli, Chimbay and Kanlikul Districts. Concerned agricultural researchers in Karakalpakstan
3	Jun. 12, 2010	Trial and demonstration fields	Members of Agro-firm in Nukus District
4	Aug. 12, 2010	Trial and demonstration fields	Members of Agro-firm in Nukus District

(5) Evaluation

The cultivation activities and harvest data were recorded by the researchers. Based on the records and questionnaires on the field-days, the pilot project was evaluated at viewpoints of DAC criteria. The final evaluation was made after harvesting in the second season.

F.3.3 Outcomes and Achievement

(1) Management the Pilot Project by the Research Institute

The pilot project was implemented by the Uzbek Scientific Research Institute for Rice under supervision of Uzbekistan Scientific Production Centre for Agriculture. The research institute had ability to implement the trials and the field-days and also guide a farmer for the demonstration cultivation. The trial field in the premises of the research institute was well managed and there was no serious trouble or delay, although the equipment of the research institute are old.

(2) Trial Cultivation in Experimental Field

1) Trial of raising seedling for open field cultivation of melon

While low temperature may be possible reason for the failure of germination in the tunnel in the early April, 2009, the seeds sown in the middle or late April germinated and grow well in both of 2009 and 2010. There was a minor difficulty to acclimate the seedlings to open condition, because control of inside temperature of the plastic tunnel was an unfamiliar and troublesome work for the field workers. Somehow the seedlings were acclimated to the open condition and transplanted to the main field. After transplanting, the seedlings grew without big problems. Survival rate of the seedlings after the transplanting was more than 80% and died seedlings were replaced extra seedlings. The harvesting time and the yield was not big different from the general cultivation, direct sowing, in the both years.

Seeds directly sown to main fields were often damaged by natural animals and soil crust and they require re-sowing and breaking surface soil by hands. However, raising seedling and transplanting did not have these problems. Therefore, raising seedling and transplanting have possibility to be introduced although it is recommendable to make a further research for improvement of appropriate nursery soil and reduction of works for raising melon seedlings in Karakalpakstan.

2) Trial of raising seedling plus forcing cultivation for early harvesting of melon

The seedlings raised in nursery with tunnel and transplanted in the main field grew well without serious trouble, although acclimating seedlings under tunnel in the main field to the open condition was difficult as same as raising seedling in a tunnel. As the result, the melon was harvested about half a month earlier in compare to the control cultivation and the yield was slightly higher than the control. There was no significant difference between tunnel plus mulch and only tunnel.

This method was required more works and costs for raising seedlings and managing the tunnel and mulch. It is recommendable to examine easier method and lower cost material.

3) Trail of direct sowing with tunnel and plastic mulch for early harvesting of melon

The melon grew without serious trouble, and fruits were harvested about 10 days earlier in compare to the control cultivation under the ambient condition, although there was no clear difference among combinations of tunnel and mulch. The yield was higher than the control cultivation in the both years.

However, lower germination rate was observed in the case of using black plastic mulch. It might be due to low soil temperature during the germination period, since black plastic mulch prevented soil temperature from increasing. Transparent plastic mulch did not have similar problems. A strong wind in April and unfamiliarity of field workers with handling the plastic film disturbed smooth works to open and close the tunnel in 2009. An appropriate control of inside temperature of the tunnel and acclimation of the plants to the ambient condition in May were also troublesome issues. However, the works in 2010 were smoother than that in 2009, since the workers practiced to handle the tunnel. It is desirable to examine a substitute material or method for the plastic tunnel in order to make sure low cost and smooth handling works. In case of 2010, there was possibility to seed earlier season, although the seeding timing depends on temperature. It is recommendable to examine optimum sowing timing in future research.

4) Comparison of mulch materials for melon

There was no difference in the timing of harvesting between the control cultivation (no mulching) and the four kinds of mulching cultivations. The productions of all mulching cultivations were lower than the control cultivation. Although the germination rate was not sufficient in all cultivations including the control, it was also observed that the germination rate of all mulching cultivations was lower than the control cultivation. It might be due to insufficient soil temperature during the germination period, since the mulching materials prevented soil temperature from increasing. No positive effect of mulching materials on forcing melon and increasing the yield was observed in the trial.

In case of mulching cultivation by black plastic film, the plant condition in the last half growing period was better than the condition of other mulching cultivations. It is assumed that black plastic film prevented soil temperature from overheating.

5) Comparison of application dose of fertilizer for melon

It was observed that the higher dosage is the higher production for all varieties. Then, the sugar contents showed the reverse result.

It is recommendable to make a further research on the most economical dosage of fertilizer application by different melon varieties considering the inputs costs, the productivity, the fruits quality and the market value.

6) Trial of melon varieties

All varieties grew well without serious trouble.

It is recommendable to make further research on detailed characteristics of the varieties and some other potential varieties in order to confirm their economic feasibility and other possible applicability, e.g. for breeding materials.

7) Trial of plant protection of melon

The major problem insects for melons were aphids and melon flies in the trial cultivation. The production under the biological plant protection method was lower than those under other protection methods. The melons under biological plant production method were more damaged by melon flies. It implies that the biological method is not effective against melon flies. There was no clear difference of production among other three methods, usual chemicals, mixed and net. However, the net method requires chemical application to control aphids, since the net is not proper against aphids. The net method, at least, did not disturb the production in comparison with usual chemicals and mixed methods. It may have higher effectiveness in areas which have more severe melon fly problem.

8) Trial of simple irrigation technology to melon

The irrigation technology showed lower water requirement and almost equal production of the melons. Therefore, the technology may be useful to decrease necessary water quantity. However, the technology required much works to pour water into the bottles by hands every 3 or 4 days.

The technology requires to research the system to reduce the irrigation works and equipment cost.

9) Trial of optimum sowing timing for raising melon seedling

All seeds except sowed in the late March germinated and grow well. Although the germination rate of the seeds sowed in the late March was around 30%, others were around 90%. The seedlings were ready for transplanting almost one month after seeding. The low germination rate may be caused by low temperature in late March. The early April was the earliest sowing timing for raising seedlings of melon under a tunnel in 2010. It means that the seeding timing was about half a month earlier than that of direct seeding in open fields. However, temperature in April fluctuates and the annual fluctuation of the temperature is wide. Therefore, it is recommendable to continue to research more optimum timing for stable and safe raising seedling.

10) Cultivation of potential crops

The results by the crops are shown below. Since the cultivation possibility, grow or not grow, is simply observed in the trial, it is desirable to examine the reasons why some crops did not grow well, and stable and economical cultivation of the crops which were possible to grow.

No	Crops	Result in 2009	Result in 2010
1	Indian spinach	Low germination rate	Grew
2	Okra	Grew	Grew
3	Squash	Low germination rate	-
4	Dill	Grew	-
5	Coriander	Grew	-
6	Haricot	Grew	Grew
7	Eggplant	Grew	-
8	Patisson	Grew	Grew
9	Lettuce	Not grew well	-
10	Celery	Not grew well	-
11	Charlotte	Not grew well	-
12	Soybean	Low germination rate and not grew well	Low germination rate and not grew well
13	Lentil	Low germination rate and not grew well	-
14	Chickpea	Low germination rate and not grew well	-
15	Oat	Low germination rate and not grew well	-
16	Barley	Low germination rate and not grew well	-
17	Rye	Low germination rate and not grew well	-
18	Radish	-	Grew
19	Sunflower	-	Grew

11) Others

While several reports indicate serious damages of melon-flies in Karakalpakstan, the damage was controlled within an acceptable level by insecticides which were commonly available in the local market. After seeding in the main field, some varieties' seeds were eaten by mice and other rodents. The soil crust was made after rain or water application to soil surface and soil crust disturbed germination. Therefore, breaking the soil crust by hands was required. Several times of complementary seeding were made for the compensation.

(3) Demonstration Cultivation in Farmer's Field

The melon of 4 varieties grew well without troubles. The melons under tunnel were harvested from the middle of June (Jamblsha variety). In case of Gurbek, it was harvested from the middle of July. There was no clear difference in harvesting time between only tunnel and tunnel plus mulch. Difference in harvesting time between tunnel plus mulch and normal cultivation was about 5 days, although the difference of growth in the beginning stage was much bigger. The products harvested in the early and middle of July have higher value, since generally it is not available so many in local markets.

Although setting the tunnel required some hard works, managing the tunnel, open and close to control inside temperature, was not troublesome and acclimating seedlings to the open condition was smooth. According to the farmer's impression, the new cultivation technologies, mulch and tunnel, were not so difficult technologies and acceptable for the farmer. Furthermore, the farmer expects continuing to use these technologies and seeding in much earlier season, early April, for early harvest. However, these technologies are suitable for small scale cultivation, not for large scale, since these require more labor works and initial costs.

The demonstration field was located near a road and neighbors and people on the road could see the cultivation. Some people were interested in and observed the cultivation.

Therefore, it is suggested that the demonstration cultivation confirmed the acceptability for the farmer and effectiveness for extension of cultivation technologies.

(4) Field-Day

The participants were satisfied with the field-days and they got some information. The field-days were effective to show results of trials as a part of agricultural extension activities. And the researchers also get some information from farmers for future research. It is suggested that the field-days are good opportunity for researchers and farmers to exchange information.

Almost all of the participants in the field-days were satisfied with the field-day. They were much interested in “forcing cultivation by using tunnel”, “melon varieties”, etc.

F.3.4 Problems and Issues Encountered during Implementation

(1) Unreliable Irrigation

Unreliable irrigation water supply was the most serious issue for managing the trial field in 2009. In order to address the issue, an irrigation pump to supply water from the nearest branch canal and a water storage tank were set up near the trial field. Even after such arrangements, availability of irrigation water was the problem throughout the cultivation period in 2009. Therefore, the cultivation had to follow the irrigation water distribution schedule, since the cultivation was conditional on the irrigation water distribution. The trial plot was shifted to other place where is more accessible to irrigation water in 2010. In addition, the irrigation water situation in 2010 was much better than 2009. Therefore, there was no serious problem on irrigation in 2010.

(2) Tough Natural Conditions, Especially during the Early Stage of Growing

Before the late April in 2009, the ambient temperature was still not enough and not stable for planting popular crops in the northern Karakalpakstan. Many farmers in the project area started their spring farming after the late April for this reason. In addition, the temperature fluctuates sometimes even in May. On the other hand, the ambient temperature in 2010 was higher than that in 2009 and it was enough high to start cultivation in the middle of April, although the temperature fluctuated.

A strong wind in the period also impedes smooth growing of the crops and efficient field works. Soil texture in the project area is also the matter of trouble. Soil crust after watering to soil surface prevented crop seeds from smooth germination. Rodent damage was another issue for the germination, as well.

Establishment of a practical technology to raise healthy seedlings under protected condition, which is one of the subjects of the trial, could be an effective countermeasure to overcome those constraints.

(3) Unfamiliarity with Intensive Farming

Agriculture in Karakalpakstan has been developed with a policy to promote large scale farming with mechanization, especially for growing cotton and wheat. Melons are also grown with relatively large scale farming in general. Under this circumstance, researchers and field workers engaged in the trial are not familiar with intensive farming technology, e.g. raising seedlings, tunnel cultivation, etc. Input materials applicable to intensive farming are also not popular in Karakalpakstan.

For the trial, local available materials were used for raising seedlings, tunnel and mulching. Attention should be paid to the circumstance for introducing new things in the trial. Simple and easy must be key features of new technology or materials, although the field workers are becoming to be familiar with handling the materials after the practice in the first and second season.

F.3.5 Evaluation of Pilot Project

(1) Items to be Verified by the Pilot Project

1) Priority Production Technologies to be Researched and Developed for Promotion of Melons

Results of the trial and demonstration cultivation imply possibilities for forcing melons under controlled environment with a plastic tunnel for early harvest, seedling raising aiming at mitigating damages during the early stage of growth and new varieties to be introduced to Karakalpakstan. On the other hand, the results imply a new burden (additional field work and material costs) of introduced technologies to farmers and other technical points to be improved for application at farmer level.

As far as the trial implies, melon flies were not a critical issue at present in the trial and demonstration field in Nukus District. Although the improvement of plant protection technology against melon flies might have low priority, the result implies effectiveness of plant protection technology using net against melon flies. In addition, the result implies possibility of improvement of plant protection technology by combination of chemical and biological plant protection for melons.

2) Adaptability of the Potential Crops for Local Conditions

The trial proved that several crops, e.g. okra, patisson, haricot, eggplant (a new variety), could grow well in Karakalpakstan. It is recommended that potential crops are going to be examined in further trials and research including accessibility to seeds, demand and economical aspects.

On the other hand, some beans & pulses and cereals did not grow well in the trial. It is also recommendable to examine the reasons why the crops did not grow well, if it is clarified that the crops have higher potential on the other aspects.

3) Possible Extension Approach to Bridge a Research Institute and the Agro-firm for Promotion of Melons

Active involvement of Agro-firm in Nukus District in the extension approach was expected in the original plan. However, members of the Agro-firm were not invited to the second field-day in 2009, since the Agro-firm had been struggling against complicated issues before launching into their expected activity. Situation of the Agro-firm became better in 2010 and the members were invited to the both field-days in 2010. The change of situation makes the activity for extension better. In addition, the demonstration cultivation gave interest to the members.

As a result, the members and researchers exchange information each other through the demonstration cultivation and field-days. It implies that the extension approach has possibility to bridge the research institute and the Agro-firm. However, it is better to extend results of the trials to not only members of the Agro-firm but also more farmers who are not members of the Agro-firm. Involvement of agriculture colleges to the extension approach may have possibility to enlarge the targets of agriculture extension and activities.

(2) Evaluation at Viewpoints of DAC Criteria

1) Relevance

The Government of Karakalpakstan is promoting crop diversification in addition to the promotion of cotton and wheat, in order to advance profitable and steady farming. The pilot project is relevant to the Government policy, since it aims at developing farming technology to cope with the diversification. Especially, melons are suitable for growing under the local environment, heat and dry, and used to be famous agricultural products in Karakalpakstan. Recovery of the famous product must be a common need of farmers in Karakalpakstan.

2) Effectiveness

The trial and demonstration cultivations showed positive results about possible technologies to be researched and developed for promotion of melons in the future, e.g. forcing melons under controlled environment with a plastic tunnel, seedling raising aiming at mitigating damages during the early stage

of growth. Though they must be modified to the applicable technologies through further research works, they could be effective basic technologies for improving melons production in Karakalpakstan. The outcomes of the trial and demonstration cultivation imply the effectiveness of the pilot project to verify potential farming technologies for crop diversification in Karakalpakstan.

The demonstration cultivation and field-days also showed positive results for possible extension approach. The activities started promoting communication among farmers and researchers through exchanging information. This approach may have effectiveness for agricultural extension, although the activities need to be continued to strengthen the network.

3) Efficiency

It is concluded that activities of the pilot project was efficiently carried out without serious trouble with following reasons.

a) Experienced researchers and field workers

Researchers and field workers engaged in the cultivation showed good discipline and performance when they worked in the trial field. They could adopt themselves to new cultivation technologies and systems based on their experience, though they shortly made try and error. They also properly handled and utilized provided inputs and equipment.

b) Utilization of the existing facilities and equipment

The Karakalpak Branch of Uzbek Scientific Research Institute for Rice allocated a part of its experimental field for the trial. Though accessibility to irrigation water was not in good condition in the first year, the allocated plot was properly managed and maintained. Additional arrangements for developing the plots including leaching were not necessary before starting land preparation, since the fields were kept at good condition. Tractors and other necessary equipment provided from the institute were in working condition, though they were very old.

c) Advanced and experienced farmer

The farmer who provided and managed the demonstration field showed good performance and contribution. The farmer positively tried the new cultivation technologies and effectively handled the inputs well.

4) Impact

Some farmers who observed the demonstration cultivation were interested in the technologies and expected to apply them to their cultivation next year. It shows that activities of the pilot project, especially demonstration cultivation, gave positive impact to the farmers.

This pilot project is expected to rouse the agricultural research sector in Karakalpakstan from the long-term stagnation in order to enhance crop diversification, especially melons. Trial cultivation of the pilot project could have some implications of possible cultivation technologies to be developed. If the research works carried out in the trial will be continued as a government project under its long-term agricultural development policy, and the developed technologies will be disseminated to farmers, they could have a substantial impact upon the advancement of profitable and steady farming in Karakalpakstan.

5) Sustainability

Through the pilot project, it was confirms that there were still capable human sources to carry out the expected research and extension works in Karakalpakstan. Researchers and field workers engaged in the trial cultivation had a reasonable ability and discipline. There were also necessary facilities and equipment in working condition in the research institute, though they became very old and their line-up was at minimum level. Such condition provides a base of sustainable development of agricultural research in Karakalpakstan. The expected research and extension activities will be developed to favorable direction with proper government intervention under its definite agricultural development strategy.

F.3.6 Lessons Learned

(1) Promising Technology

Results of the pilot project imply some possible melon cultivation technologies to be developed in Karakalpakstan. Among them, forcing cultivation with tunnel for early harvesting must be a very promising technology, if farmers could recover the necessary additional costs from early marketing. It is also confirmed that melon flies are not a critical problem for growing melon around Nukus at present, since they can be controlled to acceptable level by locally available chemicals. This is very encouraging information for Karakalpakstan for taking a step forward to the revival of melon production center.

(2) Strategic Introduction of the Technologies

The technologies need to be developed further under a strategic target of agricultural development. While the technologies are mainly for intensive cultivation, farmers in Karakalpakstan are familiar with extensive cultivation. Farmers also need time to learn and practice the technologies. The cultivation technologies will be introduced under a gradual long-range approach considering the both aspects, the technical possibility and the farmers' acceptability.

(3) Government Policy regarding Research Institutes

As evaluated above, there are still capable human resources and minimal facilities and equipment for agricultural research in Karakalpakstan. However, they are very close to a crisis of extinction due to shortage of revenue. Though the present government policy asks agricultural research institutes to be an autonomous body, they are facing difficulty to find out a promising client or patron other than the Government. The private sector in Karakalpakstan is still reluctant to invest to the research works, since it takes long time for recovering due economic returns. It is desirable that the Government should loose up the present autonomous policy considering the circumstances in Karakalpakstan.

(4) Linkage between Research and Extension

Developed cultivation technologies by research works have to reach to proper growers in order to achieve the expected ultimate goal. Agricultural research works should be strategically linked with agricultural extension works under the government agricultural development policy. Agro-firms could be the proper growers for melons as melons are one of suitable crops in Karakalpakstan. However, their activities are still at a negligible level in Karakalpakstan. It is desirable that the Government should continue its commitment to Agro-firms, so that they will be independent agri-business entities. Furthermore, it is considerable that agriculture colleges as well as research institutes is involved to agricultural extension works, since extension works need to be strengthened more and agriculture colleges may have potential to provide extension services.

F.3.7 Necessity of Modification on the Draft Action Plan

Results of the pilot project verified that the cultivation technologies applied in the pilot project had priority to be researched and developed. Especially, controlling planting season using tunnel and seedlings has value for promoting melons cultivation. In addition, the research institute and Scientific Production Centre of Agriculture have ability to research and manage a research project. Therefore, there is no necessity of modification on research activities in the draft action plan.

On the other hand, the number of Agro-firm established in Karakalpakstan is low and activities of the Agro-firm are still stagnated. Although the pilot project implied that the extension activities were effective, target farmers for extension works would be little in the extension approach. Therefore, farmers who are not member of the Agro-firm but have motivation to improve their cultivation technologies need to be involved to target of the extension works. In this case, agriculture colleges may become players as extension service provider. The results of research are provided to the agriculture colleges and farmers collect the information from the agriculture colleges. Also the agriculture colleges may provide demonstration cultivation in their territory. It means that the agriculture colleges are windows for motivated farmers to get agricultural information.

Results of Trial Cultivation of Melon in 2009

Trial Items		Harvest time	Average yield (kg/ha)
1) Trial of raising seedling for open field cultivation	Cultivation with mulch (Gurbek)	1 Aug. – 12 Aug.	19,750
	Cultivation without mulch (Gurbek)	1 Aug. – 12 Aug.	17,000
3) Trial of direct sowing with tunnel and plastic mulch	Tunnel with mulch (Gurbek)	22 Jul. – 8 Aug.	25,833
	Tunnel without mulch (Gurbek)	22 Jul. – 8 Aug.	26,000
4) Comparison of mulch materials	Black vinyl (Gurbek)	1 Aug. – 12 Aug.	16,917
	Wheat straw (Gurbek)	1 Aug. – 12 Aug.	16,917
	Rice husk (Gurbek)	1 Aug. – 12 Aug.	11,333
	Wood chip (Gurbek)	1 Aug. – 12 Aug.	9,667
	Without mulch (Gurbek)	1 Aug. – 12 Aug.	22,167
5) Comparison of application dose of fertilizer	Normal dosage (Gurbek)	1 Aug. – 12 Aug.	15,833
	+15% dosage (Gurbek)	1 Aug. – 12 Aug.	19,250
	-10% dosage (Gurbek)	1 Aug. – 12 Aug.	14,583
	Normal dosage (Ich Kizil Kruglopodnaya)	21 Aug. – 30 Aug.	21,583
	+15% dosage (Ich Kizil Kruglopodnaya)	21 Aug. – 30 Aug.	27,500
	-10% dosage (Ich Kizil Kruglopodnaya)	21 Aug. – 30 Aug.	17,583
	Normal dosage (Gurlan)	12 Aug. – 30 Aug.	22,250
	+15% dosage (Gurlan)	12 Aug. – 30 Aug.	28,750
6) Trial of melon varieties	-10% dosage (Gurlan)	12 Aug. – 30 Aug.	19,000
	Gurbek	1 Aug. – 12 Aug.	22,500
	Sari Kawn	21 Aug. – 30 Aug.	21,500
	Kis Kawn	21 Aug. – 30 Aug.	21,333
	Jambulsha	15 Jul. – 29 Jul.	12,700
	Alakama	21 Aug. – 30 Aug.	20,750
	Ich Kizil Kruglopodnaya	12 Aug. – 30 Aug.	21,250
	Gurlan	12 Aug. – 30 Aug.	22,583

Results of Trial Cultivation of Melon in 2010

Trial Items		Harvest time	Average yield (kg/ha)
1) Trial of raising seedling for open field cultivation	Cultivation without mulch (Gurbek)	1 Aug. – 14 Aug.	33,333
	Cultivation without mulch (Jambulsha)	5 Jul. – 1 Aug.	17,083
2) Trial of raising seedling plus forcing cultivation for early harvest	Cultivation with tunnel plus mulch (Gurbek)	14 Jul. – 31 Jul.	35,833
	Cultivation with tunnel (Gurbek)	14 Jul. – 31 Jul.	32,833
3) Trial of direct sowing with tunnel and plastic mulch	Tunnel with mulch (Gurbek)	26 Jul. – 5 Aug.	38,000
	Tunnel (Gurbek)	26 Jul. – 5 Aug.	37,000
	Mulch (Gurbek)	28 Jul. – 5 Aug.	36,500
	Tunnel with mulch (Jambulsha)	24 Jun. – 1 Aug.	19,800
	Tunnel (Jambulsha)	26 Jun. – 1 Aug.	19,217
	Mulch (Jambulsha)	28 Jun. – 1 Aug.	17,550
7) Trial of plant protection	Usual chemical (Gurbek)	3 Aug. – 14 Aug.	31,667
	Biological (Gurbek)	3 Aug. – 14 Aug.	21,000
	Mixed (Gurbek)	3 Aug. – 14 Aug.	33,000
	Net(Gurbek)	3 Aug. – 14 Aug.	31,333
	Usual chemical (Ich Kizil Kruglopodnaya)	5 Aug. – 20 Aug.	32,333
	Biological (Ich Kizil Kruglopodnaya)	5 Aug. – 20 Aug.	22,000
	Mixed (Ich Kizil Kruglopodnaya)	5 Aug. – 20 Aug.	32,833
	Net (Ich Kizil Kruglopodnaya)	5 Aug. – 20 Aug.	31,667
	Usual chemical (Biyshek)	23 Aug. – 31 Aug.	32,500
	Biological (Biyshek)	23 Aug. – 31 Aug.	22,667
	Mixed (Biyshek)	23 Aug. – 31 Aug.	33,667
	Net (Biyshek)	23 Aug. – 31 Aug.	32,500
	Usual chemical (Gurlan)	23 Aug. – 31 Aug.	33,167
	Biological (Gurlan)	23 Aug. – 31 Aug.	23,333
	Mixed (Gurlan)	23 Aug. – 31 Aug.	33,500
	Net (Gurlan)	23 Aug. – 31 Aug.	33,000
8) Trial of simple irrigation technology	Gurbek	3 Aug. – 14 Aug.	29,167
	Ich Kizil Kruglopodnaya	5 Aug. – 20 Aug.	29,667
	Biyshek	23 Aug. – 31 Aug.	31,333
	Gurlan	23 Aug. – 31 Aug.	32,667

Results of Demonstration Cultivation of Melon in 2010

Variety	Cultivation method	Harvest time	Average yield (kg/ha)
1) Gurbek	Cultivation with tunnel plus mulch	15 Jul. – 2 Aug.	41,500
	Cultivation with tunnel	15 Jul. – 2 Aug.	39,667
	Cultivation with mulch	20 Jul. – 2 Aug.	39,333
	Normal cultivation	20 Jul. – 2 Aug.	36,337
2) Jambulsha	Cultivation with tunnel plus mulch	14 Jun. – 2 Aug.	28,833
	Cultivation with tunnel	14 Jun. – 2 Aug.	28,833
	Cultivation with mulch	18 Jun. – 2 Aug.	26,500
	Normal cultivation	18 Jun. – 2 Aug.	26,167
3) Ichi Kizil Kruglopodnaya	Cultivation with tunnel plus mulch	25 Jul. – 15 Aug.	56,500
	Cultivation with tunnel	28 Jul. – 15 Aug.	51,500
	Cultivation with mulch	29 Jul. – 15 Aug.	56,500
	Normal cultivation	30 Jul. – 15 Aug.	48,500
4) Biyshek	Cultivation with tunnel plus mulch	13 Aug. – 31 Aug.	55,000
	Cultivation with tunnel	15 Aug. – 31 Aug.	54,667
	Cultivation with mulch	15 Aug. – 31 Aug.	46,000
	Normal cultivation	17 Aug. – 31 Aug.	45,667

F.4 Promotion of Women's Vegetable Production in Tamarka

F.4.1 Implementation Plan

(1) Objectives

The purpose of the pilot project is to verify the dissemination of production techniques and activities in order to improve the livelihoods of dehkans through the effective utilization of *tamarka*. Verifications are made to help improve dehkan vegetable cultivation techniques through technical seminars and interchange meetings between a model farm (model dehkan) and the surrounding dehkans. The verification activities will also help to obtain some of the lessons learned that will help make modifications to the approaches and activities proposed in the suitable methodology and action plans.

(2) Items to be Verified

The following items will be verified in order to determine the degree to which technologies and activities can be disseminated from the model dehkan to the surrounding dehkans.

1) Dissemination of Technologies and Activities

- Number of *dehkans* and *Auls* involved extensional effects
- Improved technologies for the participating *dehkans*

2) Activities of the Women's Committee within VCC

- Status of support for interchange meetings and other efforts to coordinate with the local residents

(3) Activities and Method of Implementation

Procedures for implementation and items to be considered are as follows.

- Select a model *tamarka* from among the successfully developing *dehkans* that will play a role in helping to disseminate the technologies, as opposed to receiving support for demonstrations. For example, receive an inspection for a neighboring *dehkan* and support the exchange of opinions.
- The number of participating *dehkans* is assumed to be about 20. The participating *dehkans* will be determined by the VCC chairperson and the Women's Committee, taking into consideration the wishes of the local residents.
- The Women's Committee and VCC will support activities to disseminate the fruitful results of the model *tamarka* to other *Auls*.
- The technologies to be introduced by the model *tamarka* will be determined by the NGO and agriculture college instructors providing instruction, taking into consideration the needs of the local residents.
- Start with a small size (500m² : 25mx20m) for the model farm and farms to be used in the project by surrounding *dehkans* so as not to imposed an excessive burden on the women.

(4) Activities and Implementing Body

Activities	Contents	Implementing Bodies
Activity 1 Determine <i>Aul</i>	Determine target <i>Aul</i> in consideration of the local conditions.	VCC chairperson
Activity 2-1 Establish model <i>tamarka</i>	Selection of one model <i>tamarka</i> among the active female <i>dehkans</i> . The roles of the model <i>tamarka</i> will also be determined with support from NGO.	The VCC chairperson and Women's Committee
Activity 2-2 Select participating <i>dehkans</i>	Selection of active female <i>tamarka</i> producers from the area surrounding the model farm to serve as participants for the verification.	The VCC chairperson and Women's Committee
Activity 3-1 Organize technical seminars	Conduct technical seminars (3 hours/day x 5 days) with support from agriculture college instructors and the district agriculture office, and support for the model <i>tamarka</i> will be started. Upon completion of the seminar, the participants will draft planting plans on their own.	NGO (with support from <i>Hakimiyat</i> and agriculture college instructors)

Activity 3-2 Prepare farming input	Review the planting plans created by the participating <i>dehkans</i> and model <i>tamarka</i> and then provide the needed materials.	NGO
Activity 3-3 Support technical promotion activities by the model <i>tamarka</i>	Instruct model <i>dehkans</i> on the role of the model <i>tamarka</i> and the methods for handling visitors.	NGO
Activity 4-1 Implement interchange meeting (surrounding <i>dehkans</i>)	Implement interchange meetings involving the model <i>dehkan</i> and surrounding <i>dhkans</i> .	NGO, VCC and Women's Committee
Activity 4-2 Implement interchange meetings (other <i>Aul dehkans</i>)	Implement interchange meetings involving the model <i>Aul</i> and other <i>Auls</i> .	NGO, VCC and Women's Committee
Activity 5 Monitoring and Evaluation	Monitoring in order to assess the progress of activities as well as changes after project implementation. Verification evaluations will be conducted by the participating <i>dehkans</i> (self-assessment), non-participating local residents, VCC officials and the Study Team.	NGO

(5) Implementation Schedule

The original implementation schedule planned in the Implementation Plan, together with the actual implementation period of the activities, are indicated in Table F.2.1

(6) Relevant Components of the Action Plan

- 141: Program for Improvement of Agricultural Technology: Activities 1413
- 511: Project for Strengthening of Communication for Local Agricultural Administration: Activities 5112
- 512: Project for Reinforcement of VCC Coordinating Abilities: Activities 5122, 5123

(7) Expected Benefit and Measures for Extension

The aim of the verification is to help promote the cultivation of produce in *tamarka* for Makhan-kenes and VCC, focusing mainly on women. Providing technical instruction and support to individual users of *tamarka* is inefficient and impractical in terms of the available budget and human resources. Therefore, the aim is to use demonstrations within Auls so that activities can be disseminated in VCC with the cooperation of the local residents.

This verification is basically conducted in terms of the activities of individual VCC and Auls. Therefore, the dissemination of the effects within VCC is due to exchanges among local residents and through chances to observe the model *tamarka*. The cooperation of the Women's Committee and member residents is indispensable for the methods used to promote the technologies and techniques.

(8) Possible Risks and Risk Management

Possible Risks	Risk Management
1. Will the role of the Women's Committee function properly?	Foster the understanding that the verification project is a VCC community project. At the same time, it will be important to closely coordinate with committee/chairpersons and female representatives from each <i>Aul</i> .
2. Will an excessive burden be placed on the model <i>dehkan</i> ?	The model <i>dehkan</i> will share in the promotion of the improved technologies and so select popular people in the community and consider incentives such as the provision of supplies and materials.

(9) Monitoring and Evaluation

The monitoring will focus on the degree of progress for activities as well as any changes in vegetable cultivation after project implementation. The evaluation in the project will focus mainly on the items indicated in 2.2.3 (2) Items to be Verified. In other words, the evaluation is to verify methods for promoting the technologies as opposed to economic impacts and changes in production amounts.

The monitoring of project activities and changes following project implementation will mainly be handled by an NGO. The evaluation will be an overall assessment encompassing self-evaluation by the

participating residents, as well as evaluation by non-participating local residents, VCC officials and the Study Team.

(10) Feedback of Monitoring Results

The verification results will mainly be based on the assessment of the items indicated in 2.4(2). Items to be verified, with feedback regarding promotion methods and improvements for project particulars being provided for the Action Plan.

(11) Possible Post Pilot Project Activities

This verification is limited to just one demonstration site and the surrounding dehkans each year. Therefore, upon completion of the verification, it is hoped that VCC and the Women's Committee will conduct exchanges with Auls and dehkans that did not have the opportunity to participate in the local resident exchanges.

Hakimiyat will secure the budget and request technical support from donors so that the results of the verification can be expanded to other VCC.

F.4.2 Process of the Pilot Project

The pilot project was implemented through close communication with *Hakimiyats*. Representatives of the *Hakimiyats* participated in major events like workshops, seminars and interchange meetings for sharing information and implementation methods. The VCC chairmen of the pilot project areas (*Makhan-kenes* No. 1 in Chimbay District in 2009 and Beskopir VCC in Kanlikul District in 2010) cooperated in implementing the pilot project. The chairmen also monitored the progress of the pilot project and made oral report to the *Hakimiyats*. Furthermore Women's Committee in the areas assisted NGO, who was hired for managing the pilot project, in coordinating the workshops, seminars and interchange meetings.

The pilot project has been carried out in accordance with the following process in 2009 and 2010.

Activities	2009 in <i>Makhan-kenes</i> No.1 in Chimbay									
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct
1) Preparation works	■									
2) Kickoff workshop				▲						
3) Set up a model <i>tamarka</i>				▲						
4) Technical seminar				■						
5) Input procurement				■						
6) Technical support and monitoring				■	■	■	■	■	■	■
7) Interchange meeting						▲			▲	
8) Evaluation workshop										▲

	2010 in Beskopir VCC in Kanlikul									
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct
1) Preparation works		■								
2) Kickoff workshop			▲							
3) Set up a model <i>tamarka</i>			▲							
4) Technical seminar			■							
5) Input procurement			■	■						
6) Technical support and monitoring				■	■	■	■	■	■	■
7) Interchange meeting					▲			▲		
8) Evaluation workshop									▲	

(1) Preparation Works

Candidate pilot project areas were selected through discussion with counterparts and *Hakimiyats* of the areas. A preparatory workshop was held in each candidate area before starting the pilot project. Resident women participated in the workshop, and objectives, process of the pilot project and role of the participants were explained and discussed. *Makhan-kenes* No. 1 in Chimbay District for 2009 and Beskopir VCC in Kanlikul District were selected through the process.

(2) Kickoff Workshop

The kickoff workshop was held in the areas and resident women were participated. Objectives, activities and role of participants, model *tamarka* and other organizations concerned like *Hakimiyat*, *Makhan-kenes/VCC* and the Study Team were explained. Necessary information, e.g. vegetable production and sale of the products, were collected from the participants as baseline data. And then, it was announced that maximum 25 women could participate in the pilot project in each area.

After the explanation, crops to be cultivated, necessary inputs to be procured and location of model *tamarka* were discussed among the participants who wanted to join in the pilot project. 25 participants of the pilot project (the Participants) in each area were fixed through coordination of the chairman of *Makhan-kenes/VCC* after the kickoff workshop.

(3) Set up a Model Tamarka

After the explanation of role of model *tamarka* in the kickoff workshop, the Participants and the chairman of *Makhan-kenes/VCC* discussed location of the model *tamarka*. Considering accessibility to the *tamarka* and cultivation ability of the growers, they decided location of the model *tamarka* in the areas.

After set up the model *tamarka*, normal cultivation method of vegetables in Karakalpakstan and some new cultivation method, e.g. wood chip mulch, mix-cropping with corn or sunflower, etc., were demonstrated.

(4) Technical Seminar

The technical seminar was held for four days after the kickoff workshop. About 20 – 25 women of the Participants participated in the seminar each day. Vegetable cultivation technologies such as land preparation, sowing, raising seedlings, transplanting, fertilizer application, irrigation, pest and diseases control, harvesting etc. were lectured by an agronomist in the technical seminar.

The lecturer explained the technologies by using figures and demonstrations. The lecturer explained not only scientific knowledge but also practical knowledge. The Participants took a note and actively asked questions. The contents of technical seminar were recorded and compiled in a handout in order to distribute to participants of interchange meetings. In addition, study tour to Beruni District, where is an advanced area on agriculture production, was held in 2010. Each participant decided kinds of vegetables to be cultivated and location of each vegetable (cropping plan) by themselves.

(5) Input Procurement

Based on cropping plans submitted by the Participants and discussion on necessary inputs in the kickoff workshop, necessary inputs and their amount supported by the pilot project were decided. The inputs were vegetable seeds, fertilizers, pesticides and agricultural tools. However, the pilot project supported the seeds for maximum 500m² of *tamarka* and 5 kinds of vegetables per one participant. And fertilizers were also supported for maximum 500m². If the Participants wanted to cultivate more than 500m² or more than 5 kinds of vegetables, they were asked to procure the necessary seeds and fertilizers by themselves.

The procured seeds and agricultural tools were distributed after the technical seminar. Before the distribution, the Participants prepared their *tamarka*, and started their cultivation immediately after the distribution. However, fertilizers and pesticides were distributed at the time of the application.

(6) Technical Support and Monitoring

The NGO hired an agronomist who lived in the pilot project area for the technical support and monitoring. The agronomist visited each *tamarka* twice or more in a month and technically supported the Participants from April to September in 2009 and from April to August in 2010. The agronomist gave advices to the Participants to make better the cultivation. The Participants also asked questions to the agronomist when they had problems on their cultivation.

The Participant recorded the activities in their *tamarka* and their harvest every day from April to September in 2009 and from April to August in 2010. The agronomist checked the recorded monitoring sheets and taught how to fill in the sheets, if necessary. Every month, the agronomist collected the filled monitoring sheets and distributed them for the next month. The *Makhan-kenes/VCC* input the data into computer under support of the NGO.

(7) Interchange Meeting

Interchange meetings were held twice in each area in sowing and germination season and in harvesting season of major vegetables. The Participants, non-participating residents, representative of *Hakimiyat* and *Makhan-kenes/VCC* in the areas were invited to the interchange meetings. At first, the objectives and activities of the pilot project were explained to the participants with distribution of explanation documents. After that they observed several *tamarkas* including the model *tamarka*. Cultivation in the *tamarkas* observed was explained by the growers and the participants exchanged their experience and knowledge on cultivation in *tamarka*.

(8) Evaluation Workshop

The evaluation workshop was held at the end of each year. The Participants, residents, representative of *Hakimiyat* and *Makhan-kenes/VCC* in the areas participated in the workshop. The activities implemented and summary of vegetable production were reported at first. After the report, change on agricultural technologies, positive and negative impacts of the pilot project and necessary improvement for future project were discussed among the participants. Finally, satisfaction of the participants with the pilot project was surveyed by the questionnaire.

F.4.3 Outcomes and Achievement

(1) Dissemination of Information for Cultivation in Tamarka

The pilot project is expected to promote dissemination of technologies for improved cultivation in *tamarka*. According to the evaluation workshop, positive opinions were collected from the Participants. The technical seminar provided cultivation technologies which were practical for the Participants. The technologies lectured in the seminar were quite interesting and favorable for the Participants, since the cultivation technologies were very simple and easy. In addition, the model *tamarka* showed new technologies and normal cultivation methods for vegetables. Therefore, the Participants could directly watch the technologies in their area and recognized how they were effective. As a result, the Participants followed the methods for their cultivation and some Participants tried to use the new methods, e.g. raising seedlings in paper pots, mix cropping, mulch etc.

Around 35 to 40 people attended each interchange meeting. The Participants and residents observed several *tamarkas* and exchanged their experience and knowledge each other. The Participants recognized that the interchange meetings were good opportunities to share technical information for the cultivation. And also some residents recognized the value or importance of cultivation in *tamarka*.

The Participants were exchange information regarding their cultivation in *tamarka* each other not only in activities of the pilot project but also in daily activities. In addition, the Participants told their experience, e.g. study tour to Beruni, technical seminar, cultivation, etc., to their neighbors.

These imply that the pilot project contributed to promote communication among residents for dissemination of agricultural information and gave good opportunities for the Participants to improve their cultivation in *tamarka*.

(2) Vegetable Production in Tamarka

1) Work in Tamarka

In case of *Makhan-kenes* No. 1 in 2009, works in *tamarka* generally starts from March in the pilot project area and the first irrigation water is supplied in the middle of March. Then, the second irrigation water is supplied in the middle of April. Although the Participants were not sure when the second irrigation water would be available, some participants had already finished land preparation

and sowing some vegetables like radish, onion and potato in March. However, the second irrigation water was not supplied even in April and it was supplied at the end of May. For the shortage of water in April and May, many participants sowed vegetables several times to complement the mal-germination or waited the second irrigation until the end of May. Vegetable cultivation in tamarka was fully started from June.

In case of Beskopir VCC in 2010, the Participants started land preparation in tamarka and the first irrigation water came in the early April. Since the irrigation water was smoothly distributed at proper timing, the Participants didn't have severe problem on irrigation water. However, some tamarkas which located near branch canal had a problem of water-logging. Therefore some participants could not start sowing at optimal time since they needed to wait sowing till the ground water level went to down. After sowing, the Participants generally didn't have severe problems till harvest.

According to the monitoring sheets recorded by the Participants, major works in each month were sowing in April, watering and weeding in May and June, watering and harvesting in July, harvesting and selling in August and September. The participants were the busiest in harvesting in August.

2) Baseline data of the production and sale

The baseline data was collected from 20 people in 2009 and 24 people in 2010. Since the people didn't have record of their production and sales, they were asked to figure out based on their memory and rough estimation. The results are shown below.

Major vegetables harvested by the respondents were tomato, cucumber, eggplant, potato, pumpkin, etc. in both areas. Average total harvested value of the vegetables was about 300,000 sum/respondent in the both areas. About 34% of the harvested value, 103,000 sum/respondent, was sold in Makhan-kenes No. 1. On the other hand, about 18% of the harvested value, 56,000sum/respondent, were sold in Beskopir VCC. Although the production amounts in the both areas were almost same, the sold portion in Beskopir VCC was lower than that in Makhan-kenes No. 1.

Estimated Production and Sales of Major Vegetables by *Dehkans* in Makhan-kenes No. 1 in 2008

	Tomato	Cucumber	Eggplant	Potato	Pumpkin	Pepper	Carrot	Onion	Radish
% of growers in all respondents	100	90	80	50	40	40	25	20	5
Average harvested quantity (kg/respondent)	315	149	71	228	62	20	55	13	10
Average harvested value (sum/respondent)	73,593	40,745	20,889	105,560	15,252	9,845	21,310	8,025	3,820
% of seller in all respondents	55	40	25	35	15	10	10	5	5
Average sold quantity (kg/respondent)	125	77	25	65	14	3	23	0	2
% of sold quantity in the harvest	40	52	35	29	23	15	42	1	15

Source: Questionnaire survey by the Study Team in January, 2009

Estimated Production and Sales of Major Vegetables by *Dehkans* in Beskopir VCC in 2009

	Tomato	Pumpkin	Potato	Eggplant	Cucumber	Pepper	Cabbage	Melon	Carrot
% of growers in all respondents	75	63	46	38	29	25	25	25	17
Average harvested quantity (kg/respondent)	271	288	208	28	18	8	25	88	58
Average harvested value (sum/respondent)	63,646	74,750	93,333	8,208	4,927	3,780	7,500	21,875	23,508
% of seller in all respondents	21	8	17	8	4	0	4	0	8
Average sold quantity (kg/respondent)	46	54	42	10	4	0	4	0	17
% of sold quantity in the harvest	17	19	20	36	22	0	16	0	29

Source: Questionnaire survey by the Study Team in March, 2010

3) Production and Sales

According to the cropping plans in Makhan-kenes No. 1, total area of the tamarkas was about 1.4ha. Average area was about 560m²/participant and total 12 kinds of vegetables were selected to cultivate in the tamarka. The productions and sales were recorded by the Participants. According to the records, total value produced by the all Participants in about 1.4ha of tamarka from April to September, 2009 was about 13,800,000sum. About 51% of the total value was sold. It means that one participant could produce about 550,000sum of vegetables and could sell about 280,000sum of vegetables in average.

According to the cropping plans in Beskopir VCC, total area of the tamarkas was about 1.36ha. Average area was about 544m²/participant and total 12 kinds of vegetables were selected to cultivate in the tamarka. According to the records, total value produced by the all Participants in about 1.35ha of tamarka from April to August, 2010 was about 6,600,000sum. About 53% of the total value was sold. It means that one participant could produce about 264,000sum of vegetables and could sell about 139,000sum of vegetables in average. However, the monitoring of Beskopir VCC was completed at the end of August because of the pilot project period, although about 35% of the total harvested value was harvested in September in case of *Makhan-kenes* No. 1. Therefore, it is expected that the production would be about 405,000sum/participant.

Summary of Results of the Major Vegetables in Makhan-kenes No. 1

	Tomato	Cucumber	Eggplant	Pumpkin	Pepper	Potato	Onion	Carrot	Radish
% of growers in all participants	100	92	92	64	68	56	32	28	16
Average harvested quantity (kg/participant)	786	264	212	111	74	248	30	9	67
Average harvested value (sum/participant)	183,988	72,042	62,402	27,356	37,023	115,350	19,226	3,554	25,746
% of sellers in all participants	60	56	60	20	24	20	8	12	12
Average sold quantity (kg/participant)	500	163	153	15	55	32	6	4	66
% of sold quantity in the harvest	64	62	72	14	74	13	20	44	99

Summary of Results of the Major Vegetables in Beskopir VCC

	Tomato	Cabbage	Potato	Cucumber	Eggplant	Pepper	Melon	Onion	Carrot
% of growers in all participants	100	84	80	56	52	40	32	28	12
Average harvested quantity (kg/participant)	312	106	150	77	88	9	30	6	11
Average harvested value (sum/participant)	68,537	56,300	64,575	22,944	23,132	5,355	15,346	2,194	4,192
% of sellers in all participants	88	68	48	52	52	24	16	12	12
Average sold quantity (kg/participant)	221	80	18	54	66	5	6	3	7
% of sold quantity in the harvest	71	75	12	70	75	56	20	50	64

In comparison the monitoring records with the baseline data, the production value increased about 83% and the sold value increased about 170% in Makhan-kenes No. 1. In case of Beskopir VCC, the production value decreased because the monitoring stopped at the end of August. However, expected production value at the end of September will increase about 35% in comparison with the baseline data. The sold value increased 148% even though the recorded value didn't count that in September. The results imply that the Participants' production activities in tamarka was activated and improved. Some reasons of the difference between Makhan-kenes No. 1 and Beskopir VCC are conjectured. 1) The total production of the Participants in Makhan-kenes No. 1 was higher than that in Beskopir VCC. 2) The Participants in Makhan-kenes No. 1 produced early harvested vegetables, e.g. radish. 3) Prices of some vegetables in 2009 were higher than those in 2010. 4) Participants who were selling vegetables before the pilot project and had recognized the effectiveness of the improvement existed

more in Makhan-kenes No. 1. 5) There might be difference in the baseline data between their estimation and actual harvest.

F.4.4 Problems and Issues Encountered during Implementation

(1) Irrigation Water Supply Schedule

Vegetable cultivation, especially in early growing stage, depends heavily on irrigation water supply from canal, because few participants have their own wells for irrigation. Since reliable irrigation schedule was not informed to *tamarka* users, it was difficult to adjust vegetable cultivation schedule to the irrigation water supply schedule. As a result, some participants sowed the vegetable seeds several times in order to complement mal-germination since the irrigation water was not supplied at expected timing in the first year.

(2) Modification of Plan

Because of the delayed irrigation water supply, water-logging etc., the Participants needed to change their cropping plan. Also the first interchange meeting in the first year was behind the schedule to wait germination of the vegetables in the first year. The pilot project always kept a flexible policy in implementing the original schedule in order to achieve objectives of the activities.

(3) Monitoring of the Production

The Participants recorded their activities and harvest in the *tamarka*. However, they didn't use to record them and there were many mistakes and contradictions. The agronomists visited the Participants and guided to correct the records. The recording was effective activities for the Participants to recognize value of their activities and production in *tamarka*, although the recording was troublesome work and there were mistakes and information lacks in the records. Therefore, the recording was continued even though there were mistakes.

F.4.5 Evaluation of the Pilot Project

(1) Items to be Verified by the Pilot Project

1) Dissemination of Technologies and Activities

The number of participants in the pilot project was 50 in two years and the number of participants in the interchange meetings was about 150 in total. The target group of dissemination of technologies and activities in the pilot project was mainly these participants.

Practical cultivation technologies were lectured in the technical seminar. The participants had opportunities to exchange their experience and knowledge of their *tamarka* cultivation in the interchange meetings. Many participants were interested in the experience and new technologies such as wood chip mulch and mix cropping with corn or sunflower. Therefore, the participants had impressions that they learned many things what they can do from activities in the pilot project. The participants were mostly satisfied the activities of the pilot project and the most participants felt that their vegetable cultivation were improved through the activities.

In addition to the improvement of their cultivation, some changes on dissemination of technologies were recognized by the participants. For example, knowledge was exchanged among participants not only in activities of the pilot project but also through daily communication. Furthermore, the technologies were disseminated from the participants to neighbors because neighbors were interested in activities of the pilot project and asked the participants about the cultivation of vegetables.

2) Activities of the Women's Committee within Makhan-kenes/VCC

Activities of Women's Committee in the pilot project were observed. The leaders of Women's Committee in the pilot project areas assisted the chairman of Makhan-kenes/VCC and NGO to arrange the participants and venues for the events of the pilot project. In addition, deputy Hakim on woman's

affaire cooperated on implementation of the pilot project. It seems that Women's Committees in Makhan-kenes/VCC were capable of arranging women within the territory.

(2) Evaluation at Viewpoints of DAC Criteria

1) Relevance

According to statistic data of the Government, tamarka has an important position in vegetable production since a certain part of vegetables produced in Karakalpakstan were produced in tamarka. Women have more important roles in vegetable production in tamarka than that in other crops. A certain part of vegetables produced in tamarka is sold and it is one of income sources for their families. However, there has never been any systematic technical support targeting women working in tamarka. Therefore, technical support for vegetable production in tamarka is necessary to improve the production and livelihood of the people.

Furthermore, the Government is promoting the rural development and tamarka usage. The pilot project approach to improve vegetable production in tamarka by women is relevant to cope with the Government concern.

2) Effectiveness

It was confirmed that women were appropriate target group for improvement of vegetable production in tamarka since women use to work in tamarka and have capacity to understand cultivation technologies for the improvement.

The technical seminar and interchange meetings provided practical and applicable technologies and knowledge to the Participants, and they could easily see the effects and results of the technologies in tamarka in their areas. It might contribute that the Participants accept and apply the technologies to their cultivation. According to their records, the vegetable production of the participants increased through the pilot project activities. As a result, the most participants were satisfied with the activities and recognized the improvement of their vegetable production in tamarka through the pilot project. In addition, the Participants recognized that the advantage of diversification of the productions based on the technical seminar, interchange meetings and market information exchanged among the Participants. These results imply effectiveness of the pilot project.

3) Efficiency

The pilot project was mainly managed by the NGO which haired by the Study Team. The NGO had hired agronomists who lived in the target areas and the agronomists technically supported and frequently monitored the Participants. In addition, the Participants could rely on the agronomists since the Participants had known the agronomists well. Therefore the pilot project seems to be efficiently managed in comparison with no-agronomist in the areas.

Items and quantities of the agricultural inputs procured in the pilot project were decided through discussion with the Participants. On the other hand, the Participants learned practical vegetable cultivation knowledge through activities of the pilot project to fully use the agricultural inputs. Therefore, the inputs were used efficiently and the Participants felt that their vegetable productions were improved. As a result, inputs for the pilot project seem to be used efficiently.

4) Impact

In the evaluation workshop, the Participants suggested that they recognized the value of tamarka, how much the production in tamarka contributed to their livelihood, through recording the production. Also the Participants and their neighbors have started sharing and transferring their knowledge not only in the pilot project but also in their own activities. On the other hand, negative impact of the pilot project was not recognized in the evaluation workshop.

The pilot project gave influence to the Participants on the cultivation and changes in dissemination of cultivation technologies, although long term and indirect impact of the pilot project cannot be

evaluated at this time. It is expected that the Participants and their neighbors will disseminate their experience and knowledge to other people.

5) Sustainability

While the pilot project didn't require high cost inputs and high technologies, the Government might be able to manage the necessary resources in the area. Hakimiyats in the areas showed much interest in the pilot project and extended close cooperation on the implementation. According to the interview to Hakimiyats, Hakimiyats have intention to implement a similar project and it may be possible to prepare human resources by themselves, although scale and implementation of the project might be depended on preparation of budget. It implies possibility to implement a similar project.

On the other hand, the Participants recognized how valuable the production in tamarka through the pilot project, therefore, the participants understood effectiveness of vegetable production in tamarka. However, the most participants demanded support although they wanted to continue improvement of tamarka use while some participants continued sharing information and collaborative procurement for improved seeds after the pilot project.

F.4.6 Lesson Learned

(1) Irrigation Water Supply Based on the Schedule

The pilot project implies that irrigation water, timing and volume, is the critical issue for improving *tamarka* cultivation. The problem of irrigation water supply was described in "3.3.3. Problems and Issues encountered during implementation". The irrigation water supply schedule should be clarified and announced to the all users as much as possible and irrigation water should be supplied based on the schedule. Therefore, agriculture producers will be able to take actions to avoid the risk. On the other hand, agriculture producers, who are users of the irrigation water, should obey the rule of water use.

(2) Flexibility of Implementation

Vegetable growth was delayed and insecure and participants frequently had to change their cropping plan at the beginning stage due to irregular supply of irrigation water, unstable temperature, water-logging, etc. In case of projects which have participatory approach, the project implementation plan should be flexibly modified based on the participants' situation in order to achieve the expected goal of the project.

(3) Availability of Human Resources

The agronomists who live in the pilot project areas monitored the vegetable cultivation and gave technical support to the Participants. They know not only cultivation technologies but also the Participants and condition of the areas well. Therefore, the Participants relied on them and could accept technical support provided by the agronomists. The pilot project confirmed that reliable human resources were availability and the availability of human resources and practical involvement of them should be advantage to implement this kind of projects.

(4) Simple and Practical Technologies

Cultivation technologies lectured in the technical seminar were practical and simple technologies. The technologies were shown in the model or other *tamarkas* and the Participants could observe the technologies near their homes. It contributed to easily understand and accept the technologies. In addition, advanced or complicated technologies were not required to improve the cultivation, since the most participants just followed normal cultivation method in Karakalpakstan and they could increase their production.

(5) Competition among the Participants

According to discussion in the evaluation workshop, the Participants recognized that they tried to make their production better than others and competed with each other. They said that the competition

was good motivation for them. In addition, the Participants discussed market situation, especially price difference between last year and this year, for better sale. Based on the market situation, they considered what they would produce next year. It may be one of the foundations of market oriented agriculture. Therefore, it implies that the pilot project, especially group activities and communication among the Participants, contributed promoting and raising awareness of the market oriented agriculture.

F.4.7 Necessity of Modification on the Draft Action Plan

Results of the pilot project have confirmed improvement of agricultural production in *tamarka* through promotion of dissemination of agricultural technologies. Furthermore, the most participants were satisfied the pilot project and recognized importance and possibility of the improvement. Therefore, modification of the process and activities on the action plan may not be necessary. However, the implementation system and project area may need to be re-considered.

In the draft action plan, Initiative Group (IG) is formulated to coordinate participants and residents and assist VCC chairman on the project activities. On the other hand, the *Makhan-kenes*/VCC chairman and Women's Committee in the area had initiative to coordinate the residents and arrange events in the pilot project in cooperation with the NGO. The coordination and arrangement were done well by the chairman and the Participants. Therefore, VCC chairman and Women's Committee in the VCC may be able to work instead of the IG under facilitation of *Hakimiyat* in the action plan. And the participants may be able to assist the chairman's activities in the project.

In the plan of the pilot project, it was expected that participants within one *aul* participated in the pilot project and their experience and other information would be disseminated to neighbors and residents in other *auls* in the *Makhan-kenes*/VCC through interchange meetings. However, this approach was not strictly followed since gathering the participants within one *aul* was a little trouble. As a result, the participants were residents in several *auls* in one *Makhan-kenes*/VCC but within walking distance each other. And there was no trouble to communicate each other. Therefore, the area can be flexibly modified within walking distance based on participants' situation in the action plan, although one *aul* is a standard of project area. Participants of the interchange meetings can be basically residents within the *Makhan-kenes*/VCC that can easily communicate each other.

F.4.8 Follow-up of the Pilot Project

The pilot project was completed without remaining or additional activities. Therefore, there may be no follow up of the pilot project. However, it is better to continue monitoring. The *Hakimiyat* and *Makhan-kenes*/VCC have initiative and monitor the activities of the Participants, whether the participants continue cultivation and communication for dissemination of agricultural technologies and information.

F.5 Dairy Promotion Package

F.5.1 Implementation Plan

(1) Objectives

The Study Team regarded cow milk producing by many *dehkans* and *fermrns*, and bringing daily income to them. Karakalpakstan people consume 137.6 kg/capita of milk per year (36.7kg/capita in Japan). The main producer of milk is *dehkans* that breeds one milk cow on average. However when paying attention to marketing, almost of milk is consumed at producer's households and local area and fresh milk is marketed without any sterilization together with lack of cooling and cold storage system. Therefore consumer must boil milk by themselves be for drinking.

The dairy promotion package pilot project is planned to be a package plan including fodder production to processing and marketing of milk. The purposes of the project is to increase milk productivity through stable fodder production and nutrition improvement, and to produce value added milk processed hygienically under the sanitary condition, and to improve standard of living and to create employment opportunity of local people through milk production. It is considered that the dairy promotion package project would meet demand of *farmers* and *dehkans* in improvement of milk production and marketing and meet consumer's demand who want to have sanitary and high quality milk as well. The plan of the small-scale milk plant is described in the Development of processed products.

(2) Items to be Verified

- Effectiveness and validity of collective fodder production by *farmers* and *dehkans*
- Effectiveness of silage using the existing banker silo for winter feeding for cows
- Capacity building of *dehkans* and *farmers* on animal husbandry technology
- Capacity building of livestock extension staff on animal husbandry technology
- Identification of constrains in initial operation of milk production

(3) Activities and Method of Implementation

- Construction of bunker silo (about 20 ton size as a model),
- Collective fodder production with provided sorghum seeds and fertilizer in 30 ha of idle farmland by selected 20 *dehkans* using hired tractor of MTP,
- Provision of 5-day training course for *farmers* and *dehkans* (35 persons in total per time, ad 3 times a year). When providing training course, pre-training questionnaire survey will be carried out to know participant's expectation on the training, and on the final day, post training evaluation will be done to grasp participant's satisfaction on each contents involving quality of training materials, lecturers and logistics etc. Participant's suggestion will be used to modify contents of training materials together with training methods.
- Provision of 5 day training course for 20 livestock extension staffs per year. Pre-training questionnaire survey will be carried out to know participant's experiences and constraints as extension staff as well as expectation on the training. And pre-test on "animal husbandry" will also be done to know participant's capability on animal care and feeding etc. On the final day, post training evaluation will be done to grasp participant's satisfaction on each contents involving quality of training materials, lecturers and logistics etc. Participant's suggestion will be reflected to modify training methods and contents of training materials.
- Construction of mini-milk plant (to be described in the Development of processed products)
- The working group in MAWR headed by Vice-Minister will be organized and evaluate the pilot project, and the target VCC chairman will form the operation group among beneficial *farmer* and *dehkan*.
- The representative of the operation group will contract on raw milk supply with core members, and agree the pricing mechanism based on quality of raw milk.
- Training of O&M of equipment for mechanical operators will be conducted.
- Raw cow milk collected from *farmer* and *dehkan* will be processed to pasteurized cow milk, and the products will be sold to fixed clients, markets and retailers.

(4) Activities and Implementing Body

Activities	Implementing Bodies
1 Overall discussion and coordination	Animal husbandry department of MAWR, State agriculture university, SRI, <i>Farmers' association</i>
2. Construction of bunker silo	<i>Hakimiyat</i> , Animal husbandry department of MAWR, SRI, Participating farmers
3. Collective forage production	Participating farmers, <i>Hakimiyat</i> , Animal husbandry department of MAWR
4 Training to <i>farmers</i> and <i>dehkans</i>	Livestock extension officers, Animal husbandry department of MAWR, State agriculture university, Agriculture college, SRI
5. Training of livestock experts	
- Preparation of training material	Animal husbandry department of MAWR, State agriculture university, Agriculture college, SRI
- Provision of training	Animal husbandry department of MAWR, Agriculture college
6 Milk processing	
- Preparation	Council of Ministers, Animal husbandry department of MAWR, Officers of <i>Hakimiyat</i> , the Study Team
- Rehabilitation of building	<i>Hakimiyat</i> , Animal husbandry department of MAWR, Contractor, Participating farmers
- Procurement order of equipment to manufacturers	Council of Ministers, MAWR, Officers of <i>Hakimiyat</i> , the Study Team
- Delivery, installation and test-run of equipment	Supplier, Contractor
- Training to operators of milk mini-plant	Supplier, Animal husbandry department of MAWR, Participating farmers
- Start of production and sale of pasteurized milk	Animal husbandry department of MAWR
7. Monitoring	Animal husbandry department of MAWR, Participating farmers, the Study Team
8. Interim evaluation	Animal husbandry department of MAWR, Participating farmers, the Study Team
9. Terminal evaluation	Animal husbandry department of MAWR, Participating farmers, the Study Team

(5) Implementation Schedule

The original implementation schedule planned in the Implementation Plan, together with the actual implementation period of the activities, are indicated in Table F.2.1

(6) Relevant Components of the Action Plan

- 211: Fodder production
- 221: Provision of training courses
- 431: Improvement of small-scale agro-processing technologies(mini-milk plant)

(7) Expected Effects of the Project

Item	Expected Effects
Collective fodder production	The target people of the collective fodder production are <i>farmers</i> and <i>dehkans</i> who produce milk. The collective fodder production will contribute to improve income of <i>farmers</i> and <i>dehkans</i> from milk through stable fodder supply to increase milk productivity. Farmers' Association who have expert for forage will be responsible in cooperation with Animal Husbandry Department and local <i>Hakimiyat</i> . The participants in the project are expected to work to extend this activity in cooperation with the staff of Animal Husbandry Department and Local <i>Hakimiyat</i> in the area.
Silage	Silage making using simple silo will contribute to improve winter feeding, when fresh forage is not available, and this will contribute to increase milk production. Farmers' Association will be responsible to expand silage preparation through their extension work in cooperation with participants of the project and SRI expert.
Training for <i>farmers</i> and <i>dehkans</i>	The training course covering animal care, proper feeding, disease control etc will contribute to improve livestock owner's awareness of "animal husbandry" to increase productivity. Participants of the training are expected to teach technologies learned in the training to other livestock owners.

Training for livestock expert/extension staff	Staff of the Animal Husbandry Department and Veterinary Department will have become an extension staff who can extend animal husbandry technologies learned in the training to improve conventional breeding methods of livestock. Their services together with veterinary services as an extension staff will contribute to increase productivity of livestock production in the Study Area.
Milk Processing	Increase of income for livestock <i>farmer</i> and <i>dehkan</i> in VCC due to better pricing on raw milk and final products, better technological extension system among VCC on quality of raw milk production, introduction of transaction system of milk products on market economy

(8) Possible Risks and Risk Management

- Collective fodder production: Availability of idle farmland with irrigation system (to be arranged by a local *Hakimiyat*), willingness of *dehkans* who own livestock
- Silage and silo: Availability of space for a model silo with 20 ton size, willingness of *dehkans* who own livestock
- Training for *farmers* and *dehkans*: Securing of budgetary allocation by the government
- Training for livestock expert/extension staff: Securing of budgetary allocation by the government
- Degradation of quality or contamination of harmful micro-organism, the terminal quality inspection shall be conducted using laboratory equipment.
- Mismanagement of equipment, the operation group under VCC will control ownership of equipment with support and arbitration of *Farmers' Association*.
- Financial shortage in cash flow, the accountant will be trained during pilot project implementation.

(9) Monitoring and Evaluation

The monitoring will be done by Farmers' Association, and the results of monitoring will be evaluated by Steering Committee and Nukus *Hakim*.

(10) Feedback of Monitoring Results

Monitoring items	Feedback
Collective fodder production	According to the result of monitoring on fodder yield, input and organizational status etc, those will be reflected to organizing method, cultivation method, and farm management method etc.
Silage and silo	The result of monitoring on testing quality of silage (color, odor etc), those will be reflected to production method (composition of materials, sealing method etc) for the improvement.
Training for <i>farmers</i> and <i>dehkans</i>	The results of the pre-training questionnaire and post training evaluation by participants will be reflected to improve contents of training materials and training method.
Training for livestock expert / extension officers	The results of the pre-and post training tests on animal husbandry technologies, and pre-training questionnaire and evaluation shall be used to modify training methods and material's contents including logistics.
Milk processing	In October 2009, the first monitoring will be executed during initial operation. The minor adjustment in more efficient logistics and transaction mode will be created. According to fluctuation of market prices and change of demand and supply passing winter season, the second monitoring will be executed. The adjustment system of supply and pricing and operation system of milk processing facility will be given feedback of monitoring results for sustainable operation.

(11) Possible Post Pilot Project Activities

Combined with propose mini-milk plant for processing milk, the proposed project in livestock sector is comprehensive covering feed production to processing and marketing. After the termination of the pilot project during 2009 to 2010, training for *farmers* and *dehkans*, and that for livestock experts/extension staff must be continued by the governmental budget to develop livestock sector with sustainability. Fortunately, various presidential orders on livestock development have been issued reflecting importance of livestock sector. The Karakalpakstan government is required to allocate necessary appropriate budget according to the propose plans referring implemented pilot projects

Concerning technical assistance from Japan, it will be considered possible as follows:

- JOCV (Japan Overseas Cooperation Volunteers) to assist in the aspect of fodder production, animal care, milk processing and AI etc mainly on farm level.
- Grass-root grant aid, and non-project grant aid to provide AI and veterinary tool, equipment with vehicles
- Project-type technical assistance: Long-term technical assistance for comprehensive livestock development covering provision of equipments, techniques, processing and marketing.

The operation group in VCC will continue to manage milk production facility corresponding to demands in quality and price in market. JOCV may assist their activities including quality upgrading of raw milk and sales promotion. *Farmers'* Association will provide know-how on processing of raw milk to other areas.

F.5.2 Process of the Pilot Project

Pilot Project was designed as package project converging from fodder production to milk processing and its marketing taking into consideration current condition of dairy production in Karakalpakstan. In Karakalpakstan, dehkans have played important role in milk and meat production accounting for 93% for the former and 94% for the latter in 2006. But their technology on animal husbandry is generally low and also they have been facing to fodder shortage, which is resulted in low production of milk and meat.

As to extension service by Veterinary Department and Animal Husbandry Department are concentrated on veterinary service such as medical care, not for increasing productivity of meat and milk. Therefore, it is necessary for them to acquire fundamental technology on animal husbandry to advice farmers and dehkans.

Marketing of milk is very limited according to field survey. Only about 20 % of milk is marketed in small scale, and the remainder is consumed for home consumption. The government of Karakalpakstan has the policy to promote animal products processing under the presidential decree to encourage market oriented economy.

Taking into consideration the above mentioned conditions, dairy promotion package project was proposed, which is composed of five activities as shown below.

- 1) Collective fodder production
- 2) Silage making for winter feeding
- 3) Training for farmers and dehkans on animal husbandry
- 4) Training for extension workers of the concerning departments
- 5) Establishment of small-scale milk plant

The above mentioned components were implemented from April 2009 to September 2010 under the contract with sub-contractor, Farmer Association in the Republic of Karakalpakstan. According to the seasonality in the Study Area, the components of 1) to 4) were conducted two times each during two years, and 5) small-scale milk plant has completed December and necessary equipment Imported from Italy were installed and tested in February 2010.

The actual process of the Package Project is as shown below.

- Date of the first contract with FA: March 31, 2009
- Sowing of sorghum (10ha) and alfalfa (5ha) : May 13, 2009, and harvesting in July 15 and September 10 2009

The Study Team selected Fayan Trans who has the office in Tashkent , agent for equipment procurement, on April 18 2009 (maker is ELM\$ of Russia). But negotiation was stopped on June 2009 because they requested 100% of the total contract amount in one time. Therefore, Furkan was selected (maker is Inventa of Italy) on September 30 2009 from three nominated companies, and both contracted on July 7 2009.

- Completion of rehabilitation of housing : January 31, 2010
- Training of silage making : October 12, 2009 (24 participants)
- Training on animal husbandry for fermer and dehkan: October 24 2009 (24 participants)
- Training on animal husbandry for extension workers : December 22, 2009 (16participants)
- Arrival of milk processing equipment at the site : February 9, 2010
- Inspection of the equipment: February 18 by local staff of the Study Team
- Installment of the equipment : February 24, 2010 by Inventa's engineer
- Test run of the equipment and training for operators : February 25, 2010 (7 trainees)

Second contract with FA : April 29, 2010

- Sawing of sorghum (5ha) and alfalfa(16ha) : May 25, 2010, and harvesting on July and September
- Inspection of the milk plant by the District Sanitary and Epidemiologic Station : June 4, 2010
- Inspection of the equipment by the Association for Meat and Milk Production (Tashkent) : June 12-13, 2010
- Possession of certificate No. of Uzstandard : June 20 2010, GOST-13277-79 (pasteurized cow milk), O'zDst1083:2005 (drinking milk)
- WS on the milk plant operation: June 23, 2010 (20 participants)
- Inspection of the plant by Republican Sanitary and Epidemiologic Station : June 20, 2010
- Test of packing using local-made packing film : June 30, 2010
- Preparation of the Technological Instruction in Tashkent : July 5 to 7, 2010
- Sending of the Technological Instruction to Ministry of Health (Tashkent) and its approval : July 8, 2010
- Payment for the local made film (170kg) from Furkan to Fuber : July 19, 2010
- Analysis of the pasteurized milk by Republican Sanitary and Epidemiologic Station, Nukus : July 21, 2010
- No detection of Bacillus coli in the pasteurized milk : July 20, 2010
- Test run of the local made film: August 5, 2010. Result was ok.
- Issue of the Hygienic certificate from Republican Sanitary and Epidemiologic Station, Nukus : October, 2010
- Issue of Certificate for the Product by Uzstandard : October, 2010
- Opening ceremony of the milk plant : August 21, 2010
- Milk tasting event : October, 2010
- Training on animal husbandry for fermer and dehkan : August 23, 2010 (18 dehkans and 12 fermers participated)
- Training on animal husbandry for extension workers : August 27, 2010 (18 Participants)
- Training of silage making : September 28, 2010(24 participants)
- Evaluation WS: September 28, 2010(24 participants)

Progress of the Dairy Promotion Package Pilot Project

Activities	Progress/Current Status
1. Milk processing and marketing	Rehabilitation of the housing had finished on December 2009. On February 25, 2010, milk processing equipment with 500 lit/day capacities was installed. 7 trainees including 2 women of the working group. Through two times inspection by RSES, hygienic certificate was attained and then the certificate by Uzstandard was also obtained on 2 nd February 2011. The sales of packed pasteurized mill started at Nukus Central Bazaar in February 2011 This plant creates employment opportunity for 11 persons from milking to marketing of product.
2. Collective fodder production	This component was implemented using a farmers farmland for two years of FY2009 and FY2010. In 2009, sorghum and alfalfa were sawn in 10ha at a fermer's farm. And averaged yield was attained. The sorghum was harvested two times and the second one was used for the training of silage making. Harvested sorghum was used by dehkans to feed cattle and cows. The perennial alfalfa sawn in FY2009 is now in second year and grows well compared to FY2009. This alfalfa will be used for 3 to 4 years hereafter.

3. Silage making	In the Study Area, silage is not made for 20 years. The silage making training was done two times in October, 2009, and September 2010. In total 48 persons participated. An existing banker silo was used for silage making. Produced silage was fed to cattle and cow of Qoniratobay-Mehri Livestock Farm from end of 2009 to spring of 2010. As a result, milk production for winter season was remarkably increased. Qoniratobay-Mehri Livestock Farm from 300 lit. milk per day to 600lit/day, twofold increase. Increase of 300lit/day is equivalent to increase of income of 240,000Sum(300 x 800sum) per day. In addition, he could reduce cost for cotton cake. Other participants trained also pay attention to the effectiveness of feeding silage. A farmer of Qoniratobay-Mehri Livestock Farm is going to make 570ton of silage in 2010. In addition, a farmer who recognized effectiveness of silage is also going to make silage in his farm in 2010. Like this, silage making is extending in the Study Area gradually.
4. Training on animal husbandry for dehkan and farmer, and extension workers	<p>1. for dehkan and farmer: The trainings were conducted two times for FY2009 and FY2010 inviting 54 participants inclusive of 30 dehkans. Learning from experience in 2009, booklet prepared based on the text edited by the Study Team was used. The objectives of the training are to acquire, 1) importance of breeding management, 2) disease prevention, 3) relationship between feeding and milk productivity, 4) importance of artificial insemination, 5) merit of feeding silage for winter. At the end of the seminar, participants rated about achievement of the objectives of the seminar. As a result, they rating was concentrated on 4 to 5, which imply that most of participants achieved the objectives of the seminar (refer to left photo).</p> <p>2. for Extension worker: The trainings were conducted two times for two years. For the second seminar, booklet was used, which was prepared using the text made by the Study Team. In total 34 participants had the seminar. The rate of right answer of the pre-and post test was 50% for the pre-test and 80% for the post test, which imply that participants acquired the contents of the seminar (right photo).</p>

F.5.3 Outcomes and Achievement

The Dairy Promotion Package Pilot Project was designed as a package project composed of following components. Here, we describe outcomes and achievement of individual component.

(1) Collective fodder production

Despite of accounting for 93% for milk and 94% for meat, dehkan has small Tamarka (0.23ha per capita). The collective fodder production was implemented for two years in 10ha of Qoniratobay-Mehri Livestock Farm and normal yield was attained. Produced sorghum was fed to dehkan's cattle and cows, and contributed to save cost for purchasing forage though it is small amount. However, if considering its sustainability after the termination of the Development Study of JICA, it is necessary to institutionalize the system for collective fodder production in cooperation with farmers who will provide their idle farmland, Hakimiyat and MAWR.

(2) Silage making for winter feeding

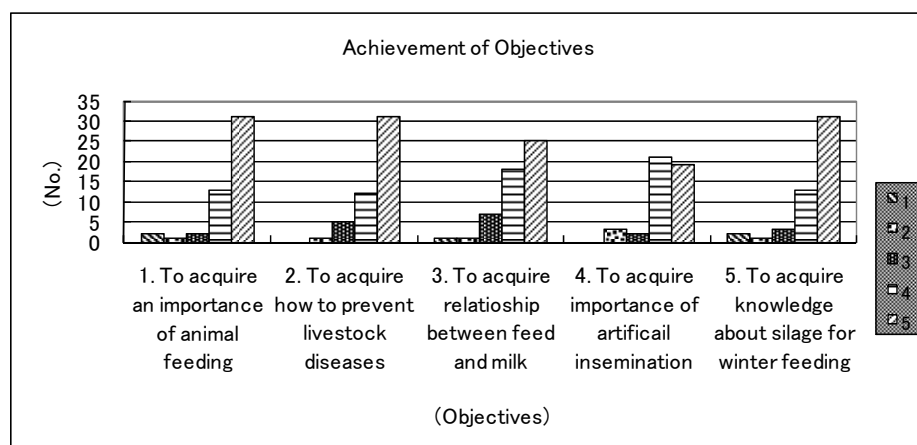
Over these 20 years, silage is not produced in the Study Area. About 300ton of silage produced in the practical training of silage making in FY2009 were fed to cattle and cows for winter season in Qoniratobay-Mehri Livestock Farm, and effect was as milk yield was increased from former 300lit/day to 600 lit/day, i.e. 100% increase after feeding silage. Increase of 300lit/day is equivalent to 240,000Sum/day (300lit x 800 sum/lit) of income. In addition he could reduce expense for cotton cake. A trainee trained in FY2009 is going to make 570ton silage in 2010 as he recognized effectiveness of feeding silage. In addition, one of farmers is going to make silage in 2010.

(3) Training for farmers and dehkans on animal husbandry

In consideration of the present extension service which is centering on veterinary services, technical training for farmer and dehkan was provided two times for FY2009 and FY2010 inviting 54 participants. The objectives of the training are to acquire, 1) importance of breeding management, 2) disease prevention, 3) relationship between feeding and milk productivity, 4) importance of artificial insemination, 5) merit of feeding silage for winter.

At the end of the training, participants evaluated about achievement of objectives of the training. As

seen in the following table, their rating are concentrated on score 4 to 5, implying that participants recognized an importance of breeding management of livestock, and objectives of the training were achieved. Outcome of the training will be generated as increase of milk and meat production in each farm of the participants and increase of their income from animal products though these will be generated gradually.



Achievement Status of Objectives

(4) Training for extension workers of the concerning departments

In order to grasp effectiveness of the training, pre-and post tests were conducted. The result of the pre-test shows that they are slightly weak against questions on animal care comparing with questions on veterinary science. Here from, it is inferred that their knowledge about animal husbandry is inadequate to advice farmer and dehkan, implying needs for strengthening of them. The averaged ratios of right answer over two training in FY2009 and FY2010 are 55% for the pre-test and 80% for the post test. The uplifting of the rate of right answer can be considered as outcome of the training because they will make use of the knowledge learned in the training in their extension services, which will be resulted in increase of meat and milk productivities of dehkan and farmer.

Test Results of Livestock Training

Questions		FY2009		FY2010		Average	
		Right answer (%)		Right answer (%)		Right answer (%)	
		Pre-Test	Post Test	Pre-Test	Post Test	Pre-Test	Post Test
1. Cattle	1.1 Age ready for first breeding	46%	62%	82%	100%	69%	86%
	1.2 Weaning period for calf	15%	77%	59%	68%	43%	86%
	1.3 Lactation period of milk cow	100%	100%	91%	100%	94%	100%
	1.4 Fresh grasses to be fed per day	54%	77%	45%	68%	49%	71%
	1.5 Fresh grasses to be fed per day in % of live body weight	38%	62%	45%	68%	43%	66%
	1.6 Gestation period	100%	100%	86%	100%	91%	100%
2. Goat	2.1 Age of buck ready to breeding	15%	54%	82%	95%	57%	80%
	2.2 Age ready for first breeding of doe	38%	62%	77%	82%	63%	74%
	2.3 Weaning period for kid	8%	62%	59%	91%	40%	80%
	2.4 Twins rate on average	15%	46%	77%	91%	54%	74%
	2.5 Fresh grasses to be fed per day	8%	54%	55%	82%	37%	71%
	2.6 Fresh grasses to be fed per day in % of live body weight	23%	54%	50%	95%	40%	80%
	2.7 Gestation period	77%	85%	82%	91%	80%	89%
	2.8 Age in month for marketing for meat	38%	62%	82%	95%	66%	83%
3. Swine	3.1 Average number of piglets per bearing	62%	77%	77%	86%	71%	78%
	3.2 Fattening period to reach marketable size for meat	15%	54%	45%	73%	34%	66%
	3.3 Average yielding ratio of meat per head	23%	69%	45%	68%	37%	69%
4. Forage	4.1 Name of leguminous fodders containing high protein	15%	85%	50%	73%	37%	77%
	4.2 Fodder trees that can be used for animal feed	23%	85%	45%	82%	37%	83%
Overall Rate of Right Answer		38%	70%	67%	85%	55%	80%

(5) Establishment of small-scale milk plant

Since installment of equipment on February 2010, it took about six months until the plant can operate milk processing. During these six months, the Study Team spent a time to find a factory producing local-made packing film in Tashkent, and its test run, and attainment of the technical Instruction of Association for Meat and Milk Products in Tashkent, and certificates of RSES and Uzstandard. Therefore in fact tangible outcomes were not attained up to February 2011. However, this established milk plant has functions of processing pasteurized milk, packing and selling (1,200 Sum/1 lit. pack) as the first case in Karakalpakstan, though it is small scale. In that context, establishment of a modernized and hygienic milk plant itself can be considered as outcome of the pilot project under the national policy of market oriented economy. In addition, operation by the organized milk producers group is also the first case in the Republic of Karakalpakstan. The milk plant also creates employment opportunity for 11 persons including women from milking to processing and selling. Since raw milk is collected from several milk producers nearby the Qoniratobay-Mehri Livestock Farm, they also can get income shifting from former home consumption to selling, which will be also outcome of the pilot project. Following table shows the estimated cash and flow and financial internal rate of return (FIRR) in case of 800Sum/lit. for raw milk purchasing.

FIRR of Small Scale Milk Plant

In case of 800 Sum/lit for raw milk purchasing

(Unit.Sum)

Item	Year-1	Year-2	Year-3	Year-4	Year-5
A. Capital Investment					
1 Milk filter	220,500	0	0	0	0
2 Staineless Steel Vat	1,782,000	0	0	0	0
3 Centrifugal electric pump	2,052,000	0	0	0	0
4 Alimentary hose	141,000	0	0	0	0
5 Reqrigerated milk tank	8,728,500	0	0	0	0
6 Pasteurizer (mini-dairy)	19,779,000	0	0	0	0
7 Electric pump	891,000	0	0	0	0
8 Alimetary hose	141,000	0	0	0	0
9 Milk analyzer	1,912,500	0	0	0	0
10 PH calibration kit	631,500	0	0	0	0
11 Electric skimmer	6,966,000	0	0	0	0
12 automatic packing machine	19,479,000	0	0	0	0
13 UV Lamp	3,783,000	0	0	0	0
14 Stamp mechnizm	2,418,000	0	0	0	0
15 Compressor	1,335,000	0	0	0	0
16 Refrigerator	5,464,500	0	0	0	0
17 Packing material	1,830,000	0	0	0	0
18 Dierasel generator	7,912,500	0	0	0	0
19 Antscale device	1,210,500	0	0	0	0
20 Spare parts	1,000,500	0	0	0	0
Sub-total	87,678,000	0	0	0	0
B. Gross Income					
1 Sale of pasteurized milk	219,000,000	225,570,000	232,337,100	239,307,213	246,486,429
c. Transaction and Operation Cost					
1 Salary	6,360,000	6,550,800	6,747,324	6,949,744	7,158,236
2 Depreciation cost for building	1,550,000	1,596,500	1,644,395	1,693,727	1,744,539
3 Purchasing cost of raw milk	146,000,000	150,380,000	154,891,400	159,538,142	164,324,286
4 Depreciation cost for equipment	8,767,800	9,030,834	9,301,759	9,580,812	9,868,236
5 Trasnportation cost	12,775,000	13,158,250	13,552,998	13,959,587	14,378,375
6 Packing materials	13,383,333	13,784,833	14,198,378	14,624,330	15,063,060
7 Electricity	2,315,706	2,385,177	2,456,732	2,530,434	2,606,348
8 Water	133,590	137,598	141,726	145,977	150,357
9 Marketing service	239,075	246,247	253,635	261,244	269,081
10 Tax	1,094,424	1,127,257	1,161,074	1,195,907	1,231,784
11 Gas or stove fuel	165,345	170,305	175,415	180,677	186,097
Sub-total	192,784,273	198,567,802	204,524,836	210,660,581	216,980,398
D. Net profit	26,215,727	27,002,198	27,812,264	28,646,632	29,506,031
E. Cash Flow Total	-61,462,273	27,002,198	27,812,264	28,646,632	29,506,031
Discount Value Factor (@10%)	0.9000	0.8100	0.7290	0.6561	0.5905
F. Present Value	-55,316,046	21,871,781	20,275,141	18,795,055	17,423,016
Discounted Benefit	197,100,000	182,711,700	169,373,746	157,009,462	145,547,772
Discounted Cost	252,416,046	160,839,919	149,098,605	138,214,407	128,124,755

FIRR =	29%
B/C =	1.03
NPV =	23,048,947

F.5.4 Problems and Issues encountered during Implementation

(6) Services Quality by the Subcontractors

It is considered that the subcontractor's understanding on the contract is inadequate. For example, provision of necessary quantity and units of the materials described on the contract was not done smoothly. Consequently, the Study Team had to ask them once and again to provide faithfully. Regarding equipment procurement, the agent's services were not smooth and adequate to meet Study Team's demand especially on the packing machine and packing material. The local made packing film they had brought to the site was not suitable for packing liquid such as milk, and this is resulted in about five months delay in operation of the milk plant since Study Team had to look for the factory who can produce quality packing film in Tashkent and to test it at the site before decision of adoption.

(7) Lack of Sense of Sanitary Supervision

In general, village people's sense about importance of hygienic practice has not developed enough even in the people who are engaged in milk processing in the pilot project. Therefore, Republican Sanitary and Epidemiology Station (RSES) instructed to improve hygienic condition of the milk plant and employees through two times inspection in parallel with bacteria test of the processed milk. RSES instructed to submit authorized bill of health of milking ladies and operators, and authorized one for milk cows in addition to instruction to keep clean equipment, plant, water and waste water. The Study Team had to advice the operators to put on clean cloths and white coat and to wash hand before processing milk in parallel with provision of chemical cleaning agents, soaps, floor brushes, towels etc. It is indispensable to ensure sustainable sanitary supervision about people and the plant since milk processing is a part of food processing under the government laws and regulations. In that context, it is considered that the instructions by the RSES would enlighten them about importance of sanitary supervision.

F.5.5 Evaluation of Pilot Project

On September 28, 2010, both silage making training and evaluation WS were conducted inviting 24 participants at the VCC Chairman office in Kerder VCC. One of the participants, Mr. Esenbay who is a farmer made silage in his farm according to instruction in the last training, gave his presentation on effectiveness of feeding silage for winter based on his experience that he could increase milk production by 2 times and reduce expense for cotton cake. Participants of 18 (75%) out of 24 showed interest in silage making in their farms.

Regarding 5 aspects evaluation, the participants were requested to evaluate each components of the Dairy Promotion Package Pilot Project by rating 1 to 5, and also to give their opinions on good points and bad points about the components. On the whole, their rating is considered to be high and not realistic, implying that they may not understand 5 aspects for evaluation. Therefore, both results of the evaluation done by the Study Team and the one by participants are shown below. The opinions of participants on the milk plant and trainings are: 1) the plant is necessary for country, 2) trainings were good experience and effective.

(1) Dairy Promotion Package Project

1) Relevance (score at 4 of 5 by Team, and 4.9 by the participants)

Necessity :

Milk productivity of both dehkans and farmers is low, probably mainly because of low animal husbandry technology, lack of animal feeds (especially in dehkans). Also current marketing volume of milk is estimated at only about 50% due to lack of milk factory, and poor marketing system. Under the condition, it is necessary to plan package project covering from fodder production to marketing along with capacity building of producers to encourage dairy industry in Karakalpakstan. The proposed

project becomes a good model for that purposes.

Priority :

Karakalpakstan government has been encouraging meat and milk processing. Therefore, the project is consistent with the policies.

Suitability as a mean: The site is located at the village mainly managing animal husbandry 40 minute-drive distant from Nukus city. Milk processing, silage making, and collective fodder production are carried out here in the village. The site is blessed in accessibility and easy milk collection and marketing as well.

2) Effectiveness (score at 4 of 5 by Team and 4.8 by the participants)

Forecasting for attaining project goal:

500 lit./day of milk is processed and marketed. This is the first production of packed pasteurized milk in Karakalpakstan, and also first case of processing and marketing milk by milk producers themselves who will be provided training under the project. It is expected that value added milk, stable feeding of feeds, improvement of household economy of producers, and creation of employment opportunity.

Cause-and effect logic :

In order to attain project goal, close solidarity of the working group under strong leadership for sustainable processing, and stable demand of consumers for safe milk are indispensable.

3) Efficiency (score 3 of 5 by Team and 4.9 by the participants)

Degree of attainment of output: :

Modern equipment to produce 500 lit milk/day was procured from Italy, and test run along with training for operators was done on February 2010.

Cause-and effect logic :

It is considered that capacity of 500 lit/day is not excessive scale for the safe milk production as a model. Input for sorghum production in 11 ha is also standardized one.

Timing :

The collective fodder production by dehkans was done according to normal cropping pattern in Karakalpakstan. The start of full operation is delayed due to delayed procurement of equipment and adjustment of equipment, the timing is not considered to be an obstacle since milk is produced all year round.

Cost : Standardizes input was dosed for the collective fodder production. The small-scale milk plant with 500 lit/day is considered suitable input as a model.

4) Impact (score at 4 of 5 by Team, and 4.8 by the participants)

Forecasting for attaining overall goal :

Consumer's demand for safe milk has been increasing. It is inferred that hygienic milk production by dehkans and farmers will give impact on processing and marketing of milk in Karakalpakstan, and contribute to improve living standard of milk producers by selling value-added safe milk. Impact on the collective fodder production will depend on aggressive involvement of the Animal Husbandry Department and dehkans themselves.

Cause-and effect logic :

There is no misfit between overall goal and project goal.

Spreading impact :

Under the encouragement of animal products processing by the Karakalpakstan government, no negative impact is predicted since modern equipment was installed for milk processing. And no

negative impact is forecasted in the collective fodder production.

5) Sustainability (score at 3 of 5 by Team, and 4.8 by the participants)

Political and institutional aspects :

The Karakalpakstan government has been encouraging livestock sector and animal products processing as well. Institutional credit is also available. As to fodder production, dehkans have no idea to date to produce fodder collectively, implying necessity of promotion of this method by the Animal Husbandry Department.

Organizational and financial aspects :

The working group members are solidarized under the strong leadership of the leader (owner of the farm). The leader markets milk everyday to the Nukus Dehkan Bazaar. Therefore, the project is considered sustainable under the working group members. Operation and management will be done by running milk profit since governmental financial support is not expected.

Technical aspect :

Operation and management of the plant is not considered so difficult since the project aims producing drinking milk. And sorghum production itself has been practiced in Karakalpakstan but it is required for the Animal Husbandry Department and Veterinary department to extend proposed collective.

6) Necessity for course correction

There is not necessary to correct course in this project since this package project is proposed taking into consideration results of the survey on dairy industry sector in Karakalpakstan.

(2) Collective Fodder Production

1) Relevance(score at 4 of 5 by Team, and 4.8 by the participants)

Necessity :

Despite the role of dehkans in milk production surpass that of farmers they have only 0.5 ha per household on average. Fodder production is one of the issues for dehkans to improve their living standard.

Priority :

Proposed activity is consistent with the Karakalpakstan governmental policies to promote livestock production. Fodder production is indispensable to maintain cattle's nutrients and production of meat and milk.

Suitability as a mean :

The site (11ha) is located at Qoniratobay-Mehri Livestock Farm 40 minute-driving distant from Nukus city. Despite the Karakalpakstan government has been encouraging livestock sector, there is no concrete policies focusing on dehkans who are major animal products producers. The proposed collective fodder production by dehkans is the first trial in Karakalpakstan. The target is about 20 dehkans who have only small area in their backyards. The Animal Husbandry Department is required to have initiative to extend collective fodder production method. Harvested sorghum seeds are to be distributed to group members of the working group.

2) Effectiveness(score at 3 of 5 by Team, and 4.7 by the participants)

Forecast for attaining project's goal:

The trial could attain 7 to 8 ton yield/ha, namely 77 to 88 ton in 11ha, which is normal yield in the area nearby according to the owner of the farmland. However, originally, there is no idea of the collective production of fodder in dehkan people.

Cause-and-effect logic :

It is necessary to attain the goal that the Animal Husbandry Department should have initiative to

extend collective fodder production by dehkans by the proposed activity.

3) Efficiency (score at 3 of 5 by Team, and 4.9 by the participants)

Degree of attainment of output :

The collective fodder production using an idle land owned by a farmer could attain almost normal yield of sorghum, though unevenness of growing was observed in the first of FY2009.

Cause-and-effect logic :

Scale of 11ha for this activity is considered appropriate. And standardized volume of sorghum and alfalfa seeds was input.

Timing :

Cultivation and sowing of fodder crops were carried out following predominant cropping calendar, namely, cultivation and sowing in May.

Cost :

Input per ha was done according to the standard in the area, and normal yield of 7 to 8 ton/ha was attained.

4) Impact (score at 3 of 5 by Team, and 4.8 by the participants)

Forecast for overall goal : Impact is expected but depending on aggressive involvement of the Animal Husbandry Department and dehkans themselves.

Cause-and-effect logic : There is no misfit between overall goal and project goals.

Spreading impact : The objectives of this activity are stable production and feeding to livestock. Therefore no negative effect is predicted.

5) Sustainability (score at 3 of 5 by Team, and 4.7 by the participants)

Political and institutional aspects :

Generally dehkans have no idea of the collective fodder production as well as the governmental livestock policies. Initiative of the Animal Husbandry Department is indispensable for extension.

Organizational and financial aspects :

Current extension services have been conducting focusing on veterinary services. Therefore, it will be difficult to expect government support for this activity.

Technical aspect :

Sorghum production itself is not difficult technology as it has been predominantly practiced in and around the area. The point of the activity is to produce sorghum by organized dehkans collectively who have only small area. It will be necessary for the Department of Animal Husbandry and Veterinary Department to encourage aggressively this method in dehqan people.

6) Necessity for course correction

The collective fodder production was carried out as scheduled. So far such collective fodder production by dehkans has not been executed in Karakalpakstan. The collective fodder production is required under the institutional supporting system.

(3) Training on Silage making with demonstration

1) Relevance (score at 4 of 5 by Team, and 4.8 by the participants)

Necessity :

Current winter feeding is based on dried sorghum and reed, which have low nutrient value. Silage containing much nutrient value will contribute to increase of milk in winter season.

Priority :

Though silage making is not involved in the governmental livestock policy of Karakalpakstan but

should be given higher priority from viewpoint of present status of winter feeding.

Suitability as a mean :

Karakalpakstan government has been encouraging livestock sector. So silage making is suitable strategy to increase milk production in winter as part of livestock policies.

2) Effectiveness(score at 4 of 5 by Team, and 4.7 by the participants)

Forecast for attaining project goal :

Effectiveness of silage is especially higher for farmers who have large number of cattle.

Cause-and-effect logic :

Though silage was utilized until 1970s, dehkans and farmers who were provided training will use it again.

3) Efficiency(score at 3 of 5 by Team, and 4.8 by the participants)

Degree of attainment of output :

In Qoniratobay-Mehri Livestock Farm, milk production had increased by 100%, two times, by feeding silage.

Cause-and effect logic :

Scale of training and demonstration is considered suitable if considering current status that no one makes and uses silage for winter feeding.

Timing :

The training was conducted during 2nd harvesting of sorghum for two years.

Cost :

Low cost, only for training and demonstration.

4) Impact(score at 4 of 5 by Team, and 4.7 by the participants)

Forecast for attaining overall goal :

Silage made in the beginning of October 2009 is fed until spring in 2010. As a result, milk production increased by 100% by feeding silage and income from milk is expected to increase as well.

Cause-and effect logic :

There is no misfit between overall goal and project goals.

Spreading impact :

No negative effect is predicted since increase of milk is expected by feeding silage.

5) Sustainability(score at 3 of 5 by Team, and 4.8 by the participants)

Political and institutional aspects :

It is expected that silage utilization will be expanded by strong leadership of the Department of Animal Husbandry in the extension services.

Organizational and financial aspects :

Sustainability is expected mainly by leadership of the Department of Animal Husbandry and advanced farmers who participated in the training.

Technical aspect :

A farmer who is a group leader of the working group is also going to make 300 ton of silage for winter feeding in FY2009. In this manner, sustainability will be expected through advanced farmers like Qoniratobay-Mehri Livestock Farm.

6) Necessity for course correction

There is no necessary for correction of concept of technology transfer through the training since at present no one uses silage.

(4) Training on animal husbandry technology for farmer and dehqan

1) Relevance(score at 4 of 5 by Team, and 4.9 by the participants)

Necessity :

Awareness of animal husbandry technologies of both farmer and dehqan is generally low in livestock productivity, prevention of diseases, and animal feeding. It is indispensable to strengthen their capability for animal husbandry through the training in order to encourage livestock production.

Priority :

The Karakalpakstan government has been encouraging livestock production. Therefore, uplifting of animal husbandry technologies of farmer and dehqan is considered indispensable.

Suitability as a mean :

So far, such kind of training targeting farmer and dehqan has not been conducted. This activity aiming at increasing livestock productivity is consistent with governmental policies, and suitable.

2) Effectiveness(score at 3 of 5 by Team, and 4.9 by the participants)

Forecast for attaining project goal:

The effects of the training might be difficult from short-term viewpoints, but possible from mid to long-term viewpoints since awareness of dehqan and farmer will be improved gradually

Cause-and-effect logic :

From mid to long-term viewpoint, attaining of project goal will be promising since they will be strengthened their technologies and knowledge through the training.

3) Efficiency(score at 3 of 5 by Team, and 4.9 by the participants)

Degree of attainment of output :

Examination of effects of the training will be possible by data collection of milk yield etc. Other items are also possible by inquiry survey to the participants in the training.

Cause-and-effect logic :

This kind of training has not been conducted so far for farmer and dehqan. Therefore, this activity must be conducted with sustainability to attain the project goal.

Timing :

As October is still busy farming season for wheat and cotton, the training was carried out using a few interval.

Cost :

Low cost; only cost for training material preparation and venue.

4) Impact(score at 3 of 5 by Team, and 4.9 by the participants)

Forecast for attaining overall goal :

From mid to long-term viewpoints, effect will be generated in increase of milk yield and lower outbreak of diseases etc.

Cause-and-effect logic :

There is no misfit between overall goal and project goal.

Spreading impact :

No negative impact is predicted.

5) Sustainability(score at 3 of 5 by Team, and 4.9 by the participants)

Political and institutional aspects :

Sustainability will be expected depending on budget allocation by the Karakalpakstan government who will recognize an importance of training for farmers and dehkans.

Organizational and financial aspects :

Budget allocation for the Animal Husbandry Department and Veterinary Department is the premise.

Technical aspect :

No groundbreaking technology is included in the training. The training aims at strengthening farmer and dehkan's knowledge by transferring fundamental technologies on livestock management. Sustainability is expected in cooperation with concerning departments.

6) Necessity for course correction

No course correction is necessary because this activity is indispensable to strengthen capability of farmers and dehkans. However, some modification of training materials may be necessary to make it understandable for them.

(5) Milk processing and marketing

1) Relevance(score at 4 of 5 by Team, and 4.9 by the participants)

Necessity :

Milk consumption in Karakalpakstan is 137kg per capita per year. Lack of milk processing plant and inadequate marketing are current major issues to be solved for both dehkans and farmers who are the milk producers.

Priority :

Priority for milk processing and marketing is high to encourage dairy production, and consistent with the governmental policies.

Suitability as a mean :

At present, milk hygienically processed, which is drinkable without boiling has not produced in Karakalpakstan. The proposed small-scale milk processing plant will become a good model to produce safe milk for consumers processed by producer's group. Recently a few investors in Karakalpakstan are going to invest to animal products processing sector. Therefore, spreading of effect is expected.

2) Effectiveness(score at 4 of 5 by Team, and 4.7 by the participants)

Forecast for attaining project goal :

As of end of September 2010, the proposed small-scale milk plant is not yet fully operated. We are waiting for the certificate from RSES. The organized working group is solidarized under the leadership of group leader. Therefore, attainment of project goal will be promising. The planned scale of the small-scale milk plant is considered appropriate to verify effectiveness of safe milk production and its marketing.

Cause-and-effect logic :

This activity is considered adequate to attain the project goal of producing safe milk by producers group.

3) Efficiency(score at 3 of 5 by Team, and 4.8 by the participants)

Degree of attaining output :

The working group members produce more than 500 liter milk everyday which exceeds capacity of the proposed small-scale milk plant. Therefore, attainment of targeted milk processing of 500lit/day is possible based on the test run.

Cause-and-effect logic :

This activity is considered adequate from view point of safe milk production, management, and marketing by producer group themselves.

Timing :

The plant is designed suitably to avoid excessive scale. Though procurement of equipment rehabilitation of housing are delayed as of end of September 2009, it is considered that timing of input is suitable since milk production has no seasonality.

Cost : Input to this activity is considered suitable since the equipment is planned to be bare essential for a model mini milk plant.

4) Impact(score at 3 of 5 by Team, and 4.9 by the participants)

Forecast for attaining overall goal :

In Karakalpakstan, long life milk (LL milk) is sold, and demand for safe milk has been increasing among consumers. Therefore, improvement of living standard by producing pasteurized safe milk will be attained, and the result of this activity will affect government policies encouraging animal products processing.

Cause-and effect logic :

There is no misfit between overall goal and project goal.

Spreading impact :

A part of investor in Karakalpakstan has been interesting in milk processing. Therefore, spreading of effect will be promising.

5) Sustainability(score at 3 of 5 by Team, and 4.8 by the participants)

Political and institutional aspects :

The Karakalpakstan government has been encouraging animal products processing such as meat and milk, and institutional credit system is also available. Therefore, sustainability of this activity is expected through milk producers who have financial capability centering on farmers.

Organizational and financial aspects :

The group leader (owner of the farm) of the organized working group has a strong leadership. It is considered possible that solidarized group member will be able to manage the milk plant by running profit from selling milk.

Technical aspect :

Along with equipment installation(beginning of February 2010) , test operation shall be done to transfer operation and management method to group members. The group leader has experience of milk processing.

6) Necessity for course correction

No course correction is necessary. The plant will be operated in February 2010 though procurement is delayed. JICA Study members do not stay when equipment arrives at the site. Therefore, there is some uncertainty about equipment inspection, test operation etc, which shall be done by the local staff of the Team in cooperation with the contractor considering contractor's capability.

(6) Training on animal husbandry for livestock extension workers

1) Relevance(score at 4 of 5 by Team, and 4.9 by the participants)

Necessity :

Since all extension workers of livestock sector are veterinarians, their services have been centering on veterinary services, which are not met farmer and dehkans' demand. Therefore, capacity building to uplift their technology on animal husbandry is required. Priority : The government has been

encouraging livestock production. Therefore, uplifting of animal husbandry technologies of extension workers is considered indispensable.

Suitability as a mean :

Such kind of training for extension workers has not been conducted. This activity aiming at increasing livestock productivity is consistent with governmental policies, and suitable.

2) Effectiveness(score at 3 of 5 by Team, and 4.9 by the participants)

Forecast for attaining project goal:

The effects of the training might be difficult from short-term viewpoints, but possible from mid to long-term viewpoints since extension worker's capacity will be improved through the training.

Cause-and-effect logic :

From mid to long-term viewpoint, attaining of project goal will be promising since they will be strengthened their technologies through the training.

3) Efficiency(score at 3 of 5 by Team, and 4.9 by the participants)

Degree of attainment of output :

Examination of effects of the training will be generated as increase of meat and milk yield and decrease of animal diseases etc. Other items are also possible by inquiry survey to the participants in the training.

Cause-and-effect logic :

So far, this kind of training has not been conducted for extension workers. Therefore, this activity must be conducted with sustainability to attain the project goal.

Timing :

The training was done two times on December 2009 and August 2010 when farming practices are not so busy.

Cost :

Low cost; only cost for training material preparation and venue.

4) Impact(score at 3 of 5 by Team, and 4.9 by the participants)

Forecast for attaining overall goal :

From mid to long-term viewpoints, effect will be generated in increase of milk yield and lower outbreak of diseases etc.

Cause-and-effect logic :

There is no misfit between overall goal and project goal.

Spreading impact :

No negative impact is predicted.

5) Sustainability(score at 3 of 5 by Team, and 4.9 by the participants)

Political and institutional aspects :

Sustainability will be expected depending on budget allocation by the Karakalpakstan government who will recognize an importance of training for extension workers.

Organizational and financial aspects :

Budget allocation for the Animal Husbandry Department and Veterinary Department is the premise.

Technical aspect :

No groundbreaking technology is included in the training. The training aims at strengthening extension worker's knowledge by transferring fundamental technologies on livestock management.

Sustainability is expected in cooperation with concerning departments.

6) Necessity for course correction

No course correction is necessary because this activity is indispensable to strengthen capability of extension workers.

F.5.6 Lessons Learned

Electricity is not always supplied for 24 hours though depending on the site(s). If electricity is not available for 24 hours, generator is indispensable. In the same way, water supply and its quality must be confirmed regardless of tap water or well,

- There are some governmental organizations concerning food processing in Uzbekistan and Republic of Karakalpakstan working under the laws on food processing such as Uzstandard, Republican Sanitary and Epidemiology Station, Association for Meat and Milk Products. However attention to these organizations and concerning laws by the Study Team was inadequate before implementing pilot project of milk processing, which caused delay of getting certificates from the concerning organizations,
- In general, milk producer's awareness of hygienic on food processing and processing plant is basically lack,
- Institutional supporting system for dehkans, major animal products producer in Republic of Karakalpakstan, has not been consolidated yet,
- As compared to farmers, dehkans' educational status is considered to be low. Most of them cannot read and write Russian. Therefore, it is desirable to prepare training materials and other documents for dehkans, and also to make them visual as much as possible using Karakalpak language,
- The local staff's employment is indispensable to promote and supervise the pilot projects when the Study Team is absent. It is risky to leave all activities to the contractors.
- If based on SGA method, it has taken 40 to 60 days for a contractor to withdraw contract money from the National Bank. It made the start of the pilot project delay since a contractor has no their own fund that can be used immediately for the commencement of the pilot projects.

F.5.7 Necessity of Modification on the Draft Action Plan

It is considered that modification of the draft action plan for the dairy promotion project is not necessary in principle because dairy promotion project is designed as package project covering fodder production to marketing of processed milk inclusive of training for farmer and dehkan and livestock extensionists. However, we make some recommendations for implementing M/P and A/P, which are based on the experiences during implementation of the pilot project over two years.

- Observing the current status of livestock production in Karakalpakstan, it is recommended that dairy promotion should be encouraged in the form of package project as the proposed pilot project had been implemented for two years in parallel with provision of training on animal husbandry (not on veterinary technology) for farmer and dehkan and extension workers of the concerning departments such as Veterinary Department and Animal Husbandry Department. In order to execute these activities steadily, it is recommended that the Karakalpakstan Government should allocate necessary annual budget according to the proposed M/P.
- At present, there is no institutionalized technical training system for dehkan and farmer to increase animal's productivity. Therefore, it is recommended to conduct training regularly in order to improve their technical level on animal husbandry such as fodder production and proper storing method, nutrition management, hygienic on animal and animal products etc. Herewith, it is expected that animal nutrition will be improved to increase meat and milk production, and resulted in improvement of income of dehkan and farmer.
- In order to realize the above mentioned (2), it is necessary to uplift capacity of the livestock

extension workers. It is recommendable to conduct the training at least two times a year as the Study Team conducted in the pilot project. Present services by extension workers are considerably slant to veterinary services such as diagnosis, medical care, not to the technical and practical advices that farmer and dehkan want to acquire. The results of the pre- and post tests conducted in the training shows needs for strengthening technologies on animal husbandry.

- The winter season in Karakalpakstan is very severe for feeding livestock, in which stored forage such as dried sorghum, reed, straw etc are fed but nutrition values of these winter feeds are generally low. The silage made and used in the pilot project showed its effectiveness to increase milk productivity by 100%, twofold. Therefore, it is recommendable to extend silage making technology through extension services.
- RSES should execute regular inspection of farms and food processing plants to uplift the sense of hygienic supervision at each site.
- Though it is difficult to estimate the acreage, there are many idle farmlands in the Study, which are mostly owned by farmers. Meanwhile, dehkans have only small area as Tamarka but in fact, they are accounting for 93% of milk production in Karakalpakstan. Taking into consideration such condition, collective fodder production was proposed and implemented in FY2009 and FY2010 as the first trial in Karakalpakstan. But in consequence, involvement of dehkans were not much as we had expected probably due to social position of dehkan compared to farmer, poor financial power of them, and lack of idea for collective fodder production among them. Therefore, it is recommended to institutionalize collective fodder production to support dehkans engaged in livestock production.

Proposed procedure of the collective fodder production under the institutional system is shown in the following table:

Proposed Procedure for Collective Fodder Production

Activities/procedure	Executing Agencies	Supporting Agencies
1. Organizing of dehkan group and Application for collective fodder production	Dehkan group	Hakimiyat, Dept. of Animal Husbandry, FA
2. Arrangement of farmland and machinery	Hakimiyat,	FA, Dept. of Animal Husbandry,
3. Procurement of fertilizer and seeds	Dehkan group	Hakimiyat, Dept. of Animal Husbandry, FA
4. Crop management	Dehkan group	Hakimiyat, FA
5. Harvesting, transportation and use of forage	Dehkan group	Hakimiyat

F.5.8 Follow-up of the Pilot Project

The Dairy promotion Pilot Project was implemented for two years from FY2009 to FY2010. However, this limited period was considered not enough to attain certain outputs, and therefore, it is required for the Karakalpakstan Government to follow project activities even after finishing the Development Study by the Study Team by allocating necessary budget according to the same method that the Study Team had applied for two years in order to extend outputs in other areas.

(1) Training for farmer, dehkan and livestock extension workers

The training for extension workers should be continued to uplift their capacity to enable them to give proper advice on animal husbandry technology to dehkan and farmer to increase livestock productivity of meat and milk. During two years from FY2009 to 2010, the Study Team could provide this training only for 34 (16+18) extension workers. Therefore, the training should be continued to follow up Study Team's activity by using prepared manual by the Study Team.

As well as the training for extension workers, the training for farmer and dehkan should be also continued using prepared manual by the Study Team. For two years the Study Team could provide this training only for 54 (24+30) farmer and dehkan in total. Dehkans' contribution to livestock production will be important in future too, and their capacity and knowledge must be uplifted to increase animal productivity through the training.

(2) Collective fodder production

As recommended in the above 3.4.6 (6), dehkan should be supported to stable their forage production if considering their contribution to livestock production. It will be better to set up institutional system involving Hakimiyat office, dehkan and fermer groups, and Department of Animal Husbandry of MAWR.

(3) Milk processing

Recent year, the government has been encouraging agricultural and animal products processing under the market-oriented economy policy. Though being small-scale, the Study Team established modernized and sanitary milk plant at Kerder VCC in Nukus and the plant shall be operated by the organized milk producer group in cooperation with Kerder VCC. This small milk plant will become a good sample to extend the same one in other districts.

The Karakalpakstan government in cooperation with Nukus Hakimiyat should follow up milk processing activity in the Qoniratobay-Mehri Livestock Farm in Kerder VCC to support them in provision of stable water and electricity supply and promotion of selling for Soda factory in Kungrad, kindergartens in Nukus District, Dehkan Bazaar in Nukus and other potential markets.

(4) Extension of silage making

Since effectiveness of feeding silage for winter season was confirmed from late of 2009 to early 2010 at the Qoniratobay-Mehri Livestock Farm in Kerder VCC in Nukus District by attaining 100% increase of milk production compared to normal production in the farm. And silage making is going to extend to Chimbay district in 2010 as a fermer recognized effectiveness of silage being informed from a participants of the training in 2009. Therefore, Veterinary Department and animal Husbandry department should work with initiative to extend silage making technology in cooperation with Mr. Esenbay, a fermer trained in 2009 and 2010 to make farmer-to farmer extension.

F.6 Improving Water Management in Internal Canal and Water Use in the Field

F.6.1 Implementation Plan

(1) Objectives

The Project has two aspects which are water management in internal canal system and water use in the field. The Objectives of the Project are:

To improve water management in the internal canal system by renovating canal system and installing division box (“*Shandur*”) and to enable WUA to maintain canal system properly by strengthening activity of WUA. Through the activity of the Project, the activities for strengthening WUA’s function proposed in the Master Plan will be examined its validity and adaptability.

To increase water use efficiency in irrigation and leaching and increasing effect of leaching to salt removal by implementing land leveling and improving water use practice in the field in the model farm. The effect of these measures will be examined the validity and adaptability. The measures will be demonstrated to *farmers* in the model farm and the acceptability of measures to *farmers* will be assessed through the Model Farm Project.

(2) Items to be Verified

1) Water management in internal irrigation system

- Improving water management by renovating canal system and installing division box
- Fulfilling proper maintenance of internal canal system by strengthening activity of WUA

2) Water use in the field

- Verification of land leveling and improving water use practice in the field to increase water use efficiency and effect of salt removal in leaching
- Assessment of adoptability of measures and acceptability to *farmers*

(3) Activities and Method of Implementation

1) Water management in internal irrigation system

- Cleaning and digging internal canal, repairing and installing gate equipment and water measurement facilities in the system
- Installing division box at the intake of farms
- Strengthening WUA by appointing adequate water man, equipping transportation (bicycles) to water man, training to water man, etc.
- Assessing the capability of WUA to operate the renovated canal system properly (with above strengthening measures)
- Assessing potential of water management with division box to improve water management in the field by *farmers*, assessing adaptability to the area and acceptability to *farmers* of the measures will be examined as well.
- A mini-excavator is equipped to WUA by repairing existing WUA’s machinery or leasing machinery and WUA will use it for regular maintenance work of canal system. The capability of WUA to manage construction machinery and to maintain canal system by the machinery will be assessed.
- The project site is so far assumed to be at the Katraban Irrigation Block of the Katagarana WUA, Nukus District.

2) Water use in the field

- Implementation of land leveling and re-arrangement of on-farm ditches
- Monitoring and verification of field improvement in effect on water use efficiency and salt removal
- Assessment of adaptability and acceptability to *farmers* through demonstration and technical seminars

- Two farms, approximately 8 ha, were selected for the verification plot from the project site.

(4) Activities and Implementing Body

Activity	Implementing Body
a. Watre management in internal irrigation system	
Discussion on Implementation Plan and site, Selection of participating <i>farmers</i>	WUA, LABM, ISD, SANIIRI, the Study Team
<i>Improving water management by renovating canal system and installing division box (“Shandur”)</i>	
Survey and design work for renovation of canal system	WUA, ISD, SANIIRI, ICA Study Team
Cleaning and digging canal and constructing gate and water measurement equipment	WUA, LABM, ISD, Contractor, SANIIRI
Construction of division boxes	Contractor, WUA, SANIIRI, the Study Team
Operation of the model irrigation block by WUA and monitoring works	WUA, LABM, ISD, SANIIRI
<i>Fulfilling proper maintenance of internal canal system by strengthening activity of WUA</i>	
Equipping mini-excavator to WUA by repairing existing machinery or leasing	WUA, LABM, ISD, SANIIRI
- Maintenance work of canal system by WUA	WUA, LABM, ISD, SANIIRI
- Management of construction machinery based on the plan	WUA, LABM, ISD, SANIIRI
- Participation of members to maintenance work	WUA, LABM, ISD
- Participation of <i>dehkans</i> to maintenance work	WUA, LABM, ISD
Evaluation	WUA, LABM, ISD, SANIIRI, the Study Team
b. Water use in the field	
<i>Preparation</i>	
Discussion on Implementation Plan , Decision of site, Selection of participating <i>farmers</i>	WUA, LABM, ISD, HME, SANIIRI, the Study Team
<i>Implementation</i>	
Development of the model farm (land leveling, arranging on farm ditch)	WUA, SANIIRI, Contractor
Monitoring of leaching activity	WUA, SANIIRI
Monitoring of irrigation activity	WUA, SANIIRI, the Study Team
Evaluation	WUA, ISD, SANIIRI, the Study Team

(5) Implementation Schedule

The original implementation schedule planned in the Implementation Plan, together with the actual implementation period of the activities, are indicated in Section 2.3.2.

(6) Relevant Components of the Action Plan

- 311: Improving Internal Canal System, Activity-4, 5 and 6
- 312: Strengthening Water Management in the Field, Activity 1-1 and 1-2, Activity 3
- 321: Introduction of Water Saving Technology, Activity 1
- 332: Improving Drainage Conditions in the Field, Activity 1
- 341: Strengthening WUA and Enhancing its Activity, Activity 1-1, 1-3, 1-4, 2-2, 2-3, 2-4 and 4-1

(7) Expected Benefit and Measures for Extension

As a result of improvement of internal irrigation system and strengthening of WUA, WUA is expected to become self-sustaining technically and financially in its water management activity.

Water use in the field level will be improved by introducing land leveling and improving water use practice in the field. It will contribute to effective use of limited water resources through fulfilling effective water use and water saving in the leaching and irrigation as well. Those technologies are to be introduced by invest of *farmers*. Thus, it is essential to show the investment effect clearly to *farmers* in order to promote such technologies. The technologies of which adaptability, investment effect and acceptability of *farmers* are verified in the Project, are expected to be included in the issues which ISD and SANIIRI promote in their extension program through the demonstration in the model farm proposed in A/P No.321 Program for Introducing Water Saving Technology and No.331 Program for Improving Drainage Conditions in the Field.

(8) Possible Risks and Risk Management

Because the Project supports the regular activities of WUAs and it will not give significant change of the WUA's activities, the implementation of the Project is not expected to obstruct the activity of WUA or farming activity of member *farmers*. On the other hand, the Project is planned on the assumption that ISD will provide adequate irrigation water to the WUA on time. Thus, there might be a risk of lack of irrigation water in the irrigation system due to severe drought during the project period. In the case of the severe drought, the plan will be modified flexibly, such as modification of the irrigation plan with reduction of irrigation area, in order to minimize the damage.

In the Project, various conditions of preparation of the field and leaching practice will be applied in the experimental field where *farmer* cultivates crop in his regular farming practice. The condition of the field is expected to be improved from the former one, however, there is possibility that insufficient salt removal occurs in some fields according to the condition set in the experiment. The condition of leaching, especially for the amount of water applied to the field, will be decided based on discussion with *farmer* in advance.

(9) Monitoring and Evaluation

The monitoring activity consists of i) formulation of irrigation plan and maintenance plan of the irrigation system by WUA before irrigation period, ii) operation of irrigation system by WUA and practice of water use in the field by members during irrigation period, and iii) maintenance work of irrigation system by WUA after irrigation period. The monitoring issues in each stage are summarized as below:

Stage	Monitoring issues	Indicator and methodology
For Monitoring Water Management		
Before irrigation period	Formulation of irrigation plan and maintenance plan of the irrigation system	Confirmation of plan/program prepared by WUA <ul style="list-style-type: none"> • Irrigation and water distribution plan • Maintenance plan of irrigation system • Business plan of WUA
During irrigation period	Operation of irrigation system and water use in the field	Record of WUA's activity on water management <ul style="list-style-type: none"> • Record of activity of waterman • Record operation (water distribution) of the irrigation system • Record of members' water use practice in the field • Record of water use in the field (operation record of division box)
After irrigation period	Maintenance work of irrigation system	Record of maintenance work by WUA <ul style="list-style-type: none"> • Record of maintenance work of irrigation system • Record of operation of excavator • Record of user's participation to maintenance work
For Monitoring Verification Plot		
During leaching period	Water use for leaching in each conditioned field and the effect of salt removal	Monitoring by <i>farmer</i> <ul style="list-style-type: none"> • Record of operation of division box • Amount of water applied for leaching • Water level in the observation well Monitoring by SANIIRI <ul style="list-style-type: none"> • Soil sampling in the experimental field and analysis • Sampling and analysis of groundwater at the observation well
During irrigation period	Irrigation water use, and groundwater level and quality	Monitoring by <i>farmer</i> <ul style="list-style-type: none"> • Record of operation of division box • Amount of irrigation water applied • Water level in the observation well Monitoring by SANIIRI <ul style="list-style-type: none"> • Sampling and analysis of groundwater at the observation well

A series of evaluation workshop with WUA staffs and members of the targeted irrigation block will be conducted during the project period. Major topics of each evaluation workshop are planned as shown below:

Workshop	Period	Major topics
1 st Evaluation Workshop	October, 2009	Evaluation on the operation of irrigation system and water use in the 1 st irrigation period
2 nd Evaluation Workshop	April, 2010	Evaluation of the maintenance work of irrigation system
3 rd Evaluation Workshop	September, 2010	Evaluation on the operation of irrigation system and water use in the 2 nd irrigation period

During the project period, demonstration/seminar on leaching technology which targets *farmers* in the neighboring area will be conducted by using the experimental field. The demonstration/seminar for farmers will be used for evaluation workshop.

Workshop	Period	Major topics
1 st Demonstration/Seminar	April, 2010	Improvement of leaching effect and water use in leaching by land leveling and under drain
2 nd Demonstration/Seminar	September, 2010	Improvement of water use in the field Evaluation workshop on land leveling and under drain

Through the evaluation o workshops, the following issues are expected to be clarified:

- Member's sense of fairness and satisfaction on water distribution under the monitoring the amount of water delivered to farms, and member's motivation on payment of water fee
- Member's understanding on participation to operation and maintenance of irrigation system, and member's motivation on participation
- Member's satisfaction on WUA's activity on water management and operation, and points to be improved
- Possibility of introduction of water charge system according to the water amount delivered, and member's intension
- WUA's capacity for operating the improved internal canal system, especially in the number and ability of watermen
- WUA's capacity for maintaining the improved internal canal system, especially in the capacity for operating excavator, formulating business plan, involving members to the maintenance work
- *Farmers'* intension to invest on land leveling and under drain, possibility of introduction of land leveling and under drain by *farmers*

(10) Feedback of Monitoring Results

The activities of WUA and members on water management, water use in the field and operation and maintenance of irrigation system, etc. will be evaluated through discussion among WUA staffs and members in the evaluation workshops, so that the expected effect of various actions proposed in the A/P will be verified and the necessary actions or support to be added to the A/P will be clarified.

The evaluation of *Farmers'* intension to invest and possibility of introduction by farmers as well as the results of the effect of improvement of salt removal in the field and water saving in the leaching practice, will be feed-backed into the examination of the priority of land leveling and other technologies in A/P and into the contents of extension program.

(11) Possible Post Pilot Project Activities

The WUA targeted by the Project is expected to continue its activity on operation and maintenance of the irrigation system self-sustainingly by utilizing the improved irrigation system and construction machinery. The performance of the business plan of WUA including the record of operation and maintenance and the collection of water fee, as well as the receipt of support from ISD, are proposed to be monitored by ISD continuously.

The improvement of internal canal system in the other area than the Project site is recommended to be implemented by the finance of the government of Uzbekistan just after completion of the National Drainage Improvement Program.

The model farm activity proposed in A/P No.321 Program for Introducing Water Saving Technology and No.331 Program for Improving Drainage Conditions in the Field is expected to be implemented rapidly.

F.6.2 Process of the Pilot Project

The Pilot Project has been carried out in accordance with the following process:

- 1) Preparation works to set up participation of WUA and member farmers
- 2) Construction work to renovate and improve internal irrigation system
- 3) Improving water management by renovating canal system and installing division box
- 4) Fulfilling proper maintenance of internal canal system by strengthening activity of WUA
- 5) Improving water use and drainage condition in the field
- 6) Evaluation workshop

Planned and actual schedule are shown in Table F.2.1.

F.6.3 Outcomes and Achievement

(1) Preparation Works

1) Discussion and preparation of implementation plan

In prior to implementation of the pilot project, the draft implementation plan was discussed among the stakeholders including MAWR, SANIIRI, ISD, WUA, etc., and the possible site and participating farmers were selected. The result of discussion was explained to possible participants. The participants list was concluded and signed at the explanation meeting on January 26, 2009.

As for the pilot project site, the Katlaban Irrigation Block of the Kattagar arna Water Users Association, Nukus District (hereafter Katlaban Block), of which physical area covered approximately 500ha, was selected and 12 farmers agreed to participate to the project for Improvement of Water Management in Internal Canal System.

After the explanatory meeting to farmers on January, WUA had a series of supplemental explanation and discussion among the farmers for consensus building among the WUA members on the decided implementation plan and site.

2) Kick-off Meeting

After the draft implementation plan of the pilot project was approved by JICA, the official activities of the pilot project had started on March. As a first step, Kick-off meeting was held on March 26, 2009, with participation of farmers of Katlaban block, WUA, SANIIRI and the Study Team at the school near by the WUA's office. During the meeting, the detailed implementation plan, task allocation among participants and working schedule were explained and confirmed.

As for the verification field for the Improving Water Use and Drainage Condition in the Field, two fields were selected from the Katlaban Block; one is approximately 5ha from "Berdah-Maksim" Farm and approximately 3ha from "Usta Rahim-Baba" Farm. The owners of both farms agreed to apply their field for verification plot.

(2) Construction Work

1) Preparation of construction work

- a. Survey and design work for renovation of canal system

Field survey and design work for improving internal canal system was conducted by Project Institute under the Subcontract between the Study Team. The Work was carried out from the middle of March to the beginning of May.

b. Meeting on facility/structure plan

Based on the design work, the layout plan and facility/structure plan was explained to participants and discussion on the facility/structure plan among the stakeholder was held on April 14 and May 19, 2009. At the 1st meeting, the general layout plan of the improvement of irrigation system was discussed and adjusted in consideration with participant's idea. The construction plan of the digging earth canal and discharge pond of pump was agreed among the participants as well. At the 2nd meeting, the construction plan of gate facilities, division boxes and the development of verification plot were concluded. The tentative construction schedule was also agreed among the participants.

2) Implementation of improvement of internal canal system and development of verification plot

During this phase of the pilot project, the following construction work and repairing work were planned to be carried out in order to improve the internal canal system and to develop verification plots.

- Cleaning and digging canal, repairing pump and digging discharge pond of pump
- Constructing gate and water measurement equipment, Construction of division boxes
- Development of the verification plot (land leveling, improvement of canal/collector in the field)

According to the results of the field survey and design work, those works were decided to be implemented by 2 subcontracts with local agency/company, i.e., the Rehabilitation of Irrigation System Katlaban Phase-1 Contract and the Rehabilitation of Irrigation System Katlaban Phase-2 Contract. The Phase-1 Contract was concluded on May 22, 2009 and the Phase-2 Contract was concluded on June 7, 2009. Due to the delay of process of Special Grant Account of the subcontractor by the Central Bank of Uzbekistan, the completion of the construction work was delayed from the original schedule, so that they had completed by April 2010 finally.

The contents of the construction works for the Improvement of Internal Canal System and Development of Verification Plot are summarized below.

Summary of Construction Work for Improvement of Internal Canal System

Facilities	Contents of work item	Subcontract
Rehabilitation of Earth Canal and Discharge Pond of Katlaban	Rehabilitation of 7.38 km of earth canal Rehabilitation of 400 m ² of discharge pond Katlaban.	Phase-1 Contract with Kattagar Buztow ISD
Repair and Construction of Regulating Gate Facilities	Repairing and constructing 36 regulating gate facilities, of which 32 are existing facilities to be repaired and 4 are to be newly constructed.	Phase-2 Contract with Magstral Story Service. Co.
Construction of Division Boxes	Construct 16 division box	
Repair of Concrete Flume	Repairing the existing damaged concrete flumes, of which distance approximately 44 flumes or 264 m of total distance.	
Digging Earth Canal	Digging, trimming and cleaning the slope of 1,378 m of the earth canal	
Construction of Hydropost	Construction of 22 hydroposts, of which 22 are for the distance of concrete flume and 5 are for earth canal distance.	
Development of Verification Plot	Developing the verification plot in the "Usta Rahim-Baba" Farm and the "Berdah-Maksim" Farm. The area of verification plot is approximately 8 ha and the work items for the development of the verification plot are 3 gate facilities, 17 division boxes, 1 hydropost, cleaning earth canal and land leveling.	

(3) Improving water management by renovating canal system and installing division box

1) Monitoring of WUA's activity plan (business plan)

The business plan of 2009 was prepared by WUA and the monitoring team from SANIIRI reviewed the plan. The business plan consists of several activities such as cleaning canal and construction of

hydropost in addition to staff salary and operation cost for pump. However, it does not consider about the fund or realistic income level of WUA and it seems to be prepared only for price decision of the water fee.

Plan and Actual Expense of WUA Budget of 2009 and 2010

Items	Year 2009			Year 2010		
	Plan (Sum)	Actual expense (Sum)	Ratio (%)	Plan (Sum)	Actual expense ¹ (Sum)	Ratio (%)
I. Employment Cost	7,041,825	4,512,401	64.0 %	10,456,949	1,792,000	17.1%
1) Salary for staffs	5,678,891	3,175,741	55.6 %	8,433,024	727,000	8.6 %
2) Social insurance premium	1,362,934	1,336,660	98.0 %	2,023,925	1,065,000	53 %
II. Operating Cost						
1) Expense of the production	10,110,553	0	0.0%	1,765,000	0	0.0%
2) Fuel for land reclamation	2,000,000	0	0.0%	1,040,000	0	0.0%
3) Construction of hydrosposts	500,000	0	0.0%			
4) Electric power	4,775,000	0	0.0%			
5) Cleaning and digging canal	1,500,000	0	0.0%	675,000	0	0.0%
III. Other expense (Administrative cost including Commission for District WUA)	1,885,553	1,029,862	54.6 %	5,000	0	0.0%
Total	27,812,931	5,542,263	19.9%	13,986,949	1,792,000	12.8%
Expense commuted farmer's contribution		3,311,853			Not yet included	
Grand Total		8,854,116				

Water fee is collected by several means from member farmers, i.e., in cash, bank transfer, in kind of agricultural product, commuting the contribution to maintenance work. At moment, in-cash does not observed for water fee collection except for ad hoc collection in farmer's contribution to maintenance work. Collected fee in kind of agricultural product is mainly used for payment of staff salary after selling in the market and the one by bank transfer is mainly used for payment of social insurance of staffs and tax. These two portions are the only part WUA can expense as its budget. The farmer's contribution to maintenance work, such as labor contribution, providing fuel and other materials, purchasing spare parts of pump, renting farmer's tractor or truck, is commuted to price and counted into payment of water fee.

According to the account report of WUA to the general meeting held on March 15 2010, the total income of WUA as water fee in 2009 was 8.85 million sums where the bill to farmers were 26.56 million sums including unpaid bill for past years, of which 12.74 million sums was for water charge in 2009 business year. The collection ratio was equal to 33.3 % to total bill and 69.5 % to charge in 2009 business year. Commuted amount of farmer's contribution was commuted to the amount of 3.31 million sums which occupied 37.4 % of total income, and the amount that WUA can use as their budget is limited to 62.6 %. The budget which can be used for staff salary is limited to in kind of agricultural product, which were 3.18 million sums equal to 35.9 % of total income. The actual expenditure for salary was only 55.6 % of the amount to be paid, and the total personal expense including social insurance and tax, which are collected by bank transfer, was equal to 64.0 % of the amount to be paid. The shortage remains as unpaid.

Bill and Income of WUA in 2009

Items	UZS	Proportion	Collection ration
I. Income			
(1) Paid to water fee	5,542,263	62.6 %	
1) Paid in cash	0	0 %	
2) Paid in kind of agricultural product	3,175,741	35.9 %	
3) Paid by bank transfer	2,366,522	26.7 %	
(2) Commuting member's contribution	3,311,853	37.4 %	
Total Income of water fee	8,854,116	100 %	

¹ The actual expense at the end of August, 2010. It shall be noted that the expense/income of 2010 shown above is as of the end of August and WUA expects an increase of water fee collection after farmers obtain their income from this year's product.

II. Bill charged to members			
1) Bill for business year 2009	12,743,362		69.5 %
2) Bill including unpaid in the past years	26,559,391		33.3 %

It is noted that this limited budget for salary causes WUA had to manage their activity with limited number of active staff in the field, i.e., 3~4 active staffs out of 7 staffs in the authorized number.

In 2010, water fee collection reaches 2.9 million sums that is equal to 21.1 % of the Bill for water fee of 2010 (13.7 million sums) at the end of August. Because more than half of water fee is paid after harvest in usual and a good crop situation is expected in 2010 due to abundant water, WUA is expecting to result of water fee will exceed that of last year.

2) Training of WUA staffs on water management and monitoring work

The training seminar to WUA staffs for water calculating and measurement practice was conducted for theoretical course on May 14 and for field practice on June 1, 2010. The training aimed to encourage watermen (operator of the irrigation canal) to cope with the improved internal canal system, to which gate facilities and water measurement tools are equipped. After the seminar, a series of field training was carried out by the Monitoring team of SANIIRI. In parallel with the training to watermen, some lectures for improving the administration and business planning of WUA were held to director and accountant.

3) Technical seminar to farmers on water management and irrigation practices

During this monitoring period, a series of technical seminars on water management and irrigation practice targeting farmers of the Katlaban block was held. The topics of seminars are as shown below.

Record of Technical Seminars in 2009 and 2010

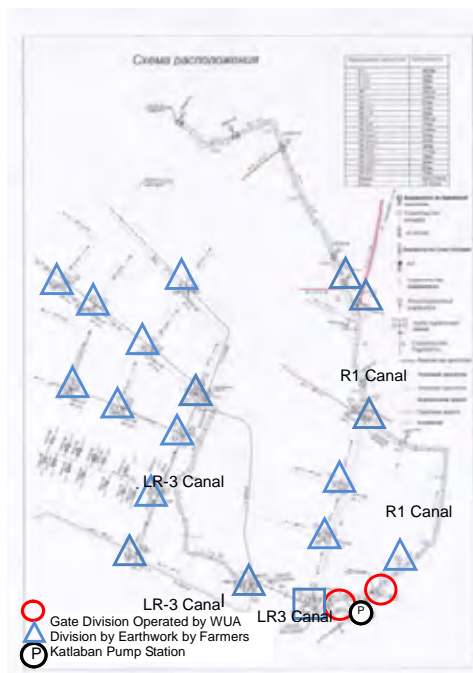
1 st Seminar	Date: May 19, 2009	Participants: 8 farmers, WUA, SANIIRI
Topic: Necessity and importance of step by step irrigation in the irrigation system		
A lecture on the necessity and importance of step by step irrigation in the irrigation system was held. Participants discussed on possibility and intention to introduce the practice. The participants agreed the necessity and importance.		
2 nd Seminar	Date: July 29, 2009	Participants: 7 farmers, WUA, VCC
Topic: Rational irrigation water use in the plot		
A lecture and demonstration of various irrigation method in the plot, such as traditional method and improved method at the cotton field which will be used for verification field. A field irrigation method called "counter furrow irrigation method (Встречный полив)", which supplies irrigation water from two opposite direction to shorten the actual length of irrigation ditch, was demonstrated at field.		
3 rd Seminar	Date: June 21, 2010	Participants: 9 farmers, WUA
Topic: Rational irrigation practice for potato cultivation		
Technical seminar and 2nd evaluation workshop were conducted together on this day. Lecture on the field irrigation for potato and demonstration of the field irrigation practice were carried out in the verification plot of "Berdah-Mahsim" farm. Because farmers in the area do not have enough experience of potato cultivation even potato was appointed as a priority crop of the District this year, the needs of farmers for the topics was raised and the seminar concentrated to the field management for potatoes.		
4 th Seminar	Date: August 23, 2010	Participants: 10 farmers, WUA, District WUA, and 3 WUAs of the District
Topic: Demonstration of water management practice and water measurement		
Demonstration of effective water use in the verification plot and activities of WUA were carried out as well as demonstration of water measurement in the improved irrigation canal. At the same time, a mobile type water measurement spill way which was developed by scientists of Tashkent Irrigation Institute was also demonstrated. In this seminar, representatives of the Nukus District WUA and other WUAs in the District were invited in order to exchange opinions on water management in the project site.		

4) Operation of the irrigation block by WUA

Operation of the irrigation system before improvement (Vegetation period of 2009)

In the vegetation period of 2009, before the completion of the improvement work, the operation of the irrigation block was carried out using the existing facilities with ordinal management practice. WUA operates the irrigation pump according to the daily coupon issued by ISD². The pump operation was managed only by the operation days. The water delivered by pump was measured by temporary tools by the monitoring team

WUA controlled the water delivery to the major irrigation blocks, i.e., the block belonging to R-1 canal and the block belonging to LR canal, by operating the hydraulic gates at the discharge pond of pump. After delivering water to major two blocks, the operation of water distribution was carried out by farmers by themselves. Due to malfunctioning or lack of gate facilities, farmers operated the diversion in canal by earth work, that was embanking and digging soil by hand whenever open and close the canal. It caused difficulty in frequent and in time operation so that farmers tended to take water into their farm at once in each blocks.



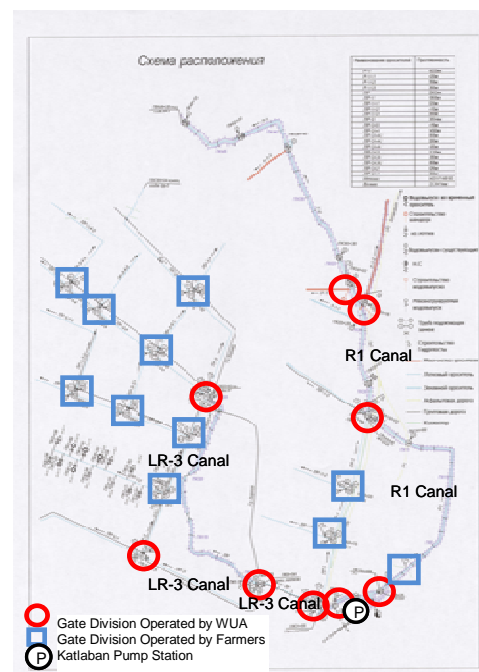
Operation in 2009

Operation of the irrigation system after improvement (Vegetation period of 2010)

The procedure of the pump operation was not change from 2009. ISD issued irrigation coupon by each 5 or 10 days through the irrigation period because the main canal had enough water in 2010.

By the project, 20 gate division works, which consists of 36 gates, were rehabilitated or constructed. WUA operates 9 gate division works which control the water delivery to small blocks that consist 1~2 farm owners each, and the remaining 11 gate division works are operated by farmers by their own arrangement. Basically each gate was operated by ON-OFF (full open and full close) operation without regulating water discharge. In some cases, farmers use the gate with intermediate opening ratio for dividing water, where they control the division by counting the revolution of spindles. WUA staffs and farmers appreciated that they can operate water delivery without amount of works by using gate equipment and it enabled to operate frequently and in time.

Owing to the improvement of water delivery operation, rotational water use by small blocks was implemented by the initiative of WUA. Farmers operated the water distribution within the small blocks by their own arrangement with rotational use.



Operation in 2010

Water measurement and recording operation results

Hydroposts were equipped and training for that was carried out to WUA staffs through the project, so that the condition for water measurement in the irrigation system was ready in the end. However,

² The coupon is usually issued for 5 or 10 days of irrigation water delivery of the main canal. At the beginning half of the vegetation period of 2009, it was issued for daily delivery because shortage of water resource had been expected.

water measurement for regular water distribution operation was not implemented by WUA during the project period, expect for amount of water intake at the pump or water measurement at the block including the verification plots. The reasons of skipping water measurement were considered as;

- i) insufficient ability of WUA due to shortage of staff in the field, which is caused by serious financial condition of WUA, and
- ii) insufficient understanding for necessity of water measurement in regular water distribution. WUA did not consider about the importance of water measurement in their operation.

Even WUA was requested to keep record of the operation of water distribution, it did not fulfilled during the project period. It is considered that there was same reason with water measurement mentioned above. According to the evaluation workshop, farmers have a sense of fairness and satisfied in the water distribution manner through WUA arrangement.

Results of Operation of Water Distribution

Before improvement (2009)	After completion (2010)
<u>Pump operation</u> <ul style="list-style-type: none"> 1 or 2 pump operation based on the Coupon issued by ISD Half day operation due to limitation of power supply Simultaneous distribution to R-1 and LR-1 in case of 2 pumps operation, and alternating distribution in case of 1 pump operation (rotational use by 2 major blocks) 1 pump operation was forced frequently by trouble of pump equipment even WUA had coupon for 2 pumps 	<ul style="list-style-type: none"> The operation scheme of pump was not changed. Owing to repair of pump, the limitation of pump use by trouble was mostly solved.
<u>Operation of water distribution</u> <ul style="list-style-type: none"> WUA operates only gates just after discharge pond and control 2 blocks alternate water use for R-1 and LR-1 Each block consist of approximately 6 farms Farmers operate the water distribution by earth work under the control of WUA at the major division points in canal system, and farmers operate by their arrangement at the remaining points. ON-OFF (full open and full close) operation was applied at each division pints. 	<ul style="list-style-type: none"> WUA operates 9 gate division works directly. After alternate distribution to 2 major blocks (R-1 and LR-1), WUA controls rotational water distribution by 8 small blocks, which consists of 1~2 farms. Other 11 gate division works are operated by farmers based of arrangement by themselves. Water use in each small blocks are left to farmers Basically ON-OFF (full open and full close) operation was applied at each gate division works and regulating discharge was carried out in some cases.
<u>Operation of facility for water distribution</u> <ul style="list-style-type: none"> Difficulty in frequent and in time operation due to amount of work for earth work Difficulty in water intake at the lowest reach of irrigation system due to insufficient maintenance of canal, i.e., sedimentation, collapse of slope or flume, choking at the road crossing, etc. 	<ul style="list-style-type: none"> Gate equipment made the operation work easy so that frequent and in time operation become enable. Owing to the rehabilitation of irrigation canal, the difficulty in water intake was solved at the lowest reach of R-1 block.
<u>Water distribution planning</u> <ul style="list-style-type: none"> WUA decides the water distribution plan in considering with the coupon of ISD and request of farmers 	<ul style="list-style-type: none"> WUA decides the water distribution plan in considering with the coupon of ISD and request of farmers
<u>Water measurement for distribution operation</u> <ul style="list-style-type: none"> No work 	<ul style="list-style-type: none"> Amount of water intake by pump and distribution to the blocks including verification plots was measured and recorded. Water distribution based on water measurement was not fulfilled even the conditions were prepared.
<u>Water delivery (off-take) to farm lot</u> <ul style="list-style-type: none"> Difficulty in frequently and in time operation due to amount of work of earthwork (cutting and backfilling the embankment) 	<ul style="list-style-type: none"> Division box with stop log was applied to the verification plot. It made the off-take operation easy so that frequent and in time operation become enable. Cutting farm road for taking water into plot, which caused obstacles in transportation or tractor operation, was solved.

Cropped are and water use in the Katlaban block

The cropped area of Katlaban block in 2009 and 2010 is summarized below. The major crops are rice, wheat, cotton, sorghum, vegetables and fruits garden. Among crops, rice was the largest and was cropped twice of the plan. Most farmers decided to cultivate rice after confirming the increase of irrigation water on June 2009.

Actual Cropped Area of Katalaban Block in 2009 and 2010

Cropped Area (ha)	Total	Wheat (08-09)	Rice	Sorghum	Cotton	Sunflower /Industrial crop	Vegetables	Fodder crops	Fruits Garden	Trees
Actual Record as of August 31, 2009	210.4	48.0	60.5	20.3	28.0	2.8	19.8	0	22.0	9.0
Actual Record as of August 31, 2010	302.6	99.2	94	4.7	0	14.5	53.8	15.5	20.9	

According to the data of WUA before starting vegetation on March 2009, the water limits of 12 farmers in the Katlaban during the vegetation period of 2009 (April- September) was planned to be 4, 647 thousand m³ for 330 ha of cropped area. As a result of the monitoring, the actual value of water intake proved was equal to 4,297 thousand m³, where the actual cropped was totally 210 ha. The theoretical water demand for the actual cropped area can be calculated to be 2,405 thousand m³ according to SANIIRI and the irrigation efficiency of the overall system was estimated to be 55.6%.

After WUA concluded the Contract Limit (Distribution Contract of Irrigation Water) with ISD, farmers modified and decided their crop plan based on their own judgment. Finally, the total actual cropped area reached 210ha, which was equal to 64% of the initial plan. Even though water shortage was expected during March to May, the irrigation water supply by ISD was increased and recovered after June due to increase of water in the Amudarya River. As a result, most farmers, except for particular farmers located at the end part of the canal, received sufficient water for cropped area of 210ha.

In the vegetation period of 2010, the Contract Limit was concluded as 100% of the cropping plan prepared by WUA, due to abundant water resources in the Amudarya River on April. Because the promotion crop in the Nukus district has been changed from cotton to food crops such as potato according to the governmental policy in 2010, there was some confusion among farmers and it took a little time to prepare their cropping plan. Thus, the Contract Limit was negotiated by tentative plan on March.

In vegetation period of 2010, the water limits in the Katlaban was planned to be 6,204 thousand m³. As a result of the monitoring, the actual value of water intake proved was equal to 5,174 thousand m³, where the actual cropped was totally 303 ha. The theoretical water demand for the actual cropped area can be calculated to be 3,332 thousand m³ and the irrigation efficiency of the overall system was estimated to be 64.4%.

There are rather low interests in the economical use of water both in WUA and water users in general. In principle water users are interested in the larger water intake as much as possible when they can obtain. Even in the composition of the water use plan, they intend to overstate the irrigating standard of agricultural crops.

(4) Fulfilling proper maintenance of internal canal system by strengthening activity of WUA

1) Operation of repaired mini-excavator of WUA

The project consists of the repair of a mini-excavator (a tractor equipped with shovel arm attachment) which belongs to WUA, for the purpose to increase WUA's capability of canal maintenance. The repair work is a part of in the Phase-1 Contract.

The mini-excavator started to be in use on April 2010 and WUA operated it for digging and cleaning of earth canal. WUA completed approximately 700 m of digging and cleaning canal in one month. After one month use, the mini-excavator had mechanical trouble and WUA had to stop the operation. It took time to arrange the repair because there was a difficulty in clarifying the responsibility of repair. WUA and members decided to repair the machine by farmers' contribution finally, and it has completed at the middle of September.

By the experience of one month operation, WUA and its operator showed their ability to operate the machine for canal maintenance. Members could understand that the mini-excavator would make WUA possible to make quick and in time canal maintenance, and that it would make minimize the duration of water stop due to canal trouble and prevent farmers to miss irrigation water even water was available in the main canal. When the mini-excavator will be back to use, it is expected to contribute fully use of irrigation water as well as rising up the presence of WUA among members.

2) Maintenance work of canal system by WUA

Due to lack of financial source, WUA did not carry out any canal maintenance by his own fund based on the business plan. WUA carried out several repairing or maintenance of canal system, which were conducted with contribution by means of labor force, material and fuel as well as ad hoc burden charge to beneficiary farmers. This situation had been continued in 2009 and 2010.

The record of the maintenance work of irrigation system arranged by WUA in 2009 and 2010 are summarized in the table below:

In 2010, WUA organized 16 times of earth canal maintenance work for approximately 11 km in total, 1 time of flume canal maintenance for approximately 150 m, and 4 times of pump repair. While pump repair was implemented by WUA or ISD budget, all of canal maintenance was conducted farmers participation in labor work or fuel.

In comparison with record of 2009, the frequency and work amount of canal maintenance arranged by WUA was significantly increased in 2010. Each maintenance work was conducted in good organization and manner of farmer's participation. This can be evaluated that WUA tried to tackle arranging farmer's participation to canal maintenance more actively through the guidance and monitoring works of the project.

Furthermore, it can be noted that WUA started to use mini-excavator in canal maintenance work, even it was a limited period, and started to organize *dehkans* into water management actively as well as member *farmers* in 2010.

Maintenance Work Carried Out by Arrangement of WUA in 2009

Date	Type of maintenance	WUA's activity	Funding source and contribution by members
March 2009	Repairing transformer of irrigation pump	WUA requested fund to JICA Study team and managed the repairing work.	Funded by JICA Study team for material. Repairing work was supported by engineer of KKUNSES
March 2009	Repairing collapsed canal embankment of the head reach of Katlaban	WUA arranged to gather all member farmers in the Katlaban block and managed the repairing work.	Labor contribution by farmers as well as ad-hoc burden charge by farm area (2,000 Sum/ha)
June 2009	Repairing collapsed canal embankment at the R1 earth canal	WUA arranged to gather particular members who receive water from the canal and managed the repairing work.	Labor contribution by beneficiary famers

Maintenance Work Carried Out by Arrangement of WUA in 2010

No.	Date	Type of maintenance	Amount of work	Type of work	Financial source	Participation of users
1	15-Mar-10	Digging internal canal	1.5 km	Manpower	Farmers (labor contribution)	1 <i>fermer</i> and 7 people
2	19-Mar-10	Digging internal canal	500 m	Manpower	Farmers (labor contribution)	1 <i>fermer</i> and 11 people.
3	19-Mar-10	Digging internal canal.	500 m	Manpower	Farmers (labor contribution)	1 <i>fermer</i> and 6 people.
4	02-Apr-10	Digging inter-farm canal for settlement	1 km	Manpower	Farmers (labor contribution)	1 <i>fermer</i> and 10 <i>dehkans</i>
5	15-Apr-10	Digging inter-farm canal for settlement	3 km	Manpower	Farmers (labor contribution)	2 <i>farmers</i> and 40 <i>dehkans</i> .
6	23-Apr-10	Pump repairing.	Impeller replace		ISD.	None
7	25-Apr-10	Digging inter-farm canal	75 m	Excavator work	Farmers (fuel contribution)	WUA staff operation
8	28-Apr-10	Digging headrace canal of pump	15 m	Excavator work	WUA	WUA staff operation
9	03-May-10	Digging internal canal	450 m	Excavator work	Farmers (fuel contribution)	WUA staff operation
10	06-May-10	Digging inter-farm canal for settlement	150 m	Excavator work	Farmers (fuel contribution)	WUA staff operation with participation of 1 <i>fermer</i>
11	23,24-May-10	Digging collector	0.6 km	Manpower	Farmers (labor contribution)	1 <i>fermer</i> and 13 people
12	25-May-10	Pump repairing	1 unit	Manpower	WUA	4 WUA staffs and labor works
13	29-May-10	Digging inter-farm canal	0.7 km	Manpower	Farmers (labor contribution)	1 <i>fermer</i> and 8 people
14	12-Jun-10	Digging internal canal	0.5 km	Manpower	Farmers (labor contribution)	2 WUA staff and 7 <i>farmers</i>
15	18-Jun-10	Digging internal canal	1.0 km	manpower	Farmers (labor contribution)	2 <i>farmers</i> and 12 people
16	22-Jun-10	Pump repairing	1 unit	Manpower	WUA	2 WUA staffs
17	05-Jul-10	Digging internalcanal.	0.2 km	Manpower	Farmers (labor contribution)	<i>Fermer</i> and 6 people
18	13-Jul-10	Digging inter-farm canal	0.39 km	Manpower	Farmers (labor contribution)	1 <i>fermer</i> and 14 people
19	18-Jul-10	Digging internal canal	0.5 km	Manpower	Farmers (labor contribution)	7 labors from <i>fermer</i>
20	24-Jul-10	Pump repairing	1 unit	Manpower	Farmers	Labors from <i>fermer</i>
21	13-Aug-10	Repairing flume	0.15 km	Manpower	WUA	WUA's 4 Staff

3) Participation of members and *dehkans* to maintenance work

Participation of member *farmers*

In 2009, the canal maintenance was implemented as an ad-hoc or emergency rehabilitation by collective work and contribution of beneficiary members under the coordination of WUA. The maintenance of important facility such as head reach of the canal of Katlaban, of which damage affects large area or many members, was organized by WUA. Most minor work in individual distance of internal canal was carried out by individual or small collective work of particular famers without participation of WUA.

Even though the canal maintenance was implemented as an ad-hoc or emergency rehabilitation by collective work and contribution of beneficiary members as same with 2009, the frequency and work amount was significantly increased in 2010. According to the working record, WUA organized members' participation well and it could cope with troubles of canal in time, even the quality of work was limited to minimum level to secure the function.

Organizing tamarka users (dehkans) to maintenance work

It could not be observed an approach to involve *dehkans* to water management by WUA in 2009. WUA organized water user's meeting including *dehkans* in some settlement to solve particular problems concerning water management, especially for water use manner and maintenance of canal for settlement in 2010. WUA requested to *dehkans* to use water effectively in their *tamarka* farming plot in the meeting. WUA proposed collective work of *dehkans* for maintain the settlement canal as well, and WUA successes to implement the proposed work based on the agreement in the meeting.

Result of organizing *dehkans* to maintenance work

Date	Settlement	Agenda of water user's meeting	Results
March 30, 2010	Tolis Settlement	- Request of rational water use in tamarka - Arranging collective work for maintaining settlement canal	Implementing 1 km of digging settlement canal by collective work of 1 <i>fermer</i> and 10 <i>dehkans</i> on April 2, 2010.
April 2, 2010	Uzin Kol Settlement	- Request of rational water use in tamarka - Arranging collective work for maintaining settlement canal	Implementing 3 km of digging settlement canal by collective work of 2 <i>fermers</i> and 40 <i>dehkans</i> on April 15, 2010.

(5) Improving Water Use and Drainage Condition in the Field

1) Activities in the Verification Plot

Based on the result of the Kick-off meeting held on March 2009, the verification plots were set up in the "Usta Rahim Baba" farm, which is located close to the pump station, and in the "Berdah Maxim" farm, which is beneficiary of concrete flume canal.

Summary of Verification Plot

	"Usta Rahim Baba" Farm	"Berdah Maxim" Farm
Total area of farm economy	68.7 ha	18.5 ha
Connected internal canal	R-1 canal of Katlaban block	LR-3 canal of Katlaban block
Area to be set as verification plot	Approximately 5 ha	Approximately 3 ha

A comparative cultivation upon on-farm irrigation technology was carried out in cotton cultivation in the vegetation period of 2009. Due to the change of the governmental policy on promotion crop in the Nukus district, which was shifted from cotton to food crops such as potato, a comparative cultivation was continued by changing crop in 2010, i.e., potato in "Berdah Maxim" farm and sesame and sunflower in "Usta Rahim Baba" farm. A series of demonstration seminar to farmers, 4 times in total, were held in the field together with technical seminar on water management through the project period.


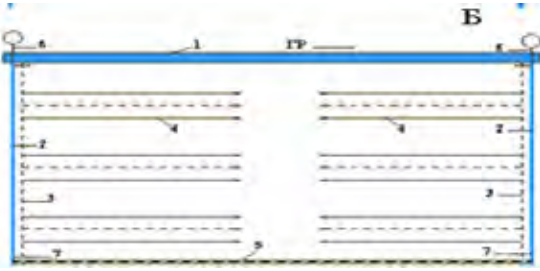
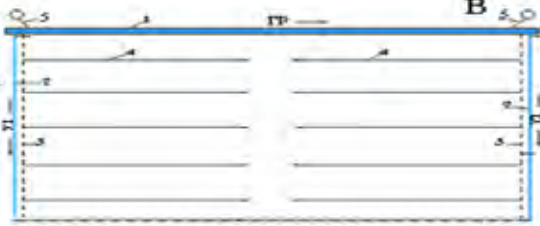
Summary of Activity in Verification Plot

Items	Vegetation period of 2009	Vegetation period of 2010	Leaching period (non-vegetation period) 2009-2010
Land leveling	without	done	Partially done
Improvement of irrigation facilities	without	done	Partially done
Crop cultivated in verification plot			
"Usta Rahim Baba" Farm	cotton	Sesame, Sunflower	
"Berdah Maxim" Farm	cotton	Potato (early potato)	
Applied on-farm irrigation technology	Type-I: Traditional furrow irrigation Type-II: Over furrow irrigation Type-III: Counter furrow irrigation	Type-I: Traditional furrow irrigation Type-II: Over furrow irrigation Type-III: Counter furrow irrigation	
Monitoring items	- Water use - Soil moisture and salinity - Groundwater level - Production	- Water use - Soil moisture and salinity - Groundwater level - Production	- Water use - Soil moisture and salinity - Groundwater level

2) Monitoring of irrigation activity and field condition

In order to demonstrate the effect of improving water management in the field, three kinds of on-farm irrigation technology were applied for comparative cultivation in the verification plot. Guidance and instruction of each practice in the field was given to farmers and the difference of irrigation practice, amount of irrigation water and timing to be applied, condition and yield of crops were introduced to farmers through demonstration.

Applied on-farm irrigation technology in the verification plot

Type-I: Traditional furrow irrigation (One way furrow application)	
	The irrigation using furrow in a certain direction of water flow, which is applied without slope or with minimum slope of the field. The main disadvantage (deficiency) is large labor cost, large duration of irrigation time, large volume of vertical filtration, on small value of water discharge in furrow (up to 0,4 – 0,5 l/s), eventually, it cause for excessive water use and increasing groundwater level.
Type-II: Over furrow irrigation (Skipping furrow application)	
	The irrigation through the furrow, where water will be fed alternatively. On applying over furrow irrigation, there are allowed slight slope close to earth surface (0,0003 – 0,0005) and water supply is implemented skipping one furrow alternatively. The soil aeration is improved during all vegetation period and thereby, it decreases number of inter row soil cultivation and it is possible to get high yield by making least water consumption (expenses) as well.
Type-III: Counter furrow irrigation (Facing furrow application);	
 <ol style="list-style-type: none"> 1. Internal distributor 2. Field distributor 3. Temporary distributor in plot 3. Furrow direction 4. Plot boundary 5. Water inlet 6. Water outlet 	The irrigation through furrow, with water feeding from both sides of plot by using temporary ditch. Counter furrow irrigation is combined with concentrated water supply. Besides, irrigation is produced from both sides through one temporary distribution channel. Water supply is implemented simultaneously from both sides. Therefore, the length of furrow and time of irrigation decreases for 1,5 – 2,0 times. The obligatory condition is to make good land leveling with zero slopes.

The results of water use and harvesting in the verification plot in the vegetation period 2009 and 2010 are summarized in the table below. The crop yield in the plot applied Type-II (Over furrow) and Type-III (Counter furrow) exceeds the one with Type-I (Traditional furrow) in each crop and period. Type-II gives the lowest in both of water consumption per area and per crop production, and Type-III is in the second place. Even though Type-II shows the most economic water use, it has to be noted that this practice requires frequent water application and accurate management of irrigation timing. According to the discussion with famers, it was pointed out that it is difficult to apply such manner under the condition of present irrigation process. Due to such requirement of Type-II technology, Type-III was recommended for wide application and introduction to farmers through demonstration at the field. To achieve it, it is required to prepare each plot not exceeding 150-200 meter of furrow length. Furthermore, appropriate land leveling is the most essential to introduce the technology.

In addition, it is necessary to examine the possibility to introduce Type-II in the area where frequent and flexible water use in the field will be allowed, especially in case that serious water shortage is expected.

Summary of Results of Cultivation and Water use in Verification Plots

Verification Plot	Crop	Type of irrigation	Yield of production (ton/ha)	Water intake (m ³ /ha)	Unit expenditures of water (m ³ /ton)
Vegetation Period 2009					
Berdah Maxim Farm	Cotton	I (Traditional)	2.276	2,373	1,043
		II (Over furrow)	3.116	998	317
		III (Counter)	2,787	2,100	753
Usta Rahim Baba Farm	Cotton	I (Traditional)	2.100	4,186	1,993
		II (Over furrow)	2.670	816	816
		III (Counter)	2.920	1,318	1,318
Vegetation Period 2010					
Berdah Maxim Farm	Potato	I (Traditional)	15.5	1,406	90.7
		II (Over furrow)	19.2	924	48.1
		III (Counter)	17.3	1,212	70.1
Usta Rahim Baba Farm	Sunflower	I (Traditional)	1.01	N/A	N/A
		II (Over furrow)	1.23		
		III (Counter)	1.22		

3) Monitoring of leaching activity

Salinity conditions of the verification plot

In general, it is possible to note that due to the low drainage system capacity and surplus water intake, the groundwater level, specifically in the territory of new opened lands in the “Usta Rahim Baba” farm is close to ground surface (0-160 cm) and they affect in causing secondary salinization of soil. Simultaneously, it leads to the reduction of leaching efficiency. On the other hand, high groundwater level does not cause threatening action for soil salinization due to the weak underground water salinity in the “Berdah Maxsim” farm.

Implementation and results of leaching in the verification plot

Filed leaching was implemented in two periods, at the beginning of December of 2009 in winter and from the middle of March to April of 2010 in spring in the verification plot of the “Usta-Rahim-Baba” farm and “Berdah-Mahsim” farm.

The results of monitoring showed that the actual leaching norm in the winter period was 3,368 m³/ha in “Usta-Rahim-Baba” farm, and 3,110 m³/ha in «Berdah -Mahsim» farm respectively. According to salt survey, the initial salt content before leaching in the fields of «Usta Rahim Baba” was rather high it is referred to average saline soil. After water supply (after leaching) in the winter period, the soil desalinated up to the acceptable level for crop (EC = 4 mS/cm).

In the spring period, actual average leaching norm was 2,495 m³/ha in “Usta Rahim Baba” farm and 573 m³/ha in “Berdah Maxsim” farm respectively. Because leaching norm applied in the winter period was enough for soil desalination up to acceptable level, the spring leaching was considered to be implemented for maintaining soil moisture before sowing and partially played desalinization role.

Summary of Monitoring Results on Leaching in Verification Plot (2009-2010)

Verification Plot	Leaching date		Area (ha)	Water intake (m ³)	Leaching norm (m ³ /ha)	Salt content mS/cm	
						Before	After
"Usta Rahim Baba" Farm	Winter	25-27.12.09	3.78	12,757	3,368	7.75-8.07	3.03-3.86
	Spring	23-27.04.10	3.78	9,490	2,495	3.03-3.86	2.57-2.84
"Berdah-Mahsim" Farm	Winter	5-6.12.09	1.7	5287	3,110	N/A	
	Spring	20.03.10	1.7	974	573	3.64	2.48

In accordance with actual leaching norm in “Usta Rahim Baba” fluctuates from 5,595 to 6,131 m³/ha and 3,683 m³/ha in “Berdah Mahsim“, although standard leaching norm for average salted soils is 2500-3000 m³/ha. With the aim to economic water use and preventing up-lifting of saline groundwater, it is recommended to concentrated leaching in spring period and combine with water retention, thereby, economize water amount in 2,200 – 2,500 m³/ha.

Leaching in the Katalban Block of the Kattagar arna WUA

The results of calculation showed that actual magnitude of autumn water intake for leaching within WUA in 2009 (December) with total irrigated area of 137 ha was equal to 689.7 thousand m³, of which leaching norm was 5,034 m³/ha in average which varies from 4,600 m³/ha to 7,900 m³/ha.

Quantity of spring water intake for leaching in 2010 (march-may) was equal to 1,220 thousand m³ total irrigated area 225.5 ha, which except leaching of irrigated fields includes spring irrigation of separate crops (winter wheat and others). The leaching norm was calculated as 5,034 m³/ha in average.

Summary of Monitoring Results on Leaching in the Katlaban Block (2009-2010)

Leaching	Water intake (m ³)	Area, fact of leaching (ha)	Leaching norm (m ³ /ha)
1 st Leaching: implemented in December 2009	689,739	137	5,034
2 nd Leaching: implemented in March to May 2010	1,219,927	225.5	5,410

(6) Evaluation Workshop

1) 1st evaluation workshop for wrap-upping and assessing the activity of WUA, farmers and the project during the vegetation period of 2009 held on October 14, 2009

WUA reported that WUA provided several services to members on water distribution and canal maintenance. Even though farmers agreed the arrangement of collective work for maintaining canal was successful in a part, some of them expressed dissatisfaction with WUA's activity expect for that, especially for inspecting condition of the canal and water distribution at the end reach of canal system.

It was shared awareness both of WUA and members that low ratio of water fee collection makes WUA's activity difficult. WUA insisted farmers to pay water fee otherwise he cannot provide services continuously, while some of famers insisted WUA did not complete the service listed in the business plan. It was guessed there were some distrust sense between WUA and some famers regarding WUA's finances.

2) 2nd evaluation workshop for assessing the activity of maintenance work by WUA held on June 21, 2010

Activity of WUA in 2009 to 2010 spring season was reviewed and discussed among the participants, especially for the canal maintenance work. Some participants assessed the WUA's activity was accelerated and improved in its quality through the project period, besides it was noted by others that WUA is too passive in its activity and its capability is still not enough. WUA agreed that they do not have enough capability to fulfill necessary actions at moment, while WUA pointed out that it is caused by the financial situation of WUA due to low water fee collection.

It was concluded to prepare the act for the responsibility on irrigation facility between WUA and each member, in order to clarify the responsibility of each user in use of irrigation system and to manage the facilities adequately by collaboration of WUA and users.

3) 3rd evaluation workshop for wrap-upping and assessing the results of the project held on September 21, 2010

Activities and results of the project were summarized and evaluation and wrap-up discussion was held among the participants. Participants summarized the results of the project as shown below:

There was noted significant improvement in all water system. After starting operation of hydraulic facilities, the water reaches smoothly and unconstrained to the end water user. Positive changes in relation to WUA among most farmers were observed and farmers started to agree schedule and volume of water supply among themselves. After the WUA's control of the hydraulic facilities to small blocks, farmers control water supply voluntarily in their own irrigated areas. Gradually, step by step irrigation is being established, since, farmers are getting agreed the irrigation schedule and deadline of water supply among themselves.

F.6.4 Problems and Issues Encountered during Implementation

1) Delay of construction work by subcontract

During the implementation, a serious delay of subcontract work for construction occurred and it affected to the implementation schedule of the pilot project. One of the reasons is an unexpected long duration of bank procedure for withdrawing the Special Grant Account by subcontractor. The lack of self finances is another reason of the delay that is the subcontractor could not start to work without withdrawal of the bank account. They are issues of the economical system of the Uzbekistan and it is difficult to prevent. In the case that construction work will be included in future activity, the implementation schedule shall consider the issue carefully.

2) Electric supply for irrigation pump

Because the Katalaban block relies on the electric pump for irrigation, an uninterrupted power supply is the earnest desire of farmers as well as water supply in the main canal. At present, the power to the pump is regularly supplied from 12:00 to 18:00 due to the network of the electricity and a regular electrical power switching resulted in frustration to farmers in planned sowing works, especially in the farms at the end reach of the canal system. In addition, it causes difficulty in taking full water from the main canal within the scheduled days allowed by ISD in the drought season. Unfortunately, there is no measure to solve this issue in short term because it would be required re-arranging the power supply network.

3) Financial source of WUA

The financial source of WUA activity shall be covered by the revenue from water fee principally. However, in consideration with the present situation of WUA such as accumulation of past uncollected water fee and expected collection ratio of this year, it is considered to be unrealistic to change situation drastically. It seems necessary to consider a temporary financial support by money or material such as fuel to WUA in order to smooth implementation of the project. To increase collection of water fee, it is important for WUA, as a first step, to show its ability to members and to activate its service even little by little. There is possibility that WUA applies the repaired mini-excavator for contract service to obtain small income which will be applied to activity of WUA in short term.

4) Antitheft measure for equipment after completion of construction work

As a result of construction work of the pilot project, several metal materials such as stop logs, gate equipment and sign board for hydropost will be installed in the project site. Because small metal materials in the field are vulnerable to property loss or mischief, it is required to consider about protection and antitheft measures. Rising up ownership mind of farmers and increasing concern to equipment through a campaign is the most principal and indispensable measure. In addition, the act for the responsibility on irrigation facility between WUA and each member will be effective to clarify the responsibility of each user in use of irrigation system and to manage the facilities adequately by collaboration of WUA and users.

F.6.5 Evaluation of Pilot Project

(1) Evaluation from the Items to be Verified

1) Improving water management by renovating canal system and installing division box

Before the improvement of the internal canal system, WUA did not participate to water distribution to farms and did not control or coordinate water use within major block, while WUA decided water distribution to the major canal within the system. The water delivered to the smaller blocks was used under the self coordination among the users within block. Once water delivered to the internal canal or smaller block within the system, all users try to take water to their farm concurrently without any order or step, which is an ordinal practice of water use. It can be pointed out that information on water supply in the main canal and pump operation was not provided to WUA and farmers promptly and it

was sometimes just before the implementation. In addition, water supply in the main canal sometimes stopped before scheduled and the promised days of each irrigation was not satisfied due to lack of water source. It makes farmers difficult to prepare and implement irrigation as scheduled. Because it is not clear if farmers will receive promised period of each irrigation, farmers feel a sense of distrust and frustration on the water management implemented by WUA, even though WUA does not have direct control of the situation. This is one reason that farmers hesitate to follow the step by step irrigation (rotational water use) in the field.

As a result of the improvement of irrigation facilities and approach to WUA and its members by the project, WUA starts to control water distribution by small blocks, which consist of 1~2 farms, after the distribution to 2 major blocks in the system. The index of irrigation efficiency of overall system was assessed to be increased by 16 points, which was 55.6% before improvement and 64.4% after improvement. In addition, it was observed that there were positive changes in relation to WUA among most member farmers so that farmers started to agree schedule and volume of water supply with WUA and among themselves. Owing to them, a rotational water use by small block has been established in the system and farms in the lowest block could receive scheduled water. It was highly appreciated by members.

The water distribution to small blocks was operated by WUA mainly with ON-OFF (full open and full stop) operation of division gates. And in some cases, farmers regulate water with intermediate discharge checking by counting the number of revolution of spindle. This manner of water distribution is considered sufficient for the rotational use by small blocks in the case there is not a serious water shortage. WUA is evaluated to satisfy its minimum role in the water distribution under the condition that there was not serious limitation of water resources.

However, it shall be noted that the condition of water resources, that was sufficient and stable during the irrigation period due to the large flow of the Amudarya River, contributed to the result of water management in 2010. In other words, some of the reason of the manner in water use mentioned above is still remaining such as unreliable water supply in the main canal. Thus, it is wondered if WUA is able to manage water distribution under the strong pressure from members in the case of drought condition when the rotational water use becomes important.

Most farmers appreciated the following five points as the most valuable result of improving water management in the project;

- Reduce of work amount to operate division of water by gate equipment, which enables frequent and in time operation.
- Water distribution by small block, which enables individual operation of water distribution for farmers.
- Smooth and unconstrained water flow in canal, which secure reliable and in time water delivery to farmers at the lower reach of canal.
- Time saving on irrigation application, which contributes to flexible water use as well as to save labor work.
- Easy to observe water intake in each farm, which contribute to increase farmer's sense of fairness and relevance in water use.

During the irrigation period of 2010, WUA did not fulfill to keep record of water management even it was requested by the monitoring team, except for water intake of pump and water measurement at the block of the verification plots. It is considered that both of WUA and members had low attention to necessity of record keeping in the water management activity. Without water measurement and record, the water distribution tend to be carried out by the manner trying to take fully the delivered (allocated) water in the main canal and to distribute it to farms as much as possible, and the effective use of water would not be considered. It is necessary to give more effort to increase the senses of WUA and farmers to keep record of their activity in the water management.

2) Fulfilling proper maintenance of internal canal system by strengthening activity of WUA

Business plan of WUA

According to reviewing the business plan of 2009, the plan includes various activities such as canal maintenance and construction of hydroposts as well as the constant expense such as staff salary and electricity for pump operation. The proposed plan does not seem to be a realistic plan in consideration with the past experience of WUA revenue, which was strictly limited due to low water fee collection. The plan formulated by WUA is considered a plan for the formality and it is used only for price setting of water fee, not for planning management work of canal system. Because uncollected or deferred amount of water fee occupies a large part of revenue plan, it is difficult to have a realistic and viable business plan for managing canal system.

The serious financial situation of WUA was still continued even in 2010 and significant improvement was not achieved. Even though the business plan of 2010 was formulated by excluding unrealistic construction plan or maintenance work, it was still difficult to secure even salary of staffs due to no increase of the revenue. It is essential to improve finances of WUA by increasing water fee collection. Under the condition that a significant improvement of WUA's financial condition cannot be expected, it is necessary for a while that the first priority in the business plan will be paid to staff salary to secure active staff for water management in the field, and that the canal maintenance will be carried out in ad-hoc by farmers' participation of labor, material and tentative charge, as well as making effort to increase collection of water fee.

Strengthening of WUA by equipping repaired mini-excavator

At present, the maintenance work of the internal canal is conducted by collective work with ad-hoc contribution and by mechanical work of ISD. The mechanical work by ISD is carried out based on the request from WUA. Quick and in-time response cannot be expected because this work is usually provided during unoccupied hour of ISD's ordinal work. Thus, the assignment of own excavator to WUA is highly expected for maintaining canal.

Even the mini-excavator repaired in the project had operated only for one month due to mechanical trouble again, it could demonstrate the ability of WUA in mechanical work to members deeply and the expectation of members to WUA was observed to be highly increased. There was a lot of request of farmers for canal digging before stopping service due to mechanical trouble. The mini-excavator was repaired by member's contribution in spare parts and budget, and has got back in use in the middle of September 2010.

At present, WUA is assessed not to have capability to formulate viable maintenance program of the internal canal and to fulfill the plan, due to lack of finance even the mini-excavator has been repaired. Because it is considered quite difficult to improve financial condition of WUA immediately, it is expected WUA will carry out ad-hoc maintenance work by contribution of fuel and materials from beneficiary members when damage or trouble occurs in the canal system for a period of time. Even though the canal maintenance will be carried out by ad-hoc or emergency work, WUA can make prompt action against the trouble and minimize the affect to water delivery by operating excavator. It is expected to contribute to rise up the member's sense of security or reliability on WUA's water management activity, so that the member's intention to paying water fee will be increased.

Improving technical capability for management of internal canal system by WUA

The technical information of the internal canal system such as survey and design result prepared by the project was provided to WUA. To share the technical information will contribute to increase capability for management and maintenance work of WUA.

Maintenance of canal system by WUA and farmers participation

In the period of 2010, WUA organized several collective works and contribution of members for maintaining the canal system actively, so that the troubles occurred in the canal such as water leakage or collapsing slope were dealt quickly in time. This achievement is considered to be resulted by increased member's expectation to the function of improved canal system and WUA's relatively active approach to members owing to the advice and instruction through the project.

Even though WUA's activity was limited to repair of major damage or important equipment and the manner was limited to emergency work, the arrangement was organized well and in time. The members participated to the collective work positively, especially in the maintenance work which affects to water delivery to their own farm clearly and directly. WUA took initiative in organizing collective work, arranging materials and equipment, and guidance of the work.

Members expect that WUA has more active role in the maintenance work even in a small or individual work. Excavator of WUA is expected to increase WUA's participation to maintenance work and help member's collective work. It will contribute to generate mutual relationship of relevance between WUA and members.

In addition, WUA had some approaches to *dehkans* to involve to water management during the period of 2010. WUA organized water user's meeting targeting *dehkans*, where a guidance and instruction for water use planning and economic use of water was given and collective works by member farmer and *dehkans* for improving settlement canal were organized by WUA. Because involving *dehkans* to water management is one on the important issue in the improvement of water management, it can be appreciated as a one of achievement of the project activity and it is necessary for WUA to continue the approach.

3) Improving water use practice in the field to increase water use efficiency

Demonstration of field irrigation technology for effective use of water

Through a series of the technical seminar and field demonstration, the results of improving water management in the field by applying adequate field irrigation technologies had been introduced to farmers. Among the field irrigation technologies, Type-III (Counter furrow irrigation) was promoted to famers in the project site in consideration of the balance of economic water use and irrigation planning (the condition of unreliable water supply in the main canal). It was pointed out that land leveling was indispensable to be developed in order to achieve the improvement of water management in the field.

Most participants expressed their strong interest in the improved practice and intention to introduce to their farm in the next vegetation period. Because their farms have a various condition such as fluctuation of flatness within plot or condition of field irrigation, it is necessary to continue to keep close contact and monitoring with them.

(2) Evaluation at Viewpoints of DAC Criteria

1) Relevance

For the project area where has a serious natural condition and water resources is limited, the effective and efficient water use in irrigation is indispensable. To maintain the internal canal system and keep its function adequately is essential for fulfilling effective use of irrigation water. It meets to famer's demand who seeks the sustainable irrigation as well.

- The Uzbekistan Government is coping with rehabilitation of irrigated land with high propriety and has carried out the improvement of drainage condition by the National Drainage Improvement Program. Besides, the internal canal system is left as a territory of WUA and WUA has a full responsibility to maintain it. However, most WUA cannot achieve his role due to lack of financial and technical issues at present. Establishing adequate support and strengthening of WAU is required immediately.
- In consideration of the present financial situation of WUA or farmers, it is not possible to fulfill the improvement or rehabilitation of the internal canal system by themselves and external support is required. In parallel with physical support, it is necessary to strengthen the activity of WUA who has a responsibility on the facilities after completion. Because the problems of WUA or the internal canal system are common over the Karakalpakstan, the way to improve WUA's activity on water management can be widely useful in order to fulfilling the appropriate water management and effective use of water resource.

2) Effectiveness

- The improvement of the canal system realized to secure the flow capacity of canal and to reduce the work amount in water distribution by using gate equipment. It contributed to expand the actual coverage of the control and management work by WUA, of which active staff is limited. As a result, WUA can control the water distribution by small block, which consists of 1~2 farms, and a rotational water use was achieved.
- The operation of water distribution based on water measurement was not fulfilled even though the water measurement tools were equipped. It was understood that both of WUA and farmers had small attention to necessity on the water measurement because there was no serious problem in water resource owing to abundant water resource in 2010. It is necessary to increase their attention and fulfill that in order to increase efficiency of water use, to increase water fee collection and to conduct adequate water management, even in the condition of water shortage.
- The mini-excavator equipped to WUA showed the advantage of mechanical work in canal maintenance and ability of WUA for operation, by demonstrating the result of 700 m of digging canal, even it had operated limited period due to mechanical trouble. It increased member's expectation and relevance to WUA's service.
- WUA organized the farmer's participation in canal maintenance and the frequency and work amount was increased significantly in 2010, even though WUA could not fulfill the maintenance work based on the business plan. WUA tried to involve *dehkans* to water management and collective canal maintenance works with *dehkans* were organized as well. Even there are strict constraints especially in the financial condition, it is evaluated that the ability of WUA on organizing water users has increased.
- The results of effective water use by improving water management in the field were demonstrated and necessary information was provided through the technical seminar. Most participants expressed their strong interest in the improved practice and intention to introduce to their farm.

3) Efficiency

- Due to delay of the construction work, the preliminary training to WUA and members for using the improved facility planned to be held in autumn 2009 was cancelled, so that they started to use the facility without preliminary training. Even some confusion was observed at the beginning of the irrigation period of 2010, WUA and members had fulfill the operation by small blocks with rotational water use finally, that is one of the achievement of the improvement of water management.
- A quantitative analysis on the effect of land leveling on water use efficiency in leaching could not carried out due to delay of land leveling work in the verification plot.
- Due to delay of repairing machinery, the mini-excavator was assigned to WUA at the beginning of the irrigation period of 2010. It was expected for WUA to have a contract service using excavator and obtain small budget which contribute to WUA's financial condition, however, it was not realized due to limited operation period.
- Technical seminars and demonstration in the field were implemented as scheduled and they received high appreciation of farmers. Farmers understood the necessity and practical techniques for the field irrigation technology. Because farmers in Nukus district had small experience on potato cultivation, which was promoted to Nukus district in 2010, the seminar and demonstration on field irrigation technology for potato was meet with farmers needs in time and contributed to introducing potato cultivation of farmers.

4) Impact

- If WUA operate and maintain the internal canal system properly after the completion of the improvement by the project, the system would realize its function into the future and water would be used effectively.
- Through demonstrating a good practice of the management of internal canal system by WUA and

clarifying necessary support to WUA, a spread effect to strengthening activity of WUA in Karakalpakstan other than the target WUA is expected, even it is necessary to seek the external support for the improvement of the system.

5) Sustainability

- In the Master Plan and Action Plan prepared by the Study, the rehabilitation and improvement of the internal canal system is proposed to be carried out as a national program after the National Drainage Improvement Program. Based on the results of the improvement of the internal canal system and support to WUA in the pilot project site, it is anticipated to implement the Action Plan immediately.
- Once WUA maintain canal system properly and provide adequate service to members, it would contribute to improve the finances of WUA through increasing water fee collection. As a result, it will enable WUA to make proper management of the system sustainably and continuously.
- It is necessary to clarify that the operation of own machinery of WUA is effective and sustainable through the pilot project, because assigning machinery to WUA is one of the key issue for strengthening of WUA from both view points of physical and financial capability. If WUA manage machinery adequately, it can be expected that WUA will provide service using excavator under the contract and be able to complement the finances for his activity, in addition to regular maintenance of the canal system. It will contribute to improve the finances of WUA.

F.6.6 Lessons Learned

(1) Improvement of facilities

1) Improvement of internal canal system

As a result of the project, the flow capacity of internal canal was restored by digging earth canal, repairing concrete flume and reconstructing road crossing work, so that farms located at the lower reach of the system could receive water sufficiently. In addition, constructing gate division works enable frequent and in time operation of water division, which contribute to improve the water management in the system.

Through the experience of the project, WAU showed its ability to manage local and small scale repair of canal and faculties by coordinating collective work and famer's contribution. However, it was also made clear that WUA dose not have financial ability for a large scale construction work covering the system and the external support for finance is indispensable to full-scale rehabilitation by itself.

2) Improvement of drainage system

The Project started without including the improvement of drainage system as a component, because National Drainage Improvement Program (NDIP) is expected be implemented in the project site in near future. It was observed that the shortage of capability of drainage system in and around the site affected to up-lifting of groundwater level and obstacle to leaching effect in the verification plot. NDIP is expected to be implemented surely and quickly.

(2) Improvement of water management

1) Water management in the condition of water shortage

As a result of improvement of canal system and water managing, a rotational water use by small block was fulfilled in the project. However, it shall be noted the abundant water resources in 2010 was contributed to the result. It is wondered that re-arranging and coordinating irrigation plan (water sharing) among farmers would be rather difficult under the condition of water shortage in the system.

To cope with the unreliable water supply in the main canal in the drought condition, that the days for water taking is strictly limited or the scheduled water supply is suddenly canceled before completion, it is necessary to introduce an operation of rotational water division by quarter a day or hours instead of usual daily operation. For such accurate operation of water system, the followings are considered as important issues:

- Reducing time required for reaching water to the farms by maintaining the function of canal system,
- In time operation of water distribution by gate equipment which reduces work amount for division operation,
- Reducing irrigation time required for one watering in the field by improving water use in the field (introducing land leveling and counter furrow irrigation),
- Enhancing the coordination of irrigation planning among farmers by strong initiative of WUA.

It is required to increase active staffs of WUA and cooperation of farmers due to increases of control work done by WUA. In addition, it is strongly expected to secure the electric power supply (realizing 24 hours supply) in case of pump irrigation like Katlaban,

2) Visualization of water distribution and record keeping

Through the experience of the project, it was understood that establishing relationship of mutual trust among farmers and WUA and increasing a sense of fairness of farmers on water distribution were the most important issue for introducing rotational water use. Owing to restoration of canal system, equipping gate facilities and installing division boxes, farmers can understand the situation of water distribution to farms and plots visually, and it contributed to create farmer's sense of fairness. The visualization inhabited the hidden water intake or operation in breach of rules by farmers as well.

In case of necessary, the gate was operated by intermediate opening to regulate water flow based on agree among farmers, who counted the revolution of spindle to regulate. Even During the project, the training for using hydropost was given only to WUA staffs and farmers in the verification plot, even hydropost was equipped over the system. It is necessary all farmers will be trained to observe water measurement into their farm in order to promote the visualization of water distribution.

Water measurement and record keeping by WUA will contribute to create a reliance of farmers to WUA through demonstrating accurate and adequate water distribution and its results, and it is expected to increase of water fee collection. It is required both of farmers and farmers understand the necessity and importance of water management based on water measurement and record keeping.

(3) Maintenance work

1) Management of canal lot

It was observed that there were many trees planted by farmers within the canal lot, in some case within the slope of earth canal, even the canal lot is protected as a property of WUA and restricted to plant trees by regulation. These trees are planted for using by farmers themselves or selling as construction material for additional income, thus, a conflict occurred between WUA and farmers when WUA tried to cut to maintain the canal. It caused constraints to the canal maintenance work by WUA such as restoration of canal cross section or widening of canal. It is required for WUA to manage the information on facilities and their territory adequately and to enhance the control of canal lot through inspection and guidance to farmers.

2) Clarifying the responsibility of WUA and farmers for facilities

The internal irrigation system belongs to WUA as its property and WUA has a responsibility for operation and management, in principal. However, in consideration with its large territory, it is difficult to carry out daily inspection all over the territory by itself under the condition of shortage of human resources. Thus, farmer's cooperation and assistance are indispensable for management of facilities. It is required to clarify the responsibility of WUA and farmers (users) and to confirm that both sides jointly having the responsibility for appropriate use and maintenance of facilities.

In the project, both of WUA and all famers (users) in the block signed the hand over act when the consecution work had been completed as well as the act for the responsibility on irrigation facility, between WUA and each famer (user) was concluded. It will contribute to create ownership sense in famers and to increase the sense of appropriate use and securing the fasciitis.

3) Operation of mini-excavator

WUA showed its ability on operating mechanical work and daily maintenance of machinery through the project. The results of mini-excavator operation increased farmer's reliance and expectation regarding to the WUA's service significantly. It is expected to contribute to increase intention of farmers to pay water fee. Besides, it has to be noted that WUA does not have a financial ability on repairing the machinery by its budget at moment. It is required to collect ad-hoc charge or contribution in kind from farmers for repairing.

4) Supply system of parts and materials for hydraulic gate, pump and tractor

WUA usually procures necessary spare parts or materials for pump and tractor in the market by second hand articles. It causes difficulty to obtain in time and problem in quality of parts. Furthermore, spare parts for the hydraulic gate such as spindles installed in the project cannot be found out in the market. It is required to establish the supply route or system of parts and materials for hydraulic gate, pump and tractor under the assistance of ISD and Karakalpakstan UNSES.

(4) Enhancing WUA's activity and improving water fee collection

1) Appointing necessary staff of WUA

In the experience of the project, WUA had shortage of human resources due to limited active staffs. In the case of the project, while WUA could operate the irrigation system of the project site of Katlaban, it was rather difficult to provide the same level of service in the remaining area. In other words, WUA met difficulty in operation in Katlaban as required in the project, when the trouble occurred in the remaining area. Appointing necessary staff of WUA is considered the most essential issue in the improving water management. During the shortage of staffs, it is required to involve farmers to operate gate division works under the clear rules and responsibilities.

2) Equipping PC for WUA administration

The project did not include equipping PC for WUA administration. However, through the experience of the project, it was identified that WUA was required to show member farmers their ability on irrigation planning and administration work such as preparing the contract limit with ISD, preparing the contract with each members, etc. In this regard, PC will contribute to WUA. During WUA fully depending on ISD for such works, member farmers might consider WUA as a corresponding clerk to ISD and it causes that member farmers will not understand the importance or necessity of WUA itself.

3) Cultivation of farmer's leader on water management

Kattagar arna WUA has more than 70 member farmers and 500 ha of agricultural land. It is rather difficult to establish close relationship between WUA and each farmer directly. To enhance the relationship, it is required to cultivate leaders among members who understand necessity and importance of WUA activity and water management.

4) Collective work and contribution of member farmers

Through the project period, WUA had well organized collective work and farmers' contribution for canal maintenance. It was evaluated functioned well. On the other hand, some farmers express their objection to water fee by the reason that they burden the maintenance work of irrigation system and WUA do not fulfill its role mentioned in the regulation or contract. There might be a danger that WUA member farmers would lose reliance to WUA's role, if WUA continues to rely maintenance work on ad hoc farmer's contribution excessively. After the water fee collection starts to increase, it is necessary to increase the portion of the maintenance work based on the business plan of WUA.

5) Finding income for short term fund of WUA

Because there is no way to improve the financial condition of WUA quickly and drastically, it is required WUA to find a tentative income for its activity in addition to water fee for the moment. Providing contract service using the mini-excavator is possibly a mean for income of WUA. However, using mini-excavator for contract service out of water management shall be a tentative manner limited to the critical financial condition, and a clear and strict rule for use shall be established including account reporting to members.

F.6.7 Necessary of Modification on Draft Action Plan

According to the results and lessons learned of the pilot project, it was confirmed that major modification was not required in the concept or component of the Draft Action Plan on Improvement of Irrigation Water Use Efficiency and Reducing Crop Damage by Salinity.

(1) Program for Improving Internal Canal System

- There is no change on the activities.
- It was confirmed through the experience of the pilot project that the improvement of canal system contribute to improve water movement. On the other hand, it is recommended to implement this program by establishing the special fund as described in the A/P, because WUA and farmers do not have financial ability.
- WUA has a responsibility for maintaining the improved system, it is necessary to consider ad hoc maintenance work by famer's contribution at moment. After the financial condition of WUA starts to improve by increasing water fee collection, it will be shifted to the maintenance based on the business plan of WUA.

(2) Program for Strengthening Water Management in the Field

- The combination of land leveling and improving irrigation practice in the field such as counter furrow irrigation, which will contribute to increase water use efficiency as well as reducing labor work and time required for water applying in the field, will be proposed as a technology for improving water management in the field. Technical seminars in the Activity-2 will be proposed to combine with the model farm and extension activity, of which key technology is land leveling, of the Program for Introducing Water Saving Technology (Activity-1) and the Program for Improving Drainage Conditions in the Field (Activity-1), in order to increase the effectiveness.
- In regard to the Activity 1-1 and 1-2 (Installing division box with water measurement tool and water measurement), enhancing famers awareness on the record of ordinary operation of water division and clarifying the responsibility of WUA and users for record keeping will be focused in the seminar (Activity-2).
- SANIIRI is expected as a key informant for the technical issues, as well as MAWR and LABM/ISD are expected to have an active role as an executing body.

(3) Program for Introducing Water Saving Technology and Program for Improving Drainage Conditions in the Field

- The model farm and extension activity is proposed to implement in combination with Improving Water Management in the Field, Introducing Water Saving Technology and Improving Drainage Conditions in the Field as mentioned above.
- Under drain is considered as a mid and long-term possible technology which shall be examined in the research and development activity, due to unsuitable soil condition and large investment cost.
- Land leveling is considered as a key technology to be widely and immediately developed among field water management water saving technology and drainage condition in the field. Preparing construction machinery and preference credit system which are able to apply for land leveling are required to start to prepare immediately (Activity 4 and 5).
- An optimum water use for leaching according to the soil and salinity condition shall be promoted to avoid affects of over irrigation. Technical consultation for optimum leaching will be provided by ISD and MAWR branches in coordination with the model farm activity. Karakalpakstan HME is expected as a source of technical information on salinity conditions.
- Steady progress of NDIP is expected because the improvement of drainage system is essential to improve field condition.

(4) Program for Strengthening WUA and Enhancing Its Activity

- Appointing necessary staff for water management (Activity 1-1) shall be set as a first priority among the activities. As an immediate measure, support of human resources from ISD and entrusting a part of operation to farmers under the clear rules are considered.

- Equipping PC for WUA administration and necessary training (Activity 1-2 and 1-3) is proposed to be implemented with high priority in order to show WUA's activity to member farmers.
- Management of canal lot by WUA shall be enhanced as well as preparation of inventory and technical information for operation and maintenance work (Activity 2-2). It is required to clarify the rules of use of canal lot and enhancing farmers understanding of rules through general/regular meeting of WUA and technical seminars in the Actions.
- Equipping mini-excavator to WUA (Activity 2-3) is expected to increase reliance and expectation of farmers to WUA's service as well as increase WUA's ability on canal management. Due to a large investment in total, it is proposed to implement in combination with repairing existing machinery belongs to WUA and renting construction machinery and providing machinery service (Activity 2-5).
- In regard to the collective work and farmer's contribution to canal maintenance (Activity 2-7), it is necessary to clarify and describe in the business plan of WUA.
- Revising water service fee system to amount based tariff(Activity 3-1) is considered to be difficult to introduce at moment due to lack of human resources of WUA for water measurement and keeping record. It is necessary to make effort to increase water fee collection under the present area based tariff system for a moment.

F.6.8 Follow-up of the Pilot Project

In order to full use of the investment and results of the pilot project, it is proposed to continue the activities in the project site. The project site, Katlaban block of the Kattagar arna WUA can be set as a model area of improvement of water management.

- Continue to improve activity of WUA and farmers by guidance and instruction
- Monitor and evaluate the possible effect of improving water management to cope with drought condition by reducing time required for reaching water to the farms ,in time operation of water distribution by gate equipment and reducing irrigation time required for one watering in the field.
- Setting the verification plot as the site of model farm proposed in the A/P, and using for demonstration of improvement of water management in the field such as use of division box, land leveling and field irrigation technology (Counter furrow irrigation)

MAWR and LABM are expected to be a responsible agency and ISD is expected to act as a monitoring and guidance team in the field. SANIIRI is able to provide technical assistance. MAWR and LABM are expected to seek for internal or international fund for implementing the follow up activity.

F.7 Model Agro-firm Establishment (including small-scale vegetable and fruit processing)

F.7.1 Implementaion Plan

(1) Objectives

Objective of the pilot project is to enhance bargaining power of *farmers* and *dehkans*, through activating existing Agro-firm, Taqirkol Agro-firm in Nukus district. Since individual *farmers* and *dehkans*, who produce vegetables and fruits, can't produce enough volume of products due to limited production scale and marketing channel, their bargaining power tend to be weak, and collective action for marketing is necessary.

In spite of two major advantages of Taqirkol Agro-firm, located in production canter of vegetables and fruits in Karakalpakstan and in nearby large consumption area, Nukus city, its activity is less active due to failing in providing incentives to the member farmers. The reason is quite simple. The Agro-firm has not made an effort to provide needed service to its members. As a result, member farmers have been suffering from finding sale destination of their products, particularly low-quality products including fallen fruits.

The pilot project will provide an opportunity to member farmers to formulate Agro-firm's business plan through participatory manner, so that members can nurture sense of ownership to the firm. Through implementation of the pilot project, stakeholders will also identify problems which come up during implementation of the pilot project, and which will incorporate in final version of the marketing plan completed in the second year.

(2) Items to be Verified

- Effectiveness of the business model to enhance bargaining power of the small-scale farmers
- Economic benefit from collective action for marketing
- Applicable and acceptable processing technologies for vegetable and fruit
- Identification of constrains in initial operation; transaction method, necessary tool and equipment, collection method, critical quality control point

(3) Activities and Method of Implementation

- The Target Area of the Pilot Project will be the farm-land operated under the existing Agro-firm in Nukus District (Taqirkol Agro-firm).
- A Working Group for the implementation of the Pilot Project will be established, and a Kick-off Workshop will be held to define further activities based on the needs of Agro-firm members.
- Preparation of Business Plan including; (1) Needs analysis and identification of promising products, (2) Development of Marketing Strategy, (3) Implementation of Study Tours, (4) Elaboration of Action Plan, (5) Training (accounting, finance, computer)
- Product Development: Specifying details of the product (unit size for retail, packaging), collection, processing, packaging
- Marketing: Identification of customers (Nukus Market, Hospitals, Kindergartens Orphanages, Merchants)
- The working group in MAWR headed by Vice-Minister will be organized and evaluate the pilot project.
- The Agro-firm will coordinate processing group to agree target products and transaction mode.
- Training to core members and processing operators of Agro-firm will be conducted.
- The Agro-firm will sell the products to markets, retailers and traders, and adjust processing volume, and consequently to concentrate specialized products accepted by consumers. In the initial stage, the processed products of apple, apricot and melon will be produced and sold.

(4) Activities and Implementing Body

Objective of the pilot project is to enhance bargaining power of *farmers* and *dehkans*, through activating existing Agro-firm and value adding to products by processing of vegetables and fruits.

Activities	Implementing Bodies
Preparation	Agro-firm members, Business Incubator, Council of Ministers, <i>Hakimiyat</i> , the Study Team
Establish working group by agro-firm members	Agro-firm members, <i>Hakimiyat</i> , Business Incubator, the Study Team
Focus group discussion on analysis of current situation of the Agro-firm and future directionality	Working group, <i>Hakimiyat</i> , Business Incubator, the Study Team
Preparation of business plan	Working group, Agro-firm members, Business Incubator, the Study Team
Production based on business plan	Agro-firm members, Business Incubator
Processing of vegetable and fruit	
Preparation	Council of Ministers, Agro-firm members, Business Incubator, Officers of <i>Hakimiyat</i> , the Study Team
Rehabilitation of building	<i>Hakimiyat</i> , Contractor, Agro-firm members, Business Incubator the Study Team
Procurement order of equipment to manufactures	Council of Ministers, , Officers of <i>Hakimiyat</i> , Agro-firm members, Business Incubator, the Study Team
Delivery,, installation and test-run of equipment	Supplier, Contractor
Start production and sale of vegetable & fruit products	Agro-firm members, Business Incubator
Evaluation	Working group, <i>Hakimiyat</i> , Agro-firm members, Business Incubator, the Study Team

(5) Implementation Schedule

The original implementation schedule planned in the Implementation Plan, together with the actual implementation period of the activities, are indicated in Table F.2.1

(6) Relevant Components of the Action Plan

- 151: Research and development of melons and apple
- 411: Joint marketing by *Fermer* group (Model Agro-Firm establishment)
- 161: Strengthening of Women's Vegetable Production in *Tamarka*
- 431: Improvement of Small-scale Agro-Processing Technologies

(7) Expected benefit and Measures for Extension

- Business plan, which enables the Agro-firm acquire loan from bank or future investment from private investors, is developed
- Management skill of the Agro-firm's staff is enhanced
- Member farmers have a sense of ownership to their Agro-firm
- Agro-firm can make profit through collective marketing activities
- Member farmers can gain profit from Agro-firm's activities
- The working group of ministries will evaluate the activities of the Agro-firm, and will promote small-scale processing production of foods in other areas using funds of Aral Sea Fund, Grass-root Grant of Japanese Embassy, UNDP project, etc.

(8) Possible Risks and Risk Management

- Defection of member farmers: Managed by providing incentives to member farmers through participatory planning of the Agro-firm's activities
- Unstable supply of utilities (electricity, gas, water): Managed by applying labor-intensive method for marketing, and Involving *Hakimiyat* into the pilot project
- Price escalation of input materials (e.g. fuel): Managed by Applying labor-intensive method for processing
- Trading in low prices and remnants, core *farmers* shall negotiate with buyers in advance in terms of prices, unit weight per package, package design/materials and delivery methods.

- Mismanagement of equipment, the Agro-firm will register equipment ownership in official log book with support and arbitration of *Farmers'* Association.
- Financial shortage in cash flow, the accountant will be trained during pilot project implementation.

(9) Monitoring and Evaluation

The monitoring will focus on the degree of progress for activities as well as any changes in vegetable and fruits transaction after project implementation. The evaluation in the project will focus mainly on the items indicated in 2.2.6 (2) Items to be Verified. In other words, the evaluation is to verify methods for promoting the approaches as opposed to economic impacts and changes in market transaction.

The monitoring of project activities and changes following project implementation will mainly be handled by Business Incubator in Karakalpakstan. The evaluation will be an overall assessment encompassing self-evaluation by the participating farmers, VCC officials and the Study Team.

(10) Feedback of Monitoring Results

- Result of monitoring and evaluation will be discussed at the annual meeting (workshop for review of business plan), and incorporated in the following year's business (action) plan
- The minor adjustment in more efficient logistics and transaction mode will be created. After winter season, when consuming dried products, the second monitoring will be executed. The quality of market-demand products and operation system of processing facility will be given feedback of monitoring results for sustainable operation.

(11) Possible Post Pilot Project Activities

The working group, headed by the Council of Ministers, takes responsibility to establish model Agro-firm in other districts. Under initiative of the working group, *Hakimiyats* will make an announcement to VCC chairman and outstanding farmers, who succeeded major properties from former Shirkat for instance, and hold stakeholder meeting to ask their willingness to participate in the Agro-firm Establishment Project. The one who show a will to participate in the project must submit a business proposal, and the working group will evaluate it. The winner will be an implementation body of the project. The result of the pilot project, including skills for business planning and management know-how will be transferred to the other districts via the working group.

The Agro-firm will continue to manage vegetable and fruit processing facility corresponding to demands in quality and price in market. Business Incubator will provide know-how on processing of agricultural products to other applicants, who are not only Agro-firm but also the leading *farmers* in other areas. Finally, they may create new Agro-firms.

The model Agro-firm establishment project will be developmentally succeeded by "One-village One-product" project in the future.

F.7.2 Process of the Pilot Project

The Study Team made contracts with Business Incubator of Karakalpakstan (the BI) on April 8, 2009 for the 1st year contract and March 24, 2010 for the 2nd year contract, to commission supervising and monitoring the pilot project. For beneficiaries, the project was officially started at a Kick-off workshop on April 11, with participation of candidate farmer members, board member of the Agro-firm, representatives of VCC, and a deputy Hakim of Nukus district.

After the commencement, it was found that the AF was not active and substantial activities were not conducted since its establishment in 2006. Therefore, at the beginning, the management staff concentrated on the restructuring of the AF, which includes registration of renewed Agro-firm, revision

of statute, reorganization of member farmers. However, director of the Agro-firm had changed four times during set-up period, and nobody showed their initiative to run the firm, which became the first and the biggest obstacle of the pilot project.

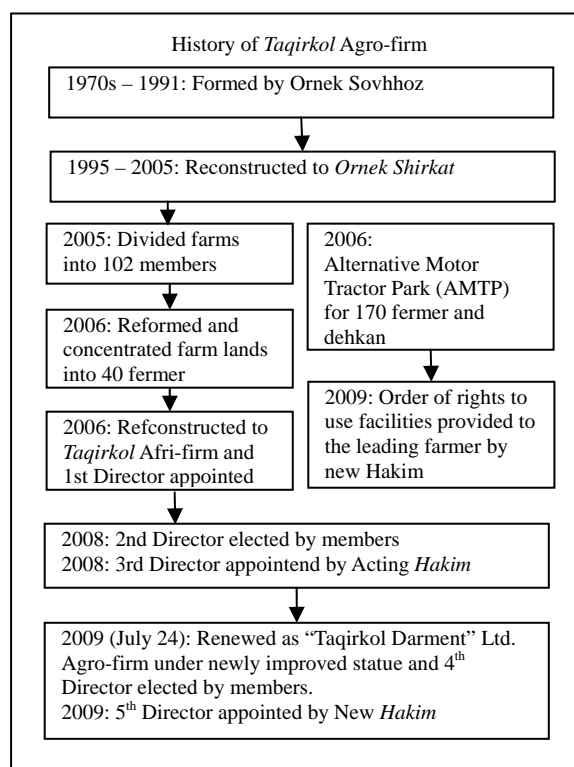
Followings are the summary of project activities from March 2009 to September 2010.

(1) The First Year Activities

1) Assignment of Agro-firm Director

A new director of Taqirkol Agro-firm, the fourth director after the establishment, was approved by 65 attendances at the village meeting on March 27, four days after the new Hakim of Nukus district was assigned. The new Hakim also attended the village meeting to ask villagers to select their own leader by voting. The fourth director was an engineer at pump station living in Nukus district, and has an experience of farming in past years, but was not a member of the Agro-firm. However, the fourth director turned sour on running Agro-firm due to personal reason, and resigned at the time of renewal of the Agro-firm on June.

New Agro-firm, namely “Taqirkol-Darbent” Agro-firm, is established (registered) on June 26, 2009. In prior to the renewal, the fifth director was approved by 20 core members at the general meeting of the firm conducted on June 24, 2009. The fifth director is the founding director of the former “Taqirkol” Agro-firm, and holds the post of current MTP director. However, the fifth director did not start any activities of the Agro-firm since he is quite busy in operating the MTP, and shadow his intention to resign his chair at the time of mid-term evaluation of the pilot project. The MTP plays an important role in harvesting cotton and planting winter wheat from spring to autumn, and the director always receive work order directly from the Hakim of Nukus district.



2) Assignment of Board Members

Once, the fourth director assigned new board members on April 3, which included a deputy director and an accountant. However, since no farmer member was included, the Study Team suggested adding at least one more member from the farmer members. The fourth director agreed upon the suggestion and assigned a leader farmer of Taqirkol VCC to a deputy director.

After the renewal of the Agro-firm, however, the fifth director did not assign any board members and no activities of the newly established Agro-firm have been conducted due to lack of leadership of the new director.

Therefore, again, the Study Team suggested that adding an active farmer to the board to handle exclusively vegetable and fruits transaction is necessary for the successful operation of the Agro-firm. The fifth director agreed on the suggestion, and assigned a leader farmer to deputy director who does not need working for cotton, but can focus on handling vegetable and fruits exclusively.

3) Identification of member Farmers

Forty-four (44) founding members were listed in the original statute of Taqirkol Agro-firm, but it was found that the procedure for making the list was quite doubtful since some members were listed up without any willingness. It is quite important that, to activate the sluggish Agro-firm, the member farmers have strong willingness to participate in and to contribute capital fund for its operation.

Therefore, based on the Study Team's suggestion, twenty (20) core members were identified at the general meeting of "Taqirkol-Darbent" Agro-firm, held on June 24, 2009, and signed on their statute with contribution amount of the capital fund. Until September 2010, nine (9) members have contributed to the capital fund raising.

4) Kick-off Workshop (April 11, 2009)

Kick-off workshop of the pilot project was held on April 11, 2009 at Nukus District No.9 primary school with participation of 11 (former) member farmers, (former) board member of the Agro-firm, representative of Taqirkol VCC, and a deputy Hakim of Nukus district. Out of the four board members, only two members, the fourth director and the deputy director (a leader farmer), were participated in the workshop.

After sharing concept and outline of the pilot project, the participants discussed their expectation to the firm, which include processing, provision of marketing related information, supplying chemical fertilizers, and assistance for export license acquisition. Based on the expectation, the participants discussed details of the service menu of the firm, in view of activities, target market, agro-processing and envisioned competitors, etc. For processing, participants proposed to introduce drying equipment for apple, apricot, melon and other vegetables. Then participants developed an action plan of the project activities, which includes details of time schedule, and approved it at the end of the workshop. Finally, the participants agreed upon their future vision, that is "Let's get the first prize of the Best Farmer of the Year in Tashabus Exhibition within 3 years!".

5) Establishment of Management Organization

The statute of the Taqirkol Agro-firm was originally enacted on April 14, 2006, and revised on March 31, 2009, after the fourth director took the chair of director. However, contents of the statute was not sufficient, since the statute does not mention bare minimum, including service menu, condition of membership, decision making, condition of board members, initial capital, account, property balance, and member list. Therefore, the Study Team recommended reviewing the statute, with showing ideal contents of the new statute, after renewal of the Agro-firm.

New Agro-firm members developed a new statute with advice from the Business Incubator, and 20 core members of the firm approved the statute on June 24, 2009. Then, the statute was registered at Nukus Hakimiyat and enacted on June 26, 2009. The 20 core members are listed in the statute with their contribution of capital fund.

6) Study Tour to Tortkor Agro-firm (April 29, 2009)

The one-day study tour to Tortkor Agro-firm was conducted on April 29, 2009, with participation of 16 farmers, who showed strong interest in participate in the Agro-firm operation. The Tortkor Agro-firm was established in March 2006, and their activities include (a) processing vegetables and fruits, (b) marketing the products to supermarket and bazaar in Tortkor district, (c) providing technical trainings to farmer members. The training includes technical guidance on seedling, planting, fertilizing, and weeding. The main products of the firm are (1) tomato paste, (2) pickled vegetables (tomato, cucumber), and (3) melon marmalade. Total field of the 34 farmer members is around 70 ha, ranging from 0.5 ha as a minimum to 4.0 ha as a maximum.

At the time of the tour, a meeting was organized with management staff of the Tortkor Agro-firm. During the meeting, participants asked many questions regarding management of the firm, organizational structures, production infrastructure of the firm, as well as marketing of the products. Also, the participants show strong interest in the pest and disease control method of vegetable and fruits production. As a result, according to the participants, they could obtain desirable picture of their future Agro-firm management, including how to tie up with producers and management body, how to find and fix a new marketing outlet, and how to control pest and disease of vegetables and fruits.

7) Test Processing at Amudarya Agro-firm (October 8-15, 2009)

The project has a plan to provide processing equipment to the Agro-firm, but due to delay of preparatory activities of rehabilitating warehouse, the processing activities had not been undertaken until October 2009. At the time of the mid-term evaluation, most vegetables and fruits were under harvesting, and the project lost the best timing for the first trial. Furthermore, when we consider the repeated change in directors of the firm, it was recommended to postpone the procurement of processing equipment until when the firm's organization becomes stable.

In stead, using idle equipment to verify the profitability of processing products was a practical solution under such conditions. For this reason, a trial processing was conducted at Amudarya Agro-firm which is also aiming at producing dried vegetables and fruits. The Agro-firm in Amudarya district had a full set of dry processing equipment, but could not start operation due to lack of working capital to purchase raw materials. Accordingly, their processing equipment, including a dryer (10ton/day capacity, electric heating type), a peeler, two slicers cum chopper, and packing equipment, had been idle since their procurement in 2008. By using these equipments, the trial session of processing was conducted, under the initiative of the deputy director of the Taqirkol-Darbent Agro-firm. From this operation, fallen apple, carrot, and pumpkin were dried and packed with original label for test marketing purpose.

8) Study Tour to Amudarya Agro-firm (October 13, 2009)

A study tour to Amudarya Agro-firm was conducted on 13th of October, 2009, with participation of 6 core farmers including director and deputy director of the Taqirkol-Darbent Agro-firm, in addition to director of Business Incubator, and the Study Team members. At the time of the study tour, the Amudarya Agro-firm had processed dried carrot, pumpkin and apples procured in Nukus, and the participants learned processing technologies, division of labor for the processing, and consumers' preference to the dried products. The Amudarya Agro-firm employed an engineer from Andean region, who had experiences on trade with Russian buyers. Therefore, the participants also acquired market information of Russia. According to the engineer, taste of dried apple produced by mechanical dryer is better than that by sundry, since sugar contents of the latter decreases a lot.

9) Consultation on Plant Protection to Tashkent Agricultural University (October 16, 2009)

Since most farmers in Nukus district has been suffered heavy damages by disease and pests to vegetables and fruits, pest control is quite important and urgent to increase their incomes. For this purpose, the Study Team and the deputy director of Agro-firm made a contact with Professor Dr. Torenliyazov E. Sh., Nukus branch of Tashkent Agricultural University on October 16, to discuss how to against pest and disease and asking a possibility to work together for plant protection in 2010. The professor agreed on the proposal, and conducted field survey on the same day to make a practical plant protection method and schedule.

10) Technical Seminar (December 17-19, 2009)

The business incubator of Karakalpakstan, a contract partner of the pilot project, conducted a technical seminar on December 17 to 19, to the core member of the Agro-firm. Major topics of the three-day seminar were; 1) role and function of the Agro-firm in general, 2) requirement to the Agro-firm management, 3) laws and regulations related to the Agro-firm management, 4) importance of the business plan, 5) processing technologies, 6) marketing of agricultural products, and 7) plant protection method. All these topics were determined through a series of discussion between the business incubator and representatives of the Agro-firm. A Professor for plant protection from the Tashkent Agricultural University, Deputy Chairman of Farmer's Association, and an Economist from the same University, for example, were invited as resource persons of the seminar.

11) Test Marketing at Nukus Central Bazaar (January 29, 2010)

A market research was conducted at Nukus Central Bazaar by the Study Team on January 29, 2010. The Team brought three kinds of products, which were produced at Amudarya Agro-firm in October 2009. Following table show the result of the survey.

Result of Market research (Nukus Central Bazaar)

Responder	Comments
Trader (male, 50 th)	<ul style="list-style-type: none"> - Out looking of the products is quite bad. Quality of package material must be improved, and label must be put on outside of the package. Otherwise, no body will be attracted to the commodity. - There is no custom to consume dried vegetables in Karakalpakstan. Therefore, it must take a long time to accept it by consumers. For this purpose, demonstration of cooking and advertisement are necessary. - Consumers could accept the products if it is for Prof. - The price must be 500sums/kg or 250sums/0.5kg.
Trader (female, 60 th)	<ul style="list-style-type: none"> - No will to buy dried carrot, since fresh carrot is now selling at cheaper price (200 sums/kg). It is possible to buy during March to May, when the price of carrot increases more than 1000sums/kg even though quality becomes bad. - Even such a case, the price of dried carrot must be below the price of fresh. Possible price of dried carrot was 500-600sums/kg. If the price was 800sums/kg, no customers would buy.
Retailer of grocer's shop (female, 30 th)	<ul style="list-style-type: none"> - If consumers adopted, it can be sold. But it must take a long time. - Dried eggplant is now on sale at Korean food corner. Dried mushroom is also has adopted by customers in Karakalpakstan. - 0.5kg-size package is too big, it must be 1/3 of the package for sample products. - In winter time, carrot is sold at 200sums/kg, but during March to May the price will be more than 1000sums/kg. At that period, if the price of dried carrot was less than 800sums/kg, I will buy.
Retailer of Korean foods (female, 50 th)	<ul style="list-style-type: none"> - It must be easier selling the dried products at Kazakhstan, but quite difficult at Nukus, since we can buy fresh vegetables whole year round. - Demand for dried eggplant is quite high in Kazakhstan, particularly in autumn and spring (two seasons in a year). - In Nukus, demand for dried shiitake mushroom is quite high and can be sold at 4000/sums/kg, particularly during March to May. 10kg of fresh shiitake mushroom decreases its weight to 1kg after drying. Most Korean family loves it and they make it at home. - No matter how the price of carrot is expensive, we want to buy fresh one. - Dried pumpkin can make a sense since we can use it for soup. Fresh pumpkin is too expensive (800-3000sums/piece) and also too heavy. If the price of dried pumpkin is cheaper than the fresh, you may find customers. - After Testing (Feb.4): It's not possible to sell at market since taste is quite different from fresh one. Also, form is too small. Other people whom I asked for testing said also same things.
Retailer of Korean salads (female, 40 th)	<ul style="list-style-type: none"> - If the product was adopted by consumers, I'm ready to sell it my shop. - It is sure that dried shiitake mushroom has a steady demand in Nukus market. The mushroom is dried under shadow in August. Drying process is different from dried vegetables at Agro-firm. - After Testing (Feb.4): It's not good for cooking, and taste of fresh one is better. Size of carrot and pumpkin is too small to use in cook. In addition, there are many bad one included in the package.
Retailer of Korean salads (female, 50 th)	<ul style="list-style-type: none"> - There is no custom to consume dried vegetables in Nukus, but let me try it at home. Let public aware the products, promotion campaign must be necessary. - Price at 500 sums/kg seems make sense for this sort of products. - After Testing (Feb.4): Taste is too bad, and children never want to eat it. Fresh one is better for cooking Prof.

12) Business Planning Workshop (February 1, 2009)

In prior to the business planning, a series of key informant survey were conducted on October 2009 to grasp market demand for fresh and dried vegetables/ fruits. A coordinator farmer in Nukus district, traders from Samarkand and Nukus city, and a former director of processing factory in Tahiatash for example were selected for the key informants. In short, demand for fresh vegetables/ fruits are high in both internal and external market, whereas demand for dried vegetables is high in the external market but low in the domestic market. The result was incorporated in the business plan.

Business Planning Workshop was held at No. 9 Primary School in Wolnek VCC with 16 participants from farmers. Main items to be discussed were 1) review of the last years' activities, 2) problems to be solved, and 3) formulation of the business plan. For this purpose, Business Incubator assigned a business planner, Mr. Utambetov Polat, who has trained by JICA for business consultation in 2005.

At the session for the review of the last years' activities, the Study Team showed a plan of operation, which was made in the kickoff WS on April 11, 2009, and reviewed each activity with all participants. The first years' activities focused on a) establishment of management organization of the AF, 2) training to farmer members, 3) consignment production of dried vegetables/ fruits at Amudarya Agro-firm, and 4) test marketing of the dried products. The Team presented the result of each activities with asking a comment from vice director of the AF.

The main problem of the pilot project is waiting attitude of farmers and, in some case, lack of interest to the project. Therefore, hidden purpose of the WS is to stir up participant's interest and motivate them to participating in the project activities. For this purpose, the Team made some attractions during the WS.

First, the Team distributed the dried products, which was made at Amudarya AF, to farmer participants, so that they can feel reality of the project activities.

Second, detail list of dry equipment, which are now on the way to arrive at their AF, and layout plan of the processing plant in the rehabilitated their building were disclosed to them.

Third, the Team presented Japanese apple, Sun-Fuji variety, and 2 litter-bottle of charcoal vinegar, which are related to the next years' activities. Most farmers showed their strong interest in the charcoal vinegar, since they have been suffering from acute damage from disease and pests.

Fourth, a manual for vegetable production, produced by the Study Team, was distributed to all participants for their reference.

Fifth, detail activities for the year were proposed to them during the business planning session.

As a result, at the end of the WS, the participants promised to the Team that they will organize the AF core members again, and raise the capital fund for further activities. Then, after the completion of the WS, the farmers held an emergency meeting at the same venue and discussed how raise the capital fund and quantity of the obligation fees. The farmers start transmitting their obligation fees, 75,000 sums/person, from February 2, until 9 members will have contributed.

13) Rehabilitation of the Agro-firm Building

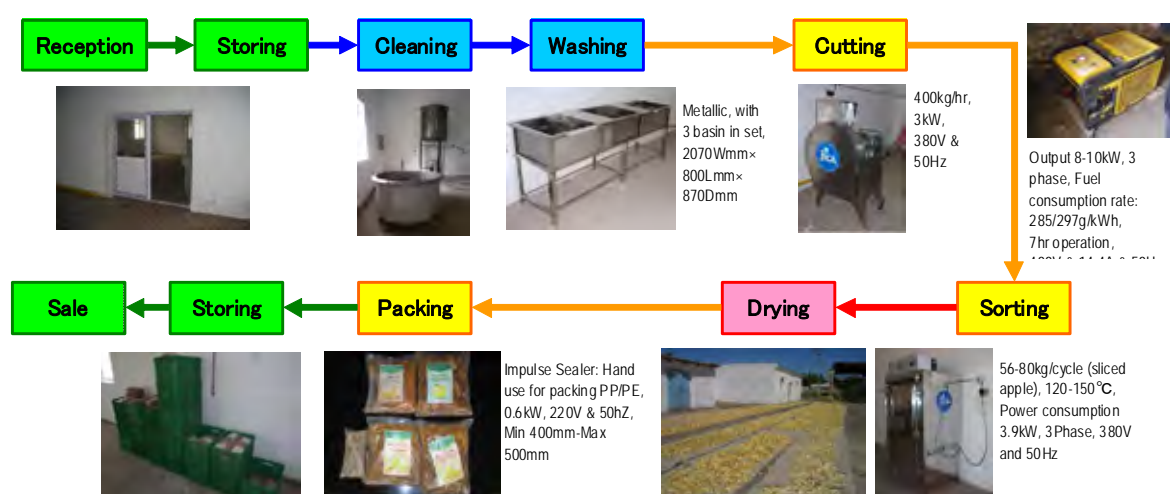
Rehabilitation of the Agro-firm building started on November 2009, and completed on June 2010, due to delay of payment through to the contractor the Special Grant Account. The building was shared with other public organizations including mini-bank and MTP, and the rehabilitated room was used for public meeting of the residents in Taqirkol VCC. The room had an area of 200m² with damaged roof and wooden floor. After the rehabilitation, the room is divided into two parts; processing room and storage room. Also, generator room was constructed outside of the AF building. Gas, Water and three phase electricity are also connected to the processing room so that the building can operate hole year round. Total cost of the rehabilitation is 35,300 thousand sums including installation of shallow well.

14) Procurement of Processing Equipment

Equipment from Taiwan for dry processing, including a 3-section stainless sink, cutter, electric dryer, diesel generator, electric scale, working table, and impulse sealer, were arrived at Taqirkol in Nukus by the end of February. By that time, rehabilitation of convention hall in the AF building was also completed. Then, installation and test run of the equipment was conducted at newly renovated AF building on March 1, 2010, with presence of main AF members, engineer from plant maker, import agent from Tashkent (FURKAN), and representatives of the Study Team. Followings are the procured equipment for dry vegetables and fruits production.

Summary of Processing Equipment Procured by the Project

Name of Equipment	Qty	Production Capacity	Main Specification
Washing machine (complete)	3	500 kg/hr	Metallic, with 3 basin in set, 2070Wmm×800Lmm×870Dmm
Slicer (to small pieces)	1	400 kg/hr	400kg/hr, 3kW, 380V & 50Hz
Working table	1	500 kg/hr	1900Lmm×600Wmm×850Hmm
Dryer (complete)	1	80 kg/cycle	56-80kg/cycle (sliced apple), 120-150 °C, Power consumption 3.9kW, 3Phase, 380V and 50Hz
Electronic scales	1		Electric, 10V, desk-top type, potable, 220V & 50Hz
Impulse Sealer	1	240 kg/hr	Hand use for packing PP/PE, 0.6kW, 220V & 50Hz, Min 400mm-Max 500mm
Diesel generator	1	10 kW/hr	Output 8-10kW, 3 phase, Fuel consumption rate 285/297g/kWh, 7hr operation, 400V & 14.4A & 50Hz



15) 1st Study Tour to Fergana Research Center (March 2-5, 2010)

A study tour to Fergana branch of Research Institute of Horticulture, Viticulture, and Wine-making, under the Science-production Center for Agriculture, was conducted from March 2 to 5. The research institute has received a technical cooperation project on fruits growing from JICA since 2005, and has sent 2-3 agronomists to Japan in each year to learn Japanese fruits growing technologies. A Japanese NPO, Fukushima-Uzbekistan Cultural and Economic Cooperation Association, have provided technical knowledge to the research institute and established experimental field (demo-farm) at the center.

Participants of the study tour are core members of the pilot project including Mr. Mambet (deputy director of the AF), Mr. Bairam (Agronomist of the AF), Dr. Torenliyazov E. Sh. (Nukus branch of Tashkent Agricultural University), Mr. Babashev (Director of the BI), and Vladimir (a national staff of the Study Team). The main subject for study was pruning, branch forming, grafting and charcoal vinegar making. The participants were surprised to know that Japanese skills are quite different from their practice, and an agronomist of the AF mentioned that he recognized there are still many things to learn.

(2) The Second Year Activities

1) Reconsideration of the Marketing Strategy in 2010

At the beginning of the 2nd year implementation, a kick-off meeting was held on April 16, 2010. The meeting was facilitated by BI and discussed AF activities in the second year and determined actions to be taken. After the meeting, participants visited to the site for charcoal vinegar plant and the AF

building where dry equipment were already installed.

However, marketing environment was quite different from when the Study Team planned activities for the 2nd year. Therefore, it was necessary to review the project activities based on the new marketing environment. Followings are the steps to review the marketing strategy in 2010.

I. Marketing Environment in 2010 (Key factors to be noticed)

Socio-economic Environment

- Taqirkol-Darbent Agro-firm has to handle 3,500t of vegetables and fruits from farmers by the end of this year, since the state order to Agro-firms in entire Uzbekistan has released from Cabinet of Ministries (Tashkent) on March 2010.
- Farmers in Karakalpakstan have to plant 5,000 ha of potatoes in 2010, and the share of Taqirkol VCC is 400 ha. Instead, farmers in Nukus district have no obligation to plant cotton in this year.
- Water availability is quite high in 2010, which may result in good harvest of vegetables and fruits.

Market Environment

- Price drop of vegetables is expected during summer season due to abundant irrigation water.
- Increase in diesel price due to supply shortage results in high transportation cost

Management Environment

- Lack of leadership of current AF director, and lack of human resources including accountant
- Lack of self-owned capital, including land properties which is necessary for collateral
- Difficulty in avoiding political intervention from both Hakimiyat and the central government.

II. SWOT Analysis

Internal and External Environment of Taqirkol Agro-firm

Internal Environment	External Environment
【Strengthen】 <ul style="list-style-type: none"> • perspective on production surplus of vegetables and fruits • be in possession of dried equipment • existence of marketing coordinator in VCC • marketing experiences to domestic market • proximity to Nukus Central Bazaar 	【opportunity】 <ul style="list-style-type: none"> • State order to handle 3,500t of vegetables and fruits • High availability of irrigation water in 2010 • Being able to concentrate in wheat, vegetables and fruits (no cotton production in 2010) • Financial support for advance payment from the government • High demand on dried products in northern countries (e.g. dry melon in Russia) • High demand on fresh products in domestic and foreign market
【Weakness】 <ul style="list-style-type: none"> • Low quality of products due to diseases and pests • Government intervention to AF activities • Shortage in capital fund and operation cost • Lack of real estate collateral • Lack of initiative of AF leader • Lack of problem-solving ability • No experience on legal export • No internet access in VCC 	【Threat】 <ul style="list-style-type: none"> • Expected price drop in summer 2010 • Emergence of china products (dried products) into Russian market • Government's first priority on filling domestic market • Natural disasters (cold wave, diseases and pests) • Less demand (1/4) in Samarkand, comparing with last year • High diesel price in 2010 (transportation, processing)

III. Action Plan of 2010

Action Plan 2010

No.	Strategy	Action
1	Export promotion of vegetables and fruits	1-1. Confirm export procedures at Ministry of Foreign Economic Relations 1-2. Acquisition of export permission 1-3. Identification of foreign partner 1-4. Entering into contract with farmers
2	Diversification of processed products to reduce risks by natural disasters	2-1. Develop dried products from vegetables and fruits 2-2. Develop other processed products from vegetables and fruits 2-3. Introduction of honey production as an additional income source of the AF
3	Positive marketing to nearby market in early harvest season	3-1. Collective marketing of 3,500t of fresh vegetables and fruits 3-2. Improve quality of fresh vegetables and fruits
4	Quality improvement of fresh products	4-1. Plant protection with scientific approaches 4-2. Study Tour to Chimbay bio-laboratory 4-3. Demonstration at Iha experimental field
5	Development of processed products targeting domestic market	Consolidate into Action number 2 (diversification of products targeting to local market)
6	Reduction in weigh of products to reduce transportation cost	Consolidate into Action number 2 (dried products are lighter than fresh products)
7	Decrease in political intervention and increase in managerial independence	7-1. Ask Hakim for kind understanding and cooperation 7-2. Assign a person who can exclusively work for AF activities
8	Increase in self-owned capital	8-1. Calling for capital fund raising to farmer members 8-2. Collateralizing AF properties including land and building
9	Enhancement of organizational capability	9-1. Assign Mr. Mambet to the 1 st Deputy Director of the AF 9-2. revision of the business plan of the AF
10	Opening a marketing channel to foreign market	Consolidate into Action number 1
11	Increase in problem-solving ability	11-1. Enhancement of social capital of the AF (Networking) 11-2. Provision of OJT opportunities (Study tour, On site training by Professor of Tashkent Agricultural University)

2) Charcoal Vinegar Production (April to June 2010)

Charcoal vinegar is good for disinfection of fruits trees, and the know-how was transferred from a Japanese farmer, who is a member of the Fukushima- Uzbekistan Cultural Exchange Association, to the Fergana Research Center through JICA project. Deputy Director of the Agro-firm participated in the Study tour to the Fergana, and learned it. After the study tour, he followed what he learned at the center, and made efforts to obtain good charcoal vinegar after try and error process.

Charcoal vinegar plant was established at near the Deputy Director's home on April 5, 2010, and harvested 2 litter of the vinegar on April 12. The capacity of plant is 1.5m³ (1.5m×2.0m×0.5m), and constructed by concrete and bricks. Since then, the Deputy Director has tried 4 times and finally gets the knack of control method of flame and steam. According to him, he could harvest 60 litter of charcoal vinegar at last from one trial. He distributed the vinegar to farmer members and started applying it to orchard trees.

3) Consultation on Export Procedures to Ministry of Foreign Economic Relations

Consultation on export procedures to Import and Export Department, Ministry of Foreign Economic Relations (MoFER) was conducted on May 31, 2010 with Chief of Import and Export Department in MoFER, Deputy Director of the Agro-firm, Director of Business Incubator, and the Study Team.

According to the official at the MoFER, there are two way to export; 1) export though Karakalpak Agro-Export, and 2) export directly. The Karakalpakstan Agro-Export is a state-own company, and is only one company that authorized by Cabinet of Ministers as an export entity in Karakalpakstan, and has a lot of experiences of export to abroad. This option is relatively easier than the latter, but the AF must pay commission to the company.

As for the latter, the AF has to obtain export permission from the Cabinet of Ministries in Tashkent, which takes complicated procedures. As a result of the consultation, the attendants recognized that there are many obstacles to export directly, that are; 1) the government policy to fill domestic market first, 2) obligation of the barter trade, 3) 100% advance payment to the contractor, and 4) complicated procedures. Because of the first obstacle particularly, the Agro-firm had to give up starting export in 2010.

4) 2nd Study Tour to Fergana Research Center (June 3-5, 2010)

A study tour to Fergana branch of Research Institute of Horticulture, Viticulture, and Wine-making, under the Uzbekistan Scientific Production Center for Agriculture, was organized by the Karakalpakstan Business Incubator from June 3 to 5, with participation of 8 farmer members of the Taqirkol-Darbent Agro-firm. Mr. Saydaliev Alisher, Director of the Research Institute, received the tour members and provided field lecture to the participants.

A study tour to Fergana branch of Research Institute of Horticulture, Viticulture, and Wine-making, under the Uzbekistan Scientific Production Center for Agriculture, was organized by the Karakalpakstan Business Incubator from June 3 to 5, with participation of 8 farmer members of the Taqirkol-Darbent Agro-firm. Mr. Saydaliev Alisher, Director of the Research Institute, received the tour members and provided field lecture to the participants as follows.

- Orchard development: The participants studied appropriate planting density at the model farm where fruits trees are planted at 2m intervals vertically and at 6m horizontally. The method enables farmers to manage their orchard efficiently with keeping higher productivity. Also, the participants recognized that height of trees are also important in view of pest control in addition to harvesting work, since pesticides can not reach the higher part of trees, which result in spread of pests and diseases from the top.
- Alley cropping: Alley Cropping is practiced at the model farm where strawberry and other plants are growing between trees. The method is also new for the participants and learned how to maximize productivity of their land.
- Importance of soil fertility: Farmers recognized that weeds grow anywhere in the model farm, which protect soil on the ground from strong sunshine, and fertile soil in the orchard.
- How to apply charcoal vinegar: After the first visit, the farmer members of the AF had established their own charcoal vinegar plant at their field in Nukus and tried forth to get the vinegar more. Based on their experiences, they made practical questions to the technicians about how to gain better vinegar more effectively, and how to apply it to the plants.
- How to get improved seedlings: The participants showed their strong interesting in improved seedlings for apples, apricot and other fruits trees. Particularly, they wanted to know how they can buy and carry those seedlings from the institute. The price of apple seedlings is 2,000 sums/seedlings, for example.

5) Study Tour to Chimbay Bio-laboratory

Study tour to Chimbay bio-laboratory was conducted on August 19, 2010, with Professor Dr. Toreniyazov E. Sh. (Nukus branch of Tashkent Agricultural University) and 8 farmer participants. The bio-laboratory develops entomophagous insects for plant protection purpose, and accumulates knowledge how to use them. Director of the laboratory (Mr. A. Jandauletov) welcomed the participants and gave a lecture, together with Professor Dr. Toreniyazov, on how to use the biological pesticides in the field. The biological pesticides include trichogramma, brakon, and lacewing entomophage.

6) Plant Protection Activities

Dr. Toreniyazov E. Sh., a professor at Nukus branch of Tashkent Agricultural University, provided a series of field lecture on pest control at 1 ha of experimental apple garden and 5 ha of experimental tomato field. The lecture started at Mr. Biram's orchard on October 16, 2009, and continues up to September 2010. The reason why he started from fall season was to prevent worms pass the winter,

which is quite important to protect fruits trees during the next season. The professor visited the experimental fields once or twice a month and gave lectures and instructions to farmers regarding how to against pests and diseases. Detail activities are shown in the monthly monitoring reports written by the professor.

7) Products Development (Aug-Sep, 2010)

Dry apricot production was initially planned in June. However, the activity has to be canceled due to the cold wave in March, which damage on 90% of apricot flower. As a result, it is said that market price of apricot (4,500 sums/kg) becomes 20 times higher than the last year (200 sums/kg). The lesson from this experience is necessity of products diversification to reduce management risk against natural disasters. Therefore, another processing alternative was developed from August to September. The tested products were apples, peach, onion, pumpkin, pumpkin seed, potato, and tomatoes. For this purpose, the Study Team provides recipe note for making dried vegetables and fruits to the Agro-firm.

8) Joint Processing with Khodjeyli Silk Factory (July 2010)

The AF acquired new two customers in summer 2010; one is the tomato paste factory in Nukus district, and the other is Khodjeyli Pilla (Silk) Factory in Khodjeyli district. The former is the one which had been stopped their operation due to difficulty in finding customers, but reentry start again with support from a bank and the local government. The AF supply 20t of fresh tomato to the factory in August 2010. The latter's main product is silk, but has huge dryers and storage facility which are not fully utilized. Therefore, the factory is looking for a partner to increase rate of operation of their equipment and facilities. Then, they heard about the Agro-firm in Nukus district, and made a contact to offer the joint operation.

The firm initially offered 500t of fresh apples to the AF, but a few days later, stopped contract due to lack of operating capital. Instead, they decided dealing 25t of fresh apples, which was already procured by the AF by the time of cancel (early July). The AF purchased fresh apples from farmer members at 40 sum/kg, and sold them to the factory at 80 sum/kg. Then the AF rent their 2 cutters at 560,000 sum. Deputy Director of the Agro-firm provided his own cutter, which was used during Soviet era, in addition to the one procured by the project. The reason why the AF did not cut the fresh apples at their building was that electricity supply is not stable in the Taqirkol VCC.

The factory produced dried apple using sunlight. According to the deputy director of the AF, the dried product by mechanical dryer is better than the sundry products since color of the sundry apple turned brownish and sugar contents becomes lower. Then, AF supported the factory to find buyers since the factory owner does not have experience to sell agricultural products. In August, they sold 1t of dried apple to a trader, but still keep 3t in the factory's storage, waiting the best timing to sell them at higher price.

F.7.3 Outcomes and Achievement

(1) Demand oriented service menu of the Agro-firm

At the kick-off workshop held on April 11, 2009, farmer participants discussed regarding expectation to the Agro-firm. Based on the discussion, service menu was initially determined, and initial service components were, 1) joint marketing, 2) processing, and 3) technical training. After implementation of the 1st year activities, the farmer members reviewed the service menu at the mid-term evaluation workshop held on September 26, 2009, and add the production support to the services. The production support includes plant protection activities for orchard and tomato field. At the final evaluation workshop, farmer members looked back on that the plant protection including charcoal vinegar application was the most appreciated activities. Following are the attained service menu of the Agro-firm.

Service Menu of the Tagirkol-Darbent Agro-firm

Type of Services	Description
Technical Training	Technical training on plant protection, farm management (pruning, grafting, fruits tree formation, charcoal vinegar application, etc.), marketing, business planning, quality improvement, etc.
Food Processing	Processing of dried vegetables and fruits, using mechanical dryer and sundry
Joint Marketing	Joint marketing of dried and fresh agricultural products, Provision of customer information, Coordination of market transaction
Production Support	Charcoal vinegar production, Lending beehive for pollination, On-site demonstration for plant protection, Charcoal vinegar distribution

(2) Business plan which shows a business model to generate profit

Business plan must show how the firm generates profit using their resources. Through the joint processing with the Khodjeyli Silk Factory, the Agro-firm members find a way to generate profits from their resources. This business model is divided into two stages. First stage is selling fresh apples to the Khodjeyli factory, and second stage is to assist their marketing utilizing the AF's marketing network.

At first, the AF purchased fallen apples at 40 sum/kg and soled it to the Khodjeyli factory at 80 sum/kg. Transportation cost from farmland in Nukus district to the Khodjeyli factory was bearded by the AF. Then, the AF rent their cutting equipment to the Khodjeyli to support their drying process. After the Khodjeyli factory produced dried apples, the Agro-firm supported the Khodjeyli marketing by introducing the AF's customer. Through the marketing support activity, the AF obtained 10% of gross income of the dried products as broker's commission. Following table shows the balance of the joint processing activity, conducted on July 2010.

Balance of the Joint Production of Dried Apple

	Agro-firm	Khodjeili	Total	Remarks
Expenditure				
Raw Material	1,000,000		1,000,000	25t×@40sum/kg, Payment to farmers
Transportation	200,000		200,000	To Khodjeili
Raw Material		2,000,000	2,000,000	25t×@80sum/kg, Payment to the AF
Rental Fee		560,000	560,000	2 cutters from AF
Labor		310,000	310,000	62person/days×@5,000sum
Fuel, etc.		800,000	800,000	
Subtotal	1,200,000	3,670,000	4,870,000	
Income				
Raw Material	2,000,000		2,000,000	
Rental Fee	560,000		560,000	
1 st Batch	100,000	900,000	1,000,000	1t×@1,000sum/kg, AF gain 10% of sales
2 nd Batch	450,000	4,050,000	4,500,000	3t×@1,500sum/kg (expectation), AF gain 10% of sales
Subtotal	3,110,000	4,950,000	8,060,000	
Balance	1,910,000	1,280,000	3,190,000	US\$208 (@1,632sum/\$)

Source: Takirkol Da'rbent Agro-firm

Merits of this business model is that the AF can fully utilizes their advantages, and overcome their disadvantage through collaboration with the business partner. The advantages of the AF in this case are; 1) being able to procure fresh but damaged apples at cheaper price, and 2) being able to introduce buyer of the dried apples using their marketing network, whereas disadvantage of the AF is that they can not use electricity during day time, due to poor supply condition in rural Nukus. On the other hand, the Khodjeyli factory had relatively stable electricity supply, but did not have marketing network of the dried products. Therefore, this transaction materialized win-win situation to both sides. This was their first trade with small transaction amount, and they have a plan to deal 500t of fresh apples in the following year.

However, the joint production only is not enough to compensate initial investment cost of the AF,

since payback period of the transaction is more than 10 years. According to cash flow analysis in the final business plan of the Taqirkol-Darbent Agro-firm, collective marketing of fresh vegetables and fruits such as tomato and apples is necessary to materialize good financial performance. If the firm handles 200t of fresh tomato and 10t each of apple and apricot for drying, payback period was 6 years and Financial Internal Rate Return (FIRR) was estimated at 14%.

(3) Enhanced management body of the Agro-firm

1) Work Sharing among Management Members

One of weakness of the Agro-firm was poor management of board members. Director of the AF had changed four times at the start-up stage and the last (the fifth) Director sometimes cried on his shoulder and shadowed his resignation many times. After joining Mr. Mambet, a leader farmer who organizes collective marketing at grassroots level in Taqirkol VCC, to the board members, the Agro-firm activities started somehow.

However, it was found that Director of the Agro-firm tends to receive the government order through Hakimiyat of Nukus district, and can not concentrate on the firm's activities. Therefore, the working group, which includes the AF Director and Deputy Director, the Business Incubator, and the Study team, decided to share tasks of the AF board members. Since then, the Director handles administrative and governmental works, while the Deputy Director concentrates on the AF operation. This formation functioned well and keeping the formation is vital to continue successful operation of the Agro-firm.

2) Networking

At the initial stage of the Agro-firm establishment, networking was one of indispensable activities of the pilot project, since human resources of the Agro-firm was quite limited. They could not employ technologist and business specialist since they do not have budget for the purpose. In this regard, outsourcing of key function was inevitable and networking with resource persons were strategically conducted during the pilot project period. When the project faces some difficulty in its implementation, the working group tried to find relevant organization and visited with all members of the working group as far as possible. As a result, the AF members established a human network with government institutions, university, and business support organization for example as listed in the table below.

Institutional Support of the Taqirkol-Darbent Agro-firm

Institution (organization)	Detail of Support
Business Incubator	Business Support, Technical training (business planning, marketing, accounting), Institutional arrangement including documentation works
Tashkent Agricultural Univ.	Technical training (pest control, agro-economy, etc.)
Fergana Research Center	Technical training (pruning, grafting, tree formation, charcoal vinegar application, etc.), Procurement of seedlings
Ministry of Foreign Economic Relations	Provision of market information, supporting export procedures
Cabinet of Ministers	Supporting export procedures
Nukus District Hakimiyat	Ensure stable supply of gas, electricity, and water. Legal and administrative support

On September 17, the Agro-firm ordered 2,000 seedlings of fruit trees (60% for apples, and remaining for cherry, plum and peaches) to Fergana Research Center. The AF members keep in touch with the agronomist in the center to ask scientific approaches of fruit tree growing. Together with the charcoal vinegar production, the network is one of fruitful result of the study tour to Fergana. This connection is also meaningful in view of synergy effect of the Japanese ODA projects.

3) Capital Accumulation

Capital accumulation at the AF is quite important to expand their business through further investment, and activate rural economy. Capital fund is also important to acquire running capital from bank or other financial institutions. After the joint operation with Khodjeyli Silk Factory, the AF could gain the 1st profit from their transaction. Starting from the 1st profit, it is recommended to accumulate the capital continuously so that the firm can expand their business little by little. At present, it is obvious

that scale of their production line, particularly production capacity of the Dryer, is too small to export dried products to Kazakhstan and Russia. Through capital accumulation at the AF, it will be possible to purchase large Dryer and expand their production capacity.

As of September 2010, nine (9) core members contributed capital fund raising, and total amount is estimated at 675,000 sums. This amount is quite small as a business entity, but it is just the beginning of the small enterprise's operation in rural Karakalpakstan. It is expected that the first profit share will be distributed to the capital fund members by the end of 2010. If the Agro-firm could successfully shows that their business is enough profitable, more farmer cooperators encouraged to pay the capital fund.

In addition to the capital fund, the land title and building property are now under the AF's balance. Base on these properties, the AF can receive financial support from the Government and other funding sources. Following table shows summary properties of the AF as of September 2010.

Properties of the Taqirkol-Darbent Agro-firm

Type of Property	Economic Value (1,000 soums)	Specification
Office Building	30,100 (processing factory)	Managers' Room, Processing Room, Storage Room, Generator Room (Shared with mini-bank and other public entities)
Land	N.A.	Location: TAQIRKOL-DARBENT Agro-firm, Taqirkol VCC, Nukus District, Karakalpakstan
Processing Equipment	35,400	Dryer, Slicer/Cutter, Diesel Generator, Washing Sink, Impulse Sealer, Working Table, Electric Scales, Plastic Container
Office Equipment	2,9500	Personal Computer, Printer, Photocopy Machine, and Set of Stationery

(4) Economic benefit through collective marketing

1) Joint Production

It is sure that the joint operation with other factory makes profit to the AF, as shown in 3.6.2 (2). Candidate partners of the joint operation are Khodjeyli Silk Factory, Amudarya Agro-firm, and Tomato Paste factory in Nukus district. The Tomato Paste Factory was once bankrupted due to marketing failure. However, recently the Nukus Hakimiyat and a bank embarked on the reconstruction, and restarted their operation from last year. Then, the factory approached to the AF and asked for providing fresh tomatoes for their operation. The Khodjeyli Silk factory is also one of those factories which approached from their side. These facts indicated that the Taqirkol-Darbent Agro-firm is gradually recognized in the business world in the Karakalpakstan. If the AF can expand their business with those partners, the farmer cooperators can acquire more benefit from the AF's operation.

2) Plant Protection

On one hand, as a result of plant protection activities at 5 ha experimental field for tomato, damages of products reduces from 30%-60% in 2009 to 5% in 2010. According to monitoring report prepared by the professor, other tomato field which was not applied biological pesticides got damages around 30-40% of products.

On the other hand, remarkable change can be observed at Mr. Bairam's apple orchard. His plant protection activities started from last October and leaves of his apple trees becomes healthier now. Even though apple trees in next garden drops a part of leaves by September 2010, his trees keep full of leaves with deep green color. Mr. Baiaam, an agronomist of the AF, also apply charcoal vinegar to his 1 ha experimental field with mixing chemical fertilizers. According to him, he applies the charcoal vinegar for 7 times and applied totally 60 to 70 liters in one season. Following table shows result of the plant protection activities in the experimental fields.

Result of Plant Protection Activity

Crop	Area	Damage in 2009	Damage in 2010	Observation
Tomato	5 ha	30-60%	5%	Good harvest. Out of 20 tracks for harvesting, only one track volume could not sell to market. Tomato field which was not conducted plant protection activities got damages around 30-40% of products.
Apple	1 ha	70%	50%	Leafs become healthier, and keep on the tree till September with deep green color. Charcoal vinegar is also applied around 60-70 liters with mixing chemical fertilizer. However, fruits got damage due to unexpected type of warm.

Source: Taqirkol Da'rbent Agro-firm

According to Mr. Bairam, his apple trees had a problem on leaves in last year, and the problem seems solved due to the project activity. He is looking forward to see the further result in the next year. However, he can not say that damages on fruits are reduced in this year, since unexpected type of warm was widespread in this summer. He explained that possible reasons of the phenomenon are bad quality of chemical pesticide, miss the best timing to spread chemical pesticide, or unusual high temperature in this summer. Therefore, continuous practice is required to gain output from the land protection activities.

F.7.4 Problems and Issues Encountered During Implementation

(1) Re-establishment of the Agro-firm

According to the presidential decree #3709, issued on January 9, 2006, newly established Agro-firm can exempt from payment of taxes (income tax, land tax, property tax, VAT, except Vat for imported goods) for three years. However, since the Taqirkol Agro-firm was established in 2006, duration of receiving benefit of tax exemption was already expired. Therefore, the Study Team suggested to the fourth director to discuss among members whether they renew the Agro-firm or succeed the existed firm. Establishing new Agro-firm might require long procedures, but advantage was that the new firm could receive tax benefit. Based on the suggestion, Agro-firm members decided to reorganize a new Agro-firm to obtain the legal preferential treatment. As a result, new Agro-firm, namely "Taqirkol-Darbent" Agro-firm, was established (registered) on June 26, 2009.

(2) Adding a farmer member to the Board

Since farmer was not included in the AF board member of the fourth director, the Study Team suggested adding at least one member from the farmers, otherwise they cannot make a close relationship with farmer members as a consequence of misleading and distrust from farmers. The fourth director agreed upon the suggestion and assigned a leader farmer of Taqirkol VCC, Mr. Mambet, to a deputy director. However, since the director resigned on the middle of June due to loss of his interest, substantial activity for marketing was not undertaken until September 2009. However, it should be noted that, in spite of such a difficult condition, the deputy director personally started support activity for marketing to neighboring farmers. Now the deputy director is absolutely necessary person for the AF's operation, and it is sure that success of the AF can not be obtain without him. The deputy director promoted to the 1st deputy director on June 12, 2010.

(3) Identification of the farmer members

Forty-four (44) founding members were listed in the original statute of Taqirkol Agro-firm. However, it was said that the name list was quite doubtful since some members were listed up without any acceptance to be a member of the Agro-firm. Therefore, the Study Team suggested to the fourth director that, at first, identification of member farmers of the Agro-firm was necessary, and recommended that newly established Agro-firm should start with those members who show willingness to participate in and to contribute capital fund for its operation. As a result, twenty (20) core members were selected at the time of the renewal, and 9 members had contributed to the capital fund raising by the end of September 2010.

(4) Changing Site for Installing Processing Equipment

The Study Team signed up an agreement on January 20, 2009, between Council of Ministers, Taqirkol VCC Chairman and the fourth director of Taqirkol Agro-firm, for a sift of land use right from the MTP to the Agro-firm with the aim of establishing food processing plant. However, the agreement was thrown into a dust bin just a few months after, because the VCC Chairman and the MTP Chairman decided to give the right to other farmer and rejected the transfer to the Agro-firm.

According to the new Hakim, assigned on March 2009, he received the petition from “farmers” in Taqirkol VCC, who appealed to use the MTP garage for machinery maintenance purpose, and illustrated his policy to put higher priority on enhancing machinery services for cotton and wheat production. Then, the Hakim introduced other candidates of processing place, which are used for forage storage cum shop and for public meeting at present. The land titles of both buildings are belongs to the MTP, means properties under the Nukus District Hakimiyat. The Hakim promised that he would take all necessary actions to shift the tile and to supply utilities after the candidates being selected. After the field examination with the AF members and the Study Team, the public meeting place was selected for the processing plant. Rehabilitation of the building started on October 2009 and completed on June 2010.

(5) Less interest in vegetables/ fruits marketing among the key person of VCC

Under the current system, Agro-firm director is nominated by the Hakim, and what members can do is just approve the nominated candidates. Accordingly, the past directors did not show positive attitude toward the AF’s operation, and could not concentrate in the firm’s activities during busy farming season of cotton and wheat.

Since cotton and wheat are the most important products in Uzbekistan, most farmers are busy in the both farming, and the vegetable and fruits growers tend to stay away from the main stream of the government support. Under the circumstance, it is necessary to show that the vegetable and fruit trading is enough profitable and nurture the key person’s interest in the trading. Since nobody take an initiative in the firm’s activities until September 2009, the Study Team took the initiative for starting consignment production of dry vegetables and fruits at Amudarya district on early October, to clarify profitability of the production. The operation could not successfully conclude due to poor quality of the dried products, but could successfully show the importance of taking action to change the rural situation in the Nukus District. Since then, some farmers showed their positive attitudes toward the AF’s operation, including capital fund raising, offering a part of farmland for experimental purpose, and active participation in study trips and field seminars.

(6) Sense of mistrust to processing factory

Many farmers in Taqirkol VCC had a bitter experience regarding work with processing factory. In the past, ex-Hakim of Nukus district ordered farmers to supply fresh tomatoes to a tomato-processing factory located in the same district, and farmers had to follow the order. However, the tomato paste factory failed in its marketing and did not pay contract money to the suppliers. The problem has not yet been solved, since neither the factory nor the Hakimiyat took appropriate action including compensation to the farmers. Since then, farmers in the VCC do not trust processing factory. This experience resulted in their negative attitude to contribute capital fund of the Agro-firm. Building up trustful relations with farmer members though assuring their income, e.g. paying a share of profit to capital fund members or assure farmers’ income by paying advance payment by cash, are necessary actions to dissolve this problem.

Particularly, paying an annuity to the nine (9) core members, who contributed capital fund for its operation, is quite important. The dividend payment affords incentive to the member farmers, which result in further cooperation to the AF. At this moment, most member farmers doubt if the AF can make profit and helpful for them. Therefore, paying an annuity is quite important to show significance of existence of the AF. Due to 1st transaction of AF with the Khodjeyli Pille (Silk) Factory, it is expected that the AF can gain 1st profit within this year. Therefore, it is recommended to pay an annuity to the core members, at least, by the end of this year.

(7) Poor conditions of utilities

Unstable supply of electricity and water is bottleneck of food processing factory in Nukus district. At present, according to the AF members, electricity is available only during morning (7am-11am) and evening (7pm-12pm). Therefore, operation of processing equipment has to be within the limited time duration. To overcome this drawback, the AF decided to collaborate with other factories located in the better operating environment. In this regard, Khodjeyli Silk factory and Amudarya Agro-firm have an advantage of electric supply.

In addition, domestic water from public network is available only one hour in Taqirkol. Therefore, the AF had to fix water tank in the processing plant to store water when it is available. The AF has a shallow well near the processing building and is available at any time. However, water quality is quite important for food processing factory to keep processing environment in good sanitary condition. At the AF, water is used for washing fresh vegetables and fruits before cutting. Therefore, the water tank is necessary to keep clean water whenever electricity is available. Also, working with other factories in the urban area, including Khodjeyli and Amudarya firms, is one of solution of the problem.

(8) Catastrophic damages on the target plant

Dry apricot production was initially planned in June 2010. However, the activity had to be canceled due to the cold wave in March, which damage on 90% of apricot flower in Taqirkol VCC. As a result, market price of apricot (4,000 sums/kg) becomes 20 times higher than the last year (200 sums/kg). The lesson from this experience is necessity of products diversification to reduce management risk against natural disasters. During August and October, the AF members tried to develop dried products by using apples, apricot, peach, onion, tomato, pumpkin, pumpkin seed, potatoes, and beet. Also, once apple pie making was tried using electric dryer, but the trial was not succeeded.

(9) Export control to fresh vegetables and fruits

To make profit from fresh vegetables and fruits, export to the Northern countries including Kazakhstan and Russia, is key option of the AF members. In year 2010, the AF got the government order to support farmers' to sell 3,500t of vegetables and fruits, and export was necessary to make profit from the transaction. Therefore, the working group (the AF members, the BI, and the Study Team) decided to challenge export this year and made visits to Ministry of Foreign Economic Relations and Council of Ministers to ask their support. However, it was found that export of fresh vegetables and fruits is almost impossible in the Karakalpakstan due to the following reason.

- **Filling domestic market first:** On the assumption, export of fresh vegetables/ fruits is possible only when domestic market is stable. Needless to say, first priority of the national government for agricultural trade is to fill domestic demand and stabilize the food prices. Therefore, it is inevitable risk for traders that they can not export unless the domestic market is stable.
- **Barter Trade:** Barter trade is practicing with neighboring countries. According to the regulation, the exporter must encash 50% of trade income at exchange rate of the central bank, whereas the rest 50% must be used for buying import goods, which are scares in the domestic markets. The regulation must be an additional burden to the exporters, especially to farmers.
- **100% advance payment:** According to the Import and Export Department of MoFER, the Importer must pay 100% of contract amount as advance payment. Otherwise, the custom office issue a certification only for the paid amount, and the exporter can not export whole amount. If the exporter can not get 100% of advance payment, the exporter has to submit a guarantee that the importer will pay the remaining after obtaining the products.
- **Complicated Procedures:** Even though, trade of fresh vegetables and fruits require quick actions to keeping freshness and profit from market price fluctuation, the transaction in Uzbekistan enforcing lots of task to exporters. Also, even though the government requests many tasks, they allow only 10 days to the exporters for shipment after getting the export permission. Individual farmers can not follow these necessary procedures, since they are too complicated and time

consuming. As a result, individual farmers have to give up the trading with foreign partners. In this regard, the AF was an appropriate and useful body to take the burden for and on behalf of the farmers.

(10) Assignment of Accountant to the Agro-firm

Another important issue of the current AF's operation is that the AF still does not have accountant in their board members. Transparency and fairness in its operation are necessary and indispensable to acquire full support from member farmers. It is true that only the 1st deputy director makes great efforts to activate the Agro-firm until now. Therefore, a great extent of its profit in the first year should go to the 1st deputy director. Otherwise, he will lose his incentive to run the Agro-firm further, and then the project will be failed. However, the benefit to him must be carried out with rule-based and consensus-based manner, so that all member farmers can trust to the AF. For this purpose, it is strongly recommended to employ an accountant as soon as possible.

F.7.5 Evaluation of Pilot Project

(1) Evaluation of Verification Items

1) Effectiveness of the business model to enhance bargaining power of the small-scale farmers

When we discuss about incentives of member farmers, it is quite important that the developed business plan proves its effectiveness by generating profit to the farmer members. More significantly, it is necessary that the generated profit will be shared among member farmers without fear or favor. Of course, it is possible for farmer members to nurture a sense of ownership to the Agro-firm through participating in business plan formation and starting activities involving them. However, if the firm cannot generate their profits, the farmer cannot trust the Agro-firm and do not want to participate in the firm's activities further. In this regard, this verification item indicates the success and sustainability of the project.

Through the two-year activities with the AF members, a business model of the AF is established. The business model is composed by four types of services, which are 1) technical training to farmer members, 2) food processing of dried vegetables and fruits, 3) joint marketing of fresh vegetables and fruits, and 4) production support including plant protection, charcoal vinegar production, and lending beehive for pollination. Among these services, 2) and 3) are the core activities to generate benefit to the farmer members. As shown in article 3.6.2 (2), the AF can generate 2,000,000 sums from 25t of fallen apples. If the AF expands activities utilizing their advantages, the AF could gain more than 24 million sums of profits as shown in the business plan in 2010. Even though the full model can not be materialized within pilot project period, it is possible to see the effectiveness of the business model to enhance bargaining power of the farmer members in rural Nukus.

2) Economic benefit from collective action for marketing

As shown in the business model established, it is possible for farmer members to gain economic benefit from its collective marketing. Purposes of the collective marketing are to work the scale-economy through increase in transaction amount, and to enhance bargaining power of small-scale producers. Particularly, the latter is enhanced through adding value of raw products and making efforts to meet market demand. Also, it is possible for producers to become a price maker of their products, if they have enough volume of products and proper market information.

In our business model, member farmers of the AF can gain profit from fallen apples which is used to be sold at throwaway prices for animal feed. In case of the joint production with Khodjeyli Silk Factory, the AF purchased the fallen apples at 40 sums/kg and sold them to the factory at 80 sums/kg, generating 800,000 sums of net profit (excluding transportation cost) from 25t of damaged apples. One of reason for realizing this transaction was that the buyer wanted to purchase raw materials for dry apple production at cheaper price, and the AF had consultation ability for the dry processing and marketing. By adding value on the fallen apples and support marketing of the value-added products,

the AF proves that they can sell the damaged products at higher prices, and can be a price maker of the dried products. The deputy director of the AF is now waiting the best timing to sell their products, so that they can gain more profits.

3) Applicable and acceptable processing technologies for vegetable and fruit

Applicable and acceptable processing technologies can be determined by market condition of the targets. As a result of marketing survey, conducted by the working group from October 2009 to January 2010, it is sure that demand for dried vegetables is low in the domestic market, but quite high in the foreign markets such as Kazakhstan and Russia. Therefore, target markets of the dried vegetables are determined to the foreign markets.

On the other hand, demand of dried fruits is high in both domestic and foreign markets. However, marketing channel of the dried products in the domestic market is already established and competitors' quality is quite higher since their fruits are grown in the better agricultural environment than Nukus district. Therefore, quality improvement of fresh fruits itself is necessary if the AF set their target to the domestic markets. For this reason, initial target markets of the dried products are set to the foreign countries.

Then, marketing survey of the foreign markets was conducted by interviewing Kazakh traders, an engineer at Amudarya Agro-firm who had an experience of trading with Russian buyers, and ex-owner of food processing factory in the Tahiatash. Through these activities, the AF identified variety of dried products, method of processing, usage and form of the products, and their price range. The first products, dried apple, produced at the Khodjeyli Silk Factory was sold at 1,000 sums/kg to a middleman whose final destination is Russia. Now, the AF and the Khodjeyli factory are waiting for the best timing to sell. This fact indicated that their processing technology meet the foreign market's demand.

4) Identification of constrains in initial operation; transaction method, necessary tool and equipment, collection method, critical quality control point

During initial operation of the AF, many problems are raised as mentioned in article 3.6.3. Among these problems, followings were the serious constraints to attain the project purpose.

- Less interest in vegetables/ fruits marketing among the key person of VCC
- Sense of mistrust among farmers against processing factory
- Poor conditions of utilities in Taqirkol VCC
- Catastrophic damages on the target plant
- Export control of Fresh Vegetables and Fruits

In addition to these constraints, poor quality of fresh products is not negligible. In year 2009, around 70% of apples and 30% of tomatoes got damages by insects and diseases, and farmer members can not sell their products at higher prices. The result of test processing using damaged apples at Amudarya Agro-firm indicated a simple theory that bad quality of raw materials makes bad quality of dried products. Therefore, from second year activity of the pilot project, the working group started plant protection activities through technical training, study tour to Fergana and Chimbay, and a series of field seminar with a professor from Tashkent Agricultural University. These activities have to be continued so that the farmer members can have enough competitive products at domestic markets.

Also, through a transaction at the Khodjeyli factory, one important constraint is obtained. Initially, they tried to produce dried apples from 500t of fresh products based on the request from their buyer. At the contracting stage, it is said that the buyer in fact paid advance payment to the Silk factory's bank account. However, the factory could not withdraw the cash, since the bank did not have enough cash to pay. Then, they decided cancel of the business since farmers require cash transaction. It is unfortunate that the lack of cash in the bank is one of serious obstacle of doing business in the Karakalpakstan. According to traders at Nukus Central Market, many traders in the outside regions do not prefer trading with Karakalpakstan farmers since they do not accept transaction through bank transfer. Needless to say, credit transaction is quite basic and indispensable in the market economy.

Otherwise, no body can trust their business partner and the business can not be stood.

(2) Evaluation at Viewpoints of DAC's 5 Criteria

1) Relevance

National Policy: The government of Uzbekistan promotes establishment of Agro-firm as a part of agrarian reform policy, which mainly focus on the restructuring and privatization of agricultural sector. The main purpose to establish Agro-firm is to promote processing and marketing of vegetables and fruits through collective action of farmers and dehkans, and the target Agro-firm is the only one firm (at the time of the pilot project formulation) established in the study area (Nukus District) in 2006, even though their activity is quite limited. Therefore, activation of the existing Agro-firm still meets the agrarian policy of the Uzbekistan government.

Necessity: Farmers in Taqirkol VCC still need the implementation of the pilot project, since vegetable and fruits growers hardly receive support from the government, which, rather, intensively support cotton and wheat production. The farmers expect that the Agro-firm would materialize increase in income through collective action of processing and marketing. The project aims at enhancing bargaining power of the vegetable and fruits growers, which in turn increase in farmers' incomes. In this regard, the project still meets target group's needs.

Relevance as a Mean: At the time of pilot project formulation, only one Agro-firm was existed in the study area. In general, establishing a new marketing organization takes more time than enhancing existing one. Therefore, in view of the project purpose and its time limit, the latter is suitable if members of the existed organization shows strong will to activate its operation. At the time of the kick-off workshop on April 11, 2009, farmers in Taqirkol VCC showed their strong expectation to the operational success of the Agro-firm. In this regard, the project approach for enhancing the existed Agro-firm was relevant.

However, after the commencement of the pilot project, it was found that sluggishness of the Agro-firm is deeply rooted since the directors of the firm tend to receive direct order from the local government and cannot spend enough time for the firm's operation during busy season for cotton and wheat. On the other hand, it was also found that a leader farmer in the VCC takes an active role in coordinating vegetable and fruits marketing in the VCC, but faces difficulties due to administrative constraints. Then, the working group of the pilot project recommended to the AF director to assign the leader farmer to the board members to activate the firm's operation. The leader farmer is current 1st deputy director, and is absolutely necessary person for the AF's further operation. It is sure that success of the AF can not be obtained without him. In this regard, the project approach to select the AF is still relevant.

2) Effectiveness

Attainment of the Project Purpose: The project purpose is to enhance bargaining power of small-scale farmers through promoting collective action for marketing of vegetables and fruits. On the other, the Agro-firm is a business body to promote processing and marketing of vegetables and fruits through collective action of farmers and dehkans. In this regard, if the operation of Agro-firm is successful, it is enough possible to attain the project purpose.

As a result of the second year's implementation, the AF could get their first profit from damaged apples which were used to be sold at throwaway prices. Even though the transaction is not yet completed since the AF is still waiting the best season to sell, the AF members can see that the AF can make from its transaction. This fact indicated that the AF is now the decision maker of their selling price of the dried apples, meaning their bargaining power is enhanced. In this point of view, it can be said that the project purpose can be attained.

However, it is necessary to keep watching their activities since their marketing activity is just started. To generate more income to recoup the initial investment, further transaction is necessary as shown in the business plan. Marketing of fresh tomatoes and more profitable dried products including apricot is required in the next year's operation.

Assumption to the Attainment of the Purpose: The Optimization policy was introduced from December 2009. Purpose of the policy is to reorganize farmland to materialize effective farm management. The Hakimiyat has an obligation to implement the policy in their jurisdiction, and have to merge inefficient farmlands to promising farm owners. According to the AF members, after the 1st optimization in December 2009, 170 farmers in Taqirkol VCC had reduced to only 98 farmers. For the AF members, 4 farmers out of 20 core members could not keep their farmland. It is said that the policy will be implemented again in 2010, and many farmers feel fair for the policy implementation. If the remaining core members of the AF lose their farmland, it is possible that the AF's operation will be run upon the sunken rock.

3) Efficiency

Timing of Input: Kick-off workshop was once undertaken on April 11, 2009 with participation of the fourth director, his board members, and 11 candidate farmers. Then, a study tour to Trutkor Agro-firm was conducted on April 29, 2009, with participation of 16 farmers, who showed strong interest in participation of the Agro-firm operation. The purpose to conduct these activities was to stimulate member farmers, and to promote their active participation in the business planning and other Agro-firm activities. However, since the fourth director resigned his post on mid-June, and his successor did not take any action to follow-up these activities until September 2009, the project lost the best timing to gain fruitful result from the planned activities.

Also, due to the delay of project activities in 2009, particularly delay of identifying building place of processing activity and land title transfer, rehabilitation of the processing place started just from October 2009, resulting in delay of procurement of processing equipment.

Timing of Activity: Due to delay of the rehabilitation of processing place and the procurement of processing equipment, the first year's operation of dried food processing had to be canceled and the farmer members lost their income generating opportunity in 2009. According to the action plan of the AF, which was developed at the kick-off workshop held on April 11, 2009, the AF members start their processing and marketing activities from autumn 2009, and review the 1st year's operation during winter to acquire successful result in 2010. In conclusion, it must be said that the lengthy delays of the 1st year's project activities cause the delay of achievement of the project purpose within the projected period.

As a result, acquiring certifications of the processed products is not yet conducted by the time of final evaluation. The procedure may take a certain period with some amount of cost to keep sanitary friendly environment at the processing factory. Also, it is necessary for the AF members to learn about the importance of hygienic practice. After determined their principal commodities, they have to follow the necessary steps to acquire the certification from the Uzbekistan Standard and the sanitary authorities.

Investment Cost: The total investment cost of the processing activity is 24,540 thousand sums, which is composed of; 1) 35,423 thousand sums for processing equipment, 2) 30,051 thousand sums for building rehabilitation, 3) 4, 119 thousand sums for shallow well installation, and 4) 2,947 thousand sums for office equipment. The investment cost can be compensate within 6 years if the AF successfully operate their processing and marketing activities based on the business plan. In this regard, project cost for the processing activities is enough reasonable comparing with the project output.

4) Impact

Spillover effect: Other farmers in Nukus district faces the same problem as the one target group faces. Nukus district had been a production center of vegetables and fruits during Soviet era, but most vegetable and fruits growers cannot receive enough support from the government due to its policy of overriding priority on cotton and wheat production. Therefore, once the firm can establish a business model to make profit from the collective marketing and processing of vegetables and fruits, it is enough possible that their business model will be spread over the district. Also, many farmers in the Karakalpakstan faces difficulty in marketing of their agricultural products, and the successful result of

the project can be a good model for the other farmers in the Karakalpakstan.

Employment opportunity: The successful operation of the Agro-firm can generate employment opportunity in the rural Nukus. At the time of the joint production at Khodjeyli Silk Factory, the factory employed 27 labor/days for cutting and 35 labor/days for drying. According to their business plan, when the AF start processing activities of dried apricot and dried apples, they will employ at least 67 labor/days for dried apricot production (June to July) and 75 labor/days for dried apple production (August to September), which provides employment opportunity to the rural residents.

Fostering Entrepreneurship of the AF members: Even though most farmers who attended the kick-off workshop showed their strong interest in the fruits and vegetables processing and marketing, most farmers do not have experience on the activities in recent years. All their expectation is based on the past experiences during the Soviet era, when their VCC was a production center of vegetables and fruits in the entire union. Therefore, when processing and marketing activities of the Agro-firm started, farmers forced to enter the competitive markets, which in turn foster entrepreneurship of farmer members. In Addition, a good business plan enables the Agro-firm to borrow running capital from bank or private investors who want to be involved in their management and contribute equity capital for their operation.

Regional Vitalization: If the Agro-firm can show successful operation of vegetable and fruit marketing and generate enough profit to the members, the local government recognizes their existence value and put more importance on their activities. In addition, other vegetable and fruit growers encourage in their activities, which may result in re-vitalization of the former production center of vegetables and fruits under the Soviet era. Even though there are formidable competitors in the international market such as China and India at present, farmers in the Karakalpakstan still have a comparative advantage toward northern countries including Kazakhstan and Russia, which can provide them business opportunities.

5) Sustainability

Adequacy as a model: As the project title indicated, final goal of the pilot project is to establish a model of the Agro-firm so that other farmers who have entrepreneurship can follow after the 1st Agro-firm in the Karakalpakstan. In this regard, the Taqirkol-Darbent Agro-firm does not yet show effectiveness of their business model since the Agro-firm is still at the initial stage of its operation. However, in the course of the project implementation, the firm accumulates lots of experiences, from establishment of the Agro-firm to making a profit from their activities. Among their experiences, many difficulties such as organizational weakness and unstable utilities as a bottleneck of their operation are included. All these experiences are now in their hand. Therefore, the Taqirkol-Darbent Agro-firm can show how to establish the agricultural marketing organization, and can be a good model to the followers.

When the government expands the Taqirkol-Darbent Agro-firm's experiences to other district, the Business Incubator can be a good guide since the business support organization also shares the firm's experiences as a contractor of the Study Team. The Business Incubator monitored and supervised all project activities, and provided advices from view of business support entity. Therefore, it is recommended that utilizing the Business Incubator's know-how is one of short cut to the successful expansion of the Taqirkol-Darbent Agro-firm's experiences to other district.

Killer Assumption: There is a fear among small-scale vegetable and fruits growers that the local government merges small farm plot to larger farmland to increase farming efficiency, and most core members listed in the Agro-firm's statute faces crucial moment for losing their sedulously fatted land. The fear is based on the government order for land integration, so called optimization, which was implemented by the end of year 2009. If the policy is executed again, the existence value of the Agro-firm, which intends to materialize small-holder's collective marketing, would be lost.

Also, the director of Agro-firm is nominated by the Hakim. At the initial stage of the pilot project, the position had changed four times, due to political reason in some cases. Through this experience, it is enough possible to see that the director of Agro-firm will be changed whenever Hakim is changed. If

the next Hakim changes the Agro-firm director based on his political interest, independency of the Agro-firm could not be kept and sooner or later the firm's healthy management will be lost.

Ownership: At the initial stage of the pilot project, lack of ownership among key staff of the Agro-firm was observed. During the first-year operation, the AF director had been changed four times, and nobody show leadership to the firm's operation. Rather, they often showed a waiting attitude to the Study Team's support until the assignment of the leader farmer to the deputy director. In this regard, assignment of an active leader farmer to the board is a key to activate the Agro-firm. The leader farmer can involve fellow farmers to his operation, which may neuter a sense of ownership among members.

F.7.6 Lesson Learned

(1) Importance to find key person for the AF operation

The strong leadership is quite important particularly at the initial stage of the business. The leader should know well about farmer's main concern, and should represent farmers' interest. For this reason, the leader should be selected among farmer members so that the one can earn members' trust, and hence, earning full support from the members. However, under the current system, Agro-firm director is nominated by the Hakim, and what members can do is just approve the nominated candidates. Accordingly, the past directors did not show positive attitude toward the AF's operation, and could not concentrate in the firm's activities during busy farming season of cotton and wheat. In fact, the AF's director was changed four times during 6 months of the set-up stage, which in turn result in the lengthy delays of the project activities.

However, at the grassroots level, a leader farmer has taken an active role in coordination with farmers in Taqirkol VCC and outside traders for vegetable/ fruits marketing. Many traders from outside regions including Samarkand, Bukhara, and Nukus city try to build up a commercial relationship with him, and he introduces neighboring farmers to the buyers every harvest seasons. Therefore, the leader farmer's active involvement in the firm is inevitable for its activation. When the Study Team recommended nominating him to the board members, the past directors were not happy about it, and also the leader farmer hesitated to participate in since he is not educated. However, he has a business mind in nature and always takes initiative at the farmers meeting. In fact, after his join to the board members, the AF activities started practically. Now he is the deputy director of the AF, and is absolutely necessary person for the AF's operation. It is sure that success of the AF can not obtain without him. Lesson learned from this experience is importance of identifying a key person for the success of agri-business operation.

(2) Necessity of the demand oriented services

According to a marketing research, conducted by the BI and the Study Team on October 2009, demand for fresh vegetables and fruits are extremely high in local market, when we compare with dried vegetables and fruits. Therefore, to maximize farmer members' income, reduction in production loss of fresh products is the extremely important, in addition to process fallen and wormy fruits. In fact, farmer members showed their strong interest in the pest and disease control at the time the study tour to Trutkor.

For this reason, the project added the plant protection activities from the second year implementation. At the time of final evaluation workshop, farmer participants expressed that the most useful activities of the pilot project was plant protection activities including bio-pesticide application and charcoal vinegar production. Also, a young farmer mentioned that he was impressed on the Japanese skills for pruning, grafting, and plant formation at Fergana Research Center. Therefore, to provide demand

oriented services to the farmer members, the Agro-firm should continuously support farmers providing technical advices on production improvement including plant protection, seedlings for the improved variety, and other quality improvement methodologies.

(3) Poor utility conditions in rural Karakalpakstan

Unstable supply of electricity and water is bottleneck of food processing factory in Nukus district. At present, electricity is available only during morning and evening in Taqirkol VCC. Therefore, operation of processing equipment has to be within the limited time. To overcome this drawback, the AF decided to collaborate with other factories located in the better operating environment.

Also, domestic water from public network is available only one hour in Taqirkol. Therefore, the AF had to fix water tank in the processing plant to store water when it is available. The AF has a shallow well near the processing building and is available at any time. However, water quality is quite important for food processing factory to keep products in good sanitary condition. Therefore, the water tank is necessary to keep clean water whenever electricity comes. Working with other factories in the urban area, including Khodjeyli and Amudarya firms, is also one of solution of the problem.

(4) Necessity of production diversification

If the Agro-firm deal with agricultural products, it is necessary to diversify their products to cope against unexpected factor. Dry apricot production was initially planned in June. However, the activity has to be canceled due to the cold wave in March, which damage on 90% of apricot flower. As a result, it is said that market price of apricot (4,500 sums/kg) becomes 20 times higher than the last year (200 sums/kg). The lesson from this experience is necessity of products diversification to reduce management risk against natural disasters.

(5) Ensuring Independence from the Government

Director of Agro-firm is nominated by the Hakim. Therefore, it is enough possible to see that the director of Agro-firm will be changed whenever Hakim is changed. The Agro-firm is neither a political supporter nor a political tool, but a business entity which tries to maximize its profit through executing their activities based on business plan and the contract obligations, and through utilizing their resources rationally and reasonably. This principal is quite important since the firm have to enter into the competitive market where internationally powerful actors engage in fierce competition, otherwise the firm loose its existence value. For this reason, the Presidential Decree # 3709 issued on January 9, 2006, ensures the political independence of the Agro-firm. If the firm receives political interference from the government continuously, the Agro-firm does not work enough, and will be broken down eventually.

F.7.7 Necessity of Modification on the Draft Action Plan

(1) Implementing Body

In the initial action plan, Farmers' Association is included in the working group to take on marketing support. However, the association was not involved in the project activities. Rather, Business Incubator is appropriate to take the role. At the district level, Hakimiyat, the Business Incubator, and board members of the newly established Agro-firm should be included in the working group. In fact, it was found that the Hakim has a great influence at the district level since the Hakim plays a vital role of the legal action and utility issues. On the other hand, in addition to the Council of Ministers, it is important to involve Ministry of Foreign Economic Relations at central level committee, if the firms want to export their processing products. Sanitary authorities and Uzbekistan standard are also

important to acquire official certification of the processed products, and are necessary to involve in the central level committee.

(2) The BI's active involvement to establish Agro-firm in other district

To expand the Taqirkol-Darbent Agro-firm's experiences to other district, the Business Incubator can be a good guide since the business support organization also shares the firm's experiences as a contractor of the Study Team. The Business Incubator monitored and supervised all project activities, and provided advices from view of business support entity. Therefore, it is recommended that utilizing the Business Incubator's know-how is one of short cut to the successful expansion of the Taqirkol-Darbent Agro-firm's experiences to other district.

F.7.8 Follow-up of the Pilot Project

Even though the Taqirkol-Darbent Agro-firm could gain their first profit in 2010, their capital accumulation is just started. Through 2 years pilot project, we are sure that the Agro-firm can generate more profit from further activities as described in their business plan. However, it is necessary to support their activities so that the Agro-firm can gain further achievement and strengthen their management bases. For this reason, the follow-up activities are required to the government including the Council of Ministers and the Hakimiyat as follows;

- Keep monitor impact of the optimization policy on the Agro-firm operations is quite important in view of sustainability of the AF's operation.
- Entering into contract with electricity, water and gas companies, which are tasks of the Agro-firm, are not yet completed due to the complicated procedures. The Hakimiyat promised that they will support the contract procedures and ensure stable supply of utilities to the Agro-firm.
- Acquisition of sanitary and other certification of the processing facilities and products from the relevant authorities is necessary to market the AF's products to the markets.

Also, it is recommended that the project experiences to establish the model Agro-firm should expand to other areas in Karakalpakstan, where many small scale farmers are waiting to start collective marketing to generate more profit from their agricultural products. For this purpose, the Council of Ministers and the Hakimiyats should jointly take initiative to establish Agro-firms in other areas. The Business Incubator of Karakalpakstan is an ideal support institution to expand the project's experiences to other Agro-firms.

F.7.9 Business Plan of Agro-firm

to organize agro-firm activities aimed at increasing economic prosperity of member-farmers

Name of Firm:	Agro-firm TAQIRKOL-DARBENT
Legal address:	Uzbekistan, The Republic of Karakalpakstan, Nukus District, VCC "Taqirkol"
Legal registration	Certificate of State Registration as legal entity № 1543 under registry № 1357, given on June 26, 2009 by Registration Inspection of Nukus District Hakimiyat, the Republic of Karakalpakstan
INN (ID number of taxpayer)	301238381
Statistic codes	ОПФ-1152, ФС-142, ОКПО-22641811, ОКОНХ-18152
Serving bank	Akmangit Department of Agrobank, MFO- 00595
Bank account	№ 20 20 8000 704 788 946 001
Number of members in registration period	20 person
Authorized capital	1,450,000 UZ soums
Director	Bakhtiyar Tajimuratov (Executive Director)
Address:	Uzbekistan, The Republic of Karakalpakstan, Nukus District, VCC "Taqirkol"
Contact phone:	487-60-51

1. Project Summary

Agro-firm TAQIRKOL-DARBENT was established (registered) on June 26, 2009, composed of 20 initial members-farmers of VCC Taqirkol. Predecessor of the firm was "TAQIRKOL Agro-firm" which was established in 2006 and had succeeded to receive major properties of former Wornek Shirkat, including storage house, icehouse, and office building. Currently, the above mentioned major properties are going through the stage of repair-and-renewal operations.

The firm is located in the economic center of producing vegetables and fruits in the Karakalpakstan. The main products of local farmer and dehkan (peasant) enterprises are fresh vegetables, such as tomato, cucumber, pumpkin, cabbage, carrot, onion, potato, watermelons, melons and gourds, as well as fruits like apples, pear and grapes.

The main project services of TAQIRKOL-DARBENT Agro-firm are:

- provision of technical training for vegetable/fruits production
- manufacturing dried vegetable/ fruits
- joint marketing of dried/fresh vegetables and fruits.

Through providing these services to farmer members, the firm will increase economic welfare of the members.

2. Profile of the firm

(1) Mission/ Goals

The Agro-firm is established based on the presidential decree #3709, “Deepening Measures on Economic Reforms in Producing Fruits, Vegetables and Grapes”, dated on January 9, 2006. According to law for “the rules on the establishment of agro-firms in the sector of fruit, vegetable and grape growing and regulation of its activities”, an attachment to the decree of the Cabinet Ministry of Uzbekistan, as of March 10th 2006, number 42, the Agro-firm is considered as a legal entity whose main activities are as follows:

- Production-preparation, transportation, storage and processing of fruits, vegetables and grapes, as well as their sale in an internal and external markets
- Introduce the firm members to modern technologies of production and processing
- Conduct market research, as well as determine the preferential production volume of fruits, vegetables, and grapes
- Creation of appropriate technologies and cooperation systems
- Extend the export potentials and involving investors
- Provide job opportunities to community members

The main mission of the TAQIRKOL-DARBENT Agro-firm is “to increase economic welfare of member farmers through providing above services”.

(2) Properties for the start of the project up to the proceeding of funding.

Type of Property*	Economic Value (remained cost in thousand sums)	Specification
Office Building	28,066,000 (processing factory)	Managers' room, meeting room, processing factory (Shared with mini-bank and other public entities)
Processing Equipment	33,079,000	Dryer, Slicer/Cutter, Generator Diesel, Washing Sink, Sealer Impulse, Working Table, Scales Electric
Office Equipment	2,946,700	Personal Computer, printer, copy machine and set of stationery

*: Land, storage, building, Vehicle, tractor and etc.

3. Services and Products

(1) Type of Services

Type of Services*	Description
Technical training	Technical training on pest control, quality improvement
Processing	Processing of dried vegetables and fruits, will be made in the availability of technological line via external input
Joint Marketing	Joint marketing of dried and fresh agricultural products

*: Processing, Marketing, Training, Input procurement, Business consulting, etc.

(2) Name of Products

Name of Products	Description (processing method)
Dried vegetables/ fruits	Apples, pumpkin, carrot and etc. will be dried in a proportion of 100 % raw product - 15 % output of ready production. Produced in seasonal period (June-November) based on the supply of agro-firm members and sold in non-seasonal period. There is a possibility of partial export with the help of broker-traders
Fresh vegetables/ fruits	Tomatoes, cucumbers, pumpkin, cabbage, carrot, onion, potatoes, melons, watermelons, apples, pears, grapes. Collected and sold in seasonal period based on the supply of agro-firm members

Name of Products	Raw Products	Suppliers	Supply/Purchase Amount (kg)	Price for supplied/purchased raw product (thousand soums)		Method of payment
(products)				Unit	Sum	
Dried apple	Apple	Firm members	10,000	300,0	3,000,0	Cash
Dried Pumpkin	Pumpkin	Firm members	10,000	200,0	2,000,0	Cash
Dried carrot	Carrot	Firm members	20,000	100,0	2,000,0	Cash
Total:			43,000	x	7,000,0	

(3) Flow Diagram of Processing Process

(Please see page 11, Technological Scheme)

(4) Necessary project equipment for processing/drying of vegetables and fruits

Name of Equipment	Measuring unit	Amount	Power consuming	Production capacity
Washing machine (complete)	Set	3	-	500 kg/hour
Slicer (to small pieces)	Pc	1	3,0 kVt/hour	500 kg/hour
Work table	Set	1	-	500 kg/hour
Dryer (complete)	Set	1	4,9 kVt/hour	80 kg/cycle
Electronic scales	Pc	1		
Packing equipment	Pc	1	0,6 kVt/hour	240 kg/hour
Diesel generator	Pc	1	0,3 liter/hour	10 kilowatt/hour

The equipment cost in Uzbekistan sums including transportation costs is 40,000,000 sums.

(5) Price Setting (calculations are in the attachment)

Name of Products	Preferable output price (sums/kg)	Basis of Price Setting
Dried apple	5000,00	Production prime cost + profit
Dried Pumpkin	4000,00	Production prime cost + profit
Dried carrot	1500,00	Production prime cost + profit

4. Marketing plan

(1) Target Markets/ Customers

1. Nukus City : fresh vegetables and fruits, dried products
2. Other regions (Samarkand, Bukhara): apples, tomatoes
3. Foreign countries (Kazakhstan): dried products

(2) Market/ Customer Profile

Based on the experiences of farmer members, the main market and customers' preferences of each market are summarized as follows.

Market/ Customers	Profile of the Customers
Nukus City	Customers prefer fresh vegetables and fruits. Most dried fruits come from other regions. Consumers have no custom to consume dried vegetables. However, in winter and spring period, price for fresh vegetables and fruits increases up to 5-6 times
Samarkand	Demand for apples to produce fresh juice
Bukhara	High demand for fresh tomatoes
Kazakhstan	High demand for fresh vegetables/ fruits High demand for dried vegetables/ fruits (vegetable soup)

Russia is also considered an ideal market of dried vegetables. According to an entrepreneur who has an experience of manufacturing dried vegetables and marketing to Russian market, Russian buyer and their usage are summarized as follows.

Demand for Dried Vegetables in Russia

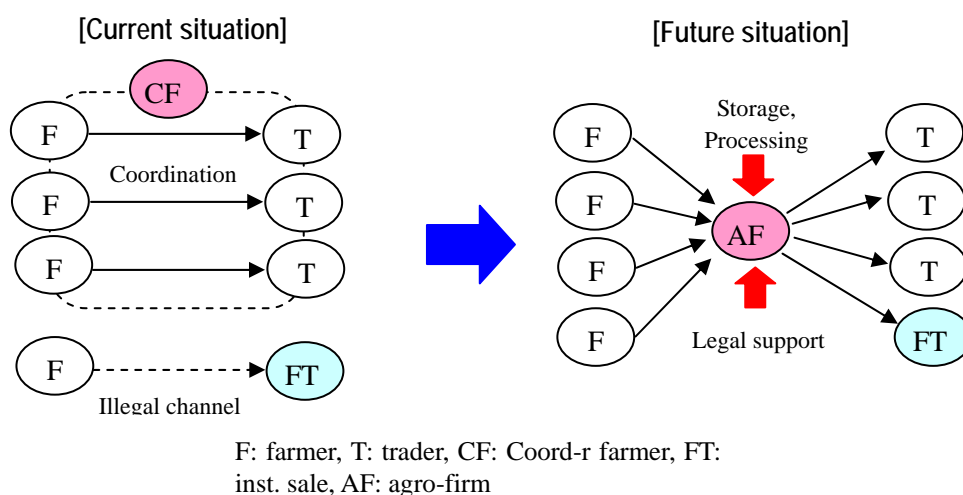
	Products	Usage in producing a product	Buyer	Form
1	Onion	Ketchup, porridge, Bouillon Cube, Soup, Noodle	Factory (Ketchup, Soup, can, Sausage, Noodle)	Chopped
2	Carrot	Ketchup, Soup, Noodle	Factory (Ketchup, Soup, can, Noodle), Consumer	Chopped
3	Paprika	Ketchup, Soup, Noodle	Factory (Ketchup, Soup, can, Noodle) , Consumer	Chopped
4	Beet	Noodle, Borscht	Military, Correctional institutions, Noodle factory, Consumers	Chopped
5	Cabbage	Soup, Noodle	Military, Correctional institutions, Noodle factory	Chopped

Source: Former Director of Dried Vegetable factory

(3) Marketing channel

[Marketing channel]

At present, all transactions in Taqirkol VCC are conducted on an ad hoc basis. When traders want to purchase vegetables and fruits from Taqirkol VCC, the traders make a call to the coordinator farmer who arranges the trade individually. The traders carry the products by themselves to large markets, including Nukus city, Samarkand, Bukhara, and even foreign countries such as Russia and Kazakhstan.



[Types of Contract]

No contracts exist in the current transaction. The Agro-firm has a plan to enter into contracts with farmer members through buying 50% of members' products aiming at establishing the confidence-based trade with farmers and outside traders. The current transaction system, transacted individually, makes the coordinator farmer difficult in collecting enough amounts of products to meet the traders' request. If the firm can grasp transaction amount of the year in advance, the firm could coordinate the trade easier, and could establish trust-based relation with outside traders.

[Transportation Means]

Woven sacks procured by farmers, or plastic containers provided by traders are the main means of transportation. All products are carried by track arranged by traders.

(4) Marketing plan

Name of Products	Market/ Customer	Transportation Means	Volume of Sales	Date of Delivery
Fresh vegetables	Nukus, other regions	truck (Trader)	200	w/in season
Fresh apples	Nukus, other regions (Samarkand)	truck (Trader)	40	w/in season
Fresh tomatoes	Nukus, other regions (Urgench)	truck (Trader)	400	w/in season
Dried apples (test)	Nukus, other regions	Damas (van)	1,5	Out of season
Dried pumpkin (test)	Nukus, other regions	Damas (van)	1,5	Out of season
Dried carrot (test)	Nukus, other regions	Damas (van)	0,3	Out of season

(5) Strategic Alliance/ Institutional Support

Institution (organization)	Detail of Support
Business Incubator	Technical training (business planning, marketing, accounting)
Tashkent Agricultural Univ.	Technical training (pest control)
MAWR	Technical training (crop production)
Nukus District Hakimiyat	Ensure stable supply of gas, electricity, and water. Legal affairs

(6) Sales Promotion/ Advertising

Entrusting traders of both domestic and foreign markets, marketing test of dried vegetables/ fruits will be carried out on October and November. Through the test marketing, promising markets will be identified, and promotion plan will be formulated.

(7) Competition

[Competitors Profile]

Competitors of fresh vegetables and fruits in domestic markets and other production area including Samarkand, Surhandarya, Kashkadarya, and Andijan, where condition of agricultural production (availability of irrigation water, etc.) and hence, quality of products are better than that of Karakalpakstan. Besides, the quality of dried fruits, including apricot and raisin, are better in Samarkand than in Karakalpakstan.

[Competitive Advantage of the firm]

The firm can provide fresh vegetables to Nukus city at cheaper price, since the firm is located only 20 minutes away from the center of Nukus city and transportation cost is also cheaper. Also, fresh vegetables and fruits in Karakalpakstan have a comparative advantage against northern countries, such as Kazakhstan and Russia, since its climate condition is warm.

(8) Risk

It must be noted that the government of Karakalpakstan strictly controls the export of fresh vegetables and fruits since supply of these products to domestic market is not enough. In its turn, this results to skyrocket of fresh products during short supply period.

Production: Sales volume

№	Name Sales volume	Quarterly indicators in tons				
		1	2	3	4	TOTAL
1	Fresh vegetables / fruits	0	0	100	100	200
2	Fresh apples	0	0	20	20	40
3	Fresh tomatoes	0	0	400	0	400
4	Dried apple (test)	1,0	0,5	0	0	1,5
5	Dried pumpkin (test)	1,0	0,5	0	0	1,5
6	Dried carrots (test)	0,1	0,2	0	0	0,3
Total		2,1	1,2	620	120	643,3

Production : Price setting

№	Name Sales volume	Quarterly indicators in sums/kg				
		1	2	3	4	TOTAL
	Seasonal prevalence	not season	not season	season	season	X
1	Fresh vegetables	0	0	100,00	300,00	X
2	Fresh apples	0	0	400,00	500,00	X
3	Fresh tomatoes	0	0	100,00	0	X
4	Dried apple (test)	5000,00	5000,00	0	0	X
5	Dried pumpkin (test)	4000,00	4000,00	0	0	X
6	Dried carrots (test)	1500,00	1500,00	0	0	X

Production: Expected income

№	Name Sales volume	Quarterly indicators in thousand sums				
		1	2	3	4	TOTAL
1*	Fresh vegetables	0	0	2,000,0	6,000,0	8,000,0
2*	Fresh apples	0	0	8,000,0	10,000,0	18,000,0
3*	Fresh tomatoes	0	0	40,000,0	0	40,000,0
	Subtotal for fresh vegetables and fruits	0	0	50,000,0	16,000,0	66,000,0
4	Dried apple (test)	5,000,0	2,500,0	0	0	7,500,0
5	Dried pumpkin (test)	4,000,0	2,000,0	0	0	6,000,0
6	Dried carrots (test)	250,0	500,0	0	0	750,0
	Subtotal for dried vegetables and fruits	9,250,0	5,000,0	0	0	14,250,0
7	TOTAL	9,250,0	5,000,0	50,000,0	16,000,0	80,250,0

5. Business schedule (Action plan for first year operation)

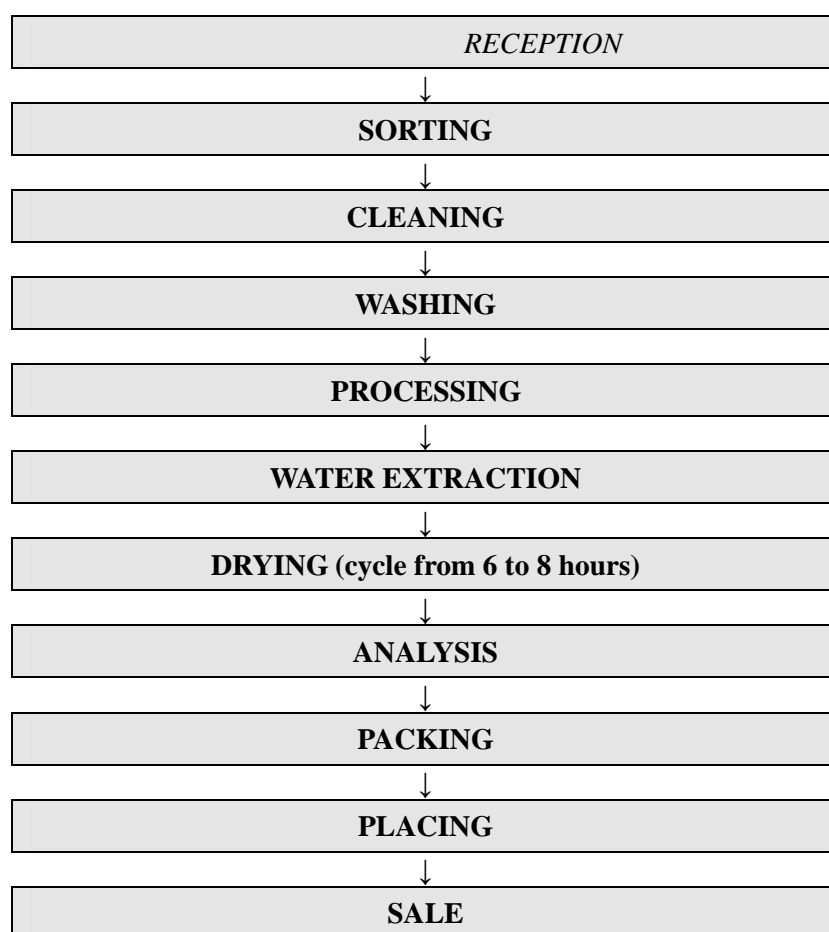
Actions	January	February	March	April	May	June	July	August	September	October	November	December
Business Planning												
Contracting w/ farmers												
Procurement of raw materials												
Processing												
Payment												

ATTACHMENTS

PRODUCTION PROCESS

- (1) Received fruits for processing initially go through assortment, discarding rotten and damaged fruits (output 90% from gross harvest).
- (2) After a thorough sorting, fruits will be placed to the basin of washing machine, where undergo an intensive washing (80 kg, 20 minutes, 300 liters for 3 basins)
- (3) Taking out the product will be done manually.
- (4) Selected fruits will go to primary processing, special cleaning, remove the peeling, fruit stem, cutting, removing the seeds and core parts. Along with mechanized method, manual labor is also applied.
- (5) At the same time it can be processed with lemon or ascorbic acid. The norm of keeping sulfur in the product contains 10 mg/kg (2.000 ppm SO₂).
- (6) Prior putting to drying cabinet, water is extracted from the surface of fruits.
- (7) Drying is proceeded in one cabinet-dryer in 20 racks under 1200-1500 C temperature during 1 cycle (from 6 to 8 hours depending on raw product type). After drying, remained humidity and number of preservatives are measured, weighed, packed to plastic packages, sack or to cardboard boxes, and stored in the facility under constant temperature and humidity.
- (8) Water supply – up to 0,3 cube meters per hour
- (9) Demand for raw product – up to 80 kg of natural fruits per shift.
- (10) Demand for raw product in 3-shift work – up to 240 kg of natural fruits per shift.
- (11) Output of ready product – 15 % - 12 kg of dried fruits per shift
- (12) If 3-shift work applied – 36 kg per day (24-hours)
- (13) Average total consuming of electricity on this project up to 5,5 kilowatt/hour
- (14) If 3-shift work applied – not more than 15 kilowatt per day (24-hours) subject to factual usage of line components.
- (15) Required number of personnel to equipment:
 - 6 workers to 3 shifts. Hereby, procurement of raw product for drying will be done in 1 shift by 3 workers, in the rest of shifts 1 worker will work under special duty schedule (observer)
 - 2 workers management board and administration

Technological Scheme



PROJECT STAFF SCHEDULE

№	Name of staff unit by production type	Number of person	Fund for monthly salary with charge of single social deduction in 25 %, coefficient for region and other benefits for workers of the sphere (sums)	
			Per person	For all workers in season
1	Administrative management personnel			
1.1	Production Manager	1	250 000	250 000
1.2	Supply- Sales Manager	1	150 000	150 000
1.3	Subtotal on AMP	2		400 000
2	Production personnel			
2.1	Master Technologist	1	250 000	250 000
2.2	Worker	5	150 000	750 000
2.3	Subtotal on PP	6		1 000 000
3	TOTAL on APM + PP	8		1 400 000

Exception : The project has planned to organize labor of production personnel in 3 shifts, not more than 8 hours per day in seasonal period for 6 months per year (Drying of products)

Fixed manufacturing cycle of production:

Working day – 1 shift – 8 hours with a glance of technological and regulatory breaks

Working week – six days

Working year – 180 calendar days from June to November of calendar year

SUMMARY ESTIMATION OF OPERATING COSTS ON DRYING

Name of indicators	Indicators for average production year (6 months) In thousand soums
Production expenses	
Raw product for production of dried fruits and vegetables in annual calculation (supplied by agro-firm members)	Ignored
Transportation for their delivery	500,0
Electricity upon estimation of total power of energy consumers in 15 kilowatt per day (24-hours), in applying of coefficient K= 1,05 considering lighting and other household appliances by price 60,4 sums per kilowatt to 180 days	171,0
Depreciation of major assets	Ignored
Maintenance of major assets	Ignored
Salary of production personnel (6 months per annum)	6,000,0
Other auxiliary production expenses (certification, technology, container, packing)	329,0
Period expenses	7,000,0
Administration salary (6 months per annum)	2,400,0
Logistic and stationary expenses, mobile communication, Internet with an estimation of 25,000 sums per month	150,0
Labor protection and TB, working clothes by norms of sphere, with an estimation of 25,000 sums per season to 6 workers	150,0
Services of bank and third parties, insurance, container, including expenses on sales fresh vegetables and fruits	2,300,0
Total operating costs	12,000,0

SUMMARY OF PROJECT FINANCIAL INDICATORS in thousand sums

Name of indicators	Investment period	Average year after launching the project
Circulating capital for the beginning of the period (input from Authorized capital)	1,450,0	1,450,0
Input via JICA line		
For purchase of equipment	40,000,0	0
For project development, including renovation of OS, property	31,150,0	0
Income from production – gross income	0	
From sales of fresh vegetables and fruits, tax base in 2 %	0	66,000,0
From sales of dried vegetables and fruits, tax base in 8 %	0	14,250,0
Total income		80,250,0
Taxes		
By 2 % rate per annum for trading enterprises from gross income for sales of fresh vegetables and fruits	0	1,320,0
By 8 % rate per annum from gross income for sales of dried vegetables and fruits, considering privileges to re-established enterprises	0	0
Total taxes	0	1,320,0
Profit after taxes	0	78,930,0
EXPENSES		
Purchase of technological equipment	71,500,0	0
Transportation for delivery of raw material for production of dried vegetables and fruits	0	500,0
Production electricity	0	171,0
Salary for production personnel	0	6,000,0
Other auxiliary production expenses	0	329,0
Salary for administration	0	2,400,0
Logistical and stationary expenses, communication	0	150,0
Labor protection and TB, working clothes	0	150,0
Services of bank and third parties, container including expenses on sales fresh vegetables and fruits	0	2,300,0
Contingencies, price difference, liquidation of Private Enterprise	0	930,0
Total expenses	71,500,0	12,930,0
Net income of period	1,450,0	66,000,0
Distribution of net income to Project participants	0	60,000,0
Circulating capital at the end of the period (discount profit)	1,450,0	6,000,0

Attachment 1. Technical Specification of Processing Equipment

Equipment: Dehydrating Mini-Plant for Vegetables and Fruits		Q'ty : 1 set
Purpose of Use: To dehydrate sliced vegetables and fruits, especially for apple, and package in conformity with UZ GOST		
Contents of Equipment: One (1) set of Dehydrating Mini-Plant for Vegetables and Fruits shall be consisted of the following equipment:		
		1 unit
Item No. 1	Dehydrator	1 unit
Item No. 2	Washing Sink	1 unit
Item No. 3	Vegetable and Fruit Slicer/Cutter	1 unit
Item No. 4	Working Table	1 unit
Item No. 5	Electric Weight Balance	1 unit
Item No. 6	Impulse Sealer	1 unit
Item No.7	Diesel Generator with Automatic Voltage Regulator (AVR)	
General Specifications:		
1. Dehydration Area		8m ² or more
2. Input of Fresh Fruit (Apple):		From 56 kg/cycle to 80 kg/cycle in sliced apples, or better
3. Package:		Up to 400mm in width of polyethylene packs with 0.5kg contents, or better
4. Moisture Contents of Fresh Fruit (Apple):		80-90%
5. Moisture Contents of Dehydrated Fruit (Apple):		Maximum 10% to minimum 5%
6. Heating Source:		By electricity
7. Total Power Consumption:		Approximately 8 kW
8. Power Source:		Operable on 3-phase, 380V and 50Hz or 1-phase, 220V and 50Hz
Notes: All necessary materials for installation such as power cables from main breaker of the building, C-type adapters, necessary pipes, bolts and nuts shall be provided. Test run and final inspection shall be conducted at the site. Training materials such as instruction manuals in Russian shall be provided.		

Item No. 1	Dehydrator	Q'ty : 1 unit
Country of Origin: Taiwan	Manufacturer and Model: Chi-Tien Industrial, CT-120	
Purpose of Use: To dehydrate sliced vegetables and fruits, especially for apple		
Technical Specifications:		
1. Type of Drying Body:	Cabinet type	
2. Capacity:	Minimum 56kg and maximum 80kg per cycle in sliced apple	
3. Heating Element:	By electricity using infrared ray heater	
4. Thermostat:	Equipped for control of temperature at 120°-150° with timer	
5. Drying Area:	Total 8m ²	
6. Tray:	Mesh type, 20pcs	
7. Air Circulation:	Equipped with air fans for homogenous dehydrating process	
8. Internal Walls and Door:	Insulated	

9. Power Consumption:	3.9 kW
10. Power Source:	Operable on three phase, 380V and 50Hz
11. Overall Dimension:	970mmL×740mmW×1800mmH
12. Weight (with pack):	418 kg
13. Material of Body:	Made of stainless steel SUS304
14. Material of Tray:	Made of stainless steel SUS304
15. Dimensions of Tray:	660mmL×660mmW×20mmH
16. Numbers of Tray:	Mesh type, 20pcs

Item No. 2	Washing Sink	Q'ty : 1 unit
Country of Origin: Uzbekistan	Manufacturer and Model: East Butterfly JV, VMP-6-3	
Purpose of Use: To wash fresh vegetable and fruit in hygienic method before processing		
Technical Specifications:		
1. Sink Partition:	3 basins in set	
2. Dimensions of Each Sink:	500Wmm×600Lmm×300Dmm	
3. Overall Dimensions:	2070Wmm×800Lmm×870Hmm	
4. Water Faucet:	Equipped with each basin	
5. Weight:	50kg	
6. Material:	Made of stainless Steel SUS304	

Item No. 3	Vegetable and Fruit Slicer/Cutter	Q'ty : 1 unit
Country of Origin:Taiwan	Manufacturer and Model: FS-400	
Purpose of Use: To slice and cut fresh vegetables and fruits in suitable size before dehydrating		
Technical Specifications:		
1. Application:	Equipped with slicing and cutting parts for hard fruits	
2. Cutting Size:	Adjustable on 3-25 mm in thickness	
3. Material of Contacting Parts with Foods:	Made of stainless steel SUS304	
4. Material of Cutting Blades:	Made of stainless steel SUS403	
4. Operating Capacity:	400 kg/hr	
5. Power Consumption:	3kW	
6. Power Source:	Operable on three phase, 380V and 50Hz	
7. Overall Dimensions:	1020 Wmm×780 Lmm×1300 Hmm	
8. Weight:	150kg	

Item No. 4	Working Table	Q'ty : 1 unit
Country of Origin: Uzbekistan	Manufacturer and Model: East Butterfly JV, SPRO-7-4	
Purpose of Use: To use for packaging or other general works		
Technical Specifications:		
1. Type:	Industrial use for food processing and flat type	
2. Size:	1900Lmm× 600Wmm×850Hmm	
3. Plate:	Double plates	
4. Weight:	52kg	
5. Material:	Made of stainless steel SUS304	

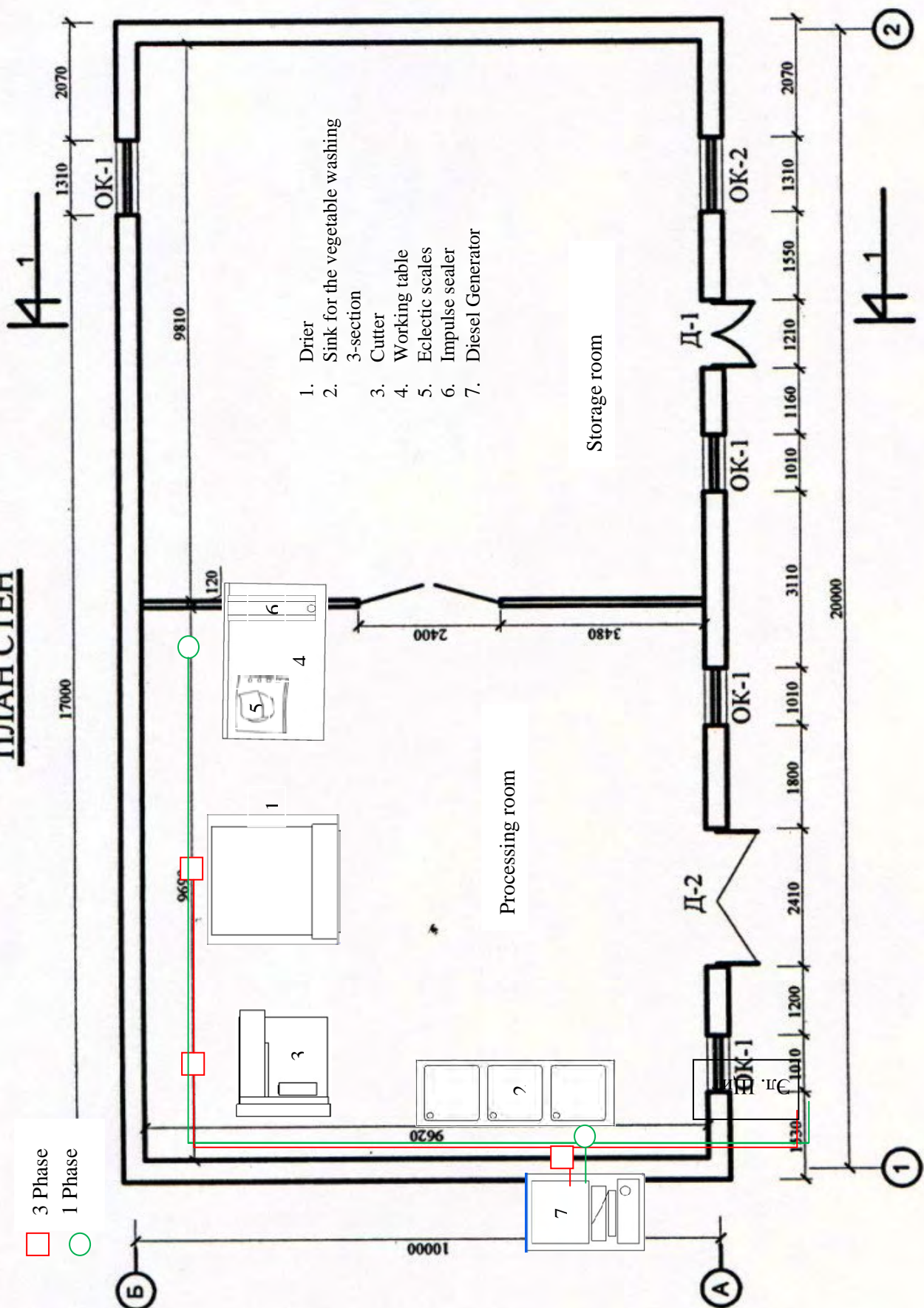
Item No. 5	Electric Weight Balance	Q'ty : 1 unit
Country of Origin: Russia	Manufacturer and Model: Polaris, PKS 0618D	
Purpose of Use: To weigh dried vegetables and fruits for packaging		
Technical Specifications:		
1. Type:	Electric desk-top type and portable	
2. Maximum Measuring Weight:	6kg	
3. Minimum Reading Scale:	0.001kg	
4. Accuracy:	±0.1g	
5. Power Consumption:	10V, equipped with automatic switch-off function	
6. Power Source:	Operable on single phase, 220V and 50Hz and batteries	
7. Overall Dimensions:	400Wmm× 400Lmm×60Hmm	
8. Weight:	2kg	
9. Materials of Top Table:	Made of stainless SUS304	

Item No. 6	Impulse Sealer	Q'ty : 1 unit
Country of Origin: China	Manufacturer and Model: PFS 400	
Purpose of Use: To seal and package dried vegetables and fruits into polyethylene bags		
Technical Specifications:		
1. Sealing Package Type:	Various kinds of plastic film bags	
2. Heating Time:	Adjustable, up to 2 seconds	
3. Applicable Thickness:	0.2 mm	
4. Power Consumption:	0.6 kW	
5. Power Source:	Operable on single phase, 220V and 50Hz	
6. Sealing Length:	Min 400 mm - Maximum 500 mm	
7. Weight:	4kg	

Item No. 7	Diesel Generator with Automatic Voltage Regulator	Q'ty : 1 unit																												
Country of Origin: China	Manufacturer and Model: Wuxi Kipor Power LTD, KDE12EA3, DG-10																													
Purpose of Use: To supply power to motors and heaters for Dehydrator and other equipment during blackout of commercial power source																														
Technical Specifications: <table><tr><td>1. Rated Voltage:</td><td>400 V</td></tr><tr><td>2. Ampere:</td><td>14.4 A</td></tr><tr><td>3. Frequency:</td><td>50 Hz</td></tr><tr><td>4. Rated Output:</td><td>8.0 kW</td></tr><tr><td>5. Maximum Output:</td><td>10.0 kW</td></tr><tr><td>6. Rated Rotating Speed:</td><td>1500 rpm</td></tr><tr><td>7. Phase:</td><td>3φ</td></tr><tr><td>8. Power Factor:</td><td>0.8</td></tr><tr><td>9. Insulation Class:</td><td>F class</td></tr><tr><td>10. No. of Pole</td><td>4</td></tr><tr><td>11. Type of Generator:</td><td>Silent type</td></tr><tr><td>12. Control System:</td><td>Equipped with AVR (Automatic Voltage Regulator)</td></tr><tr><td>13. Control Panel Display:</td><td>Digital</td></tr><tr><td>14. Fuel Tank Capacity:</td><td>25 liter</td></tr></table>			1. Rated Voltage:	400 V	2. Ampere:	14.4 A	3. Frequency:	50 Hz	4. Rated Output:	8.0 kW	5. Maximum Output:	10.0 kW	6. Rated Rotating Speed:	1500 rpm	7. Phase:	3φ	8. Power Factor:	0.8	9. Insulation Class:	F class	10. No. of Pole	4	11. Type of Generator:	Silent type	12. Control System:	Equipped with AVR (Automatic Voltage Regulator)	13. Control Panel Display:	Digital	14. Fuel Tank Capacity:	25 liter
1. Rated Voltage:	400 V																													
2. Ampere:	14.4 A																													
3. Frequency:	50 Hz																													
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5. Maximum Output:	10.0 kW																													
6. Rated Rotating Speed:	1500 rpm																													
7. Phase:	3φ																													
8. Power Factor:	0.8																													
9. Insulation Class:	F class																													
10. No. of Pole	4																													
11. Type of Generator:	Silent type																													
12. Control System:	Equipped with AVR (Automatic Voltage Regulator)																													
13. Control Panel Display:	Digital																													
14. Fuel Tank Capacity:	25 liter																													

15. Fuel Consumption Rate:	285 / 297 g/kWh
16. Continuous Operation:	7 hours
17. Noise:	72 dB or less at 7m distance
18. Overall Dimension:	1030×600×790 mm (L×W×H)
19. Weight:	200 kg
20. Engine:	
20-1. Type:	2-cylinder, 4-cycle, diesel engine
20-2. Engine Oil:	SAE (Society of Automotive Engineers) 10W30
20-3. Engine Oil Capacity:	2.27 liter
20-4. Cylinder Diameter and Piston Stroke:	2-80 mm×79 mm (cylinder number 2 80 mm diametre x piston stroke 79 mm)
20-5. Piston Displacement:	794 ml
20-6. Rated Output:	10 kW at 1500 rpm
20-7. Compression Ratio:	21.5 : 1
20-8. Engine Starting System:	Electronic ignition starter
20-9. Cooling System	Water cooling
20-10. Radiator Capacity:	2.9 liter

ПЛАН СТЕН



F.8 Environmental and Social Considerations

F.8.1 Monitoring of Environmental and Social Aspects

Most of the activities of the Pilot Projects are oriented towards establishment / strengthening of organizations. Furthermore, activities concerning installation / rehabilitation of facilities have been limited to considerably small scale. Therefore, the overall negative impacts by the pilot projects were expected to be relevantly small.

However, in order to ensure that the outcomes of the Pilot Projects meet the results of environmental studies, a set of monitoring plans has been prepared in January, 2009. These plans have been further modified based on the proceedings and the changes of project contents. Monitoring activities that were finally applied are indicated in the following.

Environmental Monitoring Activities

Pilot Project	Item to be monitored	Index	Method	Responsibility
Dairy Promotion Package Project (including small-scale milk processing)	- Milk processing facility is equipped with simplified septic tank of appropriate size	Facility Plan Operation status	Check facility plan Site reconnaissance	Local consultant / the Study Team
	- Facility cleaning plan is prepared and executed as appropriate	Situation of facility cleaning plan Situation of regular cleaning	Check cleaning plan Check cleaning record	Local consultant / the Study Team
Project for Improving water management in internal canal system and water use in the field	- Contents of construction work is explained to and agreed with local residents	Situation of explanation	Record of explanatory workshops	Contractor / the Study Team
	- Watering of construction sites is being done when necessary during works near residents.	Situation of residential areas	Site reconnaissance	Local consultant / the Study Team
	- Operation of construction machines is limited to daytime of working days	Situation of machine operation	Site reconnaissance	Local consultant / the Study Team
Model Agro-firm Establishment (including small-scale vegetable & fruit processing)	- Vegetable & fruit processing facility is equipped with simplified septic tank of appropriate size	Facility Plan Operation status	Check facility plan Site reconnaissance	Local consultant / the Study Team
	- Waste born in the process of vegetable & fruit processing is appropriately treated, such as by incineration within own premise	Facility Plan Operation status	Check facility plan Site reconnaissance	Local consultant / the Study Team
	- Facility cleaning plan is prepared and executed as appropriate	Situation of facility cleaning plan Situation of regular cleaning	Check cleaning plan Check cleaning record	Local consultant / the Study Team

F.8.2 State Environmental Examination

In the light of the Law on State Environmental Examination (25 May 2000), State Environmental Examination were required for the implementation of the following four Pilot Projects.

Category of Pilot Projects under the Law on State Environmental Examination

Pilot Project	Category
Verification of Improving Internal Canal System and Water Management by WUA*	3: Low Risk
Verification of Improving Water Use and Drainage Condition in the Field*	3: Low Risk
Small-scale Milk Processing component of Dairy Promotion Package	3: Low Risk
Small-scale vegetable & fruit processing component of Model Agro-firm Establishment	3: Low Risk

* “Verification of Improving Internal Canal System and Water Management by WUA” and “Verification of Improving Water Use and Drainage Condition in the Field” were further implemented as a single Pilot Project for Improving water management in internal canal system and water use in the field), taking into regard that they are implemented in the same project site.

State Environmental Examinations for the Pilot Projects were conducted during the period of January – June 2009, and January – March 2010. Approvals of the State Committee for Nature Protection

(SCNP) of the Republic of Karakalpakstan were obtained for all four Projects. All four projects were considered to have insignificant negative impact to the environment due to the nature of the Project Site, and the relatively small scale of activities. In addition, further follow-up or detailed environmental studies are not required under environmental legislation.

Result of State Environmental Examination

Pilot Project	Status	Remarks
Verification of Improving Internal Canal System and Water Management by WUA	Approved (17.03. 2009)	Follow up / further detailed studies not required
Verification of Improving Water Use and Drainage Condition in the Field	Approved (03.06.2009)	Follow up / further detailed studies not required
Small-scale Milk Processing component of Dairy Promotion Package	Approved (06.04.2009)	Follow up / further detailed studies not required
Small-scale vegetable & fruit processing component of Model Agro-firm Establishment	Approved (16.04.2010)	Follow up / further detailed studies not required

F.8.3 Results of Environmental Monitoring

Monitoring on environmental and social aspects of the Pilot Projects were conducted during the period of March 2009 to October 2010, based on the activities indicated in the table of subsection F.8.1.

(1) Dairy Promotion Package Project (including small-scale milk processing)

The physical construction of the facility for small-scale milk production has been completed in February 2010. However, due to technical issues of the processing equipment, regular production of processed milk has been started in early October 2010. Prior to regular production, test production has been conducted several times between June and September 2009, with 100 to 350 lit. of milk for each time. Before test production, the facility was equipped with a simplified septic / infiltration tank with the capacity of approximately 16 m³. During the test production period, the facility has been cleaned before and after each operation. A checklist of cleaning activities has been prepared to maintain the facility in a clean and hygienic condition. Site reconnaissance shows no aspects that may lead to offensive odor or release of critical pollutants. Taking the above into consideration, management of environmental and social aspects of the Dairy Promotion Package Project is evaluated to be carried out in appropriate manner.

(2) Project for Improving water management in internal canal system and water use in the field

As indicated in subsection F.8.1, explanation of construction works have been carried out to the WUA members of Katlaban block. A part of the physical construction (excavation of canals) was done during the presence of the Study Team in Nukus, and the sites were directly observed for monitoring. Taking into regard that the housings were distant from most of the sites, and that excavation was often conducted by temporarily stopping irrigation water, the influence of dust has been minimal. Working ours were only working during day time, with some activities conducted on weekends. Again, taking into regard the distance of work sites and housings, noise was also regarded to have minor influence.

There was one case in October 2009, where one farmer claimed that his trees were harmed due to the construction works of the Pilot Project. Later investigations indicated that the farmer has planted trees in the property of the WUA, and that he had no legal rights for these trees. However, based on discussions made between the contractor and the farmer, two points were agreed on; 1) The contractor will not harm the remaining trees at the extent possible, 2) In order to do so, the contractor will manually excavate a part of the canal with the support of the fermer. These points were carefully followed during the remaining works, and the farmer has not raised any issues ever since.

As for the overall situation, items such as watering during excavation and work restrictions during weekends were not necessarily practiced in a strict manner. However, taking into consideration that the

impact of the activities itself was maintained at a limited level, management of environmental and social aspects of the Project for Improving water management in internal canal system and water use in the field is evaluated to be carried out in appropriate manner.

(3) Model Agro-firm Establishment (including small-scale vegetable & fruit processing)

The installation of facilities for small-scale vegetable and fruits processing has been finished by February 2009. However, due to changes required for product development due to external factors (refer to Section 3.6.1), the facility is still under test run. Processing is done in minor quantities with small amount of waste. So far, a septic tank with the capacity of 1.3M³ has been installed, but the temporary dumping place has not been constructed. The cleaning plan based on regular processing activities is also yet to be prepared. Such items should be prepared if the activities of the Pilot Project are to be continued by the Agro Firm after the completion of this Study.

As for the evaluation during the period of the Pilot Project, the impact of the activities itself was maintained at a limited level, and management of environmental and social aspects of the Model Agro-firm Establishment is evaluated to be carried out in appropriate manner.

Results of Environmental Monitoring

Pilot Project	Item to be monitored	Results
Dairy Promotion Package Project (including small-scale milk processing)	- Milk processing facility is equipped with simplified septic tank of appropriate size	Simplified septic tank installed and operating
	- Facility cleaning plan is prepared and executed as appropriate	No specific cleaning plan Regular cleaning before and after processing activities Use of Hypochlorite salts, Sodium Bicarbonate and household detergent for sterilizing and cleaning
Project for Improving water management in internal canal system and water use in the field	- Contents of construction work is explained to and agreed with local residents	Explanation made in workshop held in March 2009
	- Watering of construction sites is being done when necessary during works near residents.	Residential area not located within 50m from major construction sites.
	- Operation of construction machines is limited to daytime of working days	Operation of machines limited to daytime. Works on weekends occurring at limited extent.
Model Agro-firm Establishment (including small-scale vegetable & fruit processing)	- Vegetable & fruit processing facility is equipped with simplified septic tank of appropriate size	Simplified septic tank installed and operating
	- Waste born in the process of vegetable & fruit processing is appropriately treated, such as by incineration within own premise	Regular works not started. Waste born was several tens of kilograms. This has been buried in site adjacent to facility. Temporary dumping site not constructed.
	- Facility cleaning plan is prepared and executed as appropriate	No specific cleaning plan Regular cleaning before and after processing activities, however, not thoroughly practiced. Claims of neighboring residents on odor when drying onions.

(4) Implementation Status of State Environmental Examination

As indicated in section 2.5.2, the State Committee for Nature Protection (SCNP) of the Republic of Karakalpakstan has provided authorization to all Pilot Projects requiring State Environmental Examination. The commits given by SCNP are summarized in the following table. These results conclude that there are no significant issues for the Pilot Projects under the Environmental Legislation of Karakalpakstan.

Summary of Comments Given by the SCNP

Verification of Improving Internal Canal System and Water Management by WUA*	<p>In process of the rehabilitation work the different type of machinery usages will be expected so the potential environmental impact related to construction.</p> <ul style="list-style-type: none"> - Engine emissions (diesel fuel, gasoline) - Excavation materials (amounts of sediment from canals) - Construction materials (cement dust and others) <p>Project formulation, location, design, implementation, and operation will have no substantial negative environmental impacts. The findings of Environmental Examinations are that a follow-up Environmental Impact Assessment or further detailed environmental impact study is not required. The Project area is not considered environmentally sensitive, and adverse environmental impacts will be minor.</p>
Verification of Improving Water Use and Drainage Condition in the Field*	<p>Expected impacts are:</p> <ul style="list-style-type: none"> - Engine emissions (diesel fuel, gasoline) - Construction materials (cement dust and others) <p>Estimation of environment condition revealed that impact level on air, surface water, soil, animals and plants is insignificant.</p>
Small-scale Milk Processing component of Dairy Promotion Package	<p>With the proper maintaining of all processing equipments and absolute management for the process of reception and storage of raw materials insignificant waste will be formed which can be removed to the special dumping place.</p> <p>Thus, initial Environment Examination shows that by operation small scale milk processing plant there will be no significant adverse environmental impacts to the air, soil, irrigation water, as well as to the fauna and flora at the area.</p> <p>The findings and assessment of the initial Environment Examination for the Pilot Project for Improvement on small-scale agro-processing technologies in VCC Kerder, illustrate that the expected milk processing plant can be function on the selected area on the assumption of necessary utilization measures.</p>
Small-scale vegetable & fruit processing component of Model Agro-firm Establishment	<p>Majority of wastewater and solid waste is formed in the process of cleaning, rinsing, sorting, inter workshop transportation, peeling vegetables and fruits, blanching, conserving in hermetic package, mixing, cooking, as well as during production room cleaning process.</p> <p>Emission to the atmosphere is low, however, in some cases, it is possible to produce some strong odor. Maintenance of equipment shall be in appropriate manners in order to minimize the amount and effect of waste, which shall be temporarily stored before it is sent to the disposal site.</p> <p>Assessment of natural environment conditions indicated that the impact of vegetable and fruit processing workshop to the atmosphere, soil, surface water, fauna and flora will be insignificant, with premise that the above measures are taken.</p>

“Verification of Improving Internal Canal System and Water Management by WUA” and “Verification of Improving Water Use and Drainage Condition in the Field” were further implemented as a single Pilot Project for Improving water management in internal canal system and water use in the field), taking into regard that they are implemented in the same project site.

F.9 Issues found during the Implementation of Pilot Projects

F.9.1 Poor Social Infrastructures

(1) Poor Rural Infrastructure for Agro-industry Development

To avoid the concentration of development activities in Nukus municipality, Pilot Projects are selected in rural area where the main target area of the Study. For the development of agro-industry in rural area, for the improvement of social infrastructure, especially electricity, water and gas supply system, is indispensable.

In the Study Area is not always supplied the electricity for 24 hours. Pump irrigation and processing agricultural and livestock products can not be operated without electricity. Therefore, electric generators were provided for agro-processing and milk processing pilot projects of the Study for uninterrupted electricity supply during processing. Diesel generator operation costs are very high and always face the shortage and raising prices of fuel during the Study.

According to the state electricity supply Nukus district branch, rural electricity supplied from national electricity grid, and distribution volume is limited at 50000 KWH/day. In general, electricity supply in rural area is intercepted 2 hours during lunch time. The distribution priority is set the first category for hospitals and special offices, the second category for milk plant, greenhouse, etc. and third category for agriculture. As for as milk, and agro-processing programs are concerned, they can be supplied electricity depend on the request as the second priority. Government owned Irrigation pumps also can be supplied based on the request during irrigation season.

All of Pilot Project sites, rural water supply system are not installed and only private well is the source of water for living. Rural water supply is operated at some area in Nukus District. Taqirkol VCC, where the agro-processing program locates has rural water supply system connected with national water supply pipeline. It can be connected to the processing factory but its supply is limited only few hours a day and volume is limited.

State owned Gas Supply Company distributes the gas to most villages in Karakalpakstan. Gas pipeline to Kerder, where milk processing plant of the Study locates, is under construction to increase the distribution capacity based on the increased demand.

(2) Improvement of Banking and Short Term Credit System

According to the Government regulation for the financial means of technical assistance, grants and humanitarian assistance of foreign governments and non-government organization, the payment of transferred to Uzbekistan contractor by donor country or organization shall be monitored by the Grant Committee of the Government (hereinafter referred to as “the SGA system”).

Under the SGA system, it is required minimum one month to withdraw from their special bank account after received transferred disbursement of contracts from the headquarter of Study Team in Tokyo. This two to three months waiting the approval is big damage for the project to be completed within short period such as this Pilot Project of JICA. This caused the delay of projects/activities with the sub-contractors in the Pilot Project who has less stock of saving for required project expenses. It is expected to shorten the assessment period of the Grant Committee and early approval for withdrawal of the sub-contractors from their special bank account. Otherwise, investment of the technical assistance with the short period projects such as the technical cooperation of JICA can not implemented. In order to the smooth implementation of projects, more accessible short term credit of bank will be arranged as a countermeasure for SGA.

For the procurement of equipment from foreign manufacturer such as milk pasteurizer for the Study, there are also difficulties for the Uzbek suppliers or agents for receiving and payment transfer under the Government foreign currency control.

F.9.2 Local Human Resources, Sub-contractors for Project

(1) Capability of Local Human Resources and Sub-contractors

The Study Team conducted Pilot Projects together with 10 subcontractors and 2 suppliers. All of subcontractors are companies/organizations/NGOs located their head office in Karakalpakstan. Through the implementation of Pilot Project, the Study Team found that their staffs have almost sufficient knowledge with high academic carriers to implement their services. But it is necessary to improve their management especially monitoring of the process and accounting with the traceability, accountability and compliances regulations.

1) Subcontractors for Manual preparation and Trial cultivation

Recently, academic researchers in Uzbekistan had less chance to apply their carriers because of the Government policies and budgets. Two Pilot Projects in the Study, on-farm technical manual and trial cultivation, are expected to conduct the project with highly academic knowledge due consideration with the conditions of farmers. Participants are prepared the outputs with their higher academic knowledge. It is found there are sufficient human resources with academic carriers in Karakalpakstan, how to involve them in the regional development shall be considered by the Government.

2) Subcontractors for consulting services

Three sub-contactors for guiding, supporting, training participants and monitoring activities in each Pilot Project have experiences work together with international organization/institutions. Most of them performed almost enough services except on their financial shortage during services under the SGA system of the Government. Until they get permission to withdrawal of their initial payment transferred by the Study Team, their activities were slow and items to purchase material/equipment under their contract could not realized on time. As a result, they could not complete the services before termination date of contracts. Two sub-contractors among them are not familiar with the services, not full understanding the scope of works of the contract and some activities were prepared by the Study Team.

3) Subcontractors of construction

Three engineering subcontractors worked irrigation and drainage and building rehabilitation. Even though they completed the works, but their performances were very low, especially on their quality management of technical and financial. They have not the common sense as a contractor. They did not prepared the construction plan including the arrangement of the human resource, required equipment and material for construction together with fund for expenses. This is one of the reasons the completion delayed together with farmers' cultivation and irrigation. The Study Team held the weekly coordination meetings among sub-contractors together with monitoring subcontractor. It was not effective to implement the construction on schedule. The contractors need more experienced and qualified engineers to control and monitoring their quality and administrations. In case of the large scale construction work is expected contractors shall be selected among national or international contractors. Other major reasons are subcontractors' financial conditions. They have less capacities of their own fund for the project implementation. Under the SGA system, it is required minimum one month to withdraw from their bank account after received disbursement to contracts from the headquarter of Study Team in Tokyo. In order to the smooth implementation of construction, more accessible bank short term credit will be arranged.

(2) Participants and farmers' Organization in the Pilot Project

The Government agriculture reform under the transitional stage and agriculture optimization is underway since 2009. In the Pilot Project Area, several fermers of the Pilot Project participants were lost their agriculture lands in 2009. Fermer participants worry so much they loose their field by the next optimization. It is expected early competition of the agriculture optimization.

Even though many project on the health and sanitary improvement conducted in Karakalpakstan, rural people in the Pilot Project area do not pay attention to the sanitation. Especially on the milk processing

scheme of the Pilot Project, milk processing workers' have less awareness on hygienic for their food processing and processing plant. It needs more health and sanitation health awareness campaign shall be continued in rural area in parallel with the Regional Development Project to be formulated by this Study.

(3) Collaboration with External Resources Persons and Organization for the Rural Development Project

Through the implementation of milk processing program, we found many governmental organizations concerning food processing in Uzbekistan and Karakalpakstan working under the laws on food processing such as Uzstandard, Republican Sanitary and Epidemiology Station, Association for Meat and Milk Products. The Pilot Projects were implemented under the collaboration with relevant organizations. Linkage of these organizations and personal linkage was developed, these experiences will be effective for the further implementation of Regional Development Project

Table F.1.1 Selection of Pilot Projects based on the Criteria (1/3)

Development strategy	Project/ Program	Activities	Items that can be verified within the time span of Pilot Projects	Items that require actual implementation of Pilot Projects	Items that can be verified through small-scale implementation	Activities that do not require institutional reforms	Items to be verified through Pilot Projects
I.1 Improvement of Soil Conditions for Sustainable Production	Establishment of Crop Rotation System and Supply of Manure	1111 Soil survey	-	-	-	-	-
		1112 Development of a comprehensive program	-	-	-	-	-
		1113 Arrangements with the central government	-	-	-	-	-
		1114 Research on alternative crops	-	-	-	-	-
		1115 Expansion of farmland under crop rotation	-	-	-	-	-
I.2 Improvement of Agricultural Technologies and Business Management of Farmer	Improvement of Agricultural Extension Service to Farmer	1211 To establish and manage a committee to develop agricultural technical manuals	Smooth coordination system to implement joint works to develop the manual by concerned agencies	○	○	○	○
		1212 To edit, print and distribute agricultural technical manual (10,000 copies)	Appropriate technical level of the manual to farmers	○	○	○	○
		1213 To train teachers of agricultural collages	Validity of training to teachers of district agricultural collages to deepen their understanding of the manual	○	○	○	○
		1311 To introduce favorable lease system for farmers to procure agricultural tractors	Affordable lease conditions to general farmers in Karakalpakstan	○	○	○	○
I.3 On-Time Planting through Efficient Agricultural Works	Promotion of renewal of agricultural tractors	1312 To renovate workshop facilities and equipments of MTPs	Necessary improvement in business management for the lease company to meet the increased customers	○	-	-	-
		1313 To train technical staff of MTPs	Appropriate training contents to mechanical staff to make them familiar with facilities/equipments and models of tractors	○	○	○	○
		1411 To assist in establishing "One Stop Agro-inputs Shops" (Targets: 10 shops to cover the 11 districts)	Applicable business model to manage an attractive "One Stop Agro-inputs Shop" to local customers	○	○	○	○
		1412 To provide a credit for supporting initial running costs of the "One Stop Agro-inputs Shops"	Effectiveness of FA's consultation activities to bridge producers/agents to "One Stop Agro-inputs Shops"	-	-	-	-
I.4 Improvement of Agricultural Inputs Supply System	Improvement of Accessibility to Agricultural Inputs for Agricultural Producers	1413 To provide consultation about establishment and management of the "One Stop Agro-inputs Shops"	Effectiveness of FA's consultation activities to bridge producers/agents to "One Stop Agro-inputs Shops"	○	○	○	○
		1511 To establish trial and demonstration field equipped with facilities	Appropriate logistic distribution system of inputs from producers/agents to "One Stop Agro-inputs Shops"	-	-	-	-
		1512 To study and research production technologies of melons by joint research	Priority production technologies to be researched and developed for promotion of melons	○	○	○	○
		1513 To produce melon seeds of recommended varieties	Adaptability of potential melon varieties for local conditions	○	○	○	○
I.5 Promotion of Crop Diversification and Production Center Development	Research and Development of Melon and Apple	1514 To study and research production technologies of apple by joint research	Possible seed/scions multiplication and distribution system of promising varieties	○	○	○	○
		1515 To maintain mother plants of recommended varieties of apple	Priority production technologies to be researched and developed for promotion of apple	○	○	○	○
		1516 To provide seeds/scions and agricultural technologies mainly to agro-firms	Adaptability of potential apple varieties for local conditions	○	○	○	○
		1611 Select target VCCs.	Possible seed/scions multiplication and distribution system of promising varieties	○	○	○	○
I.6 Promotion of Vegetables Production and Sales for Local Markets by Good Use of Tamarka	Strengthening of Women's Vegetable Production in Tamarka	1612 Setup model farms	Possible extension approach to bridge research institute and the Agro-firm for promotion of melons	○	○	○	○
		1613 Technical seminars/ supports (seminars and demonstrations).	Applicability of potential production technologies to the Agro-firm	○	○	○	○
		1614 Interchange tour	Whether demonstration technologies efficiently extend to dekhans around model dekhans or not?	○	○	○	○
		2111 Rotational cropping (including distribution of alfalfa seeds, and AI service for selected 500 farmers)	Effectiveness of rotational cropping with alfalfa and crops on soil improvement and fodder production	○	○	○	○
II.1 Increase of forage production and nutrition improvement	Fodder Production	2112 Strengthening of alfalfa seed production in 50 ha at SRIC	Effectiveness to improve livestock condition and to quality of livestock products	-	-	-	-
		2113 Collective fodder production by dekhans	Relevance of collective fodder production by Dekhans who have less than one ha	○	○	○	○
		2114 Silage production in a farmer farm with silo construction	Effectiveness on milk production in winter season	○	○	○	○
		2211 Provision of training for 105 farmers/dekhans (35 trainees x 3 times) per year	Effectiveness to improve livestock condition and to quality of livestock products	-	-	-	-
II.2 Capacity building of Farmer and Dekhan, and Livestock expert of Veterinary Department	Training Program on Animal Husbandry	2212 Provision of training for 20 livestock experts per year (200 experts for 10 years)	Effectiveness to improve livestock condition and to quality of livestock products	-	-	-	-
		2411 Establishment of artificial insemination center in Nukus	Effectiveness to improve livestock condition and to quality of livestock products	-	-	-	-
		2412 Provision of AI tools and vehicles	Effectiveness to enhance extension activities	○	○	○	○
		2413 Fostering of artificial inseminators	Effectiveness of fisheries association	-	-	-	-
II.4 Breed improvement of livestock, and Mobile Veterinary Services	Artificial Insemination and Veterinary Services	2414 Provision of vehicles for mobile veterinary service	Effectiveness of assistance by fishery associations	-	-	-	-
		2711 Rehabilitation of Association	Effect of aquaculture promotion	○	○	○	○
		2712 Establishment of seed distribution system	Effectiveness and adaptability of new system for aquaculture	-	-	-	-
		2721 Establishment of system for aquaculture development and promotion	-	-	-	-	-
II.7 Improvement of fishery through sustainable fishing and aquaculture promotion	Sustainable Fishery Promotion Program	2722 Establishment of aquaculture model for study area	-	-	-	-	-
		2772	-	-	-	-	-

Table F.1.1 Selection of Pilot Projects based on the Criteria (2/3)

Development strategy	Project/ Program	Activities	Items that can be verified through Pilot Projects	Items that require actual implementation of pilot projects	Items that can be verified through small-scale implementation	Activities that do not require institutional reforms	Items to be verified through Pilot Projects
III.1 Effective use of irrigation water through improvement of water management	311 Program for Improving Internal Canal System	3111 Establishing Special Fund for Irrigation Improvement and publication of procedures	-	-	-	-	-
		3112 Formulating technical guidance for the internal canal system improvement and its publication	-	-	-	-	-
		3113 Formulating the improvement plan of the internal canal system, preparing application form	Preparation of improvement plan by WUA with cooperation of working group	-	-	-	-
		3114 Conducting survey work and facility design based on the improvement plan, preparation of inventory and technical information for operation and maintenance work of the internal canal system	Fully use of inventory and technical information by WUA	-	-	-	-
		3115 Cleaning and digging work of internal canal and repairing canal facilities	Improvement of water distribution by equipping gates and water measurement facilities	-	-	-	-
	312 Program for Strengthening Water Management in the Field	3116 Repairing, renewal and establishing gate and water measurement facilities	WUA's capability to operate and maintain improved internal canal system properly.	-	-	-	-
		3121 Installing division box with water measurement tool (Shandur) at the inlets of farm	Operation of division box and measuring distributed water amount by members	-	-	-	-
		3122 Measuring amount of water distributed to farms	Improvement of water management in the canal system by measuring distributed water amount to farms	-	-	-	-
		3123 Holding technical seminars to members on improvement of irrigation planning and water use in the field	Effect of land leveling and re-arrangement of on-farm ditches for effective use of irrigation water	-	-	-	-
		3124 Land leveling in the field (including "Program for Improving Drainage Conditions in the Field")	Operation of model farms for demonstrating technologies	-	-	-	-
III.2 Increasing productivity of water through introduction of high efficient irrigation	321 Program for Promoting Water Saving Technology	3211 Setting up model farms and extension through operating model farms	Farmers' acceptability to effective water use, water saving and drainage improvement	-	-	-	-
		3212 Setting up consultation desk to farmers on technical and materials for water saving technology	Motivating farmers to introduce technologies for effective water use, water saving and drainage	-	-	-	-
		3213 Research and development on water saving technology and necessary measures	Functioning consultation desk to farmers on technical and materials for water saving technology	-	-	-	-
		3214 Preparation of seminar text and materials for extension	Effectiveness of materials to farmers	-	-	-	-
		3311 Model farm and extension (including "Program for Promoting Water Saving Technology")	Effect of land leveling and under drain for increasing leaching efficiency	-	-	-	-
	331 Program for Improving Drainage Conditions in the Field	3312 Preparation of technical assistance to Farmers (including "Program for Promoting Water Saving Technology")	Use of drainage improvement technology by farmers	-	-	-	-
		3313 Preparation of support system of material for improving field water management, water saving technology and improving field drainage (including "Program for Promoting Water Saving Technology")	Renting construction machinery to farmers to carry out land leveling	-	-	-	-
		3314 Preparing preference credit system for drainage improvement in the field	Ability of farmers to pay for drainage improvement work	-	-	-	-
		3315 Research and development on effective and efficient leaching technology	Activating WUA's water management activity	-	-	-	-
		3411 Appointing necessary staffs of WUA for water management	Formulating regular and mid/long term plan of maintenance work by WUA	-	-	-	-
III.3 Reduction of damage to crop production from salt through improving drainage conditions	341 Program for Strengthening WUA and Enhancing Its Activity	3412 Equipping Personal Computer for irrigation planning and WUA	Fully use of inventory and technical information by WUA	-	-	-	-
		3413 Training WUA staffs in operation and maintenance of canal system and planning of irrigation and water distribution	Operation of construction machinery by WUA using own machinery or rented machinery	-	-	-	-
		3414 Equipping transportations for water management of WUA	Organizing collective work of members for maintaining canals	-	-	-	-
		3415 Formulating regular and mid/long term plan of maintenance work by WUA	Revising water service fee system to amount -base from area-base fee	-	-	-	-
		3416 Preparation of inventory and technical information for operation and maintenance work	Increasing of WUA's capability in accounting, tax management and legal issues	-	-	-	-
	342 Program for Promoting Water Management	3417 Equipping construction machinery for canal maintenance work to WUA	Increasing water fee collection	-	-	-	-
		3418 Renting spare parts and maintenance service to WUA's machinery	Organizing turnaka user to participate to water management activity through VCC	-	-	-	-
		3419 Renting construction machinery and providing machinery service for canal maintenance work		-	-	-	-
		3420 Preparing supply system of parts and materials for hydraulic structure (gate, gauge, concrete flume, etc.)		-	-	-	-
		3421 Activating WUA's communication and coordination for collective works of maintenance		-	-	-	-
III.4 Improvement of water management through strengthening WUA and enhancing its activity	343 Program for Promoting Water Management	3422 Improving water fee system and business plan of WUA		-	-	-	-
		3423 Preparing construction work on accounting, tax management and legal issues		-	-	-	-
		3424 Propaganda and enlighten campaign to members on importance of WUA activity and water fee		-	-	-	-
		3425 Promoting turnaka user's (Dehkan) participation to water management activity through VCC		-	-	-	-
				-	-	-	-

Table F.1.1 Selection of Pilot Projects based on the Criteria (3/3)

Development strategy	Project/ Program	Activities	Items to be verified	Items that can be verified within the time span of Pilot Projects	Items that require actual implementation of verification	Items that can be verified through small-scale implementation	Activities that do not require institutional reforms	Items to be verified through Pilot Projects
IV.1 Enhancement of bargaining power through collective action of farmers	411 Joint marketing by farmer group (Model Agro-firm establishment)	4111 Establishment of task force	Effectiveness of the project implementation structure	○	○	○	○	○
		4112 Focus group discussion and establishment of agro-firm	Effectiveness for collective action of Farmers and Dehkans	○	○	○	○	○
		4113 Business planning (needs assessment, marketing strategy, study tour, business seminar, technical training, action planning)	Effectiveness to enhance bargaining power of Farmers and Dehkans	○	○	○	○	○
		4114 Products development (collection, processing, packing)						
		4115 Marketing (channel establishment, identifying transport means)						
IV.2 Improvement of accessibility to market	421 Improvement of marketing support infrastructure	4211 Holding stakeholder meeting to formulate market improvement master plan	Effectiveness to mitigate congestion at retail section, and to increase farmers' accessibility to market	-	-	-	-	-
		4212 Integration of control system for perishable food	Effectiveness to mitigate congestion at retail section, and to improve sanitary condition or persnane					
		4213 Separation of perishable food section and other commodities	Effectiveness to improve sanitary condition of perishable food, and to increase reliability among buyers	○		○	○	
		4214 Establishment of cold section	Effectiveness to improve veterinary and sanitary condition of meat and reliability among buyers	○		○	○	
		4221 Construction of small scale slaughterhouses	Constrains on operation; transaction mode, collection method, cashflow, quality control, processing season period, negative intervention	○	○	○	○	○
IV.3 Development of processed products	431 Improvement of Small-scale Agro-Processing Technologies	4311 Alleviation of barriers on initial operation and sale of small-scale agro-processing products	Consious of consumers for local-made agro-processing product					○
		4312 Research on applicable and acceptable small-scale agro-processing technologies including involvement of women	Processing method in different natural and social conditions	○	○	○	○	○
		4313 Formulation of framework on promotion of small-scale agro-processing technologies by MAWR	Commercialization of products using women's idea and workforce	○	○	○	○	○
		4314 Improvement on accessibility of information and procurement of small-scale processing equipment	Extension of researched products	○	○			○
		4315 Necessary infrastructural improvement for small-scale processing	Promotion of local-made agro-processing products to other regions and countries					
		4231 Review of Food Safety Standard	Change of consious for Farmer and Dehkan from production to processing					
		4232 Improvement of Sanitary Control Plan	More convenient information acquisition in specifications and prices of equipment					
		4233 Capacity Building of VSE (including upgrading VSE equipment)	Application of low interest credit for procurement of equipment					
		4234 Promotion of Enlightenment Activities	Improvement of infrastructure for small-scale processing in benefit/cost base					
		5111 Install information tools (computers etc.) at Hakimiyat and VCC	Financial sources					
V.1 Strengthening on Abilities of Local Administration Unit	511 Strengthening of Communication for Local Agricultural Administration	5112 Train the staff for VCCs	Alternative supply of water/gas/power supplies					○
		5113 Prepare and submit progress reports by VCCs	Appropriateness of current food safety standard	○		○		
		5114 Joint evaluation meeting	Appropriateness of current sanitary control method	○		○		
		5121 Setup IG in VCCs	Effectiveness to uplift food safety technologies and standard			○		
		5122 Prepare the activity plan by IG	Effectiveness to uplift food safety consciousness of producers and consumers, and to increase reliability of products in market			○		
		5123 Support the vegetable program by IG	Capacity improvement of staff, necessary within vegetable project	-	-	-	-	-
		5124 Monitor and evaluate the vegetable program by IG						

Table F.2.1 Planned Implementation Schedule and Actual Implementation of Pilot Projects (1/2)

Pilot Projects	Activities	Schedule Planned in IP and Actual	2009												2010											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Preparation of Agricultural Technical Manual for Farmers	1. Set-up an Inter-agency Working Group	Planned Actual																								
	2. Editorial Meetings of the Manual	Planned Actual																								
	3. Preparation of Manuscripts of the Manual	Planned Actual																								
	4. Editing the Manual	Planned Actual																								
	5. Printing and Binding the Manual	Planned Actual																								
	6. Training of the Teachers	Planned Actual																								
	7. Farmer Training Seminars (to be organized by Up Govt. with its own budget)	Planned Actual																								
	8. Evaluation (collecting information)	Planned Actual																								
Main and Promising Crop Production	1. Discussion with the Center for Implementation Plan	Planned Actual																								
	2. Field Preparation	Planned Actual																								
	3. Trial Cultivation in Experimental Field (0.5ha)	Planned Actual																								
	4. Demonstration Cultivation in Farmer's Field (0.1 ha)	Planned Actual																								
	5. Field Days	Planned Actual																								
	6. Evaluation	Planned Actual																								
Promotion of Vegetable Production by Women in Tamaka	1. Preparation	Planned Actual																								
	2. Kickoff Workshop	Planned Actual																								
	3. Set Up a Model Tamaka	Planned Actual																								
	4. Technical Seminar	Planned Actual																								
	5. Input Procurement	Planned Actual																								
	6. Technical Support and Monitoring	Planned Actual																								
	7. Interchange Meeting	Planned Actual																								
	8. Evaluation Workshop	Planned Actual																								
Dairy Production Package	1. Discussion and Preparation among Stakeholders	Planned Actual																								
	2. Silage Making Technology																									
	- Site selection	Planned Actual																								
	Training on silage making	Planned Actual																								
	- Demonstration of silage making	Planned Actual																								
	3. Fodder production																									
	- Site selection	Planned Actual																								
	- Organization of dehkans	Planned Actual																								
	- Cultivation of fodder crops	Planned Actual																								
	4. Training for Livestock Extensionists, & Dehkans/Farmers																									
	- Preparation of training materials	Planned Actual																								
	- Provision of the training	Planned Actual																								
	5. Procurement, Installation and Operation																									
	- Organization of group and preparation of agreement	Planned Actual																								
	- Rehabilitation of the existing house for milk plant	Planned Actual																								
	- Order of equipment to a maker	Planned Actual																								
	- Procurement, installation and operation of the plant	Planned Actual																								
	- Training on milk plant operation	Planned Actual																								
	- Production of pasteurized milk and marketing	Planned Actual																								
	6. Monitoring	Planned Actual																								
	7. Monitoring and Evaluation	Planned Actual																								

Note: Original Plan (IP): /
Implemented activities: /
Modified Plan: /

Table F.2.1 Planned Implementation Schedule and Actual Implementation of Pilot Projects (2/2)

Pilot Projects	Activities	Schedule Planned in IF and Actual	2009												2010											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct		
Improvement of Water Canal System and Water Management by WUA Improvement of On-farm Irrigation Management and Drainage System	1. Preparation																									
	- Discussion and Preparation of Implementation Plan	Planned Actual	▲ ▲																							
	- Kick-off Meeting	Planned Actual			▲ ▲														▲							
	2. Construction Work																									
	- Preparation of Construction work (Planning & Design)																									
	- Survey and design work for renovation of canal system	Planned Actual				=====																				
	- Meeting on facility/structure plan	Planned Actual			▲ ▲																					
	- Implementation of Improvement of Internal Canal System and Development of Verification Plot																									
	- Cleaning and digging canal, repairing pump and digging discharge pond of pump	Planned Actual				=====																				
	- Constructing gate and water measurement equipment, Construction of division boxes	Planned Actual				=====																				
	- Development of the verification plot (land leveling, improvement of canal/collector)	Planned Actual																								
	3. Improving water management by renovating canal system and installing division box ("Shandira")																									
	- Monitoring of WUA's activity plan (business plan)	Planned Actual				▲ ▲														▲						
	- Training of WUA staffs on water management and monitoring work	Planned Actual				▲ ▲														▲ ▲ ▲						
	- Technical seminar to farmers on water management and irrigation practices	Planned Actual				▲ ▲														▲						
	- Operation of the model irrigation block by WUA and monitoring work	Planned Actual				=====														=====						
	4. Fulfilling proper maintenance of internal canal system by strengthening activity of WUA																									
	- Repairing mini-excavator of WUA	Planned Actual																								
	- Maintenance work of canal system by WUA	Planned Actual																								
	- Management of construction machinery based on the plan	Planned Actual																								
	- Participation of members and dehqans to maintenance work	Planned Actual																								
	5. Improving Water Use and Drainage Condition in the Field																									
	- Monitoring of leaching activity and field conditions	Planned Actual																								
	- Monitoring of irrigation activity and field conditions	Planned Actual																								
	6. Evaluation and demonstration/seminar	Planned Actual																								
Establishment of Model Agro-firm	1. Preparatory Work	Planned Actual	=====																							
	2. Establishment of Task Force	Planned Actual																								
	3. Task Force Group Discussion	Planned Actual																								
	4. Preparation of Business Plan	Planned Actual																								
	5. Production of Crops	Planned Actual																								
	6. Small Scale Vegetables / Fruits Processing																									
	- Issuance of Direction for Implementation of Projects from CM to Hakimiyat	Planned Actual																								
	- Appointment of Hakimiyat Staff in Charge	Planned Actual																								
	- Formulation of Farmers Group for Implementation and Agreement	Planned Actual																								
	- Rehabilitation of Existing Building	Planned Actual																								
	- Issuance of Purchase Order to Manufactures	Planned Actual																								
	- Procurement, Installation and Test Operation	Planned Actual																								
	- Training Operation of Processing Plant	Planned Actual																								
	- Production and Sale of Processed Products	Planned Actual																								
	7. Field Monitoring of the JICA Study Team	Planned Actual																								
	8. Monitoring and Evaluation	Planned Actual																								

Note: Original Plan (IP) : /
Implemented activities : /
Modified Plan : /

Note: Original Plan (IF) :
 Implemented activities :
 Modified Plan :

Attachment F.1 Conclusion of SCNP for Improvement of Irrigation System
(Translated by the Study Team)

QARAQALPAQSTAN RESPUBLIKASI
TABIYATTI QORG'AW BOYINSHA
MAM'LEKETLIK KOMITETI



QORAQALPOG'ISTON
RESPUBLIKASI
TABIATNI MUXOFAZA QILISH
DAVLAT QO'MITASI

“MA'MLEKETLIK EKOLOGIYALIQ
EKSPERTIZASI”

“DAVLAT EKOLOGIK
EKSPERTIZASI”

“КАРАКАЛПАКГОСЭКОЭКСПЕРТИЗА”

230100, No'kis qalasi, Gone Tyrtyl koshesi, . Tel: (361)2240669

”17” _____ 2009 j.

№ 3-35/01

To: the Study Team for “Study of the Regional
Development in Karakalpakstan”

Copy: State Environmental Examination Department of
SCNP Republic of Karakalpakstan

CONCLUSION

**State Department for Environmental Examination
of State Committee for Nature Protection Republic of Karakalpakstan**

For the project: **Verification of Improving Internal Canal System and Water Management by
Water User's Association in Kattagar massif of Nukus District Republic of
Karakalpakstan**

Client: **the Study Team for Study of Regional Development in Karakalpakstan**

Developer: **the Study Team for Study of Regional Development in Karakalpakstan**

All necessary materials of Initial Environmental Examinations were kindly presented to the State Environmental Examination Department of State Committee for Nature Protection Republic of Karakalpakstan, for the project for Improving Internal Canal System and Water Management by Water User's Association. The Project falls into Category III of environmental classification, e.g. the Project is judged to have limited potential environmental impacts (low risk).

The Project located in area of VCC “Samambay” of Nukus District which is about 10 km far from the Nukus city, the capital of Autonomic Republic of Karakalpakstan. The Project area covers in total 547.3 ha; from them for tillage - 305,9 ha, tree plantation – 24,9 ha, pasture – 117,1 ha, for canals-10,2 ha and for other lands – 89,2 ha. About 240 families reside in the settlement which is located in the project site with area of 60 ha of homestead land. Thus the total area of land forms about 607,3 ha.

About 12 Farmers currently existing basically there are livestock farms, cotton, cereals, and vegetable & fruits production farms. The landscape of the project location is flat terrain and consider as delta of Amudarya River.

The area have acutely continental climate with hot and dry summer the average 25 to 28,5 C°, and cold winter with an average – 4,5 to -10C°. The Continental is characterized by great fluctuation of the

seasonal and monthly temperature amplitudes, and with the small precipitation. Maximum average of the temperature amplitude in summer is +46,8C°, and minimum average in winter -28,5C°, the wind in the area mainly dominated from north and northeasterly directions.

The proposed project will accomplish the following activities as improving and rehabilitation of internal earth canals - 800 m, concrete flume canals -100 m, repairing of two water pumps, and replace some existing water gates and install new ones - 33 water gates, including construction of 54 division boxes.

The project location has the well functioning collector and drainage net. The water source's for the irrigation needs come from the Kattagar canal and distributed to the internal canals through the water reservoir by pumping station which were equipped with two stationary water pumps.

Irrigation system there basically constructed with reinforced constructions and well projected with the crossroads which are suitable for the locomotion of agricultural machinery and animals. In the area by using the concrete flume canals the reduction of irrigation water has been achieved by 90% to compare to with the existed earth canals.

Thus the general evaluation of the environment conditions shows that there will be no significant adverse environmental impacts by implementing the project to the air, soil, irrigation water, as well as to the fauna and flora at the area.

- In process of the rehabilitation work the different type of machinery usages will be expected so the potential environmental impact related to construction.
- Engine emissions (diesel fuel, gasoline)
- Excavation materials (amounts of sediment from canals)
- Construction materials (cement dust and others)

Generally the Project will have considerable positive environmental impacts in the VCC "Samanbay" area. The cleaning and lining of canals will result in restoration of canal capacity and a reduction in water losses improving water availability. The Project will support the strengthening of the water resources management through installation of a modern control and distribution system, capacity building and improved operation and maintenance procedures. The rehabilitation of internal canal infrastructure in the pilot areas will improve the water management at farm level and this will reduce wastage of water and drainage requirements.

Conclusion

Project formulation, location, design, implementation, and operation will have no substantial negative environmental impacts. The findings of Environmental Examinations are that a follow-up Environmental Impact Assessment or further detailed environmental impact study is not required. The Project area is not considered environmentally sensitive, and adverse environmental impacts will be minor.

Karakalpak State Committee for Nature Protection is classifying the Project under category 3 low risk, because of minor repairs to over 500 ha of irrigated land. Karakalpak State Committee for Nature Protection **approves** environmental examinations and implementation plans for the projects. It can begin the implementation process based on the Project implementation Plan.

The State Environmental Examination Department of SCNP will be authorized to inspect and monitor the Project implementation process.

Acting Chairmen of SCNP Republic of Karakalpakstan
P.Aitmuratov

Chief of the SE ED K . Aimakov

Attachment F.2 Conclusion of SCNP for Milk Processing in Kerder (translated)

QARAQALPAQSTAN RESPUBLIKASI
TABIYATTI QORG'AW BOYINSHA
MAM'LEKETLIK KOMITETI



QORAQALPOG'ISTON
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“DAVLAT EKOLOGIK
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” 6 ” ____ 2009 j.

№ 3-45/01

To: the Study Team for “Study of the Regional
Development in Karakalpakstan”

Copy: State Environmental Examination Department of
SCNP Republic of Karakalpakstan

CONCLUSION

State Department for Environmental Examination of State Committee for Nature Protection Republic of Karakalpakstan

For the project:

For improvement on small-scale agro-processing technologies (milk processing) in VCC Kerder of Nukus District Republic of Karakalpakstan

Client:

the Study Team for Study of Regional Development in Karakalpakstan

Developer:

the Study Team for Study of Regional Development in Karakalpakstan

All necessary materials of Initial Environmental Examinations were kindly presented to the State Environmental Examination Department of State Committee for Nature Protection Republic of Karakalpakstan, for the Pilot Project for Improvement on small-scale agro-processing technologies for the milk processing in VCC Kerder. The Project falls into Category III of environmental classification, e.g. the Project is judged to have limited potential environmental impacts (low risk).

The project area will be in the territory of VCC Kerder in Nukus District, and the small-scale milk processing plant will be established in single-storey building. The size of the building is 9mX24,5m (220,5 m²). From the west and north-west side the small-scale milk processing plant will be contiguous with the livestock farm with about 450 heads of cattle and from the north and east side are fenced with the bare land and the south side are pointed to the center of the Kerder village.

The milk processing plant building is surrounded with a metal fence and has a separate entrance. The nearest cowshed located at 100 meters away from the building. The distance from the milk processing plant location to Nukus District Center “Akmangit”, is about 20 km, and distance to Nukus is about 35 km. The village “Kerder” has asphalt road which is connected with a Nukus District Center and Nukus city.

The main objectives of the Pilot project are to verify the process for value adding and marketing for raw milk by installing and operating small scale milk pasteurizing facility. The expected total outputs of processing milk will be 500 L/day.

The landscape of the milk processing plant location is flat terrain and consider as delta of Amudarya River. Surrounding lands is used as allotments for the field crops. The area have acutely continental climate with hot and dry summer the average 25 to 28,5 C°, and cold winter with an average – 4,5 to -10C°. The Continental is characterized by great fluctuation of the seasonal and monthly temperature amplitudes, and with the small precipitation. Maximum average of the temperature amplitude in summer is +46,8C°, and minimum average in winter -28,5C°, the wind in the area mainly dominated from north and northeasterly directions.

The present environmental condition characterized as a consistently stable. The project location has the well functioning collector and drainage net. The water source’s for the irrigation needs come from the Kattagar canal.

In the small-scale milk processing facilities will use about 90% of water from total consumption amount for the productions needs such as; raw milk and milk products cooling, cleansing of used equipments, heating and refrigerate settings.

Water supply of the small scale processing plant will resolve by connecting the pipe to the existed water supply net in the Kerder village.

- Annual water consumption is expected to be about 365,0m³;
- For the production needs - 328,5 m³;
- For the household needs – 36,5 m³;
- Annual average of the reused water - 273,75 m³;
- For irrevocable water consumption and water loss - 54,75 m³;

Annual volume of sewage water for the processing plant will be 310,25 m³; for production process - 273,75 m³; for household needs -36,5 m³; average of annual use of the reused water -273,75m³; irrevocable water consumption and water loss will be - 36,5 m³. The greatest substance of the sewage water will be the milk “whey”. The whey itself can be used as a feed for the cattle.

Because of absence of central sewage system in the village, in concordance with the district sanitation services the project will provide with construction of wells and concrete cesspool, with following removal of wastewater by transport to the special disposal place.

The heating source at the milk processing plant will be the individual heating system by using the “Raketa” boiler, with gravity water supply. As the fuel it will use the natural gas. The air emission from the heating will be the following; carbon oxide : 0,031g/l, 0,412 t/g; nitric oxide : 0,012 g/l, 0,164 t/g. Estimation results of air emission from milk processing plant, shows that impact will be quite small.

Electric supply of the milk processing plant will be realizes through the connection to the existed electric line in Kerder village. Electric power will be used basically to run processing facilities and lighting the industrial premises. Required demand for the small-scale milk processing plant is 102 kW.

Basic sources for the solid waste and liquid waste will be; rinsing water, unused byproducts, damaged products, and other substances which will be generated from evaporating pan.

With the proper maintaining of all processing equipments and absolute management for the process of reception and storage of raw materials insignificant waste will be formed which can be removed to the special dumping place.

Thus, initial Environment Examination shows that by operation small scale milk processing plant there will be no significant adverse environmental impacts to the air, soil, irrigation water, as well as to the fauna and flora at the area.

The findings and assessment of the initial Environment Examination for the Pilot Project for Improvement on small-scale agro-processing technologies in VCC Kerder, illustrate that the expected milk processing plant can be function on the selected area on the assumption of necessary utilization measures. Additional mitigation measures are not required.

Conclusion

Project formulation, location, design, implementation, and operation will have no substantial negative environmental impacts. The findings of Initial Environmental Examinations are that a follow-up Environmental Impact Assessment or further detailed environmental impact study is not required.

Karakalpak State Committee for Nature Protection is classifying the Project under category 3 low risk. The Project area is not considered environmentally sensitive, and adverse environmental impacts will be minor. Karakalpak State Committee for Nature Protection **approves** environmental examinations and implementation plans for the Pilot Project for Improvement on small-scale agro-processing technologies in VCC Kerder. It can start the implementation process based on the Project implementation Plan.

The State Environmental Examination Department of SCNP will be authorized to inspect and monitor the Project implementation process.

Acting Chairmen of SCNP Republic of Karakalpakstan
P.Aitmuratov

Chief of the SE ED

K . Aimakov

Attachment F.3: Conclusion of SCNP for Small-scale Agro-processing
(Translated by the Study Team)

QARAQALPAQSTAN RESPUBLIKASI
TABIIYATTI QORG'AW BOYINSHA
MAM'LEKETLIK KOMITETI



QORAQALPOG'ISTON
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TABIIATNI MUXOFAZA QILISH
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”16” April 2010

№ 4-078/10

To: the Study Team for “Study of the Regional
Development in Karakalpakstan”

State Environmental Examination Department of
Copy: SCNP Republic of Karakalpakstan

CONCLUSION

**State Department for Environmental Examination
of State Committee for Nature Protection Republic of Karakalpakstan**

For the project: **Examination of the environmental impact of project for improvement on small-scale agro-processing technologies (sub-project 2: vegetable and fruits processing) in VCC Taqirkol in Nukus District**

Client: **the Study Team for Study of Regional Development in Karakalpakstan**

Developer: **the Study Team for Study of Regional Development in Karakalpakstan**

All necessary materials of Initial Environmental Examinations were kindly presented to the State Environmental Examination Department of State Committee for Nature Protection Republic of Karakalpakstan, for the project for Improvement on small scale agro processing technologies, vegetable and fruits processing in VCC Taqirkol of Nukus District. The Project falls into Category III of environmental classification, e.g. the Project is judged to have limited potential environmental impacts (low risk).

The processing mini plant is being planned in existing one store building located in the west of central village “Ornek” of VCC “Taqirkul” in Nukus district. Dimension of the building is 10,0m x 20,0m (200,0m²). From every quarter the mini plant will surrounded by bare lands & from the east side bordering with existing village road, from the south after 100 m, with asphalt road “Nukus-Ornek”. Distance from mini plant building to houses is 50-75 m.

Distance from mini plant to Akmangit, district center is about 15 km, and to city Nukus is 20 km.

Central village Ornek has the asphalt road to the district center Akmangit and city Nukus.

Mini plant is oriented for production of dried fruits and vegetables, for prolonging terms of shelf life of natural product and package them in propylene plastic bag. Production capacity of dried product is – 140kg/circle.

Technical characteristics:

Productivity on dried product is , kg/circle. ----- 140

Output goods (from 1 kg of fresh/raw products):

– apples, strawberry, g -----	130
– pears, g plums, g-----	300
– cherry, g-----	250
– apricot, raspberry, g -----	150
– cabbage, g -----	70-90
– beetroot, carrot, onion, g-----	120-180
– greens(dill, parsley, celery etc), g -----	100
– Installed power, kW -----	33
– Serving personnel, person -----	3
– Necessary production area, not less, sq.m-----	44

Relief of territory for mini plant is plain and enters to the Amudarya delta, which formed by the ancient & modern sedimentation. These lands are manly used as crop land.

Climate in the located area is severe continental, hot and dry in summer, cold in winter. Climate continentality in this district is characterized by big daily, monthly, seasonally & annual amplitude of air temperature, and aridity- by insignificant precipitation.

Summer is hot and dry. The hottest month is July, average temperature throughout republic is 25.0-28.5 C.

Winter is cold. The coldest month is January- average temperature is fluctuated from -4,5 C in the south of the republic up to -10,0 C in the north. Max temperature in summer is +46,8C. Min temperature in winter is -28,5C. Annual average of air temperature is no higher than 13,3C.

During the whole year in the mini plant area, the winds from north and north-east directions are dominated.

Environment condition is characterized as stable. The site has supplied with normal functional collector-drainage networks. Sources for irrigation needs at the site are main canal “Kuanishjarma” and inter farm canal “Diykhanarna”.

The water usage in mini plant for vegetables & fruits processing, will be directed for transporting of the raw products, for washing of raw products, semi prepared foods and package, for maintaining of sanitization of working area, equipment & inventory.

Mini plant building water supply will be provided from the individual water well which has been located near to the building in the village center Ornek, and located along the Nukus-Ornek auto road.

- Annual volume of water demand for mini plant is 3628, 8m³, including:
- for production needs - 3628, 8m³;
- irrevocable water consumption and water loss - 52,9m³,

Mini plants annual volume of wastewater is expected to be 3575, 9m³ from which 3575, 9m³ are industrial.

Because of absence at the present the central wastewater networks in the village, in the coordination of

the district sanitation and epidemiological services the project consider to install the sewage pit and construction of dumped tank from reinforced concrete and later will be transported by truck to special dumping place in the district.

The heating source for mini plant will be individual boiler type “Rocket” with gravity water rotation with parameters 95 -70C. Natural gas will be used as a fuel for the boiler. Atmospheric emission from the boiler function are like followings; carbon monoxide 0,031 g/c, 0,412 t/g, nitric oxide 0,012 g/c, 0,164 t/g. Results of estimation shows that mini plant pollution to atmosphere is very small.

Electricity supply of mini plant will be carried out by connecting to the existing electrical network of Ornek village. Electro energy will be used mainly for production purpose and for lightening of building. Required power for mini plant is 33 kilowatt.

Main wastewater and hard waste will be formed in the process of cleaning, taking skin, separating, sorting, peeling, scalding, preserving in hermetic package, mixing, boiling, as well as on cleaning production spaces.

Emission gaseous substances is very small, however, in some cases, there is a possibilities for strong odor nuisance. With the proper maintaining of all processing equipments and absolute management for the process of reception and storage of raw materials insignificant waste will be formed which can be removed to the special dumping place.

Thus, initial Environment Examination shows that by operation mini plant for processing vegetables and fruits there will be no significant adverse environmental impacts to the air, soil, irrigation water, as well as to the fauna and flora at the area.

The findings and assessment of the initial Environment Examination for the Pilot Project for Improvement on small-scale agro-processing technologies in Ornek village of VCC Taqirkol in Nukus Districts of Republic of Karakalpakstan, illustrate that the expected vegetables and fruits processing plant can be function on the selected area on the assumption of necessary utilization measures. Additional mitigation measures are not required.

Conclusion

Based on above-stated statements the Karakalpak State Committee for Nature Protection **approves** environmental examinations and implementation plans for the Pilot Project for Improvement on small-scale agro-processing technologies for the vegetable and fruits processing in VCC Taqirkol in Nukus District of Republic of Karakalpakstan.

The State Environmental Examination Department of SCNP will be authorized to inspect and monitor the Project implementation process.

Chairmen of SCNP Republic of Karakalpakstan
P. D. Aitmuratov

Japakov A.

Attachment F.4 Conclusion of SCNP for Drainage Improvement
(Translated by the Study Team)

QARAQALPAQSTAN RESPUBLIKASI
TABIIYATTI QORG'AW BOYINSHA
MAM'LEKETLIK KOMITETI



QORAQALPOG'ISTON
RESPUBLIKASI
TABIIATNI MUXOFAZA QILISH
DAVLAT QO'MITASI

“MA'MLEKETLIK EKOLOGIYALIQ
EKSPERTIZASI”

“DAVLAT EKOLOGIK
EKSPERTIZASI”

“КАРАКАЛПАКГОСЭКОЭКСПЕРТИЗА”

230100, No'kis qalasi, Gone Tyrkyl koshesi, . Tel: (361)2240669

”3” ____ 2010

№ 3-75/10

To: the Study Team for “Study of the Regional
Development in Karakalpakstan”

Copy: State Environmental Examination Department of
SCNP Republic of Karakalpakstan

CONCLUSION

**State Department for Environmental Examination
of State Committee for Nature Protection Republic of Karakalpakstan**

For the project: **On the object: Statement project about impact to the environment of verification water use improvement and drainage in field conditions in the territory of farmers “Berdakh Maqsim” and “Usta Rakhim bobo” in the Massif “Kattaghar” of VCC “Samanbay” in Nukus district of Republic Karakalpakstan**

Client: **the Study Team for Study of Regional Development in Karakalpakstan**

Developer: **the Study Team for Study of Regional Development in Karakalpakstan**

Statement project documents about impact to the environment of verification water use improvement and drainage in field conditions in the territory of farmers “Berdakh Maqsim” and “Usta Rakhim bobo” in the Massif “Kattaghar” of VCC “Samanbay” in Nukus district of Karakalpakstan Republic are presented to the state ecological examination. Object refers to the III category of impact to the environment (low risk).

The territories where are foreseen repair works on improvement of water use and drainage in field conditions are located in the north-west, 10 km away from Nukus of Karakalpakstan Republic, in the territory of VCC “Samanbay”, massif “Kattaghar” of Nukus district. The total area of repairing land using farmers “Berdakh Maqsim” (36,4 ha) and “Usta Rakhim bobo” (12,14ha) is 48,54 ha.

Reconstruction territory relief of on-farm watering canals and water usage of massif territory “Kattaghar” in Nukus district of KR is considered to be plains and refers to delta and valley of Amudarya River, set with old and modern pumps of the river. These lands are used mainly under the sowing of field crop culture, perennial plant.

- District climate in reconstruction area is severe continental, hot and dry in summer, cold in winter.
- Climate continental in this district is characterized by big daily, monthly, seasonally and annual amplitude of air temperature, and aridity-insignificant sediments.
- Summer is hot and dry. The warmest month is July, average temperature throughout republic is 25,0 to 28,5 C°
- Winter is cold. The coldest month is January- average temperature is hesitatingly from -4,5 C° in the south of the republic till -10,0 C° in the north.
- Max. temperature in summer is +46,8 C° Minimal temperature in winter is -28,5 C° Annual average temperature is no higher than 13,3 C°
- In the project reconstruction of existing on-farm canals and water usage of massif territory Kattaghar is set following kinds of works:
- In the territory of farmer “Berdakh maksim”- installation of handles of cutting pipes, changing rubbers of shield, painting construction of gutter regulator LP-9-80 and construction of 15 dam beams d=400mm in irrigable areas of farmer.
- In the territory of farmer “Usta Rakhim bobo”-pipe changes, installation of 7 regulating constructions of switchboard regulators, building and installation of 13 dam beams in irrigable areas of farmer.
- In addition the project is set to fulfill planned works and works on reconstruction (mechanically cleaning) of collector-drainage nets in irrigated lands of farmer “Berdakh maqsim” with area 5,0 ha, and in the farmer “Usta Rakhim bobo” with area 3,0.
- State of environment is characterized stable enough.
- Plot is provided with normal working collector-drainage net.
- Source of watering the plot is on-farms canal Kattaghar. Water from the canal Kattaghar comes into on-farm canals through accumulator tank with the help of existing pumping station with 2 pumps installation. Water to the irrigated lands comes by existing gutter inter canal distributors and areas sprinklers. In irrigated massif it was built open horizon collector-drainage net for:
 - receiving from systematic drainage of different order and taking into water receiver (main collector- gather KC-1) mineralized drainage water;
 - intercepting and lowering the level of underground water in irrigated massif;
 - protecting from under flooding with filtrated water from reservoir and stream.
- Irrigated net mainly of the gutter type and totally re-enforce with necessary hydraulic works. Re-enforcing of existing irrigation network with necessary hydraulic works with passages lets to increase labor productivity of sprinklers and makes much easier for their work, also facilitate transition of agro-machinery, people and animals through open canals.
- It was achieved a decreasing of water filtration from the irrigation canals to 90% and considerable economy of irrigation water, comparing to the canals of land profile.
- Thus complex estimation of environment condition discovered that impact level of improved area on the air, surface water, soil, animals and plants is insignificant.
- In the process of building there will be used the following kinds of machinery and gearings: truck crane, auto cars and bulldozers etc.
- Expected impacts on atmosphere when building.

- combustion materials oil (diesel oil and petrol) in the car engine and mechanisms;
- from auto car comes inorganic dust when loading and unloading the cement, sand and crashed stone.
- When exploiting - only exhaust from agriculture machinery.

Implemented project “Statement about impact on the environment by repair works to improve water usage and drainage in field conditions on the territory of farmer “Berdakh maqsim” and “Usta Rakhim bobo” massif Kattaghar in Nukus district of KR is based on existing condition and characterized peculiarities of those components of environment to which directly and indirectly can reflect the activity of farmers working in this plot.

Additional measures on protection of environment in this plot are not required.

CONCLUSIONS

Based on above-stated Governmental Environmental Examination of Republic Karakalpakstan agrees project application for environmental impact of verification water use improvement & drainage in field conditions in the territory of farmers “Berdakh Maqsim” & “Usta Rakhim bobo” in the Massif “Kattaghar” of VCC “Samanbay” in Nukus district of Karakalpakstan Republic.

The State Environmental Examination Department of SCNP will be authorized to inspect and monitor the Project implementation process.

Chairmen of SCNP Republic of Karakalpakstan
P. D. Aitmuratov

Japakov A.

ANNEX-G COST ESTIMATES OF ACTION PLAN

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ANNEX G: COST ESTIMATE OF THE ACTION PLAN

G.1 General

G.1.1 Bases of Cost Estimate for Programs/project of the Action Plan

Investment costs of programs/projects are estimated by the current price at Nukus in October 2010. Unit costs were obtained from counterparts and market research by the Study Team in Nukus and/or Tashkent in UZS (Uzbekistan sum) and converted in to US Dollars (USD).

Exchange rate applied at USD 1.00 = UZS 1,657 in January 2011 is applied.

Among estimation of the total investment cost, 10% of the project cost was applied for physical contingency.

G.1.2 Summary of Investment Cost of the Action Plan

	Total Cost	Year									
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Grand Total (000 000 UZS)	184,442	9,928	14,860	25,855	18,763	19,547	20,195	19,371	18,643	18,957	18,324
Grand Total (000 USD)	111,311	5,991	8,968	15,604	11,323	11,796	12,188	11,691	11,251	11,440	11,059
Total Cost of Action Plan (000 000 UZS)	167,674.5	9,025.4	13,508.8	23,504.5	17,057.2	17,769.6	18,359.0	17,610.3	16,948.4	17,233.2	16,658.4
Physical Contingency (10%) (000 000 UZS)	16,767.5	902.5	1,350.9	2,350.5	1,705.7	1,777.0	1,835.9	1,761.0	1,694.8	1,723.3	1,665.8
111 Soil Conservation and Improvement by Crop Rotation	1,869.7	910.9	108.6	106.2	106.2	106.5	106.2	106.2	106.5	106.2	106.2
121 Improvement of Agricultural Extension Services to Farmer	590.7	59.1	59.1	59.1	59.1	59.1	59.1	59.1	59.1	59.1	59.1
131 Promotion of Renewal of Agricultural Tractors	62,766.7	5,535.0	9,225.0	9,261.7	5,535.0	5,535.0	5,535.0	5,535.0	5,535.0	5,535.0	5,535.0
141 Improvement of Accessibility to Agricultural Inputs for Agricultural Producers	291.2	12.9	121.6	41.7	28.7	28.7	28.7	28.7	0.0	0.0	0.0
151 Research and Deveelopment of Melons ans Apple	10,077.9	743.2	53.2	53.2	53.2	129.4	1,809.1	1,809.1	1,809.1	1,809.1	1,809.1
161 Strengthening of Women's Vegetable Production in Tamarka	698.8	139.8	139.8	139.8	139.8	139.8	0.0	0.0	0.0	0.0	0.0
211 Fodder Production and Promotion of Livestock	1,783.8	151.7	151.7	418.8	151.7	151.7	151.7	151.7	151.7	151.7	151.7
221 Artificial Insemination and Veterinary Services	2,895.3	174.5	221.8	184.2	175.6	1,020.5	188.7	173.7	212.0	166.0	378.4
241 Training Programs on Animal Husbandry	433.0	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3
271 Sustaible Fishery Promotion Program	1,315.6	439.5	438.1	438.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
272 Aquaculture Development Program	631.4	0.0	0.0	0.0	0.0	197.8	144.5	144.5	144.5	0.0	0.0
311 Improving Internal Canal System	48,433.9	4.5	276.7	6,053.7	6,053.7	6,053.7	6,053.7	6,053.7	6,053.7	6,053.7	5,777.0
312 Strengthening Water Management in the Field	2,863.4	0.0	0.0	357.9	357.9	357.9	357.9	357.9	357.9	357.9	357.9
321 Intorducing Water Saving Technology	589.2	20.3	104.2	85.6	63.3	63.3	63.3	47.3	47.3	47.3	47.3
331 Improving Drainage Conditions in the Field	1,125.5	0.0	166.1	203.0	203.0	203.0	203.0	36.9	36.9	36.9	36.9
341 Strengthening WUA and Enhancing its Activity	21,805.5	409.5	1,959.5	2,720.2	2,719.1	2,719.1	2,255.6	2,255.6	2,255.6	2,255.6	2,255.6
411 oint Marketing By Farmer Group (Model Agro-firm Establishment)	110.1	9.9	0.8	0.8	24.8	2.4	27.2	2.4	35.5	3.2	3.2
421 Improvement of Marketing Support Infrastructure	4,598.3	1.9	8.2	2,799.5	484.7	6.1	509.2	76.6	6.1	608.2	97.7
422 Small Scale Slaughter House	377.0	0.0	94.2	0.0	0.0	94.2	94.2	0.0	94.2	0.0	0.0
431 Improvement of Small Scale Agro-Processing Technologies	3,649.7	214.0	113.2	408.2	728.6	728.6	728.6	728.6	0.0	0.0	0.0
433 Improvement of Food Safety Technologies	154.2	32.7	101.0	6.8	6.8	6.8	0.0	0.0	0.0	0.0	0.0
511 Enhancement of Communication for Local Agriculture Administration	443.1	88.6	88.6	88.6	88.6	88.6	0.0	0.0	0.0	0.0	0.0
512 Reinforcement of VCC Coordinating Abilities	170.5	34.1	34.1	34.1	34.1	34.1	0.0	0.0	0.0	0.0	0.0

G.2 Soil Conservation and Improvement by Crop Rotation

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost (UZS)	Cost (US\$)
1 Coordination Office in the Council of Ministers						
1-1 Chief coordinator	430,500	month	120	1man x 12 months x 10 years	51,660,000	31,177
1-2 Office staff	209,100	month	240	2men x 12 months x 10 years	50,184,000	30,286
1-3 Welfare expenses, etc.	49	%	1	(1-1 + 1-2) x 0.4	40,738,000	24,585
1-4 Computer set	1,845,000	set	2		3,690,000	2,227
1-5 Vehicle	73,800,000	car	1		73,800,000	44,538
1-6 Fuel for vehicle	1,279	lit	30,000	120 months x 25days/month x 10	38,376,000	23,160
1-7 Miscellaneous expenses for office	10	%	1	(1-4 + 1-5) x 0.1	7,749,000	4,677
2 District Coordination Offices (10 offices, excluding Muynak Dist)						
2-1 Coordinator	209,100	month	1,200	1man x 12 months x 10 years x 10	250,920,000	151,430
2-2 Welfare expenses, etc.	40	%	1	2-1 x 0.4	100,368,000	60,572
2-3 Computer set	1,845,000	set	10		18,450,000	11,135
2-4 Vehicle	73,800,000	car	10		738,000,000	445,383
2-5 Fuel for vehicle	1,279	lit	120,000	120 months x 100lit/month x 10	153,504,000	92,640
2-6 Miscellaneous expenses for office	10	%	1	(2-3 + 2-4) x 0.1	75,645,000	45,652
3 Experimental Cultivation (3ha)						
3-1 Diesel (tractor, etc.)	1,279	lit	13,500	500 lit/ha/year x 3ha x 9 years	17,269,000	10,422
3-2 Ammonium sulfate	308	kg	2,700	100kg/ha/year x 3ha x 9 years	830,000	501
3-3 Nitrate phosphate	418	kg	8,100	300kg/ha/year x 3ha x 9 years	3,387,000	2,044
3-4 Potassium	295	kg	2,700	100kg/ha/year x 3ha x 9 years	797,000	481
3-5 Manure (compost)	73,800	ton	270	10ton/ha/year x 3ha x 9 years	19,926,000	12,025
3-6 Agro-chemicals (pesticide, etc.)	43,050	lit	54	2 lit/ha/year x 3 ha x 9 years	2,325,000	1,403
3-7 Seeds	1,230	kg	600	100kg/year/ha x 2 ha x 3 years	738,000	445
3-8 Hand Sprayer	88,560	set	3		266,000	161
3-9 Computer set	1,845,000	set	1		1,845,000	1,113
3-10 Miscellaneous tools and materials	2,460,000	year	9		22,140,000	13,361
4 Research Staff						
4-1 Researcher	430,500	month	216	2men x 12 months x 9 years	92,988,000	56,118
4-2 Field Worker	147,600	month	324	3men x 12 months x 9 years	47,822,000	28,861
4-3 Welfare expenses, etc.	40	%	1	(4-1 + 4-2) x 0.4	56,324,000	33,992
Total					1,869,741,000	1,128,389

G.3 Improvement of Agricultural Extension Service for Farmers

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Manuscripts and drawings preparation						
1-1 Writing of manuscripts	24,600	page	100	10 Texts/10 years	2,460,000	1,485
1-2 Preparation of drawings	61,500	drawing	50		3,075,000	1,856
1-3 Drawing materials	430,500	unit	1		430,500	260
1-4 Indirect cost	10	%	1		596,550	360
1-5 Tax	24	%	1		1,431,720	864
2 Printing & binding of the manual						
3 Training of agricultural collage teachers (5 districts)	3,075	copy	3,000		9,225,000	5,567
3 Training of agricultural collage teachers (5 districts)						
3-1 Lecturer's allowance	18,450	2hrs	15	3men/2hrs (6 hrs/day) x 5 days	276,750	167
3-2 Lecturer's transportation	1,476	trip	15		22,140	13
3-3 Trainee's allowance	34,440	day	110	2men x 11 dists x 5 days	3,788,400	2,286
3-4 Trainee's accommodation	18,450	night	88	2men x 11 dists x 4 nights	1,623,600	980
3-5 Trainee's transportation	9,225	man	22	2men x 11 dists	202,950	122
3-6 Training materials & stationeries	6,765	man	37	22 trainees + 15 instructors	250,305	151
3-7 Posters	615	poster	5		3,075	2
3-8 Rent of projector	36,900	day	5		184,500	111
3-9 Rent of lecture room	92,250	day	5		461,250	278
3-10 Indirect cost	10	%	1		681,297	411
3-11 Tax	24	%	1		1,635,113	987
4 Farmer seminars (5 days, 11 districts)						
4-1 Lecturer's allowance	12,300	day	55	1man/day (2 hrs) x 5 days x 11 di	676,500	408
4-2 Trainee's transportation	1,230	trip	13,500	2,700 farmers x 5 days	16,605,000	10,021
4-3 Posters	615	poster	55	5 posters x 11 dists	33,825	20
4-4 Rent of projector	36,900	day	55	5 days x 11 dists	2,029,500	1,225
4-5 Rent of lecture room	92,250	day	55	5 days x 11 dists	5,073,750	3,062
4-6 Indirect cost	10	%	1		2,441,858	1,474
4-7 Tax	24	%	1		5,860,458	3,537
Annual Total					59,069,041	32,111
Grand Total	59,069,041	Year	10		590,690,000	35,648

G.4 Promotion of Renewal of Agricultural Tractors

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Tractor	36,900,000	unit	1,500	150 units x 10 years	55,350,000,000	33,403,742
2 Workshop Facility Renovation						
2-1 Facility	369,000,000	MTP	10	No MTP in Muynak Dist	3,690,000,000	2,226,916
2-2 Tools and Equipment	369,000,000	MTP	10	No MTP in Muynak Dist	3,690,000,000	2,226,916
3 Training of MTP Workshop Mechanical Staff						
4-1 Lecturer's allowance	55,350	day	30	2men x 15 days	1,661,000	1,002
4-2 Lecturers' accommodation	36,900	night	28	2men x 14 nights	1,033,000	623
4-3 Lecturers' transportation	221,400	trip	2	2men (Tashkent - Nukus)	443,000	267
4-4 Trainee's allowance	34,440	day	450	3men x 10 MTPs x 15 days	15,498,000	9,353
4-5 Trainee's accommodation	18,450	night	420	3men x 10 MTPs x 14 nights	7,749,000	4,677
4-6 Trainee's transportation	9,225	trip	30	3men x 10 MTPs	277,000	167
4-7 Training materials & stationeries	24,600	man	30	3men x 10 MTPs	738,000	445
4-8 Indirect cost	10	%	1		2,740,000	1,654
4-9 Tax	24	%	1		6,576,000	3,969
Total					62,766,715,000	37879731.4

G.5 Improvement of Accessibility to Agricultural Inputs for Agricultural Producers

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 One-stop Agro-inputs Shop Facility Renovation						
1-1 Facility	2,460,000	shop	10	No MTP in Muynak Dist	24,600,000	14,846
1-2 Computer set	1,845,000	set	10	No MTP in Muynak Dist	18,450,000	11,135
2 Supporting Office in Nukus						
2-1 Coordination staff in Nukus	430,500	month	72	1man x 12 months x 6 years	30,996,000	18,706
2-2 Office staff in Nukus	209,100	month	72	1man x 12 months x 6 years	15,055,000	9,086
2-3 Welfare expenses, etc.	40	%	1	(2-1 + 2-2) x 0.4	18,420,000	11,116
2-4 Computer set	1,845,000	set	1		1,845,000	1,113
2-5 Vehicle	73,800,000	car	1		73,800,000	44,538
2-6 Fuel for vehicle	1,279	lit	18,000	72 months x 25days/month x 10 l	23,026,000	13,896
2-7 Miscellaneous expenses for office	10	%	1	(2-4 + 2-5) x 0.1	7,565,000	4,565
3 Consulting Services of Task Force						
3-1 Staff's allowance	55,350	day	540	90 man/day x 6 years	29,889,000	18,038
3-2 Staff's accommodation	36,900	night	540	90 nights x 6 years	19,926,000	12,025
3-3 Staff's transportation	221,400	trip	36	6 trips (Tashkent - Nukus) x 6 ye	7,970,000	4,810
3-4 Indirect cost	10	%	1		5,779,000	3,488
3-5 Tax	24	%	1		13,868,000	8,369
Total					291,189,000	175,733

G.6 Research and Development of Melons and Apple

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Establishment of Trial and Demonstration Field and Facility						
1-1 Renovation and leveling of the filed	510,450	ha	3		1,531,000	924
1-2 Irrigation pump	36,900,000	unit	1		36,900,000	22,269
1-3 Irrigation facility (canal, gate, etc.)	12,300,000	ha	3		36,900,000	22,269
1-4 Mother plant of apple	12,300	plant	300		3,690,000	2,227
1-5 Truck	49,200,000	unit	1		49,200,000	29,692
1-6 Office & research room renovation	123,000,000		1		123,000,000	74,231
1-7 Research and field equipment	492,000,000		1		492,000,000	296,922
2 Cultivation in Trial and Demonstration Field	0					
2-1 Diesel (tractor, truck, etc.)	1,279	lit	27,000	1000 lit/ha/year x 3ha x 9 years	34,538,000	20,844
2-2 Ammonium sulfate	308	kg	10,800	400kg/ha/year x 3ha x 9 years	3,321,000	2,004
2-3 Nitrate phosphate	418	kg	18,900	700kg/ha/year x 3ha x 9 years	7,904,000	4,770
2-4 Potassium	295	kg	2,700	100kg/ha/year x 3ha x 9 years	797,000	481
2-5 Manure (compost)	73,800	ton	540	20ton/ha/year x 3ha x 9 years	39,852,000	24,051
2-6 Agro-chemicals (pesticide, etc.)	43,050	lit	54	5 lit/ha/year x 3 ha x 9 years	2,325,000	1,403
2-7 Melon seeds	12,300	kg	18	2kg/year x 9 years	221,000	133
2-8 Miscellaneous tools and materials	4,305,000	year	9		38,745,000	23,383
3 Dissemination of Technology & Seeds/Scions	0					
3-1 Vehicle	73,800,000	car	1		73,800,000	44,538
3-2 Fuel for vehicle	1,279	lit	5,400	10 lit/day x 90 days/year x 6 years	6,908,000	4,169
3-3 Maintenance of vehicle	10	%	1	3-1 x 0.1	7,380,000	4,454
4 Research & Management Staff	0					
4-1 Chief Researcher	516,600	month	108	1man x 12 months x 9 years	55,793,000	33,671
4-2 Researcher	430,500	month	216	2men x 12 months x 9 years	92,988,000	56,118
4-3 Office staff	209,100	month	108	1man x 12 months x 9 years	22,583,000	13,629
4-4 Field workers	147,600	month	540	5men x 12 months x 9 years	79,704,000	48,101
4-5 Welfare expenses, etc.	40	%	1	(4-1 - 4-4) x 0.4	100,427,000	60,608
5 Technical Cooperation (Joint Research)	0					
5-1 Melon Expert	59,040,000	month	35	1man x 7 months x 5 years	2,066,400,000	1,247,073
5-2 Apple Expert	59,040,000	month	35	1man x 7 months x 5 years	2,066,400,000	1,247,073
5-3 Plant Protection Expert	59,040,000	month	35	1man x 7 months x 5 years	2,066,400,000	1,247,073
5-4 Coordinator	39,360,000	month	45	1 man x 9 months x 5 years	1,771,200,000	1,068,920
5-5 Indirect cost	10	%	1		797,040,000	481,014
Total					10,077,947,000	6,082,044

G.7 Strengthening of Women's' Production in Tamarka

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Kickoff Workshop Materials	12,300	person	30	VCC staff and women dehkan	369,000	223
2 Agricultural Input					0	
2-1 Seeds	61,500	set	21	0.05ha/participant, 21 participant	1,291,500	779
2-2 Fertilizers	24,600	set	21	0.05ha/participant, 21 participant	516,600	312
2-3 Agricultural tools	73,800	set	21	21 participants	1,549,800	935
3 Technical Seminars					0	0
3-1 Materials	12,300	person	21		258,300	156
3-2 Lecturer (Agronomist)	36,900	day	5	1person x 5days	184,500	111
4 Community Development Expert	799,500	month	3	15days/month x 6months	2,398,500	1,447
5 Rent a Car Fee (include driver and fuel)	55,350	day	90	15days/month x 6months	4,981,500	3,006
6 Miscellaneous	10	%	1		1,154,970	697
Total of one Model Tamarka					12,704,670	7,667
Grand Total 55 model tamarkas	12,704,670	No.	55		698,757,000	421,700

G.8 Fodder Production and Promotion of Livestock

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Alfalfa seed production center at Scientific Research Institute of Crops						
1-1 Tractor	31,661,000	unit	1		31,661,000	19,107
1-2 Seeder	15,705,000	unit	1		15,705,000	9,478
1-3 Combine	157,046,000	unit	1		157,046,000	94,777
1-4 Trailer	6,669,000	unit	1		6,669,000	4,025
1-5 Rotary mower	23,393,000	unit	1		23,393,000	14,118
1-6 Cleaner	25,168,000	unit	1		25,168,000	15,189
1-7 Seeds	50,340	kg	50		2,517,000	1,519
1-8 Fertilizer (9-9-9)	333	kg	15,000	(300kg/ha x 50 ha)	5,002,000	3,019
2 Silage production						
2-1 Construction of silo (banker type)				USD/District		0
20 ton of silage	75,503,000	LS	1	W: 3.0m x H: 2.0m x L: 10m=50? equivalent t	75,503,000	45,566
2-2 Practical training for 3 days (harvesting, drying and crowing into silo)						0
Lecturer	818,000	man/day	3	1 person x 3days	2,454,000	1,481
Lodging	257,830	man/day	41	21 persons x 20,000sum/day x 2	10,571,000	6,380
Meal	125,850	man/day	63	21 persons x 3 days	7,928,000	4,785
Transportation	37,750	trip	42	2 times x 21persons	1,585,000	957
Venue (100\$ x 3 days)	1,636,000	day	3		4,908,000	2,962
Machinery for Harvesting, drying, sto	1,636,000	day	3		4,908,000	2,962
3 Collective fodder production						
3-1 Organizing	125,850	man/day	40	2 days x 20 dehkans	5,034,000	3,038
3-2 Compound fertilizer	3,170	kg	9,000	300kg/ha x 30ha	28,540,000	17,224
3-3 Sorghum seed	25,170	kg	1,200	40kg/ha x 30ha/site	30,202,000	18,227
3-4 Plowing and Leveling by MTP tractor	699,500	ha	30	(43,900+6,632 sum/ha)	20,984,000	12,664
3-5 Harvesting by (dehkans)	125,850	LS	52		6,519,000	3,934
4 Rotational production of crops and fodder (a						
4-1 Listing up farmers by FA	125,850	man/day	15	3 daysx 5 persons)	1,888,000	1,139
4-2 Provision of alfalfa seeds	50,340	kg	3,000	750 ha/year x 4kg/ha	151,007,000	91,133
4-3 Provision of AI service	113,254	time	10,000	500 farmers/dehkans X 2times x	#####	683,492
4-4 Campaign of rotational farming system (3 days x 50 persons)						0
Organizer	818,000	man/day	3	1 person x 3days	2,454,000	1,481
Meal	125,840	time	153	51 persons x 3 days	19,253,000	11,619
Transportation	37,750	trip	102	2 times x 51persons	3,851,000	2,324
Venue	2,173,000	day	3		6,519,000	3,934
Total					#####	1,076,533

G.9 Training on Animal Husbandry

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Training program for farmers and dehkans						
1-1 Lecturers	2,453,900	man/day	10	2 persons x 5 days	24,539,000	14,809
1-2 Transportation	119,729	trip	70	35 persons x 2 times	8,381,000	5,058
1-3 Venue	4,907,800	day	5		24,539,000	14,809
1-4 Meal	399,086	time	175	35 persons x 5days	69,840,000	42,148
1-5 Lodging	755,034	night	148	4 days x 37 persons	111,745,000	67,438
1-6 Training materials	490,771	set	35		17,177,000	10,366
2 Training for livestock experts						
2-1 Lecturers	2,453,900	man/day	10	2 persons x 5 days	24,539,000	14,809
2-2 Transportation	113,250	trip	44	22 persons x 2 times	4,983,000	3,007
2-3 Venue	4,907,800	day	5	(100 \$ x 5days)	24,539,000	14,809
2-4 Meal	377,518	time	110	22 persons x 5days	41,527,000	25,062
2-5 Lodging	755,023	night	88	4 days x 22 persons	66,442,000	40,098
2-6 Training materials	736,150	set	20		14,723,000	8,885
Total					432,974,000	261,300

G.10 Artificial Insemination and Veterinary Services

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Establishment of artificial insemination center (only one place in Nukus)						
1-1 Instruments for AI	572,565,000	set	1		572,565,000	345,543
1-2 Building (1,000m ² x 120,000 sum/m ²)	15,100	sq. m	1000		151,006,000	91,132
1-3 Breeding bulls (5 head x 5,000\$/head)	8,179,600	head	5		40,898,000	24,682
1-4 Bull shed	1,132,570	sq.m	7	7m ² /head x 5 head x 1.5	7,928,000	4,785
1-5 Incidental facilities (5%)	5	%	1		38,223,000	23,068
2 Fostering of artificial inseminators						
2-1 Lecturers	1,439,600	man/day	10	(2 persons x 80\$/day x 5 days)	14,396,000	8,688
2-2 Transportation	41,550	time	20	(10 persons x 3,000 sum/time x 2	831,000	502
2-3 Transportation for lecturers	2,699,000	man/day	2	(2 persons x 150 US\$)	5,398,000	3,258
2-4 Lodging	415,267	day	60	(30,000 sum/day x 12 persons x 5	24,916,000	15,037
2-5 Meal	138,417	time	60	(10,000/capita/day x 5 days x 12	8,305,000	5,012
2-6 Venue	1,799,400	day	5	(100\$/day x 5 days)	8,997,000	5,430
3 Provision of AI tools and vehicles						
3-1 Khodjeyli						
3-1-1 Car	9,815,000	No.	1		9,815,000	5,923
3-1-2 Motor cycle	7,688,500	No.	2		15,377,000	9,280
3-1-3 Cycle	327,100	No.	7		2,290,000	1,382
3-1-4 LN2 tank	5,071,500	bottle	2		10,143,000	6,121
3-1-5 Refrigerator	818,000	set	3		2,454,000	1,481
3-1-6 Microscope	9,652,000	unit	2		19,304,000	11,650
3-1-7 Obsterical instrument	818,000	set	4		3,272,000	1,975
3-1-8 Surgical instrument	818,000	set	4		3,272,000	1,975
3-1-9 Portable insulated box	163,500	No.	2		327,000	197
3-1-10 Restraining stall and accessories	2,339,300	set	3		7,018,000	4,235
3-1-11 Protective wear	327,200	No.	10		3,272,000	1,975
3.2 Tahiatash(Khodjeyli)						
3-2-1 Car	9,815,000	No.	1		9,815,000	5,923
3-2-2 Motor cycle	7,688,500	No.	1		7,689,000	4,640
3-2-3 Cycle	327,100	No.	1		327,000	197
3-2-4 LN2 tank	5,071,500	bottle	1		5,071,000	3,060
3-2-5 Refrigerator	818,000	set	1		818,000	494
3-2-6 Microscope	9,652,000	unit	1		9,652,000	5,825
3-2-7 Obsterical instrument	818,000	set	1		818,000	494
3-2-8 Surgical instrument	818,000	set	1		818,000	494
3-2-9 Portable insulated box	163,500	No.	1		164,000	99
3-2-10 Restarianing stall and accessories	2,339,300	set	1		2,339,000	1,412
3-2-11 Protective wear	327,200	No.	10		3,272,000	1,975
3-3 Nukus region						
3-3-1 Car	9,815,000	No.	1		9,815,000	5,923
3-3-2 Motor cycle	7,688,500	No.	1		7,689,000	4,640
3-3-3 Cycle	327,100	No.	3		982,000	593
3-3-4 LN2 tank	5,071,500	bottle	2		10,143,000	6,121
3-3-5 Refrigerator	818,000	set	2		1,636,000	987
3-3-6 Microscope	9,652,000	unit	1		9,652,000	5,825
3-3-7 Obsterical instrument	818,000	set	2		1,636,000	987
3-3-8 Surgical instrument	818,000	set	2		1,636,000	987
3-3-9 Portable insulated box	163,500	No.	1		164,000	99
3-3-10 Restarianing stall and accessories	2,339,300	set	2		4,679,000	2,824
3-3-11 Protective wear	327,200	No.	10		3,272,000	1,975
3.4 Nukus city vet station						
3-4-1 Car	9,815,000	No.	1		9,815,000	5,923
3-4-2 Motor cycle	7,688,500	No.	3		23,066,000	13,920
3-4-3 Cycle	327,100	No.	1		327,000	197
3-4-4 LN2 tank	5,071,500	bottle	1		5,071,000	3,060
3-4-5 Refrigerator	818,000	set	1		818,000	494
3-4-6 Microscope	9,652,000	unit	1		9,652,000	5,825
3-4-7 Obsterical instrument	818,000	set	1		818,000	494
3-4-8 Surgical instrument	818,000	set	1		818,000	494
3-4-9 Portable insulated box	163,500	No.	1		164,000	99
3-4-10 Restarianing stall and accessories	2,339,300	set	1		2,339,000	1,412
3-4-11 Protective wear	327,200	No.	10		3,272,000	1,975

3-5 Takhtakupyr						
3-5-1 Car	9,815,000	No.	1		9,815,000	5,923
3-5-2 Motor cycle	7,688,500	No.	1		7,689,000	4,640
3-5-3 Cycle	327,100	No.	4		1,309,000	790
3-5-4 LN2 tank	5,071,500	bottle	2		10,143,000	6,121
3-5-5 Refrigerator	818,000	set	2		1,636,000	987
3-5-6 Microscope	9,652,000	unit	2		19,304,000	11,650
3-5-7 Obsterical instrument	818,000	set	2		1,636,000	987
3-5-8 Surgical instrument	818,000	set	2		1,636,000	987
3-5-9 Portable insulated box	163,500	No.	2		327,000	197
3-5-10 Restarianing stall and accessories	2,339,300	set	2		4,679,000	2,824
3-5-11 Protective wear	327,200	No.	10		3,272,000	1,975
3.6 Shumanay						
3-6-1 Car	9,815,000	No.	1		9,815,000	5,923
3-6-2 Motor cycle	7,688,500	No.	2		15,377,000	9,280
3-6-3 Cycle	327,100	No.	4		1,309,000	790
3-6-4 LN2 tank	5,071,500	bottle	2		10,143,000	6,121
3-6-5 Refrigerator	818,000	set	3		2,454,000	1,481
3-6-6 Microscope	9,652,000	unit	2		19,304,000	11,650
3-6-7 Obsterical instrument	818,000	set	2		1,636,000	987
3-6-8 Surgical instrument	818,000	set	2		1,636,000	987
3-6-9 Portable insulated box	163,500	No.	2		327,000	197
3-6-10 Restarianing stall and accessories	2,339,300	set	2		4,679,000	2,824
3-6-11 Protective wear	327,200	No.	10		3,272,000	1,975
3-7 Kegeily						
3-7-1 Car	9,815,500	No.	2		19,631,000	11,847
3-7-2 Motor cycle	7,688,500	No.	2		15,377,000	9,280
3-7-3 Cycle	327,100	No.	7		2,290,000	1,382
3-7-4 LN2 tank	5,071,250	bottle	4		20,285,000	12,242
3-7-5 Refrigerator	818,000	set	4		3,272,000	1,975
3-7-6 Microscope	9,651,667	unit	3		28,955,000	17,474
3-7-7 Obsterical instrument	818,000	set	3		2,454,000	1,481
3-7-8 Surgical instrument	818,000	set	3		2,454,000	1,481
3-7-9 Portable insulated box	163,500	No.	2		327,000	197
3-7-10 Restarianing stall and accessories	2,339,300	set	3		7,018,000	4,235
3-7-11 Protective wear	327,200	No.	10		3,272,000	1,975
3-8 Muynak						
3-8-1 Car	9,815,000	No.	1		9,815,000	5,923
3-8-2 Motor cycle	7,688,500	No.	2		15,377,000	9,280
3-8-3 Cycle	327,100	No.	3		982,000	593
3-8-4 LN2 tank	5,071,500	bottle	1		5,071,000	3,060
3-8-5 Refrigerator	818,000	set	2		1,636,000	987
3-8-6 Microscope	9,652,000	unit	1		9,652,000	5,825
3-8-7 Obsterical instrument	818,000	set	2		1,636,000	987
3-8-8 Surgical instrument	818,000	set	2		1,636,000	987
3-8-9 Portable insulated box	163,500	No.	1		164,000	99
3-8-10 Restarianing stall and accessories	2,339,300	set	1		2,339,000	1,412
3-8-11 Protective wear	327,200	No.	10		3,272,000	1,975

3-9 Beruni						
3-9-1 Car	9,815,000	No.	1		9,815,000	5,923
3-9-2 Motor cycle	7,688,800	No.	5		38,444,000	23,201
3-9-3 Cycle	327,100	No.	8		2,617,000	1,579
3-9-4 LN2 tank	5,071,500	bottle	3		15,214,000	9,182
3-9-5 Refrigerator	818,000	set	4		3,272,000	1,975
3-9-6 Microscope	9,651,667	unit	3		28,955,000	17,474
3-9-7 Obsterical instrument	818,000	set	4		3,272,000	1,975
3-9-8 Surgical instrument	818,000	set	4		3,272,000	1,975
3-9-9 Portable insulated box	163,500	No.	2		327,000	197
3-9-10 Restarianing stall and accessories	2,339,300	set	4		9,357,000	5,647
3-9-11 Protective wear	327,200	No.	10		3,272,000	1,975
3-10 Kanlikul						
3-10-1 Car	9,815,000	No.	1		9,815,000	5,923
3-10-2 Motor cycle	7,688,500	No.	2		15,377,000	9,280
3-10-3 Cycle	327,100	No.	5		1,636,000	987
3-10-4 LN2 tank	5,071,500	bottle	2		10,143,000	6,121
3-10-5 Refrigerator	818,000	set	3		2,454,000	1,481
3-10-6 Microscope	9,652,000	unit	2		19,304,000	11,650
3-10-7 Obsterical instrument	818,000	set	3		2,454,000	1,481
3-10-8 Surgical instrument	818,000	set	2		1,636,000	987
3-10-9 Portable insulated box	163,500	No.	2		327,000	197
3-10-10 Restarianing stall and accessories	2,339,300	set	2		4,679,000	2,824
3-10-11 Protective wear	327,200	No.	10		3,272,000	1,975
3-11 Chimbay						
3-11-1 Car	9,815,000	No.	1		9,815,000	5,923
3-11-2 Motor cycle	7,688,500	No.	2		15,377,000	9,280
3-11-3 Cycle	327,100	No.	6		1,963,000	1,185
3-11-4 LN2 tank	5,071,500	bottle	3		15,214,000	9,182
3-11-5 Refrigerator	818,000	set	3		2,454,000	1,481
3-11-6 Microscope	9,652,000	unit	2		19,304,000	11,650
3-11-7 Obsterical instrument	818,000	set	3		2,454,000	1,481
3-11-8 Surgical instrument	818,000	set	3		2,454,000	1,481
3-11-9 Portable insulated box	163,500	No.	2		327,000	197
3-11-10 Restarianing stall and accessories	2,339,300	set	3		7,018,000	4,235
3-11-11 Protective wear	327,200	No.	10		3,272,000	1,975
3-12 Kungrad						
3-12-1 Car	9,815,000	No.	1		9,815,000	5,923
3-12-2 Motor cycle	7,688,500	No.	3		23,066,000	13,920
3-12-3 Cycle	327,100	No.	6		1,963,000	1,185
3-12-4 LN2 tank	5,071,500	bottle	3		15,214,000	9,182
3-12-5 Refrigerator	818,000	set	3		2,454,000	1,481
3-12-6 Microscope	9,652,000	unit	2		19,304,000	11,650
3-12-7 Obsterical instrument	818,000	set	2		1,636,000	987
3-12-8 Surgical instrument	818,000	set	3		2,454,000	1,481
3-12-9 Portable insulated box	163,500	No.	2		327,000	197
3-12-10 Restarianing stall and accessories	2,339,300	set	2		4,679,000	2,824
3-12-11 Protective wear	327,200	No.	10		3,272,000	1,975
3-13 Karauzyak						
3-13-1 Car	9,815,000	No.	1		9,815,000	5,923
3-13-2 Motor cycle	7,688,500	No.	2		15,377,000	9,280
3-13-3 Cycle	327,100	No.	4		1,309,000	790
3-13-4 LN2 tank	5,071,500	bottle	2		10,143,000	6,121
3-13-5 Refrigerator	818,000	set	2		1,636,000	987
3-13-6 Microscope	9,652,000	unit	2		19,304,000	11,650
3-13-7 Obsterical instrument	818,000	set	2		1,636,000	987
3-13-8 Surgical instrument	818,000	set	2		1,636,000	987
3-13-9 Portable insulated box	163,500	No.	2		327,000	197
3-13-10 Restarianing stall and accessories	2,339,300	set	2		4,679,000	2,824
3-13-11 Protective wear	327,200	No.	10		3,272,000	1,975
4) Provision of vehicle with vet instrument for mobile vet services						
1 Vehicle (1 unit x 12,400 \$/unit)	#####	No.	1		223,137,000	134,663
2 Veterinary instrument (1 set x 48,000\$)	#####	set	1		863,755,000	521,276
Total					2,895,343,000	1,747,340

G.11 Sustainable Fishery Promotion

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Strengthening Fishery Association						0
1-1. Rehabilitation of Association						
Office equipment	1,415,000	set	1	(series of PC)	1415000	854
Additional workers	115,489	man-month	90	(5 person x 6 month x 3 years	10394000	6,273
1-2. Improvement of financial system						
2 Establishment of seed distribution system						
2-1. Seed production						
2-2. Seed distribution and verification of effectiveness						
Seed	92	no.	9000000	3,000,000 fish x 3 years	830250000	501,056
Transport	456	trip	40500	300km x 45 times x 3 years	18,450,000	11,135
Fuel	1,012	liter	24300	8,100 Lit. x 3 years	24,600,000	14,846
2-3. Setting appropriate capture production						
2-4. Opening new water area						
Technical Assistance	47,833,333	man-month	9	3 months x 3 years	430,500,000	259,807
Total					1,315,609,000	793,970

G.12 Aquaculture Development

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Establishment of system for aquaculture development and promotion						0
1-1. Staff training		man-month	3	1 person x 3 month	369,000	223
1-2. Arrangement of support system for aquaculture promotion						
1-3. Extension and publicity						
2 Establishment of aquaculture model for study area						
2-1. Implementation of model production						
Construction of Pond (1ha)	38,130,000	LS	1		38,130,000	23,011
Seed	984,000	LS	1		984,000	594
Feed	9,840,000	LS	1		9,840,000	5,938
Fertilizer	246,000	LS	1		246,000	148
2-2. Making of manual and promotion						
Printing		book	300		3,690,000	2,227
Technical Assistance		man-month	12	3 months x 4 years	578,100,000	348,884
Total					631,359,000	381,025

G.13 Improving Internal Canal System

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Establishing special fund for irrigation improvement and publitzation of procedures						
Seminar	227,500	session	4	4 days for WUA at ISD	910,000	549
2 Formulating technical guidance for the internal canal system improvement and its publitzation						
Technical guidance seminar	3,560,000	LS		by consultants	3,560,000	2,148
3 Formulating the improvement plan of the internal canal system, preparing a				regular activity of ISD	0	0
4 Conducting survey work and facility design of the internal canal system						
Survey & design	28,290	ha	156,500	by consultants	4,427,385,000	2,671,928
5 Cleaning and dredging work of internal canal and repairing canal facilities						
Cleaning & digging	108,240	ha	156,500		16,939,560,000	10,223,030
Technical experts with transportation	202,070	man-month	560	14 person x 5 monrh x 8 years	113,159,200	68,292
6 Repairing, renewal and establishing gate and water measurement facilities						
Facility renovation	172,200	ha	156,500	unit rate estimated by pilot project implementation	26,949,300,000	16,263,911
Total					48,433,874,200	29,229,858

G.14 Strengthening Water Management in the Field

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Installing division box with water measurement tool (Shandur) at the intakes of farms						
Seminar	391,790	session	90	includes transportation	35,261,000	21,280
division box installation	16,000	ha	156,500		2,504,000,000	1,511,165
2 Measuring amount of water distributed to farms						
				regular activity of ISD	0	0
3 Holding technical seminars to members on improvement of litigation planning and water use in the field						
Preparation of seminar materials	92250000	LS	1		92,250,000	55,673
Seminar	136400	session	88		12,003,200	7,244
Consulting services	219,851,800	LS	1	includes office equipment	219,851,800	132,681
4 Land leveling in the field						
	Costs included in "Improveing Drainage Conditions in the Field"					
Total					2,863,366,000	1,728,042

G.15 Introducing Water Saving Technology

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Setting up model farms and extension through operating model farms (10 model farms with 1ha)						
Plannning establishment of model farm	8,487,000	farm	10	model farm 1 ha	84,870,000	51,219
Underdrain installation	40,490	farm	10		404,900	244
Land leveling	18,500	farm	10		185,000	112
Installation of drip irrigation	3,321,000	farm	10		33,210,000	20,042
Consulting services	#####	LS	1	guidance, monitoring & evaluatio	353,708,100	213,463
2 Setting up consultation desk to fermers on technical and materials for water						
				included "strengthening Water Management"		
3 Research and development of water saving technology and necessary materials						
Reserch and development of 5 year program		L.S.	1		79,950,000	48,250
4 Preparation of seminar text and materials for extension						
Material preparation of extension semi	36,900,000	L.S.	1		36,900,000	22,269
Total					589,228,000	355,599

G.16 Improving Drainage Conditions in the Field

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Model farm and extension				included in "Strengthening Water Mangement Pro		0
2 Preparation of technical assistance to fermers				included in "Strengthening Water Mangement Pro		0
3 Preparation of support system of material for other irrigation Program of Action				included in "Strengthening Water Mangement Pro		0
4 Preparing construction machinery for drainage improvement in the field						
Land leveling equipment	18,450	ha	16000		295,200,000	178,153
5 Preparing preference credit system for drainage improvement in the field				included in regular activity	0	0
6 Research and development on effective and efficient leaching technology					830,250,000	501,056
Total					1,125,450,000	679,209

G.17 Strengthening WUA and Enhancing its Activity

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost in UZS	Cost in US\$
1 Increasing water management capacity of WUA						
1-1 Appointment of necessary WUA staff	9,224,000	LS	216	216 staff required for 64 WUAs	1,992,384,000	1,202,404
1-2 Introduction of computer for WUA manager	1,601,500	set	90		144,135,000	86,986
1-3 Training WUA staff on O&M	127,740	session	50	10 days x 5years	6,387,000	3,855
1-4 Provide transportation divices of WUA	246,000	unit	450		110,700,000	66,807
2 Increasing canal / collector maintenance capacity of WUA						
2-1 Formulation of Plan of O&M				included in regular activity		
2-2 Prepartion of inventory list for O&M				included in "Improving Internal Canal System"		
2-3 Provide mini-excavator for WUA O&M	79,950,000	unit	76	new equipment	6,076,200,000	3,666,989
2-4 spareparts & maintenance service of eq	15,990,000	unit	24	for existing mini-excavatorw	383,760,000	231,599
2-5 Leasing construction equipment for O&	27,675	ha	469,500	156500 ha/ 9years/3	12,993,412,500	7,841,528
2-6 preparation parats supply system for hydor-structure	1,145,500	L.S.	1	preparation design standard of ga	1,145,500	691
2-7 Activate WUA communication				included in regular activity	0	0
3 Improving water fee system and business plan of WUA						
3-1 Improvement of water fee and business system				included in regular activity		
3-2 Consultation on WUA Accounting syst	184,500	man-month	480	4 persons of ISD 10years	88,560,000	53,446
3-3 Campain for importance of water fees for WUA				included in regular activity		
4 Promoting tamarka user's participation in water management activity through WUA						
Promoting tamarka users participation to WUA	4,920	session	1,800	Seminar to Tamarka users at 90W	8,856,000	5,345
Total					21,805,540,000	13,154,305

G.18 Joint Marketing by Farmer Group

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost (UZS)	Cost (US\$)
1. Establishment of Working Group						
Computer for Info. Bank	1,636,000	set	1		1,636,000	987
2. Focus Group Discussion						
Workshop (3days)	135,300	man-day	90		12,177,000	7,349
3. Business Planning						
Workshop (5days)	135,300	man-day	150		20,295,000	12,248
Study Tour (Tashkent, logging)	1,079,600	day	5		5,398,000	3,258
Study Tour (Tashkent, Meeting)	135,300	time	20		2,706,000	1,633
Study Tour (Tashkent, Air fee)	2,609,200	trip	5		13,046,000	7,873
Study Tour (Tashkent, Minibus)	1,079,500	day	2		2,159,000	1,303
Business Seminar (Lecturers)	899,500	man-day	2		1,799,000	1,086
Technical Training (Lectures)	899,667	man-day	3		2,699,000	1,629
Action Planning (1day)	135,300	man-day	30		4,059,000	2,450
4. Products Development						
Resource Parson (5times)	899,800	man-day	5		4,499,000	2,715
5. Marketing						
Computer for Agro-firm	17,995,000	set	1		17,995,000	10,860
Rent a Truck	1,439,600	day	15		21,594,000	13,032
Total					110,062,000	66,422

G.19 Improvement of Marketing Support Infrastructure

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost (UZS)	Cost (US\$)
1. Stakeholder Meeting						
Workshop (3days)		10000			1,107,000	668
Study Tour (Tashkent, logging)			60		196,000	118
Study Tour (Tashkent, Meeting)		10000			62,000	37
Study Tour (Tashkent, Air fee)			145		474,000	286
Study Tour (Tashkent, Minibus)			60		98,000	59
2. Integration of Control System						
Technical Training (Lectures)			50		4,090,000	2,468
Computer for Perishable Food Control			1000		16,359,000	9,873
3. Estimation of separation of perishable food section and others (including cost for detail design)						0
Kungrad		L.S.	1	area 620 sq.m	369,000,000	222,692
Muynak				area 22 sq.m	0	0
Shumanay		L.S.	1	area 240 sq.m	169,740,000	102,438
Kanlikul		L.S.	1	area 108 sq.m	147,600,000	89,077
Kegeily		L.S.	1	area 160 sq.m	191,880,000	115,800
Chimbay		L.S.	1	area 600 sq.m	861,000,000	519,614
Khodjeyli		L.S.	1	area 1017 sq.m	799,500,000	482,498
Nukus		L.S.	1	area 1000 sq.m	769,980,000	464,683
Karauzyak		L.S.	1	area 160 sq.m	100,860,000	60,869
Takhtakupyr		L.S.	1	area 160 sq.m	199,875,000	120,625
Beruni		L.S.	1	area 340 sq.m	307,500,000	185,576
4. Estimation of Establishment of Cold Section						0
Kungrad		L.S.	1	area 620 sq.m	96,027,000	57,952
Muynak		L.S.	1	area 22 sq.m	818,000	494
Shumanay		L.S.	1	area 240 sq.m	33,209,000	20,042
Kanlikul		L.S.	1	area 108 sq.m	20,285,000	12,242
Kegeily		L.S.	1	area 160 sq.m	22,248,000	13,427
Chimbay		L.S.	1	area 600 sq.m	87,030,000	52,523
Khodjeyli		L.S.	1	area 1017 sq.m	151,157,000	91,223
Nukus		L.S.	1	area 1000 sq.m	150,503,000	90,829
Karauzyak		L.S.	1	area 160 sq.m	22,248,000	13,427
Takhtakupyr		L.S.	1	area 160 sq.m	22,248,000	13,427
Beruni		L.S.	1	area 340 sq.m	53,167,000	32,086
Total					4,598,261,000	2,775,052

G.20 Small Scale Slaughterhouse

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost (UZS)	Cost (US\$)
1 Building	755031.25	sq. m	160	(8m x 20m x 150000 sum/m ²)	120,805,000	72,906
2 Processing instrument	130,872,000	set	1		130,872,000	78,981
3 Cold storage	71,980,000	unit	1	(8m x 6m x 3m)	71,980,000	43,440
4 Insulated ban	52,349,000	unit	1		52,349,000	31,593
5 Hide salting room	966,000	unit	1	(4 x 4m x 120000sum/m ²)	966,000	583
Total					376,972,000	227,503

G.21 Improvement of Small-scale Agro-processing Technologies

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost (UZS)	Cost (US\$)
1 Confirmation of Distinctive Factors on Initial Operation		LS	1		221,928,000	133,934
Mobilization for monitoring activities of groups		LS	1		72,896,000	43,993
2 Research and Development of Small-Scale Agro Processing						
Training of MAWR experts in agro-processing and dairy/meat prod		LS	1		32,398,000	19,552
3 Training of experts and policy making						
Mobilization for selection of target groups and site check of busines		LS	1		14,579,000	8,798
Seminar at Nukus, Chimbay and Kungrad		LS	1		14,579,000	8,798
4 Credit Facilitation and Procurement of Equipment						
Milk mini-plants		LS	1		1,133,937,000	684,331
veg/fruits processing units		LS	1		388,778,000	234,628
Others (food oil extractors, rice/flour mill)		LS	1		323,982,000	195,523
Mobilization for monitoring and sales support		LS	1		48,597,000	29,328
5 Minimum Improvement of Infrastructure						
Rehabilitation of building, electricity / gas / water s		LS	1		1,397,982,000	843,683
Total					3,649,656,000	2,202,568

G.22 Improvement of Food Safety Technologies

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost (UZS)	Cost (US\$)
1. Revi Outsourcing of food inspection	65,436,000	man-month	0.5		32,718,000	19,745
2. Improvement of Sanitary Control Plan						
Workshop (3days)	12,300	time	90		1,107,000	668
Study Tour (Tashkent, logging)	98,160	man-day	25		2,454,000	1,481
Study Tour (Tashkent, Meeting)	12,300	time	20		246,000	148
Study Tour (Tashkent, Air fee)	237,200	trip	30		7,116,000	4,295
Study Tour (Tashkent, Minibus)	98,250	trip	4		393,000	237
3. Capacity Building of VSE						
Workshop (3days)	12,300	10000	90		1,107,000	668
Knowledge Development (Lecture)	81,667	time	3		245,000	148
Skills Development (Lecture)	82,000	time	1		82,000	49
Text Book Development	16,359,000	LS	1		16,359,000	9,873
Upgrading VSE equipment	71,896,000	LS	1		71,896,000	43,389
4. Promotion of Enlightenment Activities						
Material Development	17,995,000	LS	1		17,995,000	10,860
Video Camera	1,636,000	set	1		1,636,000	987
Digital Camera	818,000	set	1		818,000	494
Total					154,172,000	93,043

G.23 Enhancement of Communication for Local Agricultural Administration

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost (UZS)	Cost (US\$)
1 Community Development Expert	43,973,000	man-month	1		43,973,000	26,538
2 Training for Hakimiyat Officers						0
1) Venue	0	day	2		0	0
2) Materials	676,556	set	9		6,089,000	3,675
3) Specialist	1,353,000	man-month	2		2,706,000	1,633
3 Training for VCC officers						0
1) Venue	0	day	2			0
2) Materials	676,600	set	5		3,383,000	2,042
3) Specialists	1,353,000	man-month	2		2,706,000	1,633
4 Evaluation Workshops						0
1) Venue	0	day	1			0
2) Materials	676,500	set	20		13,530,000	8,165
3) Meal	676,500	man-month	20		13,530,000	8,165
4 Computers and printers etc.	87,945,000	set	3		263,835,000	159,225
5 Vehicle and Fuel, etc.	3,044,267	day	30		91,328,000	55,116
6 Miscellaneous	2,030,000	LS	1		2,030,000	1,225
Total					443,110,000	267,417

G.24 Reinforcement of VCC Coordinating Abilities

Item	Unit Rate (UZS)	Unit	Quantity	Description	Cost (UZS)	Cost (US\$)
1 Community Development Expert	43,973,000	man-month	1		43,973,000	26,538
2 Information Workshop						0
1) Venue	0	day	2		0	0
2) Materials	676,500	40	40		27,060,000	16,331
3 Training for VCC officers and IG						0
1) Venue	0	day	3		0	0
2) Materials	676,500	LS	10		6,765,000	4,083
4 Vehicle and Fuel	3,044,267	day	30		91,328,000	55,116
5 Miscellaneous	1,353,000	LS	1		1,353,000	817
Total					170,479,000	102,884