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Determination of information resources of earthen pond fish farmers in Milas district, Muğla province, Turkey

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Abstract

This study aimed to identify the main sources of information for earthen pond fish farmers in the Milas district of Muğla province. The main materials were obtained from 56 earthen pond fish farmers, constituting 39% of all earthen pond fish farmers in the study area. Results show that earthen pond fish farmers' own knowledge and experiences are regarded as important information resources. Probit models were used to determine the factors affecting the information acquisition decisions of earthen pond fish farmers. PC/internet usage had positive significant effect on earthen pond fish farmers' information acquisition decisions related to fish feeding. In contrast, earthen pond fish farmers' education level, and earthen pond fish farming experience had negative significant effect. Earthen pond fish farming experience had negative significant effect on earthen pond fish farmers' information acquisition decisions related to fish disease and pest control. Earthen pond fish farming experience, credit usage and reading newspapers had negative significant effect on earthen pond fish farmers' information acquisition decisions related to pond maintenance. Earthen pond fish farming experience, participation in the seminars about earthen pond fish farming and listening radio had positive significant effect on earthen pond fish farmers' information acquisition decisions related to fish marketing. In contrast, number of earthen ponds had negative significant effect.

Key words: Earthen pond, information, information sources.

Introduction

Aquaculture is an important economic activity in the coastal and rural areas in Turkey. It offers opportunities to create employment, helps community development, reduces overexploitation of natural aquatic resources, and contributes to enhance food security. It is estimated that the aquaculture sector in Turkey provides employment for around 25,000 people. Aquaculture has developed to such an extent that Turkey is currently one of the largest finfish aquaculture producers in the world and the second largest producer of sea bass, sea bream and rainbow trout [10]. Sea bream and sea bass account for 42.36% of total national fish production in Turkey [19].

Sea fish farming in earthen ponds was commenced in Milas district of Muğla Province towards the end of 1980s. Fish farming was initiated with the production of sea bass and sea bream, and has continued for along time [16].

The concept of information has been generally or universally viewed as a basic resource which all people use to improve their condition of living and is essential to development process [17, 23]. Information is defined as data that have been put into a meaningful and useful context which is communicated to a recipient who uses it to make decisions [1]. Learning and information accumulation are hypothesized to play a major role in innovation diffusion [12]. Agricultural information can be seen as an important factor which interacts with the other production factors such as land, labour, capital and managerial ability [7]. Agricultural information interacts with and influences agricultural productivity in a variety of ways. It can help inform decisions regarding land, labour, livestock, capital and management. Agricultural productivity can arguably be improved by relevant, reliable and useful information and knowledge [8]. Access to the right information at the right time in the right format and from the right source may shift the balance between success and failure of the farmer [24]. Farmers' access to information about a technology, economic motivation and resources endowment are important in adoption of a recommended package of fish farming technology [28]. Information accumulation improves farmer's knowledge on farming practices which in turn reduces uncertainty and therefore induces new technology adoption by risk-averse operators [13].

Information channels include several sources through which people gain certain information and interact with their surrounding environment [18]. Farmers may acquisite information about new technology from various sources such as extension services, farmer organizations, neighbours, friends, relatives, input-sellers, output-sellers, radio, TV, printed materials, internet and others. Acquisition information is important for farmers. Farmers use information sources for making production, marketing, and financial decisions related to their farm business [9, 14]. The effectiveness of sources and frequency of agricultural information availability then becomes of paramount importance, if any meaningful development is to be achieved. Information sources

may also have contributory linkages to the utilization of information, essential in packaging and adapting information for local relevance [11].

The study was conducted in two phases. First, earthen pond fish farmers' information sources were determined. The second phase probit models were used to determine the factors affecting the information acquisition decisions of earthen pond fish farmers.

Materials and Methods

Study site: Milas is a district of Muğla province. The district is located at the country's south-western corner (Figs. 1 and 2). Milas is an important historical and touristic district called "Civilizations City" with its past 5000 years and cultural diversity. Milas is not only the cradle of sea tourism but also cradle of nature and culture tourism. Milas is a mark with a natural organic agricultural product, the purpurin Milas carpet, the hospitable friendly people and the easiness of transportation with highways sea route airway [4].

The district has an important agricultural and aquacultural potential. Milas is the most important olive and olive oil producing region of Aegean region. As of 2010, Milas district has the potential of olive trees by 6.86% of Turkey, in addition Milas district has the capability to fulfill the current demand of the Turkish olive oil by 7.28% [26]. Milas district also accommodates the presence of beehive by 2.14% in Turkey. On the other hand, 1.11% of whole honey production in Turkey has been fulfilled in Milas [27].

Aquaculture is a very important sector for Milas economy. The district achieved to export total 18,435.97 tons of fish in 2008. Approximately 100 million fish fries are being produced in 4 hatcheries in the district [3].

All of the earthen pond fish farmers raises fishes in the earthen ponds and they provide the fingerlings from local hatcheries. Generally sea basses and sea breams are produced in these farms.

Materials: The main material of the study consisted of the primary data collected by the survey conducted by the earthen pond fish farmers in the villages of Avşar, Yaşyer, Savran, Ekinambarı, İçme, Akyol, Kıyıkışlacık and Baharlı in Milas district. There were 142 earthen pond fish farmers in Milas 2011 [5]. The sample volume was determined through the proportional sampling method [21]:

$$n = \frac{Np\,(1\text{-}p)}{(N\text{-}1)\,\sigma_{px}^{\,2} + p(1\text{-}p)}$$

In this equation n = sample volume, N= population (142), p= proportion of earthen pond fish farms (0.50) and $\sigma_{px}^{\,2}$ = Variance of ratio ($\alpha = 0.10$, $\sigma_p = 0.06079$).

The proportion of earthen pond fish farmers was taken as 0.50 to reach maximum sample volume and calculated as 47. In case that the earthen pond fish farmers do not wish to participate in the survey or that they may leave the survey unfinished, back-up surveys which are 20% of the sample size were conducted and 56 completed surveys were evaluated (Table 1).

Methods: In this study probit model was applied to determine the factors influencing decisions regarding information acquisition of earthen pond fish farmers.

The Probit model constrains the estimated probabilities to be between 0 and 1, and relaxes the constraint that the effect of independent variables is constant across different predicted values of the dependent variable. The probit model assumes that while

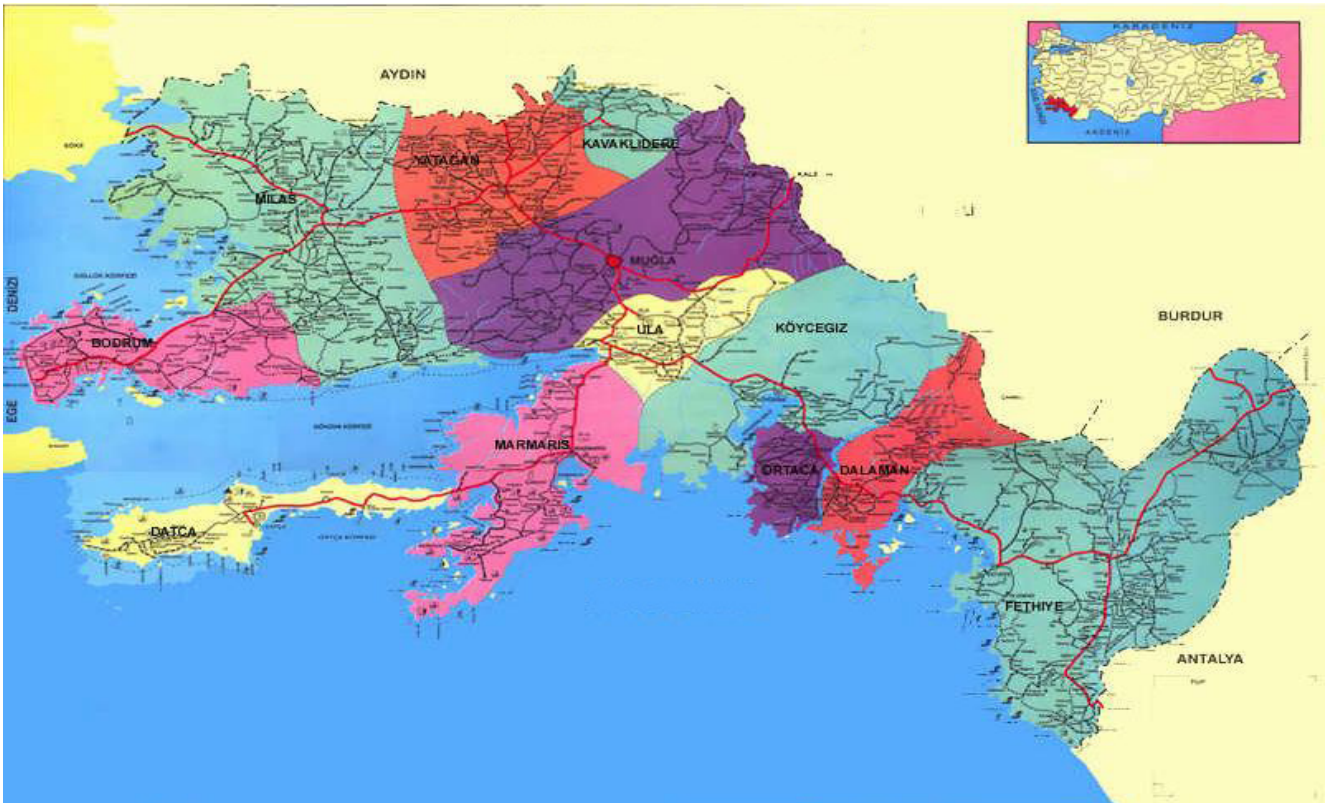

Figure 1. Map of Muğla province [2].

Figure 2. Map of Muğla province[2].

Table 1. Definitions of dependent and independent variables (n = 56).

Variables	Description	Mean	Std. dev.
A.Dependent variables			
y_1	= 1 if earthen pond fish farmer acquisition information about fish feeding, zero otherwise	0.4285714	0.4993502
y_2	= 1 if earthen pond fish farmer acquisition information about fish disease&pest control, zero otherwise	0.8928571	0.3120939
y_3	= 1 if earthen pond fish farmer acquisition information about maintenance of earthen ponds, zero otherwise	0.2678571	0.4468505
y_4	= 1 if earthen pond fish farmer acquisition information about fish marketing, zero otherwise	0.5178571	0.5042031
B.Independent variables			
AGE	Age of earthen pond fish farmer (in years)	48	9.318603
POP	Household population (persons)	3.803571	1.367408
EDU	Education period (in years)	7.392857	3.519703
EXP	Earthen pond fish farming experince of earthen pond fish farmer (in years)	8.089286	6.359751
COOP	=1 if earthen pond fish farmer is cooperavative member, zero otherwise	0.5357143	0.5032363
POND	Number of earthen ponds	5.803571	3.42939
SEM	=1 if earthen pond fish farmer participated in the seminar about earthen pond fish farming, zero otherwise	0.5892857	0.4964157
CRE	=1 if earthen pond fish farmer get credit, zero otherwise	0.8392857	0.370591
RAD	=1 if earthen pond fish farmer listen to the radio, zero otherwise	0.4821429	0.5042031
NWS	=1 if earthen pond fish farmer read to the newspaper, zero otherwise	0.7142857	0.4558423
MAG	=1 if earthen pond fish farmer read to the aquaculture magazines regularly, zero otherwise	0.4464286	0.5016207
PC	=1 if earthen pond fish farmer use PC/internet, zero otherwise	0.5535714	0.5016207
REC	=1 if earthen pond fish farmer keep farm records regularly, zero otherwise	0.6785714	0.4712514
AGR	=1 if earthen pond fish farmer do agricultural activity	0.5178571	0.5042031

we only observed the values of 0 and 1 for the variable *Y*, there is a latent, unobserved continuous variable *Y** that determines the value of Y . We assumed that Y* can be specifed as follows:

$$Y_i^* = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + ... + \beta_k x_{ki} + u_i$$

and that:
Y_i=1 if Y_i^*>0
Y_i = 0 otherwise

where x_1, x_2,..., x_k represent vectors of random variables, and u represents a random disturbance term [20].

Results

In order to determine the information resources which the earthen pond fish farmers use for being aware of the earthen pond fish farms, the farmers were asked a question "how did you first learn about the earthen pond fish farming?". Most of farmers (94.64%) tell that they first heard about the earthen pond fish farming concept from their friends. One of the earthen pond fish farmers (1.79%) tells that he heard this concept from the district/provincial directorates of Food Agriculture and Livestock, and other farmers (1.79%) tell that he first heard it from a university. There is also another earthen pond fish farmer saying that he is the first farmer to have done earthen pond fish farming in the region.

Of the earthen pond fish farmers 62.50% think that they are well-informed about earthen pond fish farming, however, 37.50% of them think that

Table 2. Information needs of earthen pond fish farmers.

	Number	%
Feeding the fishes	19	33.93
Disease and pest control	17	30.36
Maintenance of the ponds	4	7.14
Providing and using earthen pond fish farming equipments	2	3.57
Marketing	20	35.71
Credit	2	3.57
Legal arrangements	10	17.86
Raising fingerlings	1	1.79
Groundwaters	1	1.79
Alternative energy resources	1	1.79
New fish species to be raised	1	1.79
No need for information	4	7.14

*The total number exceeds 100% since the answers are multiple.

they do not have enough information of it. Earthen pond fish farmers need information about several topics on fish farming technologies (Table 2). According to the Ofuoku *et al.* [22], the farmers need information on feeding the fishes (79.2%), disease and pest control (54.2%) and marketing (38%).

The earthen pond fish farmers' own knowledge and experiences are regarded as important information resources (Table 3). In the study in Nigeria aiming to determine the information resources of the farmers, Ugboma [25] found out that 63% of the farmers rely on their own experiences while making production and experiences of the farmers are the most important information resources. Boz and Ozcatalbas [6] found that farmers' own personal experiences and other farmers were the most important sources of technical information. Ghunaim *et al.* [15] pointed out that farmers rely on their own experience for making farm management decisions such as fertilizer selection and application, crop selection, irrigation methods, business and marketing.

The results obtained from the probit model estimation are summarised in Table 4. The results show that PC/internet usage had significant positive effect on the farmers' decision to acquisition information about fish feeding. Conversely, education level, and earthen pond fish farming experience had significant negative effect on farmers' decision to acquisition information about fish feeding. Earthen pond fish farming experience had significant negative effect on farmers' decision to acquisition information about disease and pest control. Earthen pond fish farming experience, credit usage, and reading newspapers had significant negative effect on farmers' decision to acquisition information about pond maintenance. Earthen pond fish farming experience, listening radio, and participation in the seminars had significant positive effect on the farmers' decision to acquisite information about fish marketing. Conversely, number of ponds had significant negative effect on farmers' decision to acquisite information about fish marketing.

Marginal effects from the probit models are presented in Table 5. Depending on the increase of internet/PC usage, the possibility of the farmers to get information about the fish feeding increased by 47.04%. On the other hand, as long as the education level increased, the possibility of the farmers to get information about the fish feeding decreased by 6.23%. As long as the earthen pond fish farming experience increased, the possibility of the farmers to get information about the pond maintenance decreased by 3.42%. Also, while the reading newspaper rate of the farmers increased,

Table 3. The information resources used by the earthen pond fish farmers in various activities.

	Number*	%
Information resources of the earthen pond fish farmers regarding fish feeding		
Own experiences	33	58.93
Other farms	5	8.93
District/Provincial Directorates of Food Agriculture and Livestock	2	3.57
Feed dealers	4	7.14
Fish fingerlings companies	4	7.14
Veterinarians	7	12.50
Aquacultural engineers	8	14.29
Information resources of the earthen pond fish farmers regarding disease&pest control		
Own experiences	6	10.71
Other farms	2	3.57
Veterinarians	39	69.64
Internet	1	1.79
Aquacultural engineers	4	7.14
Fish fingerlings companies	8	14.29
Information resources of the earthen pond fish farmers regarding the maintenance of the ponds		
Own experiences	42	75.00
Other farms	6	10.71
District/Provincial Directorates of Food Agriculture and Livestock	2	3.57
Veterinarians	6	10.71
Aquacultural engineers	2	3.57
Fish fingerlings companies	1	1.79
Information resources of the earthen pond fish farmers regarding fish harvest technique		
Own experiences	49	87.50
Producer union	1	1.79
Other farms	8	14.29

*The total number exceeds 100% since the answers are multiple.

Table 4. Results of Probit model.

	Coefficient			
Independent variables [a]	Feeding	Disease&Pest control	Maintenance	Marketing
CONSTANT	3.009403	0.7435562	1.142586	1.281797
	(2.659267)	(3.170276)	2.323962	(2.02072)
AGE	0.0273232	0.0326522	0.0031465	-0.0424923
	(0.0375546)	(.0476254)	(0.036784)	(0.029464)
POP	0.2157431	-0.3189748	0.1546772	0.0353413
	(0.2153539)	(.3259152)	(0.185023)	(0.1682775)
EDU	-0.1937008*	-0.0763418	0.137098	0.0270229
	(0.1038188)	(.1303719)	(0.0977578)	(0.09464)
EXP	-0.29259***	-0.1664808*	-0.1512373**	0.0978607*
	(0.0928805)	(.0925815)	(0.0745746)	(0.058054)
COOP	-0.6460722	1.344562	0.2590658	-0.6141285
	(0.7164799)	(1.117262)	(0.7439582)	(0.6146694)
POND	-0.1750381	0.3020461	0.0336326	-0.3689674***
	(0.128698)	(.234718)	(0.1053427)	(0.1385676)
SEM	-0.2732108	-0.4927901	-0.3909249	1.123286**
	(0.4881)	(.71605959	(0.5478579)	(0.5191288)
CRE	-0.339615	0.6373003	-1.469.307*	1.205303
	(0.8753407)	(1.119132)	(0.8890299)	(0.7328672)
RAD	0.2771405	1.06243	-0.3036398	1.159791**
	(0.5278837)	(.9265294)	(0.561763)	(0.5372938)
NWS	-0.6820238	-0.9496813	-1.338.389*	0.5906154
	(0.5530102)	(.9344499)	(0.726146)	(0.5850157)
MAG	-0.8099415	0.067671	-0.0856563	-0.0593204
	(0.5839771)	(.9329301)	(0.5438191)	(0.470396)
PC	1.634.557*	-0.1276065	0.6174423	-0.1255754
	(0.8833198)	(.8606281)	(0.7728379)	(0.6428955)
REC	-0.4330391	0.6735203	-0.5227656	-0.0639312
	(0.6072781)	(.7464125)	(0.595788)	(0.5437879)
AGR	-0.1644823	-0.2363365	-0.8770853	-0.8303101
	(0.6705907)	(1.014329)	(0.6088033)	(0.5540988)

[a]For variable definitions see Table 1.
[b]Numbers in paranthesis are standart errors.
*, **, and *** represent statistical significance at 10%, 55, and 1% levels, respectively.

Table 5. Marginal effects of the Probit model.

Independent variables [a]	Feeding	Disease&Pest control	Maintenance	Marketing
AGE	0.0087981	0.0016515	0.0007117	-0.0169495
	(0.01168)	(0.00247)	(0.0083)	(0.01176)
POP	0.0694691	-0.0161337	0.0349889	0.0140971
	(0.06844)	(0.01787)	(0.04094)	(0.06712)
EDU	-0.0623715*	-0.0038614	0.0310124	0.010779
	(0.03399)	(0.00727)	(0.02213)	(0.03775)
EXP	-0.0942138***	-0.0084206	-0.0342108**	0.039035*
	(0.02337)	(0.00785)	(0.01431)	(0.02317)
COOP	-0.2089519	0.0908023	0.0580497	-0.2412028
	(0.22448)	(0.10955)	(0.1633)	(0.2339)
POND	-0.0563622	0.0152775	0.0076079	-0.1471751***
	(0.03927)	(0.01536)	(0.02388)	(0.05515)
SEM	-0.0891958	-0.023531	-0.091757	0.4230109**
	(0.16159)	(0.03558)	(0.12897)	(0.17403)
CRE	-0.1167453	0.0507436	-0.470115	0.4182782**
	(0.32136)	(0.1238)	(0.30926)	(0.19376)
RAD	0.0893621	0.0593361	-0.0683262	0.4380125**
	(0.17162)	(0.06762)	(0.12606)	(0.18118)
NWS	-0.2356973	-0.0357596	-0.382643*	0.2299247
	(0.19851)	(0.04902)	(0.21533)	(0.21785)
MAG	-0.2497274	0.0033997	-0.0192821	-0.0236571
	(0.17736)	(0.04619)	(0.1212)	(0.18753)
PC	0.4704846**	-0.0063788	0.1351735	-0.0500617
	(0.20236)	(0.04305)	(0.16157)	(0.25599)
REC	-0.1454817	0.0453285	-0.1299577	-0.0255001
	(0.20816)	(0.08652)	(0.15841)	(0.21684)
AGR	-0.0530305	-0.0119384	-0.2022281	-0.3219708
	(0.21842)	(0.05364)	(0.14713)	(0.20281)

[a]For variable definitions see Table 1.
[b]Numbers in paranthesis are standart errors.
*, **, and *** represent statistical significance at 10%, 5%, and 1% levels, respectively.

the possibility of the farmers to get information about the pond maintenance decreased by 38.26%. While the earthen pond fish farming experience, seminar participation, credit use and radio listening rate increased, the possibility of the farmers to get information about the fish marketing increased as well. On the other hand, as long as the number of the ponds increased, the possibility of the farmers to get information about the fish marketing decreased by 14.71%.

Discussion

It has been seen that there is an important development in earthen pond fish farming in Milas for the last years. Of the earthen pond fish farmers 82.14% involved in the research started to operate in 2001 and later. The research showed that the earthen pond fish farmers' own experiences and benefiting from the other earthen pond fish farmers' experiences play an important role in earthen pond fish farming activities. The earthen pond fish farmers rely on their own experiences in feeding the fishes (58.93%), maintenance of the ponds (75%) and marketing (51.79%). On the other hand, 10.71% and 37.50% of the earthen pond fish farmers consult the other earthen pond fish farmers regarding the maintenance of the ponds and marketing, respectively.

In this study, it was concluded that PC/internet usage had positive significant effect on earthen pond fish farmers' information acquisition decisions related to fish feeding. Also earthen pond fish farming experience, participation in the seminars about earthen pond fish farming and listening radio had positive significant effect on earthen pond fish farmers' information acquisition decisions related to fish marketing.

Of the earthen pond fish farmers 37.50% did not have enough knowledge of earthen pond fish farming. On the contrary, it has been found out that the producers did not visit the district/provincial directorates of Food Agriculture and Livestock very often. Approximately half of the earthen pond fish farmers (48.22%) visited the district/provincial directorates of Food Agriculture and Livestock in every four or six months.

It has been determined that almost none of the earthen pond fish farmers had education on earthen pond fish farming. This fact proves that local knowledge and scientific knowledge are not associated properly regarding earthen pond fish farming. For this reason, an education and extension project of earthen pond fish farming needs to be prepared and information transfer to the earthen pond fish farmers regarding the necessary subjects such as raising animals, marketing, alternative energy resources, and legal arrangements should be accomplished.

The study found out that earthen pond fish farmers need information on various earthen pond fish farming activities. They need information on marketing (35.71%), feeding (33.93%) and disease and pest control (30.36%). Taking these information needs into consideration, brochures, leaflets and booklets including various subjects on earthen pond fish farming should be prepared and distributed to the earthen pond fish farmers by district/provincial directorates of Food Agriculture and Livestock.

The relations between the earthen pond fish farmers and the agricultural extension experts in the district/provincial directorates of Food Agriculture and Livestock should be strengthened. To this end, the visits between the earthen pond fish farmers and the agricultural extension experts should be increased. Milas Freshwater Aquaculture Producers Union should focus on marketing extension activities in order to give support to the earthen pond fish farmers.

Conclusions

Earthen pond fish farmers need information about earthen pond fish farming. Most of earthen pond fish farmers rely on their own experience. Also earthen pond fish farmers get information from different sources.

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