Field investigation on the state of marine safety of traditional fishery

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Abstract. Gaining an understanding of the characteristics that affect maritime safety is not easy. It is necessary to have sufficient information about what can support safety. Problems in traditional fishing are visible from the low level of safety and the availability of information that supports the fishers' safety. Several accidents that occur due to negligence of work prove that the low quality of information is also the cause of failure to maintain safety. What commonly happens is that there are differences and discrepancies in recorded accident data with reality on the field, where this is rarely known even though accidents occur. It shows that there is no data integrity to support safety. When talking about safety, there must be a potential failure, which can be identified from the information obtained. However, in reality, the information used to support fishers' safety is not available, so traditional fishing boats' safety cannot run optimally due to data unavailability. When safety governance cannot be carried out using correct data, safety management becomes ineffective. By investigating the state of marine safety and examining the role of information on traditional fishers' safety, it is hoped that it can produce a better mechanism for traditional fishers' safety.

1. Introduction
The problems in traditional fishers are visible from the low level of safety and the flow of information that supports the safety management of traditional fishermen themselves. According to [1], information is data that has been processed into a meaningful form for the recipient and is useful for current or future decision making. Concerning safety, especially traditional fishers safety, one of the most critical pieces of information is the last position of a fishing boat when an accident occurs in the middle of the sea. The last coordinate part that provides information on the accident incident is often an obstacle to both the rescue and evacuation of victims. Law Number 17 of 2008 on Shipping, [2] it is stated that ship worthiness is the condition of the ship that meets the requirements for ship safety, prevention of water pollution from ships, manning, loading, health and welfare of the crew and passengers, and the legal status of the ship to sail in certain waters. In [3], we look at the importance of safety management and its maritime applications, where the choice of destination will depend on the area of interest. One of them is the importance of information when the goal is to make facts, figures, instructions, dates, and knowledge available to those needing them in forms that are relevant, up-to-date and user friendly. The resources involve social skills and facilities such as computer hardware and software. The activities are coordinated to ensure that the goal can be met. The scope of the arrangements in marine operation includes the area of the sea, marine development, marine management, marine development, marine space management and marine environmental protection, defense, security, law enforcement, safety at sea, governance and institutions, and public participation [4]. We see that the state must be present in the context of marine safety. Important point is also discussed in [5] where estimation and detection of dangerous situations is one of the key problems of
maritime activities, monitoring, and decision support, which governments can easily do. We can define government as an entity with agency that can form a relationship with fishers to exchange significant information. To form a relationship to communicate between humans and agents with intentionality, autonomy, rationality, individuality, and interactivity, humans must understand the purpose behind an agent’s behavior [6]. Operators, equipment, procedures and the entire radiocommunication system, as a whole, constitute a fundamental pillar for the safety of human life at sea, as well as for the safety of navigation [7]. Humans have a tendency to avoid changing their behaviour, also when it comes to safety critical tasks. People sometimes express their understanding of the need for change, but in practice use all means to sabotage new procedures, in [8] we call this unwillingness to change. This unwillingness to change does not only happen to traditional fishers but also agencies related to marine safety. Apart from safety culture issues, the weather is also an obstacle for traditional fishers carrying out their activities at sea. Where the availability of information also plays a vital role in helping traditional fishers to be able to carry out activities at sea safely. The question that may arise is whether the agency can provide this information. The frequency of occurrence of types of adverse or unfavorable weather conditions is extremely important for sea ports, for their effective work. No matter what cargo is handled in a given port, strong and very strong winds are to be treated as weather conditions which disturb or even do not allow working properly [9]. A fishing vessel can be a dangerous working environment. But the risk of accidents will be greatly reduced if proper precautions are taken [10]. This research was conducted at the Port of Pasuruan and involved several agencies related to the safety of traditional fishers in Pasuruan City. In this study, more investigations are carried out in the field to get a big and bare picture of how the interactions between agencies related to marine safety are, what data is available there, what is the role of each agency in helping marine safety, how technology plays a role in the process of recording data, how much is the ability of an agency to carry out search and rescue activities of traditional fishers. All these questions are fundamental in achieving marine safety in the regional scope, where the government is also obliged to play a role. The benefits of this research provide a big picture with the findings in the field and are the first step to build a marine safety mechanism and as a lever in improving the quality of the information in supporting the safety of traditional fishers. This research will present more qualitative data. However, findings and field investigations will provide a reality in addition to answering the existing questions and showing that the success of improving the safety of traditional fishers is determined by the integrity of the data and completeness of the information.

2. Identification of the Availability of Data for Traditional Fishery

In observations made either through direct observation or interviews with agencies related to the safety of traditional fishing boats in Pasuruan City, there are six agencies including Harbormaster (KSOP Class V of Pasuruan City) which also includes KPLP (Sea and Coast Guard), Lantamal V Indonesian Navy, Polair (Water Police Unit), Transportation Department of Pasuruan City, Marine and Fisheries Department of Pasuruan City, Disaster Management Agency of Pasuruan City (BPBD). From the six agencies then identified the availability of data on traditional fishers’ accidents. As for what is meant by the availability of data on a traditional fishers’ accidents is that the agency can provide data in the form of notes or reports that show the incidents of traditional fishers’ accidents. In this study, we call this significant information. Apart from safety culture issues, the weather is also an obstacle for traditional fishers carrying out their activities at sea. Where the availability of information also plays a vital role in helping traditional fishers to be able to carry out activities at sea safely. The question that may arise is whether the agency can provide this information. The frequency of occurrence of types of adverse or unfavorable weather conditions is extremely important for sea ports, for their effective work. No matter what cargo is handled in a given port, strong and very strong winds are to be treated as weather conditions which disturb or even do not allow working properly [9]. A fishing vessel can be a dangerous working environment. But the risk of accidents will be greatly reduced if proper precautions are taken [10]. This research was conducted at the Port of Pasuruan and involved several agencies related to the safety of traditional fishers in Pasuruan City. In this study, more investigations are carried out in the field to get a big and bare picture of how the interactions between agencies related to marine safety are, what data is available there, what is the role of each agency in helping marine safety, how technology plays a role in the process of recording data, how much is the ability of an agency to carry out search and rescue activities of traditional fishers. All these questions are fundamental in achieving marine safety in the regional scope, where the government is also obliged to play a role. The benefits of this research provide a big picture with the findings in the field and are the first step to build a marine safety mechanism and as a lever in improving the quality of the information in supporting the safety of traditional fishers. This research will present more qualitative data. However, findings and field investigations will provide a reality in addition to answering the existing questions and showing that the success of improving the safety of traditional fishers is determined by the integrity of the data and completeness of the information.

2.1. Availability of Data for Traditional Fishery at Harbormaster (KSOP Class V of Pasuruan City)

Harbormaster (KSOP Class V of Pasuruan City) is a Technical Implementing Unit (UPT) within the Directorate General of Sea Transportation (DJPL) which is responsible to the Director-General of Sea Transportation and has the task of carrying out supervision and law enforcement in the field of safety and shipping security, coordination of government activities at ports as well as regulating, controlling and supervising port activities at ports that are commercially operated. In its activities in the field of marine safety, the Harbormaster does not record any incidents of traditional fishers accidents. The main recording or data collection activities carried out by the Harbormaster are records related to ships call and data related to shipping and maritime activities, including the activity of issuing ship certificates, carried out for one year.
In its activities in the field of marine safety, the Harbormaster because it does not record traditional fishers accidents, it can be said that the Harbormaster digitally records traditional fishers accident data was also not carried out. However, it is known that in terms of annual recording and reporting carried out, computer technology has been used.

**Table 1. Findings at the Harbormaster (KSOP Class V of Pasuruan City).**

| Issue                                      | Findings |
|--------------------------------------------|----------|
| Accident Data Availability                 | X        |
| Accident Data Recording Using Computer Technology (Digital) | X        |

2.2. Availability of Data for Traditional Fishery at Indonesian Navy (Lantamal V)

The Main Base of the Indonesian Navy V (Lantamal V) is a service element with one of the main tasks of carrying out maritime security patrols in the work area of the Indonesian Navy Main Base. Where it is known that Lantamal V Pasuruan City is included in the elements involved in the safety of traditional fishers, in its activities in the field of maritime safety and security, the Main Base of the Indonesian Navy V (Lantamal V) always records accidents that occur within its working area. The elements of information contained in the recording or data collection of accident events conducted by the Lantamal V Pasuruan City are as follows:

**Table 2. The information elements contained in the records by Lantamal V.**

| Column          | Contain                                                                 |
|-----------------|-------------------------------------------------------------------------|
| DAY             | - The day of the incident                                               |
|                 | - The date of the incident                                               |
| TIME            | - Time of incident                                                       |
| EVENTS *(different format for each incident)* | - Chronological sequence of events                                       |
|                 | - Name of ship                                                           |
|                 | - Size of the ship                                                       |
|                 | - Name of ship owner                                                     |
|                 | - List of crew (ABK) names                                               |
|                 | - Address of crew members                                                |
|                 | - The name of the ship's captain                                         |
In its activities in the field of marine safety and security, Lantamal V Pasuruan City is known to record traditional fishers accidents. However, data recording of traditional fishers accidents is done manually without using technology such as computers or similar technological devices that are capable of storing data in digital form. It is known that in recording the archives, it is appropriately stored using a folio-sized book with stripes.

Figure 2. Folio-Sized Record Book by Lantamal V.

| Issue                                                      | Findings |
|------------------------------------------------------------|----------|
| Accident Data Availability                                  | ✓        |
| Accident Data Recording Using Computer Technology (Digital) | X        |

2.3. Availability of Data for Traditional Fishery at Polair (Water Police Unit)

The Water Police Unit or what is commonly called the Polair, is an element that carries out the main tasks of the city police (Polres) who are under the Police Chief. The Water Police Unit is in charge of carrying out police functions in the waters, which includes patrolling waters, law enforcement in the waters, fostering coastal and other marine communities, as well as searching and rescuing accidents in waters (SAR). Where the Water Police Unit (Polair) is one of the elements involved in the safety of traditional fishers, in its activities in the field of marine safety, the Water Police Unit of Pasuruan City always records accidents that occur in its working area. The elements of information contained in the recording or data collection of accident events conducted by the Water Police Unit (Polair) of Pasuruan City are as follows:
Table 4. The information elements contained in the records by Polair.

| Column                | Contain                                                                 |
|-----------------------|-------------------------------------------------------------------------|
| NO                    | Listing serial number (every change of month)                          |
| UNIT                  | The unit that records the incident                                      |
| POLICE REPORT         | Record report number                                                    |
| TYPE OF CASE          | Types of accident cases                                                 |
| EVENT DESCRIPTION     | A brief chronology of the sequence of events which also tells the time of the incident and the name of the reporter |
| IDENTITY OF SUSPECTED | The name of the suspect                                                  |
| VICTIM                | The name of the victim                                                  |
| WITNESS               | Name of witness                                                         |
| BREAKING THE ARTICLE  | Types of articles being violated                                         |
| PROOF GOODS           | Evidence of events                                                      |
| DESCRIPTION           | Status of the victim's condition                                        |

Figure 3. Sample Fishers’ Accident Record by Polair.

In its activities in the field of marine safety, the Water Police Unit (Polair) records traditional fishing accidents, and data of traditional fishing accidents recorded by the Water Police Unit (Polair) is carried out using computer technology (digital).

Table 5. Findings at the Polair.

| Issue                              | Findings |
|------------------------------------|----------|
| Accident Data Availability         | ✓        |
| Accident Data Recording Using Computer Technology (Digital) | ✓        |
2.4. Availability of Data for Traditional Fishery at Transportation Department of Pasuruan City

The Department of Transportation is an element implementing government affairs in the transportation sector, which is the regional authority. In its activities in the field of marine safety, the Transportation Department does not record any incidents of traditional fishers accidents. The data collection activity carried out by Transportation Department is data related to registration of ship documents with a size of below 7 GT, provided that this authority only applies in 2016 and has been returned in 2017 to the Harbormaster following the Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 39 of 2017 on Registration and Nationality of Ships and is valid until now.

The Department of Transportation because it does not record traditional fishers accidents, it can be said that the digital recording of traditional fishers accident data by the Department of Transportation is also not carried out. However, in terms of recording others that have been implemented have used computer technology.

![Table 6](image)

| Issue                          | Findings |
|--------------------------------|----------|
| Accident Data Availability     | X        |
| Accident Data Recording Using Computer Technology (Digital) | X        |

2.5. Availability of Data for Traditional Fishery at Marine and Fisheries Department of Pasuruan City

Marine and Fisheries Department of Pasuruan City is an element implementing government affairs in the field of Fisheries and Marine, which is the regional authority. In its activities in the field of marine safety, Marine and Fisheries Department of Pasuruan City have not recorded any incidents of traditional fishers accidents. Although at the time of the accident involving fishers, the Marine and Fisheries Department received information on the incident from both the Pokwasmas Nelayan (Fishers Community Group), as well as Polair and BPBD. Pokwasmas Nelayan is a community chaired by a traditional fishing group that connects traditional fishers with agencies related to marine safety.
2.6. Availability of Data for Traditional Fishery at Disaster Management Agency of Pasuruan City (BPBD)

Disaster Management Agency (BPBD) of Pasuruan City is a non-departmental government institution that carries out disaster management tasks in the area of Pasuruan City based on policies set by the National Disaster Management Agency (BNPB). Disaster Management Agency of Pasuruan City has the main task of implementing disaster management. In its activities in the field of marine safety, the Disaster Management Agency (BPBD) of Pasuruan City is known not to have recorded incidents of traditional fishers accidents. Although at the time of the accident involving fishers, Disaster Management Agency (BPBD) of Pasuruan City sometimes gets information about the incident from both the Pokwasmas Nelayan (Fishers Community Group) and Polair.

Table 7. Findings at the Marine and Fisheries Department of Pasuruan City.

| Issue                                           | Findings |
|-------------------------------------------------|----------|
| Accident Data Availability                      | X        |
| Accident Data Recording Using Computer Technology (Digital) | X        |

Table 8. Findings at the Disaster Management Agency (BPBD) of Pasuruan City.

| Issue                                           | Findings |
|-------------------------------------------------|----------|
| Accident Data Availability                      | X        |
| Accident Data Recording Using Computer Technology (Digital) | X        |

2.7. Recapitulation of Traditional Fishers Accident Data Availability at Each Agency

From the six agencies observed and interviewed, only Lantamal V and Polair recorded the data. The data recording referred to in this case, is every fisher accident that occurs on purpose. Moreover, stored in the form of dates, the sequence of events, number of victims, types of accidents, and so on, in a medium such as books, reports, or digital data storage media, so that when someone asks for the data, it is useful data every quarter, yearly, or in the more time, the agency can provide the desired data. There is one case such as happened to the Marine and Fisheries Department, which got data when an accident occurred through an Android-based application, namely WhatsApp, but the data did not just become stored data. The agencies were observed and interviewed, and among the Lantamal V and Polair, which were previously known to have records of fishing accidents, only Polair used computer technology in the data recording process. As for other four agencies such as the Harbormaster, Transportation Department, Marine and Fisheries Department, and Disaster Management Agency (BPBD) of Pasuruan City are automatically excluded from the agency, which uses computer technology (digital) in the process of recording fisher accident data. The findings and field investigations regarding the availability of data on the six agencies related to marine safety show a lack of awareness to record every incident that is known to exist even though data exchange has occurred and may have occurred between the six agencies. Also, it can be seen that the poor management of information is shown by most of these agencies where only one out of six agencies keep records digitally and are neatly arranged in table form so that it can be said that only 17% of these agencies have the power to support marine safety in terms of data availability. Although there is one other agency that records events by hand, we know that non-digital recording has a high risk of data loss. The application of technology is an absolute must if marine safety goals are to be realized not only on the agency's side but also by traditional fishers.
Table 9. Findings at all the agencies.

| Agency                                      | Accident Data Availability | Accident Data Recording Using Computer Technology (Digital) |
|---------------------------------------------|----------------------------|------------------------------------------------------------|
| Harbormaster (KSOP Class V of Pasuruan City)| X                          | X                                                          |
| Indonesian Navy (Lantamal V)                | ✓                          | X                                                          |
| Water Police Unit (Polair)                  | ✓                          | ✓                                                          |
| Transportation Departement                  | X                          | X                                                          |
| Marine and Fisheries Department             | X                          | X                                                          |
| Disaster Management Agency (BPBD)           | X                          | X                                                          |

3. Identification of the Role of each Agency in Traditional Fisheries Safety

From the six agencies that were observed and interviewed, all of them had a relationship to coordinate in terms of marine safety even though they were not in one task group or agency function. For example, the Harbormaster, followed by the Sea and Coast Guard (KPLP), Water Police Unit (Polair), Indonesian Navy (Lantamal V), and Disaster Management Agency (BPBD) coordinating with search and rescue operations (SAR) when the accident occurs involving a traditional fisher. The Water Police Unit (Polair) and Indonesian Navy (Lantamal V) coordinate on patrols to prevent accidents. The Transportation Department and Marine and Fisheries Department coordinate in terms of providing guidance and socialization related to marine safety. We can conclude that agency has a role both in terms of prevention and handling of marine safety even though their duties do not overlap with each other.

Figure 5. The role of local agencies in marine safety.
3.1. The Role of Traditional Fisheries Safety Development

The role of training in the safety of traditional fishers is carried out by two local agencies, namely Transportation Department as the main driving force in the field of unique marine safety guidance for fishers who use traditional fishing boats under 7 GT as well as fisherwomen groups, then assisted by the Marine and Fisheries Department as the supervisor of the fishing community in Pasuruan City. Guiding and coaching activities are generally carried by dividing the guidance areas based on sub-districts which have fishers in the community. The sub-districts that are the location of socialization and guidance include Panggunrejo Village, Tamba’an Village, Mandaranrejo Village, Ngemplakrejo Village, Gadingrejo Village, and Bugul Lor Village. The Marine and Fisheries Department delivered the socialization materials in addition to guidance in increasing the productivity of fisheries, the socialization by the Transportation Department, among others, was conveying socialization related to marine safety which included a briefing on knowledge of safety equipment that fishers must carry when doing activities at sea, as well as providing direction on the importance of community participation in participating in monitoring and maintaining order in the implementation of marine activities, where the socialization activities are related to the role of local governments to participate in fostering communities around ports according to Law Number 17 of 2008 on Shipping.

![Image of socialization and guidance activities](image_url)

**Figure 6.** Socialization and guidance activities.

3.2. The Role of Search and Rescue of Traditional Fisheries

From the six agencies that were observed and interviewed, there were four agencies that carried out SAR actions, namely the Harbormaster followed by the Sea and Coast Guard Unit (KPLP), the Water Police Unit (Polair), Indonesian Navy (Lantamal V), as well as the Disaster Management Agency of Pasuruan City (BPBD). SAR measures can be carried out by four of these agencies supported by the availability of patrol boats, except for BPBD which is only supported by owned rubber boat.

| Agency                        | Availability | Amount     |
|-------------------------------|--------------|------------|
| Harbormaster                  | ✓            | 1 Patrol Boat |
| Water Police Unit (Polair)    | ✓            | 4 Patrol Boats |
| Indonesian Navy (Lantamal V)  | ✓            | 1 Patrol Boat |
| Disater Management Agency (BPBD) | X           | 1 Rubber Boat |
| **Total**                     |              | **6 Patrol Boats** |
Bad weather is one of the obstacles in the Search and Rescue (SAR) process where it is known that the maximum search time that can be carried out is seven days so that the process can be stopped when the search process has reached seven days even though without getting any results (no victims of shipping accidents were found missing). For the availability of SOP (Standard Operating Procedure), the following is a recapitulation of SOP availability at four agencies carrying out Search and Rescue (SAR) activities:

| Agency                          | Availability |
|---------------------------------|--------------|
| Harbormaster                    | X            |
| Water Police Unit (Polair)      | ✓            |
| Indonesian Navy (Lantamal V)    | X            |
| Disaster Management Agency (BPBD)| X            |

As for the results of interviews and observations, it is known that there is no integrated joint SOP between four SAR-related agencies carried out together to form standard coordination. It is also known that of the four agencies carrying out SAR, only the Water Police Unit (Polair) has an SOP for SAR activities. In contrast, the Harbormaster (KSOP), Indonesian Navy (Lantamal V), and the Disaster Management Agency of Pasuruan City (BPBD) does not have SOP (Standard Operating Procedure) for SAR activities.

4. The Reality that Occurs in the Marine Safety of Traditional Fisheries

After knowing the availability of data on traditional fishers accidents and the role of local agencies in supporting the safety of traditional fishers, it is necessary to identify the realities of what happens in the field regarding the safety of traditional fishers. The reality that occurs in the field is often far from expectations, where the best hope is that it becomes something ideal. One example of the reality that occurs in the safety of traditional fishers is the difference in the recording data of traditional fishing accidents between the Indonesian Navy (Lantamal V) and the Water Police Unit (Polair). Ideally, the two agencies have the same data and even complement each other, but the reality in the field shows that the data owned by one agency is different from that of other agencies.
From the evidence above, it is known that the data recorded on Indonesian Navy (Lantamal V) and the Water Police Unit are different. For data from the Water Police Unit (Polair), in 2017 it started in January and lasted only until May so that in 2017 there were a total of 5 incidents recorded. Lantamal V data, the initial data for 2017 the incident was in December so that in 2017 there was a total of 1 incident. From the two records, it was also known that there was no record of the same accident. However, for data in 2018, both Lantamal V and the Water Police Unit have the same data, namely, for 2018 there were no incidents of traditional fishing accidents.

### Table 12. Differences in recorded data between agencies.

| Agency                        | Event Date     | Number of Events |
|-------------------------------|----------------|-----------------|
| Water Police Unit (Polair)    | 26 January 2017|                 |
|                               | 12 February 2017|                |
| Indonesian Navy (Lantamal V)  | 14 March 2017  | 5               |
|                               | 23 April 2017  |                 |
|                               | 23 May 2017    |                 |
| Lantamal V                    | 18 December 2017| 1               |
Accidents that occur to traditional fishers can occur on the fishing boat and the fishers themselves, whether in a docked condition or carrying out fishing activities in the middle of the sea, even though fishers have made efforts to avoid them. Accidents involving traditional fishers have many scenarios in reporting events to the evacuation process of victims. Various incident scenarios can be influenced by several factors, including the reporting tools used by fishermen, the domicile of the accident victim and the domicile of the accident reporter, and the first recipient of the accident report. The factors that influence the number of scenarios in the SAR (Search and Rescue) process are the realities that occur in the field and of course, of the many possible scenarios some obstacles make the scenario a reality that is not ideal.

5. Conclusion
The main conclusions drawn are:

- Lack of marine safety management due to poor management of information shows that we are further away from the goal of safety.
- Investigations and field findings indicate that the role of government agencies in supporting safety needs to be supported by technological advances.
- The discrepancy of data recorded in local government agencies is one finding that shows that the safety of our fishers is at a slightly unfavourable level.
- More methodological work needed for future study on how to strongly capture the impacts and outcomes of a lack of marine safety management in this study, including further cost-benefit analysis and exploration of implications when information to support safety is limited.

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