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SAFETY PROBLEM - A FACTOR IN SUCCESSFUL FUNCTIONING OF THE SHIPPING INDUSTRY

SUMMARY

Continual growth of world maritime trade involves the growth of world shipping-industry capacities. This growth implies not only bigger ships and greater overall capacities, but also some technical and technological changes that include new ships, specialisation and development of new technologies within the maritime traffic.

Due to complex navigation conditions, newer and more expensive ships that represent very complex and sensitive objects, the competition and human factor, the safety problem has often been out of control.

The governments of countries within IMO and ILO increasingly introduce new rules and conventions to enhance navigation safety. However, in view of economic-financial effects, many shipping companies overlook the safety problem.

The most recent revision of STCW Convention and the ISM Code implementation, which are becoming operative in the current years, aim to increase the overall culture of quality management (QM) and to enhance the safety management on ships and in maritime companies.

1. INTRODUCTION

The system of maritime shipping industry represents an assembly of complex processes and activities, including ship capacities, technological structure, changes on maritime market worldwide and navigation safety.

Due to its complexity and significance for the world maritime trade, research and analyses of world merchant fleet and safety management integration deserve special attention by scientists and practitioners in that field.

An integration of economic policy and safety policy in the world maritime shipping-industry has become a necessity in the most recent times, since development and utilisation of modern technology encompasses financial and economic possibilities.

Transfer of ships to a flag-state and open register endangers considerably the navigation safety as well as the sea and shore pollution protection. An indicator of such statement is a very high share of human factor

as the most frequent cause of maritime damages and accidents.

Under the umbrella of international organisations IMO and ILO great accomplishments have recently been made in enhancing and increasing the navigation safety through some new regulations related to ship construction and especially safety management. In that sense the revision of the "International Convention on Standards of Training, Certification and Watchkeeping for Seafarers" - STCW Convention, development and implementation of the "International Safety Management - ISM Code" have a strategic meaning and represent the obligation and significant field of activity for the world ship-owners.

2. TOTAL CAPACITIES AND TECHNOLOGICAL STRUCTURE OF THE WORLD MERCHANT FLEET

Influenced by scientific-technological revolution, world economies today experience fast technical, technological and organisational changes. Mass and specialised production, with the utilisation of mechanisation and automation, characterise that process. Production, consumption and traffic increasingly cross national borders and expand the dependence level of all the countries.

The mentioned phenomena of production and consumption are reflected on traffic, which has become the most significant factor in the process of social reproduction and consequently one of the fundamental integral factors. Actually, a bigger problem for the world today is how to transport goods and raw materials fast, economically and safely than how to manufacture and consume in various remote places.

New transportation systems world-wide have a special role today and in the future, since connecting production and consumption in remote places of the world means utilising comparative market advantages and enabling universal development of the world mar-

ket and particular countries, especially the maritime ones.

The role of modern maritime transport technologies can be analysed and observed on the example of Japan. Without modern maritime transport technologies Japan, and the world as well, would look different. Japan is only the most obvious example. However, development of modern maritime transport technologies has an extraordinary meaning for all maritime and other countries world-wide.

According to tasks that have been required of the modern transport systems during the recent years, an even greater affirmation of modern transport technologies in all the traffic fields in years to come has been expected. Many international ports experience a larger growth of container and RO-RO traffic. Furthermore, terminals for bulk and liquefied cargo are being modernised and expanded. World maritime companies, which have based their business activities on modern maritime transport technologies and specialisation, fight the crisis on the world maritime market much easier.

Within modern international transport systems, special results are attained by containerisation and RO-RO transport systems. Container manufacturing, as a base of containerisation, deserves special attention. The growth of container production and transport is expected in countries that were behind with the introduction of new technologies. Production and transport of special containers has particular meaning for the structure of containerisation in the future.

In order to understand better the tendencies of modern maritime transport technology development in the future, it is necessary to get the information about the capacity structure of the total world merchant fleet. The analysis of the condition in the merchant fleet or the shipping-industry, regarding the size and kinds of ships, represents the best way to view particular maritime transport technologies. The fundamental structure of the world merchant fleet, expressed by the size and kinds of ships, is given in Table 1.

By analysing the indicators in Table 1, it can be concluded that out of the total of 490 million GRT of world merchant fleet, 29.2% are ships for liquefied cargo (Oil), 26.2% are ships for dry bulk, 11.6% are ships for general cargo and other kinds of ships as presented in the Table. Concerning the number of ships, the highest number, 17 180, refers to ships for general cargo.

It can be noted that the world fleet continues to have a high age profile, the average age of the cargo fleet having increased from 17 to 18 years. The average age of the dry bulk fleet was 14 years and oil tankers 17 years. The age of general cargo fleet was 21 years, while the container fleet maintained an average age of 11 years.

Table 1. Category-wise Analysis of World Merchant Fleet 1. Jan. 1996.

| CATEGORY | WORLD FLEET | | |
|---------------------------------------|-------------|--------|-----|
| | No. | GTR | Age |
| (in millions) | | | |
| Cargo Carrying Vessels | | | |
| Oil | 6 761 | 143.5 | 17 |
| Dry Bulk | 4 799 | 128.5 | 14 |
| General Cargo | 17 180 | 56.8 | 21 |
| Passenger/General Cargo | 351 | 0.7 | 29 |
| Container | 1 763 | 38.7 | 11 |
| Refrigerated Cargo | 1 446 | 7.2 | 16 |
| Bulk Dry/ Oil | 226 | 14.1 | 15 |
| Self Discharging Dry Bulk | 158 | 2.9 | 24 |
| Other Dry Bulk | 982 | 6.1 | 15 |
| Chemical | 2 077 | 12.1 | 12 |
| Liquefied Gas | 985 | 14.9 | 14 |
| RO-RO Cargo | 1 673 | 20.4 | 15 |
| Passenger/RO-RO Cargo | 2 256 | 10.6 | 19 |
| Passenger | 2 613 | 6.2 | 18 |
| Other Dry Cargo | 216 | 1.9 | 22 |
| Other Liquids | 315 | 0.4 | 20 |
| TOTAL (including other categories) | 43 802 | 464.99 | 18 |
| Non-Cargo Carrying Vessels | | | |
| Offshore Supply Vessels | 2 382 | 1.87 | 17 |
| Other Offshore Vessels | 463 | 2.49 | 22 |
| Research Vessels | 818 | 1.11 | 20 |
| Dredging Vessels | 1 125 | 1.87 | 19 |
| Towing/Pushing Vessels | 7 721 | 2.09 | 21 |
| Fish Catching Vessels | 23 111 | 11.00 | 19 |
| Other Fishig Vessels | 818 | 2.34 | 17 |
| Other Activities | 2 650 | 2.90 | 18 |
| TOTAL | 39 088 | 25.67 | 19 |
| GRAND TOTAL | 82 890 | 490.66 | 18 |

(Source: Lloyd's World Fleet Statistics 1995)

Ships mentioned in Table 1 navigate under 152 various flags. Over 3/5 of these ships navigate under favourable flag-state such as Liberian, Panamanian, Cypriot, Maltese, St. Vincent & Grenadine etc.

Having in mind total capacities of the world merchant fleet, it is also necessary to emphasise the condition and alterations in the total international maritime trade in recent couple of years, given in Table 2.

Table 2. World Seaborne Trade 1979-1995 (in Millions of Tonnes)

| Year | Crude Oil | Oil Products | Iron Ore | Coal | Grain | Other Cargo Estimate | Total Trade Estimate |
|----------|-----------|--------------|----------|------|-------|----------------------|----------------------|
| 1979 | 1 497 | 279 | 327 | 159 | 182 | 1 270 | 3 714 |
| 1980 | 1 320 | 276 | 314 | 188 | 198 | 1 310 | 3 606 |
| 1981 | 1 170 | 267 | 303 | 210 | 206 | 1 305 | 3 461 |
| 1982 | 993 | 285 | 273 | 208 | 200 | 1 240 | 3 199 |
| 1983 | 930 | 282 | 257 | 197 | 199 | 1 225 | 3 090 |
| 1984 | 930 | 297 | 306 | 232 | 207 | 1 320 | 3 292 |
| 1985 | 871 | 288 | 321 | 272 | 181 | 1 360 | 3 293 |
| 1986 | 958 | 305 | 311 | 276 | 165 | 1 370 | 3 385 |
| 1987 | 970 | 313 | 319 | 283 | 186 | 1 390 | 3 461 |
| 1988 | 1 042 | 325 | 348 | 304 | 196 | 1 460 | 3 675 |
| 1989 | 1 120 | 340 | 362 | 321 | 192 | 1 525 | 3 860 |
| 1990 | 1 190 | 336 | 347 | 342 | 192 | 1 570 | 3 977 |
| 1991 | 1 247 | 326 | 358 | 369 | 200 | 1 610 | 4 110 |
| 1992 | 1 313 | 335 | 334 | 371 | 208 | 1 660 | 4 221 |
| 1993 | 1 356 | 358 | 354 | 367 | 194 | 1 710 | 4 339 |
| 1994 | 1 403 | 368 | 383 | 383 | 184 | 1 785 | 4 506 |
| 1995 Est | 1 428 | 380 | 400 | 407 | 198 | 1 865 | 4 678 |

(Source: Fearnley's Review 1995)

According to Table 2, the world seaborne trade volume reached a new record in 1995 at 4.678 million tonnes with 3.8% increase (172 million tonnes) which was the same as in 1994, as per estimates published by Fearnley's Review for that year. Measured in tonne-miles, the increase was somewhat less at 3% at 20 190 billion tonne-miles. World trade estimates by OECD indicate a growth of 9.2% in 1995 against 9.8% in the previous year. It is observed that while the seaborne trade volumes are heavily dominated by low value bulk commodities, the trade in manufactured high value goods increased more than bulk goods.

Here was a 2% increase in the oil trade volume during the year, most of the export growth coming from non-OPEC sources, the average shipment distances for crude oil having decreased during the year. While the volume of crude oil shipments by sea increased by 1.8% from 1 403 million tonnes to 1 428 million tonnes, in terms of tonne-miles there was a decrease of 1.2% to 7 380 billion. Oil product shipments are estimated to have increased by 3.3% to 380 million tonnes with continued large increased import by South East Asian Countries and the Far East, whereas import of the USA decreased.

After an uneven development through the year, the volume of dry bulk shipments showed a strong growth, with 5.6% increase during 1995 in the five ma-

nor sectors. Raw materials shipments to steel industry increased greatly during the year, whereas there was stagnation in shipment of steel products. Accordingly, iron ore shipments increased from 383 to 400 million tonnes, thermal coal from 219 to 236 million tonnes, basically in short-haul inter-Asian trades, coking coal from 164 to 171 million tonnes and grain from 184 to 198 tonnes (13% increase in tonne-miles due to smaller shipment distances). Other cargoes like minor dry bulks, liquefied gas, chemicals, container, RO-RO and other general cargo, cars etc. increased by about 4.5% in volume, forest products and fertilisers showing great increase. Trade volumes in general cargo also showed solid growth, whereas liquefied gas trades showed mixed developments.

3. FLAGGING-OUT AND OPEN REGISTERS

A growing number of ship-owners chose to reflag their tonnage to open registers. The benefits of such a move entail tax allowances or tax shelters, freedom to crew ships with low-wage labour regardless of nationality and without the involvement of labour unions, less stringent vessel classification and inspection rules. Flagging-out is an operational decision made by ship-owners aimed at streamlining operating costs and

other conditions to those prevailing in competing third countries. As such, flagging-out cannot be condemned, particularly not if the countries offering open registry facilities comply with international regulations.

In practice, however, flagging-out goes hand in hand with an increase in safety and environmental problems. Low-wage personnel often implies less qualified or unqualified seafarers. Human error has been identified as the principal cause of accidents, both at sea and in ports.

Another point to make is the fact that many open registers do not fulfil their duties as a flag-state. Inspections are often carried out by classification societies, not having the same regulatory power as a flag-state. In this way open registers give ample opportunity to those ship-owners who distort the competition by non-compliance with internationally agreed regulations.

From the relevant statistics, it appears that the heaviest casualty record is to be found among open registries. The existence of financial advantages is primarily due to shortcoming in flag-state control. This financial advantage is one of the attractions for ship-owners underlying the economic position of an open register. There is a mutual benefit.

The poor casualty record of these registries ought not to be explained only by the existence of a high percentage of substandard tonnage among their fleets, but also by the many times equally poor management performance of the beneficial owners and their staff and crews. It is believed that a different picture would emerge if a casualty analysis was performed on the basis of the beneficial ownership of open registry fleets rather than the mere flag-of-registry type of analysis. This analysis is confirmed by an investigation of the International Maritime Bureau in London showing there was no relation between casualty and flag. The important factor was the relation between casualty and technical management of the company.

The real problem with open registers in shipping is therefore that they have severed the genuine link between flag-state and the management of the company. In doing so they disrupted the traditional operating business environments in shipping. New operating business environments came into existence. However, due to cost-cutting strategies and the global market, in many cases the operating business environment was spread around several countries and the shipping industry became to a certain extent anonymous. In the tramp market of shipping industry, safety and environmental awareness were diminished due to the increased competition in price regardless of the quality.

Open registers brought their own primary interests into the shipping market, the optimisation of registration fees. Incentives for quality in shipping are coun-

terproductive for many open registers. They earned their fees by providing the management of shipping companies with possibilities for economic benefits by going substandard. In this way they destabilised the primary market relation between ship-owner and cargo owner.

4. THE CORRELATION OF MARITIME SHIPPING-INDUSTRY AND NAVIGATION SAFETY DEVELOPMENT

Research conducted over the recent years has shown that maritime transport safety depends mostly on the ship condition, ship system management, personnel expertise and qualification. Classification societies take care of the safety and the reduction in number of sea casualties. At the same time, they cover design, construction and maintenance of ships.

Particular international organisations have tried for decades to improve regulations which should enhance navigation safety and reduce the number of human factors which, according to conducted research, represent the major cause for accidents on the sea. According to statistics, the ship condition causes only 20% of sea accidents, whilst 80% of accidents is caused by human factor. This is the reason for repeated concern in the world for improvements within the system of leading and managing the ship, as well as personnel expertise and qualifications.

For personnel expertise and qualifications particular bodies within the IMO are responsible, which have prepared the "International Convention on Standards of Training, Certification and Watchkeeping for Seafarers" - the STCW Convention. This convention regulates standards on training, certification and seafarers watchkeeping on the ship. The utilisation of convention regulations is due for the beginning of the next century. The transfer period will begin in 1998.

Following the IMO's adoption of several resolutions that determine technical demands related to design and construction of ships and equipment, it has been concluded that the regulations are satisfactory. However, the question of improving the utilisation of issued regulations still remains to be solved.

After additional analyses on the navigation safety, the IMO has adopted the resolution A. 741 (18) in November 1993 under the title "International Management Code for the Safe Operation of Ships and for Pollution Prevention" (International Safety Management - ISM Code). This resolution became IX. Chapter of SOLAS in the middle of 1994.

The IMO's International Safety Management - (ISM) Code is widely viewed by the shipping-industry as the most far-reaching regulatory change for many years. Nevertheless, it is questionable if it can bring

about the necessary QM culture. With mandatory compliance for owners and operators of passenger ships, tankers, bulk carriers, chemical carriers and high-speed cargo craft fast approaching, the Code is prompting many countries to rethink how to comply best with its requirements. However, the most important force driving the "quality movement" in shipping is fear.

This can be explained as the fear of being excluded from the industry (if no ISM certificate is obtained), or a major liability claim (in case a company cannot demonstrate due diligence in its day-to-day activities). Moreover, it is the fear of losing one's market share and contracts if competitors can show potential customers proof of "management excellence" in the form of a QM certificate.

Notwithstanding the many positive factors for adopting QM, fear can very well lose its driving force and endanger the forthcoming of the necessary cultural change. There is growing concern in the shipping-industry that by no means all flag-state administrations responsible for conducting company and shipboard audits (either directly themselves or through the appointment of a classification society or similar body), will adopt a responsible and diligent attitude. There is major concern that many substandard ship operators will simply slip through the compliance net due to superficial regulation and that the overall contribution of the ISM Code to maritime safety and pollution protection will be severely limited. Many flag-states and substandard ship operators would be out of business if they willingly complied to ISM. Plain success of ISM is not very feasible, with the exceptions of chemicals, where the market has already found a solution.

The same situation occurs thus to be true for ISM as well as for STCW. Regulatory instruments can only function effectively if embedded in economic rules directed at the economic rationality of the players in the market in order to create self-organisation.

4.1. Revision of the STCW Convention

The "Standards of Training, Certification and Watchkeeping Convention" was introduced in 1978 to enhance safety by giving minimum standards for the quality of individual seafarers. This instrument has been a major disappointment, with its vast scope for interpretation, permitting a lowest common denominator in manning to apply. The revision of the STCW Convention from 1995 has brought more harmonisation. Although the enforcement of its standards is basically still in the hands of flag-states, the first step has been set in this Convention towards giving a certain executive power to the IMO secretariat in holding

audits to ensure the quality of the training levels and the certification of ships officers.

However, further increase of Port State Control (PSC) inspection burden is inevitable thus confirming the importance of PSC as the first line of defence. Countries willing to enforce the standards will notice that these input rules will create a certain rigidity. Innovations in training and education, e.g. use of simulators and integrated functions on board, will be hampered due to this rigidity. Ship-owners are not stimulated to define at company level the required skills and know-how for optimal ship operation.

In spite of the success in harmonisation the revision has brought, the result is a very detailed input regulation at the level of the individual seafarer, while all private economic rationality remain as before. The still open questions are the sufficiency of harmonisation for the success if the rules are not enforced properly and whether effective enforcement represents the reality or leads these rules again to economic benefits when one chooses non-compliance. At least no progress is made on the road to self-organisation.

4.2. ISM Code - Creation and Control of Certificate

According to IMO's resolution A.741(18), the "International Safety Management Code" - ISM Code, was developed as an additional source of navigation safety aimed at establishing the base for effective functioning and safety management in ship-owners' offices and on the ships in their fleet.

The resolution A.741(18) itself consists of the preamble and 13 chapters. It determines on the whole the ISM Code on Ships and Pollution Prevention. The preamble of the resolution A.741(18) implies that there are no two identical shipping companies or two identical ship-owners, that ships navigate in a broad area of various conditions, that the ISM Code is based on general principles and goals. The ISM is in the resolution given in general terms, so that it could be used broadly. Naturally, various management levels on shore and at sea require various levels of knowledge and understanding of determined requirements.

Fundamental goals of ISM Code are enhancing the ship safety, preventing human casualties, preventing loss of human lives, avoiding damages to the environment and material goods as well as enhancing development of organised management in shipping companies.

It has been proven world-wide that those companies that have succeeded in creating and introducing the safety management system employ people who enhanced the level and general cognition on safety. Besides, the aim is towards constant improvements of safety, costs reduction, expanding clients' trust, com-

plaint reduction and improvements of employees' morality in the company.

By complying with the standard requirements, each shipping company must document management procedures which assure that conditions, activities and assignments of the company on shore and on the ship related to the safety and environmental protection are in accordance with regulations. So documented procedures are called Safety Management System - SMS. (Scheme of the SMS structure and adequate documentation are shown in Figure 1.)

In accordance with ISM Code, the government of flag-state, i.e. the organisation authorised by the government is authorised for certification. It has been expected that the government of particular country

would authorise classification societies that will perform the classification process on their behalf.

Due to complexity and importance of the problems, members of the International Association of Classification Societies (IACS) continuously counsel about the certification procedure. This procedure includes company's classification that consists of safety management audit in a company and issuing of the Document of Compliance to the company. Besides the certification of the company, the certification of ship is performed which includes the Safety Management System audit on the ship and issuing of the Safety Management Certificate for the ship.

After issuing the particular documentation and certificates, periodical audit of Safety Management

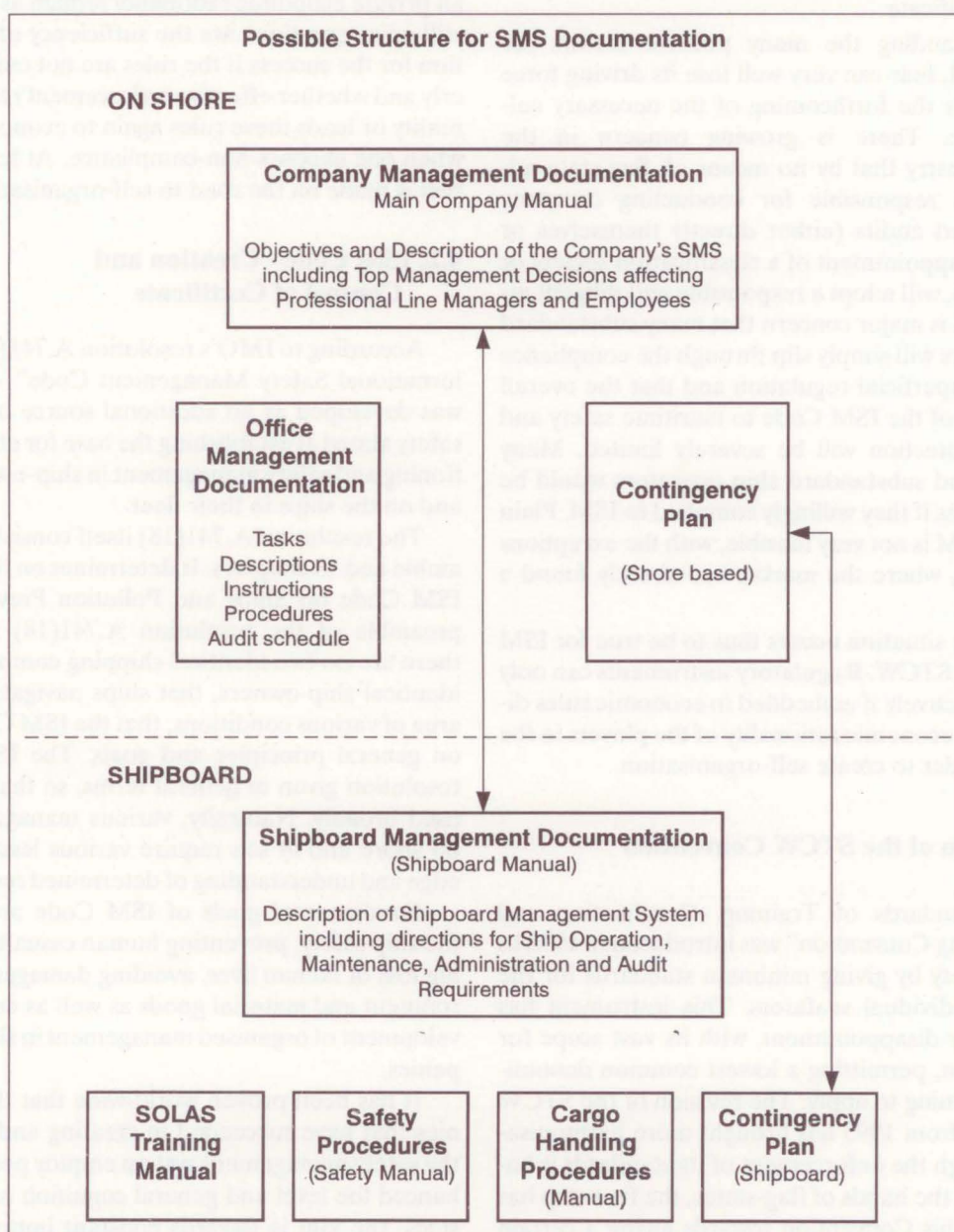


Figure 1

System must be performed, i.e. the control whether the documents are in compliance with ISM Code requirements and whether the issued documentation is being correctly used in practice.

After the successfully performed audit by authorised classification society, the company obtains the Document of Compliance, which is valid for three years.

Subsequent to the validity control of the Document of Compliance, shown in Figure 1 which relates to ISM Code requirements, and the control of utilisation of the mentioned documentation on a particular ship, the Safety Management Certificate is issued for the ship, also valid for three years. Both certificates maintain validity during three years only if annual audit is performed. Certificates for the following three years are issued only after the expired three years and the performed audit.

The harmonisation by ISM Code requirements is obligatory for passenger ships and high speed passenger vessels from July 1st 1998, oil tankers, chemical tankers, liquefied gas tankers, bulk cargo ships and high speed cargo vessels up to 500 GT and more, from July 1st 1998, other cargo ships and movable off-shore objects for submarine drill up to 500 GT and more, from July 1st 2002.

5. CONCLUSION

Total capacities of the world merchant fleet and technological structure show constant growth and progress. Continual competition on the world maritime market requires rationalisation and costs reduction which cause ships' flagging-out. However, all the mentioned factors intensify the safety problem in maritime shipping-industry. This is not only a technical problem but also an economic one that significantly affects the technical and technological equipping and utilisation of the ship.

The most recent measures of the international organisations and governments of maritime countries develop new strategies of economic and safety policy integration in the maritime shipping-industry. Those

strategies should insure development of capacities and new technologies, as well as an increase in the navigation safety which is becoming a vital question in the implementation of the "safer shipping-industry and cleaner sea" strategy world-wide. Revision and utilisation of the STCW Convention, implementation of ISM Code and PSC are becoming major points in which governments create networks for the maritime market and development of modern organisation in the future.

SAŽETAK

PROBLEM SIGURNOSTI - ČIMBENIK USPJEŠNOSTI FUNKCIONIRANJA MORSKOG BRODARSTVA

Stalan porast svjetske pomorske trgovine povlači za sobom i porast kapaciteta svjetskog morskog brodarstva. Taj porast ne znači samo veće brodove i veće ukupne kapacitete već se u isto vrijeme radi o tehničko-tehnološkim promjenama koje podrazumijevaju nove brodove, specijalizaciju i razvitak novih tehnologija pomorskog prometa.

Zbog složenosti uvjeta plovidbe, sve novijih i skupljih brodova koji predstavljaju vrlo složene i osjetljive objekte, konkurencije te ljudskog čimbenika, problem sigurnosti često je bio izvan kontrole.

Vlade zemalja unutar IMO i ILO donose sve više novih pravila i konvencija kojima se nastoji povećati sigurnost plovidbe. Međutim, zbog ekonomsko-financijskih učinaka mnoge broderske kompanije zapostavljaju problem sigurnosti.

Najnovija revizija STCW konvencije i implementacija ISM-koda, koje stupaju upravo na snagu ovih godina, imaju osnovnu zadaću podići opću kulturu kvalitete menadžmenta i poboljšati sigurnost upravljanja na brodovima i u pomorskim kompanijama.

LITERATURE

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