



PARTICIPATORY IRRIGATION NETWORK MANAGEMENT A CASE STUDY IN QAZVIN

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ABSTRACT

Iran, with 1,648,195 square kilometer area is placed in a dry zone of the world. Average annual precipitation of Iran is equal to 250mm. It is predicted that, in 1400 (2021) the volume of water per capita per year will be about 1300 m³. Qazvin plain irrigation network is placed in 150 Km west of Tehran. Totally 278 MCM volume of water is conveyed by 9 Km tunnel from Taleghan storage dam into Ziaran diversion dam and then convey to Qazvin irrigation network. Main canal and laterals have concrete lining and have cumulatively 1100 Km length. Capacity of main canal varies from 30 to 3 m³/sec. Total irrigated area by this network is equal to 80,000 ha. Currently, "Utilization & Maintenance of Qazvin Irrigation Networks Company" under surveillance of "Ministry of Power" manages the distribution network. Governmental system is unable to manage network utilization correctly; furthermore, farmers don't have sense of ownership about the network and their related structures. Farmers don't play effective role on water distribution affairs. Thus, network dose not have appropriate function. This paper suggests applicable techniques upon rural cultures, customs and manners. For participate "Water User Associations (WUA)" on irrigation management. In this way, legal impediments and lack of laws are considered. Participate WUA's on Qazvin irrigation management must be a gradual process and done during 5 years. For the first & second years, while participate legal representatives on utilization & maintenance of irrigation networks, 51% stocks of present company will be transfer them. In third & forth years, laws must be modified and legal impediments remedy. Farmers need to learn skills and educate about network utilization. This stage contains these required educations. Final goal will be accepted after fifth year and all affairs on irrigation management will be transferred for WUA's.

PREFACE:

Iran with 1648195 sq km area is pleased in dry zone of world. Total area of agricultural lands is about 17.7 million hectares, that about 7.2 million hectares of these lands irrigate about 1.3 million hectares of them have irrigation network. Total volume of water per capita in 1375(1996) was about 2160 m³ and it is predicted that in 1400(2019) this amount will be just 1300 m³. however, all main & sub main canals have concrete lining but researches shows that distribution and conveyance efficiency of water in this network is about 50% that equal to earth canals. In point of view experts, main reason of

this problem is refer to lake of participation farmers in schedule, utilization & maintenance of irrigation networks affairs. Participation of farmers in utilization & maintenance management is scope of this research. The Qazvin irrigation network has selected pilot in first stage.

This paper suggests applicable techniques upon rural cultures, custom manners and financial considerations. In other hand, costs of utilization & maintenance, transfer management of network and supervision of WUA's (Water User Associations) has considered.

DONE RESEARCHES

Several researches done on participatory irrigation network management in Iran & other countries of world. Some of most important are:

- 1- Utilization system of agriculture water (Jamab consulting engineers, 1375(1996))
- 2- Utilization system and participatory of peoples on L2 canal of Qazvin irrigation network (Ab Tose Paydar consulting engineers, 1379(1998))
- 3- Workable techniques on creation WUA's on irrigation network (A.Poorzand, 1383(2002))
- 4- Review of Qazvin plain irrigation network studies (Pandam consulting engineers, 1384(2004))

Also there is many experiences on utilization & maintenance irrigation networks to farmers in other countries from 3 continent (Asia, America and Africa)

MAJOR INFORMATION ABOUT QAZVIN PLAIN:

Region that studied is placed on reach Qazvin plain that is located in Qazvin province in 150 km distance from west of Tehran. Upon statistics of Qazvin synoptic station, average of annual temperature is 13.9 °C, average of annual precipitation is 324.8 mm and average of rational humidity is 51.5%.

Amount of evaporation from class a pan estimated 1669 mm per year.

Net area of Qazvin irrigation network is equal 58000 ha that about 72% of it consists of class A & B lands. This network begin from Ziaran river in east of Qazvin plain & was extended to Takestan city with 92 km length & 8.7 km average width.

SOCIAL & ECONOMIC PROJECT STUDIES:

Social & economic studies have important role for suggest workable plan on irrigation network management transfer to farmers. Summary of this studies are:

POPULATION & POWER MAN INDEXES:

According 1384 statistics, population of 77 villages in Qazvin plain was 145295 persons in 31560 families. This amount in 1375 was 111372 persons in 21900 families. Then increase rate population between 1375 and 1384 was estimated about 3 percent.

STUDY & LITERARY:

Done researched shown that, from 6 years and older persons who lives in Qazvin plain 79.7 percent have literacy. This ratio for men is 85.5% and 72% women.

SHARE CROP METHODS:

Share crop method in this region are in below forms:

- 1- Farmers who they have land and work on land.
- 2- Share croppers who they don't have land but work on others farmers land and get some part of production.
- 3- Common in some region, common of people have stock from one land. They work on land and share profile of production upon their stock.

QAZVIN IRRIGATION NETWORK CHARACTERISTICS

This network has impure 80000 ha area. it begin from Ziaran and ended to kahak in Takestan. This network cover Qazvin, Abyek, Takestan and Boeinzahra agricultural lands. Upon hydrologic divide, this region belong "shoor" basin. This network don't have drainage system and infiltrated irrigation water in form of ground water convey to Qazvin slough. Finally net area of lands that irrigated by this network is approximately 58000 ha. But in initial plan this amount had predicted about 52000 ha. It means in 6000 ha exceed area irrigated now. Annual water requirement of these lands has been calculated according initial program about 366 MCM. Cropping pattern consist of 50% autumn planting include wheat and barely. 15 to 25% of lands have been allocated to spring planting and 25 to 35% in fallow. 99 MCM volume of needed water provide from well and 184 MCM from "Taleghan" river. By construction of Taleghan storage dam, total volume of allocated water for Qazvin plain will be increase to 278 MCM. Presently, "Sangban" division dam, Taleghan convey tunnel, main & sub main canals with 94 & 220 km length & 3 to 30 M³ capacity, lateral and farm canals with 880 km length have been constructed and utilize now. From 78 dug wells, 63 wells belong to utilization & maintenance of Qazvin irrigation network company ("UMQINC") and 53 wells utilized now. 40 wells are under construction. 9 wells don't have any discharge and remain wells will be complete & outfit in early future.

QAZVIN IRRIGATION NETWORK MANAGEMENT

After implementation of "Land reform law" in 1341(1962), "Qazvin plain irrigation company" established for provide drink & agriculture water by water & electricity ministry. After Islamic revolution in 1357(1979), agriculture ministry created

agriculture service centers for organize farmers in associations that named agriculture councils. These councils were taking cropping pattern, seed and fertilizer from agriculture service centers and distribute between farmers. Most activities of “Qazvin plain irrigation company” was consist of:

- 1- Complete Qazvin irrigation network and resumption dig of deep wells
- 2- Provide drink water for about 150 village of Qazvin plain
- 3- Utilization from agriculture deep wells placed in plain
- 4- Utilization from Qazvin irrigation network
- 5- Survey, conservation and management of water resources.

In 1370(1991) “Qazvin plain irrigation company” renamed to “Qazvin regional water affairs administration”. “Utilization & maintenance of Qazvin irrigation network company (UMQINC)” established in form of “join stocks” also in 1372(1993). This company has been working subject water affairs administration but was independent. Governmental systems are unsuccessful frequently and had been predicted that at least 51% stocks of this company assign to farmers. Gradually, it got private form but state operation. “UMQINC” stocks also, deposited to power ministry subject companies (49% to Tehran regional water company and 51% to “Lar” & “Reyab” consulting engineers) instead farmers. Different parts of company, have been working under 3 below manager:

- 1- water distribution management
- 2- repair & maintenance management
- 3- finance & office management

Mention managers also subject to general director. Water distribution manager in addition supervise east & west parts of main canal operator and head of water distribution office. Sub main canals operators, were working subject head of water distribution office. Sub main canals operators were delivering water to agriculture councils in lateral turnouts. Repair & maintenance affairs has related to maintenance manager. In 1384(2005), water distribution management transferred to WUA’s and “UMQINC” work by 18 organization posts that was not enactment yet. This posts are include coordination & utilization affairs, executive & technical affairs and finance & office affairs.

FORMATION PROCESS, EXISTENT STATUS AND ROLL OF WUA’S ON QAZVIN IRRIGATION CONDUCT

New triennium plan of Qazvin irrigation network utilization system, designed by “UMQINC” & executed since 1381(2002). This plan consist of 3 below stages;

- 1- first stage one years lasts include, system design, planning, basic information collection about lands, owners, water requirement and cropping pattern planning, well’s hydrometry and provide water supply & utilization contract minute upon 158 lateral’s turnouts.

- 2- Second stage one year's lasts include, registration of 30000 farmer under 88 association, appointment of farmer's representatives, ratification of water supply & utilization contracts and registration & start working of WUA's.
- 3- Third stage one year's lasts include, deliver canals, establish "cooperatives" on sub main canals, "UMQINC" stocks transfer, provide cadastre maps and real participation of WUA's on utilization & maintenance of irrigation network.

REALIZATION SCOPE OF PLANE REVIEW

- 1- 158 WUA's were established and registered. Association's Head, secretary and clerks were defined by farmers in election
- 2- 8 cooperatives were established, but didn't registered yet
- 3- "association's club" was established and seated in "UMQINC"
- 4- Registration of these associations in form of join stocks or cooperative companies were did not yet. This object were devolved to "association club". Stipend of club's, cooperation's and association's personnel pay from 7% water charge that receive from farmers
- 5- Cadastre maps was not provided yet
- 6- "UMQINC" stock was not transferred to farmers and cooperatives up to now
- 7- According realization of plan scope, the "WUA's engineering & support services company" was not established
- 8- And finally, management of irrigation services that had been most important goal of plan was not transferred to farmers.

EXISTENCE STATUS FUNCTION ANALYSIS

ANALYSIS OF FACTORS AND CONDITIONS THAT AFFECTED ON FORMING WUA'S

Most effective factors that help to forming WUA's in Qazvin irrigation network are:

- 1- good function and solidarity between agriculture organization & Qazvin plain irrigation company records
- 2- existence of agriculture councils
- 3- lack of water right before construction of irrigation network
- 4- modern irrigation network
- 5- existence of studied records and general director's effective role
- 6- management & financial independence
- 7- water charge reception and regular volumetric water distribution
- 8- good financial status of "UMQINC"
- 9- successful world experiences

- 10- compatible government opinion
- 11- regulated water
- 12- sustain financial stamina of WUA's

REVIEW AND ANALYSIS OF STRUCTURE, WORK ROUTINE, AND FINANCE MANAGEMENT OF EXIST WUA'S AND FUNCTION OF "UMQINC" AT PRESENT

As pre nominated "UMQINC" fall to constitution of 158 trade WUA's association, 8 cooperative and one "association's club" in 1384(2005). Board of directors of this club, were elected by association members and club work under supervision of "UMQINC" via annual ratification contract with this company. We will be describe each element of organization.

1- agriculture councils:

These councils are subset of WUA's. for many years, utilization & maintenance of lateral and farm canals, was under taken of agriculture councils and "UMQINC" had no role on this matter

2- trade WUA's:

Each association has sponsorship of some agriculture councils that their farm lands were placed downstream of a lateral turnout. Take water requests from agriculture councils and forward to respective cooperative and distribution of water between farmers in lateral & farm canals are most tasks of associations

3- cooperative:

most task of these companies include, take water requests from sponsorship associations and forward it to "club", receipt volumetric water from "club" (in main & sub main canal's turnouts and deliver to associations. Utilization & maintenance of sub main canals perform by cooperatives

4- trade WUA's club:

this club established, registered and board of directors election was setup in 1383(2004).main task of this club is, take water requests from representatives of cooperatives, coordinate this queries with "UMQINC" and deliver water to cooperatives in main & sub main canal's turnouts.

MOST TASKS & OPTIONS OF "UMQINC" AND COOPERATIVES:

1- COOPERATIVE TASKS:

- Buy & distribution of allocated water to WUA's
- Protection and systematic maintenance of installations and structures of wells
- Protection and systematic maintenance of structures and hydromechanical conveyance and distribution canals

- Dredge, repair and maintenance of sub main, lateral and farm canals installations and structures in their operation
- report faults, failures and erosion of network and violations of water users to water distribution office and represent offenders to court

2- “UMQINC” TASKS

- Provide & deliver required water from surface & subsurface resource during year and take water charge according water distribution schedule.
- Supervision allocation, distribution and volumetric delivery of purchased water by cooperatives.
- Implementation main repair of conveyance & distribution canals installations and wells on time
- Continually services on legal support and plead in court and prosecute offenders

EVALUATION OF “IRRIGATION SERVICES MANAGEMENT TRANSFER” PLAN FROM FARMER'S POINT OF VIEW

For evaluation of this plan and get farmer's view points, convoke farmers and constitute many sessions. Some of questions asked in form of questionnaire from farmers. After take questionnaire and analysis answers, these results obtained:

- 75% of farmers believed that after establishment of associations, cooperatives and club, illegal water use, canal lining destruction and turn outs manipulations was reduced
- 75% of farmers repined from canals and wells repair, and declared big difference wasn't occurred.
- 25% declared, their productions was increased by square water distribution
- 58% declared, after WUA's establishment, most farmers complains resolve at their office & recourses to “UMQINC” was reduced
- 91.7% of farmers were evaluated function of “UMQINC” bad or not good not bad

SOLUTIONS & SUGGESTIONS

IMPLEMENTATION & DIFFICULTIES ON WUA'S STABILITY ANALYSIS

Up to now, participatory irrigation management, was not legalized and farmers expect in ratio of their share, participate on decide and irrigation network management. Then transfer “UMQINC” stocks to beneficiary farmers, predispose to legalize participation of farmers on irrigation networks management. In addition, governmental companies interposition will become at least. According clause 22 and 51 “square water distribution” law, power & jahad-keshavarzi ministries should supervise on execution of “optimize usage of water bylaw”. According clause 29 footnote, lateral & farm canals

construction and distribution of water, was devolved to agriculture ministry. So it shows that all activities of water industry from provide to distribution of water was devolved to government and WUA's have no any effective role on this affairs.

One of the most important worries of farmers is water charge payment. This subject, unfortunately have negative effect on formation process of WUA's, because most farmers was not justified about water abonne.

FINANCE STATUS OF "UMQINC"

As a rule, in companies that their B/C (benefits per costs) ratio is greater, they have more chance and better favorable conditions for participate WUA's on utilization & maintenance of modern irrigation networks affairs. Financial information of "UMQINC" was taken between 1379(2000) - 1384(2005) years and these results were derived from table 1:

YEAR

Table 1: Incomes and costs of "UMQINC" (million rial)

B or C	1379	1380	1381	1382	1383	1384	1385*
income (contract)	2,400	3,300	3,352	3,900	4,900	5,510	6,612
Real income	2,601	2,661	3,865	5,100	5,891	7,997	10,816
Costs	2,419	2,245	4,017	4,782	5,306	5,320	6,384
Net B or C (tax subtract)	179	416	-152	300	438	-	-

* predicted

- "UMQINC" was frequently profitable
- Real income of "UMQINC" during 1383(2004)-1384(2005) was been equal to 5890 and 7997 million rials corresponding and it is predicted that this amount reach to 10816 million rials. This income can be use for maintenance and repair of network and compensate costs of network management.

APPROPRIATE PLAN FOR FORMATION AND PERMANENCY OF WUA'S ON QAZVIN PLAIN

Farmers reject quick transfer irrigation network management. Most worries are including:

- Afraid about responsibility of reconstruction costs of network and tax
- Lack of enough experiences with management, techniques, utilization & maintenance of network affairs
- Wear off canals lining and necessary to recondition
- This transfer must be in gradual process and at least 5 years need for solidification.

IMPLEMENTATION SIMPLE STRUCTURE THAT HARMONIZE WITH TRADITIONS

One of the most important factors on formation & stability of WUA's having harmony with people's culture & traditions

PREVENTING ABOUT MAIN & SUDDENLY REFORMS

Notwithstanding, disadvantages and objections, relevant associations a good plan should consider 18 month effort on formation of this associations and try to complete and remove deficiencies according scheduled program.

SOCIAL JUSTICE

Its necessary an appropriate plan, privilege WUA's same as government companies during management transfer progress.

FINANCIAL MOTIVES

Positive balance sheet, create motives for farmers participatory.

FINANCE CERTIFICATION

Annual costs accounting and continually audits of WUA's finance function during management transfer in plan is necessary.

DECENTRALIZATION

Power ministry, must privilege enough options to estates water affairs companies, for irrigation management transfer to WUA's.

PROVIDE REGULATED WATER

Existing regulated water play important role on stability of WUA's. construction of Taleghan reservoir dam, was realized this factor.

SOCIAL AND LEGAL POSITION OF WUA'S

Identification and support WUA's as legal representatives of farmers had positive feedback within rural societies.

PLAN ADMINISTRATOR

In successful plan, plan administrator play important role in management transfer in most countries that have successful experiences on "PIM". Administrator (consultant + navigator) have vital role.

IMPROVEMENT & RECONSTRUCTION

During management transfer, improvement of network can create motive to accept responsibilities by farmers.

COMPATIBLE WITH CURRENT LAW

Change of current laws is necessary but it is time consume process. Then a good plan must be a compatible with current laws.

PARTICIPATE AND TRANSFER QAZVIN IRRIGATION NETWORK MANAGEMENT TO WUA'S

A 5 years length period was considered for complete plan. During this period structural, managerial, financial and legal corrections must be implementing as plan is in progress. In this plan important topics are:

FIRST YEAR: ADVISEMENT YEAR

In first year, preparation of legal bed and preparatory actions will perform for transfer 51% stocks of "UMQINC" to WUA's. In addition, some reformations need as below:

- 1- Trade water user association's reinforcement.
- 2- Reformations in cooperatives.
- 3- Reformation in utilization and Maintenance Company.

SECOND YEAR:

In second year, according reformations in first year and consideration "clause 5" of power & agriculture ministers agreement, 51 percent stock of "UMQINC" will be transfer to WUA's (as legal farmers representatives). According trade law, farmers via their representatives, have restrict participation in irrigation network management.

THIRD YEAR

In third year, 41% leaving stocks of “UMQINC” that belong to governmental companies, will be transferred to WUA’s. Therewith, all stocks of “UMQINC” will appertain to WUA’s and governmental sector transfer all management affairs to WUA’s

FORTH YEAR

In forth year, these items predict to be performed:

- 1- Assignment all governmental tracks & machines, to “UMQINC”.
- 2- Increase company investment from 100 stocks 20000 rials to 80000 registered stocks 50000 rials. For each hectare of lands (80000 ha) one stock was considered.
- 3- Emission licenses of water utilization for lands area that belong to each association.
- 4- Emission stocks paper for each association.
- 5- Improve exist database and network.
- 6- Monitoring and evaluation of irrigation management transfer to WUA’s process.
- 7- Correct & complete 5 years plan routine.
- 8- Advice during 4th years, WUA’s employ consults for technical help.

FIFTH YEAR

METHOD 1: TRANSFER OWNERSHIP OF IRRIGATION NETWORK

According results of questionnaires, 50% of farmers are disagreeing with transfer ownership of irrigation network and 50% agree eventual.

Its show that, there are basic themes for gradual transfer. By transfer irrigation network management during 5 years, farmers found benefits and maybe agree with ownership transfer.

METHOD2: AGRICULTURE WATER ABONNE

In comparison of network ownership transfer to WUA’s, there is other option and it is, catch water abonne. That was predicted in “square water distribution law” and communiqué to regional water company by power minister, in 1375(1996). According to questionnaires, 50% of farmers agree with second method.

AGRICULTURE WATER CHARGE

If irrigation networks ownership, transfer to WUA’s, protect & maintenance of network will be increase because ownership sense and maybe cause farmers agree with increase water charge. Specially, if farmers be confident that all of water charge will use for their network.

WUA' ADMINISTRATION

Guidance and administration of WUA's by professional & expert will be continue, until 5 years of plan, main tasks of this team will:

- Offer correction of "water charge law" by definition water charge according final costs.
- Prepare and perform instruction schedule for WUA's in protection, utilization, surface & subsurface water resources detection in irrigation network.
- Facilitate Qazvin irrigation network evaluation during transfer years.
- Establish justify courses for WUA's during transfer years.