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RESEARCH ARTICLE ARAŞTIRMA MAKALESİ

Challenges for revitalizing seafood exports in Hatay's of Türkiye: A comparative analysis (2008-2023)

Hatay'ın Su ürünleri ihracatını canlandırma yolunda zorluklar: Karşılaştırmalı bir analiz (2008-2023)

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Abstract: A comparative analysis of seafood exports in the Hatay region between 2008 and 2023, in relation to overall trends in Türkiye and different regions, was conducted. Seafood export data was obtained from the Turkish Statistical Institute. The export amount has been in a long-term decline fishing and seafood production potential of Hatay, contrary to the general trend in Türkiye. Specifically, the export amount decreased by 62% since 2018, while it decreased by 22.65% in 2023 compared to the previous year. This ongoing downward trend can be attributed to the COVID-19, Syrian civil war, and the recent devastating earthquake in the region. Despite the high potential for seafood production in the region, investments have been limited due to the lack of allocation in organized industrial zones. Additionally, the absence of a wholesale fish market is a major issue preventing the emergence of a regional market. All these factors have caused disruptions in the supply chain and production, increased input costs, and market uncertainties both domestically and internationally. This indicates that infrastructure investments in the region must be prioritized by all stakeholders, the central authority, decisionmakers and policymakers for sustainable seafood exports contributing to regional development. In conclusion, despite the strong industrial and logistics infrastructure in Iskenderun Bay, the seafood sector in Hatay has failed to reach its full potential, unlike the national trend in Türkiye. This shortfall is directly reflected in export values. Therefore, necessary measures must be taken to effectively utilize the region's seafood potential.

Keywords: Seafood exports decline, Hatay fishing industry, supply chain disruptions, infrastructure investment needs

Öz: Bu çalışmada, 2008 ile 2023 yılları arasında Hatay bölgesindeki su ürünleri ihracatının, Türkiye genelindeki ve farklı bölgelerdeki eğilimlerle karşılaştırmalı analizi yapılmıştır. Su ürünleri ihracat verileri Türkiye İstatistik Kurumu'ndan elde edilmiştir. Balıkçılık ve su ürünleri üretim potansiyeli açısından Hatay'da ihracat miktarının Türkiye genelindekinin aksine uzun vadede azalma eğiliminde olduğu tespit edilmiştir. Özellikle 2018 yılından itibaren ihracat miktarı %62 oranında azalmış, 2023 yılında ise bir önceki yıla göre %22,65 oranında düşmüştür. Bu sürekli düşüş eğilimi, COVID-19, Suriye iç savaşı ve bölgedeki son yıkıcı deprem gibi faktörlere bağlanmaktadır. Bölgedeki yüksek su ürünleri üretim potansiyeline rağmen, organize sanayi bölgelerinde yer eksikliği nedeniyle yatırımlar sınırlı kalmıştır. Ayrıca, bu bölgede bir toptan balık halinin olmaması bölgesel bir pazarın oluşmasını engelleyen büyük bir sorundur. Tüm bu faktörler, tedarik zincirinde ve üretimde aksamalara, girdi maliyetlerinde artışa ve hem yurtiçi hem de yurtdışı piyasalarda belirsizliklere yol açmaktadır. Bu durum bölgesel kalkınmaya katkıda bulunacak sürdürülebilir su ürünleri ihracatı için bölgedeki altyapı yatırımlarının tüm paydaşlar ve Tarım ve Orman Bakanlığı tarafından önceliklendirilmesi gerektiğini göstermektedir. Sonuç olarak, İskenderun Körfezi'ndeki güçlü sanayi ve lojistik altyapısına rağmen, Hatay'da su ürünleri sektörü, Türkiye'deki ulusal eğilimin aksine, henüz tam potansiyeline ulaşamamıştır. Dolayısıyla, bölgenin su ürünleri potansiyelinin etkin bir şekilde değerlendirilmesi için gerekli tedbirlerin alınması şarttır.

Anahtar kelimeler: Su ürünleri ihracatında düşüş, Hatay balıkçılık endüstrisi, tedarik zinciri aksamaları, altyapı yatırım ihtiyaçları

INTRODUCTION

The fishery and aquaculture industry serves as a significant source of nutrition and is among the most traded food commodities globally (Subasinghe, 2017; Kale, 2020; Acarlı et al., 2022; Cengiz and Paruğ, 2022; Yarkina and Logunova, 2022). This makes it a crucial income source in many countries, driving economic development and contributing to global food security. In 2022, global fisheries and aquaculture production reached approximately 185.5 million tons. Fishery and aquaculture products consistently hold a prominent position among traded food commodities, with a trade volume of 68 million tons and a value of 190 billion dollars in 2022 (Can et al., 2023). Approximately 37% of the total production was exported. Fisheries and aquaculture trade significantly contribute to economic growth in many developing countries, providing economic opportunities and export revenue (FAO, 2023).

In 2023, Türkiye's seafood production increased by 18.6% compared to the previous year, reaching 1,007,921 tons. Production from fishing rose by 39.4%, while aquaculture production saw a 7.6% increase. The total catch from fishing amounted to 454,428 tons, with 387,115 tons from marine fishing and 67,313 tons from inland waters. Aquaculture production reached 553,862 tons, accounting for 55% of the total seafood production in Türkiye. Of this, 72.1% was from marine aquaculture, and 27.9% from inland waters. The most cultivated species were sea bass (160,802 tons) and sea bream (154,011 tons) in marine environments, and rainbow trout (154,006 tons) in inland waters (TurkStat, 2023). In 2023, Türkiye exported fishery products to 103 countries worldwide. The export quantity increased by 5.4% to 251,000 tons compared to the previous year, and the value rose by 20% to

1.652 billion dollars (Aydemir, 2024). Russia is the primary destination for fishery exports, accounting for 18%, with trout exports constituting 76% of this share. In 2022, 66% of fishery product exports were directed to European countries (FAO, 2022).

While fisheries production in the past focused predominantly on fishing, the share of aquaculture in fishery production has increased over the years. This increase is attributed to Türkiye's rich natural resources and strategic geographical location. Türkiye, with its extensive coastline along the Mediterranean, Aegean, and Black seas, as well as numerous inland water sources, provides ideal conditions for both marine and freshwater aquaculture. These natural advantages are strengthened by Türkiye's commitment to developing human resources in this field. Specialized education and training programs in fisheries and aquaculture have created a skilled workforce knowledgeable in modern aquaculture techniques, sustainable fishing practices, and efficient seafood processing. This skilled manpower has played a crucial role in maintaining the quality and sustainability of seafood products, providing Türkiye with a competitive advantage in the global market. In recent years, significant advancements in aquaculture systems have been observed in Türkiye. The relocation of fish farms in the seas to open and deep waters, the adoption of new techniques suitable for local conditions, and the application of technology exceeding global standards in cage sizes and structures, net systems, and feeding systems have all contributed to improvements in the sector (Bilgüven and Can, 2018).

Despite the general upward trend in Türkiye's aquaculture and fisheries exports, regional disparities are evident. Actually, the Hatay region, with its strategic location and the vital Iskenderun Bay, offers significant potential. Iskenderun Bay contains natural stocks of fish and shrimp of high economic value. On the other hand, Hatay province, being a border region, has been active in seafood exports for a long time. Indeed, Hatay has a special place in Türkiye, where the export of seafood products increased especially in the 1950s. This substantial increase highlights Hatay's leading role in the fisheries sector and the rapid development of the industry, supported by various innovations such as the introduction of trawl fishing (Nümann, 1953). It is a well-known fact in the region that many seafood exporting firms operate as family-owned businesses rather than institutional enterprises. None of these companies in Hatay are situated within organized industrial zones; instead, they are located in limited areas outside the city. These businesses commonly face challenges related to infrastructure and high land costs, which have driven investors to consider other regions of Türkiye. This has restricted the region's growth potential in the seafood sector, placing local businesses at a disadvantage. Over time, as a result, many of these companies have scaled down their export operations, with some having ceased activities entirely. Although the Iskenderun Bay has very suitable areas for sea bass and sea bream farming, investments in this area have lagged behind other regions of Türkiye. This delay has hindered investments in hatcheries and feed factories in this region, limiting the infrastructure elements of the marine aquaculture sector (Kumlu et al., 2016).

Additionally, the Hatay region has faced various challenges in recent years; geopolitical issues, the consequences of the COVID-19 pandemic, and the February 6 earthquakes is severe destruction and infrastructure have affected the seafood sector (Şimşek and Can, 2019; Can et al., 2020; Demirci et al., 2020; Demirci et al., 2024). These events have led to supply chain disruptions, production interruptions, increased input costs in fisheries, and market uncertainties (Demirci et al., 2020).

This study aims to investigate these regional disparities by providing an in-depth analysis of the factors affecting growth patterns in Hatay compared to Türkiye's broader seafood environment. The study will provide information on the dynamics of the seafood export sector in Türkiye, focusing on how regional differences and challenges can be addressed to benefit from the full potential of regions such as Hatay in the global seafood market.

MATERIALS AND METHODS

Data

The data encompasses seafood exports from Türkiye between 2008 and 2023. This comprehensive foreign trade dataset is sourced from the Turkish Statistical Institute (TurkStat, 2023), a reputable institution known for its detailed and reliable statistical data on a wide range of economic indicators, by utilizing "Foreign Trade by Province and Region Classification (Province/Region-Chapter)" from Foreign Trade Statistics menu on the website. The export data is presented in US Dollars, facilitating international comparisons.

The dataset includes annual export figures, providing a granular view of the export volumes and values over the 15-year period. This allows for a thorough examination of trends and patterns within Türkiye's seafood export sector. The data is segmented by different types of seafood products, enabling an analysis of which specific products have experienced growth or decline over the years.

Additionally, the dataset includes information on the destination countries for these exports. This geographic segmentation provides insights into how Türkiye's seafood export markets have evolved and shifted during the study period. By analyzing the export destinations, the study can identify key markets and potential opportunities for expansion.

Statistical analysis

In order to accurately analyze the change in Hatay province, export data from Adana-Mersin, Istanbul, and Aydın-Muğla, which are important regions in the production and export of aquatic products in Türkiye, were also taken into account. To capture the time dimension of the data and provide

a comprehensive analysis of export amounts, the following two methods were used together:

a) Graphical method: The general trend during the study period was determined based on simple linear regression. This method involves plotting the export data over time and fitting a linear regression line to observe the overall direction and strength of the trend.

b) Proportional determination: The change in export amounts between consecutive years was determined proportionally. This method provides a year-by-year comparison to identify specific periods of growth or decline in export amounts.

The following formula was used to determine the change rate of aquatic products exports (USD) in Türkiye and Hatay province over consecutive years:

$$\textbf{\textit{Change rate}}\ (\%) = \frac{(amount\ year_{\ n} - amount\ year_{n-1})}{amount\ year_{n-1}} X100$$

This formula calculates the percentage change in export amounts from one year to the next, providing a clear measure of annual growth or decline. By applying this formula to the export data, the study aims to identify significant fluctuations and trends in the seafood export sector both in Hatay province and in other key regions of Türkiye.

To understand regional disparities and contextualize the trends observed in Hatay province, the export data from Adana-Mersin, Istanbul, and Aydın-Muğla were compared. This comparative analysis was conducted by:

Trend comparison: Comparing the slopes of the linear regression lines for each region to determine which regions experienced the most significant growth or decline.

Change rate comparison: Analyzing the annual change rates across different regions to identify any common patterns or unique deviations in export performance.

All data analyses were conducted using Microsoft Office Excel software, ensuring accurate computations and visualization of results. The graphical method and proportional determination method were both implemented using appropriate statistical functions and tools available within the software.

This dual-method approach allows for a comprehensive analysis of seafood export trends in Hatay province and other key regions in Türkiye, providing valuable insights into the factors influencing export performance and regional disparities.

RESULTS

The export values in Türkiye and Hatay region between 2008 and 2023 and the change rates of exports over the years compared to the previous year are given in Table 1, Figure 1 and Figure 2. The ratio (%) of Hatay in Türkiye's total exports over the years is given in Table 1.

Table 1. Türkiye and Hatay's seafood export (in Millions USD), Change Rates (%), and the contribution percent of Hatay to Türkiye's total export between 2008-2023

Year	Türkiye (US$)	Hatay (US$)	Türkiye (%)	Hatay (%)	Contribution (%)
2008	382.7	9.33			2.44
2009	317.44	15.43	-17.05	65.38	4.86
2010	312.33	16.32	-1.61	5.77	5.23
2011	395.31	15.50	26.57	-5.02	3.92
2012	413.74	14.56	4.66	-6.06	3.52
2013	473.28	19.06	14.39	30.91	4.03
2014	601.56	19.62	27.10	2.94	3.26
2015	690.14	20.25	14.73	3.21	2.93
2016	730.93	21.99	5.91	8.59	3.01
2017	832.01	22.04	13.83	0.23	2.65
2018	869.56	22.58	4.51	2.45	2.60
2019	912.65	8.58	4.96	-62.00	0.94
2020	1008.99	8.81	10.56	2.68	0.87
2021	1100.75	5.37	9.09	-39.05	0.49
2022	1200.65	4.15	9.08	-22.72	0.35
2023	1359.45	3.21	13.23	-22.65	0.24

While Türkiye's total seafood exports have an increasing trend in the period between 2008 and 2023, in the Hatay region, although there was a fluctuation over the years, it was generally seen to be in a decreasing trend (Table1, Figures 1-3). In this sense, when the results were analyzed in more detail, the following determinations were made regarding the export of aquatic products from Hatay province.

The largest proportional decrease in seafood exports in Hatay province compared to the previous year was 62% in 2019. However, it was seen that there have been many fluctuations regarding exports in Hatay province over the years until this year. After 2018, although there was a small increase (2.68%) in the export amount in 2020 compared to 2019, the decline continued dramatically. This is an indication that Hatay province was not stable in terms of production and export.

The contribution of Hatay province to Türkiye's exports peaked in 2010 with a rate of 5.23%, but it is seen that it decreased continuously (r=-0.54) after that (Table 1 and Figure 3). This was also an indication that, apart from Hatay province, other regions in Türkiye have had a greater position in both production and export over the years.

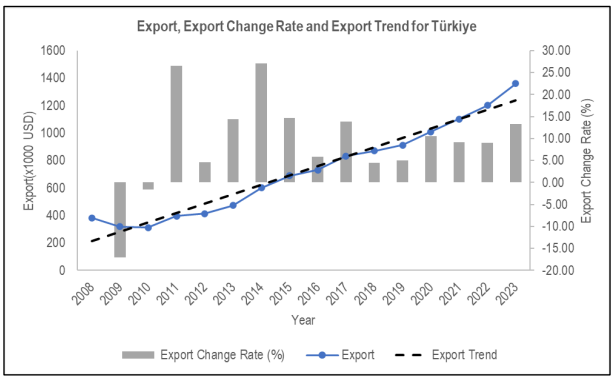

Figure 1. Seafood exports, change (%), and trend in exports for Türkiye between 2008 and 2023

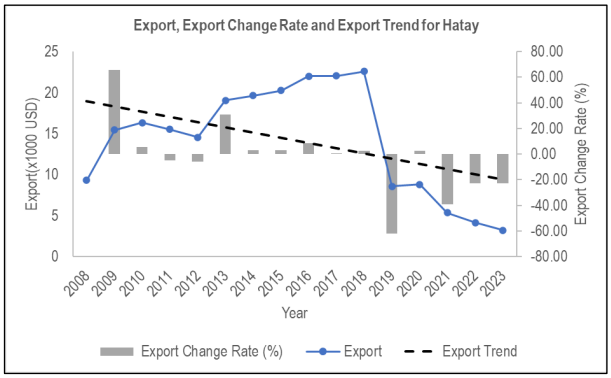

Figure 2. Seafood exports, change (%), and trend in exports for Hatay between 2008 and 2023

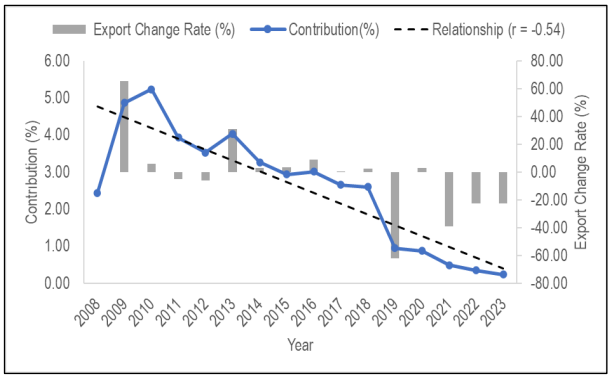

Figure 3. Hatay province's share in Türkiye's seafood exports, amount of change and trend

DISCUSSION

Türkiye's seafood production (fishing and aquaculture) has reached 800 thousand tons by 2023. 500 thousand tons of this production value comes from seafood. Although fisheries production has been almost constant over the years, the amount from aquaculture is increasing slightly every year. There have been significant increases in the production and export of sea bream, sea bass and trout in Türkiye. This is inevitably reflected in export figures. One of the reasons why the share of the Hatay region in Türkiye's seafood exports has decreased over the years is that, although there is production potential in the Iskenderun Bay, the capacities of the seafood production facilities in the region are currently much less than in other regions of Türkiye. For example, in 2022, the increase in seafood exports compared to 2008 was 460.39% in the Adana-Mersin region, 84% in Istanbul, 483.91% in Aydın-Muğla, and 302.24% in the whole of Türkiye, while it decreased by -28.14% in Hatay province. This can also be seen from the proportional contribution (%) of the relevant regions and Hatay province to Türkiye's seafood exports over the years (Table 2).

The reasons for the decrease in seafood exports in the Hatay region can be discussed as follows. For exporting companies in this region, land and infrastructure issues are the primary problems. Despite the presence of numerous organized industrial zones, no space has been allocated for seafood. Therefore, existing facilities struggle primarily with infrastructure issues.

Table 2. Proportional contribution of Hatay, Adana-Mersin, Istanbul and Aydın-Muğla provinces to Turkish seafood exports (%)

Year	Hatay	Adana-Mersin	İstanbul	Aydın-Muğla
2008	2.44	1.46	16.56	32.43
2009	4.86	1.88	14.82	29.50
2010	5.23	1.80	12.48	32.88
2011	3.92	2.22	16.12	44.15
2012	3.52	1.34	15.06	42.76
2013	4.03	2.71	13.69	47.48
2014	3.26	4.29	16.34	60.00
2015	2.93	5.59	13.53	66.43
2016	3.01	6.24	15.26	75.73
2017	2.65	5.74	17.68	80.24
2018	2.60	7.54	18.83	93.88
2019	0.94	6.98	26.05	103.67
2020	0.87	5.28	23.73	113.72
2021	0.49	5.85	22.84	144.75
2022	0.35	8.19	30.49	189.38

Additionally, local municipalities have not established a seafood market, despite the region's significant potential. This is a fundamental reason for the underdevelopment of the seafood sector in Hatay. One reason for the decrease in Hatay's share of Türkiye's seafood exports is the much lower capacity of seafood production facilities in the region compared to other parts of Türkiye, despite the potential in Iskenderun Bay. The increase in exports in these regions reflects the increase in the production of not only fresh seafood but also processed seafood.

The declining exports in the Hatay region can also be attributed to other factors:

Syrian civil war: There are two border gates with Syria in Hatay province. Before the war, trade between the two countries was increasing in all sectors. However, after the Syrian civil war, trade significantly decreased (Collinsworth, 2013; Özenir et al., 2019; Çörekçioğlu et al., 2021). Recent research shows that the war has damaged the aquatic ecosystem and maritime transport in the region (Kılıç, 2018; Özenir et al., 2019; Arslan et al., 2021).

COVID-19 pandemic: Since December 2019, the pandemic has affected every field globally, including the aquaculture sector (Genç et al., 2020; Alam et al., 2022; Sercan, 2022; Demirci, 2024; Koçyiğit and Demiryürek, 2024). The pandemic has had negative effects on the seafood sector globally, such as supply-demand imbalances, restaurant closures, storage inadequacies, plastic pollution, border closures, illegal fishing, inequalities in the sector, and curfews (Can et al., 2020; Kaya and Can, 2022). In a study conducted in Hatay province, the most negative impact of the pandemic in terms of trade (in quantity, kg) was observed in exporters with

a 65% decrease, followed by wholesalers (35%), retailers (17% for fishing products and 14% for aquaculture products) (Demirci et al., 2020). However, a study evaluating the effects of the pandemic on Turkish seafood exports found that while fresh seafood exports decreased during the pandemic, frozen and canned seafood exports increased (Can et al., 2020). These results indicate that regions with seafood processing facilities in Türkiye were much less affected by the pandemic than regions without. Since there are not enough processing facilities in the Hatay region, the sharp decrease in 2019 is considered to be due to COVID-19.

Earthquake: The total impact of the disaster caused by the Kahramanmaraş and Hatay earthquakes, which occurred in February 2023 and affected 11 cities in Türkiye, is estimated to be approximately 103.6 billion dollars (Akkuş and Kişlalioğlu, 2023; Yıldız and Kına, 2023; Şenol Balaban et al., 2024). This size, within the scope of the evaluation made by the Presidency's Strategy and Budget Directorate, is estimated to reach approximately 9-10% of the national income of 2023. Hatay province is one of the provinces affected by the earthquake. After the earthquake, not only was the infrastructure damaged, but there was also a migration of qualified personnel out of the city. Like all people in the province, numerous fishermen had to suspend their fishing activities for life care reasons (Demirci et al., 2024). Therefore, the fishing sector was directly and indirectly affected by these disasters. However, the fisheries sector entered the normalization process much earlier than other sectors, about a month after the earthquakes (Demirci et al., 2024). Although this situation cannot be measured exactly for now, it is thought to be inevitably reflected in seafood export data (Can, 2024). These reasons show that the decrease in seafood exports in the Hatay region is due to both regional infrastructure problems and external shocks. Solving these problems is critical for fully realizing the region's seafood potential.

CONCLUSION

Considering the strong industrial and logistics infrastructure in Iskenderun Bay and the region, it is seen that the seafood sector in Hatay has not been able to realize its true potential, contrary to the trend in Türkiye. This situation was inevitably reflected in export figures. It has become inevitable that the already "fragile" sector in the region will be more affected by geopolitical problems, the impact of the epidemic and the effects of earthquakes. An integrated perspective is needed to solve the issue. First of all, the establishment of seafood production facilities in the cages previously planned for Iskenderun Bay should be accelerated. In addition, it will be necessary to establish seafood storage and processing factories, especially fish feed factories, that will support production in the region, taking into account the seafood production capacity. It may not be sufficient to attribute the changes in the seafood sector in Hatay solely to the three factors mentioned. Other elements, such as administrative influences, internal dynamics within the sector, broader economic conditions, and fluctuations in fish stocks in the eastern Mediterranean, may have also impacted production and exports. Considering these additional factors could provide a more comprehensive understanding of the challenges and trends in Hatay's seafood industry. Thus, further analysis into these areas might be valuable for a holistic assessment of the sector. It should not be forgotten that for sustainable export, both qualified human resources and a strong infrastructure are needed. In this sense, universities in the region should also train qualified fishery engineers who can produce added value in the seafood sector, taking into account the needs of the sector.

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AUTHORSHIP CONTRIBUTIONS

Aydın Demirci: Conceptualization, methodology, investigation, supervision. Mehmet Fatih Can: Visualization, methodology, investigation. Yavuz Mazlum: Data collection, writing-reviewing and editing. Emrah Şimşek: Data collection, writing-reviewing and editing. Lastly, all authors read and approved the final manuscript.

CONFLICT OF INTEREST

The authors of the article declare that there is no conflict of interest between them.

ETHICS APPROVAL

No specific ethical approval was necessary for the study.

DATA AVAILABILITY

All relevant data is in the article. Even so, for any questions, the corresponding author should be contacted.

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