

A Preliminary Study on Sustainability of Fishery Cooperatives in the North-eastern Mediterranean, Turkey

*Huriye Göncüoğlu¹, Yeliz Doğanyılmaz Özbilgin², Vahdet Ünal¹

¹Ege Üniversitesi, Su Ürünleri Fakültesi, 35100, Bornova, İzmir, Türkiye

²Mersin Üniversitesi, Su Ürünleri Fakültesi, 33169, Yenişehir Kampüsü, Mersin, Türkiye

*E-mail: huriyegoncuoglu@gmail.com

Özet: Kuzeydoğu Akdeniz (Türkiye) su ürünleri kooperatiflerinin sürdürülebilirliği üzerine bir ön çalışma. Bu çalışmada, Kuzeydoğu Akdeniz kıyılarında faaliyet gösteren Su Ürünleri Kooperatifleri ve bu kooperatiflerin hizmet sürelerine etki eden değişkenler incelenerek bir model oluşturulmuştur. Bu amaçla, soru formları hazırlanmış ve bölgedeki tüm kooperatif yetkilileri (20 su ürünleri kooperatifi) ile yüz yüze görüşmeler gerçekleştirilmiştir. Çalışmada, kooperatiflerin hizmet sürelerini etkileyen faktörleri analiz etmek için doğrusal regresyon model kullanılmıştır. Regresyon model sonuçlarına göre; balıkçıların kendi arzusu ile kooperatif kurması, profesyonel bir yönetici tarafından yönetilmesi, kooperatif av sahasındaki toplam balıkçı sayısı, gemici üye sayısı ve mevcut politikalar değişkenlerinin kooperatif hizmet süresini etkilediği tespit edilmiştir. Çalışma sonuçları, bölgedeki balıkçı kooperatiflerinin daha iyi anlaşılmasına yardımcı olacak ve balıkçılık yönetimi açısından ilgili idarelere önemli bulgular sağlayacaktır.

Anahtar Kelimeler: Kuzeydoğu Akdeniz, Su ürünleri kooperatifleri, Küçük ölçekli balıkçılık, Doğrusal regresyon model

Abstract: Active fishery cooperatives located along the North-eastern Mediterranean coast and the factors affecting their service period are discussed in this study. The purpose of this study is to advise on a cooperative model that will serve in the long term and to decide on what variables to use as well as how to use them in the case of a local or regional fisheries management. A questionnaire was prepared and face-to-face interviews were performed with all the managers of all fishery cooperatives in the region (20 fishery cooperatives). Linear regression model was used to analyze the elements affecting the service period of the cooperatives. Results of the regression model revealed that some variables affecting this service periods are; foundation of the cooperatives by the fishermen themselves (fishery cooperatives that are formed on the basis of local initiative), having competent management personnel, total number of fishermen in the cooperative area, total number of fisher members (non-vessel-owners) within the cooperative, and existing related policies-legislations. Results of the study will lead to a better understanding of the cooperatives in the area and constitute significant findings for the authorities in terms of fishery management.

Key Words: North-eastern Mediterranean, Fishery cooperatives, Small-scale fisheries, Linear regression model

Introduction

Many studies have been carried out on the significance of cooperatives on fisheries in Turkey (Koçel, 1971; Arısoy, 1974a, b; Çıkin and Elbek, 1991; Berkes, 1992; Raakjaer *et al.*, 1997; Knudsen, 1998; Ünal and Yercan, 2006; Ünal *et al.*, 2008; Ünal *et al.*, 2009a,b,c). These studies cover the properties, problems, achievements and the roles fishery cooperatives could play in the management of fisheries. Ünal *et al.* (2009a,b) argues that a detailed understanding of the characteristics of the cooperatives will help conceive their operations and derive benefits from these characteristics when establishing a management on the local scale. Nonetheless, no mention was made so far on what terms a cooperative would survive and be considered successful although it is imperative to know and therefore analyze the characteristics that satisfy effective and sustained service of cooperatives.

Fishery cooperatives, which are founded by fishermen themselves (Jentoft, 2005), independently and without any external assistance or pressure, grant them the opportunity to partake in the fisheries management as well as to be primary shareholders to protect fish stocks and create MPAs (Ünal *et al.*, 2009a). Although the Cooperatives Act No.1163 which

secured many cooperatives to be organized and developed had entered into effect in 1969, no effective and comprehensive policies that can help cooperatives work in integrity and coordination have yet to be commenced.

Presently there are 180 fishery cooperatives related especially to marine capture fisheries (Ünal *et al.*, 2009b) in Turkey, however their roles in addressing the management or needs of fisheries are unsatisfactory. The majority of studies on fishery cooperatives in Turkey, correspondingly, make mention of an ineffective cooperative structure (Koçel, 1971; Arısoy 1974a,b; Berkes, 1992; Ünal and Yercan, 2006; Ünal *et al.*, 2008; 2009a,c).

On the flipside, there are cooperatives which have proven successful on the local level (Ünal *et al.*, 2009b), but their number is limited and the elements helping their success are yet to be deeply analyzed.

In determining the success of a fishery cooperative, correlating the measurable and observable variables could be of use (Baticados *et al.*, 1998; Baticados, 2004; Ünal *et al.*, 2009c); where one such is the duration it is able to serve its members, since those cooperatives that fail to serve are

almost destined to cease. Therefore determination of the factors that affect the service period gains importance, and the fact that there is limited literature on the methods that analyze the structures of successful cooperatives raise the significance of the study.

The purpose of the study is to advise on a cooperative model in the North-eastern Mediterranean coasts of Turkey which will succeed to serve in the long term as well as to determine which and how variables are to be used in doing so. In this context, firstly common characteristics of cooperatives are determined and later those variables that affect the service duration are found. Resulting regression model is expected to help better understand the cooperatives in the area and lead the planners accordingly.

Materials and Methods

The study was carried out along the 667 kilometer-long coastal line of North-eastern Mediterranean region of Turkey, surveying a total of 20 fishery cooperatives actively serving in this area in 2007-2008 (Fig. 1).

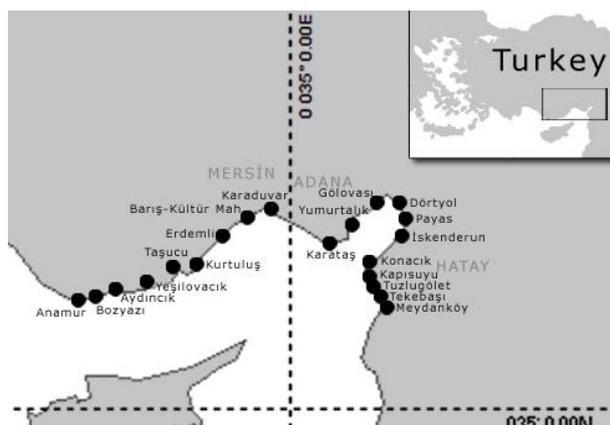


Fig. 1. Map of Northeastern Mediterranean coast spotting fishery cooperatives

(West to East along the coast: Anamur, Bozyazı, Aydıncık, Yeşilovacık, Taşucu, Kurtuluş Köyü, Erdemli, Barış-Kültür Mahalleleri, Karaduvar Mahallesi, Karataş, Yumurtalık Merkez, Gölövası, Dörtöyl Yeşilsu, Payas, İskenderun, Konacık Işıklı, Kapısuyu, Tuzlugölet, Tekebaşı Beldesi, Meydanköyü)

The conditions of twenty marine fishery cooperatives in the area were analyzed mainly by focusing on their characteristics, problems and the factors affecting their service period. The study was conducted through face-to-face interviews with the managers of the cooperatives or anyone from the managerial level in 2008 fishing season, using a modified version of the questionnaire originally designed by Ünal *et al.*, (2009c) to outline cooperative activities.

Linear regression model was used to analyze the elements affecting the service period of the cooperatives. White test was run to examine the heteroscedasticity between the variables of the model, and Ramsey test was run to verify that the structure of the model was statistically meaningful.

Results

Characteristics of fishery cooperatives

Of the 20 cooperatives examined, the newest three were founded in 2006 whereas the oldest two in 1973. Their average period of service was found to be 17 ± 12 , however 65% are not as old as 10 years (Tables 1 and 3).

Table 1. Age distribution of 20 fishery cooperatives

Years	Number	Percent (%)
1-9	7	35
10-19	6	30
20-29	3	15
30 and over	4	20
Total	20	100

Out of the total 1087 registered members of the 20 cooperatives that fall in the scope of the study, 634 are active. The cooperative with the least population has 12 members, while the opposite has 110. 69% ($n=749$) (Table 3). of the members live on fishing only. Membership rate among the fishermen working within the areas of operation of these 20 cooperatives is 18%.

Results derived from the questionnaire indicated that the percentage of fishery cooperatives where solidarity is present amongst members and meeting attendance is as good as 55 percent. It was found that only one cooperative increased capital and no cooperatives distributed patronage refund.

In nearly half (45%) of the cooperatives in the area there were changes both in the managers and the board of directors in the last 5 years while in 70%, changes occurred only in the board of directors.

Only 25% of the north-eastern Mediterranean fishery cooperatives have professional managers. 40% of the authorities surveyed stated that the cooperatives have contributions to the sustainability of the fish stocks and a 13% were optimistic about the future of the fishery and the cooperative.

There are no employees in 65% of the cooperatives. While there are exceptionally higher number of employees in two cooperatives (6 in one and 17 in the other) compared to the region and Turkey average, the rest employ one or two people only.

Only two cooperatives stated they provide education and information services to their members. Of the 20 cooperatives in the area, only two (10%) are engaged in marketing activities. There are, however, no cooperatives making auctions or selling fish.

The most known problems of these cooperatives appear to be the limited financial resources and the insufficient policies on fishery cooperatives (Table 2).

Table 2. Main problems of cooperatives and the frequencies these problems are reported

Problems	Reporting Frequency (%)
Tax System	35
Illegal Fishing	50
Disputes among fishermen	30
Limited marketing opportunities	65
Marketing problems	55
Limited fishing area	50
Failure to collect member fees	60
Indifference of shareholders	65
Limited financial sources	95
The Fisheries Notification	70
Patrolling & Control Services	65
Poor policies on fishery cooperatives	90
Lack of slipway location	70

Outputs of the Regression Model

To help the cooperatives planned to be built both in the short and long term to continue existence and sustain service in the long run, a model was created regarding solely the variables of statistical significance.

In the linear regression model built in order to determine the factors affecting service periods of the fishery cooperatives in the area of the study, the dependent variables were based on the period of service. Independent variables that are found statistically significant are; establishment of the cooperative with the fishermen's own will, ($p < 0.10$), having a professional manager ($p < 0.10$), number of vessel owner members ($p < 0.10$), total number of fishers within the catching area of the cooperative ($p < 0.05$), and insufficient policies on fishery cooperatives ($p < 0.10$). White test was run to examine the heteroscedasticity null hypothesis.

There is no evidence for the presence of heteroscedasticity. Functional misspecification errors on a linear regression model are diagnosed via Ramsey test. The Ramsey test results "H₀ : model modification is correct". In F distribution, degree of freedom is 5 and 14 (Table 4).

The results of the regressions show that the period of service is directly proportional to the establishment of the cooperative with the fishermen's own will (X_1), having a professional manager (X_2), total number of fishers within the fishing area of the cooperative (X_4), and insufficient policies on fishery cooperatives (X_5); and inversely proportional to the number of non-vessel-owner members. Variables and their descriptions are presented in Table 5.

Linear regression model results as below, also as shown in Table 4.

$$\hat{y} = -10.482 + 17.044X_1 + 9.701X_2 - 0.3106X_3 + 0.008X_4 + 15.446X_5$$

Table 3. Main characteristics of North-eastern Mediterranean fishery cooperatives

Fishery Cooperatives	Year founded	NCM (y)	TNF (x)	MR(%) [(y/x)*100]	NACM (z)	RACM (%)		
						[(z/y)*100]	NE	Marketing
Anamur	1972	45	55	82	35	78	0	No
Bozyazı	1984	23	83	28	23	100	2	No
Aydincık	1988	20	35	57	10	50	0	No
Yeşilovacık	2004	12	24	50	6	50	2	No
Tasucu	1999	35	95	37	20	57	2	No
Kurtulus Köyü	1976	104	239	44	50	48	17	Yes
Erdemli	2006	50	140	36	50	100	0	No
Barış-Kültür Mahalleleri	2001	88	238	37	35	40	0	No
Karaduvar Mahallesi	1993	110	310	35	60	55	2	No
Karataş	1975	100	290	34	80	80	1	No
Yumurtalık Merkez	1997	94	109	86	30	32	0	No
Gölovası	2002	48	48	100	30	63	0	No
Dört Yol Yeşilsu	1993	38	388	10	20	53	0	No
Payes	1984	18	58	31	12	67	0	No
İskenderun	1972	103	703	15	90	87	6	No
Konacık Işıklı	1991	53	65	82	25	47	0	No
Kapusuyu	1989	69	74	93	7	10	11	No
Tuzlugölet	1979	24	224	11	16	67	2	No
Tekebaşı Beldesi	2006	18	18	100	0	0	0	No
Meydanköyü	2006	35	105	33	35	100	0	Yes

(NCM: Number of cooperative members; TNF: Total number of fishers; MR: Membership Rate; NACM: Number of active cooperative members; RACM: Rate of active cooperative members; NE: Number of employees)

Table 4. Linear regression model results (N=20).

Dependent variable: (y) period of service	Coefficient
Constant	-10.482 (0.065) *
Establishment of the cooperative with the fishermen's own will (X ₁)	17.044 (0.001) ***
Having a professional manager (X ₂)	9.701 (0.004) ***
Non-vessel-owners (X ₃)	-0.310 (0.001) ***
Total number of fishers within the catching area of the cooperative (X ₄)	0.008 (0.026) **
Insufficient policies on fishery cooperatives (X ₅)	15.446 (0.002) ***
F (5, 14)	18.753
Adjusted R-squared	0.824
S.D. dependent variable	11.52039
S.E. of regression	4.566139
Schwarz criterion	131.498
Akaike criterion	125.524
White test	0.740335
Ramsey test	0.465975

*Significant for $\alpha=0,01$, ** Significant for $\alpha=0,05$, *** Significant for $\alpha=0,10$

Table 5. Variables in the model and descriptions

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- (a) *Establishment of the cooperative with the fishermen's own will:* Fishermen in the area must get together with their own initiatives to establish the cooperative. This increases the period of service of the cooperative.
- (b) *Having a professional manager:* Cooperatives must employ a full-time professional manager who has a formal education in the field of cooperatives and fisheries. Those cooperatives having a professional manager have a longer period of service.
- (c) *Non-vessel-owner members:* There is an inverse proportion between the period of service and the number of members who do not own a vessel themselves but work as fishers in other members' vessels.
- (d) *Total number of fishers within the catching area of the cooperative:* Increase in the number of fishers in the catching area of the cooperative has, though minimal, positive effect on the period of service. Increase in the number of fishers will result in the thrust of competition, thus urging each fisherman to be secured in an organization to protect his rights and help him work in equality
- (e) *Insufficient policies on fishery cooperatives:* Cooperative policies deemed insufficient result in the unity of fishermen who struggle together against these adverse conditions under the roof of a cooperative, helping a longer period of service through solidarity.
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Discussion

The study examines the general conditions, problems and the variables affecting the service periods of the marine fishery cooperatives in the North-eastern Mediterranean region of Turkey, where some similarities and differences are observed in comparison (Çeliker *et al.*, 2006, 2008; Ünal *et al.*, 2008; 2009a,b,c) to the structures of those in other regions. When compared to the study carried by Ünal *et al.* (2009a) in the Aegean coasts, the results revealed that the average periods of service are identical in both regions (17 years) although the rate of cooperatives exceeding 10 years of service are explicitly higher in the Aegean region (83%) than that of the other (65%).

The most significant difference between the two regions is the membership rates. While the membership rate in North-eastern Mediterranean cooperatives is 18%, same was reported as 62% in the Black Sea region (Çeliker *et al.*, 2006), 64% in the Aegean region (Ünal *et al.*, 2009a), 52% in the Mediterranean region (Taşdan *et al.*, 2010).

While only 25% of the fishery cooperatives in the North-eastern Mediterranean coasts have a cooperative manager while the rate is 32% in those in the Aegean region. 10% of the cooperatives in the North-eastern Mediterranean region provide education and information services to their members as opposed to as high as 70% in the Aegean region. Similarly, none of the cooperatives in the North-eastern Mediterranean region have distributed patronage refund to their members in the last 5 years and only one of them has had a capital increase, while 12% of those in the Aegean region have distributed patronage refund and 28% increased their capitals.

Cooperatives in the North-eastern Mediterranean region are poor in marketing their products as only two of them (10%) conduct marketing activities where in the Aegean region, 25 of

the cooperatives (44%) market their products either through auctions or by selling the products of their members in the cooperative (Ünal *et al.*, 2009b). The fish auctions in the Aegean region of Turkey are not embraced in those of North-eastern Mediterranean region. Only one cooperative is reported to be making auctions in the Black

Sea region (Çeliker, 2006). All these differences in the regional level can be explained by the fact that the cooperative system started earlier in the Aegean region, gradually becoming more of a culture. Also tourism, both international and domestic, relatively more developed along the Aegean coasts, may have indirectly affected the auction activities of the fishery cooperatives.

Insufficient policies on the fishery cooperatives is the common primary problem of both Aegean and North-eastern Mediterranean cooperatives. This situation, which can be explained as an utter neglect of the cooperatives where fishermen have expectations from the government which are not answered, is on the other hand a motivation for the existence of the cooperatives. Fishermen try to keep the cooperatives alive to be able to change these policies and protect their rights.

Problems suffered by the fishery cooperatives are similar regardless of the region in the Aegean, Black Sea and North-eastern Mediterranean where the cooperatives fail to perform effectively or try to survive against mounting difficulties. Accordingly the model constructed for the fishery cooperatives of the North-eastern Mediterranean region of Turkey can be considered for those in the other regions for a much longer period of service. This suggests that a cooperative should be established through a movement solely by the local fishermen without an external imposition or stimulation, the cooperative

should have a professional manager and the total number of fishermen in the area should be taken into consideration.

The model further suggests that effective policies should be exercised and the focus should be towards the increase in the number of vessel owner members, rather than that of sailors. The R^2 (Adjusted R-squared=0.824) in the model has a high explanatory power. Coefficients of the variables comply with the model and conform to a priori expectations.

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