APPENDIX J.

WATER USERS' ASSOCIATION AND RURAL SOCIOLOGY

Appendix J Water User's Association and Rural Sociology

J.1 Institutional and Legal Framework

Relating to the JICA Study in adherence to the Egyptian policy of economic reform and deepening the role of the private sector in production and service activities, following issues are earmarked from the Fourth Five Year Plan for Economic and Social Development in the field of agriculture and rural development. They are:

1)Projects of integrated rural development focusing on supporting the activities of the village women in agricultural development either in governmental bodies or non- governmental organizations

2)Providing cooperatives and the private sectors with all the means of supporting the liberalization of Egyptian agriculture

3)Encouraging the contribution of self efforts and individual initiatives in operation costs and the maintenance of irrigation networks

4)Agricultural credit as one of the essential tools for bringing about development within the framework of economic liberalization to be carried by the Principal Bank for Development and Agricultural Credit (PBDAC)

5)Providing incentives to farmers and boosting the role of the private sector in agricultural development which is reflected on expanding the cultivation of strategic crops, increasing agricultural exports etc.

6)Investment of a sum of L.E. 17.3 billion by the government sector towards implementing infrastructure, agricultural researches and studies, rationalizing water use, protecting it from pollution, upgrading its utilization and supplying it from unconventional sources etc.

At the same time, from the regional viewpoints for Center and East of the Delta Area, the following issues are picked up from the Fourth Five Year Plan.

1)Investment of a sum of L.E.47.3 billion for developing the Area (i.e. for Governorates of Gharbia, Kafr El Sheik, Dekehlia, Demiut, Monofeia and Sharkia)

2)Improvement and maintenance of old cultivable lands

3)Supporting agricultural training centers

4)Purifying straits and reducing salinity, and increasing the efficiency of using water resources

5)Boosting the numbers and activities of social, youth and children and family institutes with a concentration on productive family projects

J.2 Rural Community and Farmers' Organization

For the purpose of deepening understanding as per the relationship among rural society, farmers' willingness/incentives and IIP cum IAS, the Rural Sociology Survey has been done in the phase-1 study.

Table J.2-1 shows locations, related administrations etc. of the selected canals for this survey (For reference, selection of canals has been done based on the preceding "Farm Economy Survey" done by the Team).

Table J.2-2 shows adopted formats for this survey, and Figure J.2-1 shows results of the survey.

For reference, some crucial points of the above formats are digested below.

*farmers' ownership for pump and/or saqiya and their capacity, durability, money spent etc.
*ideal size of water users unit in terms of member farmers
*ways of joint maintenance of mesqas and drainage canals (such as by own labor, cost payment, hiring laborers or machines etc.), and monetary or in kinds burdens for them
*ways of decision making for O/M (such as by discussion, customary law or regulation etc.)
*major conflicts in irrigation management (such as of offense against the decision, inequity of water allocation, illegal use of pump, damage or loss of pump/saqiya etc.)
*ways of penalty in case of offense (such as in monetary fine, dismissal from group, submission to local authority etc.)
*influential person for penalty decision or conflict solution (such as Umda, police etc.)
*farmers' knowledge about IIP and its source (such as from other farmers, rural authorities, MPWWR staff etc.)
*farmers' knowledge about IAS and its source (such as from other farmers, rural authorities, MPWWR staff etc.)
*expected merits brought by IIP & WUA (such as stable and equitable water supply, decrease in O/M costs, decrease in conflict/ dispute etc.)
*anxious demerits brought by IIP & WUA (such as increase in conflict/dispute, increase in O/M and other costs, friction occurrence between WUA and conventional authorities etc.)
*most indispensable supports through IIP implementation and WUA establishment (such as stable water supply, support for market-oriented agriculture, making importance in farmer oriented program, establishment of permanent field office for supporting farmers etc.)
*last but not least, main constraints hampering agricultural activities and daily life of farmers, and ways to solve them

Table J.2-1 Canals for Rural Sociology Survey

Canal					Irriga tion Administration			Rema rks	
Location	Main or Branch	Branch or 1st Delivery	2nd Delivery	Delivery Surveyed	Directorate	Inspection	Water District		
Upstream	Omar Pick			Tereek El Mahallah	Gharbia	El Mahallah El Kobra	Bahary Zifta		
	Bahr El Mallah			Dakhmoos	Gharbia	El Mahallah El Kobra	Bishbeesh		
				2 deliveries					
Middlestream	Bahr Tera			Abshan	Kafr El Sheikh	Beila	Beila		
	Raiah Belkas			Bashawat	West Dakahlia	Belkas	Belkas		
	Raiah Belkas	El Banawan El Alaa		Bahr El Bashma	West Dakahlia	Belkas	Maasara		
				3 deliveries					
Downstream	Bahr Tera			Canal No. 4	Kafr El Sheikh	Beila	Balteem	Mixed with drainage	New reclamation area
	Bahr Hafir Shehab El Deen	El Nile	El Eslah	El Sharakwa	West Dakahlia	Belkas	Zahraa		New reclamation area
	Bahr Basandila			Bahr El Samar	West Dakahlia	Belkas	Basandila		
	Bahr El Sahel	El Balamoun		El Wastanie	Damietta	Damietta	Kafr Saad		
				4 deliveries					
Qahwagi	Met Yazid			Matboul	Kafr El Sheikh				With IIP
				1 delivery					
Behr Saidi	El Ghanima			El Kassabi	Kafr El Sheikh				Wih IIP
				1 delivery					
Total				11 deliveries					

Source: Consolidated by JICA Study Team

Table J.2-2 Rural Sociology Survey

(based upon the results obtained from "Farm Economy Survey" -hereinafter referred to as FES) No.

Name of Farmer: _____ Date interviewed: ,1998

Address: Subvillage: _____ Enumerator: _____

Village: _____ Checked by: _____

District: _____

Main canal: _____

Delivery Canal: _____

Meska: _____

FES 11,12,13 as per Mesqua System and Its O/M

(1) Number of farmers of each Mesqua in which you belong

Mesqua A: _____

Mesqua B: _____

Mesqua C: _____

(2) Number of Marwa intakes of each Mesqua in which you belong

Mesqua A: _____

Mesqua B: _____

Mesqua C: _____

(3) Do you have your own pump and/or saqiya for Marwa irrigation? "Yes" , or "No" .

If "Yes", it capacity is _____ HP, _____ l/min. and/or applicable for _____ feddan.

(4) By how many farmers the pump and/or saqiya is owned and used ? _____

(5) How much you paid for the pump and/or saqiya (including installation) ? _____ LE

(6) The pump and/or saqiya was purchased in 19 _____ ,and expectedly more _____ years durable

(7) So called "Saqiya Ring" or other traditional incorporating irrigation system is still viable in your irrigation area or not "Yes"_____, "No"_____,

(8) In maximum, how many farmers can incorporate with in an irrigation group by using a unit pump and/or canal system ?

up to 10 ____, up to 20 ____, up to 30 ____, up to 50 ____,
up to 100 ____, over 100 ____,

(9) At present, how you are joining a maintenance of Mesqua and drainage, such as dredging and weeding ?

By offering your own labor: _____
By cost payment: _____
By hiring laborers: _____
By hiring rental machines: _____
Not join: _____
(specify the reason) _____

(10) How much money or how many days you spend annually for the above mentioned job ?

_____ LE/year, or _____ days/year

(11) How such rules are decided in allocating shared burden against each farmer ?

By discussion among farmers in each year or crop season: _____
By customary law such as "haqq al-'arab" etc.: _____
By fixed regulations etc. _____
Others _____

(12) What kind of conflicts are mostly seen in your Mesqua ?

Offense against the decided responsibility as per canal O/M: _____
Inequity of water allocation between head and tail reaches: _____
Illegal use of pump/: _____
Damage or loss of pump/saqiya caused by other member: _____
Destruction of canals incurred by careless driving of tractor: _____
Others: _____

(13) If rules decided are not observed by some farmer, then what kind of penalty will be imposed to him ?

Monetary fine: _____
Dismiss from the irrigation group: _____
Submission of subject to local authority : _____
Others : _____

(14) In case of penalty decision or conflict solution , who will be a most influential person in your Mesqua ?

Village chief(Umda): _____

Police: _____

Senior member of rural community: _____

Through a democratic negotiation among farmers: _____

Others: _____

(15) Have you ever heard about "Irrigation Improvement Project(IIP)" which is aiming at a bold innovation of giving water users a large authority and responsibility through the establishment of "Water Users Association(WUA)" , as a regal entity, in each Mesqua canal ?

"Yes"_____ , or "No"_____

If "Yes", from whom you have heard this subject ?

From other farmers or intimate: _____

From rural authorities/ agricultural cooperative/ extension workers etc. _____

From MPWWR staff: _____

Others: _____

(16) Have you ever heard about "Irrigation Advisory Service(IAS)" which is to help farmers in establishing WUA through technical, and institutional assistance ?

"Yes"_____ , or "No"_____

If "Yes", from whom you have heard this subject ?

From other farmers or intimate: _____

From rural authorities/ agricultural cooperative/ extension workers etc. _____

From MPWWR staff: _____

Others: _____

(17) If a WUA is established in your Mesqua canal, what kind of merit you expect ?

(Please fill at least three numbers in turn in accordance with your expectation)

Stable and equitable water supply: ( )

Decrease in O/M costs for Mesqua canal and drainage: ( )

Decrease in conflict/ dispute regarding water distribution: ( )

More flexible crop diversification: ( )

Labor saving in water application in each allotment: ( )

Increase in gross income(by marketing etc.) and/or

decrease of farm input costs (by grouping procurement etc.): ( )

Upheaval in farming cum daily life environment: ( )

Reduce in over-intervention by Government
for farmers' self-govering: ( )

No merit is expected: ( )

Others: ( )

(18) By contrast, what kind of demerit you are afraid which may arise by WUA establishment ?
(Please fill at least three numbers in turn in accordance with your worry)

Increase in conflict/dispute regarding O/M allocation: ( )

Increase in O/M and other costs
such as pump replacement: ( )

Friction occurrence between WUA and conventional authority( )

Decrease in private time due to WUA administration: ( )

Increase in farm input costs and/or decrease of gross income: ( )

Loss of tradition which has been kept in rural community: ( )

No demerit is worried: ( )

Others: ( )

(19) What kind of supports are most indispensable to establish a WUA in your Mesqua canal,?
(Please fill at least three numbers in turn in accordance with your expectation)

Stable water supply at Mesqua and/or branch canal head: ( )

Technical support for market-oriented agriculture: ( )

Support in opening bank account: ( )

Coordination in contacting with equipment firm, construction
company and other related services such as training etc( )

Lightening and/or elongation in repayment for IIP costs: ( )

Making a new system for subsidy such as cost preparation
for pump replacement etc.: ( )

Preparation of attractive policy in price, market, compensation etc.( )

Making importance in farmers' incentive and farmer oriented program:( )

Establishment of permanent field office for supporting farmers
even after IIP completion:( )

Others: ( )

FES 11,12,13 as per Others in General

Last but not least, what are the main constraints hampering your agricultural activities and daily life of which you want to solve urgently for your better life ?

Figure J.2-1 Results of the Inquiry Surveys

Some focal points obtained from the rural sociology survey are shown in ( ), and results from the preceding economic survey are in [ ], respectively.

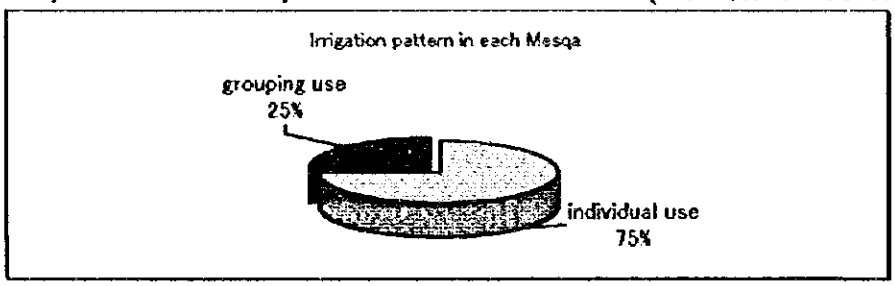
1) *Average number of farmers per Mesqa*
(96 households per mesqa)

2) *Each mesqa has around*
(17 marwas)

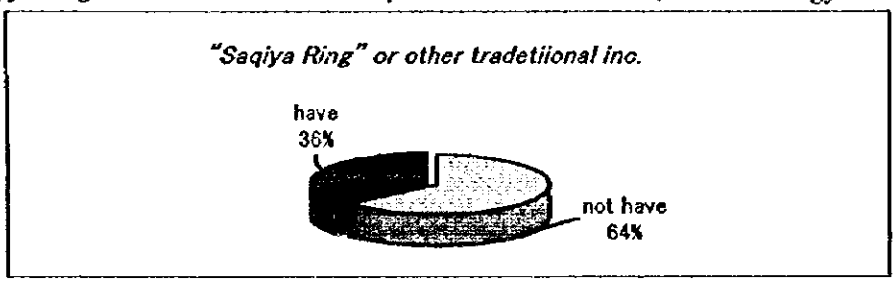
3) *Accordingly*
(5 -6 marwa intakes per mesqa)

4) *Number of Mesqa canals each farmer uses*
{1.2 canals/farmer}

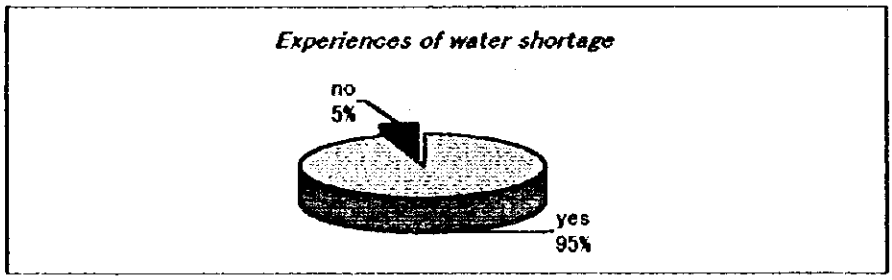
5) *Irrigation pattern in each Mesqa* { from economic survey }



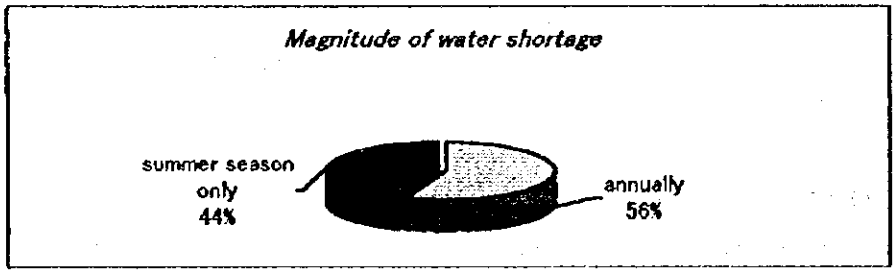
6) *"Saqiya Ring" or other traditional incorporation* (from sociology survey)



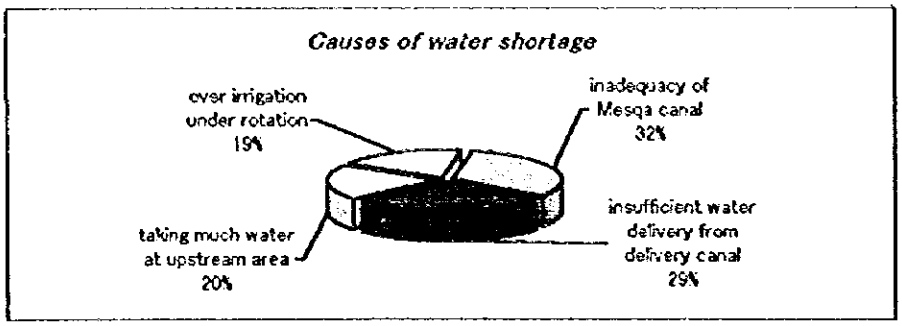
7) *Experiences of water shortage* { from economic survey }



8) *Magnitude of water shortage* { from economic survey }



9) *Causes of water shortage* { from economic survey }

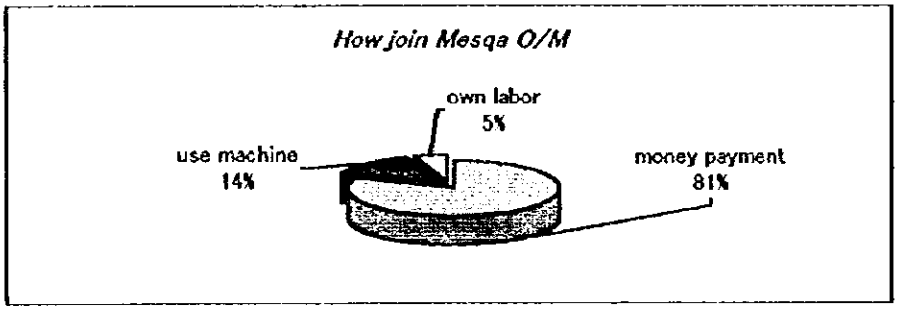


10) *Own pumps by each farmer*
horse power (8.6HP)
irrigable area by own pumps (0.42F)

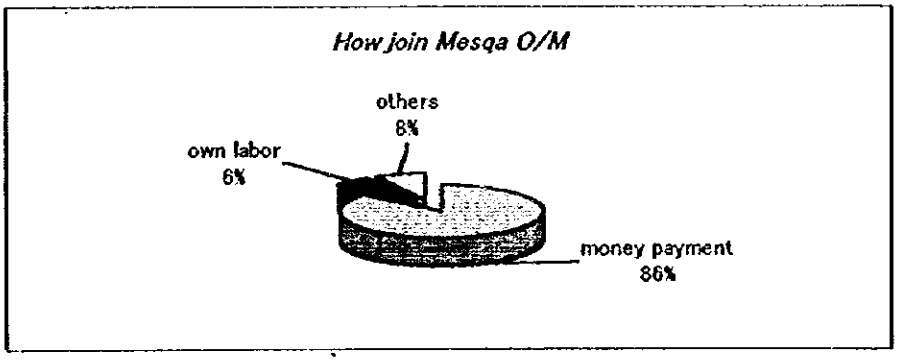
11) *Ideal size of water users' unit*
(less than 20 member farmers)((85%) of correspondents)

12) *Monetary burdens for mesqa O/M*
around (LE40 per year)

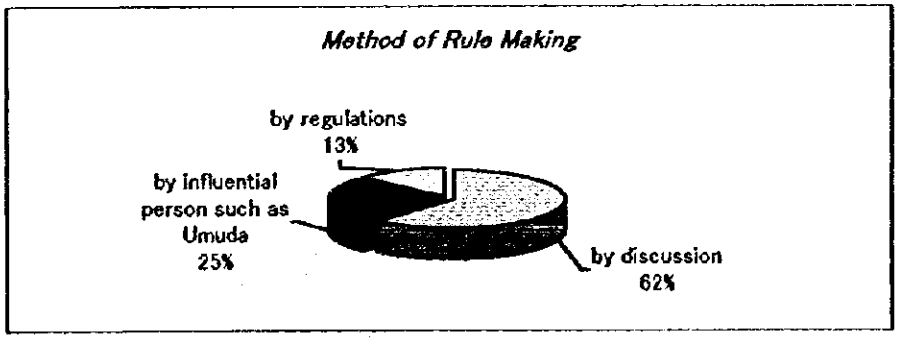
13) *How join Mesqa O/M* (from sociology survey)



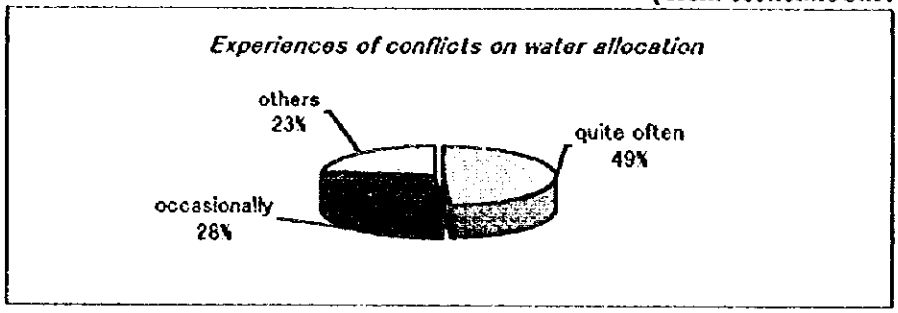
{ from economic survey }



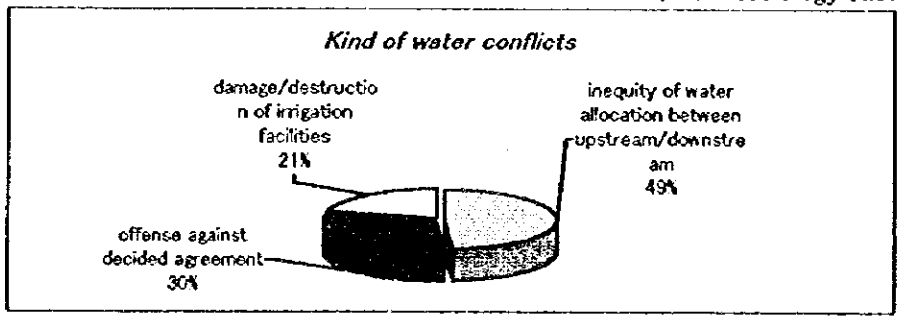
14) *Method of Rule Making* (from sociology survey)



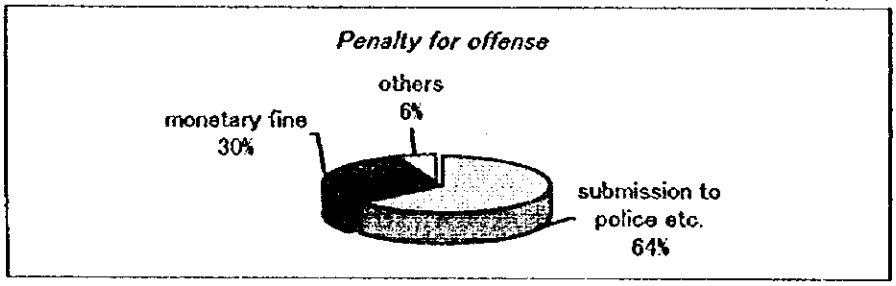
15) *Experiences of conflicts on water allocation* (from economic survey)



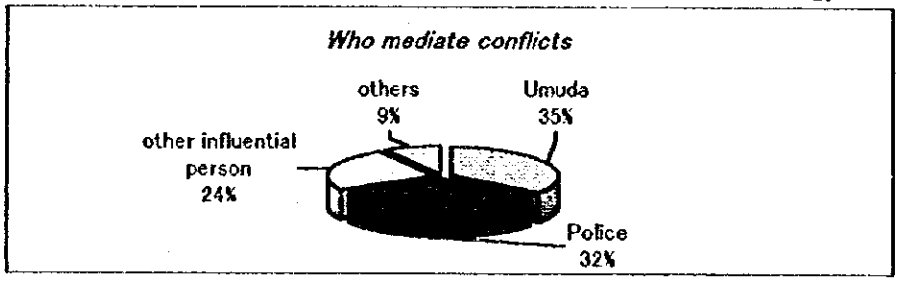
16) *Kind of water conflicts* (from sociology survey)



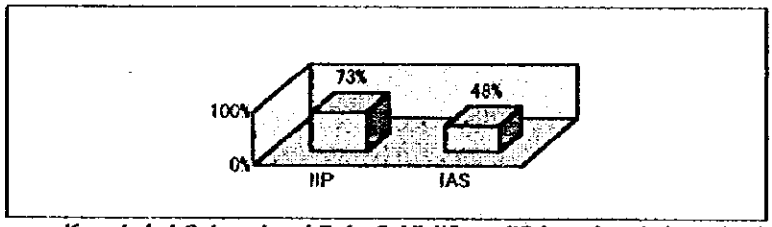
17) *Penalty for offense* (from sociology survey)



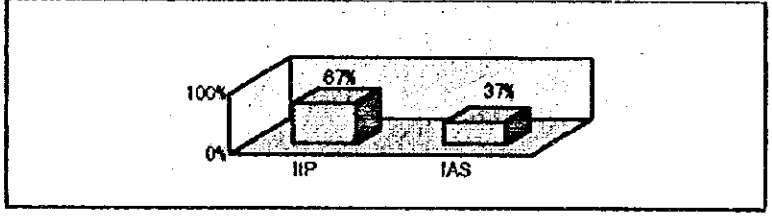
18) *Who mediate conflicts* (from sociology survey)



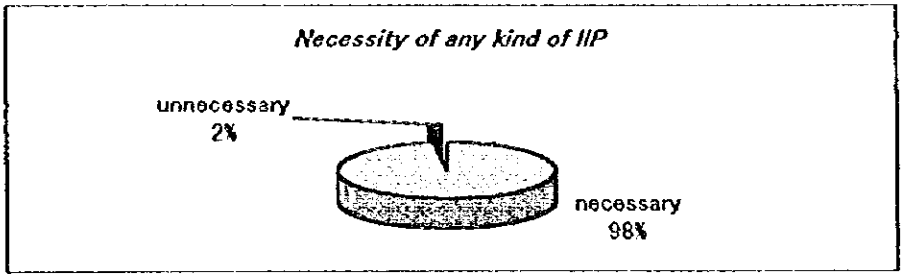
19) *Whether farmers are aware of IIP and IAS* (from sociology survey)



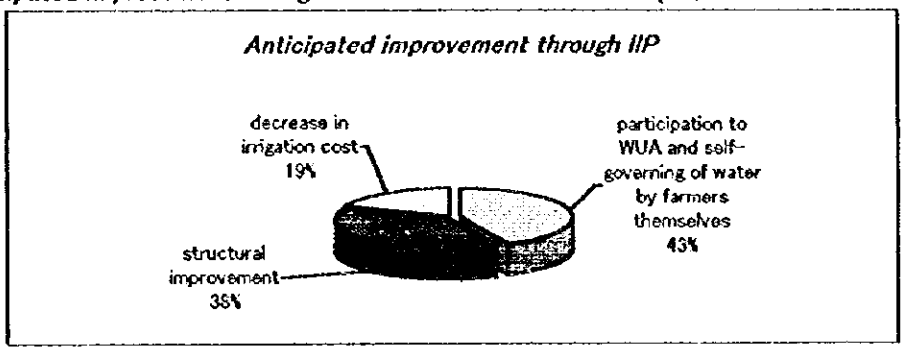
however if excluded Qahwagi and Bahr Saidi, Where IIP has already been implemented



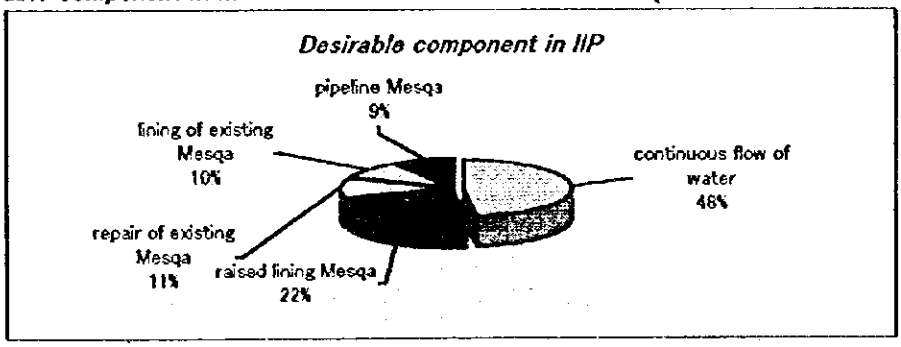
20) Necessity of any kind of IIP { from economic survey }



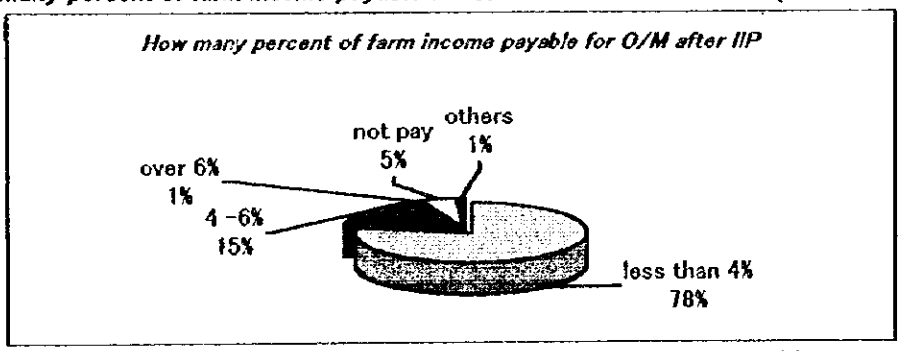
21) Anticipated improvement through IIP { from economic survey }



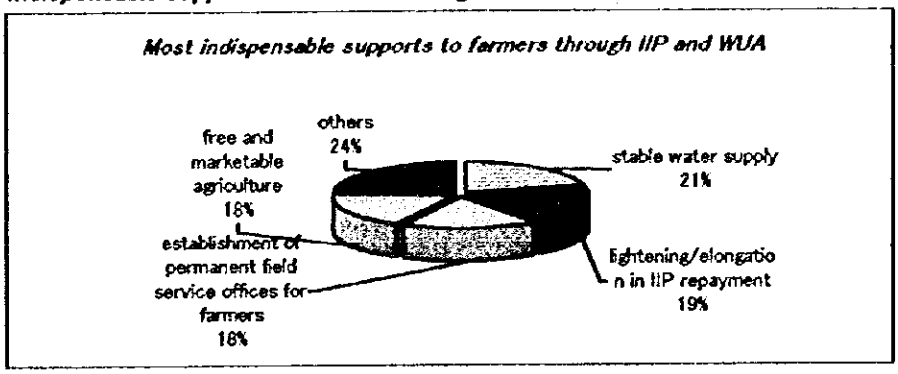
22) Desirable component in IIP { from economic survey }



23) How many percent of farm income payable for O/M after IIP { from economic survey }

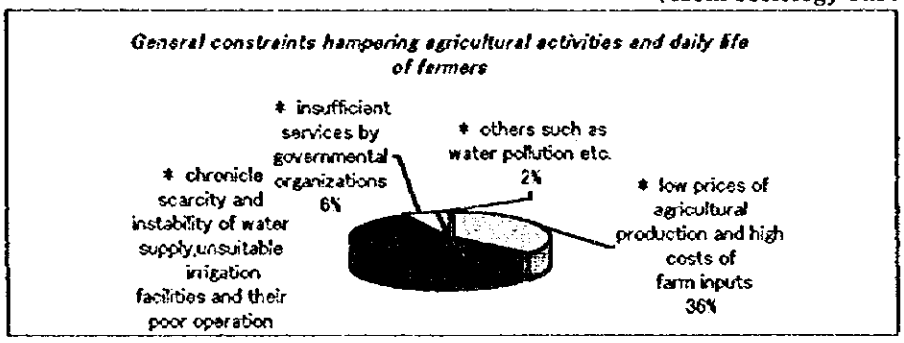


24) Most indispensable supports to farmers through IIP and WUA { from sociology survey }

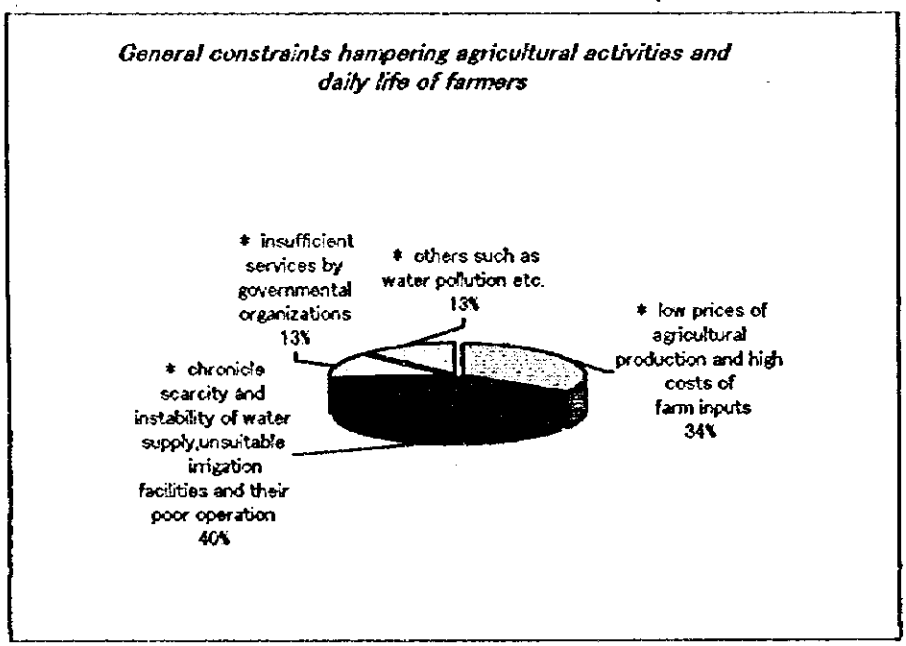


25) General constraints hampering agricultural activities and daily life of farmers

〈 from sociology survey 〉



{ from economic survey }



J.3 Traditional irrigation systems in Egypt and concerning Islamic water law

When considering fundamentals of Moslem water law, the general theory of the water treatment is outlined in the various statements of the Prophet Mohammed such as declarations of "free access to water is the right of the Moslem community", "water as the perfect, indispensable and priceless element", "ensure to all members of the community the right to water" and so forth, by which the Prophet endeavored to prevent water from being seized and hoarded by one person, causing scarcity or ruin for all.

Based on such fundamentals, irrigation canals are the joint property of the individuals who built them, and they alone are entitles to exercise the right of irrigation. Similarly, the upper land is irrigated before the lower along small streams, but the quantity of water retained should not reach above the ankle. As for wells, the digger of a well, whether on his own land or on unoccupied land, becomes the owner of the well water as soon as he has completed the digging.

As far as maintenance concerned, the general principle of watercourse maintenance is that riparian owners enjoying the right to use water are jointly responsible for the maintenance and clearing of watercourse. More precisely, the riparian owners bear no expenses other than for the portion of the watercourse which crosses or borders their land and that they do not have to share in the maintenance costs for the rest of the watercourse.

Needless to say, water use principles mentioned above are still valid in Egypt, thus farmers' irrigation has been done in line with these ways. According to the report prepared by Eng. Essam Barakat of IAS, several historical precedents can be seen in the field of irrigation by farmers in Egypt. As an example, the traditional "Sakia Rings" had allocated water to land and shared costs of maintenance and repairs among the member farmers although this system has been almost disappeared at present due to the rapid mechanization to the popular diesel power.

Another historical precedent is found in the Fayoum Governorate where water is delivered to farmers' fields from gravity mesqas. The mesqa organizational unit is known as "Ra'is El Munawaba system". This informal system has a "mowwaz El fatha" as a chief or leader in allocating water and ruling this self-governing body for irrigation management assisted by small units known as "tarafs". In such a case, the well known "Haq el Arab" or "right of the Arabs" concept is well functioned in decision making and solution of conflicts (Partly excerpted from the report by Eng. Essam Barakat).

Table J.3-1 Stagewise Classification of WUAs at Present

Directorate: / Command Area	Phase I		Phase II		Phase III		Phase IV		Phase V		No. of WUAs Registered	Last Date
	No. of WUAs	Area Served	No. of WUAs	Area Served	No. of WUAs	Area Served	No. of WUAs	Area Served	No. of WUAs	Area Served		
	Nos	Feddan	Nos	Feddan	Nos	Feddan	Nos	Feddan	Nos	Feddan	Nos	
Damanhour:												
Balakter	126	11500	72	5540	72	5540	46	3810	42	3422	40	1/4/98
El Mahoudia	646	47300	345	22160	345	22160					4	30/4/98
Esna:												
Abbadi	59	4395	54	3886	42	3175	42	3175	42	3175	37	30/4/98
Khor Sahel	64	3250	37	1730	31	1283						
Minya:												
Herz Numani	99	3400	85	3400	85	3400	60	2300	58	2150	22	6/5/98
Mantont	330	9600	215	9600	210	9600	210	9600	210	9600	120	
Beni Abied	194	4450	65	4450	65	4450	65	4450	65	4450	27	
Ashroba	123	3665	68	3665	68	3665	68	3665	68	3665	33	
El Gharak	1	292	1	292	1	292	1	292	1	292	1	
Qiman El Aros	112	5650	112	5650	112	5650	112	5650	94	4750	112	6/5/98
Iqal Shamia	4	200	4	200	4	200	2	86	2	86		
Tanta:												
Qahwagi	107	9600	107	9600	79	5000	45	2720	40	1953	23	26/2/98
Bahr Saidi	270	19636	224	14237	224	14237	224	14237	144	10442	44	
Wasat	309	20210	155	9280	155	9280					57	30/4/98
Manaifa	204	14000	116	7320	116	7320					43	
Zagazig:												
Saidia No.1	93	6658	93	6658	93	6658	93	6658	83	6162	43	2/5/98
Saidia No.2	163	11782	163	11782	163	11782	158	10952	142	9519	77	
Saidia No.3(A)	5	720	5	720								
Saidia No.3(B)	6	582	6	582								
Total	2915	176890	1927	120752	1865	113692	1126	67595	991	59666	683	

Note: Phase I: Entry Activities

Phase II: Organizational Activities

Phase III: Preparation for Mesqa Improvement Activities(Design)

Phase IV: Participation in Mesqa Improvement (Construction has started)

Phase V: Reguler Operation and Maintenance (Improved Mesqa fully operated)

Source: IAS HQs

Table J.3-2 Status of Meska Improvement

Directorate:	Number of Mesqa																Date
	Planned		Construction completed		Under Construction	Construction Start	Turnover Complete	Operational with Pumps									
	No. of Mesqas	Area Served	No. of Mesqas	Area Served				Gravity	Demo.	Korean	Farmers	WUA by Coop	WUA by IBDA	WUA by IIP	Type	Total	Area Served	
Esna:																		
Abbadi	42	3175	42	3175			28	42							P.L=42	42	3175	30/4/98
Minya:																		
Beni Abied	65	4450	65	4450			58		7		10		19	29	P.L=27, R.L=38	65	4450	6/5/98
Ashroba	68	3665	68	3665			68		1		15	3	19	30	P.L=30, R.L=38	68	3665	
Mantont	210	9600	210	9600			210		3		148		2	57	P.L=90, R.L=120	210	9600	
Herz Numani	85	3400	60	2300	4	21	29				25	21	12		P.L=10, R.L=48	58	2150	
Iqal Shamia	4	200	2	86		2			2						P.L=2	2	86	
Beni Swif:																		
Qiman Arus	112	5650	112	5650			112		26		5	13		47	P.L=58, R.L=36	94	4750	1/4/98
Bahr El Gharag	1	292	1	292			1	1							P.L=1	1	292	
Zagazig:																		
Saidia No.1	93	6658	83	6162	10		83	5	17	1		1	7	52	P.L=77, R.L=1, CLL=5	83	6162	29/4/98
Saidia No.2	163	11782	146	9875	17		142	1	19	2			1	119	P.L=136, R.L=3, ILL=3	142	9519	
Tanta:																		
Qahwagi	45	2720	45	2720			42		5		9			25	P.L=32, R.L=7, ILL=1	40	1953	26/2/98
Bahr Saidi	224	14237	224	14237			213				6		1	126	P.L=128, R.L=5, ILL=11	144	10442	
Damanhour:																		
Balaqter	42	3422	42	3422			27		18		7	4	13		P.L=11, R.L=29, CLL=2	42	3422	11/4/98
Total	1154	69251	1100	65634	31	23	1013	49	98	3	225	42	74	485	P.L=644, R.L=325 CLL=7, ILL=15	991	59666	

Note: P.L=Pipeline Mesqa
R.L=Raised Line Mesqa
CLL=Concrete Low Level Mesqa
ILL=Improved Low Level Mesqa

Source: IAS HQs

Table J.3-3 Local Staff Allocation for IAS

No.	Command Area	IAS Director	Civil Engineer	Agri. Engineer	Technician (Field Agent)	Total	Refer ence	
							IAS Planned Area	Area per person
							Feddan	F/person
1	Tanta(Delta Middle)	1						
	Qahwagi & Bahr El Saidi	1		5	26	32	29,236	914
	Wasat	1	1	6	21	29	20,210	697
	Manifa	1	1	4	15	21	14,000	667
2	Damanhour(Delta West)							
	Balaqter	1		2	8	11	11,500	1045
	Mahmoudia	1	2	8	31	42	47,300	1126
3	Zagazig(Delta East)							
	Saidia	1	5	3	28	37	19,742	534
4	Middle Egypt							
	Minia	1	4	3	68	76	21,607	284
	Bani Seif (Qiman Aros)	1	1	4	11	17	5,650	332
5	Esna(Upper Egypt)							
	Abbadi			1	11	12	4,395	366
Total		9	14	36	219	278	173,640	625

Sourse: Recent table consolidated by IAS HQs

Appendix J.4 Rural Sociology and Farmers' Organization

Appendix J.4.1 Problems and Constraints on Rural Sociology and Farmers' Organization

According to the study of the existing IIP by using collected data/information mentioned in 2.3, IIP performance is not necessarily satisfactory at present. Besides, the Government has recently pointed out the importance of series of refinements, in which prompt realization of Branch Canal Federations of WUAs is focussed. In line with these background, several innovative ideas should be introduced in solving problems. Major problems the IIP is now confronting with are;

a) on farmers' willingness and establishment of WUAs;

b) on technical supports to WUAs

c) on financial supports to WUAs

d) on the Gov't commitment and legal framework

e) on Monitoring and Evaluation (M/E)

IIP inauguration and its implementation are to be based on farmers' request in principle, however these decisions have actually been derived from scheduled IIP implementation by the governmental under the sign of the minister of MPWWR. This "top-down" decision is conveyed to the farmers of each delivery canal through directorate offices. According to the four criteria stipulated between MPWWR and USAID to issue budget for construction works, necessary maturity should be satisfied among concerning farmers.

However, after the preliminary survey and explanation done by IAS, a WUA is established if agreement is gained from farmers whose farmland occupies more than 30 % of canal command, regardless of maturity among farmers. For these procedures, it takes usually 3 to 6 months only. This rough-and-ready procedure will inevitably cause a poor performance in IIP because farmers hardly have chances to exchange views about the necessity of IIP and about its desirable contents such as custom fit design etc. (For reference, data collected shows that almost beneficiary farmers were misunderstanding that main content of IIP is increased water resources).

From now on, therefore, IIP inauguration and its implementation should actually be based on the farmers' request. In other word, any IIP will not be implemented if farmers' willingness and mutual consent among them are still not enough. According to the

experiences in other countries including Japan, it is necessary at least 1.5 to 2 years for this maturity and/or preparation period.

Appendix J.4.2 Problems on Technical Supports to WUAs

At present, a series of training course is executed by IAS staffs for councilors of WUAs after its establishment , and this job has so far occupied majority of IAS staffs' working time. However, USAID diagnoses itself rather rigorously saying that "No evidence of practical application of the course at the farm level" (Extracted from page 54 of "Final Report for the IIP Component of the IMS Project", 1996) . One reason of this phenomena, as occasionally seen in many countries, is that establishment of WUAs and attendant IIP implementation are not necessarily derived from farmers' incentive thus farmers may feel training courses as obligation for them.

From now on, therefore, the share of IAS staffs' job should be drastically changed from on-going IIPs to proposed IIPs to grasping farmers' willingness and enhancing mutual understanding among them. More specifically, IAS staffs should execute a series of group meeting in each basis of unified Marwa, Meska and delivery canal through which IAS staffs are expected to join discussions among farmers, lead them to the right way, consolidate their opinions and conclude and judge impartially whether the concerning farmers necessitate IIP. This procedure may be called as a kind of "On-the-job Training" for the Participatory Planning (PP) methodology, and through it some extra results might be obtained such as transformation of the farmers from nominal participants to facilitators and/or social organizers to enhance the future IIP by themselves.

Another problem on technical support to WUAs is a lack of permanent service measures for the pump equipment after the completion of the IIP. Regarding this matter, many farmers responded to the questionnaire survey. In this connection, for example, a function of MED should be strengthened from medium to long term view point specifically in the field site because the government is aiming at dissemination of successful IIP to whole of the nation (i.e. to 6,734,000 feddan) by the year 2017 and it means more than 100,000 of one-point lifting pumps would be installed at last.

From short term view point, however, it may be more realistic to support farmers through a Joint Committee which is to be composed by representatives both from farmers side and government side where a mechanical engineer would be involved. Also, a Federation of WUAs must have a mechanical sector of which a mechanic such as retired from MED may join.

Appendix J.4.3 Problems on Financial Supports to WUAs

Since the existing IIP has been implemented under the foreign grant aids or not reaching to the repayment period in the case of World Bank project, cost recovery problem has not become intensified so far. From now on, however, beneficiary farmers must bear IIP expenses, thus the capacity of repayment as well as O/M costs by farmers will become one of the most serious problems. Therefore, this problem should be taken into consideration mainly from the following three issues.

a) Lightening of the repayment period etc. for IIP
b) Advantageous supporting systems for a limited period
c) Re-allocation of O/M execution in delivery canal basis

a) Regarding **lightening of the repayment period, etc. for IIP**, as shown in the collected data (See 2.3.1), pump procurement as well as collection of O/M fee encompass several problems even now. Besides, the future implementation of IIP in each delivery canal basis means that financial systems of the Federation of WUAs would be much complicated, when compared with Meska basis WUAs, where a problem of cost sharing among farmers is included. Under such circumstances, it would necessitate some years in stabilizing new systems. Bearing this in mind, current regulations regarding the repayment period etc. for IIP should be lightened. (for more detail, refer to section 3.7).

b) Regarding **advantageous supporting systems for a limited period**, some attractive and acceptable systems of financial supports for farmers should be introduced for a limited period of new IIP implementation in each delivery canal basis. For reference, some examples of financial support for PIM are picked up from other countries as shown as follows:

Country	Project type	Subsidy by Gov't	Burden for farmers	Remarks
Japan	less than 100 ha	around 55 %	around 22.5 %	remaining by local Gov't
China	less than 667ha	10-60%	40-90%	depend on the regions
India	Tubewell (600 l/min)	25-50%	50-75%	depend on landholding
Bangladesh	Pump (3m3/min)	25%	75%	
Nepal	Small tubewell	40%	60%	

Note: from FAO/RAPA Expert Consultation Report (1989)

As such, some proposal is assumed like that if more than 2/3 farmers of a delivery canal agrees upon IIP implementation with temporary submission of request within limited years, they can accept advantageous financial support for pump procurement from the government and , by contrast, after passing limited years this advantage will be invalid.

Another problem is preparation of budget necessary for the period just after the turnover of canal O/M, from the government to a Federation of WUAs. According to the collected examples from the upper Nile areas (Herz Nomaniya, etc.), around 70 LE/feddan/year of budget is required for the sound O/M of Meska and around 2,000 LE/Meska should be stocked anytime for emergent uses such as for pump troubles etc. Despite it, the Federation cannot stock enough budget for these purposes at its early stage. Therefore, some proposal is assumed like that if more than 2/3 farmers of a delivery canal agrees upon IIP implementation with temporary submission of request within limited years, they can accept the government subsidy of e.g. 75 % of O/M costs for the first year, 50% for the second year and 25 % for the third year.

c) Regarding **re-allocation of O/M execution in delivery canal basis**, a premise that "a total cost necessary for O/M of Meska cum delivery canal is to be decreased" should be satisfied until otherwise such re-allocation will have no meaning. Based on the collected data (See 2.3.2), a hypothetical estimation for an average sized delivery canal in the Priority Area can be shown below.

Estimation of total O/M cost for an average sized delivery canal (A=1,800 feddan, L=4.5km) (in LE)			
O/M cost for Meska	Current O/M system	Proposed O/M system	Balance
Salary & Wages	(10 LE/feddan/year) 18,000	(10 LE/feddan/year) 18,000*1	0
Running costs for pumps	(28 LE/feddan/year) 50,400	(28 LE/feddan/year) 50,400	0
Weeding & Dredging	(3.5 LE/feddan/year) 6,300	(3.5 LE/feddan/year) 6,300*2	0
Costs for pump renewal etc.	(40 % of total costs) 49,800	(40% of total costs) 49,800	0
O/M cost for delivery canal			
Salary & Wages	(500 LE/km/year) 2,250	0*1	-2,250
Weeding & Dredging	(1,500 LE/km/year) 6,750	(850 LE/km/year) 3,825 to 0*2	from -6,750 to -2,925
Total	133,500	from 124,500 to 128,325	from -9,000 to -5,175*3
(LE/feddan)	74.2	from 69.2 to 71.3	from -5.0 to -2.9 *3

Note :

*1: Currently, a sum of 1.3 LE/feddan is spent for salary & wages of field staffs of the Gov't. This amount would be absorbed into the 10 LE/feddan for salary & wages which is currently spent by farmers for Meska O/M, if joint O/M system of Meska cum delivery is realized. Moreover, by adopting this new system, staff allocation (currently around 1.5 person/delivery canal) will be remarkably strengthened to 17 person/Meska cum delivery.

*2: Similarly, if joint O/M system of Meska cum delivery is realized, costs for weeding & dredging for delivery canal (currently 1,500 LE/km) would be absorbed into the 3.5 LE/feddan for Meska, or be decreased by around half

*3: Due to the above 2 reasons, total O/M costs for Meska cum delivery canal would be decreased from 3 to 5 LE/feddan by adopting new system.

Above hypothetical estimation means that a total cost necessary for O/M of Meska cum delivery canal could be decreased if joint O/M system of Meska cum delivery canal is realized by a Federation of WUAs. Thus, it is quite reasonable for the government to pay a sum of 3 to 5 LE/feddan within the current budget when it decides a turnover of O/M jobs to a Federation in each delivery canal basis. Incidentally, such consignment allowance should be discriminated from 5 LE/feddan to zero to encourage farmers in accordance with the quality of O/M performance.

Appendix J.4.4 Problems on the Government commitment and legal framework

This matter is classified into the following four items.

a) Expansion of farmers' authority/responsibility centering on Federation of WUAs
b) Cheap and quick implementation of IIP
c) Interaction among related organizations
d) High level commitment by the Government

a) The expansion of farmers' authority/responsibility is reasonable direction since crop diversification will be enhanced year by year in accordance with the privatization policy and ways of irrigated agriculture will become much complicated in the future. Under such circumstances, management of terminal irrigation/drainage should unavoidably be turned over to the farmers with legal endorsement. Such example can be seen in the

activities of LWB(Local Water Board) in Fayoum endorsed by Decree No.263 of 1997, and this enlightening example should be reinforced and applied in the whole country centering into clarification of authority/ responsibility to the Federation of WUAs.

Another problem to be considered in this item is more active participation of women to farmers' organization. In other countries such as India and Laos, women involvement in WUAs is ruled by relevant regulations when a WUA is established. However, such examples are not necessarily applicable to Egypt mainly due to the traditional customs. Bearing this in mind, it might be recommended to establish a women's conference as an annex to a WUA. This conference is expected to contribute to a WUA not by direct participation in water policy decision, but by acting indirectly as a catalyst to convey necessary information for the better rural life like environmental issues, rural welfare and daily learns among women etc. For this purpose, the conference is to be composed by at least two members and they will report matters concerned directly to the chairman of the WUA. In the same way, a women conference will be attached to a Federation of WUAs, too.

b) Regarding cheap and quick implementation of IIP, the Egyptian government is aiming at the direction of future IIP in which expenses for construction and rehabilitation works (i.e. hardware works) are the less the better and IIP performance be gained as much as possible through the turnover of terminal O/M works to farmers' organization (i.e. software works). Understanding this direction, still a minimum hardware works should be undertaken since several unsuccessful examples can be seen in other countries where O/M works had been turned over to farmers' organizations without good physical condition of irrigation structures and as a result farmers had neither got stable water nor been willing to effort toward better O/M due to such physical shortcomings. Minimum hardware works necessary prior to the turn-over should be reinforcement of a gate at the head of delivery canal and lock structures at the tail-end points of each Meska and delivery canal.

c) Interaction among related organizations should be strengthened through the two ways. The firstis arrangement of correlative sections of irrigation, drainage, mechanics and agronomy etc. in a Federation of WUAs, and the second is an active participation of officers/engineers to a Joint Committee which is organized between the government and farmers. Expected officers/engineers may be a District engineer, Area drainage engineer, Mechanical engineer and Agricultural manager etc. from each district-level office.

d) Regarding high level commitment by the government, so-called "the carrot and stick policy" should be introduced. As examples of "carrot", several advantages aforementioned should be precisely presented to concerning farmers. By contrast, although "stick" has assumably never been presented so far, this should be also shown to the farmers in justifiable ways explaining that the government cannot avoid re-allocation of water resources and relevant budget from the existing farmland to the newly reclaimed area and/or to the more potential area being supported by highly. willing farmers. In other word, it means farmers are indispensably required to guarantee necessary water through their self reliant manner from now on, no matter how they accept IIP.

Appendix J.4.5 Problems on Monitoring and Evaluation (M/E)

So far, M/E for the existing IIP has hardly been carried out in full-scale and systemized ways. Towards the final target of IIP implementation for 6,734,000 feddan by year 2017, however, compilation of systemized and highly reliable data is absolutely

necessitated. In this context, following two categories of M/E should be executed. They are

1) Stage-wise M/E throughout IIP procedures
2) Overall M/E to compare "before" and "after" IIP

Taking into consideration current situation of insufficient number of IAS staffs, the first category is recommended to be carried out by farmers under a contract between IAS and a Federation of WUAs with reasonable payment. In this case, submitted data/information of M/E will be checked by IAS and be input to computerized data-base system. For this purpose, an existing M/E format should be rearranged into simpler ways, and a computer system itself should be set up in IAS headquarters. Such system is expected to be transmitted to Federations of WUAs from the long term viewpoint.

On the other hand, regarding the above mentioned second category, there are some useful methodologies developed by international organizations like W.B and IIMI. In such methodologies, quantitative indices such as an agricultural output per unit command area (in $/ha), unit water consumed (in $/cu.m) and relative irrigation supply (in ratio) are used , and they are favorable to compare the performance of Egyptian IIP with that in the other countries. In line with this, more applicable methodology will be studied.

J.4.6 Rural Sociology and Farmers' Organization

As described in the Main Report, the Study has been executed by adopting the means of a tripartite combination of

(1)Comparative study of world-wide examples on PIM, including Japanese experiences

(2)Review of perfonnance of the existing IIP in Egypt

(3)Study on farmers' opinion/ incentive

Figure J.4-1 shows such background and flows of tripartite measures. Also, Figure J.4-2 shows an example to image comprehensive elements pertaining to PIM as well as to grasp what degree a country or project attains in terms of objective magnitudes as per PIM(or IMT) , and some key components included in such studies are tabulated in Table J.4-1 .

Table J.4-2 shows features of each country of which INPIM (International Network on Participatory Irrigation Management) executed a comparative study on PIM.

Column J.4-1 and Figure J.4-3 explain about general features of LID(Land Improvement District) system in Japan. Also, Column J.4-2 and Figure J.4-4 show a typical example of a LID for pump irrigation scheme.

Table J.4-3, J.4-4 and Figure J.4-5 shows features and evaluation results of each country of which IIMI (International Irrigation Management Institute) executed a comparative study on PIM.

Table J.4-5 and J.4-6 show general features of financial impacts of PIM in each country of which IIMI executed impact surveys on PIM.

Some other useful and enlightening comments/ suggestions regarding PIM mainly extracted from INPIM and IIMI reports are digested in Column J.4-3.

"Partnership System" in the Philippines, as an example to make both governmental and farmers' incentives for IIP coincide, are described in Column J.4-4 and Figure J.4-6.

Figure J.4-1 Ways of Study on Water Users' Association / Rural Sociology

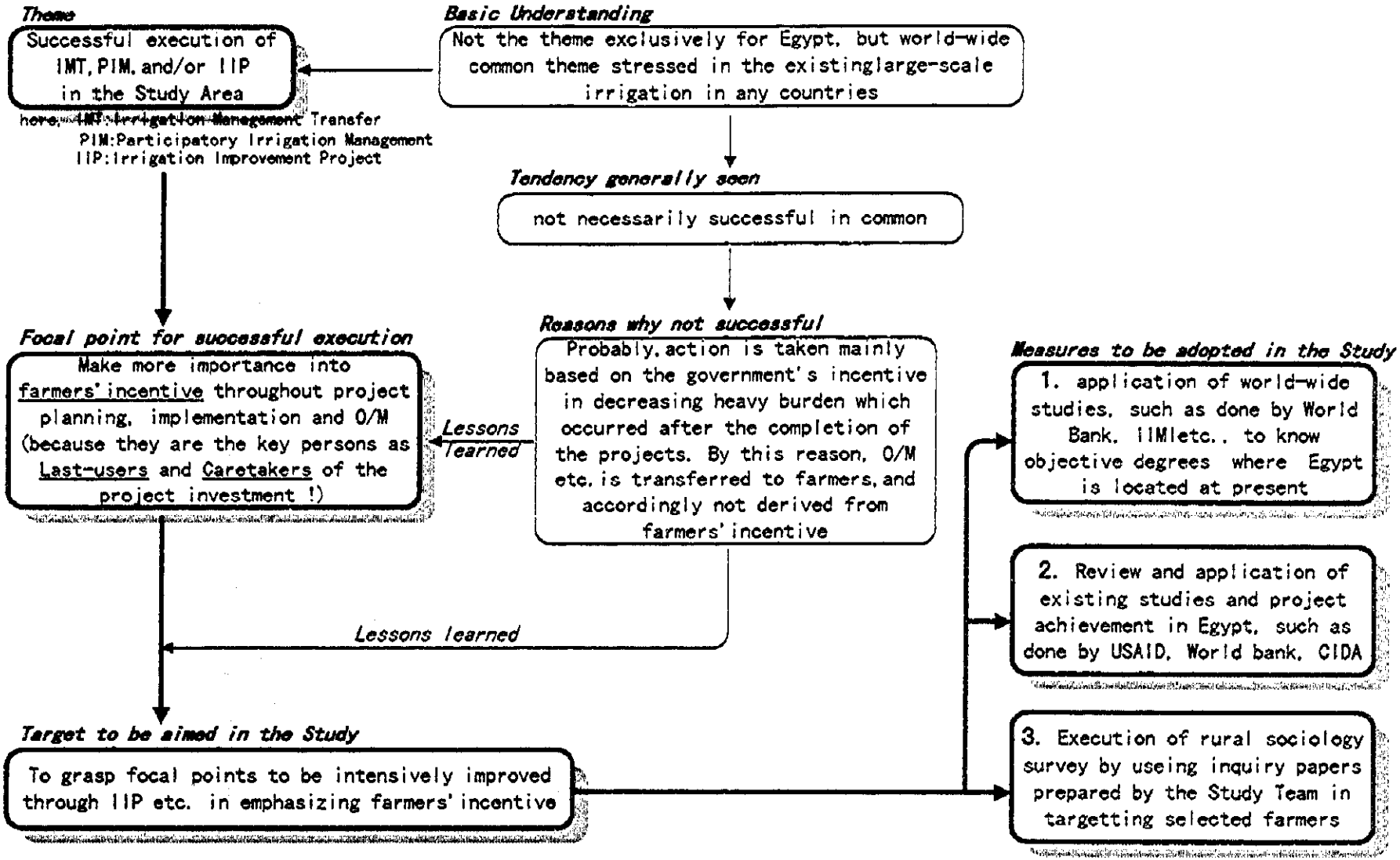
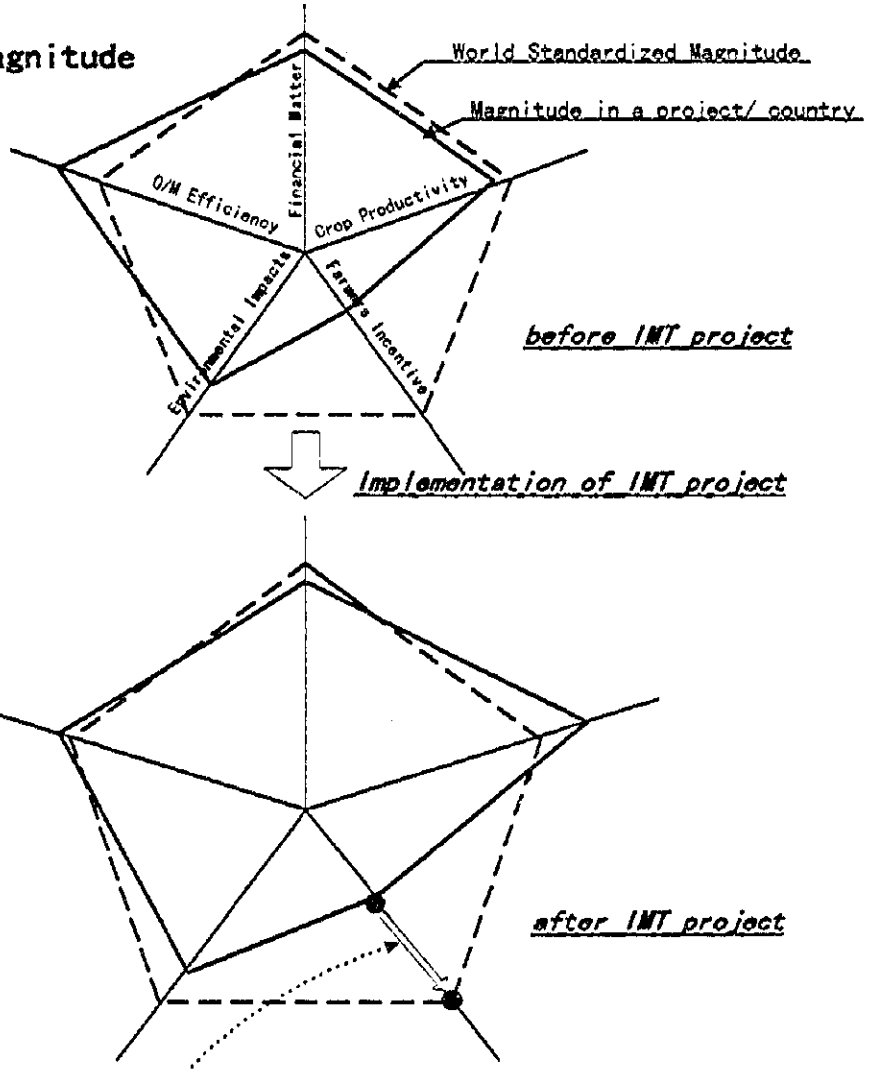


Figure J.4-2 Schematic Drawing for PIM Magnitude

(PIM: Participatory Irrigation Management)



In this case, a dimension of "Farmers Incentive" is remarkably inadequate, therefore IMT measures should be improved from this viewpoint.

Key Component

Financial Matter
- Cost to government
- Levels of management staff
- Cost to farmers
- Withdrawal of government subsidy
- Fee collection rate
- Budget solvency
- Responsibility of future rehabilitation and replacement

O/M Efficiency
- Water delivery service
- Head/tail equity of water allocation
- Water consumption per hecare
- Night Storage
- Cost-conscious management

Crop Productivity
- Cropping intensity
- Unit yield
- Cultivated area increase
- Net farm income per hactare

Farmers' Incentive
- Sense of Ownership for Irrigation Facilities
- Sense of Belonging to Irrigation System
- Sense of Values in Rural Community
- Sense of Autonomy on Farm Management

Environmental Impacts
- Salinity
- Water Pollution

Table J.4-1 Key components included in studies on impacts of IMT

Country	Study Year	Irrigation Type	Operational	Financial	Agricultural	Economic	Maintenance
Philippines	1995	SI	●	●			●
Philippines	1994	SI	●	●	●		
Philippines	1994	LI	●	●			
Philippines	1992	SI, LI	●	●	●		
Indonesia	1993	LI	●	●			●
Vietnam	1994	LI	●		●		
China	1995	SI	●	●	●	●	
Bangladesh	1996	LI	●	●	●	●	●
Nepal	1994	?	●	●			
Nepal	1994	LI	●				●
Nepal	1996	SI	●	●	●	●	
Sri Lanka	1996	SI	●	●	●	●	
Sri Lanka	1992	SI	●		●		
India	1994	LI	●	●	●		●
India	1994	SI	●		●		●
India	1994	?	●				
India	1994	LI		●			
India	1995	LI		●	●		
Egypy	1994	SI	●	●	●	●	
Sudan	1995	LI	●		●	●	
Turkey	1996	LI		●		●	
Nigeria	1993	SI	●	●	●		
Senegal	1995	LI	●		●	●	●
Dominica	1994	SI	●	●			
Colombia	1996	SI	●	●	●	●	●
Colombia	1994	SI,LI	●	●		●	
Mexico	1996	SI	●	●	●	●	
USA	1994	SI	●		●	●	●
New Zealand	1994	SI		●			

Note: IMT = Irrigation Management Transfer

Source: "Impacts of Irrigation Management Transfer: A Review of the Evidence", Douglas L. Vermillion of IIMI (1997)

Table J.4-2 Features of PIM Case Studies

	Turkey	Mexico	Argentina	Colombia	Philippines
Type of first-level management unit	District	District	District	District	Community-based
Beginning year of program:	1993	1989	1984	1976	1976 *1 1980 *2
Implementing agency	DSI	CNA	DGI	INAT and IAs	NIA
Special law on transfer	No	Yes (1992/1994)	No	No	Yes (1974)
Total area of governmet irrigation systems	1,467,000	3,300,000	360,000	315,125	652,000
Share of area covered by program	61% (1995)	90% (1997)	100% (1997)	64% (1996)	90%
Number of levels of local management:	1	2	3	1	2
Average size of 1st level local mgt unit [Ha]	6,500	7,900	3,000	12,500	40
Avarage size of 2nd level local management unit [Ha]	–	107,000	20,000	–	275
Average size of 3rd level local management unit [Ha]	–	–	90,000	–	–
Number of staff/100 Ha (IA)	na	0.2	0.19	0.8	1.8(vol) 1.1(paid)
Average irrigation service fee [$/Ha/yr]	25 (1995)	40 (1996)	70?? (1997)	52 (1996)	77 (1997)
Fee base	Area/crop	Area/crop	Area	Area/crop *3	Area/crop/source
Share of fee assessment recovery	72+% (1995)	92% (1997)	70% *4 (1997)	76% (1996)	58% (1995)
Share of O&M cost supported by fee income	most	85% (1997)	12% (1997)	52% (1996)	46% (1995)
Facilities ownership	Govt	Govt	Govt	Govt	Govt
Maintenance equipment transferred to IA	No	Yes	Yes	Yes	No
Transition phase of shared responsibility	Yes	Yes	Yes	No	Yes
National Association of IAs	No	Yes	No	Yes	No
Farmers can refuse transfer	No	Yes	No	na	Yes

*1 Communal Irrigarion Systems
*2 National Irrigation Systems
*3 Fixed plus volumetric fee schedule in pump schemes
*4 Recovered by DGI

Source: "Lessons from the International Workshop on PIM: Benefits and Second Generation Problems" by INPIM Experts in World Bank (1997)

Column J.4-1

General Background of Land Improvement Districts (LIDs) in Japan

1) What are LIDs
   a) LIDs are organizations mainly for managing irrigation/drainage facilities
   b) LIDs are highly public and can force farmers to join and share costs
   c) LIDs are cultivator-oriented, i.e. members must be cultivators

2) Objectives of LID
   a) to raise both labor and land/water productivity
   b) to increase the total agricultural products and food self-sufficiency
   c) to promote production of crops in accordance with market-oriented demands
   d) to change agricultural structure, through the improvement of irrigation/drainage facilities

3) How to establish LIDs
   a) More than 15 farmers apply for establishing a LID
   b) They determine the LID's area, and notify publicly the outline of its activities and the by-law of the LID
   c) They must get agreement of at least 2/3 of all farmers concerning this area
   d) They finalize the project planning and the by-law of the LID
   e) They make an apprication to prefectural government for establishing of LID

4) Organization of LID
   a) Decision making bodies
      * General meeting: The supreme decision making body, which must be held at least once a year

      * Representative meeting: If the number of member is above 200, they can hold the representative meeting instead of the general meeting. Representatives are selected through election, and their term is 4 years
   b) Implementing bodies
      * Executive Director(ED): The number of ED must be more than 5 who are selected through election at general meetings, and their term is 4 years
      * Auditor: must be more than 2 Secretariat: Implement LID's daily work

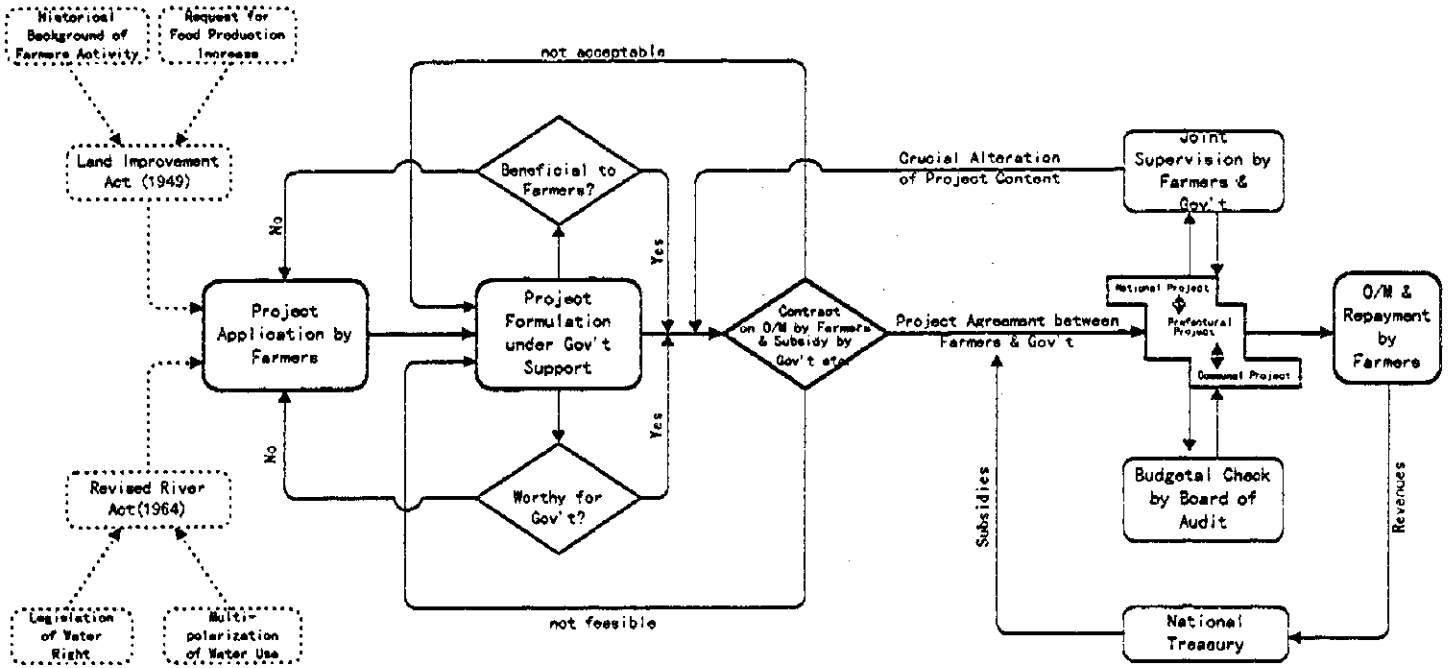
The current situation of LID systems in Japan is briefly summarized as shown below.

a) Number, area and size of LIDs: Total number of LIDs as of 1995 was 7,796 and an average ruling area and member farmers of each LID were 409ha and 587 farmers respectively.

b) Financing: There are two kind of irrigation fees, i.e. ordinary fees for regular O/M services and special fees for some specified construction works such as feeder road improvement etc., and total fees for each member farmer are equivalent to about 6% of their annual income or to about 300kg of hulled rice. Percentage of fee collection from member farmers is almost 100% in usual, but recently due to cost hike for labor the collected fees are not enough to the O/M costs. Therefore, about 26% of the total number of LIDs is subsidized from municipalities, because irrigation/drainage facilities have some characteristics of public properties.

c) Staff: There are two kind of LIDs' staffs, i.e. a full-time and part-time staff, depending on the size of LIDs and attendant jobs, and total number of both staffs is about 2 for the size of 100-500ha's LID, 3 for 500-1,000ha and 5 for 1,000-2,000ha. Therefore, it meets to the service area of about 150-300ha per staff.

Fig. J.4-3 A Flow Chart of Land Improvement Project Execution in Japan



* Land Improvement Project is comprised of irrigation, drainage and land reclamation works

Column J.4-2 Typical example of a LID for pump irrigation in Japan:

An example of pump irrigation project, attendant LID organization named "Nansou Land Improvement District" and its farmers' grouping activities are introduced below.

a) Beneficiary area: 1,535 ha
b) Number of member farmers: 3,130 (0.49 ha/household, in average)
c) Number of irrigation/drainage pumping stations: 65(23.6 ha/ station, in average)
d) Number of weirs: 6

e) Main jobs:
- * Repairing pipelines and irrigation/drainage canals
- * Repairing pumps, motors and electric equipment
- * Eradication and dredging of irrigation/drainage canals
- * Cleaning pimp suctions
- * Feeder road construction (L = 5,500m)

f) Organization:
- * President: 1
- * Director: 15
- * Auditor: 4
- * Representative from each pump WUG: 45(70 member/WUG, in average)
- * Assistant: 69

g) Finance

Members fee for O/M costs(around 5% of each members' farm income), and subsidies from local and central government for road construction(30% and 45% of total cost, respectively)

Remarkable nature of this LID is that 65 irrigation/drainage pumping stations (23.6 ha/ station, in average) are operated and maintained by 45 Water Users Groups (70 member/WUG or 48 member/ pumping station, in average) under mutual corporation among members. These lowest administration is quite appropriate not only in using pump equipment effectively but in securing a route for procuring materials/tools for repair, as well as in keeping conventional rural discipline supported by human ties.

Fig. J.4-4 An Example of Pump WUGs in Japan

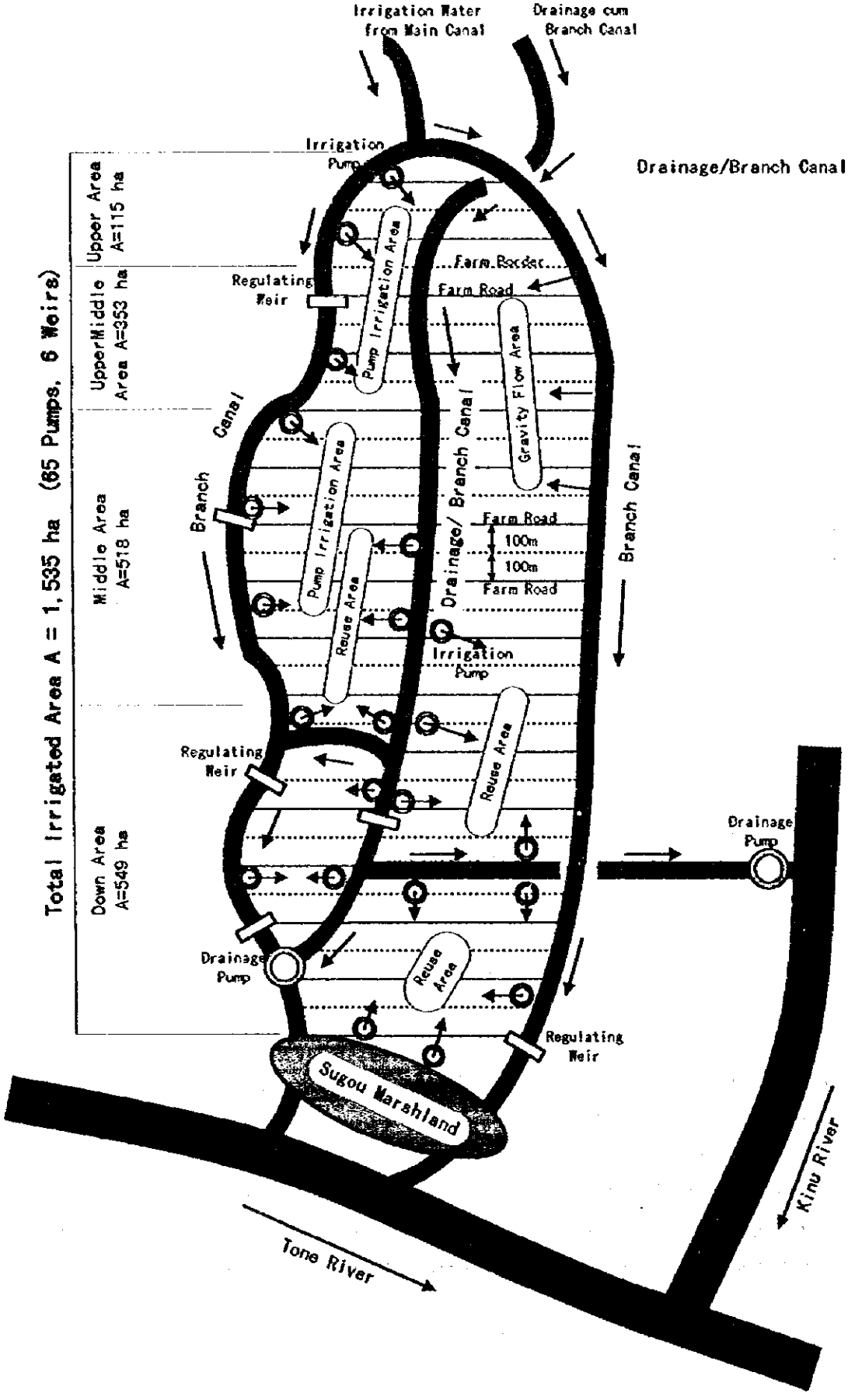


Table J.4-3 Salient features of the studied irrigation schemes.

No.	Country	System name	Type of system	Command area (ha)	Cropping pattern	Climate	Cropping intensity	Annual rainfall (mm)	Annual evaporation (mm)	Type of management	Water availability
1	Burkina Faso	Gorgo	Tank storage	50	Rice, potato,	Sudano	0.93	400 to	2,600	Village	Water-short
2		Mogtedo	Village irrigation scheme	93	Tomato, bean	Sahelian	2.00	1,200		cooperatives	systems
3		Savili	Pumping scheme	42		Agroclimatic zone	0.94				
4	Colombia	Coella	Diversion	25,600	Rice, maize, sorghum	Temporate and	1.01	1,000 to	1,800	Transferred	Water-short
5		Saldana	Diversion	13,975	Fruit and vegetables	tropical	1.61	1,500		to WUAa	Water-abundant
6		Samaca	Storage	3,000	Onion and potato		1.60	700	1,100		Sufficient water
7	Egypt	Nile Delta	Storage	3,100,000	Wheat, maize, Rice, sorghum, Egyptian cloves, Cotton	Arid	2.00	10 to 500	-	Agency-managed	Sufficient surface water, groundwater, drainage water
8	India	Mahi Kadana	Storage-cum-groundwater (conjunctive use)	212,000	Rice, wheat, Tobacco, banana, Vegetables	Semiarid	1.20	823	1,700	Agency-managed	Abundant
9	Malaysia	Muda	Storage	96,000	Rice-rice	Humid	2.00	2,000	1,800	Agency-	High rainfall but
10	Mexico	Alto Rio Lerma Cortazar Modul Salavatierra Module	Storage system 1,714 deep wells (conjunctive use)	107,541 18,848 15,897	Wheat, sorghum, maize and bean. Underground water used for wheat, vegetables, alfalfa	Moderate Subhumid	0.66 0.70 0.46	700	-	Transferred to WUA	Surface Water-short project
11	Morocco	Triffa Scheme	Storage and pumping	36,060	Orchards, sugarbeet, Potato, wheat	Semiarid Mediterranean	1.00 150-450	Average 30(	-	Agency-managed	Water-short
12	Niger	Saga	Pumping from river	407	Rice	Arid	1.85	300 to 550		Agency-	Water-sufficient
13		Kourani Baria I	Pumping from river	425	Rice		1.76			managed	
14		Kourani Baria I	Pumping from river	268	Rice		1.69				
15	Pakistan	Chishtian sub-division	Storage-cum-groundwater	70,656	Cotton, rice	Arid	1.20	200 mm	agency-	Water-short managed	
16	Sri Lanka	Nachchaduwa	Storage	2,539	Rice, chili, soybean, Vegetables, onion,	Semiarid	2.00	981	2,000	Joint management	Water-short
17		Rajangana	Storage	5,909	Rice		2.00	500 to 1,80(Average 750	2,000	- do -	Water-abundant
18	Turkey	Seyhan	Storage	120,200	Maize, cotton, oranges, and many others	Mediterranean	0.86	620		Transferred	Water-abundant

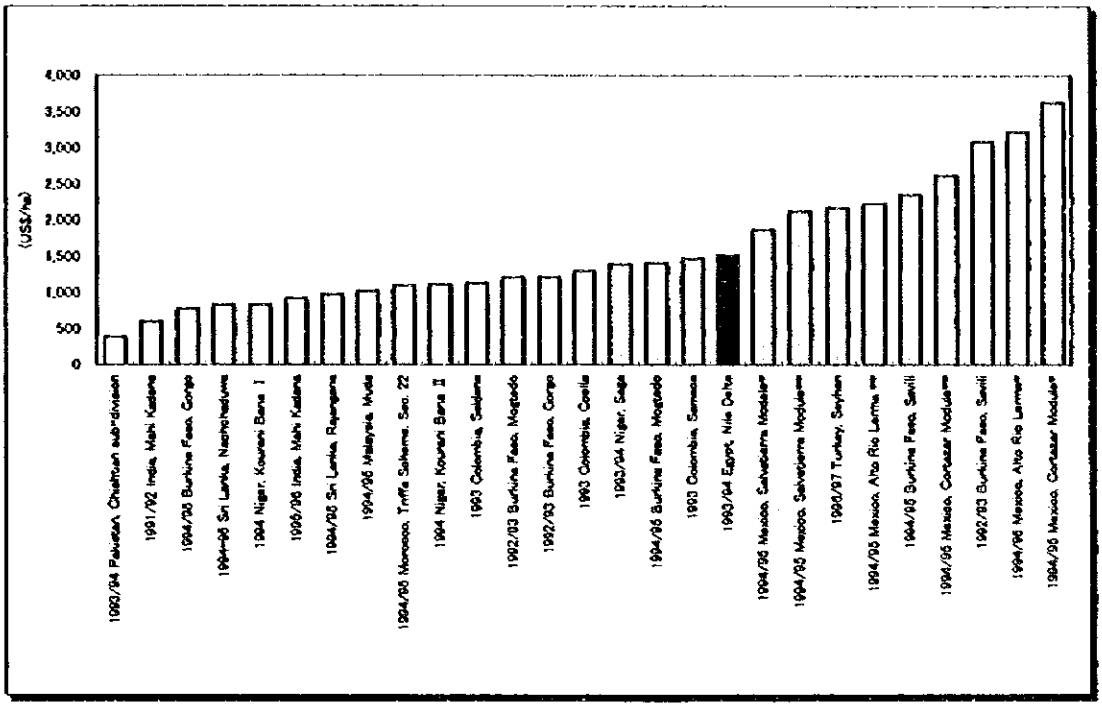
Table J.4-4 Performance indicators computed for 18 systems throughout the world.

Country	System	Year	Output/unit cropped land ($/ha)	Output/ unit command ($/ha)	Output/ unit irrigation supply ($/m3)	Output/ unit water consumed ($/m3)	Gross return on investment %	Financial self-sufficiency %	Relative water supply Ratio	Relative irrigation supply Ratio	Water-delivery capacity Ratio
Burkina Faso	Gorgo	1992/93	1,205	1,065	0.10	0.91	9	42	1.6	3.5	3.5
	Mogtedo	1992/93	1,204	2,499	0.09	0.14	21	79	1.4	2.7	2.1
	Savill	1992/93	3,085	2,652	0.37	0.80	33	-	0.5	2.6	2.9
	Gorgo	1994/95	771	679	0.08	0.12	6	35	1.9	2.7	3.5
	Mogtedo	1994/95	1,403	2,384	0.11	0.15	20	78	1.4	2.5	2.1
	Savill	1994/95	2,348	2,281	0.28	0.62	29	28	2.5	2.6	2.9
Colombia	Coella	1993	1,290	1,303	0.14	0.20	24	114	1.8	1.8	2.2
	Saldana	1993	1,125	1,811	0.12	0.17	33	127	2.2	2.9	3.2
	Samaca	1993	1,472	2,462	0.63	0.34	36	109	1.2	1.1	1.7
Egypt	Nile Delta	1993/94	1,510	2,594	0.12	0.11	26	-	1.6	1.6	1.3
India	Mahi Kadana	1991/92	605	515	0.04	0.03	30	-	3.9	3.0	2.9
	Mahi Kadana	1995/96	916	893	0.07	0.06	52	53	2.7	2.5	2.6
Malaysia	Muda	1994/95	1,021	2,041	0.38	0.10	59	-	0.8	0.4	-
Mexico	Alto Rio Lerma										
	Surface + Public wells	1994/95	2,227	1,464	0.18	0.24	28	80	2.2	3.3	5.1
	Private wells	1994/95	3,220	2,242	0.26	0.37	64	-	1.9	2.5	-
	Cortazar Module										
	Surface + Public wells	1994/95	2,615	1,827	0.22	0.25	33	133	2.1	2.3	1.2
	Private wells	1994/95	3,626	2,888	0.26	0.48	66	-	2.2	2.6	-
	Salvatierra Module										
	Surface + Public wells	1994/95	2,117	974	0.10	0.27	27	101	4.1	4.8	2.4
	Private wells	1994/95	1,863	703	0.14	0.23	75	-	2.3	4.5	-
Morocco	Triffa Scheme, Sec. 22	1994/95	1,087	1,358	0.27	0.34	-	47	1.3	1.1	-
Niger	Saga	1993/94	1,389	2,592	0.12	0.13	-	139	2.2	1.8	-
	Kourani Baria I	1994	827	1,460	0.05	0.17	-	-	2.9	2.4	-
	Kourani Baria II	1994	1,107	1,879	0.06	0.11	43	-	2.2	1.7	-
Pakistan	Chishtian sub-division	1993/94	384	477	0.04	0.05	-	40	1.3	1.2	0.8
Sri Lanka	Nachchaduwa	1994/95	826	1,544	0.04	0.08	34	-	2.0	2.2	-
	Rajangana	1994/95	967	1,934	0.06	0.11	43	-	-	-	3.3
Turkey	Seyhan	1996/97	2,167	2,526	0.21	0.19	108	88	2.07	2.15	2.62

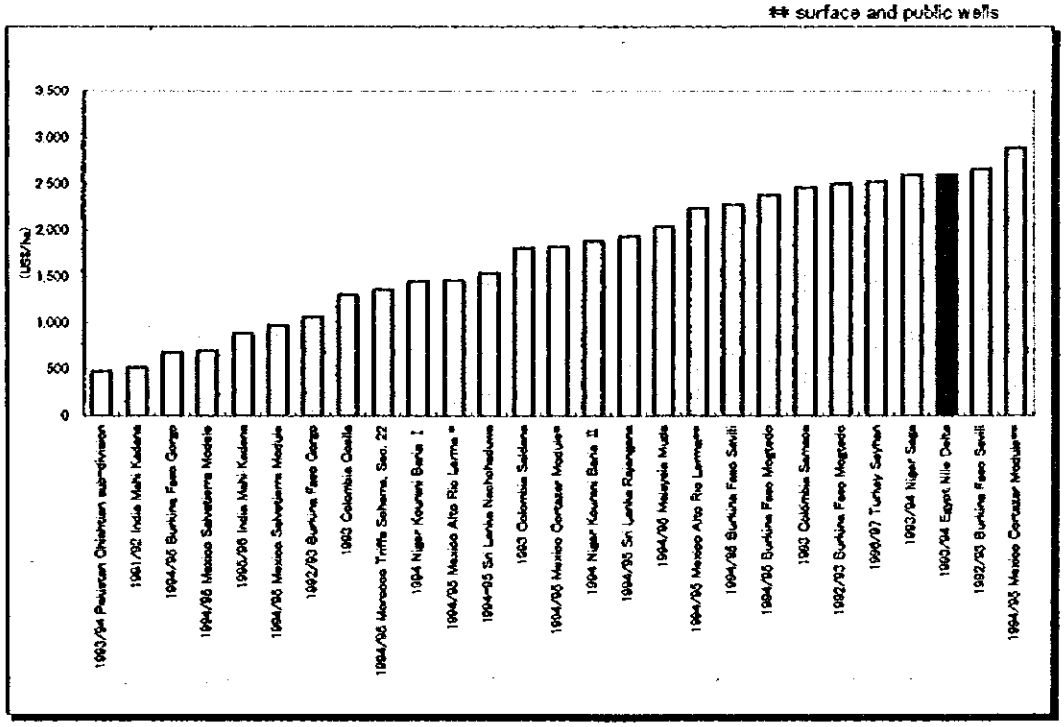
Source: "Indicators for Comparing Performance of Irrigated Agricultural Systems" by IIMI experts (1998)

Figure J.4-5 Schematic indicators

Standardized gross value of production per unit cropped lan * private wells
** surface and public wells

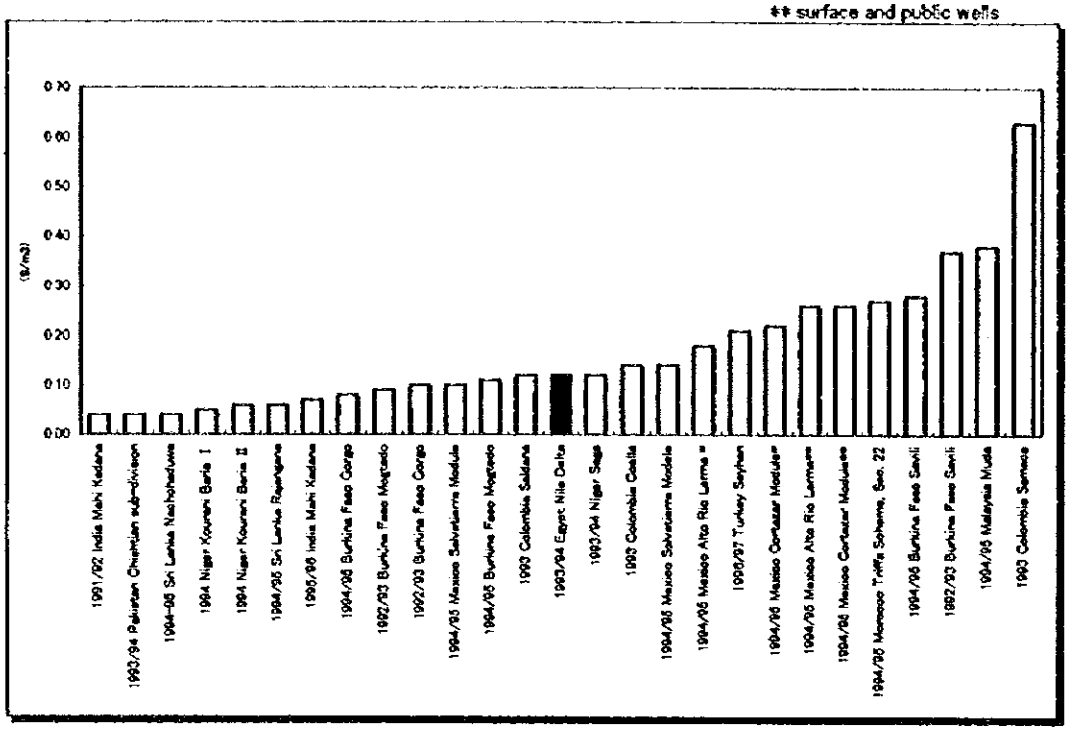


Standardized gross value of production per unit command * private wells
** surface and public wells



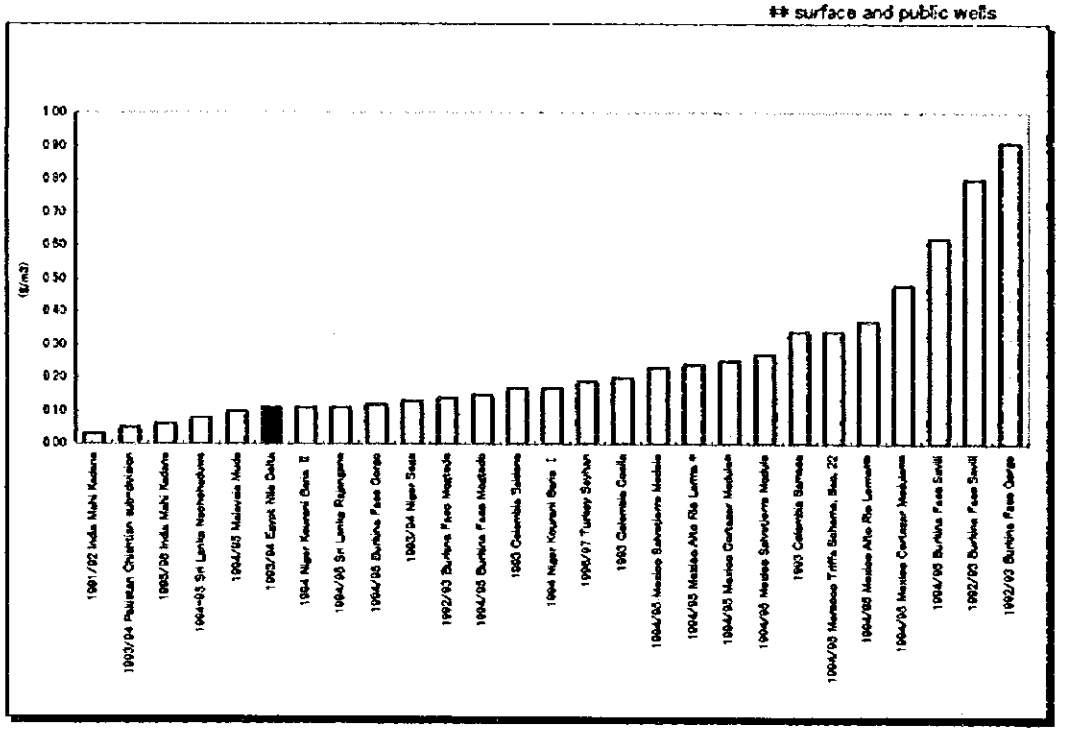
Standardized gross value of production per unit irrigation su

* private wells
** surface and public wells

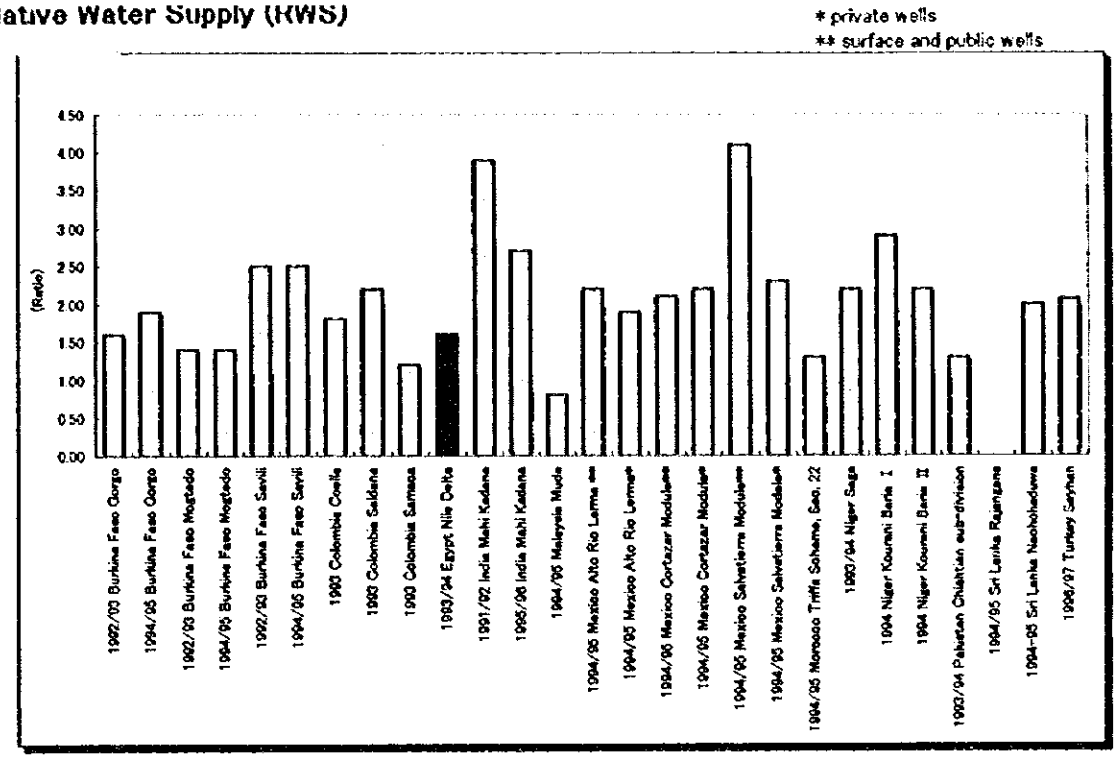


Standardized gross value of production per unit water consi

* private wells
** surface and public wells



Relative Water Supply (RWS)



Relative Irrigation Supply (RIS)

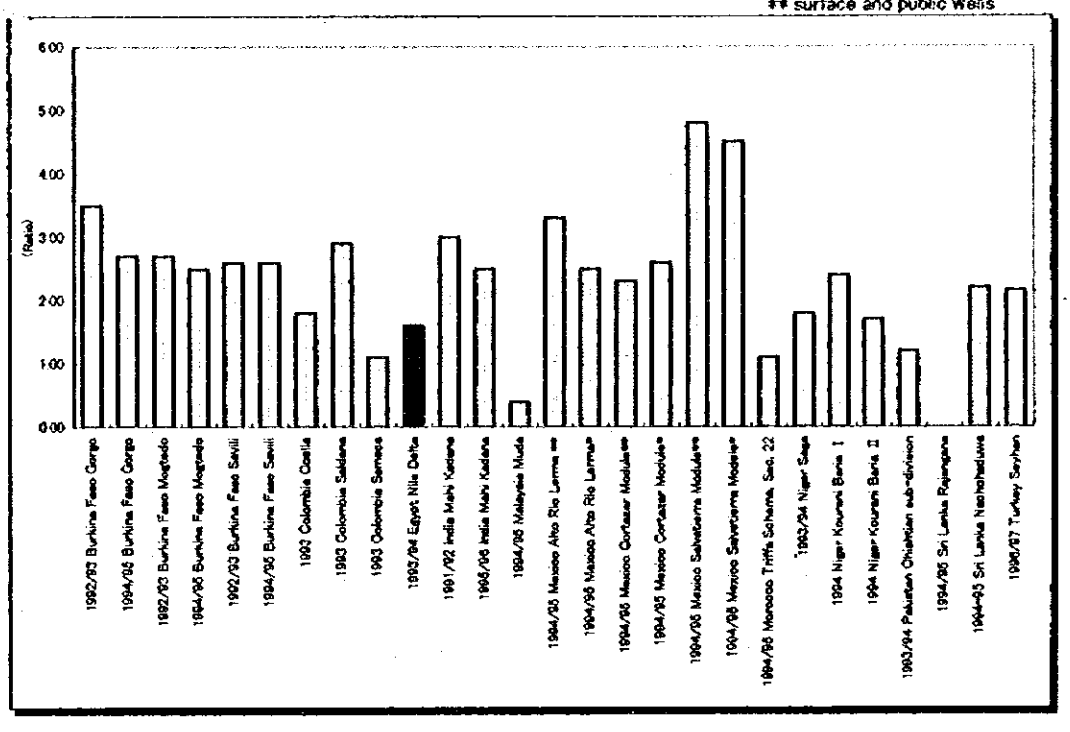


Table J.4-5 Studies on Irrigation Management Transfer (IMT)

Country	Study Year	Irrigation Type	Transfer Unit	Size of Transfer Unit (ha)	New Manage-ment	O/M Transfer	Finance Transfer	Ownership of Assets
Philippines	1995	SI	Entire scheme	150-200	WUA	Partial	Partial	Gov't
Philippines	1994	SI	Laterals & entire	500-5,000	WUA	Partial	Partial	Gov't
Philippines	1994	LI	Distributary	2,500	WUA	Partial	Partial	Gov't
Philippines	1992	SI, LI	Distributary	< 5,000	WUA	Partial	Partial	Gov't
Indonesia	1993	LI	Tube-well	5-200	WUA	Partial	Full	Gov't
Vietnam	1994	LI	Pump scheme	n.a.	Parastatal	Full	Full	Gov't
China	1995	SI	Scheme	5,000	Irrigation district	Full	Full	Gov't
Bangladesh	1996	LI	Tube-well	< 100	WUA	Full	Full	Private
Nepal	1994	?	Irrigation system	500-2,000	Agency/WUA	Partial	Partial	Gov't
Nepal	1994	LI	Tube-well	120	WUA	Full	Full	Gov't
Nepal	1996	SI	Entire scheme	8,700	WUA	Partial	Partial	Gov't
Sri Lanka	1996	SI	Distributary	80-260	Agency/WUA	Partial	Partial	Gov't
Sri Lanka	1992	SI	Field channels	50-150	WUA	Full	Partial	Gov't
India	1994	LI	Tube-well	84	Cooperative	Full	Partial	Gov't
India	1994	SI	Distributary	14,000	Intervillage committee	Partial	Partial	Gov't
India	1994	?	Minor canal	359-513	WUA	Partial	Partial	Gov't
India	1994	LI	Tube-well	50-150	WUA	Partial	Partial	Gov't
India	1995	LI	Minor canal lift scheme	< 400	WUA	Full & partial	Full & partial	Gov't
Egypy	1994	SI	Field channels	20-60	WUA	Full	Partial	Gov't
Sudan	1995	LI	Pump scheme	80-4,000	Private company/ WUA	Partial	Partial	Gov't
Turkey	1996	LI	Scheme & subunits	50-34,000	Municipal gov't	Full	Full	Gov't
Nigeria	1993	SI	Distributary	126-271	Agency/WUA	Partial	Partial	Gov't
Senegal	1995	LI	Lift scheme	20	WUA	Full	Full	Private
Dominica	1994	SI	Federated	5,240-9,240	WUA	Partial	Partial	Gov't
Colombia	1996	SI	Irrigation district	14,000	WUA/district	Partial	Full	Gov't
Colombia	1994	SI,LI	Scheme	1,000-35,000	WUA/district	Full	Full	Gov't
Mexico	1996	SI	Blocks	3,000-20,000	WUA	Full	Full	Gov't
USA	1994	SI	Irrigation district	77,000	WUA/district	Full	Full	Gov't
New Zealand	1994	SI	Scheme	2,000	Mutual company	Full	Full	Private

Source: "Impacts of Irrigation Management Transfer: A Review of the Evidence", Douglas L. Vermillion of IIMI (1997)

Table J.4-6 Reported Impacts of IMT on Irrigation Finance

Country	Study Year	Irrigation Type	Reported Impacts for Finance
Philippines	1995	SI	Reduced cost to farmers, 75% drop in budget. Fee collection rates rose from 20% to 81%.
Philippines	1994	SI	Revenue from water charges increased from 24% to 60% in 1990. Reduction in agency field staff. Diversification of revenue sources.
Philippines	1994	LI	Budget losses converted to surpluses. Fee collection rate rose from 27% to 60%.
Philippines	1992	SI, LI	Decrease in frequency of deficit budgets; increase in revenue from water charges and other income. 29% drop in the operating expenditures. Decline in staff from 13% to 75%. Government subsidy dropped from P 25 million in 1976 to zero in 1982.
Indonesia	1993	LI	Cost of water pumped increased five to seven times
China	1995	SI	Per hectare cost of water to farmer rode 2.5 times. Growing importance of sideline revenue enterprises after reform.
Bangladesh	1996	LI	O/M costs remained similar after privatization, though loss of subsidies meant increased costs to farmers. Diesel deep tube-wells not financially viable without subsidy.
Nepal	1994	LI	Costs of water decreased 40-50%.
Nepal	1996	SI	Cash and labor value raised from farmers increased to US $ 8.77/ha, and 77% of farmers psid water charges.
Sri Lanka	1996	SI	Government subsidies for O/M continued. Farmer organizations invested mainly in input provisions and marketing, not in O/M. Annual government costs decreased 33%. Diversification of revenue sources.
India	1994	LI	50% reduction in the cost of water. Budget deficits converted to surplus.
India	1994	LI	50% reduction in cost of water.
India	1995	LI	Increased costs and time required for farmers. Improved rate of recovery for water charges. No decline in government expenditures for O/M.
Egypy	1994	SI	Dramatic decline in maintenance costs. Per hectare pumping costs declined from US $ 68 to $ 40-50 after rehabilitation and IMT.
Turkey	1996	LI	Increase in average water fee collection rate from 36% to 72% in the first year after IMT.
Nigeria	1993	SI	Water fee collection rates rose from 50% to 90% after IMT.
Dominica	1994	SI	Water fees increased 1,500% in 8 years. Fee collection rates increased from 12% to 80%.
Colombia	1994	SI,LI	Declining trend in fee levels. Reduction in staff by 38%. Shift from deficit to surplus budgets in all study cases.
Colombia	1996	SI	44% average decline in total staff. Farmer emphasis on cost-cutting. No long-term major change in cost of irrigation. Cost of water relative to production fell 27%. Diversification of revenue sources, from 10% to 20% of revenue other than fees. Budget deficits converted to surpluses.
Mexico	1996	SI	45-180% increase in water charges. Increase in fee collection rates from 15%, originally, to 80% to 100%. Shortfall in financing declined nationally from US $ 66 million to $ 41 million annually. Local self-reliance increased from 43% to 78%.
USA	1994	SI	Decrease in government staff by 86%. Farmer emphsis on cost-cutting. Volumetric charges reduced by 16%. Diversification of revenue sources. Water charge was 80% of revenue before and 67% after IMT. Farmers raised capital replacement fund.
New Zealand	1994	SI	Farmer emphsis on cost-cutting. Average operational costs declined 66%. After IMT, water charges were a quarter to a half of the pre-IMT level.

Notes: IMT = Irrigation Management Transfer
SI = surface irrigation
LI = lift irrigation

Source: "Impacts of Irrigation Management Transfer: A Review of the Evidence", Douglas L. Vermillion of IIMI (1997)

Column J.4-3 Some Useful Suggestions Extracted from INPIM and IIMI Reports

P.Sun of INPIM Secretariat in the World Bank refers to probable merits obtained by adoption of "the carrot & stick policy" in some countries such as Mexico and Turkey on the way of their PIM execution. In Mexico, since the government suffered from a lack of fund in carrying out basic management functions for the large-scale irrigation schemes, by 1995 more than 2/3 of the country's 3.2 million ha of irrigated land had been transferred to 316 irrigation associations (which are called as "Odules" in Mexico). The transfer program was initially focused on the most productive irrigation schemes, in accordance with the most commercially oriented farmers.

At that time, the government provided "carrots", under a 20-year concession, such as a specified share of the total water supply, assurance that canal network can be kept in repair at government expenditure and management autonomy etc. to farmers groups which agreed to take over management. To the contrary, so-called stick was that if farmers refused to take over management, the government could offer no assurance that canal network could be kept repair. By this stick, many farmers, particularly the commercially oriented farmers, were afraid about the risk that the irrigation infrastructure might be collapsed, thus they preferred to take over the management.

Turkey followed to "Mexican Model" and by now more than half of the irrigated land (totally around 1 million ha so far administered by the government) has been transferred to farmers' associations in terms of each size of about 6,300 ha in average. For reference, since 1954 in Turkey the irrigation policy has allowed transfer of irrigation systems to farmers, but few requests were made from farmers' side due to quite comfortable subsidy systems as well as technical assistance etc. provided by the government. From 1993 onwards, however, the government launched the Accelerated Transfer Program in which the farmers who were transferred management have to bear the sticks of decreased technical and financial assistance and, to the contrary, they can taste carrots such as no payment for water fee to the government.

Subsequently, as a result of comprehensive study on PIM in 5 countries (Mexico, Turkey, Argentina, Colombia and the Philippines), P.Sun consolidates some important premises in stimulating PIM policies. They are

a) National budgetary crisis: Without a crisis, there is no urgency to initiate changes
b) Top level political will and commitment to promote PIM:

c) Good physical condition of irrigation infrastructure: Unless the system works well, farmers will not be willing to take over management. For example, Mexican government promised farmers to rehabilitate certain portions of their systems even after the management turnover, and

d) Workable legal framework: As per water right, establishment of WUAs, role of government organization, supportive measures etc.

Also, P.Sun refers to modes of implementation approach of PIM which are categorized into

a) Top-down and/or Big-bang Approach, and

b) Bottom-up and/or Gradualism Approach,

and he opines that the former may be rather suitable in the beginning stage of PIM where awareness campaigns and rehabilitating infrastructure etc. are included, and the latter may be essential when WUAs are to be organized with the mutual understanding of the farmers.

Regarding this, four countries excluding the Philippines have likely been adopting the former approach with their large-scale land holding and market-oriented agriculture. By contrast, reasons why the Philippines has adopted the latter approach spending more than 15 years is due to its smaller land holdings of less than 1 ha per farmer and attendant limited scope and objectives of PIM derived from its peasant agriculture. In this connection, it can be said that Egyptian agriculture at present is still staying at the peasant agriculture like the Philippines, however its agriculture in the near future will be a more market-oriented one like in Mexico. Therefore, the situation surrounding PIM in Egypt may be assumed the one locating between the two.

Similarly, in his report entitled "Impact of Irrigation Management Transfer: A Review of the Evidence", D.L.Vermillion suggests that farmers' irrigation management is categorized in the following three basic models.

a) Direct management of small-scale irrigation systems by farmer organizations

b) Management of medium-scale or complex systems by irrigation districts governed and supervised by farmer-elected boards and employing specialized staff for management

c) Management of large-scale or complex systems by irrigation companies either owned or contracted by a federated farmers' organization and governed by a farmer-elected boards

Also, he emphasizes some preconditions for successful irrigation management transfer. They are

a) A firm, consistent long-term political commitment to the policy

b) Clear water rights with compatible water distribution arrangements
c) Legal and political recognition of farmer organizations, including their right to raise revenue, enter into contracts, and apply sanctions
d) Benefits exceeding costs and being proportionally related to farmer investments, even through total costs paid for services may be more than that before turnover

Subsequently, as for the integral assessment of irrigation performance, two study reports can be cited, i.e. "Indicators for Comparing Performance of Irrigated Agricultural Systems" and "Impact of Irrigation Management Transfer: A Review of the Evidence" which have been published very recently by IIMI(International Irrigation Management Institute). In the former publication, some indicators are used for the purpose of quantification of the irrigation performance in 11 countries (18 schemes) including Egypt. Therefore, through the study of their quantitative comparison, objective judgement of Egyptian irrigation might be enabled..

The said indicators are
*1: Agricultural output per cropped area($/ha) = Crop production / Irrigated cropped area
*2: Agri. output per unit command($/ha) = Crop prod. / Command area
*3: Agri. output per unit irrigation supply($/m3) = Crop prod. / Diverted irrigation supply
*4: Agri. output per unit water consumed($/m3) = Crop prod. / Vol. of water consumed by ET
*5: Relative water supply (ratio) = Total water supply / Crop demand
*6: Relative irrigation supply (ratio) = Irrigation supply / Irrigation demand
and so forth.

According to the calculation results by using these indicators, the performance of Egyptian irrigation, comparing to other countries, is "more or less moderate", i.e. "good or excellent" for land utility (indices *1 & *2), "moderate or low" for water utility (indices *3 & *4), and "moderate or good" forwater efficiency(indices *5 & *6).

Another report, i.e. above mentioned "Impact of Irrigation Management Transfer: A Review of the Evidence", mainly deals with a financial analysis of PIM based on the recognition that irrigation system is a part of an agricultural economic system.

Based on its studies mentioned above, IIMI summarizes the present magnitude of Egyptian irrigation as shown below.
a) Irrigated agriculture in Egypt is characterized by its high crop yields (per unit of land and water) and a high cropping intensity (200%)
b) A creeping crisis of the coming shortfalls in water supply is afraid in accordance with

Egyptian total dependence on water from the Nile

c) High degree of centralization of authority on water supply may cause time-lag in decision making and information flow regarding water allocation and "accountability gap" between the government officials and the water users, and

d) Salary levels throughout the Egyptian officials are extremely low as shown below, even compared to developing countries poorer than Egypt. This may cause stagnation in their incentives for the greater and more successful implementation of IIP

Salary of Engineers in MPWWR, Compared to Other Countries (%)

Country	Low-Ranking Officials	High-Ranking Officials	GNP/Capita
Egypt	100	100	100
Pakistan	486	383	66
India	470	260	54
Sri Lanka	293	194	82
Bangladesh	230	198	36

Column J.4-4

"Partnership System" with "Stage-wise Turnover" in the Philippines:

Stage I is a contract on ISF(irrigation service fee) collection (ISFC) wherein the FIA(farmer irrigators association) participates in the campaign and collection of ISF payment within their jurisdictional area. The ISFC contract specifies that the NIA(National Irrigation Authority) will provide an incentive to FIA per cropping season in the range of 1 to 5 percent of the current ISF payment if the collection efficiency within the FIA area reaches 70 to 100 percent.

An additional 2 percent of collected previous or back account is given to the FIA once qualified in the incentive for the current ISF collection. To enhance competition among the IA, the NIA prioritizes repair and maintenance works on the FIA area with high collection efficiency.

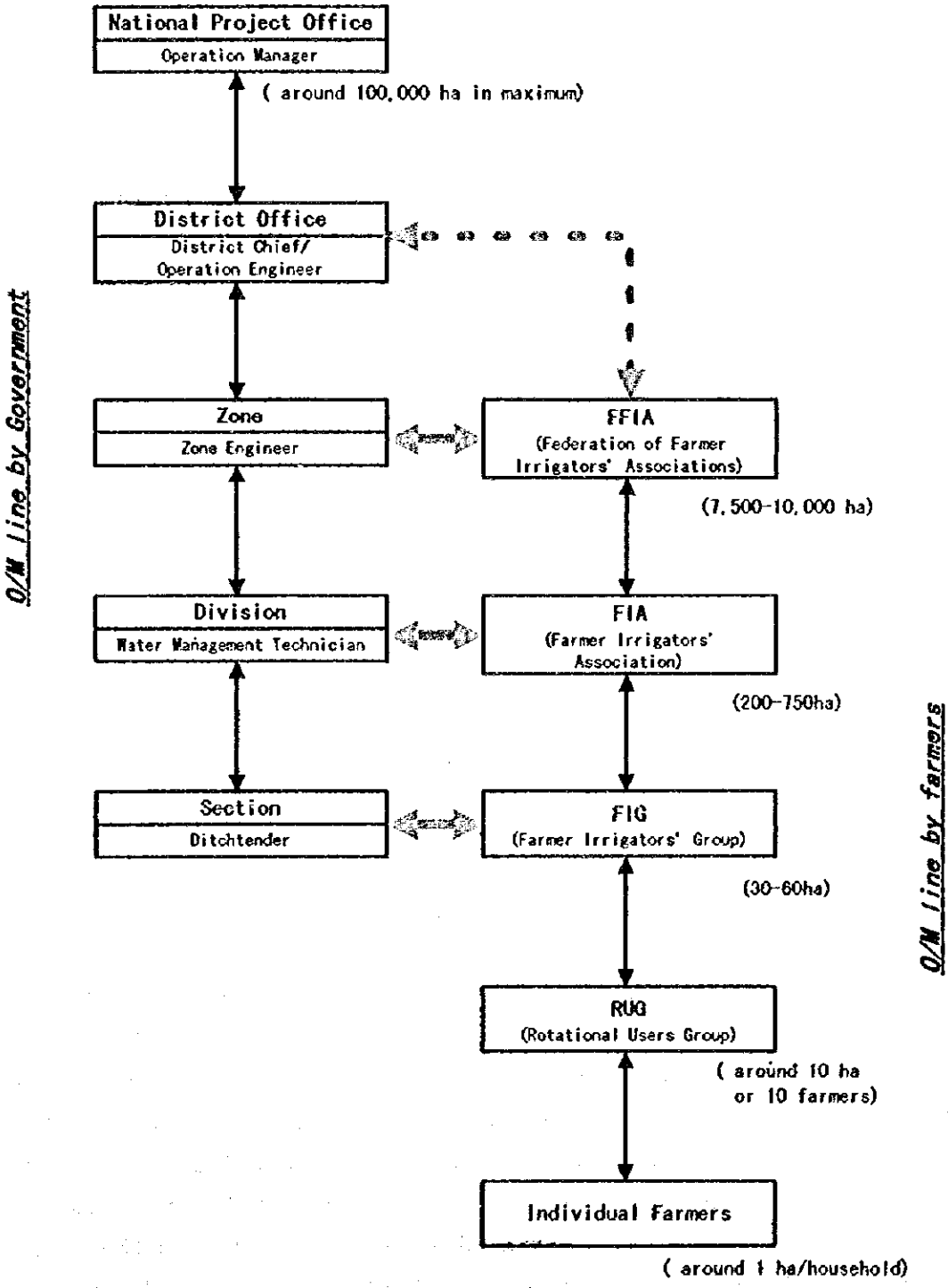
Stage II is on canal maintenance turnover wherein a particular lateral within the FIA jurisdictional area is vacant or without any Ditchtender(DT) assigned. Once the FIA agreed to undertake the maintenance of the canal, the NIA pays the services of the FIA in the amount of money equivalent to 2,856 kg of paddy per annum for a length of 3.5 km (which is equivalent to one DT section). The payment serves as incentives to FIA for their services in maintaining the specified canal including its facilities and structures. The payment however is subject to the monthly maintenance evaluation conducted by an Evaluation Committee of the Agency.

Stage III is on the turnover of /M of a particular system or part thereof to the FIA. This specifies that system management activities like water distribution, maintenance and ISF collection within the area should be handled by the FIA. The responsibility to the NIA is the payment, in any manner that is agreed by both parties, of the amount used in the construction including amortization and other related system operational expenses.

In this connection, training programs are also ranged in a stage-wise manner to accord with turnover system mentioned above. They are

Module 1: Pre-membership and organization of field training
Module 2: Strengthening NIA-FIA partnership (Live-in training)
Module 3: Echo field training
Module 4: Operation and financial management training
Module 5: ISF billing and collection training
Module 6: Canal maintenance training
Module 7: System management training

Figure J.4-6 Partnership System for O/M in the Philippines



J.5 Development Plan on Farmers' Organization

Farmers have many opinions pertaining to the IIP. As summarized below, farmers are desiring ;

1)stable supply of water above all, and accordingly some IIP implementation in realizing this (even if they would not have clear imagination regarding the contents of IIP)

2)more demand-oriented approaches in implementing IIP, because they feel that farmers' opinion/ incentive are not necessarily reflected satisfactorily in the current system of IIP and under such government dominated approaches they cannot be vitalized in aiming at self-reliant effort for improved irrigation management

3)continuation of individual irrigation so far experienced by themselves throughout long history because they cannot be confident about grouping activities when considering conflicts and troublesome negotiations among related farmers

4)dependence on conventional authorities such as Aila society as well as Umda and/or Shaykh balads if it is inevitably recommended to introduce grouping activities in irrigation management and to establish WUAs

5)in the above case, smaller size in each water group such as comprised of 10-20 farmers through which, supposedly they may know why, they can be intimate, thus under surveillance each other toward more effectuated managing systems

6)decrease in O/M & farm input costs by means of governmental subsidies etc. and/or increase in farm incomes by means of pricing and marketing policies, because it goes without saying that monetary burdens caused by IIP should be less than expected profits derived from IIP,

7)permanent service/repair center for pump equipment etc., because they know that beneficiary farmers of the completed IIP areas have so far been suffering from repeating occurrence of mechanical troubles after the turnover of pump equipment

In common sense, these opinions are quite appropriate. For example, regarding the above 2), many examples of government dominated approaches in several countries verify unsuitability of such approaches. In India, for instance, 3,692 of WUAs were established in 1982 as mandated for the purpose of transfer of government own tube-wells (commanded around 350 thousand ha in total, thus 35ha/WUA in average) to farmers. Out of total number of these WUAs, however, only 21% was functional as expected, 52% suspended and remaining 27% dissolved in 1989. Similarly in Thailand, aiming at O/M transfer of 540 thousand ha's irrigated land to farmers, 169 of rather large-scale WUAs were established in 1973 under the governmental instruction (around 3,000ha of command area per WUA). In 1988, it was recorded that only 20% was functional, 49% controlled by rich and influential farmers and remaining 31% suspended or dissolved.

Also, regarding the above 5), some lessons can be learned from Asian countries where smaller land-holdings of less than 1 ha per farmer is prevailing, thus average size ruled by the existing WUA is much less than 100 ha. In such small-scale organizations (so-called "peer groups" in sociological term - e.g. "Sou" in Japan, "Huengnonggye" in Korea, "Subak" in Indonesia and "Zenjera" in the Philippines etc.), member farmers are homogeneous and irrigation facilities have been constructed and maintained successfully by themselves throughout their long history.

Bearing all this in mind, following approaches would be delineated to the end of more successful IIP in the sector of farmers' organization.

(1) Measures for vitalization of farmers incentives

In line with "Privatization Policy", Egyptian farmers are to be insured a vitalized free-hands in directing their farm management at their own beck and call, and by this, agricultural production would be greatly increased as a whole (For example in China in 1985, nationwide agricultural production showed 14% increase when the government introduced a new policy of free-market system in 1984). In this connection, necessity of improvement of each branch canal, mesqua and/or maruwa and technical means and ways to be adopted in each improvement work are to be decided by the opinion/request of beneficiary farmers in accordance with geological and social background of each canal. It means that there is no obligation for farmers to execute improvement works if they do not feel any necessity, also that there is no technical standard, at least at present, which could be commonly applicable in replying on overall requests from farmers.

(2) Clear-cut separation of water divide

As a first step of such vitally privatized agriculture in Egypt, farmers are to be insured "their own water" or "hydrological de-centralization" in line with stable and reliable ways, and by this, their self-reliant endeavors to save and effectuate water use would be directed in right way, even in the case that the given amount of water is not enough. For this purpose, a regulating structure, which enables accurate allocation and measurement of water at the head of each branch canal, is to be installed. At the same time, at least minimum consolidation works (e.g. desilting, partly bank protection etc.) are to be implemented by the government in each branch canal by the government. Seasonal water allocation to each branch canal is to be decided by a "Joint Committee" which is to be organized and managed by representatives from both the government officials and farmers groups.

(3) Hierarchy of farmers' organizations

For this purpose, beneficiary farmers of each branch canal are to be organized in a "Federation of WUAs" of which new articles are to be added in the Irrigation and Drainage Law to authorize this Federation as a new legal entity. The Federation of WUAs is to be comprised of representatives from each WUA, and all or a part of them are to be members in the Joint Committee

Meanwhile, a rather large-scale WUA, comprised of such as 50 and more farmers, is to be recommended to organize sub-groups named "WUG (Water Users Group)s" in each WAU aiming at unification of a number of maruwas into a minimum water unit, and also aiming at the stronger and more effective grouping activities in water use based on the ergonomics consideration (For reference, these WUGs, similar to "tarafs" as are seen in Fayoum Governorate, would not be legal entities but be composed in the base of each rural societies such as Sakia Rings). At the most terminal level, water management and O/M of facilities(referred to as software jobs) are to be done by WUGs, therefore structural improvement of the terminal facilities (referred to as hardware jobs) is to be the one which coincides with the needs and/or requests from the software jobs (It means usefulness or easy operating for grouping activities by the WUGs).

In consolidating the above mentioned farmers' water groups in the downstream of branch canal onwards, a hierarchy is to be composed from 3 strata, i.e. from WUGs as minimum units, via WUAs as medium-scale and legal entities, to a Federation of WUAs as a top of the hierarchy of the farmers' groups which is to be legally authorized by forthcoming revisions of the Law, and water management in this domain is to be done comprehensively by this hierarchy of farmers' groups, in principle. In this hierarchy, daily issues regarding water delivery and farm management etc. are to be discussed and decided among the beneficiaries of each WUG, and rather important issues such as seasonal water requirement, cost sharing for O/M of mesqua etc. are to be discussed by Board members of the WUA who are to be elected from each WUG. Meanwhile, each WUA is to hold its general assembly annually and/or seasonally, also in case of emergency with participation of all member farmers

(4) Roles of the government

When considering that improvement of terminal irrigation and its transfer to farmers bring predominant advantages to the government, too, in saving both water resources and national expenditure, and also that it is common in many countries to subsidize for this kind of works, the government is to subsidize a part of the cost for IIP (e.g. 25-40% ?) to encourage farmers and accordingly to expand this work to the whole nation. For the reference to farmers who

want to improve the existing irrigation systems and for the future direction in disseminating the best and cheapest techniques of IIP, the government is to test and demonstrate probably feasible technologies at pilot farms including new ideas such as introduction of connected direct-irrigation systems, installation of small farm pond in each unified maruwa by using lands born from buried mesqua in accordance with installation of pipelines etc.

Also, the government is to adopt some new ideas such as transfer of its technical staffs to technical-service enterprises which would be established as catalyst agents under a revised Law, or their step-by-step transfer to the Federation of WUAs, because the hierarchy of farmers' organizations does not have enough technical knowledge and caliber to realize practical and effective water management (For reference, such examples of staff transfer can be seen in some countries).

To confirm successfulness of the procedures mentioned above, at least 5-10 years are to be necessitated. Therefore, the government is to apply some alternative measures in parallel throughout these periods, as a transition towards the final targets (Such an example can be seen in the Philippines and other countries). At the same time, for the purpose of the dissemination of the said procedures to the whole nation, the government is to provide new financial measures such as preparation of a special fund necessary for subsidizing farmers, encompassing some possibilities such as "Two-Step Loans" by using external funds etc., if necessary.

(5) Roles of the IAS

According to the gathered information through the phase-I study, the IAS's activities have likely been inclined into training courses to the key farmers, and, to the contrary, less focussed into listening and analyzing farmers' opinion/ incentives regarding the IIP. If so, from now on, the IAS is to organize more repeating and exhaustive meetings among beneficiary farmers at each branch canal respectively to discuss on whether IIP is necessary or not in each domain and, if necessary, to decide the right and optimal way of IIP by farmers themselves. In this connection, the IAS is to function as the facilitator of such procedures and not as the instructor to direct the way to farmers. Through such procedures, farmers would be expected to grasp a sense of ownership for water as well as a sense of belonging for facilities.

These senses are deemed as the most essential components towards farmers' self-governing irrigation and attendant effective use of water in the future. Based on such a recognition, in Japan and the Philippines etc., for instance, 1-2 years are usually spent for the mutual agreement of the farmers for the project).

Table J.6-1 Characteristics of Each Delivery Canal in F/S Area

Name of Delivery Canal	Name of Water District	Name of Village	Number of Farmers (families)	Place of Main Market for Agro-production	Population Density in the Area (capt/km2)	Main Crops (summer) (winter)	Command Area of Delivery (F)	Canal Length of Delivery (km)	Number of Mesqa in Delivery Domain	Area fed by Mesqas (%)	Structural Condition at Delivery Head	Structural Condition at Delivery End	Structural Condition at each Mesqa Head	Structural Condition at each Mesqa End	Remarks
Ganabia 2 R.	Biyala				1155		1400	2.6	2	19					
Ganabia 2 L.	Biyala				689		840	3.6	2	29					
Ganabia 3 R.	Biyala				1155		680	0.5	0	0					
Feda	**Biyala**	**Hosn El-Alely**	**460**		**689**		**1650**	**3.9**	**10**	**66**					
Ganabia 4 R.	**Biyala**				**414**		**1440**	**2.7**	**8**	**53**					
Ganabia 3 L.	Biyala				689		300	0.7	0	0					
El Asmar	**Biyala**				**651**		**850**	**4.4**	**6**	**41**					
Bahr El Nour	**Biyala**	**Seray El-Din**	**900**		**651**		**2500**	**7.4**	**21**	**96**					
Bahr Biyala & El Nour	Biyala				651		1150	1.6	0	0					
Hezek	**Biyala**	**Hezek**	**232**		**2122**		**750**	**2.8**	**2**	**17**					
Ganabia 4 L.	**Biyala**	**El-Cremel**			**767**		**1950**	**3.8**	**6**	**26**					
Ganabia 6 R.	**Biyala**		**400**		**845**		**1150**	**3.7**	**5**	**74**					
El Sherbawellah	**Biyala**				**845**		**1712**	**4.5**	**12**	**54**					
Kom El Hegna	Biyala				597		700	5.3	4	50					
El Nezam	Biyala				1314		2850	8.4	10	30					
Marzouk	Biyala				506		1000	3.2	0	0					
Ganabia 7 R.	Biyala				506		450	0.9	0	0					
Tahweelah Bahr Biyala	**Biyala**				**651**		**1320**	**1.4**	**3**	**32**					
El Sherefa	**Biyala**	**El -Sherefa**	**100**		**651**		**840**	**4.8**	**8**	**55**					
Abehan	Biyala				552		3750	17.0	16	32					
Bahr Biyala	Biyala				651		5470	13.8	12	39					
El Banawan El Asfal	Hamoul				271		7000	5.0	0	0					
Ganabia 7 L.	**Hamoul**	**El-Kafr-El-Sherky**			**271**		**1150**	**3.3**	**5**	**59**					
Zobsa	Hamoul				271		3800	6.2	3	20					
El Wosta	Hamoul				271		3850	6.0	2	20					
Ganabia 1 L. Hamoul	Hamoul				271		330	1.7	0	0					
Ragheb Basha	Hamoul				271		2050	5.5	0	0					
El Walda	Hamoul				271		1000	5.6	0	0					
El Walda Branch	Hamoul				271		850	3.5	0	0					
Ganabia 1 R. Hamoul	Hamoul				271		3000	6.2	0	0					
Ganabia 10 R.	Hamoul				271		500	2.5	0	0					
El Kafr El Sharkia	**Hamoul**	**El-Zafran**			**271**		**1425**	**7.1**	**4**	**40**					
El Mahatta	Hamoul				271		2500	2.6	0	0					
Average					*606*		*1824*	*4.6*	*4.2*	*26.4*					

Table J.6-1 Characteristics of Each Delivery Canal in F/S Area

Name of Delivery Canal	Name of Water District	Name of Village	Number of Farmers (families)	Place of Main Market for Agro-production	Population Density in the Area (capt/km2)	Main Crops (summer) (winter)	Command Area of Delivery (F)	Canal Length of Delivery (km)	Number of Mesqa in Delivery Domain	Area fed by Mesqas (%)	Structural Condition at Delivery Head	Structural Condition at Delivery End	Structural Condition at each Mesqa Head	Structural Condition at each Mesqa End	Remarks
Ganabia 2 R.	Biyala				1155		1400	2.6	2	19					
Ganabia 2 L.	Biyala				689		840	3.6	2	29					
Ganabia 3 R.	Biyala				1155		680	0.5	0	0					
Foda	**Biyala**	**Hosm El-Alawy**	**460**		**689**		**1650**	**3.9**	**10**	**86**					
Ganabia 4 R.	**Biyala**				**414**		**1440**	**2.7**	**9**	**53**					
Ganabia 3 L.	Biyala				689		300	0.7	0	0					
El Azamy	**Biyala**				**651**		**850**	**4.4**	**6**	**41**					
Bahr El Nour	**Biyala**	**Seray El-Din**	**900**		**651**		**2500**	**7.4**	**21**	**96**					
Bahr Biyala & El Nour	Biyala				651		1150	1.6	0	0					
Hazek	**Biyala**	**Hazek**	**392**		**2122**		**750**	**2.8**	**2**	**17**					
Ganabia 4 L.	**Biyala**	**El-Gromal**			**767**		**1950**	**3.8**	**5**	**26**					
Ganabia 6 R.	**Biyala**		**400**		**845**		**1150**	**3.7**	**5**	**74**					
El Sherkaweilah	**Biyala**				**845**		**1712**	**4.5**	**12**	**54**					
Kom El Hegna	Biyala				597		700	5.3	4	50					
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Tahweelah Bahr Biyala	**Biyala**				**651**		**1320**	**1.4**	**3**	**32**					
El Shorafa	**Biyala**	**El-Shorafa**	**100**		**651**		**840**	**4.8**	**6**	**55**					
Abshar	Biyala				552		3750	17.0	15	32					
Bahr Biyala	Biyala				651		5470	13.8	12	39					
El Banawan El Asfal	Hamoul				271		7000	5.0	0	0					
Ganabia 7 L.	**Hamoul**	**El-Kafr-El-Sharky**			**271**		**1150**	**3.3**	**5**	**59**					
Zobaa	Hamoul				271		3800	6.2	3	20					
El Wosta	Hamoul				271		3850	6.0	2	20					
Ganabia 1 L. Hamoul	Hamoul				271		330	1.7	0	0					
Ragheb Basha	Hamoul				271		2050	5.5	0	0					
El Walda	Hamoul				271		1000	5.6	0	0					
El Walda Branch	Hamoul				271		850	3.5	0	0					
Ganabia 1 R. Hamoul	Hamoul				271		3000	6.2	0	0					
Ganabia 10 R.	Hamoul				271		500	2.5	0	0					
El Kafr El Sharkia	**Hamoul**	**El-Zafran**			**271**		**1425**	**7.1**	**4**	**40**					
El Mahatta	Hamoul				271		2500	2.6	0	0					
Average					***606***		***1824***	***4.6***	***4.2***	***26.4***					

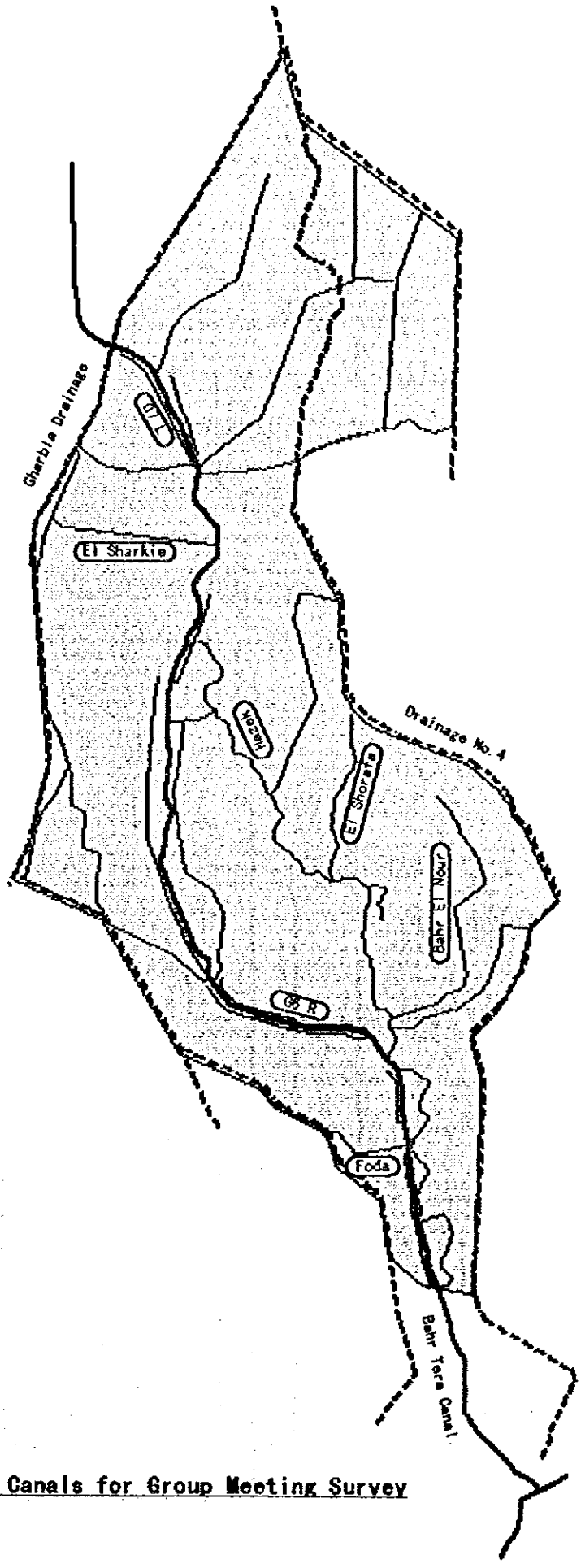


Fig. J. 6-1 7 Canals for Group Meeting Survey

Fig. J. 6-2 Action Flow of PP for Group Meeting

(PP: Participatory Planning)

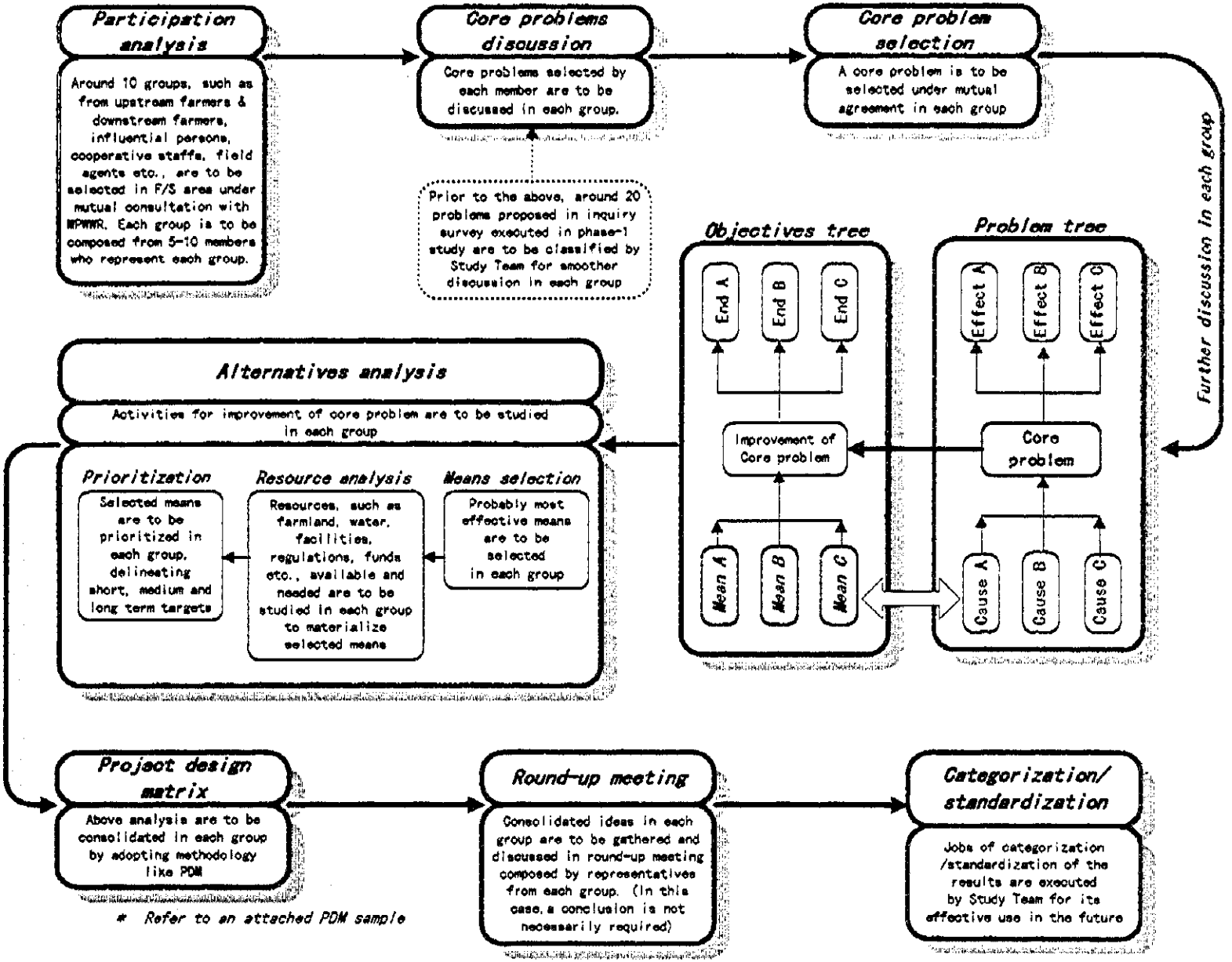


Fig. J. 6-3 A Sample of PDM

(PP: Participatory Planning)
(PDM: Project Design Matrix)

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal *Dissemination of new IIP to the whole Delta area*	*Productivity per unit land ($/ha), unit water ($/m3) and unit labor ($/hr)*	*・Sensus data ・Eva/Monitoring ・Compalison with other countries' job*	*Further expansion of Privatization policy*
Project Purpose *Improved irrigation efficiency in Project area*			*Enough budget for IIP including subsidies for farmers*
Outputs *Improved irrigation efficiency in pailot-demonstration farm*			*Inceased request for IIP based on demonstration effect*
Activities **Farmer-initiated organization of WUAs & Federation* **Improvement of branch/mesqa/marwa canals*	**Inputs** * Donor country ○○○ * Recipient country ○○○		*Positive participation of farmers* **Pre-conditions** *Enthusiastic request for IIP from farmers*

10~20 years later

5~10 years later

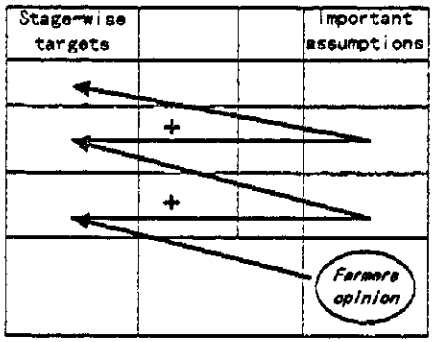
Pilot Project Period

J-63

Difference from customary methods

||

Participation & Consistency



* What should be final target (Overall goal)
* What should be direct target ? (Project purpose)
* How target can be achieved ? (Activities / Outputs)
* What are uncontrolable factors in the Projects ? (Important assumptions)
* What kind of inputs are needed ? (Inputs)
* How the Project results are observed ? (Verifiable indicators) (Means of verification)
* What are obstacles in realizing Project target ? (Killerassumption)

Table J.6-2 Results of Group Meetings

Items	Priority etc.	Name of Each Group in Branch Canal Basis							Name of Each Group in F/S Area Basis			Total	Remarks
		Foda	Ganabia 6R	Bahr El Nour	El Shorafa	Hazek	El Sharkie	Ganabia 7L	Gov't Staff	Influential Persons	Women		
		10 participants	10 participants	10 participants	12 participants	10 participants	10 participants	9 participants	10 participants	14 participants	23 participants	123 participants	Purpose: 1.To know the applicability of PP(Participatory Planning) methodology 2. To judge the most suitable canal in implementing future IIP in the F/S area Study period: 22/10/1998 - 31/10/1998 References: 1. Results of the group meeting for women show the overall judgement of the coordinators because in this category the meeting was held in each 4 sub-group thus summarization among participants was difficult 2.Overall judgement for IIP successfulness has been decided by two supervisors throughout their inspection for the study area as well as their supervision at each group meeting
Canal Dimensions	Command Area(F)	1,650	1,150	2,500	840	750	1,425	1,150	31,177 in Area total	same as the left	same as the left	same as the left	
	Canal Length(km)	3.9	3.7	7.4	4.8	2.8	7.1	3.3	129.1 in Area total	-do-	-do-	-do-	
	Number of Farmers	460	400	900	100	232				-do-	-do-	-do-	
	Number of Meaqa	10	5	21	6	2	4	5	136 in Area total	-do-	-do-	-do-	
	Fed Area by Meaqa(%)	86	74	96	55	17	40	59	30 in Area average	-do-	-do-	-do-	
Core Problems	1	Unstable water due to Rotation	Low crop price & high input cost	Unstable water due to Rotation	Low crop price & high input cost	Low crop price & high input cost	Unstable water due to Rotation	Unstable water due to Rotation	Unstable water due to Rotation	Unstable water due to Rotation	Low crop price & high input cost		
	2	Low crop price & high input cost	Inequity of water between head &	Low crop price & high input cost	Unstable water due to Rotation	Unstable water due to Rotation	Low crop price & high input cost	Low crop price & high input cost	Low crop price & high input cost	Low water level at Meaqa intake	Unstable water due to Rotation		
	3	Over-intervention by government	Poor irrigation /drainage facilities	Heavy burden etc. in IIP adoption	Poor irrigation /drainage facilities	High cost for pump irrigation	Inequity of water between head &	Low water level at Meaqa intake	Poor communication in Gov't & farmers	Illegal direct irrigation	Poor communication in Gov't & farmers		
Means to Improve	1	Continuous flow & unified pump	Subsidy for agricultural inputs	Continuous irrigation	Subsidy for agricultural inputs	Higher crop price & lower input cost	Continuous irrigation	Continuous irrigation	Continuous irrigation	Continuous irrg. & gate improvement	Subsidy for agricultural inputs		
	2	Revise Land-Renting Law	Free market for cotton etc.	Subsidy for agricultural inputs	New market	Continuous flow & unified pump	Subsidy for agricultural inputs	Improvement of marketing system	Revise Land-Renting Law	Lower intake	Continuous irrigation		
	3	Subsidy for agricultural inputs	Lower intake	New market	Continuous irrigation	Fixed date irrigation in each 4	Lower intake	Fixation of current land tax	Subsidy for agricultural inputs	Sewerage water & garbage treatment	Communication in Gov't & farmers		
	4	Free hand in crop selection	Delivery canal lining	Improvement of transportation	Gate improvement	Subsidy for pump fuel & spareparts	Stronger regulation for direct irrigation	Lower intake	Communication in Gov't & farmers	Stronger regulation for direct irrigation	Road, school, phone, medical unit etc.		
	5	New market	Subsidy for pump fuel & spareparts	More favorable adoption for IIP	More Gov't O/M for delivery canal				New market				
Necessary Resources	1	Increased water	Subsidy for agricultural inputs	Increased water	Subsidy for agricultural inputs	Regulation for crop price & input cost	Increased water	Increased water	Increased water	Increased water	Subsidy for agricultural inputs		
	2	Revise Land-Renting Law	New market	Subsidy for agricultural inputs	New market	Increased water	Subsidy for agricultural inputs	Improved market	Subsidy for agricultural inputs	Intake gate facility	Increased water		
	3	Subsidy for agricultural inputs	Intake gate facility	Fund for IIP	Increased water	Pump & gate equipment	Demery canal facilities	Intake gate facility	Staff for closer communication	Pipeline system including delivery	Staff for closer communication		
	4	Free hand in crop selection	Dredger etc. for canal maintenance		Facilities for intake & tailend	Pump fuel & spareparts etc.	Penalty regulation for direct irrigation		New market	Farmers organization	Road, school, phone, medical unit etc.		
	5	New market for cotton & new	Pump fuel & spareparts etc.		Dredger etc. for canal maintenance					Penalty regulation for direct irrigation			
Time Schedule	Short term	Continuous flow & unified pump	Subsidy for agricultural inputs	Continuous irrigation	Subsidy for agricultural inputs	Higher crop price & lower input cost	Continuous irrigation	Continuous irrigation	Continuous irrigation	Continuous irrg. & gate improvement	Subsidy for agricultural inputs		
		Revise Land-Renting Law	Free market for cotton etc.	Subsidy for agricultural inputs	New market	Continuous flow & unified pump	Subsidy for agricultural inputs	Improvement of marketing system	Revise Land-Renting Law	Lower intake	Continuous irrigation		
		Subsidy for agricultural inputs	Lower intake	New market	Continuous irrigation	Fixed date irrigation in each 4	Lower intake	Fixation of current land tax	Subsidy for agricultural inputs	Stronger regulation for direct irrigation	Communication in Gov't & farmers		
			Delivery canal lining	Improvement of transportation	Gate improvement	Subsidy for pump fuel & spareparts	Stronger regulation for direct irrigation	Lower intake			Road, school, phone, medical unit etc.		
			Subsidy for pump fuel & spareparts	More favorable adoption for IIP	More Gov't O/M for delivery canal								
	Medium term	Free hand in crop selection							Communication in Gov't & farmers	Sewerage water & garbage treatment			
		New market							New market				
	Long term												
Main Reason for IIP		Unstable water due to Rotation	Inequity of water between head & tail	Unstable water due to Rotation	Water shortage by individual pump	Inequity of water between head & tail	Inequity of water between head & tail	Unstable water due to Rotation	Unstable water due to Rotation	Unstable water due to Rotation	Poor water & rural infrastructures		
IIP Successfulness		High or Moderate	Moderate	High	High or Moderate	Moderate or Low	Moderate or Low	High				High or Moderate	

Table J.6-3 Overall Judgement for Probable Successfulness of IIP

Canal name	Dimensions	Overall judgement	Background and reasons of judgement	Remarks
Foda	A=1,650F	high to moderate	•Located in upper reach, thus saved water by IIP is to benefit to lower area, too	Each description and judgement mentioned left is based on the results of Group Meeting survey as well as on overall knowledge held by the Egyptian officers concerning to this study
	L=3.9km		•Water shortage is not so serious, but farmers' eagerness for IIP and modernized agriculture is quite high	
	M.F.A=86%		•Direct irrigation ratio is not so high that probable successfulness in organizing farmers is high	
Ganabia 6R	A=1,150F	moderate	•Water shortage is not serious	
	L=3.7km		•Structural problems are also not so serious	
	M.F.A=74%		•Due to above 2 reasons, farmers are likely not eager to any additional investment	
Bahr El Nour	A=4,000F	high	•IIP is well known and expected by farmers	
	L=7.4km		•Due to long length of canals, adjustment of water allocation is highly necessitated between upper and lower reaches	
	M.F.A=96%		•Direct irrigation ratio is so low that probable successfulness in organizing farmers is high	
El Shorafa	A=840F	high to moderate	•Structural improvement such as slope protection, especially at lower reach, is quite high	
	L=4.8km		•Due to collapsed canal slope, water distribution is highly problematic	
	M.F.A=55%		•Due to above 2 reasons, high cost for IIP is assumed	
Hazek	A=750F	moderate to low	•Individual pumps are broadly used and direct irrigation ratio is quite high	
	L=2.8km		•High cost for IIP is assumed in mitigating direct irrigation	
	M.F.A=17%		•Due to above 2 reasons, low eagerness among farmers for IIP is assumed	
El Sharkie	A=1,425F	moderate to low	•Thanks to no gate at canal head, farmers are taking water rather freely	
	L=7.1km		•Direct irrigation ratio is relatively high	
	M.F.A=40%		•Due to above 2 reasons, farmers' eagerness for IIP is low	
Ganabia 7L	A=1,150F	high	•Due to structural problems at lower reaches, water shortage is quite serious	
	L=3.3km		•Accordingly, farmers' eagerness for IIP is quite high	
	M.F.A=59%		•Location is suitable for the purpose of demonstration in Hamoul area	
Whole F/S area	A=51,177F	high to moderate	•Locating middle stream of Bahr Shebien canal, both magnitude of water shortage and expected effectiveness of IIP are assumed as moderate. By contrast, this locational background means advantageous for the purpose of demonstration for the whole M/P study area	
	L=129.1km			
	M.F.A=30%			

Note: M.F.A means irrigated ratio fed by meska canals

J.6 Summary Paper of Round-up Meeting

Name of Coordinator : Mohamed Ahmed Saad ElFetiany.

Target Area of Group : Round Up Meeting.

Date : 27th Oct. 1998 Time : From AM10:30 to PM 2:45

Venue of Group Meeting : Biala District Office

1. Round Up Meeting Agenda

Opening & Thanking by Mr./ Iida	(Team Leader)	(5minutes)
Speech of Eng.¥ Doma	(IIP Sector)	(5minutes)
Explaining the purpose of meeting By Eng.¥ Fetiany		(1 hour)
Explaining Each Group Meeting Result By Eng.¥ Fetiany		(1 hour)
Break		(20minutes)
Explaining Each Group Meeting Result by Representative		(1 hour)
Free Discussion among Farmers by Eng. Fetiany		(45 minutes)

2. The speech of Engineer Doma

Dear Farmers, It's great pleasure for us all to meet you in this stage of the group meetings after ten different meetings and you are the representatives of all the farmers which means that you are the most knowledgeable people about the farmers problems and you are the best persons to transfer these information to each other.

3. Explaining for each group meeting problems by Coordinator (Eng. Fetyani) and comment from farmers

You know that we already held many group meetings on each canal of yours and in each

group meeting the participants selected one representative to represent them in the final round up meeting for the purpose of transferring the data among all the farmers in all selected canals through you. Now I will start by explaining each group meeting problems .

Foda Canal

1)Rotational Irrigation: It means that the rotational irrigation is causing much damages to farmers in two different ways ,one, by making the farmers in the tail of meska and delivery canals suffer from water shortage because the allocated time of the rotation is not enough to make the water reaching to the tails, two, by making the farmers in the head of the canals and meska irrigate their land more than necessary (i.e. over irrigation) in order to guarantee the amount of water for the no water period of the rotation.

2)Low prices of crops and high prices of inputs: Because of importing new crops from the outside due to the new policy.

3)Governmental interfering. By preventing farmers from cultivating specified crops (such as rice) to achieve the country policy.

Ganabia number 6 right

1) Low prices for crops & high cost for inputs.

2) Inequity of water allocation

3) High cost for pump irrigation

Bahr El Nour

1) Rotational Irrigation.

2) Low prices for crops & high costs for inputs.

3) Heavy burden and too short period in repayment for IIP cost: It should be improved by giving longer period for repayment after the implementation.

In addition to the above 1)-3), other serious problem is seen in illegal use of the canal sides

by farmers such as illegal irrigation and/or cultivation. Also the canal bank must be lined using masonry bricks or any other way to protect it.(Comment from Gov't staff) The government must interfere to guarantee good quality of seeds in increasing crop yield.(Comment from Gov't staff)

Hazek Canal.

1)Low prices for crops and high cost for inputs.

2)Rotational irrigation.

3)High cost for pump irrigation: because at this canal each farmer has to use more than one pump to irrigate his land especially at the tail-end.

El Shorafa Canal:

1)Rotational irrigation

2)Low prices for crops and high cost for inputs.

3)Poor maintenance for delivery and drainage canals: because of the maintenance using short-armed excavators which are not capable in dredging and cleaning the whole canal.

Meanwhile, the problems of absence of supervisors when necessary and attendant mishandling committed by farmers would be much improved if farmers could contact with the supervisor regardless whether he is the district engineer or any other official.

Also, the bridges often cause water shortage for the lower part of the canal because they were designed to meet the old levels, and it is very difficult to clean and dredge the canal under such bridges which make semi-dams preventing water flow. If farmers are entrusted in supervising the maintenance and cleaning of even main canal, this problem might be much improved, and by this, farmers can help the district engineer and the gate keepers(Comment from Gov't staff)

The levels in the feeding canals (delivery canals) must be higher because of the high levels

of meska intakes caused by the old design.(Comment from Gov't staff)

The soil at El Shorafa Canal especially at the tail is organic ,so the masonry bricks fall and make dams disturbing the smooth water flow. Also the very high levels for the banks at the tail of this canal causes many collapse along the canal, thus water shortage for the downstream area.

It is suggested to establish a committee for each canal consisting of three members to represent the farmers on this canal especially at the tail-end , and to transfer their problems to the government side. Also it is requested to construct a small pump station at the end of El Shorafa Canal to reuse the water from drain no. 4 and feed the canal at the pick time.

ElKafr ElSharky Canal:

1) Unstable water supply: which means no fixed dates for the rotations which cause much damage for the crops because the rotated water always comes late and it is not guaranteed for the complete period

2)Low prices for crops and high cost for inputs.

3)Inequity of water allocation: This causes many conflictive problems among farmers between the head and tail-end which could be prevented by continuos flow because it makes water available at the whole canal at the same time. Illegal direct irrigation is also causing many problems among farmers accompanying with rather difficult situation to prevent it and due to not enough penalty.

Ganabia Number 7 Left :

1)Rotational Irrigation.

2)Low Prices for crops and high cost for inputs.

3)Low water levels and high levels for the intakes.

Governmental Persons:

1)Rotational Irrigation.

2)Low prices for crops and high cost for inputs.

3)Poor communication between farmers and the government: There must be some organization which acts as go-betweener between farmers and government and makes periodical meetings with farmers to recognize their problems and transfer it to the responsible authority.

Influential Persons :

1) Rotational Irrigation

2)Low water level at meska and canal intakes.

3)Illegal direct irrigation

Other than the above 1)-3), there is a very serious problem derived from the parts of canals which pass the living space, thus are easily polluted by garbage and/or residua thrown from the surrounded area. In such case, those parts should be covered to avoid no more environmental deterioration and to convey cleaner water to the downstream area.

Women

1) Low prices for crops and high cost for inputs

2) Unstable water supply.

3) Poor communication between Gov't and farmers

In addition to the above 1)-3), women in El Shorafa canal strongly requested to be provided more schools, medical units, phone lines and better road condition.

4. Records of Free Discussion

1- A problem regarding rather high level of canal bed under bridges: because of difficult dredging and cleaning by equipment used currently, especially in Bahr Biala and its branches.

2- At the tail of El Shorafa Canal, many cases of bank collapse are commonly occurred due to high level of canal side(about 3 meters), in spite of common canal maintenance, so that this level should be modified in accordance with the technically optimum conditions.

3- A problem regarding dredging main and delivery canals: which is now dredged from the sides only excluding center part of the canals because of the low capability of the equipment currently used, and left parts acts as a dam in the canal bed. As means and ways to improve this situation, farmers themselves may offer useful information to the district engineer about any shortcomings which were checked by their own eyes.

4-Farmers strongly requested the establishment of a Joint Committee between Gov't and farmers, which is to be responsible in understanding farmers' opinoins and in transferring them to the responsible people.

5- The canal part of transformer from Bahr Tera to Bahr Biala should be cleaned and dredged by the Gov't.

6- There are many hazardous trees at the length of 1 Km of El Shorafa canal near the graves which prevent equipment from effective dredging and cleaning of this part and it is considered as like a dam preventing smooth water flow.

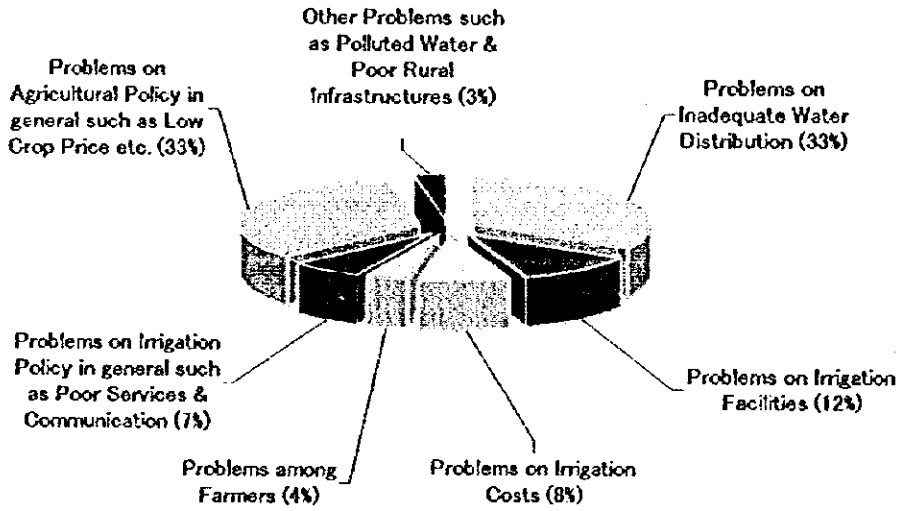
7- For the parts of Foda and Ganabia Number 7 Canals, it's required to cover the parts crossing the living space.

8- There is an animal called "Estacosa" which eats crops and makes much damage for the farmers.

9- At the Ganabia No. 7 Left Canal, renewing the bridge after about 600 meters point from the intake or making a bypass canal at the downstream of the bridge are requested because the bridge is closing the canal and preventing smoother water flow .

Fig. J.7-1 Core Problems Selected by Individual Participants of Group Meetings

(in %)



Note: Categorized from 340 answers selecetd by individual participants in group meetings

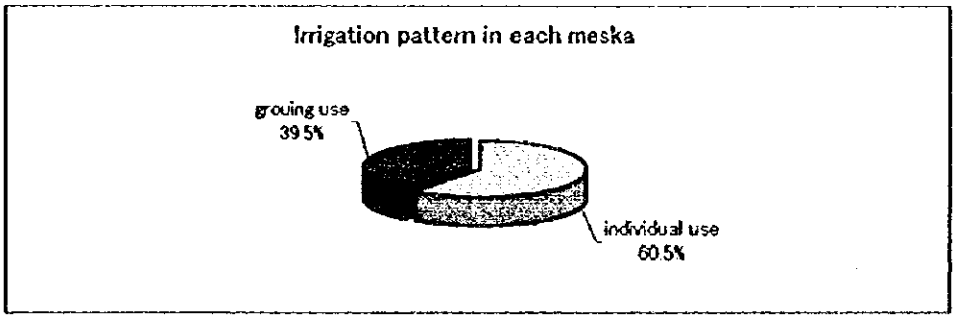
Fig. J.7-2 Results of Questionnaire Survey in Phase II Study

Out of the Farm Economy Survey for 130 farmers, inquiries involved from chapter 11 to 15 are for the purpose of deepening understanding as per the relationship among rural society, farmers' willingness/incentives and IIP cum IAS. Some focal points obtained from this survey are briefly shown below.

1) Number of farn allotments held by each farmer:<1.7alllotment/farmer>

2) Number of meska canal each farmer uses:<1.1canals/farmer>

3) Irrigation pattern in each meska

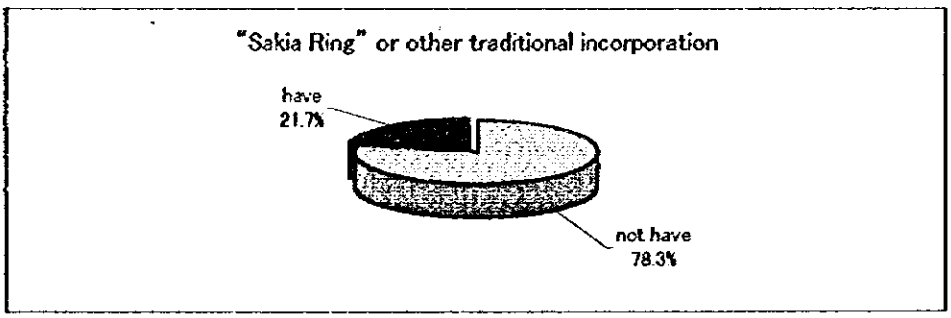


4) Avarage number of farmers in each meska:<49.7meska>

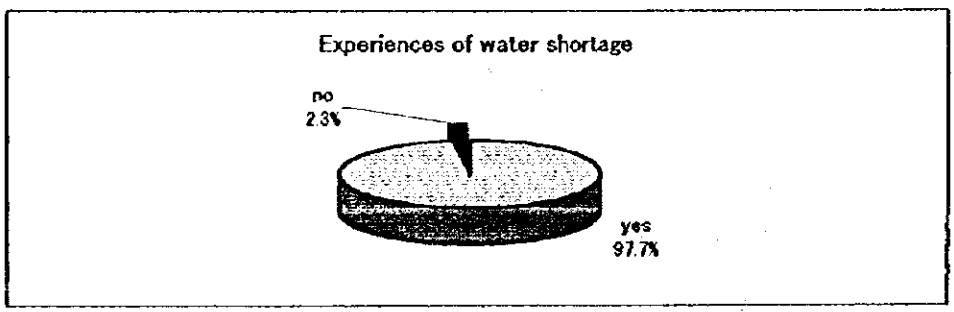
5) Each meska has around:<13.5marwas>

6) Accordingly<3.7marwa intakes per meska>

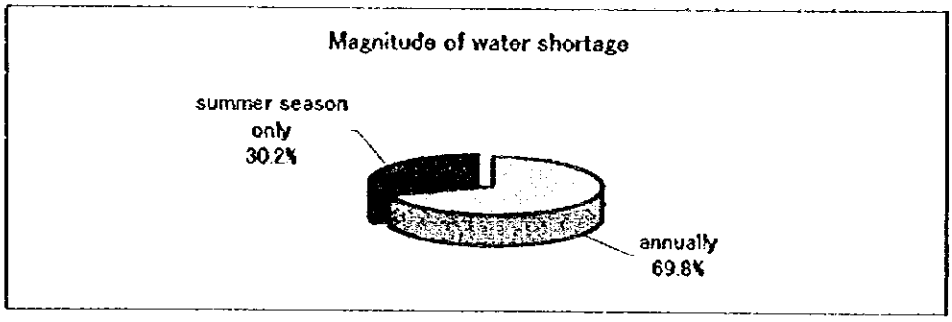
7) "Sakia Ring"or other traditional incorporation



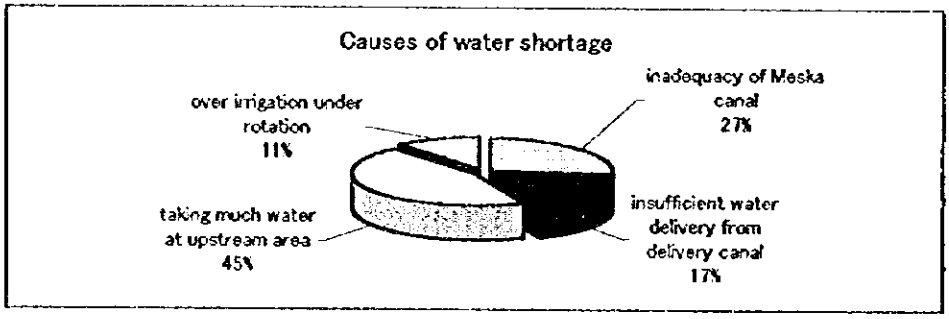
8) Experiences of water shortage



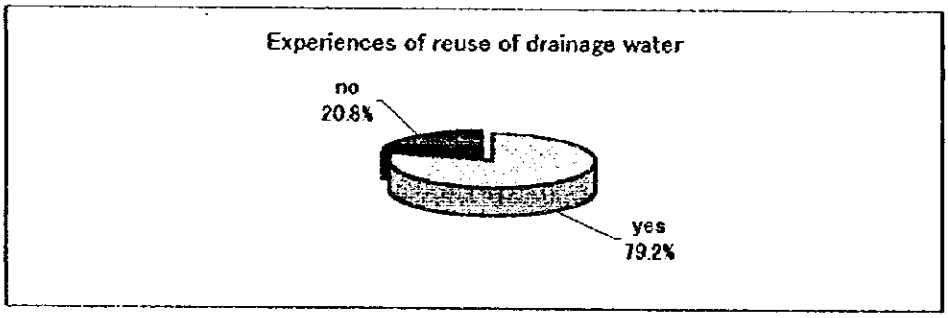
9) Magnitude of water shortage



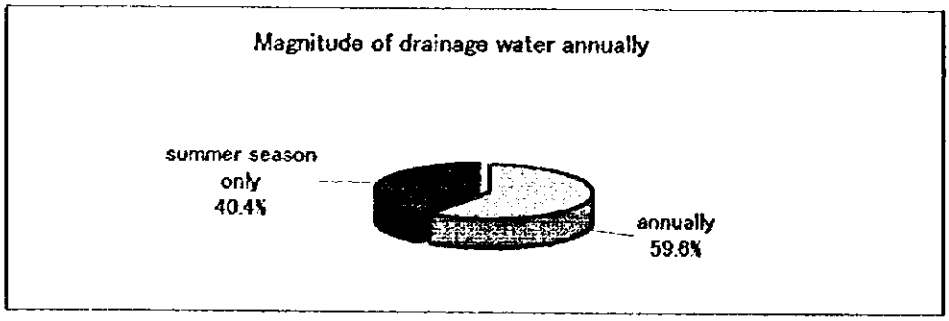
10) Causes of water shortage



11) Experiences of reuse of drainage water



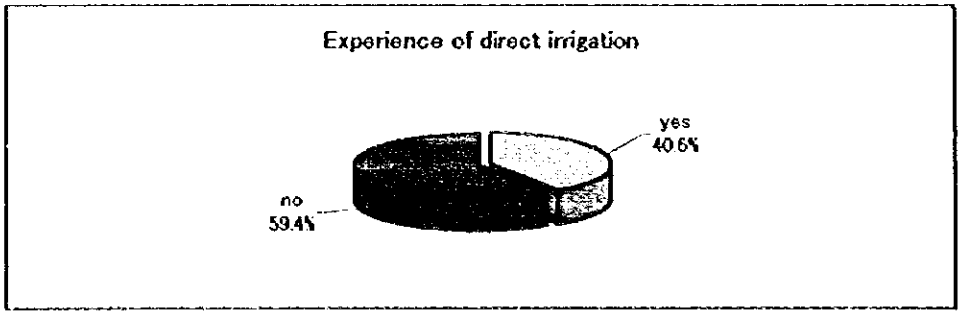
12) Magnitude of drainage water reuse



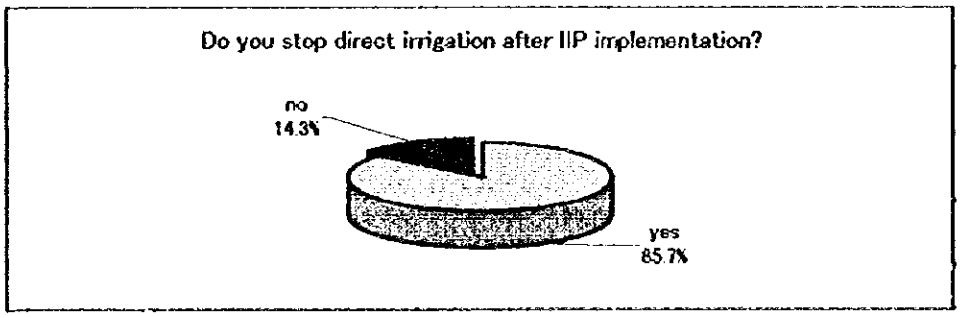
13) Own pumps by each farmer:horse power〈7.7HP〉

14) Cost of the above mentioned pumps:〈1,465LE〉

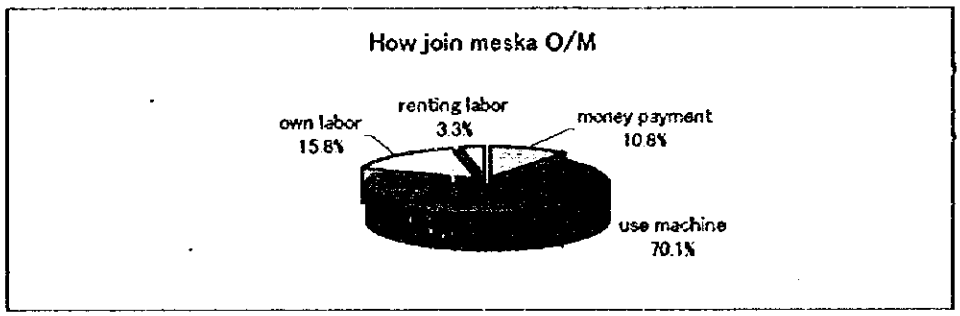
15) Experience of direct irrigation



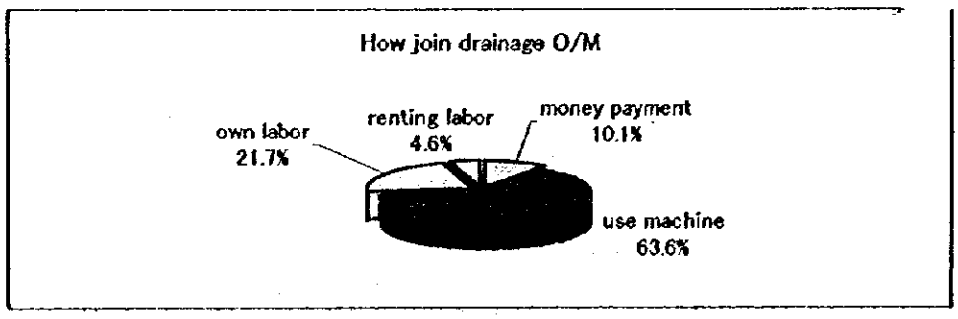
16) Do you stop direct irrigation after IIP implementation?



17) How join meska O/M



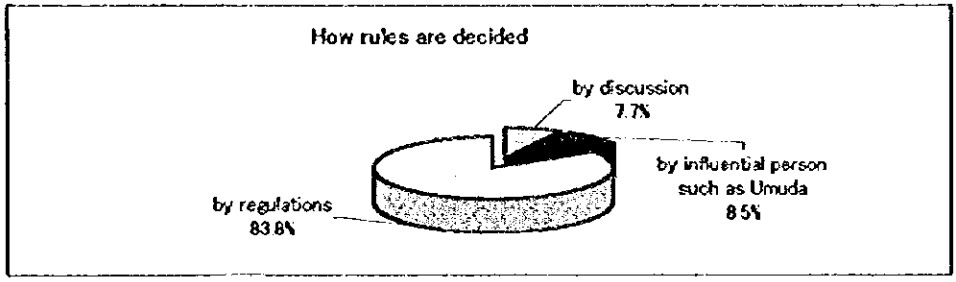
18) How join drainage O/M



19) Monetary burdens for drainage O/M: around <25.31E per year>

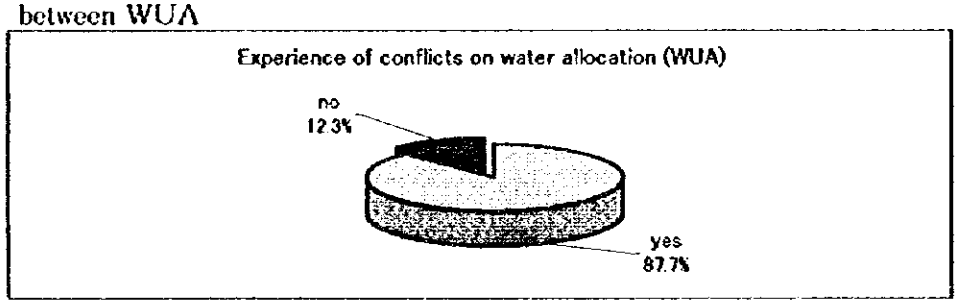
20) Monetary burdens for meska O/M: around <25.9LE per year>

21) How rules are decided

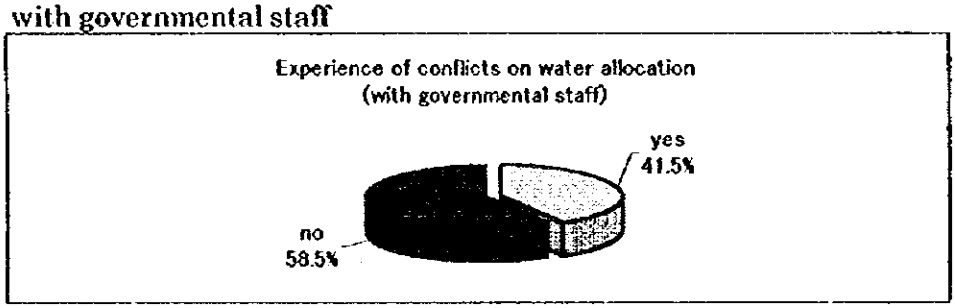


22) -1 Experience of conflicts on water alocation

*1 between WUA

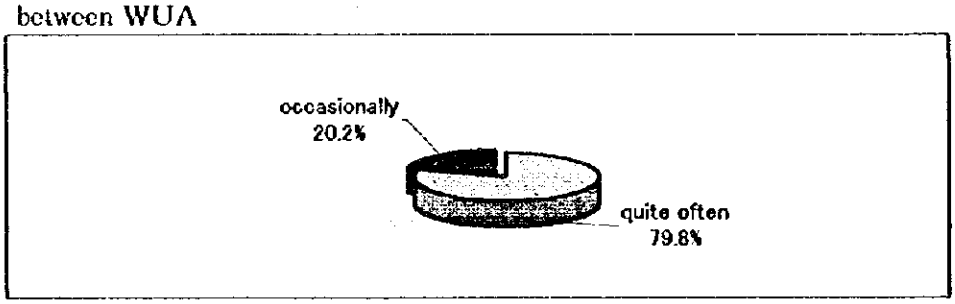


*2 with governmental staff

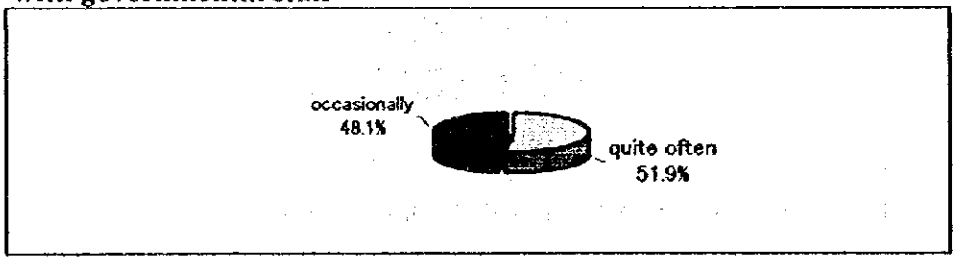


22) -2 Frequency of water conflicts

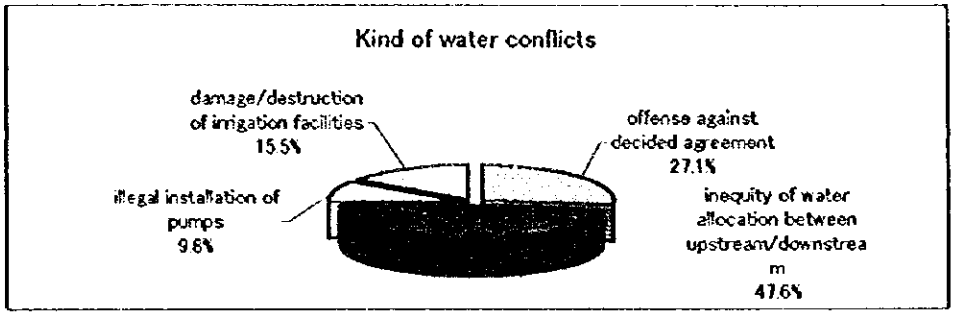
*1 between WUA



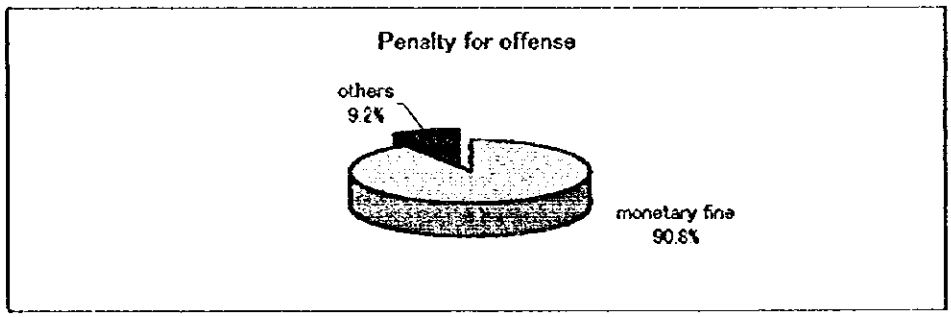
*2 with governmental staff



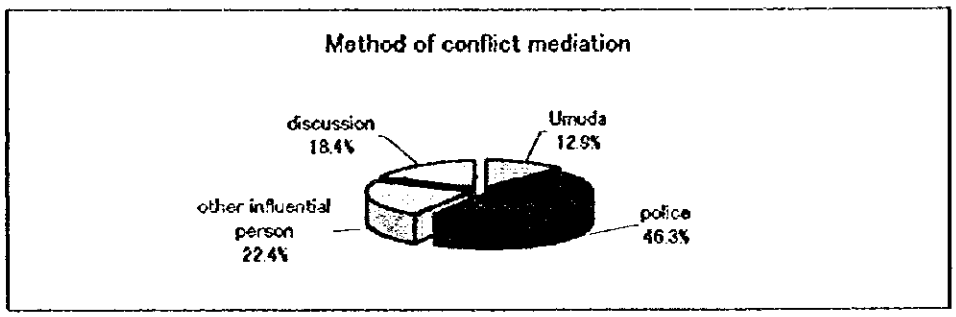
23) Kind of water conflicts



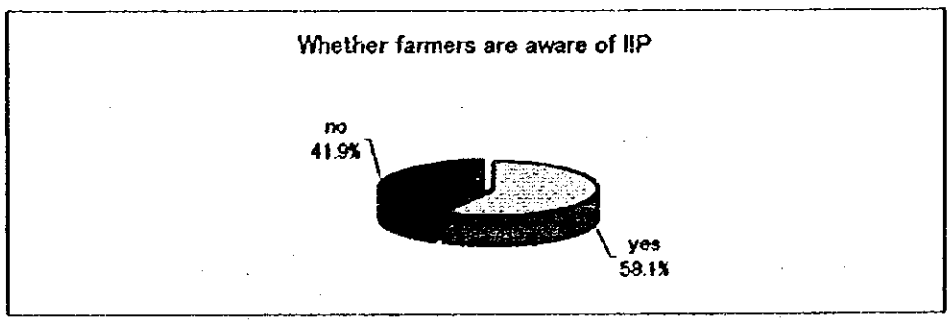
24) Penalty for offense



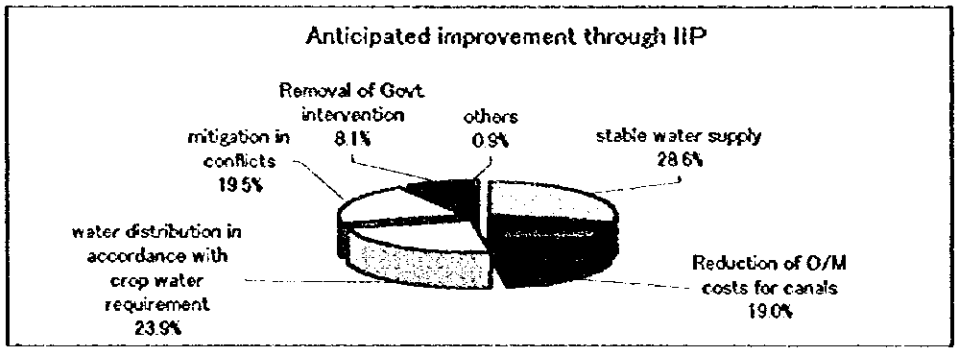
25) Method of conflict mediation



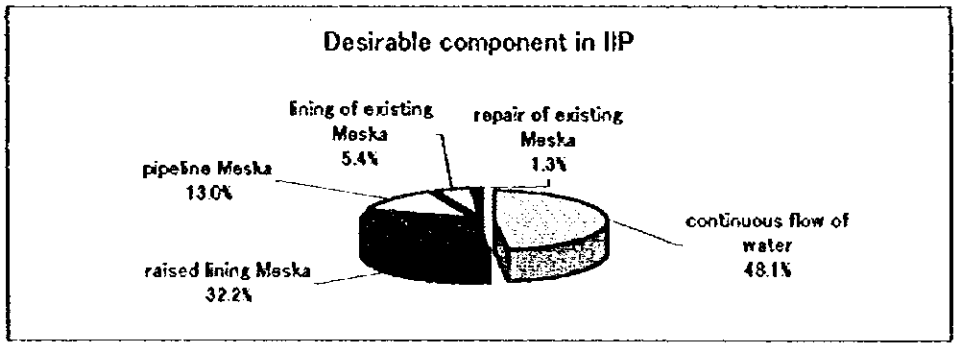
26) Whether farmers are aware of IIP



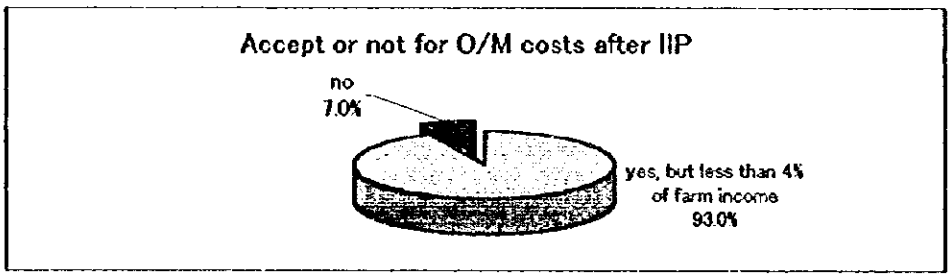
27) Anticipated improvement through IIP



28) Desirable component in IIP



29) Accept or not for O/M costs after IIP?



30) Core Problems hampering effective agriculture

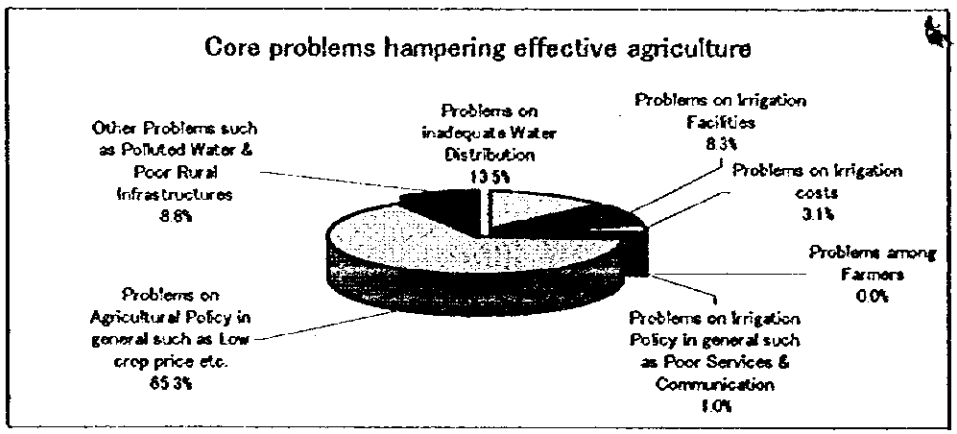


Table J.8-1 Proposals for Farmer-Initiated IIP