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The Current Situation, Problems and Proposed Solutions of Aquarium Businesses in Erzurum Province

Erzurum İlinde Yer Alan Akvaryum İşletmelerinin Mevcut Durumu, Sorunları ve Çözüm Önerileri

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ABSTRACT

This research was conducted to reveal the general situation of aquarium businesses operating in Erzurum, identify current problems and propose solutions to these issues. It was observed that the 10 active aquarium businesses in the province were concentrated in three central districts. A questionnaire, consisting of both open-ended and closed-ended questions tailored to the research objectives, was administered to these 10 businesses through face-to-face interviews. The research findings indicated that 60% of the aquarium businesses were tenants, all personnel were male, the owners were older and more experienced than the employees, and 70% of them were university graduates. It was determined that all operators sourced their fish domestically, made retail sales, experienced an increase in sales during the winter months, sold a total of 9 fish species, with Japanese (*Carassius auratus*) and guppy (*Poecilia reticulata*) fish being the most sold, and that the most common disease observed was white spot disease, affecting 80% of the fish. The majority of operators (60%) stated that aquarium cooperatives should be established. Among the most significant problems identified were high feed and material costs, high rent and electricity expenses, and low customer demand. In light of the data obtained, it has been concluded that organizing activities to increase interest in the aquarium sector nationwide and providing financial and educational support to entrepreneurs by public institutions and universities would be beneficial for the development of the sector and the resolution of existing problems.

Keywords: Aquarium fish, Business, Erzurum, Retail sales, Survey

ÖZ

Bu araştırma, Erzurum'da faaliyet gösteren akvaryum işletmelerinin genel durumunu ortaya koymak, mevcut sorunlarını tespit etmek ve bu sorunlara çözüm önerileri sunmak amacıyla yapılmıştır. İlde yer alan ve aktif durumda olan 10 adet akvaryum işletmesinin üç ilçede toplandığı görülmüştür. Bu 10 adet işletmeye yüz yüze görüşme yöntemi ile amaca uygun hazırlanmış açık ve kapalı uçlu sorulardan oluşan anket uygulanmıştır. Araştırma sonunda akvaryum işletmelerinin %60'ının kiracı olduğu, personelin tamamının erkek olduğu, işletme sahiplerinin çalışanlardan yaşça büyük, tecrübeli ve %70'inin üniversite mezunu oldukları belirlenmiştir. İşletmecilerin tamamının sattıkları balıkları yurt içinden temin ettiği, perakende satış yaptıkları, kış aylarında satışların arttığı, toplam 9 tür balık satışı yapıldığı ve en çok satılan türlerin Japon (*Carassius auratus*) ve lepistes (*Poecilia reticulata*) balığı olduğu ve en fazla beyaz benek hastalığının (%80) görüldüğü tespit edilmiştir. İşletmecilerin çoğunluğu akvaryum kooperatifçiliğinin kurulması gerektiğini (%60), en önemli sorunları arasında; yem ve malzeme maliyetleri ile kira ve elektrik giderlerinin yüksek olduğunu, müşteri talebinin ise düşük olduğunu belirlenmiştir. Sektörün gelişebilmesi ve mevcut sorunların çözülebilmesi için ülke genelinde akvaryum sektörüne ilgi artırılmalı, girişimciler desteklenerek süs balığı üretimine yönlendirilmeli ve bu konuda dışa olan bağımlılık azaltılmalıdır.

Anahtar Kelimeler: Akvaryum balığı, İşletme, Erzurum, Perakende satış, Sürvey

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Introduction

Today, aquariums range from small glass bowls in our homes to massive public aquariums (Göreci & Demirarslan, 2021). Ornamental fish attract people's attention with their vibrant colors, different shapes, patterns, and behaviors (Shraborni et al., 2024). For all these reasons, the aquarium hobby is among the preferred hobbies in the world (Sharma, 2020; Shraborni et al., 2024). Although aquarium hobbies are considered as a leisure activity, it is a sector that covers 125 countries in the world and has a trade volume of approximately 15-30 billion US dollars every year (Evers et al., 2019). Aquarium businesses offer both domestic and international market opportunities, contribute foreign exchange to the country, and provide employment opportunities for thousands of people (Anjur et al., 2021; Wijaya & Huda, 2021).

The global ornamental fish industry generates approximately 333 million USD in revenue, including export and import activities, and trades more than 2 billion live ornamental fish (Satam et al., 2018; Raja et al., 2019;Willis & Bakuwel, 2018). The leading importers of ornamental fish in the world are the USA, the UK, Japan, Germany, Belgium, China, and Australia (Yue, 2019; Sharma, 2020). According to ITC 2020 data, in 2018, 82 countries exported freshwater aquarium fish, while 130 countries imported them. The top three countries in freshwater aquarium fish exports were Japan (39.4 million USD), Singapore (36.8 million USD), and Indonesia (24.6 million USD), with a total export value of 251 million USD (ITC, 2020).

In Türkiye, although the history of the aquarium hobby dates back to the 1960s, it is known that the first fish farming facility for aquarium fish was established in the 1980s (Tolon & Emiroğlu, 2014). Imports began in 1989, and over time, both species diversity and price competition emerged (Tolon & Emiroğlu, 2014). Looking at Türkiye's aquarium fish import rankings, it is ranked 42nd in freshwater species and 37th in marine species (ITC, 2020).

Previously, aquarium shops were only seen in large cities, but in recent years, they have spread to provinces and districts (Özlüer Hunt & Koca, 2014). There is a need for accurate, reliable, and systematic information about the number, capacity, fish species, sales status, and staff characteristics of aquarium businesses in Türkiye (Kılıçerkan & Çek, 2011). Profiling aquarium businesses and identifying their needs and deficiencies is important. This way, the necessary steps for the development of the sector can be determined, and a perspective can also be created. In this context, survey studies conducted by provinces and regions are highly important. In this context, the aim of this research is to determine the current status of aquarium businesses in Erzurum, identify their structural characteristics and available resources, analyze the problems they face, and propose solutions.

Methods

The data utilized in the study originated from aquarium enterprises that sell live fish and are registered with the Erzurum Provincial Directorate of Agriculture and Forestry. While there are 11 aquarium businesses registered with the Provincial Directorate of Agriculture and Forestry in Erzurum, 10 of them are actively operating. Data were collected from these 10 businesses, located in the central districts of Aziziye, Palandöken, and Yakutiye, using the survey method. A questionnaire, consisting of both open-ended and closed-ended questions tailored to the research objectives, was conducted through face-to-face interviews. The questionnaire covered topics such as the structural characteristics of the businesses, fish species, water quality, diseases, aquariums, feeding, encountered problems, and marketing. Before the surveys were conducted, necessary explanations regarding the purpose of the survey and its content were provided. The responses given by business owners and employees to the questions were recorded by the surveyors on the questionnaire forms. The data obtained in the study were analyzed using the Microsoft Excel software, with percentages calculated and interpreted in tables and graphs.

All applicable international, national, and institutional guidelines for the care and use of animals were followed. This study was approved by the Social and Human Sciences Ethics Committee of Ordu University (Ethics approval number: 2024-161, Date: 30/10/2024). Consent was obtained from all participants in the study.

Results and Discussion

The investigation revealed that aquarium enterprises registered with the Erzurum Provincial Directorate of Agriculture and Forestry were mainly located in three central districts, with no aquarium firms present in other districts. When the general distribution of the 10 aquarium businesses in Erzurum province was examined; it was determined that 80% were located in Yakutiye, 10% in Aziziye, and 10% in Palandöken. Evaluating the entire province, it is clear that aquarium businesses are not located in the center, but are instead found in three districts with large populations. In the research carried out Pala and Yılmaz (2020), it was determined that

aquarium enterprises were predominantly situated in areas with elevated population densities and greater economic development. Conversely, Olgunoğlu et al. (2021) reported that 70% of these businesses were established in the central and most populous district of the province. Bulut and Özcan (2022) also reported that nearly all the businesses were located in the city center.

In the study, it was found that 60% of the aquarium businesses were established between 2011 and 2018, while 40% were established between 2019 and 2023. It was also determined that 30% of the businesses were property owners, while a large proportion (70%) were tenants (Figure 1). The ownership status of the businesses has also been identified as predominantly tenant-based (73-94%) in previous studies (Table 1) (Bulut & Özcan, 2022; Büyüktaş & Kızak, 2018; Çelik et al., 2010; Hekimoğlu et al., 2005; Olgunoğlu et al., 2021; Özlüer Hunt & Koca, 2014; Pala & Yılmaz, 2020). Additionally, it has been reported that rental expenses were among the significant costs for these businesses (Bulut & Özcan, 2022; Olgunoğlu et al., 2021; Pala & Yılmaz, 2020).

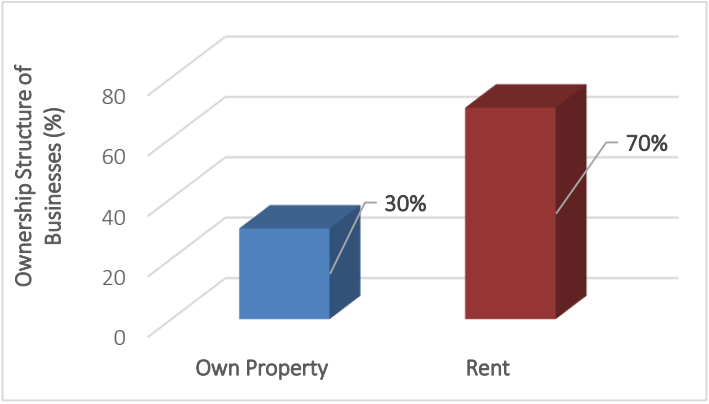

Figure 1.
Ownership structure of aquarium businesses

The study found that 100% of aquarium business owners did not have any other source of income. In previous studies, it has been reported that business owners provided their livelihoods with the income from aquarium business at varying rates such as 47% (Hekimoğlu et al., 2005), 62.1% (Çelik et al., 2010), 78.3% (Özlüer Hunt & Koca, 2014), 100% (Büyüktaş & Kızak, 2018), 82% (Pala & Yılmaz, 2020), 80% (Olgunoğlu et al., 2021), 93% (Bulut & Özcan, 2022).

When looking at the gender ratios in the enterprises, it was determined that all of the business owners and employees (100%) were male. In previous studies, it was reported that all of the staff were male at high rates, ranging from 85.7% to 100% (Bulut & Özcan, 2022; Büyüktaş & Kızak, 2018; Çelik et al., 2010; Hekimoğlu et al., 2005; Kılıçerkan & Çek, 2011; Olgunoğlu et al., 2021; Özlüer Hunt & Koca, 2014; Pala & Yılmaz, 2020), and the results are presented in Table 1.

An analysis of the results from previous studies and the current study on women's employment, as shown in Table 1, reveals that the Black Sea Region has the highest number of female employees, while the Southeastern Anatolia Region has the lowest. According to the results of the Turkish Statistical Institute (TURKSTAT) Household Labour Force Survey, the highest female employment rate in 2022 was in TR90 (Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane) region with 37.4% and the lowest female employment rate was in TRC3 (Mardin, Batman, Şırnak, Siirt) region with 18.2%, and this result coincides with the findings of the study (TURKSTAT, 2022). In the studies conducted on aquarium establishments in our country, the average rate of female employees is 6.7% and it is seen that female employment in this sector is quite low. In addition, Ayta and Şen (2023), in their study on the general outlook of women's employment in Türkiye, reported that Türkiye lags behind all EU and OECD countries in women's employment and labour force participation rates.

Data on the ages and work experiences of aquarium business owners and employees are shown in Table 2. It was determined that the average age of the business owners was 37 years and 14 years of experience, while the average age of the employees was 28 years and 8 years of experience. Analysis of the data from previous studies in Table 1 indicates that business owners possess greater age and experience compared to employees (Hekimoğlu et al., 2005; Özlüer Hunt & Koca, 2014; Pala & Yılmaz, 2020).

Analysis of Table 3, which presents the educational status of the business owners and employees, reveals that 70% of business owners are university graduates, whereas all employees possess high school diplomas. In this study, it was determined that 12% of all personnel were primary school graduates, 47% were high school graduates and 41% were university graduates. Büyüktaş and Kızak (2018) reported in their study on enterprises located on the European side of Istanbul that a very low rate of 2% of aquaculture engineering graduates operate in the sector and that this low rate causes the failure of information transfer to the customer and the decrease in the amount of sales.

The data on the educational status of enterprise owners and employees in previous studies are given in Table 1. Analysis of prior studies reveals that high school graduates represent the highest rates, while primary school graduates present the lowest rates (Çelik et al., 2010; Hekimoğlu et al., 2005; Özlüer Hunt & Koca, 2014; Pala & Yılmaz, 2020). Unlike other studies, the highest rate of university graduates was found in this study.

Table 1.
General overview of the results of studies conducted with aquarium businesses in various provinces of Türkiye.

References	City	Number of Businesses	Rent Status (%)	Being the Primary Source of Income (%)	Female/Male Ratio (%)	Business Owners Average Age/Experience (years)	Employees Average Age/Experience (years)	Education Status (Primary School-High School-University Graduate Rate) (%)	Fish Supply Location (Domestic-International-Both) (%)	Winter Sales Rate (%)	Disease (White Spot-Fungus-Other)	Cooperative (Positive-Negative) View Rate (%)
Current study	Erzurum	10	70	100	100	37/14	28/8	12 -* 47 - 41	100 - -	62	80 - 20 - 0	60 - 40
Hekimoğlu et al., (2005)	İzmir (Center)	34	79	47	6/94	38/14	31/7	21 - 53 - 26	44-3-53	67	32 - 49 - 19	-
Çelik et al., (2010)	İstanbul	19	88.1	62.1	10.1/89.9	-		32.7 - 38.2 -29.1	12 -21-67	90.9	-	-
Kılıçerkan & Çek, (2011)	Hatay	31	-	-	7.1/92.9	-		-	-	-	90 (WS+F)-10	55 - 45
Özlüer Hunt & Koca, (2014)	Mersin (Center)	23	82.4	78.3	5/95	33/11.4	27/5.3	40 - 47.5 - 12.5	-	65.3	70 (WS+F)-30	-
Büyüktaş & Kızak, (2018)	İstanbul (European side)	52	94	100	5/95	-		-	-	-	-	-
Pala & Yılmaz, (2020)	Ordu	11	73	82	13/87	43/10	27/4	46.6 - 46.6 - 6.6	91 - 9	55	45 - 50 - 5	73 - 27
Olgunoğlu et al., (2021)	Adıyaman	10	80	80	100	36.57/10+		-	90 - -	-	-	-
Bulut & Özcan, (2022)	Elazığ	14	93	93	14.3/85.7	-	-	-	-	-	-	-

* The "–" sign in the table indicates that there is no data for the relevant section.

Table 2.
Age and work experience of the owner and employees (years)

	Business Owner		Business Employee	
	Age	Experience	Age	Experience
Minimum	24	10	20	3
Maximum	52	25	57	27
Average	37	14	28	8
Standart deviation	7.26	5.35	10.73	7.21

Table 3.
Educational status of aquarium business owners and employees

	Education Status		
	Primary School+ High School	University	Total
Owner	3	7	10
Employee	7	-	7
Total	10	7	17

In the study, it was determined that none of the aquarium businesses sold live plants, and all of the fish sold by the businesses (100%) were obtained from domestic markets. Table 1 shows the fish supply locations of previous studies. When the data are analysed, it is seen that the rate of domestic fish procurement is higher in this study than the other studies.

The fish species offered for sale by the enterprises are goldfish, guppy, swordtail, moli, dolphin cichlid, scavenger, stingray, gourami and beta fish. The fish species sold in the enterprises and the average monthly fish sales of the enterprises are given in Table 4. Looking at the enterprises in general, it was determined that a total of 9 species of fish were sold, the most sold species was goldfish, followed by guppy in the second place, and the least sold species was gourami. This finding in Erzurum province is similar to the results of studies conducted in various provinces of Türkiye. Kılıçerkan and Çek (2011), Özlüer Hunt and Koca (2014), Pala and Yılmaz (2020), Olgunoğlu et al. (2021), Bulut and Özcan (2022) reported that the most sold fish species was goldfish, followed by guppy in Hatay, Mersin, Ordu, Adıyaman and

Elazığ provinces, respectively. The high sales rate of these two types of aquarium fish is associated with the fact that they are economic species, easy to maintain, easy to breed, easy to supply and easy to import (Bulut & Özcan, 2022; Büyüktaş & Kızak, 2018). In addition, in studies conducted in different countries of the world, it has been emphasised that goldfish and guppies are among the most popular and demanded species and are widely available in aquarium businesses (Faruk et al., 2012; Rixon et al., 2005; Sinha, 2016).

Table 4.
Fish species sold in aquarium businesses and monthly average number of fish sales

Latin Name	Name	Min	Max	Average Sales	Standard Deviation
Carassius auratus	Goldfish	50	500	157	135.26
Poecilia reticulata	Guppy	0	150	73	58.32
Xiphophorus helleri	Swordtail	30	120	66	49.20
Poecilia sphenops	Moli	0	120	63	46.20
Cyrtocara moorii	Dolphin Cichlid	0	100	54	41.15
Corydoras sp.	Scavenger	0	100	42	36.15
Pterygoplichthys gibbiceps	Stingray	0	100	44	35.96
Colisa unicolor	Gourami	0	40	20	16.33
Betta splendens	Beta	0	100	43	38.02
Total	9 species			562	

Only 10% of the enterprises stated that they breed fish and the species they breed is scavenger fish. Çelik et al. (2010) reported that 35.7% of the enterprises and Hekimoğlu et al. (2005) reported that 23.5% of the enterprises produced fish and the species produced were guppy, swordtail, plati, moli, ray, cichlid, goldfish, scavenger, beta, discus and gourami. In our study, it was observed that the fish production rate was lower than in other studies, with 90% of the enterprises citing high costs related to electricity, water, medicine, and feed, as well as low demand for fish, as the reasons for not raising fish.

It was determined that all of the businesses in Erzurum (100%) sold aquariums, air motors, heaters, filters, air stones, scoops, sand, siphon hoses and aquarium decoration materials. As seen in Table 1, aquarium material sales rates were determined as high as 91-97% in previous studies (Hekimoğlu et al., 2005; Kılıçerkan & Çek, 2011; Özlüer Hunt & Koca, 2014; Pala & Yılmaz, 2020). However, in this study, it was determined that 60% of the businesses sold different types of animals (birds, rabbits, dogs and turtles) and their feed and other items. Özlüer Hunt and Koca (2014) stated that 96% of the businesses sold live animals other than fish or materials related to these animals, and Olgunoğlu et al., (2021) stated that these rates were higher than the research findings.

Fifty percent of businesses has a website; however, only one engages in online sales, while the remainder does not utilize these sites actively. Furthermore, ten percent of businesses hold a favorable perspective on online fish sales, in contrast to ninety percent who regard it negatively. E-commerce, which has become an increasingly widespread and developing sector today, provides the advantage of reaching a large number of consumers simultaneously and effectively, in addition to the convenience it offers (Yılmaz et al., 2016). Despite all these positive features of e-commerce, it was seen in the research that the number of businesses selling fish online is very few and the negative perspective on online fish sales is quite high.

It has been determined that all of the businesses engage in retail sales, that fish sales vary seasonally, and that the highest sales, at a rate of 62%, occur in the winter season (Figure 2). In line with the results of this study, Pala and Yılmaz (2020) reported that 91% of businesses engage in retail sales, and the highest fish sales, at 55%, occur during the winter months. Other researchers who reported that fish sales are highest in winter have sales rates ranging from 65.3% to 90.7% (Çelik et al., 2010; Hekimoğlu et al., 2005; Özlüer Hunt & Koca, 2014) (Table 1). The high sales rates in winter can be explained by the fact that, as people's time spent indoors increases, they are more likely to engage in soothing and visually appealing hobbies.

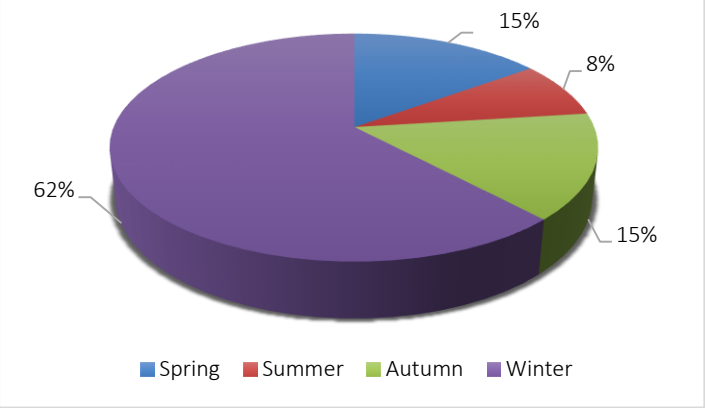

Figure 2.
Distribution rates of fish sales according to seasons

It was determined that the number of glass aquariums used in aquarium businesses varies between 4-15, has an average volume of 80 liters, and only 1 business uses two aquariums with a volume of 130 and 200 liters for display purposes. It was determined that all of the businesses use dry feed and do not use any live feed. It was also determined that the fish are fed twice a day and in small amounts (60%).

It was determined that 80% of the fish diseases seen in aquarium businesses are white spot, 20% are fungal diseases, and parasites and fungicides are used in the treatment of the diseases. When Table 1 is examined, it is seen that the disease types detected at a high rate in other studies are white spot and fungus, and these results are parallel to the research findings. Barata et al., (2017) reported in their research that problems caused by protozoan parasites have an important place among the pathogenic diseases of aquarium fish, and that one of the most important of these is *Ichthyophthirius multifilis*, the cause of white spot disease. Taner and Yıldız (2018) pointed out in their study that pathogen transfer via aquatic organisms, including aquarium fish, should be regularly monitored.

Among aquarium businesses, the rate of those who want aquarium cooperatives to be established in order to develop the sector further and solve its problems is 60%, while 40% have a negative view of cooperatives. In similar studies; Pala and Yılmaz (2020) reported that 73% of business owners have a positive view and 27% have a negative view of the establishment of cooperatives, while Kılıçerkan and Çek (2011) reported that 55% have a positive view and 45% have a negative view. When we look at the studies in general, it is seen that the rate of those who have a positive view of cooperatives is high. Doğan (2018) emphasized that, just like in other branches of agriculture, organizational structures and cooperatives can be applied in aquarium fish production, and through this, significant achievements can be made as civil initiatives in both national and international markets, as well as in decisions to be made by central governments. From this point of view, it should be considered that cooperatives will contribute to the development of the aquarium business sector.

60% of the business owners have a positive view on the obligation to employ a responsible veterinarian when opening a business, while 40% have a negative view. However, it has been determined that the business owners who find this positive do not receive consultancy services from veterinarians on any issue (disease, death, quarantine, etc.). Pala and Yılmaz (2020) stated that the majority of the business owners (64%) have a negative view on this question, and that similar to the research findings, business owners who had a positive view did not receive consultancy services from veterinarians, and that this situation was quite thought-provoking. Büyüktaş and Kızak (2018) emphasized the importance of removing the mandatory employment of veterinarians in this field and granting this authority to individuals who have received engineering education in aquaculture and possess real authority.

The operators stated that there is a shortage of educated and trained personnel in the sector, this negatively affects the development of the sector, the demand for fish, feed, materials, etc. They stated that costs are high, demand for aquarium fish is low, expenses such as rent and electricity are high, and the fact that feeds for other animals are sold in markets negatively affects their sales. They also emphasized that the knowledge and experience level of business owners and employees must increase in order for this sector to develop. 60% of business owners think that those who engage in clandestine aquarium hobby negatively affect fish sales, do not comply with the maintenance and feeding conditions of the fish, produce as a side business with hearsay information and disrupt price stability. They also stated that many people who sell without a tax plate negatively affect the market by selling fish cheaper than aquarium shops.

When aquarium business owners were asked about their perspective on illegal fish entry, 20% of the operators thought that it had a positive effect and stated that there was illegal fish entry from Iran, and that this increased their chances of buying fish at a low price. 80% stated that they had no information on this subject. Many researchers have pointed out that fish are entering our country from Syria, that fish are transported in unhealthy and unsuitable conditions, that diseases are spread, that market conditions are shaped according to the prices of incoming fish, and that illegal fish entry should be prevented (Kılıçerkan & Çek, 2011; Gümüş et al., 2013; Kanyılmaz et al., 2013; Özlüer Hunt & Koca, 2014). 60% of the businesses stated that they apply quarantine procedures when they buy fish, while 40% stated that they do not apply any procedures. It has been emphasized in studies conducted in İzmir (Hekimoğlu et al., 2005) and Mersin (Özlüer Hunt & Koca, 2014) that imported fish and plants cause problems in businesses by spreading diseases because they are not quarantined. The fact that the number of businesses applying quarantine as a result of the research is high shows that aquarium owners are somewhat aware of the problems that businesses may encounter when fish are not quarantined when purchased from abroad.

Conclusion and Recommendations

As a result of the findings obtained from the research, the problems experienced by aquarium owners in Erzurum province were determined and solution suggestions were developed for these problems. The first of these problems is the high costs. The main costs are rent, electricity, fish, feed and aquarium material expenses. The operators, who are tenants at a high rate of 70% and only deal with this business, experience financial difficulties from time to time and have difficulty in surviving in the sector. As a result of high bills due to electricity usage, there is also a loss of work efficiency. This situation causes an increase in expense costs and decreases the profit and income of the operator. For this reason, not being left alone with incentives or supports on rent, electricity, etc. through the Ministry of Agriculture and Forestry will encourage the increase in initiatives and activities to be carried out in the sector.

Another problem detected in the sector is that there is not enough fish sales to minimize the high cost disadvantage. In this regard, it is thought that it would be beneficial to carry out some entrepreneurial activities that will increase the interest and curiosity of people living in Erzurum province in aquarium fish. These include the establishment of city aquariums that can attract people of all ages and the establishment of large aquarium businesses in city shopping malls. Such businesses are areas where students of various educational institutions can visit and families can spend time on weekends and can accelerate the development of the sector.

In the study, it was determined that aquarium operators complain about the inadequacy of the knowledge and experience levels of people working in this sector, that this situation negatively affects the development of the sector and that they want more educated people to be employed and take part in the sector. It is possible to close the gap in educated personnel through lifelong learning programs and seminars to be organized by universities or the Ministry. It would be beneficial to encourage the participation of existing aquarium operators and employees in these trainings and seminars. Through these training programs and seminars, the knowledge levels of the fish species they sell, feeding programs, fry production, broodstock care, recognizing diseases, knowing the methods of combating them, hygiene and also sales and marketing can be increased and conscious and professional aquarium management can be ensured. Especially being able to produce fry from their own broodstock can provide great benefits in terms of disease control and preventing the spread of diseases, which is one of the important problems of the enterprises. In addition, it would be more functional for the consultancy work in aquarium enterprises to be given by aquaculture and fisheries technology engineers who have knowledge and experience in both fish farming techniques and diseases, instead of veterinarians.

In this research and similar studies conducted in different provinces, it has been frequently emphasized that aquarium enterprises do not have a professional chamber or cooperatives that will have the power to represent them. In fact, it has been determined that the enterprises are registered to different chambers. It is seen that it is necessary to realize the cooperative organization as soon as possible, which will enable them to take faster steps in order to prevent this confusion and solve the existing problems. The segment that is not keen on cooperativism also needs to be enlightened about the opportunities that cooperativism will offer them. In this context, there is a need for projects that will enlighten the operators about the importance of cooperatives to be established between university and sector members and the opportunities they will offer them.

The breeding and trade of aquarium fish not only meets the demands of hobbyists, but also creates employment opportunities for thousands of people in rural areas of developing countries, as in the Far East. Therefore, supporting entrepreneurs and directing them to ornamental fish production in order to increase interest in this sector throughout the country is important in terms of reducing external dependency and providing employment. At the same time, large enterprises can be encouraged to invest in this field, and foreign exchange input can be provided to the country's economy.

It is a fact that our country is not in the place it deserves in the aquarium fish sector. Numerous academic studies have been conducted on aquarium fish and their breeding to date. The studies and the data from this research show that serious steps need to be taken to remove the obstacles to the development of the sector. Considering the data obtained from the scientific studies conducted, conducting a regional and countrywide current situation analysis will be an important step towards eliminating the deficiencies. Paving the way for the development of aquarium fish management with projects to be carried out jointly by the University, the General Directorate of Fisheries and Aquatic Products of the Ministry of Agriculture and Forestry and sector representatives is of great importance in terms of the professionalization of the sector.

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