

## **Pilotage and Tugboat Operation Interface Safety**

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### **Abstract:**

The pilotage operation is a means of safety for the ship when it enters the ports and narrow channels, and it achieves these facilities for the ports and channels so that they are not disrupted as a result of traffic accidents that occur when the ships enter the shipping lane or leave the port or the tramway safely.

This research aims to study is to eliminate the potential risk during pilotage operation and minimize the potentials for accidents during pilotage operations. This research considered a literature review paper from 2011 till the year 2022.

**Keywords:** Pilotage Operation, Safety, Ports, Suez Canal, Egypt.

سلامة عمليات الإرشاد والقاطرات

**المستخلص:**

تعتبر عملية الإرشاد وسيلة من وسائل الأمان للسفينة عند دخولها الموانئ والقنوات الضيقة، وتحقق هذه التسهيلات للموانئ والقنوات الملاحية بحيث لا تتعطل نتيجة الحوادث الملاحية التي تحدث أثناء دخول السفن إلى الميناء أو المغادرة من الرصيف أو أثناء عبورها في الممرات الملاحية.

يهدف البحث إلى دراسة كيفية التقليل من المخاطر المحتملة أثناء عملية الإرشاد وتقليل احتمالات وقوع الحوادث أثناء عمليات الإرشاد، يعتبر هذا البحث ورقة مراجعة للحوادث البحرية من العام ٢٠١١ وحتى العام ٢٠٢٢.

**الكلمات الدالة:** عملية الإرشاد، السلامة، الموانئ، قناة السويس، مصر.

## 1. Introduction:

Maritime transport bears 90% of global trade and its annual return is in the range of 500 billion dollars. Therefore, maritime transport is the lifeblood of the global economy, as without it we would be unable to complete commercial transactions between the various continents of the world (UNCTAD, 2018).

The effectiveness and volume of exports and imports traded for ports is one of the fundamental markers for assessing the strength of the country's economic success. Ports play a significant part in the economic development of nations and increase their national income. One of the key aspects of contending with global competition is the level of development of technical services, logistical systems, and infrastructure inside ports,

One of the greatest risks occurs when a ship departs or arrives at a port. It is common for the personnel on board to be unfamiliar with the port, and it might be essential to maneuvers through shallow or busy waters. When interacting with other parties like harbor pilots, tugs, and Vessel Traffic Services, communication problems could also occur (VTS). The ability and in-depth local knowledge of harbor pilots are largely depended upon to ensure that the vessel successfully completes

the berthing procedure, even if the Master has access to a number of resources for port information.

Utilizing their knowledge of the local conditions and navigational risks, pilots provide the Master with advice and assistance during the pilotage. Although the Pilot will have vast ship management experience and precise knowledge of the specific port, it is possible that they will lack this information when it comes to the specific equipment installed on the vessel or its maneuverability; this is the crew's area of expertise. Therefore, the Master, crew, and Pilot must work together effectively for the vessel to arrive at or depart from the port in a safe manner. This can only be accomplished by a thorough interchange of pertinent information from the vessel to the Pilot and from the Pilot to the vessel, resulting in a shared understanding of the intended operation between the Pilot and the entire bridge team. Legal requirements that regulate the relation between pilot, ship's Master and tug boat IMO Resolution A.960 'Recommendations on Training and Certification and Operational Procedures for Maritime Pilots other than Deep Sea Pilots' contains the following statement

Efficient pilotage depends, among other things, upon the effectiveness of the communications and information exchanges between the Pilot, the Master and the bridge personnel and upon the mutual understanding each has for the functions and duties of

the other Subject to the state or institution that binds them to work under a legal framework and international standards

One of the quality and safety requirements for the operations of dealing with ships in the port is to provide the safety of ships from the moment they enter the port and dock on the berth, while ensuring their safety from all risks and damage, and all of this is done as quickly as possible, therefore, choosing the appropriate type and capacity for marine tugs in the port and methods of assistance while dealing with ships, as they play a vital role in the safety of ships frequenting the port, as well as reducing the time required for ships to dock and leave the berth and the port. Marine tugboats are a major part of the infrastructure of any port in the world. It is important when making the port's decision to obtain Marine tugboats that they are equipped with the best equipment to increase its ability to compete and deal with ships and trade goods.

## **2. Maritime accidents:**

The Lack of training and lack of knowledge training experience competency knowledge (23%) and equipment/mechanical failure (21. 3%) were main causes of tug accidents. Lack of proper and permanent maintenance, improper use of equipment and use of defective equipment led to technical and mechanical problems which caused to tug accidents. Breach of working procedures which is mostly related to lack of knowledge or training and poor communication onboard tug or

between tug and ship were found other main contributing factors to tug accidents. It is clearly seen that 75% of tug accidents were caused directly by human error (Oraith, 2020).

Pilotage activities include handling risky situations, which calls for extreme focus and a high level of experience and skill. One of the most difficult activities is pilotage, which is frequently carried out in a dynamic and unpredictable working environment, adverse weather, and densely populated locations. Due to their connection, dependency, and the sheer number of organizations involved in ship berthing activities, pilotage operations are subject to a variety of dangers. It is carried out by a number of operators with various responsibilities, including the pilot, ship's crew, crews of tugboats and mooring boats, VTC regulators, and shoreline personnel. These operators are required to cooperate with one another as a team in order to safely guide the ship to its berth.

A pilot error might result in a large tanker ship entering a port colliding with a breakwater, which could result in an environmental catastrophe. A disaster that might happen near straits, canals, docks, or other congested places could slow down or even stop commerce and transit and inflict significant economic harm to the neighboring.

For instance, a single serious incident brought on by human error that results in a ship grounding or colliding with another ship at sea or as it enters a port can put the port, its crew, its

ships, its cargoes, and the maritime environment in danger and have a significant financial impact on coastal nations and businesses (Xu, et al., 2021).

### *Examples of maritime accidents*

A UK Marine Accident Investigation Branch investigation into the fatal capsizing of a harbor tug while assisting a CMA CGM containership in the port of Tulear, Madagascar identified a number of safety issues that contributed to the accident. Tug Dominguez girted and capsized while assisting the container ship CMA CGM Simba departing from the port of Tulear, Madagascar on September 20, 2016. As a result of accident, two of the Dominguez's five crew members died (Paulauskas et al., 2017).

CMA CGM CENTAURUS SHIP /Structural damage to the ship. Damage to the port infrastructure, including the collapse of a shore crane,

At 1137 on 4May 2017, the UK registered container ship CMA CGM Centaurus made heavy contact with the quay and two shore cranes while executing a turn under pilotage during its arrival at Jebel Ali, United Arab Emirates. The accident resulted in the collapse of a shore crane and 10 injuries, including one serious injury, to shore.

On 10 June 2017, the UK registered bulk carrier Ocean Prefect grounded when approaching Ahmed Bin Rashid Port, in Umm Al Qaywayn, United Arab Emirates. The vessel was not damaged and

refloated 12 hours later with tug assistance. It then anchored in safe water. On 11 June, the vessel again touched the sea bottom when entering the port, but was able to continue to its berth.

In July 2005, a demonstration in dramatic fashion of the catastrophic potential of collisions between attendant vessels and offshore facilities was made by the Mumbai High North accident. A multipurpose support vessel lost control and hit several marine risers at the Mumbai High North offshore complex off the west coast of India. The collision caused a gas leak that resulted in a serious fire, and parts of the complex collapsed after approximately two hours. Of the 384 persons who were on board that day, 362 were rescued, and 22 died.

**Table (1), shows marine accidents related to pilotage and tugboat operations over previous years 2011-2014-2015-2016-2017-2019-2021.**

NAME OF SHIP	TYPE OF SHIP	Data of accident	Cause of Incident	Location
Arafura sea Delta	TUG IMO/9295646	24-06-2017	Interaction	Queensland, Weipa Harbor
DIVER MASTER	TUG SVITZER HELIOS	04/08/2014	Girded	Esbjerg Harbor
EVER GIVEN	CONTAINER IMO/9811000	23-03-2021	Grounded	SUEZ CANAL
CMA CGM Centaurus	CONTAINER IMO/9410777	04-05-2017	COLLISION	Jebel Ali, United Arab Emirates

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Ocean Prefect	Bulk carrier IMO/9249257	02-05-2016	Grounded	United Arab Emirates
APL Temasek	CONTAINER IMO/9631955	27-10-2015	ALLISION	Egypt, Port Said
Milano Bridge	CONTANIER IMO/9757187	06-04-2020	ALLISION	Port of Bussan Korea
MSC Fabiola	CONTANIER IMO/9447847	28/04/2016	Grounded	Egypt, Suez Canal
Hapag Lloyd Tolten	CONTAINER IMO/9612870	19-03-2018	ALLISION	Pakistani, Karachi
Cosco Hope	CONTAIER IMO/9472165	02-05-2016	ALLISION	Egypt, Port Said
Natalie jean	TUG	12-03-2018	Capsized	New Orleans united states
ikar	TUG IMO/6519302	29-04-2017	Capsized	Poland West van texel
Eddy i	TUG IMO/9714575	24-05-2015	COLLISION	Bremerhaven
Smit polen	TUG IMO/8521701	13-01-2011	INTERACTION COLLISION	ROTTERDAM
SOUL OF LUCK	CONTAINNEER IMO/9148647	14-07-2019	ALLISION	PANAMA
Adonis	TUG IMO/858300	11-06-2011	Girded	Australia, Queensland

Source: by author.



### **3. Research importance:**

Tugboats and tugboat crew have an important role and have a crucial role in ensuring that vessels can maneuver safely in the maritime sector, especially during port maneuvers and transiting narrow waters. Tugboats are also used to fire-fighting, to rescue the grounded ships, and to take on the task of breaking ice during ice navigation. These activities are accompanied by some dangers and pose risks for tugboat and tugboat crew. In this context, this study reviews accident reports published by the international accident investigation organizations concerning tugboat and tugboat crew.

The obtained data are analyzed by content analysis method in terms of type of tugboats, cause of accidents, consequence of accidents, flag of tugboats and etc. It is revealed that collision is the most common accident type occurred on tugboats and human error was found dominating main cause of tug accidents with 75% (lack of knowledge, training experience, poor communication and breach of working procedures (Oraith, 2020).

The ship crisis in the Suez Canal reinforced the importance of the pivotal role of marine pilots and tugs for navigation and global supply chains within the shipping lanes and within ports.

One of the requirements for quality and safety for the operations of dealing with ships in the port is to provide the safety of ships from the moment they enter the port and dock on the berth, while ensuring their safety from all risks and damages, and all this is done as quickly as

possible, so a marine pilots is chosen to guide the ship to the port and the appropriate type and capacity for marine tugs in the port and roads assistance while dealing with ships, as tugs operation a vital role in the safety of ships going to the port, as well as reducing the time required for ships to dock and leave the berth and port (Çakır, et al., 2017).

When the crew of the tug, the pilot and the captain of the ship are fully aware of the capabilities, and limitations of the work of the tugs in general, as well as determining the type of tugboat used in assistance, in order to machine the need for a particular type of tugs, including the effects on the ship, then it is in their places to take advantage of the tug in the safest and most effective way, which it gives a kind of harmony between the tug and the ship during the joint maneuvers. Many accidents occurred due to the lack of proper knowledge of the capabilities, especially in the restrictions imposed on the work of the tugs, some of which were tragic.

Accident reports have shown a growing acceleration of number of fatalities and consequences resulted out of these accidents. The research investigates a new area of marine safety as the safety of the ship pilotage and tugboat operations interface is rarely studied; as a Master of a tugboat in Suez Canal will add the required live experiences that is always missing in such kind of studies.

#### **4. Research problem**

Generally, a ship accident may result in an expensive loss. The most common damage caused by a ship accident includes

human casualties, port facility damage, cargo damage and vessel damage. In practice, those damages may harm the reputations of shipping carriers and port companies, which may lead to decreased business.

A ship accident in port may cause fuel or cargo oil leakage, leading to port pollution. Since the losses from a ship accident can be enormous, many port authorities in the world have paid attention to reducing the incidence of ship accidents in port. In addition, interactions between the ship Master, Pilot and Tug boat are a sophisticated issue, where it involves numerous variables that interacted simultaneously and vitiate from operation to another. The potential risk of misunderstanding, ambiguity, misleading response is always existing and the consequences are always disastrous.

Research problem summarized in the following questions:

- What risk factors (governing/human factor) cause marine pilot accidents and how can they be identified and classified?
- What are the causes of ambiguity, misleading and disorder between the ship`s Master and sea pilots?

### **5. Research aims and objectives**

The main aim of the study is to eliminate the potential risk during pilotage operation and minimize the potentials for accidents during pilotage operations. The main objectives of the study are to investigate the implications of the relation between the ship`s pilot and tug boats during pilotage operations enhance the maritime

pilotage safety performance and thus subsequently mitigating maritime accidents. The potential risks associated with it.

The main aim can be fulfilled through the following objectives:

- Study factors control the interface between pilot and tug Master.
- Assessment of the main potential risks and associated consequences.

## **6. RESEARCH QUESTIONS**

Given the research background aforementioned, this study aims to provide an effective human factor quantification tool, and offer a diagnostic instrument to pilotage operations to satisfy the port stakeholders in a flexible manner. The following questions have been prepared in this respect in order to guarantee that the study objectives are accomplished and for providing a foundation for operations in this research:

- What are the causes of potential risks during pilotage and tugboats operations?
- What are the causes of ambiguity, misleading and disorder between the ship`s Master and sea pilots?

## **7. Research background**

### **7.1 The concept of the pilotage operations**

There are many ways to define pilotage depending on the specifics of the pilotage act. For instance, harbor or port pilotage may be used to describe pilotage that entails directing a vessel. Pilotage, as defined by the Pilotage Act, is the practice of assisting in the

navigation of vessels while serving as the master's advisor and a navigational expert for the local waters. Enhancing vessel traffic safety and preventing environmental damage caused by vessel traffic are the goals of pilotage.

The word "Irshad" (which means "pilotage") or "Morshid" (which means "pilot") were marine pilotage is hardly covered in publications written in advanced languages despite the fact that long time ago; in contemporary ports, its significance has grown. However, it might have been since it was not recognized as a job or profession until recently, it was left out. In the writings of the early jurists.

Figuratively speaking, jurisprudence and the judiciary were left to define maritime pilotage in place of comparative marine systems legislation. The current study defined maritime pilotage as "An agreement between a master of ship and a qualified person who works in port; the latter is obliged thereunder to guide the former for the itinerary to be followed when entering, moving in, or exiting port, for a wage in accordance with statutes," whereas the majority of marine system scholars were more concerned with defining terrestrial pilotage:

1. To say (agreement): indicates that maritime pilotage is a contract because both
2. Parties have agreed upon making an effect.

3. To say (master of ship): indicates one of the two contract parties, who is the guided master of ship as agent for ship operator under his statutory powers
4. To say (to guide the former on route): refers to the subject of the contract the contracted, and the pilot's Liability.
5. To say (for a wage): refers to liability of ship operator of the piloted ship; because master enters into a contract as a servant of ship owner (provider), within the limitation of his powers (Commercial Maritime System by Royal Decree No. M33 1440).

Pilots guide vessels from the sea into port as well as from the port out to sea. They also handle vessel transfers from one quay to another within the port. Pilots work on the bridge alongside the shipmaster and other crew members. At Finn pilot, pilots serve under the authority of a particular pilot station.

Maritime pilotage is managing of high-risk situations and complex tasks that requires intense concentration and high skill levels. It is important to note that there are significant operational uncertainties present during pilotage operations, particularly when the weather is poor or the ship is quite large. Since the master will be under extreme strain as a result, he may make his own judgments on how to handle the approach to the berth, especially if he is unfamiliar with the area or is approaching the port for the first time (Armstrong, 2007). As a result, "Compulsory Pilotage in Port Areas is the Principal Risk Mitigation Measure Available to Ensure the Safety of Navigation

of Visiting Ships; Safety of Passengers and Crews Protection. Pilotage is a 24-hour operation all year round and pilots normally work on roistered shifts. Since ships arrive off ports in a random manner the workload can lead to irregular sleep patterns although most seafarers used to on board watch-keeping will have no problem adapting to this.

In order to be qualified for this work, a pilot must have

- master mariner competence,
- sufficient maritime experience and
- specialized training

## **7.2 Duties Pilots guide the vessels**

Only those rules that apply generally are given here because it is not possible to describe all port regulations regarding port safety. These are the important topics:

- through the inner and outer archipelago,
- inside the harbor areas and within
- in narrow waters, narrow channel
- Berthing requirements.
- Manning of a vessel when at berth.
- Shifting of ships.
- Use of stern- or bow-thrusters when alongside.
- Air pollution from vessels.
- Repairs aboard and alongside ships.
- mooring and un mooring operation in pilotage

- Tugboats are often used, particularly to assist large vessels when mooring to or detaching from the quay. The pilot is forced to oversee this demanding operation.
- To ensure that the vessel is not damaged in any way pilot coordinator.

### **7.3 Pillars and Characteristics of Maritime Pilotage**

In view of the definition, we can describe the pillars of maritime tug contract, its

Characteristics and description in two subjects of focus, as follows:

The phrase, the two contracting parties, and the contract's subject are the three pillars of a maritime tug contract, according to general jurisprudential principles (Oldenburg et al., 2020).

The first supporter The Terminology, which is the agreement between the two parties to the contract, shows their support for creating and signing the document and lays out all of its wording, writing, signaling, etc.

Before entering, moving into, or leaving a pilotage region, ship operators are required to flag on their mast the signal for seeking a pilot. The ship's response to this is favorable, and the Acknowledgement received from the pilot is his response to such a sign and heading for the ship in the ship's master to the safe paths in port by boarding it and the pilotage area (Bitan, 1996); Adapting jurisprudence, is the consummation of the contract by sign or by



provided and legal action? Both authors check to see if the contract's conclusion is true.

The phrasing chosen by the ship owner will provide for the necessary flexibility and speed in the advice process is a customary and required procedure in ports, but because of the main principles, verbal communication should not be avoided in the event

Communication between the ship's captain and the pilot, or, if necessary, by writing time allows Thus, it follows that the ship owner provides a specific form by which the Although a maritime pilotage contract is held, other forms of contracts may also be held. And must always strengthen the pilotage flag. The second pillar: The two parties to the contract a contractor (contract party) is someone who starts the contract and expresses approval. In order to begin the contract, he must demonstrate his ability to enter into contracts on his own behalf or establish legal authority for contracting on someone else's behalf.

Since pilotage is required for ships in the ports of the kingdom, the term "master of ship" refers to the master of each ship that enters, transits through, or leaves those ports. According to the Commercial Maritime System by Royal Decree No. M33, 1440, the following ships are not included: warships, Saudi government ships used for public services and non-commercial purposes, fishing vessels, ships with a net tonnage of less than 150 tones, maritime units that are part of ports, and yachting

vessels. Due to their practically constant presence in port and the fact that their masters are familiar with the port's routes, ship operators may be able to exempt them.

The Second Subject of Focus: Characteristics of Maritime Pilotage Contract. Maritime pilotage contract has characteristics that can be presented as follows:

- 1) Consensual Contract: The confluence of an offer and an acceptance, or the two parties' mutual assent, is sufficient to engage into a contract. Without a public or private act, the contract is established by the agreement alone. Therefore, it can be proven by all methods of providing proof. Here is appropriate for marine pilotage, which calls on swiftness and adaptability; and that the pilot presented a specific procedure for convening a marine pilotage contract, and that convening is not flagging is required in every instance when requesting pilotage as it can be blocked by other ways. Moreover, its description imposing it on the operator in ports has no impact because it is consensual (The Commercial Maritime System by (Royal Decree No. M33, 1440)
- 2) A netting contract: each side must contribute in order to receive the desired outcome. By guiding the ship's master along safe paths while in port, the pilot provides for his benefit, and the master pays the pilot's salary.
- 3) A binding contract for both parties: it gives rise to reciprocal obligations; because it has the meaning of Netting.

- 4) Commercial contracts are subject to the unique statutory provisions contained in the marine trade system and the provisions of Islamic Sharia (law), which serve as the public order in the Kingdom of Saudi Arabia, in accordance with the second article of the commercial court system.
- 5) Instant contract: Because this agreement is made for a specified purpose, time is not a significant consideration in this agreement. Is transient in nature. According to some academics, it is a contract for a temporary service.
- 6) A maritime contract that is complimentary to navigation: Because it was not designed with marine navigation in mind, it focuses on achieving that goal. As a result, it is referred to as a servant contract, complimentary contract, or supportive contract. The pilot is a member of the navigation crew's support group.

### **7.3 Liability for Damage to a Ship Other Than Piloted Ship**

It covers liability for harm done to someone else, harm done to the piloting ship, harm done to the pilot or one of the navigators of the pilotage ship. There are three concerns in this situation:

The primary concern is responsibility for harm done to others. When performing pilotage operations, the pilot may make mistakes that cause harm to a third party unrelated to the pilotage contract. Tortious responsibility to make amends to the injured party. According to the ship's operator, the ship owner is

responsible for any losses that third parties may have sustained as a result of the pilot's alleged mistakes during pilotage operations.

These are some of the concerns brought up: According to the ship operator's clause, the ship owner is entirely responsible for any errors made by the pilot, no matter how significant they are or whether they were intentionally committed or not. Following are various bases that affect the ship owner's liability for the pilot's absolute personal errors:

- 1) A pilot is an employee of the ship's owner; as such, he dissociates himself from both public and private authorities, but when the ship is in pilotage, he is subject to the same authority and supervision as the other navigators. It is known that the master is a ship owner's servant, therefore the alleged error is the master's; nonetheless, his duty is restricted to that of advising and directing, and ship leadership remains with the master of the ship. Therefore, the ship's owner alone is accountable for the pilot's error, just as the master is accountable for the servant's fault.
- 2) Protection of the pilot and maritime pilotage to achieve a better interest, particularly when the pilot is unable to afford to pay compensations and cannot insure his employment due to the high cost of insurance.

Many academics believe that, in accordance with general norms, the ship owner has the authority to demand payment from the pilot. According to the research, this statement is not supported by the

statutory provision because it holds the ship owner alone responsible for the pilot's faults. Instead, it is covered by a special provision, which comes before a general provision that includes such general provisions. Furthermore, suggesting that a pilot is useless because he lacks financial stability is untrue able to pay enormous sums of money for ships. Because a pilot is a unique type of employee as previously indicated, of jurisprudence and the special employee, according to Islamic scholars, does not guarantee except via violation and omission; the ship owner is accountable for the when pilot errors arise as a result of pilotage operation, they cause harm to others. Without violation or omission; conform to the rules of Islamic jurisprudence. But holding the ship owner accountable if they happen as a result of the pilot's violation and omission it is against the guarantee-related regulations of Islamic law.

The second concern is the responsibility for damage to the pilotage ship.

When a pilotage ship (a boat or a tugboat) operates in the small waters of the ocean,

Size frequently approaches a large ship with powerful engines, depending on the navigational circumstances, it results in marine systems requiring the ship's pilot to adhere to the technological resources in to safely approach the pilotage boat and to reduce the ship's speed as much as possible Royal Decree No. M33 of 1440 established the commercial maritime system. Pilot's error in such difficult conditions is possible and

unforgiveable unless it is not serious. This has entailed the assumption. That the reason of any damage to pilotage ship is caused by the piloted ship. Therefore, unless he can demonstrate that the pilot's error was substantial, the ship owner is responsible for the damages of the pilotage ship. This concept was established by a Saudi ship operator, who determined that the ship owner should be compensated. About harm to a pilotage ship sustained during pilotage operations or maneuvers connected to pilotage prohibits the pilot entering the ship or leaving it unless he can show that the damage was resulting from a significant pilot error (Commercial Maritime System by Royal Decree No. M33, 1440).

There are some pertinent issues, such as the fact that this provision deviates from the general rules of responsibility, which state that the ship owner may not be held liable for such damage unless he can demonstrate that the ship master who is being piloted made a mistake; under the general rules, the pilot bears the burden of demonstrating a mistake. Researchers who study marine systems find that this deviation from the norm is justified by comparison, as seen in the following:

- 1) The master of a piloted ship has a duty to ensure the safety of the pilotage ship or boat.
- 2) The responsibility here is based on the presumed error to pilotage ship (boat or tugboat).

- 3) The Pilotage Authority must ensure its personnel, lessen their duties, and correct any minor pilot faults that are expected given the dangers that pilotage ships face.
- 4) If it can be demonstrated that the damage was caused by a major pilot error, the ship owner will pay for it. The proof is required from the ship owner under particular regulations for liability resulting from maritime pilotage contracts. He must demonstrate that it was a major mistake, as a pilot's modest error is pardonable.

**The attitudes of Islamic jurisprudence on this issue are detailed as follows:**

- 1) The ship owner is responsible if damage to a pilotage ship results from a piloted ship master's mistake. In this assumption, the system is appropriate under legal rules of guarantee
- 2) If the damage to the pilotage ship occurs arising from a serious error from the pilot, the responsibility is not Due to the absence of a legal justification holding the ship owner accountable for the significant mistake of the pilot, the system is acceptable under the legal provisions that safeguard the ship owner.
- 3) Due to a lack of a legal justification that would hold the ship owner accountable for a pilot's little error, the system is improper under the legal principles of guarantee if damage to

the pilotage ship results from a mistake that the pilot made that was not substantial.

Because the original is nothing, acquaintance is the rule, and accountability is a fine brought on by a destructive blunder. The pilot is the one who makes the claim for error because he is the plaintiff and the ship owner is the defendant, and because it is the plaintiff's legal responsibility to establish the ship owner's fault.

### **Legal tools for port regulations**

A list of the responsibilities and authority must be included in every harbor authority's safety plan. Plans and follow-up reports should specify the most current review date.

Whether in harbor orders, byelaws, general directions, or harbor master's orders, duties and powers should be developed from a careful assessment of risk.

When an authority's rules are given statutory authority, the authority's plans must show how closely those rules relate to risk management. Therefore, harbor authorities must be able to show that their regulations are equally clearly enforced, and plans must indicate that sufficient resources are available to accomplish this. On the basis that further powers should only be requested and, in the case of harbor orders, byelaws, and harbor directions, will only be given,

A public port authority typically issues port regulations (port bylaws), which have a legal foundation in a specific law such a maritime code (as in Azerbaijan), a port law (as in Singapore), or a municipal law (as in Rotterdam). In general, port bylaws are



carefully thought out and give highly specific rules relating to vessel conduct, safety, and order in the port area, environmental protection, the employment of pilots, documentation of passengers disembarking, loading and unloading of cargo, and crisis management. The creation of port regulations that are universally applicable is not possible since port regulations depend on unique local circumstances. Therefore, only a few of the most crucial concerns are covered in this section.

All vessels entering or leaving the Canal, must take a pilot (Pilotage is compulsory). However, the SCA reserves the right to assign a tug Master on board vessels under 1500 SC.G.T, and a coxswain on board vessels under 800 SC.G.T instead of a pilot. Navy ships and vessels carrying dangerous cargo must have a pilot regardless of their Tonnage. Road's pilots on board vessels arriving from sea shall hand over the "Declaration of State of Navigability" and the "Pilotage Form" to the Master. The pilot must inform the Movement Control Office or the Port Office immediately by Inmarsat and tetra or V.H.F. (2) if his advice regarding the safety of navigation is not accepted or not respected by the vessel. Masters are held solely responsible for all damages or accidents of whatever kind occurring either directly or indirectly from their vessel's navigation or handling during the day or at night. Since the Master or his deputy is the only person in charge of the vessel, neither SCA nor SC pilot is held liable for

any losses incurred during travel as a result of their recommendations. (authority, December2020)

### **7.5 Scope of passage planning requirements.**

IMO resolution A893 (21) specifies the necessity for passage planning and provides some recommendations for recreational vessels. It is outlined in SOLAS V Regulation V/34 and is applicable to all vessels. Plans for the Port Passage should be flexible. A pilot must take responsibility for to inform the master of his suggestions for the pilotage route plan before embarking. The area for pilotage. As soon as is practical, this plan should be approved with the master. The strategy will account for any changes in tide and other regional factors. Such as ship movements, available berths, etc. It's crucial to avoid restricting the Pilot must respond to unforeseen conditions, yet deviating from the predetermined course Plan must be.

The pilot organization shall establish procedures for the preparation, planning and execution of the pilotage passage, with due consideration to local, national and international requirements and local best practice

### **7.6 Vessel Traffic Service (VTS) / Vessel Traffic Management (VTM)**

When a VTS/VTM system has been established, the pilot organization is responsible for ensuring that all formal agreements between the pilot organization and the VTS/VTM authority are recorded in the management system and that proper

communication is maintained during the execution of pilotage services between the pilot organization, the maritime pilot, and the VTS/VTM authority.

When information is sent between the VTS/VTM and the vessel under pilotage to support the pilotage service, the pilot organization must ensure that any system utilized for communication between the pilot organization, the marine pilot, and the VTS/VTM authority is correctly arranged. Portable Pilot Unit (PPU) If PPU systems are being used, the pilot organization must establish and maintain policies for their safe operation in compliance with regional, governmental, and international standards as well as accepted practices.

Technological advancements will embrace new PPU technology with new consequences and functionality; therefore, it is important to ensure that all applicable industry standards are taken into consideration. It is crucial that pilot organizations understand that PPU systems should only be used as a tool for maritime pilots, not as a substitute for their expertise or standard operating procedures. This potential innovation in the maritime pilot training programmer needs to be taken into consideration.

**7.7the legal requirements that regulate the relation between Pilot and ship`s Master Guidelines for navigation the Suez Canal's rules:**

**(1) ship`s Master:**

The Master or his authorized representative must be present at all times on the bridge when a vessel is transiting the Canal. They are in charge of maintaining control and management of the vessel from there. In order for the pilot to be in a position to offer better guidance to control the navigation and movement of the vessel, the Master or his trained agent must keep the pilot informed of any specific characteristics in controlling the vessel.

**(2) Pilot:**

At the entrance buoys of Port Said and Port of Suez, the pilot's responsibilities begin and end. He merely offers guidance on how to sail the ship and maneuvers it. He makes his experience and practical knowledge of the Canal available to the Master, but as he cannot be certain of every vessel's flaw or maneuverability challenges, the onus is entirely on the Master. The following "Rules of Navigation" must be followed by the vessel, according to the pilot:

- a) The articles of the "Rules of Navigation".
- b) The orders of transit given by the Suez Canal Port Office.

The maneuver and orders are carried out under the direction of the Master who is solely responsible for the vessel. It is therefore for the Master, taking into account the directions given

by the pilot, to give the necessary orders to the helm to the engines and tugs. If, in the interest of quick maneuvers the Master thinks it preferable to allow the pilot to give orders directly, maneuvers carried out in these circumstances shall be considered as having been carried out by the order of the Master and engage his sole responsibility.

The safe transit of ships through the port area is the main goal of vessel traffic management. When inland and seagoing vessels share the same port waters, there is often a high volume of traffic in big ports, may require an elaborate system of traffic regulation and management. This system comprises four principal elements:

- The ship with all of its high-tech radars for avoiding collisions and satellite communications systems for locating.
- The accessible port amenities include pilot boats, patrol boats for traffic control, tugs, and mooring boats as well as contemporary navigational aids with cutting-edge features including collision prediction, closed-circuit television, and vessel traffic systems.
- Clear traffic regulations consistent with International Maritime Organization (IMO) conventions (if applicable) as well as long-established communication procedures.
- Pilots, traffic and radar operators, patrol boat crews, tug crews, and other shore employees who are highly motivated and trained.

Provisions regarding these issues are found not only in port regulations, but also in pilotage laws and regulations, vessel traffic regulations, and IMO conventions,

In accordance with the law, a pilot advises shipmasters, but in actuality, the pilot frequently takes the helm of the vessel. Being a pilot needs a great deal of responsibility and accuracy because mistakes can seriously harm the environment or the ship, The primary responsibility of the pilot is to control ships as they approach and depart from port wharves and facilities, as well as to ensure their safe passage through what is known as the riskiest part of a ship's voyage. The ship, the environment, and the port facilities' safety are of the utmost importance. Ship handling is undoubtedly the most important ability a pilot must possess, but a proficient pilot must also be able to keep an eye on all of the factors that could impact the journey and adjust their strategy accordingly, to win the Master's trust and fit in with the ship's bridge team, a high level of professionalism is needed, the obligations associated in managing ships, sometimes with hazardous cargoes.

The performance of the overall pilotage process is significantly impacted by the quality of the Pilot Dispatch Centre's activities, which serve both internal and external pilotage customers. Processing pilot orders received by ships and shipbrokers is the responsibility of the Pilot Dispatch Center. Every day, labour is done in three shifts. The job of the pilot coordinator necessitates a customer-focused attitude, the capacity to function well under

pressure, and solid organizational abilities. Additionally, it requires the ability to learn and use the appropriate IT tools for the job as well as strong language abilities.

### **7.8 Roles and obligations between pilot and tugboat**

The role of the pilot is to co-ordinate all available assets to safely conduct the intended maneuver. The towage, the ship's main motor, thrusters, and rudder, the ship's bridge and deck crews, the usage of mooring lines and boats to suit the particular vessel, the berth and approaches, and the environment are some of these assets. The pilot will try to avoid or avoid an unintended consequence created by the planned action of one tug by applying or removing a different force somewhere else. As long as it is safe to do so, the tug master's job is to follow out the pilot's instructions. They are in charge of the crew's and their tug's safety. If a person is asked to perform an activity, they should do so as quickly and precisely as they can. The pilot assumes that the tug is functioning as and were instructed because it frequently operates out of sight of the pilot and the bridge team. Any limitations on performing the essential activity must be communicated to the pilot as soon as feasible so that they can be taken into consideration. Equally, the conducting pilot is interested in any safety issues, risks that need to be cleared, or tug master observations.

What are Tug Boats?

Towage refers to assistance provided to ships by tugs operating within the port, whether towing with ship's own lines or tug's lines, pushing or standing by.

A tugboat (tug) is a boat or ship that maneuvers vessels by pushing or towing them. Tugboats can push or towing large vessels such as ships, barges, and oil rigs with high precision and speed. A tugboat is a secondary boat that helps in the mooring or berthing operation of a ship as well as the safe exit of the ship from the berth and port by either towing or pushing a vessel towards the port.

Tugs are relatively small compared to large merchant ships, yet powerful compared to their small size; their propulsion system is the main reason behind their enormous strength. The role of tow boats is to facilitate the implementation of the special maneuvers of large ships to berthing or exit from the quay and maintain the safety of the ship from exposure to any potential dangers such as stranding or collision. Tugs are available to assist in berthing, UN berthing, towing shifting and hauling of vessels. Some are equipped with fire-fighting and anti-oil pollution equipment. Tugs are also used in LASH operations and salvage work.

### **7.9 General requirements for harbor tugs**

Continually risk assesses activities within its areas of responsibility and applies appropriate safety control measures to ship movements; this could include a requirement to use of towage. Developing guidelines is to enhance the safety of those



that operate in the ports and prevent accidents, to enhance good communications and teamwork between towage operators, harbor authorities, Pilots, and shipping companies. The tugs must be suitable for this purpose, taking into account the situation of the port and areas Approach, environmental conditions, and type, and size of ships to be handled.

Here are some important requirements:

- Good stability forward or backward while working.
- A panoramic view of the maneuvering area (bridge room) as unobstructed as possible and includes Seeing the working surface of the tug and seeing the towing winch and the towing rope, and it must be in front the tug captain has a direct eye which enables him to have a good view of the work area as well the ship and other tugs from around him, even in bad sea conditions.
- A towing winch with capacities suitable for the forces that can be generated by the locomotive and the conditions under which it is the tug must run.
- A rope tension control system may be required.
- A safety device for quick release also works when the tension rope is under extreme stress or Strong tension.
- The tug superstructure must be constructed in such a way that the tugboat can operate under the bends of the ship especially while on the move.

- A tension rope with a breaking load not less than 3 times the tensile strength of the locomotive.
- A safe work surfaces.
- Doors and other openings on the external surfaces prevent the penetration of water, especially during towing operations.
- The presence of vents for the machine room in the event that the doors are closed when towing and there are angles of inclination severe side.
- It is provided with suitable rubber fenders with a high ability to absorb the appropriate energy the locomotive's power and strength, result in sufficient pressure on the ship's hull.
- A good and reliable communication system.
- Above all, an experienced or at least good staff.

### **7.10 IMO and pilotage recommendation**

The importance of employing qualified pilots in approaches to ports and other areas where specialized local knowledge is required was formally recognized by IMO in 1968, when the Organization adopted Assembly resolution A.159 (ES. IV) Recommendation on Pilotage.

In addition to defining the ships and classes of ships for which hiring a pilot would be required, the resolution advises states to organize pilotage services where they would be likely to prove more successful than other measures. When a ship needs a qualified pilot, the local port or maritime administration will typically hire one for a charge that is based on the ship's tonnage,

draught, or other factors. Qualified pilots are usually employed by the local port or maritime administration and provide their services to ships for a fee, calculated in relation to the ship's tonnage, draught or other criteria.

One of the problems encountered by pilots is that of getting on board the ship – particularly when the weather is bad, or the ship is very large. Requirements to make this easier are contained in Chapter V of the SOLAS Convention, and have also formed the subject of IMO resolutions covering performance standards for mechanical pilot hoists (A.275 (VIII)); arrangements for embarking and disembarking pilots in very large ships (A.426 (XI)); and pilot transfer arrangements (A.667 (16)). An MSC Circular (MSC/Circ.568/Rev.1) covers required boarding arrangements for pilots.

### **7.11 Authority for pilotage competence:**

Authorization for pilot proficiency the term "competent pilotage authority" refers to either the national or regional governments or local groups or organizations that, in line with the law or custom, administer or provide a pilotage system. Governments should make the provisions of this text known to qualified pilotage authorities and support their implementation.

Each competent pilotage authority is responsible for evaluating an applicant's experience, credentials, and fitness for certification or licensing as a pilot.

The competent pilotage authority in co-operation with the national and local

Pilots' associations should:

- determine the rules and set the entry requirements for obtaining a certificate or licenses to conduct pilotage services within its authority;
- enforce the maintenance of developed standards
- Describe any requirements, tests, or experiences needed to guarantee that candidates for pilot certification or licensure have the relevant education and experience; and provide for training programs for marine pilots to take reports on investigations of occurrences involving pilotage into consideration.

### **7.12 pilot training and certification**

Every pilot must possess a valid pilotage certificate or licenses that has been issued by the proper pilotage authority. The certificate or licenses should include the pilotage area for which it was given as well as any conditions or regional restrictions that the competent pilotage authority may establish, such as the maximum size, draught, or tonnage of vessels that the holder is authorized to pilot. The IMO Assembly in 2003 adopted resolution A.960(23) Recommendations on training and certification and operational procedures for maritime pilots other than deep-sea pilots, which includes Recommendation on Training and Certification of Maritime Pilots other than Deep

Sea Pilots and Recommendation on Operational Procedures for Maritime Pilots other than Deep Sea Pilots.

### **7.13 IMO Resolutions encouraging the use of pilots on board ships in certain areas:**

Resolution A.480(IX) (adopted in 1975) recommends the use of qualified deep-sea pilots in the Baltic and Resolution A.620(15) (adopted 1987) recommends that ships with a draught of 13 meters or more should use the pilotage services established by Coastal States in the entrances to the Baltic Sea.

- A.486 (XII) (adopted 1981) recommends the use of deep-sea pilots in the North Sea, English Channel and Skagerrak
- A.579(14) (adopted 1985) recommends that certain oil tankers, all chemical carriers and gas carriers and ships carrying radioactive material using the Sound (which separates Sweden and Denmark) should use pilotage services
- A.668(16) (adopted 1989) recommends the use of pilotage services in the Euro-Channel and IJ-Channel (in the Netherlands)
- A.710(17) (adopted 1991) recommends ships of over 70 meters in length and all loaded oil tankers, chemical tankers or liquefied gas carriers, irrespective of size, in the area of the Torres Strait and Great North East Channel, off Australia, to use pilotage services
- A.827 (19) (adopted 1995) on Ships' Routing includes in Annex 2 Rules and Recommendations on Navigation through

the Strait of Istanbul, the Strait of Çanakale and the Marmara Sea the recommendation that “Masters of vessels passing through the Straits are strongly recommended to avail themselves of the services of a qualified pilot in order to comply with the requirements of safe navigation.”

- A.1045 (27) on Pilot Transfer Arrangements gives recommendations on the construction of pilot ladders.
- A960 gives recommendations on training and certification and operational
- Procedures for Maritime Pilots other than Deep Sea pilots.

### **What is the difference between a captain and a pilot?**

The captain (Master) always has command of the ship and thus has ultimate responsibility for the safety of the ship, its cargo and crew. Since the Captain (Master) is always in control of the ship, he or she is ultimately responsible for ensuring the crew, cargo, and passengers are all safe. When a ship is boarded, the pilot (in the UK) gives a transit plan, commands the course and speed of the ship to carry out the plan, and is legally responsible for the conduct of the ship in the pilotage region. “Pilot means any person not belonging to a ship who has the conduct thereof.” The following definition was established by the Merchant Shipping Act 1894 which states that, Pilots are generally professional seafarers who have served on ships in the capacity as a senior deck officer,

Pilots are often experienced sailors who have held the position of senior deck officer while working as a seafarer in a professional capacity. IMO STCW II/2 Master's qualification and experience as a captain or chief officer on a merchant ship are required for the majority of pilots serving the world's main ports (or the naval equivalent). Some pilotage authorities make an exception to this rule by hiring and training pilots within the neighborhoods. In the USA, where a lot of ports have pilotage as a family business, there are examples of this. In smaller ports, pilots are frequently hired from among persons who are familiar with the surrounding waters; also, in many of these ports, it is not unusual for the pilot to also serve as the harbor master. This can be reflected. The Marine Port Pilot only works during these terrifying times to support himself. The pilot gives a unique competency to lead the Bridge Navigation Team while completing the mission because of his or her extensive experience in ship handling and specialized understanding of the local conditions. Navigation of the ship through the jurisdiction of the pilotage area

### **Why would someone use a pilotage service?**

The goal of any pilotage service should be that ships move through the port as quickly as is safely any pilotage service should aim to transport ships through the port as swiftly and safely as possible. Possible. It concerns preserving the

environment, ensuring people's safety, and safeguarding the port's physical infrastructure. The topic is risk management.

Effectiveness is a key component of a pilotage service, which is fundamentally a safety service. An expert pilot can berth a ship safely and in much less time than a novice master who is unfamiliar with the port and its procedures might be able to. With modern ships inside port restrictions having operating costs in the range of \$3000 to \$4000 per hour, a reduction in turnaround time of just one hour more than covers the pilots' salaries. This is but one illustration of how a safety service might result in significant financial advantages.

- For their expertise in navigating in close proximity to land in narrow channels.
- For their ability to anticipate accurately the effects of currents and tidal influences.
- For their understanding of local traffic.
- For their ability to work effectively with the local VTS.
- For their language ability when dealing with shore services.
- For their expertise in handling tugs and linesmen.
- To support Master and relieve fatigue.
- To provide an extra person or persons on the bridge to assist with navigating the ship.

A Pilot onboard improves both the safety and efficiency of operation.



### **Expectation of Bridge Team/Pilot Performance.**

The primary responsibility of a pilot is to prevent ships from collision or grounding by properly navigating and maneuvering they while in pilotage. Waters. But the master and bridge crew are always in charge of the secure the ship's navigation. Bridge protocols and resource management for bridges When a pilot is present, the same rules still hold true. A prepackage must be conducted by the bridge team. Briefing the pilot to ensure that everyone is aware of the Passage Prior to execution, make a plan. The master, watch keepers, and pilots must all actively participate, and in a way that is mutually beneficial.

The master and bridge team have a responsibility to assist and supervise the pilot. This involves questioning any acts or inactions by the pilot or other members of the bridge team if they conflict with the route plan or raise any concerns about the ship's safety.

Under provisions of the Pilotage Act 1987 the pilot is not merely an advisor but has legal conduct of the navigation of a vessel. 1987 Pilotage Act Sect 31 – “pilot” has the same meaning as in the Merchant Shipping Act 1894 and “pilotage” shall be construed accordingly. Section 742 of the Merchant Shipping Act 1894 states a pilot to be any person not belonging to a ship who has the conduct thereof

**There are numerous cases which illustrate the point, which despite their age are still binding in law:**

Training. The pilot should get training in the fundamentals of both Bridge Team Management (with an emphasis on internal and external relationships and operational Bridge Team responsibilities) and Marine Resource Management in order to collaborate with the bridge team efficiently (the focus being cultural issues and the role of the pilot).

**Technical Aids.**

The benefits of using tried-and-true technology that may offer further supplementary support to both pilots and bridge staff, independent of ship systems, should also be taken into account in terms of risk reduction. Consideration should also be given to the risk reduction benefits of utilizing proven Technology that can provide additional complementary support, independent of ship Systems, to both pilots and bridge teams

**Assessment.**

Pilots should be monitored and assessed in the effectiveness of work with the bridge team. This could be through peer review or other form of audit.

**Mutual Support Level for Bridge Team**

The degree of reciprocal assistance will inevitably vary depending on a variety of conditions. Including commerce, ship size, technology offered, and personnel. But the following is thought of as a minimum condition;

- Abilities (i.e. competent and properly qualified).
- well-prepared (e.g., charts, a passage plan, the condition of the machinery, anchors, and crew deployment)
- Being responsive, such as being aware of the pilot's needs and keeping tabs on the pilot other people's behavior).
- Cooperation (e.g., positively responding to the pilot's inquiries and following instructions).
- Knowledge of English (capable of understanding standard marine vocabulary).
- Fully familiar with bridge equipment

#### Reporting Substandard Performance

Pilots have a statutory duty to report ship deficiencies that may adversely affect its safe navigation to the Competent Harbor Authority who should inform the Maritime & Coastguard Agency. This mechanism could be used to report substandard performance but if not then the safety management system must include procedures to facilitate reporting to the C HA that can be acted upon immediately if necessary (e.g. if the vessel remains in port).

#### **Recommendation on operational procedures for Maritime Pilots other than deep-sea pilots (ANNEX 2)**

The ability of the pilot, the master, and the bridge crew to communicate effectively and exchange information, as well as their shared awareness of one another's roles and responsibilities, are key components of efficient pilotage. A safe and swift voyage will be facilitated by the establishment of effective coordination

between the pilot, the master, and the bridge staff while taking into consideration the systems and equipment of the ship that are available to the pilot.

### **Duties of master, bridge officers and pilot**

The presence of a pilot on board does not absolve the master or officer in charge of the navigational watch of their responsibilities or obligations for the safety of the ship, notwithstanding the duties and obligations of a pilot. Despite a pilot's responsibilities, the master or officer in command of the navigational watch remains responsible for the ship's safety and is not relieved of their duties by the presence of a pilot on board. Before the pilotage begins, it is crucial that the pilot, the master, and the crew on the bridge are all informed of their various responsibilities for the ship's safe journey.

The safety of the ship, of everyone on board, and of anybody who is in any way threatened by the presence or operations of other ships is among the responsibilities of a ship's master. He is entitled to the full support and aid of his officers and other crew members in the performance of his duties. Everyone on board must carry out their duties in accordance with the customary maritime norms that have been time-tested and proven to work. The widely accepted seamanship norms that protect against error or accident. The officer of the watch or other suitable officers may be given authority to carry out the master's directive to guarantee that the crew supports the pilot in his tasks.

The master, officers, and other crew members are in charge of informing the pilot of any pertinent information, including flaws and oddities, and keeping a proper watch. The duty has been understood by the courts to include the obligation to report all pertinent information, even if the pilot is in a position where he or she should be able to see things clearly for themselves, that could have an impact on the pilot's conduct. When the master believes that a situation is clearly unsafe, it is his responsibility to alert the pilot to the danger and, if he determines that it is essential, to assume control of the vessel. The master's inaction is not justifiable. The pilot's primary responsibility is to oversee and control the ship's navigation, including its course. He is the only power on the boat. The common law relationship between the master and the pilot is such that the latter is restricted to situations where there is clear evidence of the pilot's incurring his own liability, is restricted to situations where there is clear evidence of the pilot's inability or incompetence, and is restricted to situations where incurring his own liability. The master-compulsory pilot relationship is unusual in many ways since it is frequently governed by tradition, practice, and law rather than a contract. Although the pilot is typically neither an employee of the ship nor a member of her crew, he is ultimately subject to the master, though the degree of subordination is less than commonly assumed. The degree of responsibility overlaps those forces both the pilot and the master to be concerned about a vessel's safety is advantageous to both the public and the industry.

At the Panama Canal, there is an exception to the rule of the usual master/pilot relationship. In exchange for more authority over ship passage in that important waterway, the Panama Canal Commission accepts a higher level of accountability. Inside the Panama Canal's locks, unless the Commission can demonstrate that the injury was the result of the vessel's negligence, it is the Commission's responsibility to pay for damages for injuries to the vessel, cargo, crew, or passengers resulting from a passage through. When such injuries are directly attributable to the negligence or fault of a Canal Commission employee, outside of the locks, the Commission passengers are covered, provided that the ship in question is one that is required to have a Panama Canal pilot on duty at all times. Damages are only available if the Panama Canal pilot was in control of the navigation at the time of the injury.

For the safe operation of the ship in pilotage waters, the master, bridge officers, and pilot all share responsibilities for effective communication and mutual understanding of their respective roles.

Masters and bridge officers have a duty to support the pilot and to ensure that:

- His/her actions are monitored at all times
- Point for pilot boarding: regarding annex 2
- The appropriate competent pilotage authority should establish and promulgate

- The location of safe pilot embarkation and disembarkation points.
- The distance between the pilot boarding point and the start of the act of pilotage should be sufficient to provide for safe boarding conditions.

The location of the pilot boarding point should also provide for enough time and space on the water to meet the needs of the master-pilot information exchange.

### **Procedures for requesting pilot**

The appropriate competent pilotage authority should establish, promulgate and Maintain procedures for requesting a pilot for an inbound or outbound ship, or for

Shifting a ship, an effective pilotage service requires information on the estimated time of arrival (ETA) or departure (ETD) to be provided by the ship as early as feasible with regular updates if possible. This is because human resources and technical means must be scheduled well in advance. In order for the pilot station to provide pertinent information on pilot boarding and the master to confirm the ship's estimated time of arrival, communication by VHF or other dedicated means should be established as soon as possible.

All the information necessary by local laws should be included in the initial ETA transmission sent to the Pilot Station, including:

- ship's name, call sign, ship's agent;

- the ship's dimensions, including its length, beam, draught, and, if applicable, air draught, speed, and thruster(s);
- Expected date and time at the pilot boarding location
- destination, berth (if required, side alongside); and
- other necessary conditions and details

### **Check List of Items to be agreed between the Master and the Pilot Navigation Advice to Pilot**

- Vessel's heading, speed, RPM. (speed increasing/ decreasing)
- Distance off / bearing of nearest appropriate navigational aid / Landmark
- ETA at next course change position/Heading
- Point out converging and close by traffic
- Depth of water under the keel

### **Reach Agreement on Underway procedures**

- Man oeuvres for narrows, bends, turns, etc.
- Courses/ headings, distance off danger areas, maximum speed
- Restrictions: day versus night movement/ berthing
- Tide and current conditions not acceptable
- Minimum acceptable visibility at any point
- Use of anchor (planned, emergency)
- Man oeuvres not requiring tugs
- Man oeuvres requiring tugs
- Number of tugs required (and when)
- Source of tug securing lines: ship or tug



- Push / pull power of required tugs
- Communications procedure between vessel and tugs
- Placement of tugs alongside
- Crew standby requirement – number available and stations
- Expected time vessel has to arrive at berth/ turning basin at high / low/slack water- average speed to his positions

### **Common errors found in the Master – Pilot relationship**

The Transportation Safety Board of Canada study is where the information presented below is taken from. This information is provided to help the student understand what to do and what not to do while creating a master-pilot relationship that fits within the parameters of bridge team management.

- Misunderstanding between the pilot and master, inattention on the part of the pilot or the OOW, or a breakdown in communication between the pilot and the OOW were all prevalent in the 273 instances that were looked at.
- The vast majority of responding masters, bridge officers, and pilots agree that effective teamwork is just as crucial to safe navigation as technical skill.
- Recent events suggest that there are still issues with the effectiveness of bridge collaboration, such as the absence of a mutually agreed-upon passage strategy, a lack of communication, coordination, and cooperation within the bridge team, a lack of accurate progress monitoring by the OOW, etc.

- It is difficult to foster harmony in bridge teamwork when there are fundamental disparities between ship officers' and pilots' corporate attitudes on matters like the requirement for mandatory pilotage and restricted legal culpability for pilots.
- The crew on the bridge is reluctant to criticize a pilot's choice.
- Few pilots claim that they are always given the information on the vessel's maneuvering capabilities, despite the majority of masters and bridge officers who responded that they do.
- The majority of bridge officers and masters believe that pilots don't always give accurate, timely information on local conditions.
- Many masters and bridge officers reported that pilots do not always provide information to the master or the OOW regarding the passage plan.
- The effectiveness of hand-over briefings is another point of contention between pilots and masters; while most masters and OOW claim that they are informative, most pilots claim that they are not.
- Language issues "sometimes" impede good communication with the master and the OOW, according to the majority of pilots; they "often" do so, according to a few.
- The amount to which OOW monitor the vessel's progress is a point of contention between the bridge officers and the pilots, with the pilots expressing some displeasure with the level of help or oversight they receive from the bridge staff. Both

parties acknowledge that the pilots hardly ever help the OOW keep track of the movements of the vessel, nevertheless.

### **Small Adjustments between pilot and tug master**

The pilot may want to modify the tug's power in smaller steps at several points throughout the operation, particularly as the ship approaches the berth. At this point, they are seeking for finesse, so the pilot may ask the tug master for "a little more" or "a little less" power. It's crucial that the tug master makes the modifications carefully and smoothly. The pilot will be keeping an eye on how the ship moves in response, and they'll ask for more modifications as needed to get the intended result.

#### **Tug master**

The tug master is the person who is fully responsible for the tug from the moment he is on board The tug until the completion of the work and fasten it securely in the place designated for it Therefore, the captain of the tug must carry out this responsibility to the fullest extent on his unit and work for her safety and the safety of the staff working on her and not to expose them to any kind of danger either for the unit or for the crew

This following figure shows the relationship between the pilot and a tug master information and the risk factors that cause a problem during the pilotage operations from the researcher's point of view, and this is represented by the lack of knowledge of the pilot college about the possibilities of optimal use of the tug boat or the risks that affect the crew of the tug or the tug itself and the lack of

agreement on a plan Work that requires the application of safety standards for both parties may lead to a greater danger

The types and capacities of the tugs used in ports nowadays vary, and they primarily depend on the size of the ships and the port's exterior conditions (wind, waves, current and shallow water). According to several scholars, the following categories best describe the primary port risks: Poor ship and port staff knowledge and training, the human factor in general, poor port tug maintenance, poor inter-player communication during a ship's arrival or departure from the port, as well as during mooring operations (in the case that the ship's crew, port pilot, and tugs masters communicate in different languages), subpar or outdated tug equipment, a subpar safety culture, etc. This study intends to increase tug options and lower navigational risks in port locations because port tugs frequently have an impact on risk factors. Since the correct and proper use of port tugs might significantly improve the situation there, a decrease in dangers at ports is an important issue to resolve. According to Egyptian researchers, the risk factors and frequency at Egypt ports are presented in percentages in Figure 1 below .

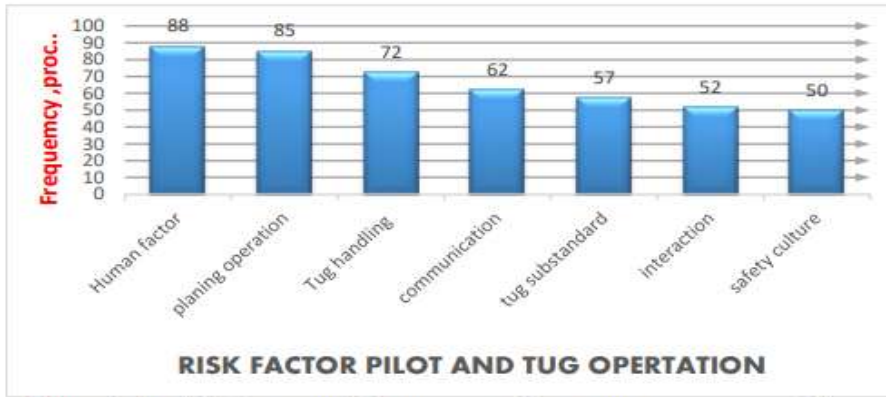


Figure 1 the risk factors and frequency at Egypt ports are presented in percentages.

The study's findings indicate that ship maneuvers are significantly influenced by the qualifications of port pilots, ship masters, and tug masters, which suggests that optimizing the usage of port tugs may be possible.

It is possible to talk about a variety of metrics taken throughout the case study analysis. Despite the small number, it nonetheless serves as a good representation of the established research topic. When performing maneuvering operations, operators behaved differently, which demonstrated that pilots and tug masters have varying levels of training. It should be mentioned that the research findings can be deemed satisfactory and enabled us to respond to the first research question, which was whether the optimization of the tug number and bollard pull at ports.

### **Human Reliability Assessment (HRA) techniques methods**

In the past few decades, there has been a change in how hazards connected to human error are identified and quantified in the maritime sector. Numerous strategies have been employed in recent studies to make it easier to identify human error and analyses human reliability. In the twenty-first century, HRA approaches have become a crucial study topic in safety-critical systems, and they have been widely used to address specific maritime safety challenges. HRA is a tool used to assess the complexity of human behavior, the trustworthiness of data relating to human variables, and the uncertainty of that data. It is recognized as one of the most significant strategies to enhance human. HRA has been in use since the beginning of the 1980s. It gained notoriety following the Three Mile Island disaster in 1979, which made the nuclear industry familiar with the technique, and it is now used in a variety of industries. The HRA seeks to evaluate human failure data and offers a sound approach for its collection, interpretation, and application, with the goal of improving human performance and reducing potential human errors within the system, including in the maritime sector, in a shipping company, or on board a ship In order to analyses the human contribution to risk, both qualitative and quantitative methods are used, where quantitative methods assist the acquisition of HEPs and qualitative methods identify probable human errors in an incident or accident. performance and to

explain how humans contribute to risk, which includes a number of techniques for locating the root causes of human errors and estimating the likelihood that they will occur.

The levels of power commonly used are Tug Power:

Depending on the role of the tug the power request is prefixed with either “lift” for pulling or “push” for pushing. For example:

“On the (tugs name) lift full” or “On the (tugs name) push half”

Reduction in Remaining Power Tugboat to retain the tug at the same relative position and angle to the ship, in addition to employing motor power to deliver the needed tow line weight, may be necessary. More power is required to achieve that hold the more headway there is, or the more tide and/or wind.

Full	100%Power
Three Quarters”	75% Power
Two Thirds”	66% Power
Half”	50% Power
One third	33% Power
One Quarter	25% Power
Minimum or easy or tight line	Line is just tight visibly or gear is simply just engaged when leaning on for a push.
No Weight” or “All Stop” or “All Easy	Line is visibly slack (not in the water) or tug is holding position/barely touching the ship side ready for a push.

**Source: By researcher.**

The previous literature review indicated that there is lack of knowledge about how to control risks in the maritime pilotage operations. Specifically, there is a lack of human related risk management framework in pilotage operations as a guidance or

foundation which would support decision makers in the achievement of efficient risk management.

### **8. Recommendations:**

shipping companies, may change their procedures and introduce strict conditions of skill verification during the employee hiring process and professional work, in pursuit of reducing the volume of tug capacity and emissions at seaports. These activities may affect the development of companies' navigational safety and environmental policy in order to decrease the costs of the operation of ships, as well as the volume of emissions. The achieved results also proved that the quality of maritime education is very important to ensure the necessary qualifications for ship operators. This justifies the need to increase the quality of professional education at universities, the theoretical knowledge and the number of practical hours on simulators among seafarers, which will enable an increase in their qualifications and attractiveness in the lab our market.

Many types of risk factors and alternatives existing in the pilotage operations, are not considered as they are less significant; nonetheless, they should be of concern. Therefore, it would be more comprehensive to consider all kinds of risks and mitigation measures in the structural model so that more complete results could be obtained.

For further research, researchers could make an electronic questionnaire to eliminate the potential risk during pilotage



operation and minimize the potentials for accidents during pilotage operations

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