

# MARITIME TRANSPORT MANAGEMENT FOR THE PURPOSE OF EFFICIENCY AND SAFETY OF SHIPPING SERVICES

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## ABSTRACT

Maritime transport is an important factor of economic development of every maritime country. Its basic task is providing shipping services, meaning that they may as well be considered as the product of the shipping economic activity.

Regarding the current marine shipping crisis, the key to success of every shipping organization, region and maritime country lies in efficiency and safety of its maritime shipping services. These are determined by the high-quality management of maritime shipping as one of the subsystem of transport as a whole. Therefore, there is a strong connection between the management system and provision of shipping services. This connection is based on interaction of all subject participating in provision of shipping services, including: vessels, shipping companies, ports, charterers, ship brokers, port authorities, pilots, etc., since they all together constitute the integrated maritime transport system.

Nowdays, severe competition between shipping companies in the world shipping market makes shipping services a key to their existence and future development. Special emphasis should be placed on service safety and safe navigation in general and good management of the same, resulting in considerable reduction of the number of maritime accidents in recent years, protection of human lives and preservation of marine natural resources.

## 1 INTRODUCTION

Contemporary maritime transport researches require a constant support of scientific achievements which have been based on both day-to-day practical problem solving in the field of maritime transport and rapid technical and technological development of modern seaborne transportation of goods. Therefore, an efficiently planned, organized and controlled system of maritime transport is a fundamental factor determining the quality, safety and efficiency of its maritime transport services. On the other hand, maritime shipping business is an important factor in economic development and economic system of every maritime country. It is a complex stochastic system which includes a quality operation and interaction of all other entities or subsystems of maritime transport.

Moreover, in the current crisis of maritime shipping business extremely important should be modern and logistic approach and organization concept, management, control and supervision in the implementation of shipping services, which are based on legal regulations adopted by the legislatures of individual states and international maritime organizations, as well as on the optimal strategies of shipping organizations and ports.

Generally, shipping represents one of the most internationalized activities in the global industry. Therefore, maritime transport is expected to have a high level of efficiency and quality, because of the fact that the transport is facilitated by sea which is rich in natural ecosystems. Consequently, shipping today cannot be approached only from a narrow national perspective, but from a wider aspect of the world development and international trade perspective. We have recently witnessed that shipping and overseas trade enabled the

integration of relatively isolated areas of the world into global community and economy. For example, China and India have been rapidly expanding the export of their goods and products in the past few years which on the other hand, in 2004 resulted in a global shortage of ships tonnage for cargo transport. To sum up, the quality management of maritime transportation at shipping company level, region and maritime country level in general is an important prerequisite for economic development.

## 2 SYSTEMATIC ASPECT OF MARITIME TRANSPORTATION

The era of rapid economic and technical-technological development of modern production requires a well-organized and above all, a safe transport system. The study of traffic as a whole involves the study of individual types and systems, especially of its most important part: maritime transport system.

Maritime transport, therefore, involves transport of passengers and/or goods by sea, which is often called shipping trade (seaborne), which can be passenger and cargo shipping. Theoretically speaking, cargo shipping is a very broad term assuming various modes of employment of cargo ships, so there are a few types accordingly - tramp, liner and specialized shipping. Each of these types of cargo shipping operates in accordance with their operational processes and control procedures, which are managed and controlled by quality management of shipping companies, and supervised by the competent state institutions and international organizations for control of maritime navigation.

Maritime transport involves the physical transport of cargoes from an area of supply to an area of demand for certain types of goods, together with all the activities required to support and facilitate such transport. Maritime transport system includes three essential components important for the movement of goods, and they are as follows:

- Fixed infrastructure such as ports or terminals
- Means of transportation such as ships and barges
- Organizational system necessary to ensure that ships and fixed infrastructure are used effectively and efficiently

However, the realization of shipping services involves a number of commercial activities, the existence of appropriate infrastructure, procedures for shipping operations, organizational management systems such as enterprise resource planning or information system which integrates all operations and applications within a shipping company or organization. The efficiency of shipping services is determined by the ratio of supply and demand on the shipping market, and managerial maritime transport uses market mechanisms in the regulations of supply and demand relationship. For example, in the past few decades there were several cases when shipping services demand grew, stagnated and declined. Figure 1 shows the five key factors of maritime transport influencing the realization of shipping services.

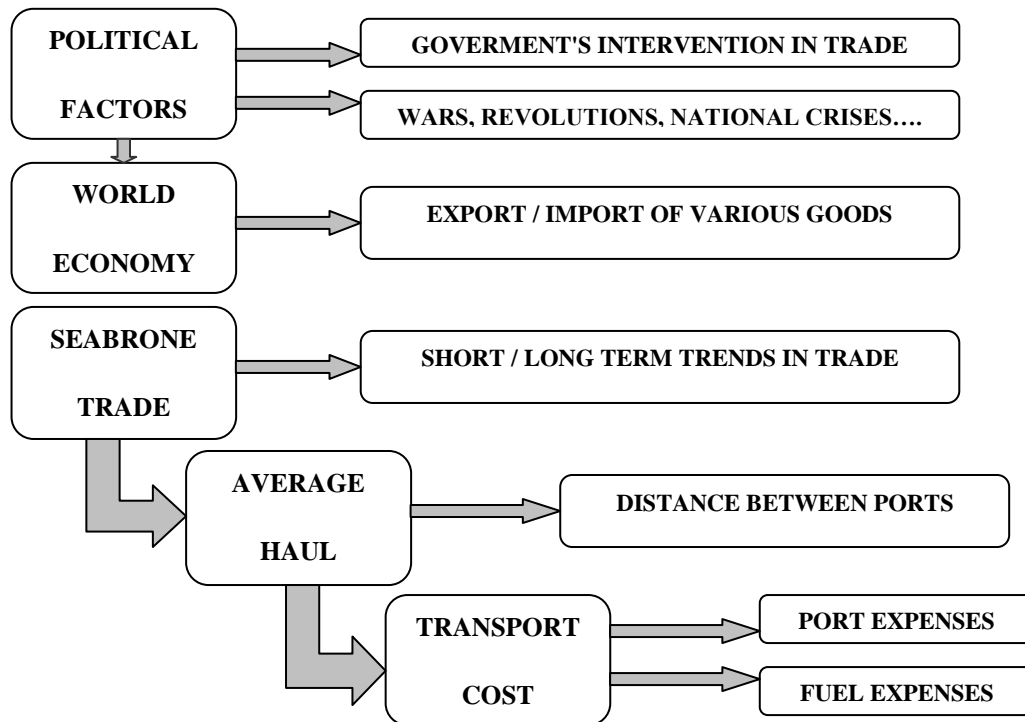


Figure 1: Determinants of demand for sea transport [1]

## 2.1 Elements and processes within maritime transportation system

Maritime transport system can be viewed as a complex stochastic system based on interaction and management of its subsystems - ships, ports and cargoes (Figure 2). The process of managing the system of maritime transport makes a set of procedures affecting the system and its subsystems in order to accomplish tasks and goals set. The goals of the system in operational terms are implemented through the flow of information regulating the quality and safe movement of ships and cargoes through the ports and seaborne routes.

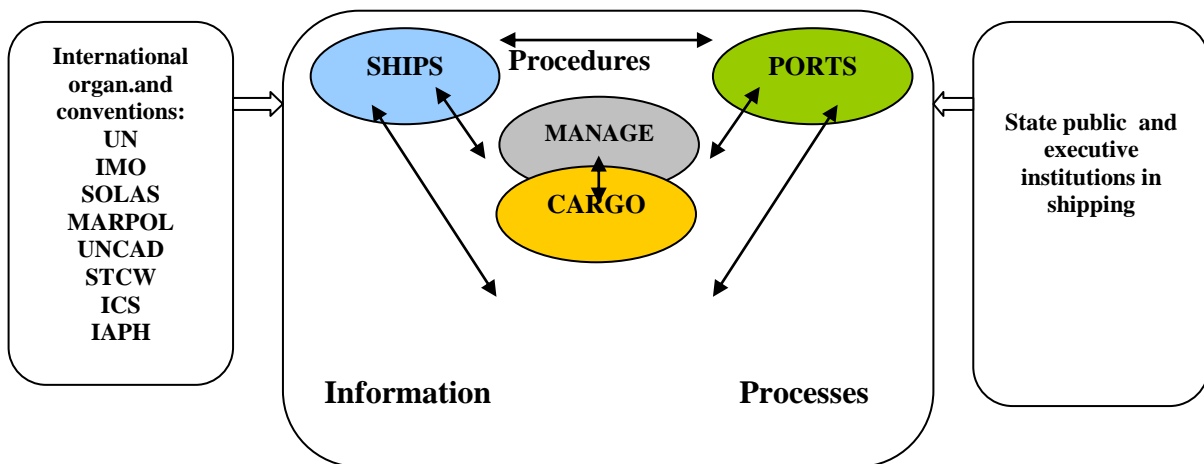


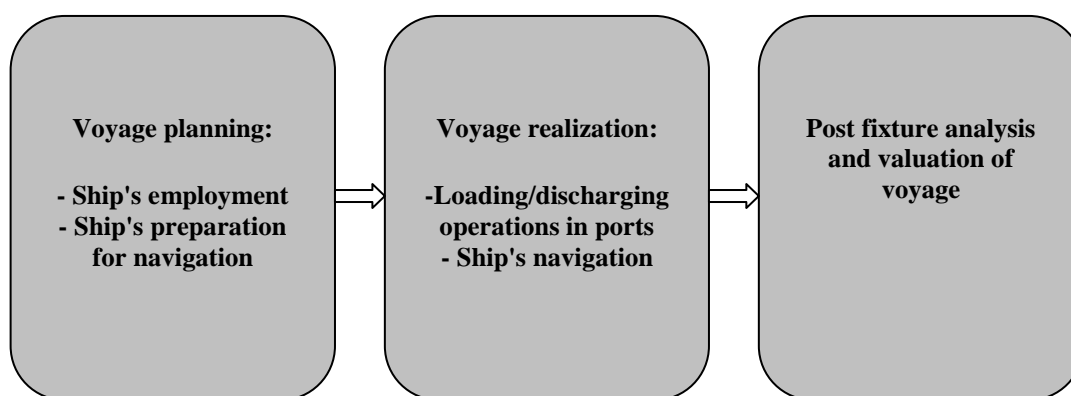
Figure 2: Model of maritime transport with its main elements

The processes occurring within maritime transport system are based on continuous flow of information and refer at the same time on both their control and management in order to achieve optimum performance of shipping services. By managing the processes within the maritime transportation system the performances are coordinated in a way that provide the quality, efficiency, speed, reliability and security of shipping services at all times.

The processes interrelated within the elements of maritime transportation system can be divided into several cycles, which correspond to the phases of a ship voyage from port A to port B.

These stages are as follows (Figure 3):

- The first phase is planning the voyage and includes commercial aspects of the ships employment whether they are liners or employed upon time charter, voyage charter or bareboat charter. Important factors determining this phase are distances between ports, types of cargoes, freight or liner rates, fuel price and port costs.
- The second phase is the realization of the voyage, which includes navigation towards the port of embarkation, cargo loading process, seaborne navigation towards the port of debarkation and cargo unloading process. In this phase the efficient management is essential for the final result of the voyage or post fixture analysis, but it also implies good knowledge of all relevant factors affecting the realization of the voyage. These may be the factors in ports such as: speed of port operations, development of port infrastructure, port congestion, etc. cargo factors or the complexity and treatment of certain types of cargoes during seaborne transport. The realization phase of the voyage includes permanent managerial control as viewed through efficiency and safety of shipping services, which has been regulated by the application of quality system in shipping business and requirements of ISM Code.
- The third phase is analytical and involves research and analysis of all aspects of the voyage (*post fixture analysis*). In this phase, the financial results of the voyage are analyzed, errors are determined, positive and negative effects of one navigation performance are summed up. The above phase is essential for future decisions of management staff, as well as for making preventive and corrective activities in order to enhance and improve overall process of maritime transport.



**Figure 3: The phases of the realization of shipping services within maritime transportation system**

Managing the above phases that occur within maritime transport system is an essential prerequisite of ships voyage optimization, loading-unloading operations in ports and ship maintenance. All this affects optimal shipping services that will satisfy at the same time the interests of customers and transportation clients, and bring positive financial result to a shipping company as well.

As shipping services stand for economic products of shipping business, their quality management involves knowledge about the economic situation and economic laws on the global market. For example, economic indicators such as world output growth and trade volume play a decisive role on shipping services market. Generally speaking, there is positive relationship between growth in world output and growth in world trade. Figure 4 presents the

relationship between growth in GDP (gross domestic product) and trade volume from 2002 to 2007. The figure indicates a positive relationship between growth in seaborne trade and world output growth. A decrease in world output growth led to decrease in both export and imports. On the other hand, an increase in world output growth triggered demand for both export and imports [1].

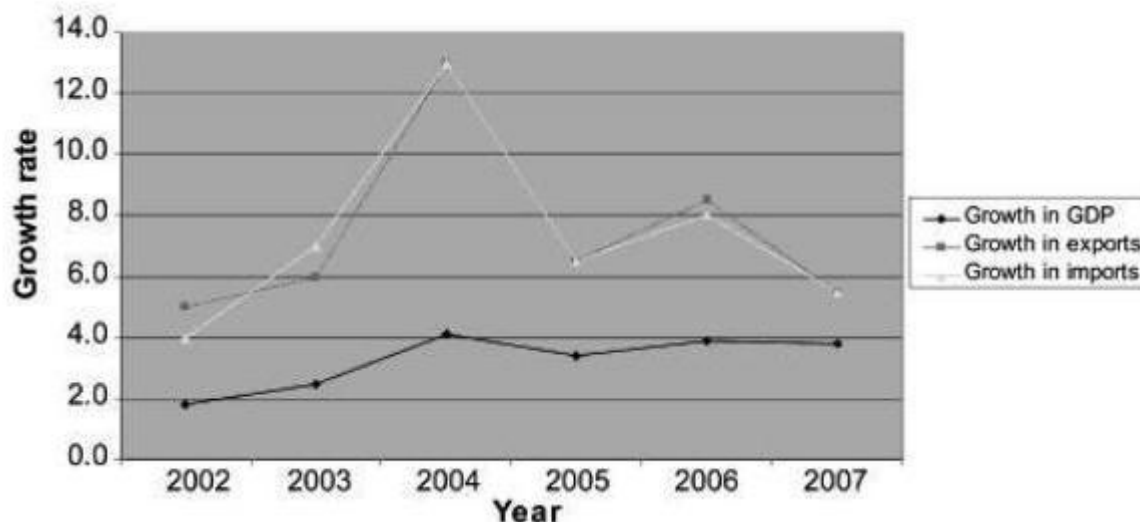


Figure 4 : Growth rate of world output and world trade; Source UNCTAD 2008 [1]

### 3 EFFICIENCY AND QUALITY OF SHIPPING SERVICES

Maritime transport naturally represents service industry which should be able to provide quality service to passengers and goods, and moreover, it should stand for the basis of every shipping company on a competitive and variable shipping market. Therefore, the quality, efficiency and safety are the most important factors in terms of maritime transport.

On the other hand, maritime transport is characterized by the following: need for activity and reliability, impact on the global economic system, extremely high value of the property and possible damage to transportation of people and/or cargo. Moreover, the ships in shipping trade are somewhat exposed to maritime accidents risks caused by human factor, technical failures, cargo damage etc. This means that a high-quality shipping service other than reliability and maximum speed of the realization should provide a certain degree of prevention and protection from maritime accidents risks. Quality shipping services can be viewed through several dimensions [2]:

- *Reliability* - ability to realize the agreed service responsibly, accurately and according to professional standards. This is an important requirement especially for users of service liners for cargoes that have already been sold and which have been issued guarantees and imported licenses for. Hence, it is very important to deliver the goods on time and in a good condition, so the operator is required to precisely determine navigation schedule and special attention needs to be given while loading and unloading passengers and cargo.
- *Frequency* - This factor increases possibility that the goods can be sold in smaller quantities in shorter delivery intervals.
- *Speed* - an important factor for users of shipping services or transportation clients who want to sell their goods on a particular market adhering to set dates of ships arrival in ports of debarkation.
- *Price* - maritime transport price differs in liner and tramp shipping. Liner shipping industry uses set and published tariff rates fixed on liner conferences but

tramp shipping providers and service users negotiate with each other on freight rates. These rates are influenced by supply and demand for shipping space on freight market, fuel prices, economies of individual countries, movement of goods and cargo flows, political situation in individual countries and on particular markets.

- *Confidence* - knowledge, professionalism and courtesy of maritime and administrative staff and their ability to provide security and confidence
- *Perceptibility* - ongoing maintenance and modernization of the ships fleet, ship's plants, navigation and communication equipment, professional training and continuous training development of personnel on ships and in shipping companies
- *Affability* - individualized attention given to clients
- *Identification* - willingness to help out clients with a quick and prompt service

#### 4 QUALITY AND SAFETY SHIPPING SERVICES MANAGEMENT

Quality management is a process which identifies and manages the activities necessary to achieve quality goals in an organization or a system. Quality management system is now used worldwide in all industries, and certification of such system is entirely accepted way of proving to current and potential partners that the product or service will satisfy his or her demands in terms of quality.

Quality management encompasses the basic processes within an organization or a system (sales of goods or services, development, procurement, production/service delivery, improvement ...) providing the following activities to manage these processes in supervised and controlled conditions:

- Describing the process (input/output, process flow, responsibilities)
- Goal setting process based on input data and information
- Measuring and monitoring processes through key indicators
- Data analysis and reporting on the process success
- Process improvement

A well developed and maintained system of quality management in service industries such as maritime transport has positive contribution in achievement of business objectives, which greatly improves the following:

- Satisfaction and confidence of clients – clients' loyalty, more efficient business relations and cooperation, prompt responses to market opportunities, etc.
- Overall results and abilities - quality of service and working effectiveness, fewer failures, mistakes and risk situations, lower costs, more accurate dates of cargo delivery, etc.

The main reason for introducing quality system in shipping is to minimize maritime accidents risk. International Maritime Organization IMO monitors systematically maritime accidents and ships losses by collecting data about the procedure from members. At the beginning of 90ies it was believed that about 80% of world maritime accidents and incidents were due to human factor. However, more accurate analysis of the causes of maritime accidents in the period 1981 – 1998 shows that the share of human errors and organization of work on board is about 60% [4].

At the General Assembly in 1989, IMO adopted the IMO Resolution A.647 (16), i.e. the Decision on the establishment of quality system in maritime shipping, which was introduced by the changes and amendments of the SOLAS 74 Convention from 1995. In the following years introducing quality management system in all aspects of maritime shipping and shipping organizations was obligatory, which had a positive impact on the quality and safety of shipping services. So with the decision on the establishment of the quality system in

shipping, the IMO introduced a certified management quality system: ISO 9001, ISO 17 021, QSCS standard.

ISO 9001 is the most widely used international standard that covers organizations of all types, sizes and areas of activity and which became involved in all branches of maritime activities. Shipping company under the establishment of ISO 9001 directly controls and improves the quality of shipping services. That control covers all aspects of the company and ships and is based on identifying problems, defining problems, education, prevention, implementation of procedures, preparing documentation, internal estimates, elimination of noncompliance, improvement of overall system quality on entire satisfaction of clients and service users.

In July of 1998 the International Management Safety Code for secure performance of ships and pollution prevention (ISM Code) was introduced and adopted by the International Maritime Organization IMO Resolution A.741 (18). ISM Code is primarily aimed at ensuring safety at sea, protecting human lives, preventing environmental pollution, especially pollution of the sea and sea bottom. Implementation of the ISM Code together with its maintenance and improvement make an integral part of management of each shipping company.

The task of each shipping company in the ISM Code is to establish clear procedures, plans and guidelines for important activities on board related to safety and prevention of marine and environment pollution. The company management must also ensure that all acts intended for safety are carried out under the supervision of Safety Management System. Particularly important task of shipping company and its management is to determine the appropriate procedures as regards the critical situations on board. Such cases must be well analyzed and documented. Down below are examples of critical operations on board [8]:

- Navigation in conditions of dense fog and low visibility
- Operations that may cause sudden loss of maneuverability of the ship
- Operations in harsh weather conditions
- Handling and stowage of dangerous goods and toxic substances
- Loading fuel on board
- Operations of loading / unloading gas and chemical on tankers
- Critical situations in the ship's operating complex

Consequently, a shipping company must involve a risk managing segment in its management thus ensuring a higher quality level of maritime transport services.

In accordance with the implementation of quality systems and ISM code in maritime shipping, the management of maritime transport is carried out through all aspects of maritime policy such as [4]:

- *Shipping companies* carry out quality management system and safety standards through ISO and ISM Code implementation
- *Ports* introduced the ISO 9001 during 2004 in order to control the quality and safety of loading / unloading operations
- *Classification Societies* started in 1995 with the introduction of management systems such as ISO 9001, ISO 17 021, QSCS.
- *Facilities for seafarers' training* introduced quality management system ISO 9001 in 2000
- *Maritime Administration* of the Member States of the IMO has introduced quality management system since 2005. Pursuant to the provisions of the Paris Memorandum of 1982, Maritime Administration implemented maritime transport control system and inspection of ships (Port State Control) - they follow technical standards and make estimates of management systems on ships. On the other hand, via performances and VTS services, Maritime Administration carries out

monitoring, supervision and organization of maritime navigation, collect data on marine facilities and traffic, provide information support and navigational advice to maritime facilities and monitor the application of maritime regulations related to maritime transport.

According to authors Šundrica, J., Roje, D., Vulić, N., who used statistic data from publications “World fleet statistics”[5], “World casualties statistics”[6] and “Annual report 2008/2009” of Croatian Register of Shipping [7], figure 5 shows the importance of application of quality and safety in maritime transport, introduction of ISO standards and ISM Code and a significant role in reduction of maritime accidents the world. [4-7].

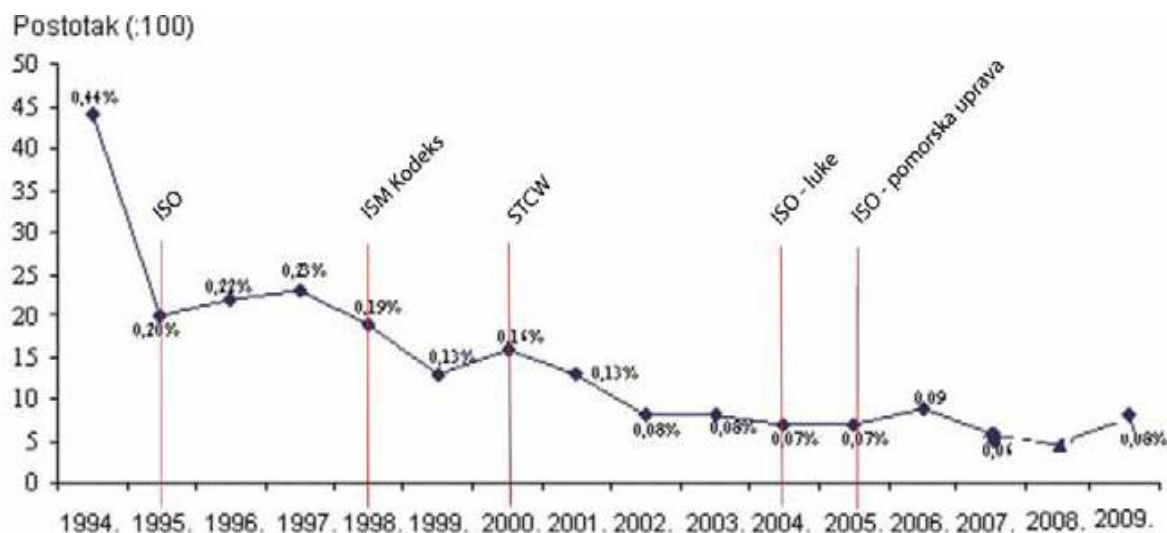


Figure 5: The implementation influence of ISO standard and ISM Code on reduction of maritime accidents at sea [4-7]

## 5 CONCLUSION

Maritime transport is an economic activity exposed to strong competition, which is constantly forcing shipping companies to improve their services, and develop and modernize their fleet. In doing so, a clear strategy within the shipping company system and a system of a maritime country, based on the functional management and logistic concept should give the best results as regards the efficiency and safety of its services. In other words, the quality and safety are fundamental requirements maritime shipping users.

The manner of organization, management, operational structure and activities within the maritime transport system, either at shipping company level, a region or an individual maritime country level, ultimate goal is having impact on the quality of maritime transport services. A stable and a well-organized system of maritime transport should set a clear vision and economic objectives, should be familiar with the work processes and tasks within the overall system and subsystems of ships, it should determine precise processes and procedures in accordance with international conventions and laws of maritime countries, in order to carry out tasks effectively on entire satisfaction of users. One of the most important features of maritime transport as a complex system is its flexibility to adapt to new conditions of the maritime market, which especially in this moment of global economic crisis and intense competition requires fast, safe, quality and efficient transportation service. By implementing ISO 9001 quality system as the widest used international standard and by introducing ISM code into maritime transport, the risk from maritime accidents has been minimized and prevented, and in this way, a high level of quality and safety of shipping services is achieved. Moreover, the sea as a natural ecosystem serves as a basic and inexhaustible resource in



permanent process of production growth and consumption of goods and services. Thus, rational and appropriate management of quality and shipping services safety gets a whole new dimension in global transport system.

### ACKNOWLEDGEMENT

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