Analysis of Current Threats to Ships from 2019 to 2022 in Selected Regions

Analiza trenutačnih prijetnji brodovima od 2019. do 2022. u odabranim područjima

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Abstract

International maritime security is of paramount importance to the maritime sector, particularly seafarers. The perception and importance of maritime security have evolved and are the subject of ongoing analysis. The concept of maritime security is closely linked to potential threats that may pose a danger to crews, ships, or the cargoes they carry. These threats are also subject to change over time. Different types of threats can have different implications for maritime security. Currently, the greatest threats to the world merchant fleet come from pirate attacks, armed robbery, terrorism, and military operations in certain maritime regions. These threats vary in nature, frequency, and motivation in different parts of the world, and so there are certain areas that are particularly vulnerable to such threats. This paper provides an analysis of maritime security from the perspective of piracy, armed robbery, and maritime terrorism by analysing individual attacks in different regions from 2019 to 2022. Each reported attack is broken down into various characteristics. Recurring characteristics in different and unrelated attacks are observed. This results in a pattern from which specific recommendations characteristic of individual regions are derived. The recommendations are subject to the dynamics of changes in international maritime security and should be actively modified and adapted accordingly.

Sažetak

Sigurnost međunarodnog pomorskog prometa od primarne je važnosti za pomorski sektor, a osobito za pomorce. Sigurnost se mijenjala tijekom vremena te je zbog toga predmet konstantnog analiziranja. Prijetnje sigurnosti pomoraca te robe koju prevoze imaju različit utjecaj na pomorsku industriju. Trenutačno najveće prijetnje svjetskoj floti trgovačkih brodova dolaze od piratskih napada, oružanih pljački, terorizma i vojnih djelovanja u području Crnog mora. S obzirom na vrstu, intenzitet i učestalost napada u svijetu, postoji nekoliko regija. U radu se analizom pojedinačnih napada u tim regijama tijekom razdoblja od 2019. do 2022. stvara opća slika međunarodne sigurnosti pomorskog prometa. Svaki se prijavljeni napad raščlanjuje na niz karakteristika. Zapažaju se karakteristike koje se ponavljaju u različitim i neovisnim napadima. Na temelju ponavljajućih karakteristika stvara se obrazac iz kojega proizlaze posebne preporuke karakteristične za pojedine regije. Preporuke su podređene dinamici promjena međunarodne sigurnosti pomorskog prometa te bi se, shodno tomu, trebale aktivno mijenjati i prilagođavati.

1. INTRODUCTION / *Uvod*

All industries around the world are striving for standardisation to increase productivity and safety and reduce potential losses. According to [1], the maritime industry is one of the most regulated industries in the world, with conventions, codes, regulations, guidelines, and recommendations defining all aspects and segments of the industry. One of the most important documents that regulate certain aspects of maritime safety is the International Safety Management Code (ISM Code). The aim of the ISM Code is to provide an international standard for the safe management and operation of ships and for pollution prevention [2]. Maritime

safety is much better regulated than maritime security. In the field of maritime security, the International Ship and Port Facility Security Code (ISPS Code) serves as the basis for a comprehensive mandatory security regime for international shipping [3].

International maritime security has evolved over time in response to various threats that have emerged in parallel with the development of the maritime transportation of goods. The dynamics of these changing threats pose a major challenge in developing rules and recommendations to address them.

One of the problems, both in theory and in practise, is the lack of uniform and universally accepted definitions of terms

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for the different types of maritime security threats. Therefore, this paper provides an overview of the definitions of maritime security threats that are currently being analysed.

The term "international maritime security" is used in various sources without a clear definition. Despite different formulations, all definitions revolve around the theme of threat. According to [4], maritime security is: *"Security from the terrorism, piracy and similar threats, as well as effective interdiction of all the illicit activities on sea such as pollution of the marine environment; illegal exploitation of sea resources; illegal immigration; smuggling the drugs, persons, weapons and other matters that can be used for terrorist activities."*, while according to [1], maritime security is: „*the state of a shipping company/vessel/crew port, being or feeling secure or the safety of a shipping company/vessel/crew/ port against such threats as terrorism, piracy, and other criminal activities."*

Currently, the greatest threats to maritime security are terrorism, piracy, armed robbery, drug and arms smuggling, the transport of illegal migrants and cybercrime [5]. In addition to the above threats, armed conflicts in the Black Sea [6] and other maritime areas destabilise international maritime security. Piracy has existed since the dawn of maritime navigation and is a crime against international law. The trends of piracy attacks have changed over time and depend on a relatively large number of different factors, but the nature of these attacks has not changed. The legal concept of piracy is defined in the United Nations Convention on the Law of the Sea (UNCLOS). Article 101 of UNCLOS defines piracy as any unlawful act of violence or detention, or any act of depredation committed by the crew or passengers of a private ship or private aircraft on the high seas (or at a place beyond the jurisdiction of any State) for private purposes against another ship or aircraft or against persons or property on board such ship or aircraft [7].

Therefore, piracy is considered to be an act that takes place only in parts of the sea outside national jurisdiction, while any activity (of a piratical nature) within the waters under national jurisdiction is not. According to Resolution A.1025(26) of the International Maritime Organisation (IMO), such a crime is considered to be armed robbery, which is defined as any unlawful act of violence or detention or any act of depredation, or threat thereof, other than piracy, committed for private ends and directed against a ship or against persons or property on board such a ship in the internal waters, archipelagic waters and territorial seas, as well as any act which incites or intentionally facilitates any of the acts described above [8].

In practise, a common definition of piracy and armed robbery is also found. For example, the African Maritime Safety and Security Agency and Herbert-Burns et al. in Lloyd's MIU Handbook of Maritime Security have recognised the International Maritime Bureau's (IMB) definition of piracy and armed robbery at sea as an act of boarding or attempting to board any ship with the apparent intention of committing a theft or other crime and with the apparent intention or ability to use force in furtherance of that act [9, 10]. According to this definition, the basic elements of the crime are the intent, execution, extent and use of force, rather than the place of commission. It also expands the concept of the understanding of violence [11], which, in contrast to the traditional understanding, does not consider only physical injury as violence. Unlike piracy and armed robbery, terrorism is not limited to the location of

the crime. It is a threat that extends to all geographical areas, regardless of borders or jurisdiction. For this reason, the United Nations has called on all states to comply with their obligations under international law and to take effective and decisive measures to prevent maritime terrorism [12]. There are several definitions of terrorism, and one of the most commonly used is the definition adopted by the United Nations Security Council in 2004, which states that terrorism is a criminal act, including against civilians, committed with the intent to cause death or serious bodily injury, or to take hostages, with the aim of creating a state of terror among the general public or among a group of persons or specific individuals, intimidating a population, or compelling a government or an international organisation to perform or refrain from performing an act [13].

In contrast to the general definition of terrorism, maritime terrorism is basically defined as a threat to human life, the marine environment, and the safety of navigation [14].

With the aim of providing a comprehensive response to threats to the safety of maritime navigation, the IMO developed the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation (1988 SUA Convention). This convention was created to supplement UNCLOS and defines unlawful acts against the safety of maritime navigation, including maritime terrorism [15].

All the above threats affect the security of seafarers, ships, and cargo. In order to increase the security of seafarers and to try to predict and prevent attacks, various organisations have been established. They differ in terms of their scope and operation. The IMO operates at the international level and seeks to establish a legal framework that enhances maritime security. The IMO also provides support, assistance, and guidance to Member States in the implementation of maritime security measures [16]. The goal of regional organisations is to establish cooperation between "partner countries" while enabling rapid data exchange [17]. Rapid data exchange enables the development of a situational picture necessary for a more efficient and rapid response to incidents. State organisations are tasked with organising and coordinating activities of common importance in the maritime domain [18], which primarily means that they are responsible for maritime security in waters under national sovereignty and jurisdiction. However, several states are unable to take measures to achieve an adequate level of maritime security. Therefore, it is violated and endangers international shipping. In order to enhance maritime security, international bodies have established organisations to collect and analyse data on pirate attacks and armed robberies and develop regulations, recommendations, and manuals on this basis. New methods are emerging to increase the level of security of seafarers in international shipping, such as the use of escort ships and armed security teams. Such methods have proven to be highly effective in combating threats to the security of seafarers in countries whose governments are unable to effectively enforce laws in the part of the sea under their jurisdiction. Although these methods are highly effective, they have their limitations, which are most evident in the limited options for action due to legal constraints associated with flag and coastal state restrictions.

This paper analyses all reported attacks on merchant ships from 2019 to 2022 to identify the latest hotspots and current trends in piracy and armed robbery. The regions of West Africa,

Southeast and East Asia, and Central America reported more than 97% of attacks worldwide. These regions are considered to pose the greatest risk to seafarers' security. In addition to the hotspots mentioned above, attacks were also recorded in East Africa, South America, West India and Oceania. In these regions, attacks should be considered isolated incidents as attackers rarely act. Although attacks in these regions are rare, they can be brutal and threaten the security of seafarers.

The paper is organised as follows: Section 2 provides a literature review, Section 3 describes the methodology, and Section 4 provides the analysis of pirate attacks and armed robberies from 2019 to 2022, divided by geographical regions and specific criteria developed with the aim of identifying patterns needed to develop recommendations to improve maritime security. Section 5 contains the conclusions.

2. EXISTING DATA COLLECTION SYSTEMS AND RECOMMENDATIONS TO PREVENT ATTACKS /
Postojeći sustavi za prikupljanje podataka i preporuke za sprečavanje napada

Piracy and armed robbery are organised criminal activities. Although they pose the greatest threat to the security of international maritime traffic, they are not the cause of the problem, but rather the result of instability on the land territory of the countries where they occur. According to [19], in order to solve the problem of piracy, it is necessary to distinguish whether it is a private or a public problem. The different definition of the problem area changes the responsibility in the fight against the threat to international maritime shipping. According to [1], the knowledge required to detect and respond to threats is acquired through the application of appropriate forms of risk management. For this reason, an attempt is made to avoid the above-mentioned problems through the recommendations contained in the manuals. The manuals have been prepared on the basis of data obtained from the organisations that collect them. Based on previous research in the scientific and professional literature, the authors try to highlight the core of the problem and present solutions in the form of recommendations that, if adopted, could help increase the security of seafarers.

In [20], the causes of instability in the region of Southeast and East Asia are presented using the method of qualitative analysis, considering historical, philosophical and legal aspects. As a result of the analysis, recommendations are made based on strengthening the coast guard, introducing tougher sanctions for perpetrators, implementing preventive diplomacy in the fight against illegal fishing and strengthening cooperation between neighbouring countries.

The authors in [21] analyse piracy and armed robbery in the Central American region, focusing on the Gulf of Mexico. The results show that the Mexican government does not fully report all pirate attacks. A permanent heightened security level (Level 2) is recommended for the southern Gulf of Mexico area, and an assessment to classify the area as a high-risk area is also recommended.

According to [22], piracy is divided into common and organised piracy. Using the method of qualitative comparative analysis, it was found that there is a direct relationship between illegal fishing, corruption, geographical area and the emergence of organised piracy. The paper also calls for further research

on organised piracy and the need for and appropriateness of conditions with new methods.

The authors in [23] discuss the implications for maritime security management. By analysing the reported attacks in the world from 2011 to 2020, they attempt to determine the probability coefficients of pirate attacks. It was found that the Southeast and East Asia region dominates in the number of attacks with a coefficient of 0.4, the most frequently attacked ships are chemical tankers with a probability coefficient of 0.26, and the probability of trauma following the hijacking of a crew member is 0.76. Therefore, this paper provides a specific analysis by geographical region.

The primary sources of this paper are the data obtained from the official websites of the organisations involved in data collection and analysis on pirate attacks and armed robbery. These organisations are the IMB, United Kingdom Marine Trade Operations (UKMTO), Maritime Domain Awareness for Trade-Gulf of Guinea (MDAT-GoG), Maritime Security Centre-Horn of Africa (MSCHOA), Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP) Information Sharing Centre (ReCAAP ISC), Singapore Information Fusion Centre (Singapore IFC), and Caribbean Safety and Security Net (CSSN). In addition to the organisations listed, Maritime Safety Information is also used as reference literature. The Worldwide Threats to Shipping Report, compiled and published weekly by the Office of Naval Intelligence, provides a brief description of attacks by geographic region [24].

Organisations involved in the collection and processing of data on piracy and armed robbery manage these data in principle in similar but non-standardised ways, which causes some problems in data analysis. For example, in its most recent annual report [25], the IMB categorises piracy and armed robbery as "boarded", ''hijacked", "fired upon" and "attempted", and divides them into three levels of security depending on the consequences for crew, ship, and cargo.

The data varies by event classification method, content, and format. For the IMO, the data is collected by the IMB. The IMB is tasked with being a single point of contact for shipmasters whose ships have been attacked [26]. Data collection is also done in such a way that data is forwarded from other organisations and the IMB analyses and processes it.

UKMTO plays an important role in collecting data on pirate attacks and armed robbery. UKMTO collects data from various relevant sources and provides direct alerts to reporting vessels and other stakeholders [27]. Data collection is done through voluntary ship reporting and/or registration on the organisation's official website. Communication takes place through the initial report, the daily report, and the final report. In the event of an attack, additional forms are completed (suspicious/irregular activity report, follow-up/after-action report) [28, 29]. During registration, UKMTO has an advisory role, while in the event of an incident, its role is to serve as an information channel between the military forces and merchant ships. MSCHOA also collects data on piracy and armed robbery in the East Africa region. MSCHOA is intended to serve as a link between the maritime industry and European Union Naval Forces Operation Somalia-Atalanta. Registration is conducted in an almost identical manner to UKMTO, although unlike UKMTO, which performs an advisory role, MSCHOA strives to present risk assessments as accurately as possible [29, 30].

Both organizations operate in the southern Red Sea, the Gulf of Aden, and part of the Indian Ocean (including the islands of Seychelles, Mauritius, and Comoros). The boundaries of the UKMTO voluntary reporting area and the MSCHOA voluntary registration area are shown in Admiralty Maritime Security Chart Q6099 [31].

For the West Africa region, the data collection is carried out by MDAT-GoG. The format of the report is also very similar to that of UKMTO. The purpose of the organisation is to help maintain maritime situational awareness and issue warnings to mariners [32].

In the Southeast and East Asia region, data on piracy and armed robbery are collected by ReCAAP ISC and Singapore IFC. ReCAAP ISC is a centre for information sharing among member states and other organizations dealing with similar problems. Data collection is done through 22 focal points. The collected data are forwarded to ReCAAP ISC, where they are analysed, processed, and disseminated to member countries as needed [33-35]. The goal of the organisation is to collect data to better understand the situation and increase situational awareness of maritime security. The Singapore IFC is also an organisation that collects data to improve maritime security, focusing on Southeast and East Asia. Data is collected through voluntary reporting when entering and leaving a specific area. The goal of the Singapore IFC is to share information with national authorities and provide advice to ships on maritime security issues [35, 36]. The fundamental difference between the ReCAAP ISC and the Singapore IFC is that ships report to the ReCAAP ISC (through the focal points) only in the event of an incident [35, 37].

For part of the Central American region (Caribbean Basin), data collection and processing are carried out by the CSSN organisation. In addition to data collection and processing, the organisation also provides information to mariners about crime in the Caribbean Basin [38]. For the rest of the Central American region, Clearwater Dynamics and Maritime Safety Information data were used as a source, which is geospatial intelligence in support of national security objectives, including maritime safety [39].

To reduce the impact of threats on international shipping and thereby improve maritime security, the maritime industry has developed several measures that are implemented on ships. These measures are codified in best management practices (BMPs) manuals. Due to the specifics and regional characteristics of pirate attacks and armed robbery, different manuals are used for different areas. BMP-5 is used for the East Africa area. BMP West Africa was developed for West Africa [40], and the ReCAAP manuals for Southeast Asia include the Regional Guide 2 To Counter Piracy and Armed Robbery Against Ships in Asia, the Regional Guide to Counter Piracy and Armed Robbery Against Ships in Asia, the Guide Book on Identification of Fishing Boats in Asian Waters, the Guidance on Abduction of Crew in the Sulu-Celebes Seas and Waters off Eastern Sabah, Guide for Tankers Operating in Asia against Piracy and Armed Robbery Involving Oil Cargo Theft, Tug boats and Barges (TaB) Guide Against Piracy and Sea Robbery, and Tips on Avoiding Piracy, Robbery and Theft [35, 37, 41-45], which analyse aspects of the threats and measures to prevent them in Southeast and East Asia. The manuals on preventing piracy and armed robbery in West Africa, Southeast Asia, and East Asia were prepared following the BMP-5 manual. BMP-5 focuses on deterring piracy and

improving maritime security in the Red Sea, Gulf of Aden, Indian Ocean, and Arabian Sea [29]. Threats specific to the Somali Basin were replaced with a general term for the area to include any additional piracy threats posed by other perpetrators in the area (threats posed by Yemen, Aden, the open Indian Ocean, and the Arabian Sea). The manuals include guidance on reducing the risk of pirate attacks and improving maritime security, a reporting format, and a clear delineation of the commander's authority in crises. The above manuals are in use today and in many ways contain a similar plan for protecting the ship in crises. The main difference is the description of the geographical area in which they are applied and the modus operandi of the attackers. The manuals are used as reference literature in this paper when new recommendations are made to complement the existing ones as accurately as possible.

3. METHODOLOGY / *Metodologija*

The study was conducted using two methodological approaches: through a literature review and analysis of pirate attacks, armed robbery, and maritime terrorism in the three geographic regions. A systematic literature review is based on appropriate sources from the field of international law, specialized international organisations and agencies for the data collection on the above threats and their analysis, recommendations and guidelines for maritime stakeholders, and books and academic papers dealing with the analysis of maritime security threats. Relevant research databases were consulted for the literature collection. After refining the selection, the relevant documents identified were analysed and synthesised according to content, context and findings. The literature list included 47 sources (6 international law documents, including conventions, codes, and resolutions; 9 recommendations and guidelines from maritime stakeholders; 19 official documents, reports, and information from specialised agencies and organisations; 9 articles; and 4 books). The results of the literature review were recorded in the paper.

The second methodological approach was the analysis of pirate attacks, armed robbery, and maritime terrorism. Data on threats were collected from relevant international organizations and agencies based on their official reports for the period from 2019 to 2022. The data analysis is conducted in two steps. In the first step, the attacks are selected by geographical regions. The regions analysed are the current hotspots of pirate attacks. These are West Africa, Southeast and East Asia, and Central America. In the second step, the attacks are broken down into components in detail.

Components are:
- type of attack (armed robbery, pirate attack, terrorism);
- distance of attack position from nearest land (less than 5 NM, (at anchor/mooring), less than 12 NM, more than 12 NM);
- number of attackers (1 to 3 attackers, 4 to 6 attackers, more than 6 attackers);
- the motivation of attackers;
- the level of force used;
- technique and equipment used during the attack;
- category of successful/unsuccessful attack.

The "distance of attack position from nearest land" component is determined by the international law of the sea, which allows coastal states to exercise jurisdiction in a zone up to 12NM. The "less than 5NM" area is of particular importance, as this is the area where most attacks have been recorded.

The "number of attackers" component is defined based on the analysis of official reports on attacks. According to these reports, attackers are usually divided into small groups (1-3 attackers), medium groups (4-6 attackers), and larger groups (more than 6 attackers).

The "motivation of attackers" component defines the persistence of an individual or group to carry out an attack and is related to the number of attackers and the type of weapons used.

The "level of force used" component is shown in Table 1. Weight categories are assigned to the level of force used. The highest level is assigned to attacks that ended in death, while the lowest level is assigned to the use of force that did not ultimately result in serious or minor bodily injury, as shown in Table 1.

Table 1 Level of force used
Tablica 1. Razina upotrijebljene sile

WEIGHT CATHEGORY (INTENSITY OF ATTACK)	DESCRIPTION
1	*An attack in which neither minor nor serious physical injuries occurred*
2	*An attack without serious physical injuries, but with minor physical injuries*
3	*An attack that resulted in serious physical injuries*
4	*An attack in which the death occurred (A fatal attack)*

The distance of the attack position from the nearest shore is divided into three categories. The categories indicate whether the attack occurred while the ship was close to shore (less than 5 nautical miles), within territorial waters (less than 12 nautical miles), or outside territorial waters (more than 12 nautical miles). In addition to the categories listed, there is also a subcategory. The "At Anchor/Mooring" subcategory is part of the "Attack" category (less than 5 nautical miles), so they are considered as one unit. The purpose of the subcategory is to describe the attacks in more detail, which would lead to more accurate recommendations.

After the attack has been broken down into its components, all the elements that are repeated in a particular region are combined using the synthesis method. In this way, a pattern is created for each region.

Descriptive statistics were used to interpret the data. Diagrams show the results of the data synthesis. Each region is described by a table and a diagram. The table shows the relationships between the type of attack and the successful/unsuccessful attacks, while the diagram shows the relationships between the intensity of the attack, the number of attackers, and the location of the attack. In this way, a pattern can be established that attackers follow in certain regions. The pattern indicates which type of attack is prevalent in a particular

region compared to other types of attacks. It is not necessarily the percentage that matters, but the relationship to other types of attacks. In a given region, if one type of attack has an overwhelming majority (more than 50% of the total number of attacks) and therefore dominates relative to other types of attacks, we refer to it as *pattern type 1*. Patterns that do not have an overwhelming majority (no more than 50% of the total number of attacks) but dominate relative to other types of attacks are referred to as *pattern type 2*. For each geographic region, the type of pattern and its specific characteristics are identified. Thus, patterns may be of the same type but have different specific characteristics. The characteristics are determined by analysing data on attacker actions. Descriptive statistics describe data presented in tables and diagrams. By understanding the patterns and specific characteristics that attackers follow, it is possible to make useful recommendations. This methodological approach aims to identify region-specific recommendations that could increase the level of security in international maritime shipping.

4. RESULTS / *Rezultati*

During the period from January 2019 to December 2022, 996 cases (piracy, armed robbery, and maritime terrorism) were reported worldwide in which the perpetrators successfully carried out an attack or had the clear intent to carry out an attack. Of the total number of reported cases, West Africa, Southeast and East Asia, and Central America accounted for 968 (97.2%) [24, 38].

Because each of the regions studied has its own characteristics, they are considered separate entities. The East and Southeast Asia region is characterized by the number of reported attacks, while the Central America region is notable for the percentage of successful attacks. The West Africa region is distinguished by the level of aggressiveness and motivation of the attackers. West Africa is the region with the highest number of hijackings and fatalities and is considered the greatest threat to the security of seafarers in international maritime transport.

4.1. Analysis of reported attacks in Southeast and East Asia region from 2019 to 2022 / *Analiza prijavljenih napada na području jugoistočne i istočne Azije od 2019. do 2022.*

In the Southeast and East Asia region, 361 attacks (Table 2) were reported from 2019 to 2022 [24, 38, 47], of which 213 (59%) were successful. In this region, armed robbery is the most common type of attack with 339 (93.9%) attacks reported, of which 196 (57.8%) were successful. Piracy was recorded in 15 (4.1%) attacks, of which 10 (66.7%) were successful. Terrorism was reported in 7 cases, in which 5 crew members were killed.

To establish a pattern in terms of trends in attacks in Southeast and East Asia, the 361 attacks are broken down and

Table 2 Relationships between the types of attack and the successful/unsuccessful attacks in Southeast and East Asia region
Tablica 2. Odnos između vrsta napada i uspješnih/neuspješnih napada na jugoistočno-istočnoazijskom području

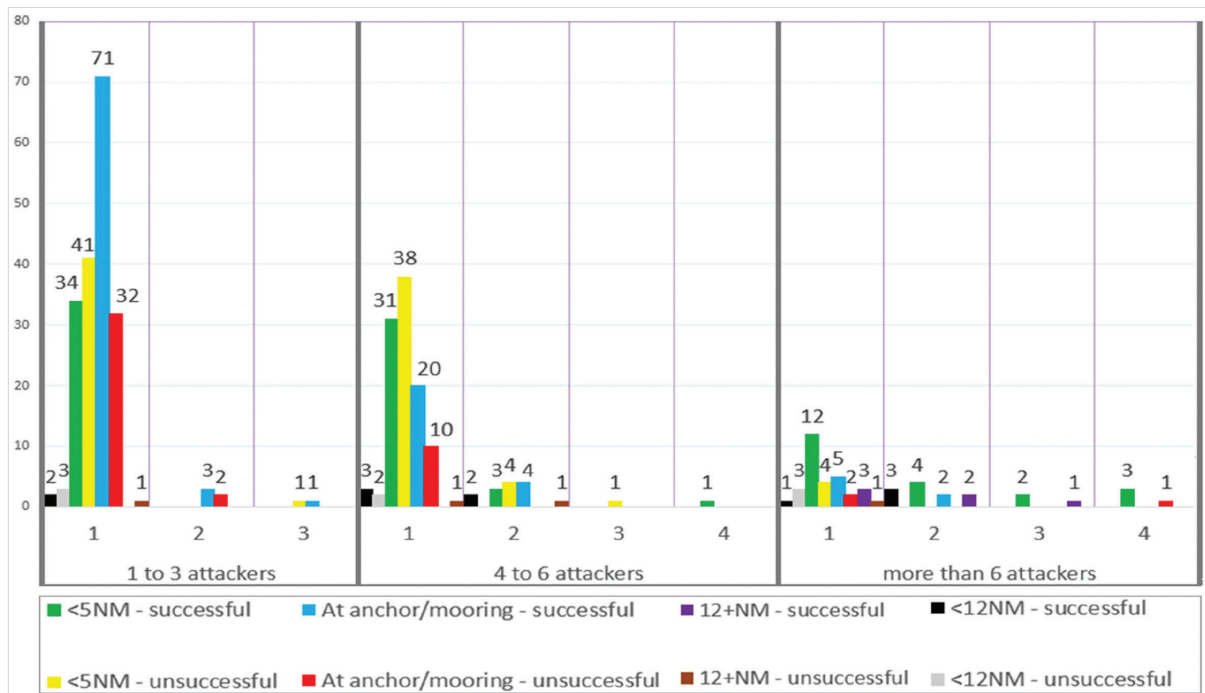| Type of attack	Successful	Successful (%)	Unsuccessful	Unsuccessful (%)	Total
Armed robbery	196	57,8%	143	42,2%	339
Piracy	10	66,7%	5	33,3%	15
Terrorism	7	100,0%	0	0,0%	7
Total	213	59,0%	148	41,0%	361

Source: [24, 38, 47]

Figure 1 Relationships between the intensity of the attacks, number of attackers, and location of the attacks Southeast and East Asia region
Slika 1. Odnos između intenziteta napada, broja napadača i mjesta napada na jugoistočno-istočnoazijskom području

Source [24, 38, 47]

analysed by components. Figure 1 shows the relationships between the number of attackers, the intensity of the attack, the location of the attack, and the successful/unsuccessful attack category in the Southeast and East Asia region. The abscissa shows the number of attackers and the intensity of the attack (as in Table 1), while the location of the attack and the category of successful/unsuccessful attack is shown on the ordinate. The columns show the number of successful/unsuccessful attacks in relation to the intensity of the attack and the number of attackers.

Analysis of the data revealed that most of the attacks occurred within 5 nautical miles of the coast. A total of 332 (92%) incidents occurred in this area, including 153 attacks while the vessel was at anchor/mooring and 179 while underway but within 5 nautical miles from shore. 312 (86.4%) attacks involved up to 6 attackers. Since attackers fled more than 90% of the time after sounding the ship's alarm or being detected by a crew member, it is reasonable to assume that they were not highly motivated [24, 38, 47]. During the observation period, 5 attacks resulting in death were recorded, representing 1.4% of the total number of attacks. A total of 5 people lost their lives, and all deaths were the result of terrorist attacks [24, 38, 47]. From the analysis of the data, a pattern can be established for this region. Since 79.2% of the incidents occurred within 5 nautical miles and involved less than 6 attackers, a pattern type 1 can be identified.

Its specific characteristics for this region are:
- Armed robbery;
- Attack within 5 nautical miles of the nearest shore;
- There are usually up to 6 attackers involved in the attack;
- The attackers are usually armed with cold (close combat)

weapons (metal pipes, machetes, knives);
- The attackers are not highly motivated or organized;
- The attack is usually without serious or minor physical injury;
- The most common items stolen are tools, ropes, food, and scrap metal;

The goal of the attackers is to commit the armed robbery as quickly as possible and avoid detection by the crew members.

The recommendation for this region is intensive surveillance of the deck through a combination of modern monitoring technology and patrols by crew members. The intensity of patrols should increase as the ship approaches the coast, especially at distances less than 5 nautical miles. The recommendation also applies to vessels at anchor and moored. The patrolman should be in constant communication with the officer on watch. If an attacker is sighted on board, the officer on watch must be informed, who will then sound the general ship's alarm and proceed in accordance with the ReCAAP manuals.

4.2. Analysis of reported attacks in the Central America region from 2019 to 2022 / *Analiza prijavljenih napada na srednjoameričkom području od 2019. do 2022.*

In the Central America region, which includes the areas of Latin America and the Gulf of Mexico, 251 attacks were reported from 2019 to 2022, of which 194 (77.3%) were successful [24, 38, 39] (Table 3). This region had the highest number of successful attacks globally from 2019 to 2022. As in the Southeast and East Asia region, the most common attack type is armed robbery, with 224 (89.2%) attacks reported, of which 177 (79.4%) were successful. There were also 27 (10.8%) pirate attacks reported, of which 17 (63%) were successful. No terrorist attacks were reported.

Table 3 Relationships between the types of attack and successful/unsuccessful attacks in Central America region
Tablica 3. Odnos između vrste napada i uspješnih/neuspješnih napada na srednjoameričkom području

Type of attack	Successful	Successful (%)	Unsuccessful	Unsuccessful (%)	Total
Armed robbery	177	79,0%	47	21,0%	224
Piracy	17	63,0%	10	37,0%	27
Terrorism	0	/	0	/	0
Total	194	77,3%	57	22,7%	251

Source: [24, 38, 39]

To establish a pattern in terms of trends in attacks in Central America, each of the 251 attacks is broken down and analysed by components. Figure 2 shows the relationships between the number of attackers, the intensity of the attack, the location of the attack, and the category of successful/unsuccessful attack in the Central America region. The abscissa shows the number of attackers and the intensity of the attack (as in Table 1), and the ordinate shows the location of the attack and the category of successful/unsuccessful attack. The columns show the number of successful/unsuccessful attacks relative to the intensity of the attack and the number of attackers.

Analysis of the data showed that most of the attacks occurred while the ship was at anchor or moored. Of the total number of attacks, 192 (76.5%) attacks occurred while the ship was at anchor or moored, of which 154 (80.2%) attacks were successful. Figure 2 also shows that there are usually up to three people attacking a vessel at anchor or moored, as there are 155 (80.7%) such attacks [24, 38, 39]. From the analysis of the data, a pattern for this region can be established. Since over 80% of the attacks are of the same type, a pattern type 1 can be identified. Its specific characteristics for this region are:

- Armed robbery;
- The attack takes place while the ship is at anchor or moored;
- Usually up to 3 people are involved in the attack;
- The attackers are armed with firearms, which are usually not fired;

- The attackers are sometimes motivated, but in principle not organized;
- Attacks usually end without serious or minor physical injuries;
- The most common items stolen are: Outboard motors of dinghies (tenders), dinghies and valuables;

In contrast to the Southeast and East Asian region, attackers in this region are more motivated and often carry firearms. However, they generally do not make use of them, and the use of firearms is characteristic of groups of 4 or more people. During the observed period, a total of 4 people were killed. The cause of death was armed robbery and piracy. The most common targets are yachts, sailboats, and catamarans. 106 attacks were reported in which the target was a yacht, sailboat, or catamaran, accounting for 42.2% of all attacks [24, 38, 39].

It is recommended that the tender be taken on the ship overnight, and if the engine is of small power and size, it should be placed in suitable safe storage. When the tender goes ashore, it is recommended that the person operating the tender, or a member of the tender crew supervise it. Taxi boats may also be used for transport from the anchored yacht to shore, with the tender remaining on board. For merchant ships, constant surveillance of the deck at the shortest possible intervals is recommended. The intensity of patrols should increase as the ship approaches the shore, especially in ports and anchorages. The patrolman should be in constant communication with the
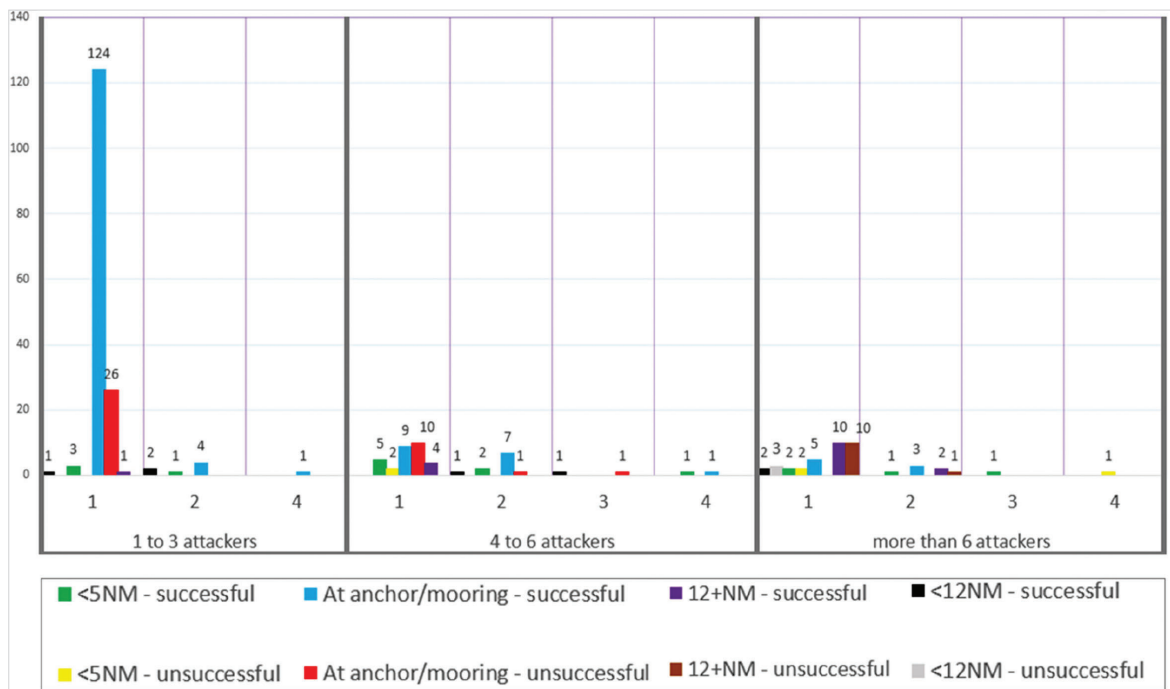

Figure 2 Relationships between the intensity of the attack, number of attackers, and location of the attacks in Central America region
Slika 2. Odnos između intenziteta napada, broja napadača i mjesta napada u srednjoameričkom području
Source: [24, 38, 39]

officer on watch. If attackers are sighted on board, the officer on watch must be informed, who should then sound the general ship's alarm. Although no BMP has been developed for this region, it is possible to appropriately apply measures from other BMPs. Since the attackers are using firearms (resulting in the deaths of 4 crewmembers), it is recommended that future application of the recommendations in existing BMPs be considered. This recommendation relates to all appropriate measures taken in the other piracy hotspots and is tailored for application in this region, considering the legal constraints in this region.

4.3. Analysis of reported attacks in the West Africa region from 2019 to 2022 / *Analiza prijavljenih napada u zapadnoafričkom području od 2019. do 2022.*

In the West Africa region, 324 attacks were reported from 2019 to 2022 [24, 38, 46] (Table 4), of which 188 (58%) attacks were successful. Although the effectiveness of attacks in this region is the lowest, they pose the greatest threat to the security of seafarers in international shipping. The most common type of attack is pirate attacks, of which 172 (53.1%) were reported and of which 89 (51.7%) were successful. Armed robbery attacks were reported in 149 (46%) cases, of which 96 (64.4%) were successful. In addition, 3 (0.9%) terrorist attacks were recorded during this period.

To establish a pattern in terms of attack trends in the West African region, each of the 324 attacks is broken down and analysed by its components. Figure 3 shows the relationships between the number of attackers, the intensity of the attack, the location of the attack, and the category of successful/unsuccessful attacks in the West African region. The abscissa shows the number of attackers and the intensity of the attack (according to Table 1), and the ordinate shows the location of the attack and the category of successful/unsuccessful attack. The columns show the number of successful/unsuccessful attacks relative to the intensity of the attack and the number of attackers.

Data analysis showed that attacks outside the 12-mile zone predominated. There were 136 such attacks (42%). The second most common type of attack in terms of attack location is the attack on the anchor/ mooring. The total number of such attacks is 129 (39.8%). Looking at the number of attackers, attacks with 6 or more attackers dominate. There were 143 such attacks in total (44.1%). In this region, aggressiveness and motivation are the highest. 14 attacks were recorded in which at least one person was killed, and more than 480 people were kidnapped in the period from 2019 to 2022. In 83 (44.1%) of the 188 successful attacks, the attacks ended with physical injury or death of the seafarers (attack intensity 2, 3, or 4) [24, 38, 46]. Pirates also do not shy away from privately contracted armed security personnel (PCASP), and when they board ships, they steal valuable items and kidnap crew members in cases where they overpower PCASP. Less frequently, they kidnap the entire crew. More common, are attacks in which

Table 4 Relationships between the type of attack and successful/unsuccessful attacks in the West Africa region
Tablica 4. Odnos između vrste napada i uspješnih/neuspješnih napada u zapadnoafričkom području

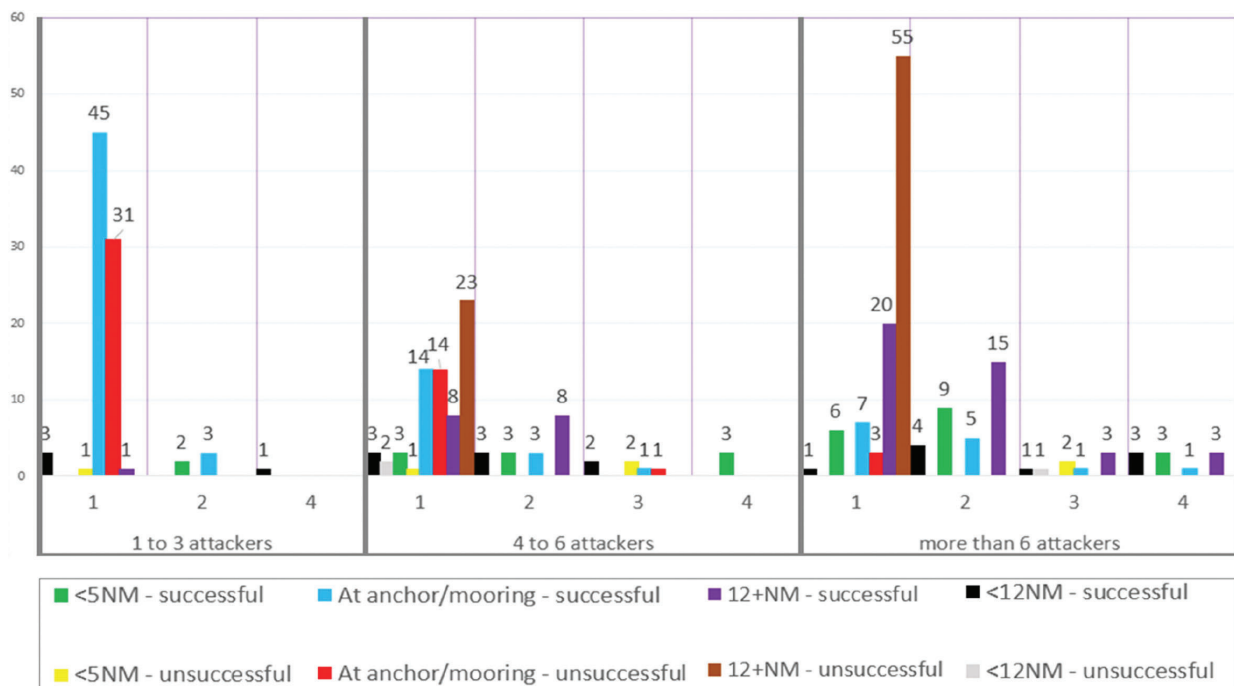| Type of attack	Successful	Successful (%)	Unsuccessful	Unsuccessful (%)	Total
Armed robbery	96	64,4%	53	35,6%	149
Piracy	89	51,7%	83	48,3%	172
Terrorism	3	100,0%	0	0,0%	3
Total	188	58,0%	136	42,0%	324

Source: [24, 38, 46]

Figure 3 Relationships between the intensity of the attack, number of attackers, and location of the attacks in West Africa region
Slika 3. Odnos između intenziteta napada, broja napadača i mjesta napada u zapadnoafričkom području
Source [24, 38, 46]

crew members of the management level (officers, chief engineer, and captain) are kidnapped. No hijackings of attacked ships were recorded, unless they were fishing boats that could serve as mother ships for new attacks. Based on data analysis, it is not possible to identify a pattern type 1 in this region. However, it is possible to form a pattern type 2. Its specific characteristics for this region are:
- Pirate attack;
- The attack takes place beyond 12 nautical miles;
- 6 or more persons participate in the attack;
- The attackers are armed with firearms;
- The attackers are highly motivated and there is a clear hierarchy;
- High level of violence (approximately 44% of successful cases end in physical injury or death);
- The goal of the attack is kidnapping for ransom.

It should also be mentioned that pirates attack ships even at a relatively long distance from the shore. The most distant attack was committed 270 NM from the nearest coast by Nigerian pirates.

To prevent attacks in the West African region, it is recommended that the number of private armed security team members (PAST) be increased and, if necessary, the number/quality of weapons used to deter attacks on ships be increased to respond with force appropriate to the attack. It is also recommended to increase the number of personnel on the bridge to detect the pirates more easily and as quickly as possible. In addition, it is recommended to reduce the number of people on deck exposed to a possible attack. If urgent work is required, it is recommended to carry it out with additional insurance. This additional insurance includes constant supervision of the person performing the work from the bridge or other control posts and the physical presence of at least one person from PAST. Supervision of a person performing necessary and urgent work is provided by at least two persons, one of whom must be a member of PAST. In addition, the crew should be warned and informed to increase their situational awareness of the brutality of attacks in the West African region.

5. CONCLUSION / *Zaključak*
The level of security in international maritime shipping changes as security threats evolve. It is common for appropriate measures to be taken in response to certain specific threats only after they have emerged. After the threats have changed, the measures to respond to them are also changed or adapted. The primary responsibility for preventing threats rests with coastal and flag states. Although there should be state authorities and organisations that enforce the laws in the waters under their jurisdiction, some states are unable to take appropriate measures to achieve an adequate level of maritime security. The ability of coastal states to prevent pirate attacks, armed robbery, and maritime terrorism is particularly important. Therefore, it is very difficult or nearly impossible to prevent these threats and improve maritime security without the cooperation and support of coastal states.

Although pirate attacks and armed robbery occur in many regions, three regions stand out. These are the regions of Southeast and East Asia, Central America, and West Africa. More than 97% of all attacks in the world from 2019 to 2022 occurred in these regions. The frequency of attacks in these regions is roughly the same, but they differ most in the characteristics of attack patterns. The Southeast and East Asia region is characterized by a "low profile" of attacks. Attackers try to attract as little attention as possible. They usually run away as soon as they are noticed. The attackers are usually neither motivated nor organized. Based on the results of the analysis, crew members are advised to focus on monitoring the ship's deck, especially when ships are approaching the coast or at anchor. Attacks on yachts are typical in the Central American region. Although the number of fatalities was not higher than in the Southeast and East Asia region, attackers in this region are more motivated but not organized. According to the analysis, it is recommended for yachts and catamarans to secure their tenders and engines on board, while for merchant vessels continuous surveillance of the deck at the shortest possible intervals is recommended. The West African region currently poses the greatest threat to maritime security in international shipping in the form of piracy and armed robbery. The attackers are highly motivated and, in most cases, well organized. During the observed period, more than 2/3 of all deaths worldwide were due to a pirate attack or armed robbery, and there were more than 480 hijackings. Recommendations focus on increasing the number of members of PAST and the number/quality of weapons used to deter attacks on ships and respond with force appropriate to the attack.

The main tools used on merchant ships to defend against security threats are a combination of a whole range of organizational and technical measures, as well as security protection measures. These packages of measures are usually developed after a threat analysis and are given in the form of recommendations. They are intended to prevent threats or mitigate their consequences. This approach to managing threats is only partially successful because it works retroactively and is not aimed at eliminating the problem. If a new type of attack were to occur, there is a likelihood that the recommendations would not provide adequate protection for seafarers. Eliminating threats such as piracy and armed robbery is a relatively complex and often difficult problem to solve at sea. In East Africa, however, the threat was eliminated when attacks began to pose a significant threat to international shipping in the area and when efforts began to address the problems simultaneously at sea and ashore. This is confirmed by the analysis of reported attacks from 2019 to 2022. During this period, not a single attack by Somali pirates was recorded in East Africa.

The paper develops a data analysis method to identify unique attack characteristics for each region. The data analysis method is based on seven components that make up the pattern. To enhance seafarer security, this paper provides, specific recommendations for each region considered that could complement the packages of measures already in place on ships. These recommendations are related to changes in international maritime security and, accordingly, need to be monitored and adapted to the latest reports from official organizations. Although they are relatively simple recommendations, their possible application can help maritime stakeholders in planning security measures that can certainly have an impact on increasing the level of maritime security in these areas.

Study limitations include non-reporting of incidents, unavailability of detailed official reports of attacks, inconsistent methods of data collection, and inconsistent forms for reporting attacks. The development of methodologies for data collection and processing aims to create a uniform system.

Future research could focus on developing proposals to standardize reporting, data collection, and processing procedures, as well as analysing the effectiveness of existing recommendations to prevent attacks.

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