Determining the performances of organizations undertaking ırrigation administration in Kırklareli, Edirne, Tekirdağ and Çanakkale Provinces, Turkey

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Abstract

With this study it was aimed to evaluate the activities of irrigation cooperatives and irrigation unions undertaking the operations regarding irrigation works in the provinces of Kırklareli, Edirne, Tekirdağ and Çanakkale and to determine the efficiencies. Efficiency values were determined by applying data envelopment analysis. In the model, the irrigated area and the

collected charges were taken as outputs and total expenses and number of staff were taken as inputs. In the area of investigation, technical efficieny varied between 0.276 and 1 and it was calculated as 0.864 on the average. This value shows that the enterprises which are not effective can reduce their inputs by 13.6% without any reductions in their outputs. In the study, organizations and target values that can be taken as references for irrigation organization that were not effective were also specified. Organization of producers is an important topic in other areas and especially with respect to the achievement of rural development, in addition to the topic of irrigation. For this reason in order to provide efficiency in irrigation, it is required for the producers to participate in the stages starting from the decision of planning of irrigation till the decisions relating with investment and planning.

Key words: Efficiency. Irrigation Cooperative. Irrigation Union

1. Introduction

Water, which has wide usage areas in agriculture, industry and in daily life, is a vital natural source for the living creatures and its being deficient can be an important developmental factor that can restrict the plant production. (Tekinel et al, 2000). Agricultural irrigation is very important for improving efficiency in the agricultural areas of Turkey, for accelerating economical growth and for reducing migration from rural areas to the cities. Irrigation method is defined as a concept that comprises the quality of irrigation network and the systems for transporting water to the farmers. (Sayin, 1993). In recent years this concept began to include irrigation water, the operation, maintenance, repair, improvement, and management of irrigation systems and the organizations undertaking these operations.

To be able to develop soil and water resources in Turkey and to improve the contribution of agriculture in the national economy, operation of irrigation facilities and ensuring their continuity are of significant importance. Especially to be able to meet the nutritional requirements of population which increases with an average rate of 1.45% in a year, improvement of agricultural production is important both qualitatively and quantitatively. As it is reached to the limit with respect to areas that can be opened for agricultural purposes, it is required to improve unit area efficiency, to have quality inputs, and to have planned production as based on usage of technology.

In Turkey the structure of water management that is based on public ownership and public enterprise, getting its power from centralized organization, as seeing water like a public value instead of an economical commodity, and operating as being supply focused is changing. Water management is within a changing process towards a structure as being in line with international policies, being based on private ownership and enterprises, being localized,

seeing water as an economical commodity, adopting the fundamental principle as pricing, and aiming to operate the system as focusing on demand. In Turkey water management is going through the starting stage of this process of change. Especially by transfering the responsibilities regarding the maintenance, repair, and management of irrigation facilities to various operational organizations in 1990s, it is aimed to enable the participation of producers in the management of irrigation from economical and intellectual aspects.

In order to ensure sustainability of benefits obtained from irrigation, it is required for a good irrigation planning to be done with respect to irrigation projects that are mainly transfered to irrigation organizations, to carry out operations in line with the requirements of the century, and to conduct the necessary monitoring and evaluation works while evaluating the data obtained by using effective methods. (Coskun, 2006).

Efficiency analysis are especially important in countries like Turkey, where economy is based on agriculture. In Turkey, 23.3% of working population is being employed in the agriculture sector and there are nearly three million agricultural enterprises. In countries like Turkey where agriculture is an important sector, as studies regarding efficiency enable the existing resources to be used in an optimum way without requiring for production inputs to be increased or for the technology to be improved, they bear significant importance. Especially in the process of full membership in European Union, there are a lot of works to be done with regards to Turkish agriculture. By enabling effective usage of resources in agriculture, agricultural returns could be increased and the sector could become more competitive. (Kacira, 2007).

Whether organizations realize their activities in an effective way or not, the degree of their efficiencies, or the level of efficiency are important particulars to be revealed. Because as per the efficiency level revealed and in accordance with its direction, outcomes would be obtained and recommendations could be made. In literature, there are studies conducted for specifying the efficiencies of irrigation enterprises and water use associations. Diaz et al. (2004), determined the efficiencies of five irrigation regions in Andalusia Region. Umetsu et al. (2005), specified the efficiencies of irrigation associations at the area of Lower Seyhan Plain Irrigation Project by using data envelopment analysis method. Coskun (2006) specified the efficiencies of 27 irrigation associations and he determined the average value of efficiency as 0.80. It was reached to the conclusion that 6 pieces of irrigation associations operated with full effectiveness. Frija et al. (2009) determined the performance and efficiency of water usage associations in Tunisia. Results shower that on average, 18.7% of the used inputs could

be saved if the water use associations operated on the frontier. The inefficiencies found can furthermore be mainly attributed to the number of years of experience in operating a water users association, in addition to the number of water pipes managed and the irrigation ratio.

The average scale efficiency, which can be calculated as the ratio between constant and variable returns to scale efficiencies, was around 71%, indicating that many water users associations are not operating at an efficient scale. The scale inefficiencies resulted mainly from administrative and organizational variables. Yercan et al. (2009) compared the performance system between water users associations and cooperatives in the Gediz River Basin in Turkey by applying a set of external comparative performance indicators. The indicators included fee collection rate, cost recovery, general meeting attendance, irrigation and personnel intensity.

With respect to the selected indicators, both water use associations and cooperatives performed well. Ntantos and Karpouzos (2010) examined the performance assessment of irrigations systems by using data envelopment analysis in order to measure the technical efficiency of irrigation systems. Performance indicators were also computed for the irrigations districts in the plain of Thessaloniki for providing an integrated investigation of the potential factors that can influence the performance of irrigation systems. Results revealed that efficiency of some irrigation systems was substantially low. Ozdemir and Armagan (2010), evaluated the performance and efficiency of eight pieces of irrigation associations having an irrigation area over 1000 ha, and being among 16 pieces of irrigation associations which took over the irrigation facilities that were opened to be operated in the city of Aydın by State Hydraulic Works (DSI). Wang et al. (2013), specified the efficiencies of irrigation organizations with small scale, operating at the northwest side of China, by using data envelopment analysis method. Sayin et al. (2013) compared 29 irrigation organizations in the province of Antalya and analyzed using a number of performance indicators.

Sufficiency, efficiency, sustainability and producer satisfaction were used as criteria for the productivity of irrigation networks. Liang et al. (2015) developed a framework for defining and clarifying various aspects of social capital and examines the effects of social capital on members' participation in collective activities and on the economic performance of farmer cooperatives. The results demonstrated a positive relationship between certain dimensions of social capital and members' participation in training and general meetings. In addition, each dimension of social capital has a significant and positive impact on the economic performance of cooperatives.

Natarajan et al. (2015) determined the effectiveness of financial performance of cooperatives: case study of Lume Adama farmers Cooperative Union in Oromia Regional State at East shoa Zone, Lume district. The findings from the study revealed that trend of membership of the union was increasing during the study period but the result of evaluation of the effectiveness of financial performance illustrated. The financial position of the union has not maintained satisfactory level of financial performance. The union needed to visualize their operations, policies and strategies for effective utilization of available financial and human resources.

The union should improve their vision and act accordingly for sustenance in fierce competitive financial environment. Ozmen and Kaman (2015) examined evaluation of the physical and financial performance criteria of 24 irrigation schemes in Antalya Valley located in the Mediterranean Region in Turkey between 2007 and 2012. In this study, physical and financial performances included irrigation ratio, sustainability of irrigated area and relative water supply ratios, and water fee collection efficiency and service area per personnel, were examined. The results of this study indicated that irrigation ratios of schemes were between 12 and 84%. Sayin and Yilmaz (2015), determined the technical efficiency of irrigation associations operating in the city of Antalya and they determined the average technical effectiveness as 0.77. Sirikwa (2015) compared the performances of private and cooperative institutional arrangements of irrigation schemes in Mbarali District.

Two irrigation schemes; Igomero cooperative institution scheme and Mbarali Estate private institution scheme were compared. Statistical results showed that there were significant performance differences between private and cooperative irrigation schemes based on factors mentioned above. Overall the performance of cooperative irrigation scheme was found better by scoring 84.11% as compared to privately managed irrigation scheme which scored 78.45%. Mubirigi (2016) determined the factors influencing the performance of agricultural cooperative members in Gatsibo District Rwanda. The research findings identified several factors that influence agricultural cooperative performance such as lack: shortage of youth in agricultural cooperatives, poor implementation of land use consolidation policy for cooperatives members, absence of input savings mechanism, lack of knowledge on the development of action plan and annual budget, low level of accountability and transparency in cooperatives, poor value addition and low level of quality checks, excessive reliance on external assistance as well as low replication of modern agricultural practices at household level to boost members productivity.

Abdelhafidh and Bachta (2017) evaluated the scope and the impact of water users associations financial deficits on their respective farms' production efficiencies. A non-parametric data envelopment analysis approach was applied to measure farms' efficiency scores. Tobit regression was then used to regress the farmers' efficiency scores to the budget deficit of their corresponding water users associations and the water turn time. Results indicated that average technical, allocative and economic efficiencies under constant return assumption to scale are respectively about: 68%, 71% and 48%.

Management of the facilities in Turkey was handed over to the organizations such as irrigation unions, cooperatives and local administration units with the implementation of the participatory irrigation management concept in many countires of the World. For successful irrigation management and in order to provide the continuity of the services of the water user organizations and to improve these services, the performances of these organizations should be determined. In Turkey, water management systems face some problems such as low irrigation ratios, over irrigation, insufficient maintenance and repair services, problems in the collection of water fees and failure to encourage producers to participate in the management of the irrigation systems. Irrigation organizations should be operated efficiently in order to provide water distribution services to maintain their existence and the resources should be used more efficiently. This study includes fourteen irrigation organizations which operate big scale irrigations among the irrigation cooperatives and irrigation associations undertaking irrigation operations in the provinces of Kırklareli, Edirne, Tekirdağ and Çanakkale. In this context, in this study it was aimed to evaluate the activities of these irrigation organizations and to specify their efficiencies in order to identify relatively efficient organizations and suggest reference unions and target input and output values for inefficient organizations. Efficiency values were determined by using data envelopment analysis.

2. Organizational Performance

Performance testing is an informational system which is the essential core of the performance appraisal process (Tuytens and Devos, 2012). This has a vital significance for the system of performance appraisal to be effective and efficient. In the context of socialization, performance appraisal provides important feedback about how wll the individual is getting along in the organization (Njuguna and Orwa, 2015). Performance appraisal help an organization in realizing the strategic purposes and in increasing of effective

working processes through continuous improvement of individuals' performance and processes along with focusing on weak improvable points (Cameron and Pierce, 2004).

The concept of organizational performance is the comparison of an organization's goals and objectives with its actual performance in three distinct areas. They are financial performance, market performance and shareholder value. Financial performance refers to an organization's results with regard to return on investment and return on assets.

The concept of organizational performance is connected to the ideas of effectiveness and efficiency. A business organization must produce the right things and it must produce them using the fewest possible inputs if it is to have a strong organizational performance (Anonymous, 2017). Organizational performance involves the recurring activities to establish organizational goals, monitor progress toward the goals, and make adjustments to achieve those goals more effectively and efficiently. Organizational performance refers to how well an organization is doing to reach its vision, mission, and goals. Assessing organizational performance is a vital aspect of strategic management. Executives must know how well their organizations are performing to figure out what strategic changes, if any, to make.

3. Materials and Method

In the study, fourteen irrigation facilities being operated by ten irrigation cooperatives and four irrigation unions in the provinces of Edirne, Kırklareli, Tekirdağ and Çanakkale were evaluated. These organizations are: Edirne Uzunköprü Değirmenciköy Irrigation Cooperative, Edirne Süloğlu Irrigation Cooperative, Tekirdağ Marmara Ereğlisi Irrigation Cooperative, Edirne İpsala Yenikarpuzlu Irrigation Cooperative, Çanakkale Lapseki Alpagut Irrigation Cooperative, Edirne Keşan Kadıköy, Dokuzdere, Mercan Lakes Irrigation Cooperative, Edirne Altınyazı Karasaz Plains Irrigation Cooperative, Tekirdağ Malkara Karademir Dam Irrigation Cooperative, Kırklareli Kayalıköy Dam Irrigation Cooperative, Kırklareli Dam Irrigation Cooperative, Çanakkale Biga Plains Irrigation Union, Çanakkale Ezine Bayramiç Plains Irrigation Union, Çanakkale Truva Irrigation Union, Çanakkale Pınar Irrigation Union. The surveys which were conducted to the managers of irrigation facilities were the material for the work. Furthermore, the studies that were done in our country and in other countries were also investigated.

Surveys which were conducted to the managers of irrigation organization were comprised of all kinds of data such as the area being irrigated, collected irrigation charges, irrigation amount accrued, total expenses (including all of the maintenance and management

costs of the enterprise), total maintenance cost, total maintenance and management cost of the enterprise, and total costs relating with maintenance personnel of the enterprise. Answers given to the questions in the survey and the data obtained from the records of relevant institutions were evaluated together.

In determining the efficiencies of irrigation organizations, data envelopment analysis method was used. It is a method that is widely used in measuring effectiveness as being a method that is not parametric. At the end of the analysis information is obtained about the efficiency value for each decision point, about how ineffective decision making units could improve their efficiencies with which ratio of inputs and outputs and information regarding decision making units which could be used as reference. One of the biggest advantages of data envelopment analysis is that efficiencies of decision making units having more than one input and output can be calculated. Another feature that can be qualified as an advantage is that the decision units being investigated are determined as per fully effective decision making units or those which are at the border of efficiency instead of units having average level of efficiency. (Coelli et al, 1998).

Data envelopment analysis was first used in year 1957 by Farrell for investigating the efficiencies of units having on output and many inputs and the model that was based on this study was development in 1978. In this study that was known as CCR (Charnes, Cooper ve Rhoddes) formula, assumption of fixed return as based on scale was made (CRS). Later on in 1984, assumption of variable return as based on scale was made by Banker, Charnes and Cooper (BCC) and it was enabled for scale and technical efficiencies to be measured as separately.

Technical efficiency showing whether enterprises operate effectively or not is divided into two subgroups as pure technical efficiency and scale efficiency (Coelli et al, 1998).
If technical efficiency values for constant return to scale and variable return to scale are different for a specific production unit, this situation indicates that the production unit has scale inefficiency. Accordingly, scale efficiency could be explained in this way (Zaim, 1999).
Technical efficiency (CRS) = Pure technical efficiency (VRS) x Scale efficiency

In models with constant returns to scale, any increase that can happen in the quantity of input could be seen as increase in the quantity of output with the same ratio, whereas for models with variable returns to scale, any increase in the quantity of input would be seen in different ratios as being reflected on the quantity of output.

Purpose in making measurements regarding inputs is to find out how much the quantity of input could be reduced without changing the quantity of output that is produced. Purpose in making measurements regarding output is to find out how much quantity of output could be increased without changing the quantity of input. Being focused on output is exactly the opposite of being focused on input. It is defined as analysing the changes in the quantities of output by keeping the quantities of input as fixed.

Scale efficiency or inefficiency is defined as the distance between efficiency border of fixed return to scale and variable return to scale. If scale efficiency is below one, it is considered that scale is inffective. If it is equal to one and if efficiency values of fixed and variable values per scale are exactly the same, it is decided that the scale is efficient.

Success in realizing production activity with the most convenient scale is defined as scale efficiency. Success of an enterprise in producing the most output by using the combination of inputs in the most appropriate way is named as technical efficiency.

On condition that technical efficiency of a decision unit is protected, it can be interpreted that as the scale is enlarged, its efficiency will be improved. This situation is defined as Increasing Return to Scale-IRS. When the scale of a decision unit is shrinked while its technical efficiency is protected, an increase can be observed in its efficiency and this could be defined as Decreasing Return to Scale-DRS. At the line of production, accepting that intervals of reducing, increasing or fixed return to scale could be existing together is defined with the concept of varying return to scale. In a production process, when the inputs are increased with a certain quantity, if the increase in the level of outputs is more than the increase in inputs, it means there is increasing return to scale if the increase in outputs is less than the increase in inputs, there is reducing return to scale and finally if the quantity of increase in outputs and the quantity of increase in inputs are the same, there is fixed return to scale (Coelli et al, 1998).

In the efficiency analysis, enterprises with efficiency coefficient between 0.95 and 1 are considered as effective, those with efficiency coefficient between 0.90 and 0.95 are considered as less effective and those with efficiency coefficient that is less than 0.90 are classified as ineffective enterprises. (Charnes et al, 1978). Since producers have more tendency to control their inputs than their outputs, efficiency measurements of Farrell (1957) relating with inputs have been used in this study. While estimating the efficiency measurements, DEAP 2.1 package program that was developed by Coelli (1996) has been used.

As the number of groups is three or more for continuous data, variance analysis was used whether there were differences with regards to the investigated variables or not.

4. Results and Discussion

In the model, the irrigated area and the collected charges were taken as outputs and total expenses and number of working staff were taken as inputs. Total expenses were composed of maintenance costs, maintenance and management costs of the enterprise, and the costs relating with the personnel. In other words, a model having two inputs and two outputs was established. In Table 1, descriptive statistics regarding irrigation organizations were stated.

Table 1: Descriptive statistics of irrigation organizations

Descriptive statistics	Outputs		Inputs	
	Irrigated area (ha)	Collected charges (TL)	Total expenses (TL)	Number of staff
Average	6666.14	394719.93	645393.79	9
Standard deviation	9941.47	382734.78	778715.16	6
Minimum	106.00	11427.00	20661.00	1
Maximum	38412.00	1151530.00	2816046.00	15

1 US$ = 2.19 TL in 2015 (average)

Total efficiency values of irrigation organizations obtained by the assumption of fixed return to scale with CCR model, technical efficiency values obtained with the assumption of variable return to scale, and the values relating with scale efficiency are given in Table 2.

Table 2: Total, technical and scale efficiencies of irrigation organizations

Name of the organization	Total efficiency (CCR)	Technical efficiency (BCC)	Scale efficiency	Return to scale
Değirmenciköy Irrigation Cooperative	0.302	1.000	0.302	Increasing
Süloğlu Irrigation Cooperative	1.000	1.000	1.000	Constant
Marmara Ereğlisi Irrigation Cooperative	0.707	0.834	0.848	Increasing
Yeni Karpuzlu Irrigation Cooperative	1.000	1.000	1.000	Constant
Alpagut Irrigation Cooperative	0.671	1.000	0.671	Increasing
Kadıköy Dokuzdere Mercan Irrigation Cooperative	0.765	0.767	0.997	Decreasing
Altınyazı Karasaz Irrigation Cooperative	0.827	1.000	0.827	Decreasing
Karaidemir Irrigation Cooperative	1.000	1.000	1.000	Constant
Kayalıköy Irrigation Cooperative	0.273	0.276	0.991	Increasing
Kırklareli Irrigation Cooperative	0.878	0.927	0.948	Decreasing
Biga Irrigation Union	1.000	1.000	1.000	Constant
Ezine Bayramiç Irrigation Union	0.293	0.298	0.981	Increasing
Truva Irrigation Union	1.000	1.000	1.000	Constant
Pınar Irrigation Union	0.934	1.000	0.934	Increasing

Average	0.761	0.864	0.893	

In the area of investigation technical efficiency varied between 0.276 and 1 and it was calculated as 0.864 on the average. This value reveals that the inputs of ineffective enterprises could be reduced by 13.6% without any reductions occuring in their outputs. Total efficiency value was determined as 0.761 and scale efficiency value was determined as 0.893. As per the value of scale efficiency and due to the fact that the irrigation organizations being investigated had scale that was different than the optimum size, it was determined that nearly 11% more inputs were being used. In their studies, Coskun (2006) determined the average technical efficiency of irrigation associations as 0.80, Frija (2008) determined the average value of efficiency for the irrigation organizations in Tunisia 0.81, Wand et al. (2013), determined the efficiency of small scale cooperatives operating at the northwest side of China as 0.43. Diaz et al. (2004), determined the efficiencies of five irrigation regions operating in Andalusia Region between 0.44 and 1, Sayin and Yilmaz (2015), determined the average technical efficiency value of irrigation organizations as 0.77.

Süloğlu Irrigation Cooperative, Yeni Karpuzlu Irrigation Cooperative, Karaidemir Irrigation Cooperative, Biga Irrigation Union and Truva Irrigation Union were specified as being fully effective both as per BCC and CCR models. In addition to these organizations, according to BCC model (variable return to scale), Değirmenciköy Irrigation Cooperative, Alpagut Irrigation Cooperative, Altınyazı Karasaz Irrigation Cooperative and Pınar Irrigation Union were found out to be fully effective.

In the CCR model, number of irrigation organizations being fully effective was 5, whereas number of irrigation organizations that were less effective was 1 and number of irrigation organizations being ineffective was 8. In BCC model, number of organizations that were fully effective was 9, whereas number of irrigation organizations that were less effective was 1, and number of irrigation organizations that were not effective was 4. In the study they carried out in the region of Aydın, Ozdemir and Armagan (2010) reached to the conclusion that 2 out of 8 irrigation associations were fully effective and in the study they carried out in the region of Antalya, Sayin and Yilmaz (2015) reached to the conclusion that 10 out of 19 irrigation organizations were fully effective. Results of data envelopment analysis are given in Table 3.

Table 3: Data envelopment analysis results

	CCR (CRS)	BCC (VRS)
Total number of irrigation organizations	14	14
Number of fully efficient irrigation organizations	5	9
Number of less efficient irrigation organizations	1	1
Number of inefficient irrigation organizations	8	4
Minimum efficiency value	0.273	0.276
Maximum efficiency value	1	1
Average efficiency value	0.761	0.864
Standard deviation	0.279	0.255

It was determined that 35.71% of irrigation organizations had fixed return to scale, whereas 42.86% of them had increasing return to scale and 21.43% of them had reducing return to scale. (Table 4). With respect to the variable of collected charges in the area of research, the difference between the groups of return to scale was statistically significant (p=0.023).

Table 4: Input and output values by return to scale groups

	Number of enterprises	Irrigated area (ha)	Collected charges (TL)	Total expenses (TL)	Number of staff
Increasing return to scale	6	1817.83	113878.33*	263595.83	7
Decreasing return to scale	3	4230.67	760404.33*	1350067.00	14
Constant return to scale	5	13945.40	512319.20*	680747.40	7
Total	14	6666.14	394719.93	645393.79	8

* The difference between return to scale groups is statistically significant in 5% significance level. (1 US$ = 2.19 TL in 2015 (average))

Organizations and target values that could be reference for ineffective irrigation organizations were specified. By determining the reference irrigation organizations and the target values relating with inputs and outputs, it will be possible to make recommendations with regards to the irrigation organization. λ density values required to calculate the target values and reference irrigation organizations are given for BCC model in Table 5.

Table 5: Reference irrigation organizations of the inefficient irrigation organizations according to BCC model

Irrigation organization	Reference irrigation organization	λ	Reference irrigation organization	λ	Reference irrigation organization	λ	Reference irrigation organization	λ
Marmara Ereğlisi	Karaidemir	0.021	Süloğlu	0.106	Alpagut	0.874		
Kadıköy Dokuzdere Mercan	Karaidemir	0.676	Süloğlu	0.324				

Kayalıköy	Truva	0.101	Karaidemir	0.153	Süloğlu	0.551	Alpagut	0.195
Kırklareli	Truva	0.006	Karaidemir	0.430	Süloğlu	0.564		
Ezine Bayramiç	Süloğlu	0.435	Karaidemir	0.134	Alpagut	0.368	Truva	0.063

According to the assumption of variable return to scale (BCC), the target values and improvement ratios relating with ineffective irrigation organizations are given in Table 6.

Table 6: Current and target values of input and outputs in inefficient irrigation organizations according to BCC model

Irrigation organization		Variables	Actual	Target	Difference	Improvement (%)
Marmara Ereğlisi Irrigation Cooperative	Outputs	Irrigated area (ha)	262.00	730.56	-468.56	-178.84
		Collected charges (TL)	42164.00	42164.00	0.00	0.00
	Inputs	Total expenses (TL)	48129.00	40160.21	7968.79	16.56
		Number of staff	2.00	2.00	0.00	0.00
Kadıköy Dokuzdere Mercan Cooperative	Outputs	Irrigated area (ha)	1930.00	4210.65	-2280.65	-118.17
		Collected charges (TL)	676234.00	676234.00	0.00	0.00
	Inputs	Total expenses (TL)	799307.00	612696.32	186610.68	23.35
		Number of staff	14.00	10.00	4.00	28.57
Kayalıköy Irrigation Cooperative	Outputs	Irrigated area (ha)	4925.00	4925.00	0.00	0.00
		Collected charges (TL)	202548.00	202548.00	0.00	0.00
	Inputs	Total expenses (TL)	633002.00	174513.77	458488.23	72.43
		Number of staff	19.00	5.00	14.00	73.68
Kırklareli Irrigation Cooperative	Outputs	Irrigated area (ha)	4565.00	4565.00	0.00	0.00
		Collected charges (TL)	453449.00	453449.00	0.00	0.00
	Inputs	Total expenses (TL)	434848.00	403069.42	31778.58	7.31
		Number of staff	14.00	8.00	6.00	42.86
Ezine Bayramiç Irrigation Union	Outputs	Irrigated area (ha)	3707.00	3707.00	0.00	0.00
		Collected charges (TL)	174331.00	174331.00	0.00	0.00
	Inputs	Total expenses (TL)	508831.00	151883.97	356947.03	70.15
		Number of staff	15.00	4.00	11.00	73.33

Süloğlu Irrigation Cooperative should increase the area of irrigation by the ratio of 178.84%, whereas they should reduce the expenses 16.56% while the number of personnel and collected charges should be kept as unchanged.

Kadıköy Dokuzdere Mercan Irrigation Cooperative should increase the area of irrigation by the ratio of 118.17%, whereas they should reduce the expenses 23.35% and the number of personnel by 28.57% while the collected charges should be kept as unchanged.

Kayalıköy Irrigation Cooperative should reduce the expenses by the ratio of 72.43% and the number of personnel by the ratio of 73.68% while the area of irrigation and collected charges should be kept as unchanged.

Kırklareli Irrigation Cooperative should reduce the expenses by the ratio of 7.31% and the number of personnel by the ratio of 42.86% while the area of irrigation and collected charges should be kept as unchanged.

Ezine Bayramiç Irrigation Union should reduce the expenses by the ratio of 70.15% and the number of personnel by the ratio of 73.33% while the area of irrigation and collected charges should be kept as unchanged.

5. Conclusion

Although technical efficiency in the area of investigation was at a good level, it was not at the desired level. According to the averages of enterprises, technical efficiency was found as 0.864. It was possible for the enterprises, that were technically ineffective in the area of investigation to reduce their inputs by the ratio of 13.6% without having any reductions in their production.

It is important to pass on to the closed channel system in the irrigation networks in order to use water in irrigation operations in a more effective way and to eliminate the problems observed in the distribution of water.

It can be reached to the conclusion that to be able to overcome the problems regarding irrigation operations, it is needed to realize some amendments in the relevant regulations and to provide public inspection and support for the irrigation organizations.

Organization of producers is important in other areas and especially with respect to development in rural areas, in addition to their being important for irrigation issues. For this reason, for having effectiveness in irrigation it is required to have the participation of producers starting from the stage of planning of irrigation till the stage of taking decisions with respect to investment and planning.

It is reached to the conclusion that in order for the ineffective irrigation organizations to reach to the level of efficiency, it is required for them to reduce their total expenses and the number of their personnel. It is reached to the conclusion that both of the cooperatives that are ineffective should increase the quantity of area being irrigated. In these organizations in order to have effectiveness, it is required for the necessary decisions to be taken and applied within the scope of an appropriate plan and it is needed for the organizations to operate more effectively.

In recent years, for the purpose of enabling the participation of farmers in the investments for irrigated farming and operational maintenance activities in our country, it has been more focused on the related works. However, in these works training is being neglected and in a way enterprises are being established to be transfered. The transfers are being

realized with the presidency of the mayor or district governor mainly to organizations like those providing services to villages and farmers, whose participation is desired, are being neglected, whereas agricultural chambers are only taken as part of these organizations as observers. In order to obtain the desired benefits from these transfers, it should be provided for the farmers to participate in these organizations at the management stage and works should be carried out in this direction.

In general terms, farmer training programs being realized either as countrywise or as locally by the publishing institutions are significantly important. In these programs, topic of agricultural irrigation and importance of participation of farmers for the development of irrigation system should be evaluated in all aspects. Especially mentioning about this subject in the agricultural programs that are placed in local press and televisions would provide benefits. If the broadcasting elements mention more about this subject in their programs, this would absolutely create benefits.

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