

Performance Evaluation of Transferred Irrigation Schemes of Lower Gediz Basin

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Abstract: In this study, some physical, economic and institutional performance criteria of transferred irrigation schemes of Lower Gediz Basin are evaluated for pre and post-transfer periods. According to the performance evaluations, the most concrete and positive change has occurred in the collection of irrigation fee. Some other criteria were also improved after management transfer to user associations.

Key words: Lower Gediz Basin, irrigation management, transfer, water user associations, performance criteria

INTRODUCTION

Development of water resources is crucial to maintain food security in the world. Increasing agricultural production to feed the world's growing population could have been possible only with the increase in the area of irrigated lands, thus the irrigated area in the world has reached to 260 million ha, which is nearly five times more than the amount that existed at the beginning of the twentieth century.

At present, irrigated area in the world accounts for 15% of the total area, but contributes 40% of the total agricultural production^[1]. Irrigation has been vital for food security and sustainable rural development, particularly in developing countries, by leading to increased income and improved nutrition and health.

Rapid expansion of irrigated area during the last century created several irrigation management problems on all over the world. Particularly, the management of irrigation schemes by government organizations and their bureaucratic mechanisms has generally resulted in insufficient financial sources for operation and maintenance costs. The centrally financed bureaucracies lack the ability and capacity to provide proper water management for public irrigation schemes. Consequently, these schemes face several challenges like deterioration of irrigation and drainage infrastructure, maldistribution and misuse of water and occurrence of salinization problems^[2].

During the recent decades, there has been an increasing amount of effort to transfer the management of irrigation schemes from government organizations to non-governmental organizations, as decentralized gained momentum and as states started to transfer some of their functions to different groups in the society. Since the early 1980's particularly, financial crisis and poor progress

in raising economic and social welfare led to a fundamental rethinking of the role of the state^[3]. Irrigation management transfers are generally initiated by governments due mainly to poor management performances, lack of operational and maintenance funds and/or very low water charge collection from the farmers^[4].

Turkish agriculture and irrigation management systems have also been affected by these developments. Since 1993, the management, operation and maintenance (MOM) responsibilities of 1 665 000 ha of irrigated area, which had been formerly managed by the State Hydraulic Works (DSI), were transferred gradually to water user associations (WUAs), thus the management of 87% of the public irrigation schemes has been turned over to the farmer's associations.

In this study, some of the economical, institutional and physical performance criteria of irrigation schemes in Lower Gediz Basin, transferred to WUAs from DSI are evaluated.

MATERIALS AND METHODS

Lower Gediz Basin irrigation schemes were managed by the second Regional Directorate, a subunit of the State Hydraulic Works (DSI). The Regional Directorate has the responsibility of water resources development activities in Izmir, Manisa and Usak Provinces, covering totally 3 058 200 ha.

The water resources and irrigation development studies in the Gediz Basin started in 1940's. Irrigated area has reached to 117 669 ha in total. The MOM of the irrigation schemes in Lower Gediz Basin was performed by DSI as a typical public irrigation scheme model until 1994. The total numbers of public irrigation management units were nineteen. In addition to these public schemes, there

Table 1: Irrigation schemes constructed prior to the transfer under the jurisdiction of the II. Regional Directorate of DSI

Irrigation schemes	Number of scheme	Net area (ha)
Schemes managed by DSI	19	117669
Schemes managed by cooperatives	77	12895
Total	96	130564

Table 2: Distribution of the transferred irrigation schemes in provinces under the jurisdiction of the II. Regional Directorate of DSI

Province	Transferred irrigation area (ha)	Transferred irrigation area (%)
Manisa	87647	75
Izmir	28126	24
Uşak	1896	1
Total	117669	100

are 77 small irrigation units, of which MOM activities are accomplished by the private Irrigation Cooperatives. The total surface area under cooperative management is 12 895 ha. The public irrigation schemes that were transferred by the DSI in the basin are shown in Table 1 and the surface area covered in each province is shown in Table 2. The major irrigation scheme area (75%) is within the Manisa province.

By the end of 1998, 14 WUAs have been established following the transfer program of DSI. They serve for 44 186 irrigators within the 126 villages. Before the transfer process, an internal training program was started among DSI management staff, local administrators and farmers. Following this training, establishment processes of WUAs were gradually achieved. The transfer program was completed in 1995.

In this study four WUAs are selected among the 14 WUAs of Lower Gediz Basin, namely; Menemen Right Wing, Menemen Left Wing, Gediz and Sarikiz. The irrigation areas of these WUAs cover 50% of the total irrigation area of the basin.

The irrigation schemes in selected WUAs are evaluated by using several performance indicators, both in pre-transfer and post-transfer periods. These performance criteria are as follows;

- Physical criteria; irrigation rate and sustainability of irrigated area,

$$\text{Irrigation Rate} = \frac{\text{Actually Irrigated Area}}{\text{Irrigable Area}} \times 100$$

$$\text{Sustainability of Irrigation Area} = \frac{\text{Current Irrigable Area}}{\text{Initial Irrigable Area}}$$

- Economic performance criteria; efficiency of water fee collection and financial self sufficiency,

$$\text{Water Fee Collection Efficiency} = \frac{\text{Irrigation Fees Collected}}{\text{Irrigation Fees Due}} \times 100$$

$$\text{Financial Self Sufficiency} = \frac{\text{Irrigation Association Income}}{\text{Total MOM Requirements}}$$

- Institutional criteria; irrigation staff intensity.

$$\text{Irrigation Staff Intensity} = \frac{\text{Irrigation Area (ha) or Irrigation Canal (km)}}{\text{Irrigation Management Staff}}$$

RESULTS AND DISCUSSION

The physical performance of irrigation schemes are evaluated in terms of irrigation rate and the sustainability of the irrigation area. No significant changes are observed in the irrigation rate values between pre and post-transfer periods in Menemen Irrigation Scheme. After transfer from DSI, irrigation rates decreased in Gediz schemes, but considerably increased in Sarikiz WUA (Table 3).

The sustainability of the irrigation area is found approximately 1.0, both for before and after transfer periods meaning that irrigation areas were remained almost the same. In order to sustain the irrigation area, however, the maintenance programs should be conducted properly, land degradation due to drainage and salinization problems should be prevented and misuse of agricultural lands by urban and industrial developments have to be strictly controlled.

The economic performance of irrigation schemes is assessed by using the criteria of efficiency of water fee collection and financial self sufficiency (Table 4 and 5). It is clearly seen that, the efficiency in irrigation water fee collection was considerably low -15% in average- in the pre-transfer period. This was mainly due to the very low interest rates charged to the late payment of irrigation fee and lack of sanctions for late or non payers. On the other hand, post-transfer water fee collection efficiencies increased considerably, by reaching to hundred percent. This indicates that the common problem of low water fee collection rates faced in public irrigation schemes of Turkey is solved in transferred schemes of Lower Gediz Basin. Similarly, raised fee collection rates for WUAs of Turkey -86% in average are reported by Ozlu *et al.*^[6].

All over the world, management transfer is often initiated by governments partly due to insufficient funds to manage irrigation schemes and their inability to collect water charges from farmers^[4]. Very low water charge collection rates and insufficient funds for MOM expenditures were also among the most important reasons for accelerated transfer of public irrigation schemes in Turkey.

Table 3: Irrigation Rate (IR) and sustainability of the irrigation area (SIA) values before and after the management transfer

Name of the Scheme	Before the Transfer (1974-1994)				Name of the WUA	After the Transfer (1995-1999)			
	IR (%)			SIA		IR (%)			SIA
	Min	Max	Mean	Mean		Min	Max	Mean	Mean
Menemen	53	102	84.5	1.49	Menemen R Wing	76	92	86.6	1.00
Manisa	32	74	58.8	1.01	Menemen L Wing	79	85	81.4	1.00
Saruhanli	46	64	55.6	1.00	Gediz	37	46	43.4	1.00
					Sarikiz	61	76	68.8	1.00

Table 4: Water fee collection efficiency values before and after management transfer

Name of the scheme	Rate before the transfer (1989-93)		Name of the WUA	Rate after the transfer (%)					
	Mean (%)			1995	1996	1997	1998	1999	Mean
General			Menemen R Wing	54.9	71.6	100.0	100.0	100.0	85.3
Value for the Schemes	15.0		Menemen L Wing	85.2	55.6	66.9	100.0	86.0	78.7
			Gediz	91.3	100.0	100.0	100.0	100.0	98.3
			Sarikiz	88.9	100.0	100.0	100.0	100.0	97.8

Table 5: Financial self sufficiency ratios before and after management transfer

Name of the WUA	Financial self-sufficiency ratio						
	Pre-transfer	Post-transfer					Mean
		1995	1996	1997	1998	1999	
Menemen R wing	0.77	3.3	1.0	1.5	1.5	1.2	1.7
Menemen L wing	0.77	5.2	0.7	1.3	1.5	1.0	1.9
Gediz	0.77	1.6	1.1	1.3	0.9	0.2	1.0
Sarikiz	0.77	1.6	1.3	2.0	0.9	0.9	1.3
Grand Mean	0.77						1.5

Table 6: Staff number and staff intensity numbers of WUAs in the investigation area in 1999

Name of the WUA	Staff Number			Irrigation Staff Intensity	
	P [*]	PT ^{**}	T ^{***}	(km per staff)	(ha per staff)
Menemen R Wing	--	16.0	16.0	22.1	355.8
Menemen L Wing	18	8.0	26.0	16.3	634.6
Gediz	11	44.0	55.0	6.8	199.3
Sarikiz	11	74.0	85.0	4.4	161.2
Grand Mean				12.4	337.7
Total	40	142.0	182.0		

^{*}Permanent; ^{**}Part-Time; ^{***}Total Staff Number

Pre-transfer financial self sufficiency value was reported as 0.77 by DSI for entire Lower Gediz Basin schemes. Financial self sufficiency values considerably increased after the transfer to WUAs. The values were particularly very high at the beginning of the turnover period since the maintenance is generally provided by DSI and WUAs did not invest for equipment during this period. The average financial self sufficiency values for WUAs are found between 1.0 and 1.9 after transfer (Table 5). The higher financial self sufficiency implies that the WUAs could financially sustain themselves for the expenditures of MOM activities.

Institutional performances of the schemes are evaluated in terms of irrigation staff intensity. Reliable and consistent staff intensity data could not be obtained for pre-management transfer period since DSI generally shifted the staffs between the departments; therefore, a comparison of staff intensities before or after management

transfer in the basin was not possible. Nevertheless, irrigation staff intensities of transferred schemes have been determined for 1999. Average irrigation staff intensity of the schemes is found as 12.4 km per staff and 337.7 ha per staff. Intensities of 13 km per staff^[7] and 333 ha per staff^[8] are generally accepted as ideal figures for the irrigation schemes. Average intensity values are found close to these ideal figures. However, the irrigation staff intensities of Gediz and Sarikiz Associations were found considerably below these values, i.e. over employment is becoming a serious problem in the schemes (Table 6).

This impact assessment study conducted in Lower Gediz Basin has shown that, some performance criteria as the, financial self sufficiency, fee collection efficiency and irrigation staff intensity have considerably improved after management transfer to WUAs. It can be concluded that, the transfer of management create a more sustainable

environment and it should be encouraged in other regions of Turkey.

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