Mar. Sci. Tech. Bull. (2023) 12(2): 201-211
e–ISSN: 2147–9666
info@masteb.com

dergipark.org.tr/en/pub/masteb
www.masteb.com
DOI: 10.33714/masteb.1241126

Marine Science and Technology Bulletin

PRENSIP
https://prensip.gen.tr/

RESEARCH ARTICLE

Risk analysis, assessment and management for local fishing ports in North-eastern Mediterranean, Türkiye

Özkan Akar[1] • Aydın Demirci[2*]

[1] *Iskenderun Technical University, Maritime Vocational School, Department of Marine and Harbour Management, 31200, Hatay, Türkiye*
[2] *Iskenderun Technical University, Faculty of Marine Sciences and Technology, Department of Marine Technologies, 31200, Hatay, Türkiye*

ARTICLE INFO

Article History:
Received: 23.01.2023
Received in revised form: 07.06.2023
Accepted: 08.06.2023
Available online: 20.06.2023

Keywords:
Fishing port
L-type matrix
Mediterranean
Port Management
Risk analysis

ABSTRACT

This study aimed to analyze the risks of activities in fishing ports in the province of Hatay. Due to these activities, the fishing port is under health, good, labor, and environmental risks. In this study, risks were identified and evaluated at the four fishing ports. For this purpose; (1) A preliminary survey was conducted with stakeholders on the current situation and the functions of the fishing ports (2) brainstorm meetings were organized in three sessions in one day- three sections with 12 invited participants throughout the year 2016, (3) as a result of these meetings, risk assessments were carried out in terms of the risks identified, loss of health, good, labor, and environment for each fishing port. The risk matrices were presented graphically in terms of the risk effect and the frequency value, and risk tables were created for each risk. Approximately 20 (17-22) risks were identified for each fishing port. The risks identified for the fishing port were found similar these were different impact levels and frequency values. These differences were generally related to the location. The differences in the settlement structure of the fishing port caused advantages and disadvantages to risks of the fishing port risk. When risks were grouped and classified as administrative, structural, pollution, and security, the lack of management and supervision was striking. Risk analysis outputs were evaluated by using the "L type matrix" method with issuing by numerical and statistical comparisons for different fishing ports. The reason for the risks was due to incompatible legal regulations and control mechanisms rather than a benefit for fishing ports than regional and personal shortfalls with the current situation and expected. Finally, these assessments were the result of a regional study, but they were important both nationally and internationally fishing port risk lack of management. This article attempts to provide a range of knowledge, which is compulsory for managers.

Please cite this paper as follows:

Akar, Ö., & Demirci, A. (2023). Risk analysis, assessment and management for local fishing ports in North-eastern Mediterranean, Türkiye. *Marine Science and Technology Bulletin*, *12*(2), 201-211. https://doi.org/10.33714/masteb.1241126

* Corresponding author
E-mail address: aydin.demirci@iste.edu.tr (A. Demirci)

Introduction

Fishing port is one of the most contributing factors that providing logistical support for fisheries and other maritime activities. Additional services carried out buy the past such as port is area where there is facilitation for repair and maintain for fishing vessels. In this direction, these areas were a workplace with a wide variety and high activities as marine tourism, different character service vessel, private yacht (Akar et al., 2022). The role of a fishing port can be thought of as the interface between logistics provide to fishing essential services landing of catch and measure point to prevent, deter, eliminate illegal, unreported and unregulated fisheries (Flothmann et al., 2010; Huntington et al., 2015). Despite this important role, there were absences about the management of fishing ports worldwide (Scheffczyk, 2010). The limited availability of international academic publications, studies and guidelines for fishing ports were the biggest indication of the shortage compared to other similar fishing and maritime issues (Akar, 2017).

In many parts of the world, there were differences in the construction and operation of the fishing port, where vary in countries as well as regions. FAO divided fishing ports into three classes according to their sizes those needed for fishing ports as artisanal beach landings to coastal fishing ports, offshore fishing ports and distant water fishing ports. The small settlement areas have separated shelters for coastal and offshore fisheries (Sciortino, 2010).

Commercial fishing is a profession that is characterized by the long-term high risk of death (Mitchell et al., 2001; Atay & Cengiz, 2022; Cengiz, 2022). In fishery health and safety inspection, fishing was described as a dangerous occupation (Ross, 2015; Soykan, 2021). Naturally, the potential important risk is at different levels for the fishing port. Consequently, any studies on risk analysis for fishing ports may be necessary at the first glance. Nevertheless, in addition to traffic in fishing ports lack authority and intensive activities in human including environmental risks also been added to traffic in fishing ports. Moreover, these risks have reduced the benefits gained in terms of fishing port infrastructure and workforce.

The natural consequences of modern management understanding are to identify possible risks that may come about in a sector (McNeil et al., 2015; Haimes, 2015). In international port management, there are some basic concepts such as planning, organizing and defining the management responsibility (MSANZ, 2004; Lam & Notteboom, 2014).

The fishing port regulations in Türkiye have been regulated by the Ministry of Agriculture and Forestry. The fishing port is described in the regulation as: "*provide service to all kinds of fishing vessels and provide sufficient pool, backwater and sheltered vessels with water area and depth to ship movement, loading, unloading and docking berths with water, electricity, the administrative building, pre-cooling and docking area, fishermen's harbor according to their sizes and possibilities, coastal structures called harboring place or docking place*" (MAF, 2015). In Türkiye, there are 385 fishing ports that have different sizes and extended along the wide coastline. This may be different from the demands of the fishing port according to the distance of the city center, other maritime activities, etc. However, management of any fishing port must have been required by Circular of Coastal Structures in the Ministry of Transport, Communication and Maritime (UBAK, 2013). Unfortunately, in practice, the majority of the fishing ports were not able to the conditions provided in the circular.

Although Iskenderun Bay has an important fishing area (Gezmen et al., 2015; Demirhan et al., 2020): it has intensive maritime activities such as transportation and tourism in the East-Mediterranean (Mazlum et al., 2019; Yılmaz et al., 2019, 2022; Akar et al., 2021). Although there are seven fishing ports, four of these ports are active (Akar et al., 2022).

In this study, the risks of these four active fishing ports were determined and analyzed by health, goods, labor and environmental losses. The outputs of the risk analyses were evaluated by numerical and statistical comparisons for each fishing port. Although these assessments were the result of a regional study, they provide significant contributions to decision-makers for the development of fisheries management strategies and policies at the national level due to the absence of fishing port risk analysis and management in local fisheries management, Besides, it has a high potential for application at the international level.

Material and Methods

The study assessed the risk analyses and management of four fishing ports in the Iskenderun Bay, the eastern Mediterranean, Türkiye. The region has served the local port-based fishing, maritime activities, heavy industry facilities small or large fishing vessels repairs, fish handily, power plants, suppliers of fuels and transportation. The population density is high in many settlements areas and its total population is about 694,000 for 8 districts (Karataş, Yumurtalık, Erzin, Dörtyol, Payas, İskenderun, Arsuz, and Samandağ).

Table 1. Some basic charactering of the fishing port in the area (Density; Ministry's evaluation, Distance: the nearest located settlements)

Properties	**Fishing Port**			
	Dörtyol	**Iskenderun**	**Çevlik**	**Konacık**
Length of breakwater (m)	1295	785	800	740
Length of berth (m)	370	465	330	270
Protective water area (m^2)	13500	10500	9000	5500
Berth number	90	115	95	60
Number of fishing vessel	200	450	60	45
Number of other ships	4	91	7	5
Density (%)	68	251	43	33
Transport distance (km)	2	0	29	33
Operation of the building	-	+	+	-
Maintenance area	+	+	-	+
Electric	+	+	+	+
Water	+	+	+	+
Operators fishing cooperative	Dörtyol	Iskenderun	Kapısuyu	Konacık Işıklı

Due to the population density, recreational marine fishing activities and yacht tourism are occurring widely in the Bay. Alternatives to sheltering areas are scarce instead of these fishing ports for different vessel sectors such as ship agent boats, the sightseeing boat, service vessels, tour boats and amateur fishing boats for in the many marine activities of the bay.

The present study assessed four fishing ports in Dörtyol, Iskenderun, Çevlik, and Konacık, which serve for the purpose of general use. General information and characteristics of these were provided from the Ministry of Transportation, Communication and Maritime (Table 1).

No data were provided by port authorities and public agencies for risk analysis. Therefore, the current situation and risks in the ports have been primarily determined for those who represent the different stakeholders of the ports. According to the list given below, a preliminary field survey was conducted with selected and contact persons and brief information was given about the subject.

1. Owners of small-scale fishing vessels
2. Owners of fishing ships
3. Recreational angling fishermen
4. Owners of yachts
5. Owners of tourist tour boats
6. Owners of marine agent boats
7. Owners of service ships
8. Fishermen (do not have a ship)
9. Port management (except chief)
10. Port staff
11. Fisheries Engineer from the Ministry of Agriculture and Forestry
12. Personnel of Coast Guard Command
13. Security personnel responsible for public order (Police/Gendarmerie)
14. Personnel of municipal responsible for cleaning
15. Civilian citizens, who have spent time in the port and are not involved in general operation

Four meetings and twelve participants were interviewed for each fishing port and risks were identified and evaluated. These meetings were held to identify and assess the determined the risk of each port. During the meetings, the co-operative chief was not invited for the meeting to be objective to work. Permission requests for public personnel were made at this time. Meetings were held with selected twelve persons from each fishing port. The three meetings were held at the Faculty of Marine Sciences and Technology, Iskenderun Technical University, excepting the meeting for the Çevlik fishing port which is away from the faculty. The meeting for the Çevlik fishing port was held at its own location of the Çevlik fishing port. A presentation was made about the purpose of the research before the meetings. The meetings have three stages:

1. At the first stage of the meeting, risks were identified in three groups of four. Later, members of the group were given the opportunity to check their own risk.
2. For every risk identified, the possible potencies of health, goods, labor and environment losses and frequencies were scored between 1 and 10.
3. The risks identified in the last session of the meetings were determined on the basis of the reason and mean.

There are 4 classes when assessed the potency of health loss including (i) no loss of health, (ii) slight injury, (iii) serious injury, (iv) disability and death. The loss of goods, the loss of occupation, and the environmental damage potency were evaluated in terms of money (Turkish Liras) in five groups. The frequencies were classified as (i) not available, (ii) 6 months, (iii) 1 year, (iv) 1-10 years, and (v) 10-49 years by a time expression for each risk.

The potential and frequency matrices, the losses of health, goods, labor and environment were demonstrated for each port in Figure 1. An evaluation was made according to the value of the potency and frequency by assuming that there is a generated linear line. The one of this linear line consists of three parts in the matrix graph (X-axis the risk potency, Y-axis is the risk frequency): (1) The blue area is lower than 3 for the value of potency and frequency, and it is located under the line, (2) the yellow area is between 3 and 6 for the value of potency and frequency, and it is located on the line, (3) the red area is higher than 6 for the value of potency and frequency, and it is located upper the line.

The causes of risks were examined by risk analysis and these risks were classified as structural, administrative, pollution and public order. A solution was recommended for all risks identified by the participants by considering the assessment of risk analysis.

Table 2. The determination at risks, risk class, risk for frequency and potential loss of health, good, labor and environmental values for Dörtyol Fishing Port (Str: structural, Pol: pollution, Adm: administrative, Sec: security and Env: environmental)

Code	Description	Category	Frequency				Potency			
			Health	Good	Labor	Env.	Health	Good	Labor	Env.
01	Inadequate depth basin	Str.	4.7	5.9	7.0	4.4	1.3	8.0	5.7	5.7
02	Inadequate cleaning	Pol.	1.0	3.3	5.4	7.4	2.5	3.5	4.7	7.3
03	Disputes and problems in boat tying	Adm.	2.9	4.1	4.2	2.5	3.3	5.8	4.9	3.0
04	Public security problem	Sec.	3.5	8.6	6.5	5.4	8.5	9.2	8.4	6.3
05	Income inadequacy for management	Adm.	1.6	3.9	5.7	6.5	4.2	4.5	6.7	7.1
06	Low of west breakwater	Str.	3.5	6.4	4.9	4.7	6.3	6.1	4.6	2.4
07	Swimming attempts	Sec.	4.8	5.1	4.5	4.3	8.4	6.3	5.7	4.0
08	Open to the public entering	Sec.	2.0	5.4	4.5	4.7	3.1	6.1	4.8	4.7
09	Lack of fire extinguishing system	Str.	2.0	2.4	2.5	2.9	5.3	4.6	4.4	4.2
10	Lack of first aid emergency	Adm.	2.5	1.6	1.8	1.4	4.5	2.4	2.1	2.2
11	The inability of the docks	Str.	2.3	4.5	5.7	4.2	5.1	5.5	6.4	4.6
12	The lack of lighting	Sec.	1.5	4.8	5.2	4.3	4.0	6.1	5.7	4.1
13	Lack of the superstructure (the resting place, etc.)	Str.	1.1	1.3	2.5	2.4	2.5	2.4	3.7	2.8
14	Absence of a ship's bilge system	Pol.	1.1	2.4	2.0	6.0	2.9	3.7	4.1	8.4
15	No state office for fishing	Str.	1.0	1.3	3.8	1.2	2.0	2.5	4.3	1.5
16	Illegal angling fishing	Sec.	2.3	3.9	3.9	5.0	4.5	5.4	5.5	6.2
17	No rules for car traffic	Sec.	1.8	3.5	2.6	5.7	5.4	5.8	4.9	6.6
18	Need to WC and shower	Str.	1.8	1.6	4.3	5.5	2.6	2.5	5.0	6.5
19	Fire helicopter closely taking water	Adm.	1.0	1.3	1.0	1.2	1.1	1.5	1.2	1.5
20	No fishing material store	Str.	1.1	4.0	4.5	7.0	2.9	5.6	5.4	7.3
21	The ships in the harbor fast cruise	Sec.	1.5	3.4	2.2	3.8	3.1	4.6	3.7	4.1
22	No management office	Str.	1.0	2.0	5.7	3.7	1.9	3.3	6.4	4.5

Results

The risks associated with each fishing port and their effects were shown with risk frequently groups in Table 2, Table 3, Table 4, and Table 5. While 22 risks were determined for Dörtyol Fishing Port, these risks were defined as ten risks for the structural category, six risks for the security, four risks for the administrative, and two risks for the pollution. The first visible risk for Dörtyol Fishing Port is that the depth of the port is shallow. However, it should be noted that there was no significant ship accident. This fishing port management has imposed the deep process under the more because of the high fish costs. Another structural important risk is the height of the west breakwater, and the height must be increased. The wave height increase may cause undesired impacts on the dock. One of the other structural deficiencies in the fishing ports is the absence of a fire extinguishing system which is vital and essential for the functioning of the ports. The four administrative risk solutions important for Dörtyol Fishing Port were very simple for the port management, but the port manager has been made unauthorized to solve these problems by the law. Security risks were determined as inadequate authority for port management and the lack of security staff due to economic insufficiency. There were two risks associated with pollution including the use of the dock in a sloppy way and the lack of waste systems (Table 2).

Table 3. The determination at risks, risk class, risk for frequency and potential loss of health, good, labor and environmental values for İskenderun Fishing Port (Str: structural, Pol: pollution, Adm: administrative, Sec: security and Env: environmental)

Code	Description	Category	Frequency				Potency			
			Health	Good	Labor	Env.	Health	Good	Labor	Env.
01	Water and electricity not available	Str.	2.5	7.5	8.6	6.7	5.8	6.7	7.9	6.3
02	Public security problems	Sec.	2.7	7.8	4.6	7.2	5.8	7.2	6.2	7.0
03	Insufficient of fire response system	Str.	3.8	6.4	5.7	5.9	7.1	7.1	6.6	6.6
04	Lack of emergency response plan	Sec.	5.0	5.6	7.5	6.5	6.6	6.9	5.7	5.5
05	No dock on the east side	Str.	3.5	5.9	6.2	5.5	6.3	6.5	7.4	6.9
06	Lack of vessels maintenance area	Str.	4.1	6.3	6.4	5.5	6.1	7.3	8.0	6.9
07	Low dock in middle side	Str.	2.4	6.3	6.9	6.7	5.2	7.4	7.5	7.2
08	The lack of main breakwater	Str.	1.2	2.5	3.6	3.3	2.5	2.7	3.8	3.8
09	Income inadequacy for management	Adm.	2.6	5.8	7.4	4.3	5.3	7.5	8.1	6.1
10	Cooperative management method	Adm.	2.6	5.5	7.8	6.7	5.3	6.4	7.5	7.1
11	Bottom wastes from the port	Pol.	2.5	4.6	5.2	7.9	4.1	6.5	5.6	7.7
12	Lack of the superstructure (the resting place, etc.)	Str.	1.5	1.8	2.5	4.0	3.1	3.4	3.9	5.2
13	Lack of park car entry, park and traffic planning	Str.	1.5	3.3	5.3	5.2	4.5	3.9	5.9	5.3
14	Non-payment of fees on a regular basis and adequate for vessels sheltering	Adm.	1.4	3.6	5.3	4.2	2.5	5.5	7.1	5.1
15	Shelter of marine vehicles except fishing	Adm.	2.4	4.0	5.4	4.1	2.7	4.5	5.9	5.1
16	Lack of skilled personnel	Adm.	2.1	5.1	6.1	4.9	3.7	5.8	6.0	4.2
17	No fishing material store	Str.	1.8	5.2	4.5	5.2	3.0	6.9	6.6	5.9
18	Using of the dock for ship maintenance	Str.	1.6	3.3	3.6	4.0	4.3	4.4	4.2	4.9
19	The use of inappropriate system for small ships	Str.	1.8	4.6	4.8	6.5	3.6	4.2	4.9	6.7

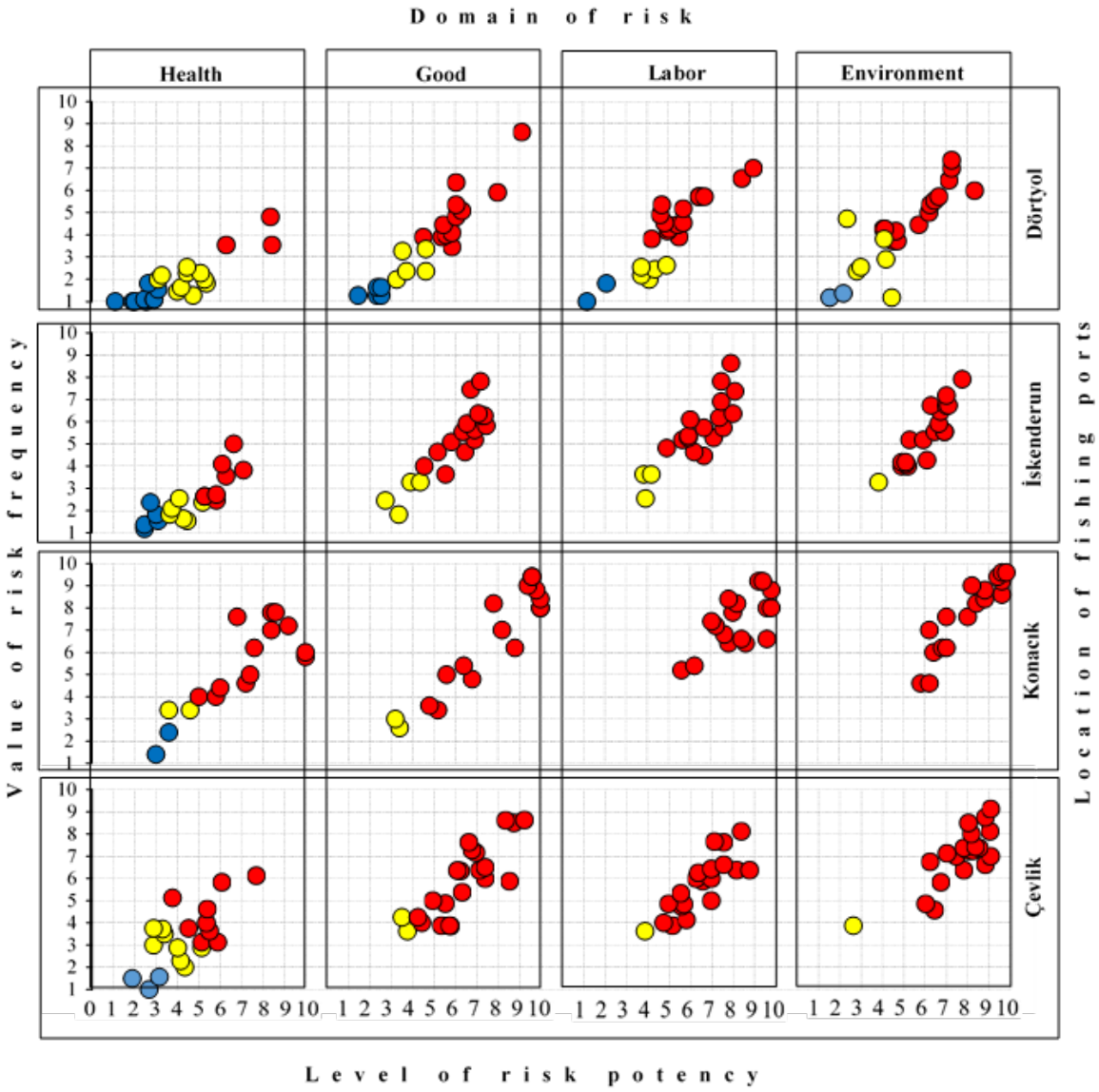

Figure 1. Matrices of the determined risks frequency values and risk potency level with health, good, labor and environmental loses for the four fishing ports in the area (red point: important risk, yellow point; medium risk, blue point: negligible)

There were 19 risk definitions in İskenderun Fishing Port. These risks were classified as eleven risks for the structural category, two risks for the security, six risks for the administrative, and one risk for the pollution. This fishing port has the most intensive fishing, tourism and other maritime activities. In addition, the general public security problem and the irregularities of port-related activities were found to be very high. Electricity and domestic water shortages are often experienced in the port due to the fact that the invoice fees are not paid. All defined administrative risks were related to each other and the main reasons were the low financial income and deauthorization of the port management. Most of the determined structural risks were similar to the Dörtyol fishing port, but there were port-specific risks related to the deficiency of the ship docking areas. The most important problem in terms of pollution is that no ship waste is collected. (Table 3).

While 17 risks were determined for the Konacık Fishing Port, these were defined as seven risks for the structural category, four risks for the security, five risks for the administrative and one risk for the pollution. Konacık fishing port is the most economic insufficiency port, while it has the least structural risk. (Table 4).

Totally 20 risks were identified for Çevlik Fishing Port including nine risks for the structural category, six risks for the security, three risks for the administrative and two risks for the pollution. In general, there were similar risks to the fishing port while there were also regional differences. It is an important structural risk was been absented short outer breakwater of the port, because it was a continuous movement of the sea in the

port. The insufficient space ship maintenance, the lack of binding vessel dock and the dock consists of the binding systems maintenance were identified as major tree structural risks. In there, this was different from other private fishing port; the risk of not honey a fish sales place was seen as risk. (Table 5).

Increasing risk for all fishing port in the region were requested to potency and frequency matrix. These matrices were given in Figure 1, as each port and the health, goods, labor and environmental losses.

Figure 2 shows the frequency valves of the average potency and risk that arise when the risk ide field at each fishing port are divide into four categories as structural, administrative, security and pollution. This figure shows that as labor losses have the highest average levels arise that they maritime environmental at good losses.

Table 4. The determination at risks, risk class, risk frequency and potential loss of health, good, labor and environmental values for Konacık Fishing Port (Str: structural, Pol: pollution, Adm: administrative, Sec: security and Env: environmental)

Code	Description	Category	Frequency				Potency			
			Health	Good	Labor	Env.	Health	Good	Labor	Env.
01	Public security problem	Sec.	4.6	9.4	7.4	6	7.2	9.6	7	6.4
02	Environmental pollution	Pol.	3.4	4.8	6.8	9.2	4.6	6.8	7.6	9.6
03	The risk created by the floating	Adm.	6.2	6.2	6.4	8.6	7.6	8.8	7.8	9.6
04	Shredding storm breakwater	Str.	7.6	8.2	8.4	7.6	6.8	7.8	7.8	7
05	The lack of electricity and water	Str.	7.8	9	8.8	8.8	8.6	9.4	9.8	8.8
06	The lack of a shower and a WC	Str.	7.8	9	8.8	7	8.6	9.4	9.8	6.2
07	line fishing	Sec.	4.4	5.4	6.6	6.2	6	6.4	8.4	7
08	Lack of first aid intervention	Str.	7	3	7.8	4.6	8.4	3.2	8	5.8
09	Fire response system deficiency	Str.	7.2	8.4	9.2	9.6	9.2	10	9.4	9.8
10	Income inadequacy for management	Adm.	4	5	8.2	6.2	5.8	5.6	8.2	6.8
11	Cooperative management method	Adm.	4	5	8.2	6.2	5.8	5.6	8.2	6.8
12	Lighthouse function insufficient	Sec.	5.8	8	8	8.4	10	10	9.6	8.8
13	The lack of lighting	Sec.	6	8	8	9.6	10	10	9.8	9.6
14	No fishing material store	Str.	4	8.8	6.6	8.2	5	9.8	9.6	8.4
15	Lack of the superstructure (the resting place, etc.)	Str.	2.4	3.4	6.4	7.6	3.6	5.2	8.6	8
16	Non-payment of fees on a regular basis and adequate for vessels sheltering	Adm.	1.4	3.6	5.2	4.6	3	4.8	5.6	6.2
17	No rules follow to individuals	Adm.	5	7	7.2	9	7.4	8.2	7.2	8.2

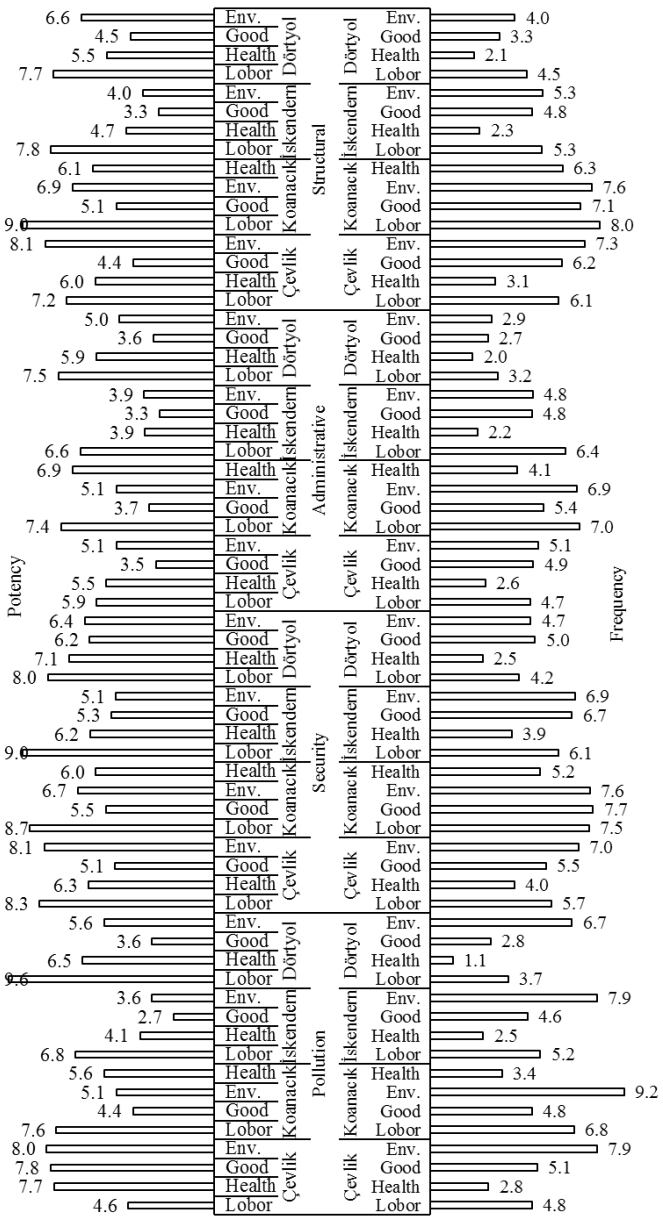

Figure 2. Risk frequency and potency in category in fishing port and domain

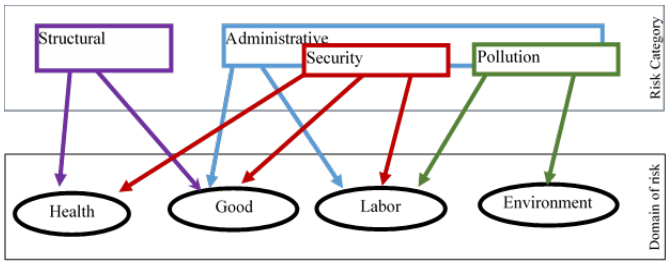

Figure 3. Overview diagram of risk category and domain for the fishing ports

Generally, loss of healthy risk values is lower than average. The categorized results of these values of risk potency and frequency for each fishing port only some points were found statistically difference by multiple analysis of variance (using SPSS 17- MANOVA). When categories of risks and domains of risks were evaluated by SPSS numerically correlations summary schema could have been obtained in Figure 3. This figure illustrated that which risk category is causing losses in the risk.

Discussion

Fishing ports, while providing logistic support for fishing, have not been valued in terms of scientific publication as an important point for realistic fishing control (Flothmann et al., 2010). It is not possible to say that there is a standard application for fishing port construction, business and management in the world (Scheffczyk, 2010). Today there have some clarifications that fishing ports can be turned into tourism support by marinas and others tourism activities due to loss of economic value for fisheries (Kim & Sung, 2016). This and similar expression have been expressed different people in our regional and national arena.

Turkish State makes significant investments for the fishery season in the other maritime sector, there are 385 fishing ports on coast of Türkiye, and this is a negative aspects of sea vehicles as a refuge for the vessels. In addition, these investments are always ongoing for both the improvement of it made and the construction of new fishing ports. The region also carried out a new fifth shelter. Repair of Iskenderun dock and of Çevlik breakwater fishing port were made in recent years and it is planned renovation for Dörtyol fishing port (UDHB, 2022). The ministry of transport communication and the maritime prepared a new fishing put became it did not fit any of the costal stretch, but many serious objections occurred the new circular by different participants (TCRG, 2017). It has estimated that, the risks identified for fishing port in this study will be reduced by this new circular, but the reduce of risk will not provide neither ensuring the satisfaction of the stakeholders nor provide the expected sustainability of fishing port management.

In this study, wide perspectives were formed with the participation of the different status to meeting. In this way, main figures of the four fishing ports' function were reached and it was observed the first time that their roles had been demonstrated as risk to loses of health, goods, labor and environment. As a result of the risk analysis there were a few specific risks for each fishing port, but in the overall, the defined risks were similar, and some were the same. Therefore, in this discussion the reason of the risks identified to assess the differences between fishing port. In this context, all these risks such as structural, administrative, security and pollution were divided into four groups for each fishing ports.

Structural risks, 6, 10, 7, and 9 were defined as Dörtyol, İskenderun, Konacık and Çevlik fishing ports respectively. The

Table 5. The determination at risks, risk class, risk for frequency and potential loss of health, good, labor and environmental values for Çevlik Fishing Port (Str: structural, Pol: pollution, Adm: administrative, Sec: security and Env: environmental)

Code	Description	Category	Frequency				Potency			
			Health	Good	Labor	Env.	Health	Good	Labor	Env.
01	Ship mooring plan insufficient	Adm.	2.0	6.3	5.3	6.5	4.3	6.2	5.5	6.7
02	Cold storage and exhibition place	Str.	1.0	6.0	4.8	5.8	2.7	7.3	5.7	6.7
03	Public security problems	Sec.	5.8	7.2	7.7	8.0	6.0	7.0	7.2	8.2
04	The outer breakwater short	Str.	2.0	8.5	7.7	8.1	4.3	8.8	7.2	9.0
05	The lack of a shower and a WC	Str.	3.0	4.3	4.8	8.8	2.9	3.5	5.6	9.8
06	Inadequate depth in dock	Str.	5.1	7.6	5.9	7.4	3.8	6.6	6.6	7.8
07	Lack of vessels maintenance area	Str.	3.8	4.9	6.3	6.8	2.9	5.5	6.4	6.3
08	Lack of dock according to the ships number	Str.	3.7	7.3	6.4	7.4	3.3	6.7	7.0	8.3
09	Disputes of vessel sheltering fee	Adm.	3.5	4.3	4.0	3.9	3.4	4.3	4.8	2.6
10	Wastes in bottom	Pol.	4.0	6.5	6.0	8.5	5.3	7.3	6.3	8.0
11	The lack of lighting	Sec.	3.6	8.6	7.6	9.1	5.5	8.3	7.5	9.1
12	Insufficient of fire response system	Str.	3.1	5.9	6.4	7.0	5.9	8.5	8.8	9.1
13	The presence of stray animals	Sec.	3.8	3.9	3.4	6.6	4.5	5.8	5.1	8.8
14	Swimming	Sec.	6.1	3.9	5.0	6.4	7.6	5.4	7.0	7.8
15	Absence of a ship's bilge system	Pol.	1.5	3.6	3.6	7.3	1.9	3.9	3.9	8.0
16	Problem using of water and electricity	Str.	2.9	5.0	6.4	7.4	5.1	5.0	8.1	8.5
17	Illegal angling fishing	Sec.	2.9	5.4	6.6	7.3	4.0	6.3	7.5	8.3
18	Broken bollard in dock	Str.	3.1	6.4	6.0	7.1	5.1	7.1	7.0	7.0
19	Non-payment of fees on a regular basis and adequate for vessels sheltering	Adm.	2.3	4.0	4.9	4.9	4.1	4.4	5.0	6.0
20	Open to the public entering	Sec.	1.6	3.9	4.1	4.6	3.1	5.7	5.9	6.4

common point of structural risks was evaluated by shortcomings in upper structure as lack of operations building, storage for fishing gears, toilet, bathroom, fire-extinguishing system soon. Administrative risk categories are occurred from legal negligence or regional and personal mistakes. In fact, the risk of, security and pollution can be considered as an administrative but more accurately defined because of an excess risk.

The matrix graph shows that the risk area was similar in fishing ports despite of different level. While goods, labor and environment losses risk were very high in all fishing ports, the assessment of the health risks were lower. Nevertheless, different number significant health risks were evaluated for each port. According to the overall assessment, the Dörtyol Fishing Port is showing more favorable condition compares to others. As a result, it can be said that the view point of Dörtyol fishing ports is better than the other fishing port. If we need to dwell on this point, its economic income and expenses can be observed to be more positive than others. This positive case has showed differences in the port administration which uses

service ships. The members of fishing cooperative who fishing port operator boat have different service for other maritime activities they provide positive income for the fishing port, since this marine sector's is much better to than income especially small-scale fishing. This is good income for the fishing port, it provides a good image compare to the other three ports, but some fisherman who were clamming non-fishing vessels crowded have not to be unhappy with this issue.

In this result of the study, it can be said that, the status of four fishing ports is similar but there are differences in their use, according to regional needs and demands. These differences can give place different results, as listed below.

1. Dörtyol Fishing Port was better than the others in terms of loss of healthy and good.
2. Iskenderun Fishing Port was incorporated serious public security problems for loss of healthy and good.
3. Konacık Fishing Port was a low income to ensuring minimum quality of facility.
4. Çevlik Fishing Port's problems were a common risk for the whole fishing port.

Conclusion

It is clear that the fishing port will not be a regulatory mechanism for the current approach and expense risk management for many people in our country. More important investments for coastal structure areas are made incorrectly only by the operations of the fishing cooperate. Because the operator experts should have at least management elements for sustainability.

In the legal circular for these coastal structures defined fishing port should be need to planned according demands of all maritime activities, and that port operator's, insufficient income should be decreased, which is the biggest problem for the operation of these areas. This approach must be regional or even the port-based instead general management. Moreover, this planning should be included demands of different fishing methods vessel. Because a fishing vessel is changed the activity in the harbor according to fishing method.

Acknowledgements

This study was carried out without financial support from any institution. We were greeted with hope for the future from the support and willingness of the risk determining personals of participating in the meetings. Therefore, authors thanks to all participates.

Compliance With Ethical Standards

Authors' Contributions

This study is a part of master thesis of the first author, which was carried out under the supervision of the second author.

ÖA: Study design, Drafting, Writing, Statistical analyses.

AD: Study design, Drafting, Writing, Statistical analyses, Supervision.

Both authors read and approved the final manuscript.

Conflict of Interest

The authors declare that there is no conflict of interest.

Ethical Approval

For this type of study, formal consent is not required.

Data Availability Statements

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

References

Akar, Ö. (2017). *Hatay İli balıkçı barınakları risk analizi* [Risk analysis for fishing ports in the province Hatay] [M.Sc. Thesis, İskenderun Technical University].

Akar, Ö., Çalışır, V., Demirci A., & Şimşek, E. (2021). Effects of COVID-19 on fuel gas emissions from marine transportation. *Proceedings of the 4th Global Conference on Innovation in Marine Technology and the Future of Marine Transportation*, Türkiye, pp. 90.

Akar, Ö., Demirci, A., Şimşek, E., Mazlum, Y., & Demirci, S. (2022). Management of fishing ports on the financial performance of the Türkiye fishery sector; A case of fishing ports in Hatay province. *Journal of Anatolian Environmental and Animal Sciences, 7*(3), 281-288. https://doi.org/10.35229/jaes.1117772

Atay, G., & Cengiz, Ö. (2022). Investigation of fishing activities in Çitören (Van, Türkiye) for occupational health and safety. *Marine and Life Sciences, 4*(2), 137–141 (In Turkish). https://doi.org/10.51756/marlife.1129940

Cengiz, Ö. (2022). Analysis of risk factors in fishing activities in Lake Erçek (Van, Turkey) for occupational health and safety. *Momona Ethiopian Journal of Science*, *14*(2), 139-148. https://doi.org/10.4314/mejs.v14i2.3

Demirhan, S. A., Alkan, A., & Şimşek, E. (2020). Artificial reef application from the Iskenderun Bay, Northeastern Mediterranean, Turkey; an experimental study. *Sakarya University Journal of Science, 24*(1), 49-54. https://doi.org/10.16984/saufenbilder.527933

Flothmann, S., Kistowski, K. V., Dolan, E., Lee, E., Meere, F., & Album, G. (2010). Closing loopholes: Getting illegal fishing under control. *Science, 328,* 1235-1236. https://doi.org/10.1126/science.1190245

Gezmen, S., Şimşek, E., & Demirci, A. (2015). Evaluation of dynamics of fish retail trade in Iskenderun. *Journal of Aquaculture Engineering and Fisheries Research, 1*(1), 33-44. (In Turkish) https://doi.org/10.3153/JAEFR15003

Haimes, Y. Y. (2015). *Risk modeling, assessment, and management*, John Wiley & Sons.

Huntington, T., Nimmo, F., & Macfadyen, G. (2015). Fish landings at the world is commercial fishing ports. *Journal of Ocean and Coastal Economics, 2*(1), 4. https://doi.org/10.15351/2373-8456.1031

Kim, Y., & Sung, J. S. (2016). Fishing port remodeling plan utilizing marine tourism resources. *Journal of the Korean Institute of Landscape Architecture, 44*(2), 52-69. https://doi.org/10.9715/KILA.2016.44.2.052

Lam, J. S. L., & Notteboom, T. (2014). The greening of ports: a comparison of port management tools used by leading ports in Asia and Europe. *Transport Reviews*, *34*(2), 169-189. https://doi.org/10.1080/01441647.2014.891162

MAF. (2015). *Fishing Port Regulations.* Retrieved on October 24, 2022, from https://www.tarimorman.gov.tr/

Mazlum, Y., Can, M. F., Yılmaz, A. B., Demirci, A., Gürlek, M., Şimşek, E., Şereflişan, M., & Uygur, N. (2019). Removal of abandoned and lost fishing equipment from various seabeds and habitats. *II. Ulusal Denizlerde İzleme ve Değerlendirme Sempozyumu Bildiriler Kitabı*, Türkiye, pp. 173-174.

McNeil, A. J., Frey, R., & Embrechts, P. (2015). *Quantitative risk management: Concepts, techniques and tools*. Princeton University Press.

Mitchell, R., Driscoll, T. R., Healey, S., Hull, B. P., Mandryk, J., & Hendrie, I. (2001). Work-related fatal injuries in the washing industry in Australia, 1989 to 1992. *Journal of Occupational Health and Safety-Australia New Zealand, 17*(4), 375-386.

MSANZ. (2004). *Guidelines for Port and Harbour Risk Assessment and Safety Management Systems in New Zealand*, Maritime Safety Authority of New Zealand, 67 p.

Ross, N. (2015). Understanding the fishing 'community': the role of communities of the mind. *Sociologia Ruralis*, *55*(3), 309-324. https://doi.org/10.1111/soru.12094

Scheffczyk, R. B. (2010). Fishing port management, the forgotten subject (pp. 216-244). In Safran, P. (Ed.), *Fisheries and Aquaculture Volume-1*. UNESCO Encyclopedia of Life Support Systems.

Sciortino, J. A. (2010). *Fishing harbour planning, construction and management (No. 539):* Food and Agriculture Organization of the United Nations (FAO).

Soykan, O. (2021). An analysis on the statistics of occupational accidents in Turkish fisheries and aquaculture sector; 2013-2019 period. *Ege Journal of Fisheries and Aquatic Sciences, 38*(4), 533–544 (In Turkish). http://doi.org/10.12714/egejfas.38.4.16

TCRG. (2017). *The Law Change Supporting to Development of the Production and Industry.* Retrieved on December 28, 2022, from https://www.resmigazete.gov.tr

UBAK. (2013). *Coastal Facilities Business Permission Granting Procedures and Principles.* Retrieved on December 28, 2022, from https://www.ubak.gov.tr/

UDHB. (2022). *Fishing Coastal Structures Status and Needs Analysis.* Retrieved on December 28, 2022, from https://www.udhb.gov.tr/

Yılmaz, A. B., Demirci, A., Akar, Ö., Kılıç, E., Uygur, N., Şimşek, E., Yanar, A., & Ayan, O. A. (2022). An assessment of sea surface and seabed macro plastic density in Northeastern Mediterranean Sea. *Pollution*, *8*(2), 543-552. https://doi.org/10.22059/poll.2021.331026.1192

Yılmaz, A. B., Demirci. A., Uygur N., Şimşek, E., Yanar, A., Akar, Ö., Kılıç, E., & Alptekin, O. A. (2019). Evaluation of plastic waste from Iskenderun Bay. *II. Ulusal Denizlerde İzleme ve Değerlendirme Sempozyumu Bildiriler Kitabı*, Türkiye, pp. 175-178.