



Enforcing Safety and Security in the Eastern Mediterranean : The Greek Effort to Implement Vessel Traffic Services

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Abstract

The Greek government has established the strategic vision of improving navigation safety by providing reliable Vessel Traffic Services (VTS) and monitoring the various high density traffic areas of the Hellenic Republic. Our analysis will present the current state of VTS operations in the Aegean Sea and evaluate the need for further improvements. The main conclusion is that the Hellenic VTS can provide a helping hand for seafarers only in a small number of choke-points and covers a rather limited area. Future expansion of the system in other busy locations is needed in the near future, with the port of Thessaloniki standing out.



Résumé

Le gouvernement grec a établi la vision stratégique consistant à améliorer la sécurité de la navigation en assurant des Services de trafic maritime (VTS) fiables et en surveillant les différentes zone de trafic à forte densité de la République hellénique. Notre analyse présentera la situation actuelle des opérations de VTS en mer Egée et évaluera la nécessité d'apporter des améliorations supplémentaires. La principale conclusion est que les VTS helléniques peuvent apporter une aide réelle aux marins uniquement dans un petit nombre de points critiques et qu'ils couvrent une zone relativement limitée. Il sera nécessaire, dans un avenir proche, de prévoir un futur élargissement du système dans d'autres lieux de forte activité, à l'exclusion du port de Thessalonique.



Resumen

El gobierno griego ha establecido la visión estratégica de mejorar la seguridad de la navegación proporcionando Servicios de Tráfico de Buques (VTS) fidedignos y controlando las varias zonas de tráfico de alta densidad de la República Helénica. Nuestro análisis presentará el estado actual de las operaciones de los VTS en el Mar Egeo y evaluará la necesidad de mejoras adicionales. La conclusión principal es que los VTS Helénicos pueden proporcionar una ayuda real a los navegantes sólo en un pequeño número de puntos críticos y cubren un área bastante limitada. Se requiere una expansión futura del sistema en otros lugares de gran actividad en un futuro próximo, excluyendo el Puerto de Tesalónica.

I. Introduction

Maritime accidents started with the very first human efforts to conquer and tame the seas and the oceans. For Greece the questions evolving around maritime accidents are of great importance given the fact that its commercial fleet constitutes today the largest maritime fleet in the world and the Greek Navy is becoming more global in its operations. In the 21st century, there is no comparison in the safety level of vessels when compared even with the very recent past. For instance, the widespread technological evolution mankind has experienced, has also helped naval architects to design modern vessels capable of remaining seaworthy in all sorts of dire situations -such as extreme weather conditions- that in the past would surely cause them to founder.

Electronics (and the introduction of the microprocessor), have made possible a great number of inventions that have been of great importance to all aspects of human endeavour. The field of navigation is not an exception (Tetley and Calcutt, 2001). Modern vessels are equipped with reliable electronic instruments and devices, while a plethora of electronic systems - with an enormous range of capabilities- are available to provide their services in all aspects of the intricate demands of the maritime profession. A considerable number of electronic means available nowadays serve the purpose of determining the position of a vessel at sea in an easy and precise manner, practically eliminating the possibility of error. In addition, ship's bridges -irrespective of size or mission are full of automatic devices and systems that greatly reduce any possibility that a technical error might lead to a maritime accident.

Furthermore, the technical infrastructure accommodating the needs of safe navigation has also improved on land. It includes, for instance, radar stations that allow the monitoring/guidance of ships as well as providing mandatory reporting and guidance systems for ships and interconnected databases. Vessel traffic services (VTS) are shorebased systems, which range from the provision of simple information messages to

ships, such as position of other traffic or meteorological hazard warnings, to extensive management of traffic within a port or waterway. The aim of our analysis is to briefly present the process of sea traffic administration by land stations. Simultaneously, we will focus upon the current state of Greek VTS operations and evaluate the need for further improvement.

Even though a considerable amount of time has passed since the first international rules of safe navigation and collision avoidance at sea were put into effect, and despite the fact that they have been constantly amended, revised and modernized, the dangers present at sea remain unchanged. Maritime accidents such as groundings or collisions still frequently make headline news, despite the fact that the existing means of avoidance today are present in every aspect of the maritime profession and far more reliable than they used to be (Pallikaris et al, 2008). Marine accidents have always occurred and may be expected to continue, but those involved in such activities need to exert every effort to ensure safer travel conditions, more effective operation of vessels and a minimization of casualties to personnel.

II. Maritime Accidents and Environmental Consequences

Due to the international and interconnected nature of the maritime economy any action taken towards improvement in all aspects of maritime activities is far more effective if taken collectively rather than individually. Coordination among all parties involved is needed. Since its inception, in 1959, the International Maritime Organization¹ (IMO) has exerted every effort to protect human life at sea, adopting practices that have been defined in the SOLAS convention (*Safety of Life at Sea*). A vessel's technological standing is in reality a key factor for the safety of navigation, since modern vessel design and equipment provide multiple safety levels; thus more than one factor have to be present for an accident to occur. Apart from SOLAS, IMO has also adopted additional measures concerning sea safety, either directly or indirectly. These include the Standards of

¹ IMO is a intergovernmental organization –under the aegis of the United Nations Organization (UN)- based in London, and is responsible for the accurate and effective communication/cooperation among its member-states in the field of navigation. The Maritime Safety Committee (MSC) of IMO is responsible for safe navigation. Chapter V (shipborne navigational equipment) of the SOLAS deals with the electronic equipment of vessels. The continuous review and improvement the treaty undergoes, covers a wide range of measures that have been designed especially for the improvement of security of navigation. IMO is taking advantage of any recent technological advancement to promote safe navigation, e.g. resolution A. 158 (ES. IV)-Recommendation on Port Advisory Systems which recognized the need for a VTS system.

Training, Certification and Watchkeeping (STCW). Conference on the education and certification of sailors/seamen and the code for High Speed Ships (HSC Code). The International Safety Management Code (better known as ISM Code) is one of the most useful tools for the improvement of the safety of vessels and one of the pillars of the so called “quality navigation” (Psaraftis, 2002).

In approaching the term “maritime accident” we could define it as an incident that occurs at sea and brings about damage or loss to the vessel or cargo or the environment or human beings and the shipmaster has an important share of this responsibility. The causes of maritime accidents are investigated by the flag state, irrespective of the location where the accident took place². In addition to the potential for loss of life, pollution, contamination and degradation are the most important threats facing the environment as a result of a maritime accident. As a result of the pressure exerted by public opinion and the action taken by environmental organizations, the most important legislation and regulations were adopted following important maritime accidents after concerted action by the IMO.

For instance, after the “Torrey Canyon” accident in 1967, the International Convention for the Safety of Life at Sea was enriched (SOLAS 1974) and the International Convention for the Prevention of Pollution from Ships (MARPOL 1973/78) were adopted. The accident of “Exxon Valdez” (1989) on the coast of Alaska –in which 36,000 tons of oil were spilt, resulted in the adoption of the International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC 90) in November 1990, while the US adopted a pioneering piece of

² In the case of Greece, there exists a legal provision for the “administrative examination of the maritime accident” that is distinguished in a preliminary examination, tactical examination and the forwarding of the relevant document to the Council for the Examination of Maritime Accidents (CEMA). The Coast Guard (CG), a body which administratively falls under the jurisdiction of the Ministry of Mercantile Marine, the Aegean and Island Policy (MMM) is obliged by law to examine any incident or accident that occurs to vessels flying the Greek flag. In addition, all incidents that take place within the Greek territorial waters are being dealt with in exactly the same fashion, irrespective of flag. The investigation process may be time consuming, as it entails sworn attestations by all parties involved in a given accident, even the potential use of experts for the clarification of

legislation, the Oil Pollution Act (OPA 90) that prohibits oil tankers without double hull/double Bottom from entering North American ports and establishes as legally binding the Unlimited Responsibility and the economic compensation of the injured party. The loss of ERIKA in 1999 – causing particularly high level of pollution and negative publicity- led to the adoption of two important legal initiatives on behalf of the European Union (EU), namely ERIKA I and ERIKA II (Psaraftis, 2003). The EU is currently debating further policies in the same direction; the ERIKA III package of regulations is under evaluation³.

III. The International Framework for the Management of Sea Traffic

The structure of the organizational framework that governs the use of new technologies in the provision of modern day navigational services was developed during the previous decade. In 1997 IMO’s Maritime Safety Committee adopted new standards for Vessel Traffic Services (VTS) that are included in chapter 5 of SOLAS for the establishment of VTS in the area of responsibility of the IMO member states. At a later date, IMO and the International Association of Lighthouses Authorities (IALA) issued recommendations for the implementation, operation and personnel training employed by the VTS. Additionally Regulation 2002/59/EC of August 27, 2002 of the European Parliament and Council, establishes the legal basis for a monitoring and information system for vessel traffic and describes the framework for the support of navigation by coastal control stations, aimed at the optimization of sea transportation. In particular, a framework of interventionism with navigation is created, because according to the regulators:

technical issues and the drafting of a report that does not only simply offer the Ministry’s official view in describing the actual facts, but also imputes responsibilities to the party responsible for the accident according to the aforementioned process. The council in question expresses its opinion on any disciplinary responsibilities –in case there are no penal ones- and the case takes its course to the Penal Courthouse of the place of the vessel’s registration or the place where the company, that is responsible for its management, seats.

³ For extensive details see also: http://ec.europa.eu/transport/maritime/safety/doc/package3/memo/2007_03_memo_maritime_safety_en.pdf

Management of the vessels' traffic and the adoption of rules for mutual sharing of information contributes to the prevention of accidents and pollution and to the minimization of the consequences towards the marine and coastal environment, the economy and the health of the regional communities.

In order to ensure the freedom of navigation, the Vessel Traffic Services (VTS) is developed, only in areas of special interest. The VTS centre has the task of communicating directly and interacting with the vessels that pass through its area of responsibility, providing solutions to any safety problems that might arise. The installation of VTS centres is normally the responsibility of the Sea Port Authorities of a given country, which are charged with the task of overseeing the implementation of the regulations of maritime traffic, in a manner parallel to that of air traffic controllers. In detail, these centres are responsible for the provision of:

- *Information Services.* The provision of information of maritime interest. The relevant information provided primarily relates to the positioning of another vessel, the identity of a certain vessel, a sudden change in the destination or the planning of a trip, weather and sea conditions . Additionally, the centre can interact with a specific vessel in order to clarify any omissions in the data provided in advance by the ship's owner or the ship master.
- *Provision of Maritime Assistance Services,* the provision of services of importance in cases of adverse weather conditions, navigational difficulties, or malfunction of vessel equipment, under the precondition that the centre will at all times oversee the operations so that it can be in a position to assist the vessel's master in making the correct decision.
- *Traffic Organization Services,* the operational management of traffic, priority of passage or access to ports or zones and the overall planning for the movement of vessels, with the aim of reducing traffic congestion.

The effectiveness of any external intervention to the management of maritime traffic, and especially in the management of the access of

vessels to ports, depends on the information provided by the owner of the ship, which has to be submitted in sufficient time before the vessel's arrival to the port. It may be noted that during a vessel's transit through a VTS area, the vessel is obliged to abide by the rules and regulations as well as any special regulations promulgated by the relevant port authorities, maintain open frequencies for radio contact and report any deviation from the agreed course. The reporting of passing vessels has to be submitted to a VTS centre, it is distinguished in the initial reporting, the entry/departure reporting, the final reporting, the intermediate reporting, the corrective and finally extraordinary reporting. The initial reporting, for example, is made 15 minutes before a vessel's entry to a VTS area and not earlier than 30 minutes before entry and it includes besides information on the vessel's identity and destination, information on the type of cargo – especially when the vessel is carrying hazardous cargo- and the quality and quantity of fuel or any oil residues. Information on matters such as the type of cargo of the cargo in a vessel that passes through a coastal area is of particular importance to the coordination and the successful implementation of a salvage operation or a spill response.

IV. Analyzing the Greek Effort in Sea Traffic Management

A considerable proportion of the world's energy resources –mainly oil and natural gas passes through the Mediterranean (Dalaklis and Siousiouras, 2006) and also through the Aegean Sea. It is from this particular maritime area – either by oil tankers or through a combination of pipelines and medium or large tankers- that the entire trade of energy resources coming from the Caspian Sea and Russia is being transported. This trend is expected to continue to grow after the completion of the Burgas-Alexandroupoli pipeline. Greece's National Vessel Traffic Management and Information System (VTMIS) constitutes an integrated system for the electronic control of sea traffic, built initially to provide VTS to a particular area within Greece's territorial waters, with the aim of improving sea traffic and protection of the marine environment. The Ministry of Mercantile Marine (MMM), in the context of a modernization policy that is under way, promotes the development of an integrated electronic informational system for the control of maritime traffic, which in it full

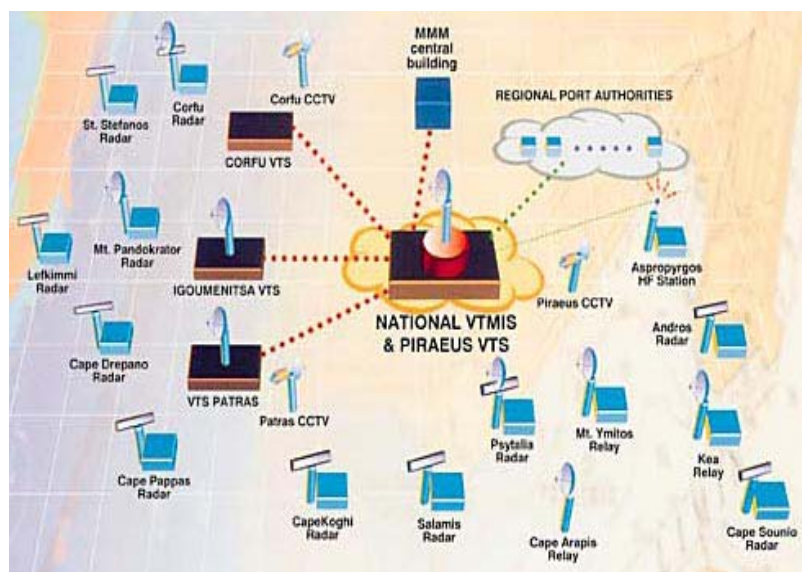


Figure 1: Configuration of the Greek VTMIS, source: Ministry of Mercantile Marine

implementation, will cover the wider Piraeus sea region as well as particular areas of the Ionian Sea, Eastern Aegean and the Cretan Sea.

The INTRACOM Company signed an agreement with the Ministry of Mercantile Marine for the provision of the VTMIS in 1999, following an international competition conducted during 1998. The VTS that have already been deployed in the ports of Piraeus, Patras, Igoumenitsa and Corfu are linked with the National VTMIS centre which is located in Piraeus and is capable of controlling the local centres. The system's objectives are analyzed below:

- Facilitation of sea traffic, since it is in a position to process all available information on ports and ships and to contribute to the organization of the flow of traffic, the optimum use of docking facilities, the organization of loading–unloading process etc.
- Reduction of marine accidents, due to the capability of traffic monitoring provided by the system and the automated signaling warning/alarm system in case of reckless vessel handling, speed limit violation, entry to forbidden areas etc.
- Improved search and rescue services due to the intercommunication with the Operations Control Area.

- Protection of the marine environment, with the use of trace-back, since the movement of vessels is being recorded electronically so that the capability of retrieving evidence following the tracing of vessel movement in case or marine pollution is made possible.
- Implementation of the National and International Marine legislation.
- Development of the efficiency of sea transport.

All the information and the overall picture of navigational movement that are collected and processed in the local VTS centres are being transmitted to the VTMIS Centre. While the role of the VTS Centres is mainly operational, the VTMIS Centre retains a mostly administrative role. The National VTMIS Centre, receives data from the local VTS centres, proceeds with processing the piece of information receive and distributed the output to the interested parties. All standard services provided by the system, such as the management of sea traffic, the monitoring of traffic through radars and cameras and the voice recordings are all synchronized to a common date and time in order to provide a unified picture of all relevant activities. The VTMIS centre plays an executive role and serves as a valuable tool for the analysis ad traffic data and the overall strategic planning. At the same time it constitutes the main interlocutor with other relevant centers

developed in other EU countries or the relevant national centers responsible for receiving/forwarding of data.

The overall system provides advantages that elevate the role Greece plays above the regional scale and contributes to the effective protection of the Greek Seas, with change for policy-makers from suppression to prevention. The renewed policy of the MMM achieves the following:

- The creation of a system of mandatory briefing, through which the Greek authorities will be in a position to access all relevant information regarding the movement of vessels that are loaded with hazardous or pollutant agents and pass through the Greek territorial waters and those of the EU member-states and the exact nature of their cargo.
- The exact knowledge of hazardous ship cargo, of information that has to do with security, as well as that on navigation, which constitutes the main elements for the preparation and the effectiveness of pollution-fighting operations.
- The prevention of accidents and marine pollution and the elimination of the effects on the marine and coastal environment, the economy and the health level of the local communities.
- The monitoring of vessels that present potential risks -due to misbehavior or deteriorated situation- to the security of navigation and the environment.

The implementation of the programme will take place incrementally in two separate stages. The

first phase of the development of the system has already been successful and the necessary establishments are already operational. This applies to the VTS in Piraeus and the VTMISS Centre in which the following took place:

- The VTS Centre is situated in a room at the CG HQ Buildings.
- The development of (1) a station of sensors in the NW region of Psitalia island, and the consequent allocation of another four (4) sensor stations in the regions of Megali Kira, Amphiali, Tournlou of Aegina island, Paoura of Kea island and Fassa of Andros island.
- The installation of numerous CCTV cameras providing full coverage of the Port of Piraeus (both sea and land areas).
- The interconnection of these sensor stations and the CCTV cameras with the VTS Centre through the use of digital microwave radio connections, so that they can be controlled from a distance without the engagement of in site permanent personnel.
- Development of two overlapping departments within the VTMISS Centre (This approach permits continuous 24 hour operations).

The second phase of the system's installation has to do with the development of a VTS Centre at the port of Rafina (currently fully operational) and a remote terminal station in Lavrio with sensor stations at the area of the port of Lavrio and at Vigla of the island of Evia. Installations in the areas of Patras Bay and the Ionian Sea have already been completed.

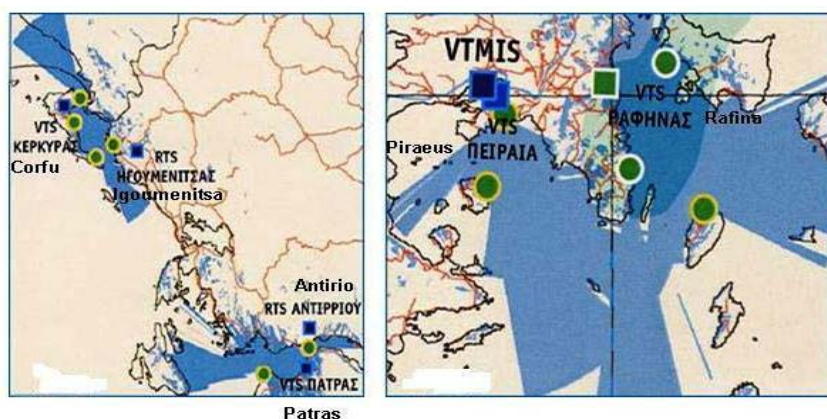


Figure 2: First phase and the stages for expansion of the Greek VTS system, source: Ministry of Mercantile Marine

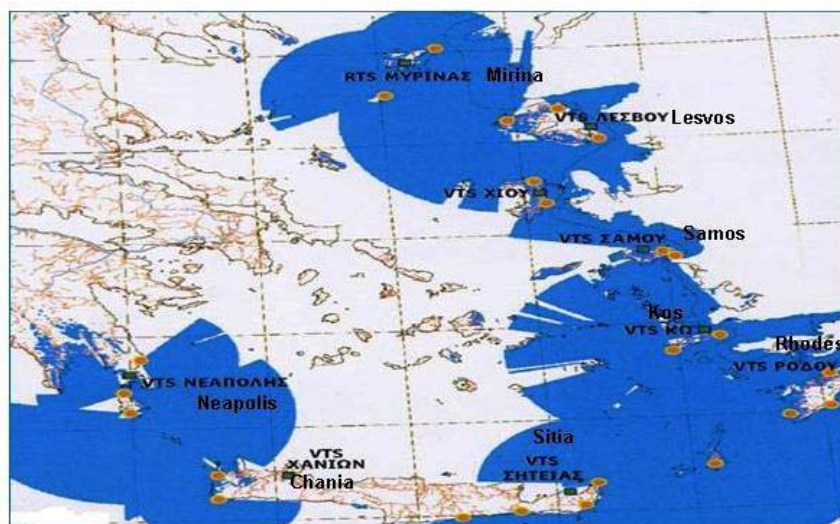


Figure 3: The future expansions of the Greek VTS system, source Ministry of Mercantile Marine

Finally, the next phase for the implementation of the project, that was announced in April 2006 (and was initially scheduled to be delivered after 21 months), involves the development of two (2) VTS for the coverage of the areas of Hania and Sitia with two respective centres as well as their incorporation to the already existing VTMISS Centre in Piraeus, which however, presents a slight delay. The infrastructure in Eastern Aegean is well behind the original schedule and intensive efforts are needed to regain track.

VI. Conclusions

Nearly four fifths of international trade is being conducted by sea. The configuration of the Earth facilitates sea transport since three quarters of the planet's surface is covered by sea or lakes⁴. Due to the availability of commercial vessels massive transport of goods in a society that is subject to increased levels of consumption in goods and raw material is made technically and financially possible. Several problems that can be encountered in short-distance navigation, in ocean-going navigation and also in passenger and tourist navigation, one must consider the potential for maritime accidents, sea and coastal pollution and the congestion of marine waterways, especially in areas that present the greatest demand for access.

⁴ With the exception of the North and South poles, the transport of passengers and goods by sea-going vessels is possible to and from any part of the world. This fact by itself constitutes a comparative advantage for sea transport against air or land transport.

⁵ Under the auspices of the IMO a whole series of measures have been introduced, in the form of conventions, recommendations and other instruments. The best known and most important of

Contemporary technology advancements have a very positive outcome upon improvements to navigation safety. Today, a maritime accident might not involve a human casualty; however it is always associated with extremely negative results towards the environment and significant financial losses. Even in the digital era of the 21st century, naval accidents still remain a grave concern both for military and civilian fleets around the globe. Numerous mishaps at sea appear quite often in the news and the negative views of the public create pressure for action by all parties involved in the safe conduct of navigation. All available means to prevent a casualty of a vessel should be used; enforcing appropriate policies to regulate high density traffic deems necessary.

Greece retains one of the leading places in international merchant navigation, and the consequent contribution in the Greek economy. For Greece the reciprocal relations between commercial navigation and national economy, constitute vessels as the fundamental factor and the means of development that are beyond the boundaries of the transport sector. Undoubtedly, transportation by sea constitutes a globalised industry that is regulated by the IMO conventions and a legal framework that is subject to constant change and development at the international level⁵. By placing emphasis on the security of

these measures are conventions, three of which are particularly relevant to navigation. These are the International Convention for the Safety of Life at Sea, 1974 (SOLAS); the Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREG); and the International Convention on Standards of Training, Certification and Watch keeping for Seafarers, 1978 (STCW). See also

http://www.imo.org/Safety/mainframe.asp?topic_id=59

navigation and taking advantage of the radical technological improvements the IMO has actively promoted the adoption of new technologies in order to avoid marine accidents as well as the overall support of the tasks shipmasters and navigators have to successfully accomplish.

The rapid technological developments –in combination with the acute economic competition- has created a new reality on the eve of the 21st century, according to which the management of information plays a dominant role, so that sea transport can be implemented with safety. As the conditions that the modern mariner has to tackle become more multifaceted and demanding, the provision of any aid is welcome in order to minimize the risk of marine accidents. VTS overall objectives are to enhance navigational safety and security and promote marine environment protection. Recognizing the need to make the work load of the bridge officer easier, resorting to technological systems of increased capabilities seems as the right solution. Marine accidents have always happened and will continue to do so. The crews and all the competent bodies that regulate the international, regional or local navigation have to exert every effort in order to improve and guarantee better conditions of travel and more effective vessel operation having as an ulterior aim to safeguard human life, both those of passengers and those of seamen.

The Greek system for the management of sea traffic undoubtedly presents a series of advantages for the country, but so far covers only the wider Piraeus area and the vicinity of Rafina as well as a small part of the Ionian Sea (the Igoumenitsa-Corfu Straits, the region of the Bay of Patras and Rio-Antirio). The immediate completion -without any further delay- of all relevant installations that were included in the initial design is deemed necessary. At the same time, a future expansion is also considered of critical importance, especially in the cases of the busy port of Thessaloniki, where there are frequent problems in the traffic of the nearby sea area, but also in the port of Alexandroupoli, where the development of the new oil pipeline creates the need for the docking of oil tankers in the near future. VTS can contribute significantly to the avoidance of marine accidents, by reducing the work load of bridge officers and by providing a completely integrated picture of vessel traffic. Any assistance that can be provided by land installations to sea traffic –even though it may be

judged by some that it reduces the freedom of navigation- should be welcomed by all crews, as it can lead to the long-wished-for avoidance of all unpleasant situations of any kind.

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