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Integrating Information Services for Managing Regulations in International Maritime Transportation

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Abstract

Nowadays, decision making in maritime transportation includes information for obligatory or not regulations related to quality, safety and security. Decisions of this nature have a significant effect on the actual cost of quality, safety and security in maritime transport. Although regulatory information is important, it is rather fragmented due to the internationalized nature of maritime operations as well as because it involves various private and public sector standardization agencies. In that respect, the development of an integrated maritime information service is essential in order to reduce costs and in turn improve maritime transportation services, streamline the flow of commerce as well as aid in developing better international, regional and national schemes. This paper initially provides two methodologies for estimating the cost of quality/safety/security and thereafter discusses the importance of managing regulatory material and information. Thereafter, a review of the literature is taking place and some innovative initiatives are presented, e.g. the "Maritime Knowledge Centre" of International Maritime Organization (IMO). Finally, a rationale will be proposed for the development of an integrated information service in order to provide a suitable and reliable information-knowledge based framework for quality, safety and security in maritime transportation. The implications resulting from the development of such a framework is discussed together with its significance for managing the relevant information.

JEL Classification: R41; L15; D83.
Keywords: Information services; Maritime transport; Quality; Safety; Security; Regulations; Standards.

1. Introduction

Information for regulations relatjed to quality, safety and security is considered to be essential for decision making in international maritime transportation (Stasinopoulos, 2003). Indeed, the maritime transportation economic sector is rather complex, internationalized and comprises of a plethora of different regulatory stakeholders from the public and/or the private sector. Having said this, one should further note that the maritime industry lacks information services based on up to date information tools and knowledge management practices in order to communicate, disseminate and investigate the rele-

vancy of all the available obligatory (or not) regulations, standards, codes, legislations, best practices, etc. Such information seems to be fragmented and dispersed due to a. the significant amount of authorities issuing quality, safety and security regulations, b. cognitive diversities emerge due to the complex and internationalized nature of maritime transportation, c. the legislative and directorial diversities among local, regional and/or international systems, d. the complicated logistics which include many businesses and organizations from different states in door to door transport services, e. the remoteness of onboard workplace in relation to the corresponding audit and regulatory authority and f. the various inconsistencies in policy implementation regarding the various quality, safety and security systems and approaches at international, regional, and local levels.

Integrated information services in maritime industry may involve various private and public sector agencies on a variety of projects and issues. These may include (Kristiansen, 2005) information about quality, safety and security for a wide rage of maritime operations, commercial maritime activities, geographical/regional socioeconomic factors etc. Therefore, the development of an integrated maritime information service is essential in order to improve decision making, which will in turn improve maritime transportation services, streamline the flow of commerce as well as aid in developing better international, regional and national schemes. Indeed, information services management can thereafter improve quality, safety and security regulations' development and implementation by means of a. supporting the dialogue among the stakeholders, b. disseminating at an international level the regulations, c. strengthening relationships among different actors and d. nurturing mutual trust through knowledge and experience exchange. In addition, communities of practice or virtual communities of quality, safety and security practices can be established where participants will share their experiences and expertises in this exciting area.

This paper initially discusses the importance of managing this type of regulatory material and information as well as some prevailing approaches for comprehending the cost of regulations. Thereafter, the role and the significance of the relevant information services for the management and dissemination of quality, safety and security regulations is exhibited together with a review of the literature. Finally, a rationale is proposed for the development of a maritime integrated information service in order to provide a suitable and reliable information-knowledge based framework.

2. The "sea" of regulations in maritime transportation and the associated cost of quality/safety/security

Scholars and professionals have to deal with a plethora of different regulations, standards, codes and other standardization documents related to quality, safety and security in maritime transportation. For example, operators within similar seaport terminals of the same or different ports may prefer different standards (e.g. ISO 9001; ISO 14001 etc.) for assuring quality/safety/security in relation to agreed priorities, legislations and regulations (Everett, 2003; Pantouvakis and Dimas, 2010). In fact, making decisions about the implementation of such systems is a rather complex issue which involves excessive investments in money and time; marketing, customer goodwill and competition issues;

changes in work patterns; degree of involvement of consultants and other external patrons; implementation and certification costs; burgeoning with organizations and businesses as well as with external social partners; communication with national, regional and international authorities etc.

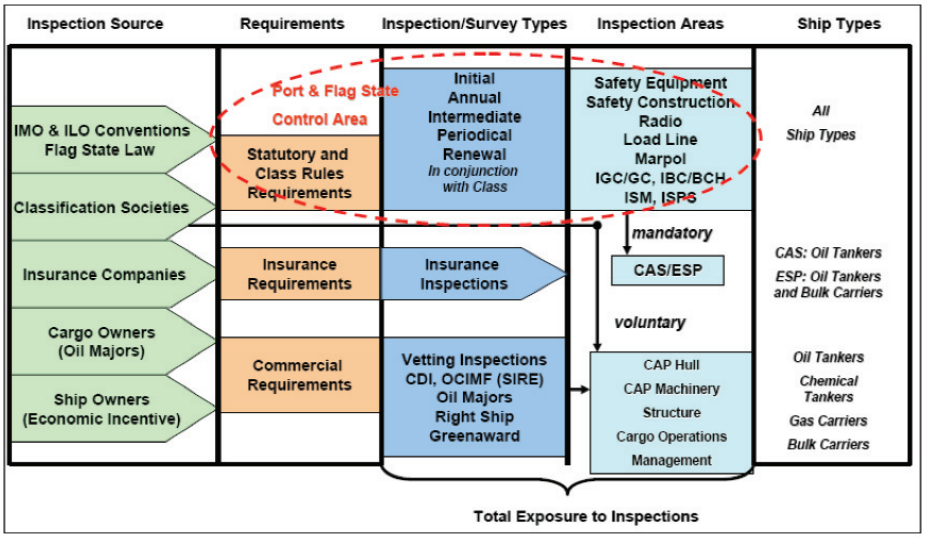
At the end of the day, one should realize that a significant issue for the maritime transportation industry is the availability of a substantial amount of different, technical or not and/or obligatory or not, standardization and regulation documents (Kostagiolas and Chlomoudis, 2011). Indeed, the IMO committees are producing normative documents concerning the quality/safety/security or maritime transport, along with a wide number of other regulatory authorities at a national, regional and international level, indicatively including the following:

- Advisory Committee on Protection of the Sea
- American Association of Port Authorities
- ASEAN Ports Association
- Association of Australian Ports and Marine Authorities
- Australian Quarantine and Inspection Service
- Coastal Guide Europe
- European Seaports Organization
- European Union for Coastal Conservation
- Hazardous Materials Advisory Coucil
- ICHCA International Ltd.
- International Association of Airport and Seaport Police
- International Association of Cities and Ports
- International Association of Classification Societies
- International Association of Independent Tanker Owners
- International Association of Lighthouse Authorities
- International Chamber of Shipping
- International Federation of Freight Forwarders Associations
- International Federation of Shipmasters' Associations
- International Labor Organization
- International Maritime Pilots Association
- International Navigation Association
- International Standardization Organization
- Nautinst Nautical Institute
- Oil Companies Marine Forum
- Oslo Paris Commissions
- Society of International Gas Tanker and Terminal Operators
- World Trade Center Association

In that respect, the maritime transportation industry due to the requirement for proactive measures (Psaraftis, 2002 and 2006) usually developed after terrible sea accidents with significant externalities (Tzannatos and Kokotos, 2009) is inclined to be viewed as a highly regulated industry. For example, Figure 1 presents different cases for control, inspection and audit in the field of maritime transport. As reported by Knapp and Fran-

ses, (2007) IMO has identified this problem and is striving to develop a "Harmonized System of Survey's and Certification" in an attempt to harmonize processes, inspections and certifications (initial, annual, renewal, etc.).

Figure 1. A diagram of different scenarios of standards and audits in the shipping transportation



Source: Knapp and Franses (2007).

The aforementioned inferences are rather idiosyncratic if one considers the "traditional" dominance of the unregulated or self-regulated maritime transportation market of the previous centuries. Adding to the analysis above however, all the rather newly introduced normative documents and regulations will become rather inactive if they do not reach in a proper manner their presupposed audiences in the maritime transportation market. That is if they are not associated directly to specific investments and costs for quality, safety and security or if they do not become known and properly reviewed by experts. Another important aspect concerns the harmonization of conflicting standards together with the integration of standards with similar requirements (e.g. Celik, 2009). This further implies that a standard can be adopted in its entirety or amended to make it equivalent to another etc.

Prior to proceeding any further, however, it would be useful to explain the meaning and the significance of "Cost of Compliance (CoC)"or the "Cost of Quality (CoQ)"models for the maritime transport industry (e.g. Bichou, 2004). The definition of quality, safety and security cost(s) differs from industry to industry and the various approaches make available their own definitions (Hwang and Aspinwall, 1996). Indeed, from a quality assurance viewpoint the quality cost is including four categories: screening, replacement of defective items, prevention of defective items, and improvement n screening.

Another approach includes the costs of ensuring and assuring quality/safety as well as the internal and external losses incurred when quality, safety and security is not achieved. Readily, the scope of these definitions extends from a department to an organization and to the socioeconomic environment as a whole, i.e. externalities of social and environmental costs caused by poor quality, safety and security (Psaraftis, 2008). Moreover, the quality/safety/security cost modes are traditionally related to a number of approaches (Hwang and Aspinwall, 1996) including the PAF (prevention, appraisal and –internal and external– failure costs), and the process cost model.

The PAF cost model introduced by Feigenbaum (1956) and Masser (1957) has been widely used and is based on classifying all costs into three main categories: prevention; appraisal; and failure costs. The first cost category, i.e. prevention costs, is associated with investments for prevention such as personnel training, maintenance, quality and safety systems implementations, ISM codes implementation etc. The appraisal costs are those associated with inspection, control, testing, quality/safety audits etc. The third, i.e. failure costs, is associated to costs for dealing with non conformances (scrap, rework etc.) as well as the externalities of quality and safety failures. On the other hand, the process cost model is introduced by Crosby (1979) and is defined as the following sum,

$$COQ = POC + PONC \quad (1)$$

where POC is the price of conformance and PONC is the price of non conformance.

The POC is including all costs associated in providing goods and services at the required predetermined level of quality, while the PONC is cost associated with wasted time and resources for dealing with the receipt, production, despatch and correction of unsatisfied goods and/or services.

Quality/safety costing in maritime industry may also include losses for a number of intangible assets (Chlomoudis, *et al.*, 2009). These costs are associated with elements such as loss of customer goodwill, delays in transportation networks, loss of staff motivation, etc. which cannot be directly estimated in monetary terms. Bearing in mind that the competition is fearsome and a significant amount of resources are used in marketing and promotion, the costs associated with the intellectual capital of a firm, and especially those related to the customers and the employs are becoming quite important. Another important category of costs is associated to the maritime externalities due to quality and safety non conformances in the transportation services (Fafaliou, Lekakou and Theotokas, 2006). The importance of quality/safety costs is quite high and goes beyond the actual monetary and accounting value for a maritime transportation enterprise.

Therefore, one way to exercise proactive measures in maritime transportation industry is by controlling quality/safety/security costs and making informed and proper decisions in regard to the combination of quality, safety and security standards, codes, approaches etc. best suited for the realization of a particular service. At the same time, these seditions should comply with the requirements of the different regulatory authorities. For that, a rigorous approach is needed towards managing information and knowledge for quality, safety and security. Indeed this is a rather evolving area. Such a transparent framework will provide confidence when structuring maritime transporta-

tion services in a way that all involved parties are comprehending trade-offs and the associated costs when making legitimate decisions concerning socioeconomic conflicts and environmental issues of general concern.

3. Information and knowledge management initiatives for regulatory activities

The modern international maritime transportation industry shifts towards an information and knowledge-based industry. The reliable information and internet technologies emerge as a key decision-making factor for the quality, safety and security. To this end information and knowledge management systems can support maritime transportation operations and services (Massingham, 2010). The rapidly evolving Information and Communication Technologies (ICT) provide technological solutions with a positive impact on the quality / safety in maritime transport. These solutions take the form of specific types of electronic communication systems (Labrou *et al.*, 2004) such as Electronic data interchange (EDI), the Vessel Traffic System (VTS), a Vessel Traffic Management Information System (VTMIS) and the Global Maritime Distress and Safety System (GMDSS). The EDI is a technology for interchanging commercial and administrative data between ports and/or other logistics businesses enhancing security because all parts have full knowledge of operations' progress. The VTS is enhancing safety in maritime traffic; while VTMIS is applied for monitoring logistics, facilitate navigation in order to reduce maritime accidents. Finally, the GMDSS developed by the IMO is aimed to strengthen safety and security by supporting ongoing communication between ships and ashore services in emergency situations.

For information and knowledge management, the EU introduced the knowledge centre for research on transportation "Transport Research Knowledge Centre, TRKC" which provides an overview of current scientific developments and EU research programs for maritime transportation. The European Seaports Organization (ESPO) has developed information services relevant to environmental management in ports. Similarly, the ECOPORTS foundation (Environmental Policy Code, EPC) in policy article 7 highlights the usefulness of an integrated information system for assists in the implementation of environmental management systems in ports. Indeed, such an initiative includes the European Marine Casualty Information Platform (EMCIP) which is a specialized information service reporting for EU ports all marine accidents (in the framework of Directive 2009/16/EC) and monitoring "shipping companies with poor performance under Port State Control"; while highlighting positive results of companies with a history of good safety performance. Moreover, an information service named "THETIS" has been developed for recording all kinds of safety inspections carried out in EU ports. Therefore, all ships and companies will be registered and ships operated by companies with solid track records will receive fewer inspections. Besides "THETIS" an international digital information service is the "EQUASIS", which was developed by the European Commission and the Governments of France, Japan, Singapore, Spain, Great Britain and the U.S. Coast Guard; while, the World Ports database includes information from 2863 ports located in 132 countries including all European state members. Finally, university departments and research institutes in Greece and internationally as well as va-

rious professional groups have developed digital information services for knowledge dissemination on quality, safety and security issues in maritime transport.

At an international level, the IMO has introduced an information service entitled "Maritime Knowledge Centre" which is including an open access digital service for informing all stakeholders at international level. Moreover, the centre's staff provides expert guidance in technical questions. The International Association of Ports and Harbors (IAPH) includes a number of relevant technical committees which study and analyze on behalf of IAPH information about innovations, requirements and good practices for port safety and security. Specialized information services have been developed by committees and agencies of the United Nations (for example, United Nations Economic Commition for Europe, United Nations Centre for Trade Facilitation and Electronic Business) as well as by Joint Technical Committees e.g. the TC 154-UN/CEFACT Joint Syntax Working Group (JSWG). In the same manner, the information portal of UNCTAD (United Nations Conference on Trade and Development) provides normative texts and technical reports. Similar services have been developed by the World Customs Organization (WCO), the European Commission (Directorate-General for Energy and Transport) and the Global Facilitation Partnership for transportation and trade (GFP). Specifically, the GFP which includes scholars and professionals from all areas of trade and maritime transport has created an interactive open-access portal for exchanging information and experiences and dissemination of relevant scientific data.

4. An information services framework for integrating regulatory perspectives

The labyrinthine and rapidly expanding quality/safety/security regulations provide an opportunity for the development of a specialized information and knowledge management service for monitoring and reporting information about quality, safety and security regulations at an international level. Such an information service can

- improve the quality/safety by supporting operations and monitoring internal and market processes; and
- increase the efficiency of obligatory and non obligatory regulations implementations for quality/safety/security by making the best possible dictions of standards, codes, best practices etc. with the internationalized competitive environment.

The traditional role of information specialists is evolving and adjusting to the new business environment. Therefore, an interesting challenge is to re-invent the library and information services in terms of the information requirements of quality/safety standards. Indeed, the traditional types of library and information services such as circulation, reference, Internet access, and reprography services may be expanded through novel information technologies including the web 2.0 based services. Indeed, library and information services of this nature may include:

- Access to databases: e.g. scholarly communication and open access resources, e-journals, etc.
- Access to specific material: e.g. printed collection, interlibrary loans, etc.
- Reference / consultation services: e.g. reference documents, assistance with database searches etc.

- Training and education: e.g. classes, curriculum liaison etc.
- Current awareness services: e.g. WEB 2.0 services, alerts etc.
- Support services: e.g. internet access, access to computers etc.

Finally, the relevance of the information services may also depend on socioeconomic issues as well as the distinct information behavioral patterns that must be suited to the different user groups. The appreciation of information services potential may further aim at suggesting meaningful usages of novel technologies including the web 2.0 based services.

5. Conclusions

Over the past few decades, the viewpoint that quality, safety and security management is dynamically linked with information has been gradually become dominant. It seems that international maritime transportation industry is becoming a regulated industry and therefore the management of this type of material for quality, safety and security is becoming very important. In this work a review of some important approaches for comprehending the cost of quality have been presented and some innovative information services have been reviewed; while a rationale is proposed for the development of a integrated maritime information service. This paper does not intend to address in depth all the research issues originated from the quality, safety and security management in maritime transportation. However, a number of considerations have been made towards the cost and the development of specific information services.

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