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RESEARCH ARTICLE

ARAŞTIRMA MAKALESİ

A preliminary study on economic value of recreational fishing in Izmir Inner Bay, Aegean Sea (Turkey)

Ege Denizi İzmir İç Körfez'de (Türkiye) amatör balıkçılığın ekonomik değeri üzerine bir ön çalışma

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Özet: İzmir İç Körfez'deki rekreasyonel balıkçılığın özelliklerini ve ekonomik değerlemesini ele alan bu çalışma, karar vericilere balıkçılık yönetimi konusunda bilgi sağlamayı amaçlamaktadır. 2011 Ocak-Haziran döneminde kıyıdan avlanan 50 rekreasyonel balıkçı ile yapılan yüz yüze görüşmeler sonucu, rekreasyonel balıkçıların demografisi, balıkçılıkla ilgili harcamaları (balıkçılık ekipmanı, ulaşım, yem ve yiyecek ve içecek gibi özel masraflar), bu aktiviteden elde ettikleri pazar ve pazar dışı ekonomik değerleri ele alınmıştır. Ardından kim, ne zaman, nerede katılıyor ve ne kadar zaman harcıyor gibi sorularla balıkçılık aktivitesine katılım ile ilgili özelliklerinin irdelenmesi planlanmıştır. Pazar dışı faydaları hesaplamak için Negatif Binomial Regresyon Model'den yararlanılırken, seyahat maliyeti yöntemiyle de rekreasyonel balıkçılıktan kaynaklanan pazar dışı faydaların sunulması hedeflenmiştir. Her birey için hesaplanan 25 liralık tüketici rantı ve resmi verilere göre İzmir İli'nde 7.669 lisanslı rekreasyonel balıkçı varlığı, İzmir İç Körfez'deki rekreasyonel balıkçlığın büyük ekonomik değerini ortaya koymaktadır.

Anahtar kelimeler: Rekreasyonel balıkçılık, Negatif binomial regresyon, Pazar dışı ekonomik değer.

Abstract: This study on recreational fishing characteristics and economic valuation in İzmir Inner Bay is intended to provide fisheries management information for the decision makers. With the on-site face-to-face interviews with 50 shore-based recreational fishermen in the period of January-June, 2011, it was aimed to demonstrate demographics, fishing related expenditures (fishing equipment, transportation, bait and special costs such as food and drinks), market and non-market economic value of recreational fishing. Then, fishing participation dimensions was planned to consider who participate, when the participation occurs, how much time they spend. Non-market benefits rising from recreational fishing was planned to represent via travel cost methodology, whereas negative binomial model was estimated to calculate non-market benefits. Calculated consumer surplus per individual, 25 Turkish Liras and existence of 7,669 licensed recreational fishers in İzmir Province according to official data represent the enormous economic value of recreational fishing in İzmir Inner Bay.

Keywords: Recreational fishing, Negative binomial regression, Non-market economic value.

INTRODUCTION

Recreational fishing (RF) has been documented as one of the most popular activities along the coasts of many countries around the world, such as Canada, Italy, Spain, and the United States of America (Sutinen and Johnston, 2003). In other countries, RF played an important social and economic role, even if not formally assessed through the use of surveys and other quantification techniques. In the European Mediterranean region, RF represents not only an important leisure activity that increases the pressure on the resources, but also a poor studied economic activity which contributes an estimated 25 million recreational fishermen who spend an estimated 25 billion Euros on their sport in the EU (Dillon, 2004; Gaudin and De Young, 2007; FAO, 2008).

Although, the social and economic impact of RF is high, no attention has been paid on assessment of its impact over the resource and on the economic yield (Lleonart, 2005). The importance of RF in the Mediterranean has been largely underappreciated whether it be from the point of view of its impacts on marine resources or of its socio-economic potential (Gaudin and De Young, 2007; Ünal *et al.*, 2010). RF is also a very complex activity owing to the diversity and heterogeneity of the pursuit itself and of the social and economic sectors and administrations associated with it (SFITUM, 2004). In October 2010, the General Fisheries Commission for the Mediterranean-Sub-Committee on Economic and Social Science (GFCM-SCESS) at its meeting in Palma de Mallorca, Spain organized a workshop on the monitoring of RF in GFCM area in order to address the common definition of RF to be used in the monitoring framework. At the end of the workshop, the sub-committee agreed on the following definition of RF: fishing activities exploiting marine living aquatic resources from which it is prohibited to sell or trade the catches obtained (GFCM, 2010).

Among a wide range of documents regarding the definitions of RF, it is also aimed to put forward an explanation from a large-scale research done by Pawson *et al.* (2008) which suggests that RF is: not deemed to be commercial fishing, in that recreational fisher do not sell the fish they catch; is not undertaken for predominantly subsistence purposes, though these may provide justification for continuance of activities not deemed to be commercial; is not undertaken for primarily cultural or heritage purposes, is often synonymous with angling (the activity of catching or attempting to catch fish by hooks, principally by rod and line or hand-held line) but may include the use of small boats equipped with nets, longlines or pots to catch fish or crustaceans, capture of fish by divers with spearguns, and hand-gathering of shellfish from the beach or shore (Pawson *et al.*, 2008).

RF generates an increase in the demand of the services sector in the place where it is practiced (SFITUM, 2004). Today, there is a number of valuation techniques to monetize the demand rising from RF. Current economic valuation techniques can be divided into three sub-categories: 1) revealed preference approaches (e.g. travel cost (TC), market methods, hedonic methods and production approaches) 2) stated-preference approaches (e.g. contingent valuation, conjoint analysis), and 3) cost-based approaches (e.g. replacement cost, avoidance cost) (Gaudin and De Young, 2007; Parkkila *et al.*, 2010). To monetize existing demand for RF, TC methodology is commonly used in which costs from transportation, accommodation, lost working time, permits and equipment rentals are included in the estimation (Parkkila *et al.*, 2010). TC method is used to estimate economic value related to RF beside financials measurement tools such as employment, expenditures, tax revenues (Southwick Associates, 2008). At this juncture, it is possible to come face to face an economic hypothesis being that, in general, the frequency of visits is lower for people with high travel costs, meaning that demand for recreational visits decrease with higher prices (Parkkila *et al.*, 2010). For instance, in 1999, total economic value of RF in Scandinavian countries is put forward by accounting total expenditures and market value of catch rising from RF (Toivonen *et al.*, 2004).

TC method is commonly operated to determine use value of natural resources for recreational activities (Belkayalı and Akpınar, 2009). TC model estimates was commonly based on count regression approaches which employs number of trips to a certain place as a dependent variable, whereas using independent variables as total travel expenditures, total travel time and demographics. Count data analysis was used in economic valuation of RF activities, especially, in United States (Bilgic and Florkowski, 2007; Park *et al.*, 2002; Gillig *et al.*, 2000; Shrestha *et al.*, 2002). A wide range of TC studies conducted for valuation of artificial marine habitats, recreational scuba diving aside from RF. (Milon, 1988; Shrestha *et al.*, 2002). In Turkey, related scientific literature on TC method considers economic value of natural parks, forests and thermal springs excluding RF activities (Ortaçeşme *et al.*, 2002; Pak and Türker, 2006, Başar, 2007; Erdoğan *et al.*, 2007; Belkayalı and Akpınar, 2009).

Conclusively, RF in marine and inland waters of Turkey is poorly studied which leads to problems in understanding the importance and the impact of RF in multi-level marine resource use. Understanding the economic value of RF will make sense in governing marine space. In this first snapshot study, it was aimed to put forward the representative non-market economic value of RF in İzmir Inner Bay. The study also considers identifying the factors affecting angling trip demand, anglers' effort and catch quantities. Lastly, this study is planned to be pathfinder for future RF studies along the coasts of marine and inland waters of Turkey which will also contribute in preparation of better management plans for coastal and marine use.

MATERIALS AND METHOD

Survey Site

The survey was carried out along the Izmir Inner Bay where local ferries, national and international cruise and transport ships are active in while no commercial fishing vessel is active except few ones which conducts illegal fishing activities according to interviewed recreational fishers in Bostanlı. İzmir is the third metropolis in Turkey with a population of 3,965,232 (TSI, 2011). Popular fishing coastal zones of İzmir are stated as Bostanlı, Karşıyaka, Bayraklı, Alsancak, Konak, Mithatpaşa, Göztepe and Üçkuyular. Main target species of recreational fishers are composed of White Seabream, European Squid, Sparus aurata, European Common Cuttlefish, European Seabass, Mugilid Mullets, Common Two-Banded Seabream, Atlantic Horse Mackerel while interviewed individuals, generally, indicated their tendency to catch European Squid, Gilthead Seabream, European Common Cuttlefish, European Seabass (Table 1).

Data Collection and Analysis

Data were collected by on-site surveys along the coasts of İzmir Inner Bay during the first 6 months of 2011. Questionnaire forms were performed with a total number of 50 recreational fishers who were active, especially, in Bostanlı, Karşıyaka, Bayraklı, Alsancak, Konak, Mithatpaşa, Göztepe and Üçkuyular districts on randomly selected days and hours. All respondents included in survey were composed of shore-based recreational fishers which were contacted by snowball sampling methodology (Miran, 2003). In addition to the on-site survey results, published materials including papers, Turkish RF circular, reports and books about evaluation of RF were used during all stages of the research.

Generally, fishers were asked their demographic factors (age, sex, marital status, monthly income, education degree, occupation etc.), fishing characteristics (fishing days per year, fishing hours per day, species caught, annual catch in weight) and fishing related expenditures (transportation, bait, equipment and other costs). Daily average fishing trip cost which was calculated by dividing total yearly all trip related expenditures including transportation, food etc. by the average number of RF days in a year. In addition, opportunity cost of time was not included in total daily expenditures. Other questions within the survey were regarding possession of a fishing license and personal experience and management.

Table 1. Main species' contribution to the total catch (%) (İzmir Metropolitan Municipality, 2011)

Family	Species	English Name	Share in total catch (%)	Share in total catch (kg)	Unit price (per kg)	Market Value
Sparidae	*Sparus aurata*	Gilthead Seabream	16.36	1,992	36.67	73,036.68
Moronidae	*Dicentrarchus labrax*	European Seabass	10.46	1,252.8	28.16	35,272.58
Mugilidae	*Mugil sp.*	Mugilid Mullets	7.86	942	7.40	6,970.80
Sparidae	*Diplodus sargus*	White Seabream	20.96	2,511	20.68	51,914.93
Sciaenidae	*Sciaena umbra*	Brown Meagre	0.08	9	8.00	72
Sparidae	*Diplodus vulgaris*	Common Two-Banded Seabream	3.76	450	7.82	3,519
Scombridae	*Boops boops*	Bogue	0.87	104	2.96	307.32
Sepiidae	*Sepia officinalis*	Common Cuttlefish	16.13	1,932	5.93	11,456.76
Loliginidae	*Loligo vulgaris*	European Squid	20.22	2,423	20.64	49,998.61
Carangidae	*Trachurus trachurus*	Atlantic Horse Mackerel	2.96	355	4.62	1,638.33
Scombridae	*Scomber japonicus*	Chub Mackerel	0.05	5.5	4.30	23.62
Sciaenidae	*Umbrina cirrosa*	Shi Drum	0.04	4.5	17.70	79.65
Total			100	11,980.8		234,290.3

Valuation Methodology: Nature of Demand Model

Count regression models are well-practiced to determine overdispersed trip demand in economic valuation studies. Because of the non-negative integer and truncated nature of RF trip data, standard Ordinary Least Squares (OLS) method may not be proper to estimate TC demand function (Shrestha *et al.*, 2002). For this reason, it is suggested to use Poisson (POIS), or Negative Binomial (NBIN) probability dispositions in econometric models (Creel and Loomis, 1990; Hellerstein, 1991; Winkelmann, 2000; Shrestha *et al.*, 2002).

Differently from the POIS distribution of count data models which consider mean and variance equality of trip counts, there is widespread alternative approach for overcoming mean-variance equality, called as NBIN (Gillig *et al.*, 2000; Winkelmann, 2000; Bilgic and Florkowski, 2007; Park *et al.*, 2002; Shrestha *et al.*, 2002). The NBIN model avoids the mean-variance equality by introducing an additional heterogeneity parameter estimation into the model.

Probability in using NBIN distributions result from a contagious process or from heterogeneity of the rate at which events occur. A random variable X has a NBIN distribution with parameters $\alpha \geq 0$ and $\theta \geq 0$, written X ~ NBIN (α, θ), if the probability function is given by (Winkelmann, 2000),

$$P(X=k)=\frac{\tau(\alpha+k)}{\tau(\alpha)\tau(k+1)}+\left(\frac{1}{1+\theta}\right)^{\alpha}+\left(\frac{1}{1+\theta}\right)^{k} \quad k=0,1,2\ldots$$

(1)

τ, denotes the gamma function such that

$$\tau(s)=\int_0^{\infty} z^{s-1}e^{-z}dz$$

for s > 0 (2)

This two parameter distribution has probability generating function

$$P(s)=[1+\theta(1-s)]^{-\infty} \quad (3)$$

The mean and variance are given by

$$E(X)=\propto\theta \quad (4)$$

and

$$Var(X)=\propto\theta(1+\theta)=E(X)(1+\theta) \quad (5)$$

since $\theta \geq 0$, the variance of the NBIN distribution generally exceeds its mean ('overdispersion'). The overdispersion vanishes for $\theta \rightarrow 0$.

The NBIN distribution comes in various parameterizations. From an econometric point of view, the following considerations are applied. In order to use the NBIN distribution for regression analysis, the first step is to convert the model into a mean parameterization, say

$$\beta=\propto\theta \quad (6)$$

where β is the expected value. Inspection of this equality shows that there are two simple ways of doing this.

1. $\infty=\beta / \theta$. In this case, the variance function takes the form

$$Var(X)=\beta(1+\theta) \quad (7)$$

Hence, the variance is a linear function of the mean. This model is called 'NBIN I'.

2. $\theta=\beta / \infty$. In this case, the variance function takes the form

$$\mathrm{Var}(X\beta) = \ + \alpha\beta^{-1}) + \ ^{2}$$

A NBIN distribution with quadratic variance function results.

$$P(X=k) = \frac{\tau\left(\frac{\beta}{\theta}+k\right)}{\tau\left(\frac{\beta}{\theta}\right)\tau(k+1)} + \left(\frac{1}{1+\theta}\right)^{\frac{\beta}{\theta}} + \left(\frac{\theta}{1+\theta}\right)^{k}$$

This model is called 'NBIN II'.

The probability functions associated with the two models are as follows:

NBIN I:

$$P(X=k) = \frac{\tau\left(\frac{\beta}{\theta}+k\right)}{\tau\left(\frac{\beta}{\theta}\right)\tau(k+1)} + \left(\frac{1}{1+\theta}\right)^{\frac{\beta}{\theta}} + \left(\frac{\theta}{1+\theta}\right)^{k} \qquad (8)$$

NBIN II:

$$P(X=k) = \frac{\tau(\propto +k)}{\tau(\propto)\tau(k+1)} + \left(\frac{\propto}{\propto+\beta}\right)^{\alpha} + \left(\frac{\beta}{\alpha+\beta}\right)^{k} \qquad (9)$$

In another summarized NBIN distribution for overdispersed count data is showed below (Shrestha *et al.*, 2002);

$$f(Z=z) = \frac{\tau(z+1/\propto)}{\tau(z+1)\tau(1/\propto)}(\propto\lambda)^{z} + (1+\propto\lambda)^{-(z+1/\alpha)} \qquad (1)$$

Where, α > 0 is nuisance parameter. The first two moments of the NBIN distribution are,

$$E(Y|X) = \lambda = exp(X\beta) \quad (11),$$

$$Var(Y|X) = \lambda\ (1+\alpha\lambda) \quad (12),$$

where

$$\mathrm{E(Y\,|\,X)} < \mathrm{Var(Y\,|\,X)} \quad (13)$$

(Shrestha *et al.*, 2002). And a specified simple NBIN equation is showed below;

$$NB(\beta = \exp(XB), \propto) \quad (14)$$

Overdispersion problem determined for count data in the study forced us to use Negative Binomial Regression (NBREG) model. In this study, zero-truncated negative binomial regression (ZT-NBREG) model was used because of the over-dispersed and truncated nature of the count data. ZT-NBREG was used to assess factors affecting trip data and to calculate CS of recreational fishers (Gillig *et al.*, 2000; Winkelmann, 2000; Park *et al.*, 2002; Shrestha *et al.*, 2002; Bilgic and Florkowski, 2007). The most common form of truncation in over-dispersed count data is (left) truncation at zero. Truncated poisson and negative binomial models have been discussed, among others, by Creel and Loomis (1990), Grogger and Carson (1991).

Mean and variance of the truncated at zero negative binomail model are given by

$$E_{tz}(y|\lambda, y>0) = \frac{\lambda}{1-(-\lambda)} \quad (15) \quad \text{and}$$

$$\mathrm{Var}_{tz}(y|\lambda, y>0) = E(y\,|\,\lambda, y>0)\left(1-\frac{\lambda}{exp(\lambda)-1}\right) \quad (16).$$

Since λ (the mean of the untruncated distribution) is greater than zero, 0<exp (-λ)<1 and the truncated mean is shifted to the right. Morover, the truncated-at-zero model displays underdispersion since $0 < 1 - \lambda / (\exp(\lambda) - 1) < 1$ (Winkelmann, 2000).

If $\mathrm{E}(\mathrm{TRIPS}_{,}\lambda) = \quad {}_{i}$ (17) is showed, general equation can be summarized as below:

$$ln\,\lambda_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + ..\,.; \beta, \varepsilon$$
(18)

In the equation, $TRIPS_i$ is the number of trips by individual i, (λ_i also states number of trips taken by individual i, β is the vector of parameters (β_0 is the constant term, β_1, β_2, β_3 are coefficients of independent variables which include travel costs, demographic dimensions) and ε is random error term.

Consumer surplus is found by using integral of recreational demand function.

$$\int \lambda_i dp = \lambda_i / \beta \quad (19)$$

$$CS_{per\ trip} = \int_{T_s}^{T^0} \lambda_i dT = -\lambda_i / \beta_T \quad (20)$$

In the equation above, $CS_{per\ trip}$ represents individual consumer surplus for each trip, T_s, actual sample mean of each trip cost, T^0 is the choke recreation trip cost, β_T is the estimator of individual trip cost variable on demand function and λ_i is the expected latent quantity demand. Consumer surplus per fisher for each trip is calculated by $-1/\beta_T$. By using this fraction, recreational consumer surplus can be calculated for sampled population. Then, demand curve can be improved by using equation above which expected to show negative relation between number of trips and travel cost per trip in Figure 1.

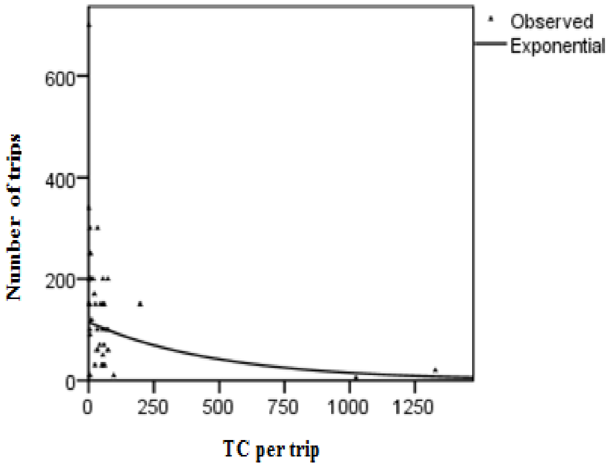

Figure 1. RF demand curve (Total travel cost/Annual visit)

As mentioned before, POIS models generally used to analyze count data while Ordinary Least Squares (OLS) model for count data is inappropriate because of overdispersed or endogenous distribution of data. In this study, ZT-NBREG models are used as an alternative to POIS models to overcome overdispersed count data to handle the mean-variance equality. Overdispersion in the data set was also proved by histogram plot which showed right skewness of number of fishing trips taken during the year.

RESULTS

Demographics

Survey results from a total number of 50 respondents show that 98% of the respondents supported the idea of RF is a male dominant activity. Ages of respondents were categorized as 0-20, 21-40, 41-60 and over 61. It was also found that recreational fishers 41-60 years of age had the highest share (50%), they were followed by fishers 21-40 years of age (38%), fishers over the 61 (10%), fishers 0-20 years of age (2%). Besides, considerable amount of respondents (74%) were married. While the percentage of educated respondents was % 96, secondary school degree and high school degree got the biggest and equal shares as 30%. They were followed by primary school degree (22%), and bachelor degree (14%). Monthly income of participants of questionnaire was analyzed according to 6 groups (Turkish Liras: TL): 0-500 TL, 501-1000 TL, 1001-1500 TL, 1501-2000 TL, 2001-2500 TL, 2500-3000 TL (monthly income levels). Survey results showed that fishers with 501-1000 TL monthly income ranked first (36%), and they were followed by 1001-1500 TL (28%), 1501-2000 TL (12%), 0-500 TL (6%) and 2500-3000 TL (2%). Generally, 36% of respondents were retired, while artisan individuals constituted the biggest share by 40%. Then, self-employed individuals with 14% and offices with 10% followed them.

Recreational Activity

High seasons for RF activity were assessed by participation levels on each month. Generally, in June, July, August, September and October, anglers showed highest continuous participation for fishing while occasionally participation takes highest ranks throughout the year except July, August, September when is most popular months for RF along the coasts of inner bay.

70% of respondents mainly indicated that they have tendency to participate RF whenever they want, while 18% of respondents were stated weekends. By the way, 98% of respondents were basically shore-based anglers. Generally, 36% of survey respondents have a RF license that is not compulsory to own in Turkey. Average personal fishing experience was calculated as 18.8±15.1 years for anglers who also participates hunting with low percentage (20%). Hours spent on fishing were ranged from 2 to 10 with an average 4.74±1.9. Unlike monthly individual participation days in winter (10.3±7.1), summer period showed higher participation (15.0±8.1).

Average daily catch (DCATCH) was calculated as 0.88 kg, whereas average daily fishing hours (FHOURS) were 4.74 hours (4 hours, 44 minutes) in a day. DCATCH/FHOURS was calculated as 0.42 kg. With a high TCOST value per individual was calculated as 14.14±18.1 TL, and hourly cost of fishing trip (TCOST/FHOURS) was 2.98 TL; however, average daily transportation costs were calculated as 1.44 TL and the mean arrival time was 15.3 minutes to the fishing site.

Target species caught with high rates are composed of White Seabream, European Squid, Gilthead Seabream, European Common Cuttlefish, European Seabass, Mugilid Mullets, Common Two-Banded Seabream, Atlantic Horse Mackerel, decreasingly (Table 1).

Model

For the operated ZT-NBREG model, variables were included as listed in Table 2. Statistically significant and some important demographic and technical variables were included in the model to show relations. For TCOST variable includes transportation, bait, equipment and other costs (food, drink etc.) were included. Descriptive statistics of variables in the model were also demonstrated in Table 3.

Total number of average RF trips was calculated as 143.4±113.33, while mean total trip cost per fisher was stated as 14.14±18.10 TL in which high average opportunity cost of time was not included to prevent TC bias for people who preferred working to fishing (44.6 TL). Only average yearly total transportation to the coast of the bay was 207±522.07 TL. In addition, mean number of hours spent for a daily fishing trip was 4.74±1.90 hours whereas personal fishing experience was 18.75±15.08 years.

Table 2. Definitions of the variables used in the ZT-NBREG model

TRIPS	Dependent variable, number of RF visits to İzmir inner bay in the last 12 months.
TCOST	Total round trip travel costs in TL
GEARVAL	Total present value of owned fishing equipment
AGE	Respondents' age
INC	Respondents' monthly income in TL (1:Under 500 TL, 2:501-1000 TL, 3:1001-1500 TL, 4:1501-2000 TL, 5:2001-2500 TL, 6:2501-3000 TL)
EXP	Respondents' personal RF experience in years
TOTCATCH	Total amount of fish caught during last year in kg

Table 3. Descriptive statistics of the variables used in the regression model

Variables	Mean	Std. Dev.	Min.	Max.
TRIPS	143.4	113.33	10	340
TCOST	14.14	18.1	0.88	62.4
GEARVAL	882.9	1,154.09	10	5,000
AGE	45.04	12.81	17	71
INC	3	1.26	1	7
EXP	18.75	15.08	1	60
TOTCATCH	125.75	165.11	3	992

Min., minimum; Max., maximum; Std. Dev., standard deviation; N=50.

Demand model was estimated by considering crucial variables for nature of TC demand model, TRIPS as dependent variable and TCOST as independent variable; whereas, GEARVAL, AGE, INC, EXP, TOTCATCH were included as other independent variables (Table 4).

In general, statistically significant variables were consistent with prior expectation demonstrating highly statistically significance between the number of trips and total daily trip costs. This evidence is the primary expected result of recreation demand models, suggesting a downward sloping demand curve where anglers take fewer RF trips as costs of travel increase. Morover, the total value of individual owned gear, total yearly individual catch, RF experience in years and monthly individual income of respondents were found to be positively correlated with the number of RF days in a year. Respondents who pay more for RF equipment ($p<0.01$) and who catch more in RF ($p<0.1$) were determined to participate more fishing trips in a year. In addition, one year increase in the RF experience results in 4% increase in the RF days ($p<0.1$) whereas, one level increase in the salary of respondents (Table 2) resulted 8% more RF trips in a year. Lastly, consumer surplus per fisher was calculated by fraction below (17):

(17)

$$CS = -1/\beta_T$$

Table 4. Estimation of RF demand model via ZT-NBREG

Independent Variables	Coefficient	Std. Errors
TCOST	-0.04***	0.01
GEARVAL	0.00***	0.16
AGE	0.01	0.07
INC	-0.08*	0.00
EXP	0.04*	0.15
TOTCATCH	0.00*	0.01
Constant	4.28	0.23
Dependent variable	TRIPS	
Log likelihood	-412.10	
Likelihood Ratio Chi^2	63.34	
Alpha	0.41	0.01
Pseudo R^2	0.06	
Log L	-273.0589	
Number of Observations	50	

*** Coefficient significant at $P\leq0.05$ or better.

** Coefficient significant at $P\leq0.05$ or better.

* Coefficient significant at $P\leq0.10$ or better.

CS was calculated as 25 TL by dividing -1 into -0.04 which is reasonable value compared to past recreational demand studies. Even if the number of recreational fishers is not known in full, number of licensed anglers can be taken into consideration to calculate total recreational benefits of angling. There are currently 7,669 licensed recreational fishers in İzmir according to ministry records. By considering the average number of trips (143.4), estimated total number of fishing trips was calculated as 1,099,735. Then, finally, total attributed consumer surplus with 27,493,375 TL can be represented by multiplying estimated total number of fishing trips (1,099,735) by calculated consumer surplus (25 TL).

DISCUSSION

Shore-based fishing activity in İzmir Inner Bay seems to be an important marine related recreational activity which has a high potential participation regarding the high resident population around the coast of bay. The biggest forcing power to participate such an activity is accessibility to the bay and existence of important target species were defined (Table 1). In addition, 78% of the respondents' generally caught their maximum amount of fish on shore which explains the dependence and availability of fishing on the central coast of İzmir.

By deeply querying activity related expenditures of recreational fishermen, other costs including foods, drinks were found to get the biggest share among expenditures by 13.69% whereas fishing equipment, bait and transportation costs got shares as 9.66%, 5.90%, 4.44%, respectively. However, opportunity cost of time was stated to be the highest cost to RF participators with 66.32% share, but it was, generally, thought that RF as a leisure time activity so that opportunity cost of time were excluded although considerable amount of fishers were represented as full time workers. It is essential to emphasize that economic value of RF is not only about the expenditures relating RF, but also the opportunity cost of time. But over attribution of opportunity cost of time through overall expenditures drove us not to include.

While 54% of fishermen have no idea about the legal fishable sizes of target species, 24% of the fishermen have partially idea on legal sizes. 84% of survey fishermen have not got a RF circular. In addition to that, 96% of fishermen have no membership to any non-governmental organization (NGO); however, 44% of them found that the RF regulations are legally insufficient and 48% have no idea about the appropriateness of RF regulations. These represent great indifference of respondents on regulations and management.

There was no observed tendency to attend any RF NGO, that's why any of the respondents have a membership to an RF NGO. Besides, indifference to know legal sizes and the most important fact that İzmir Inner Bay is closed all fishing activities according to Turkish Fishing Circular should be focus points of RF (Anonymous, 2008). Therefore, angling management organizations (AMOs) can be introduced to be the most effective solution for more sensitive and coherent activity.

NBIN or other all count data models should be well understood and defined to calculate value rising from RF. The econometric model showed us distinct negative relationship between travel costs and travel counts as expected, even if the participators of the coasts were not coming from so far. RF in the bay was highly valued as 42,757,681 TL although opportunity costs of time for employed respondents were not considered.

In addition to calculated non-market benefits of RF via TC, it is thought to be realistic scenario that if total market value of species caught by 50 individual recreational fishermen is 234,290.3 TL during a year, attribution of this result for 7,669 licensed fishermen will give us 35,935.424 TL, which is a considerable value for such a recreational activity.

As a result, high amounts of catch, high market and non-market value high attraction, RF seem to be a crucial leisure timed activity for coastal people. TC demand functions are indispensable to put forward the portrait of RF activities where it is practiced as in Izmir Inner Bay case. And, this preliminary study showed general profile of RF in the bay which will guide to conduct future studies concerning economic value of RF via TC method in Turkey.

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