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# Reducing undeclared and misdeclared dangerous goods to improve maritime transport safety



En förstudie utförd inom Trafikverkets branschprogram Hållbar sjöfart som drivs av Lighthouse

## **Reducing undeclared and misdeclared dangerous goods to improve maritime transport safety**

### **Författare**

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Detta projekt har genomförts inom Trafikverkets branschprogram Hållbar sjöfart, som drivs av Lighthouse.

## Summary

Transport of dangerous goods creates substantial utility to society, but carries a risk to the environment, health and safety. Some of the accidents and incidents occurring during dangerous goods transport can be attributed to poor practices, such as misdeclaration or failure to declare the goods. This pre-study aims to investigate the problem of undeclared and misdeclared dangerous goods transport on container, RoRo and RoPax vessels and to investigate the circumstances and causes that lead to incorrect declaration.

For this purpose, this research carried out a literature review and conducted several interviews with main stakeholders in Sweden such as port authorities, port terminals, shipping companies, insurance companies and public institutions. Main results suggest that the existence of different regulations (land transport and sea transport for dangerous goods), can be a risk for managing these goods. Furthermore, it is important to enhance coordination between different actors and increase digitalization to control information flows.

This pre-study is coordinated with the longer and larger project *Transparent information management and collaboration for improved reliability during transportation of dangerous goods* funded by the Swedish Civil Contingencies Agency (MSB).

## Sammanfattning

Transport av farligt gods skapar stora nyttor för samhället men medför också en risk för miljö, hälsa och säkerhet. Vissa olyckor och tillbud som inträffar under transport av farligt gods kan hänföras till dålig praxis, såsom felaktig deklaration eller underlåtenhet att deklarerera varorna. Denna förstudie syftar till att undersöka problemet med transport av odeklarerad och felaktigt deklarerad farligt gods på container-, RoRo- och RoPax-fartyg och att undersöka omständigheterna och orsakerna som leder till felaktig deklaration.

För detta ändamål genomfördes en litteraturöversikt och genomförde flera intervjuer med huvudintressenter i Sverige såsom hamnmyndigheter, hamnterminaler, rederier, försäkringsbolag och myndigheter. De viktigaste resultaten tyder på att förekomsten av olika regler (land- och sjötransport för farligt gods) kan utgöra en risk för kontrollen av dessa varor. Dessutom är det viktigt att förbättra synkroniseringen mellan olika aktörer och öka digitaliseringen för att kontrollera informationsflöden.

Denna förstudie samordnas med det längre och större projektet *Transparent informationshantering och samarbete för förbättrad tillförlitlighet vid transport av farligt gods* som finansieras av Myndigheten för samhällsskydd och beredskap (MSB).

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## Acronyms and abbreviations

ADR	Agreements concerning the international carriage of dangerous goods by road
Baltic Sea MoU	Memorandum of understanding for the transport of packaged dangerous goods on RoRo ships in the Baltic Sea
BSU	Bundesstelle für Seeunfalluntersuchung (German Federal Bureau of Maritime Casualty Investigation)
CCC	Carriage of cargoes and containers
CTU	Cargo Transport Units
CINS	The Cargo Incident Notification System
DMAIB	Danish maritime accident investigation board
HD	Högsta domstolen ( <i>In English: The Supreme Court</i> )
IBC Code	International code for the construction and equipment of ships carrying dangerous chemicals in bulk
ICHCA	The International Cargo Handling and Coordination Association
ILO	International Labour Organization
IMDG Code	International Maritime Dangerous Goods Code
IMO	International Maritime Organization
MARPOL	International convention for the prevention of pollution from ships
MSW	Maritime Single Window
MSC	Maritime Safety Committee
P&I Club	Protection & Indemnity Insurance (P&I) Club
RID	Agreements concerning the international carriage of dangerous goods by rail
RoRo	Roll-on/Roll-off ship
RoPax	Roll-on/passenger ship
SJÖFS	Sjöfartsverket ( <i>In English: The Swedish Maritime Administration</i> )
SOLAS	International convention for the safety of life at sea
TISS	Transparent information management and collaboration for increased safety in the transport of dangerous goods
TSFS	Transportstyrelsen ( <i>In English: The Swedish Transport Agency</i> )
UNCTAD	the United Nations Conference on Trade and Development

# 1. Introduction

Globalization and international trade have increased the movement of dangerous goods<sup>1</sup>. Dangerous goods are used widely in industry and are transported as raw material and intermediate substances as well as products for consumer end use (paints, batteries, fuels, etc.). Transport of these goods carries a risk to the environment, transport sector workers, and the public. For transport by sea, there are risks to the ship's crew and port workers, and dangerous goods accidents on a ship can result in losses for other cargo owners and to the ship owner. Several large fires occurred on container and roll-on/roll-off (RoRo) vessels in 2019, resulting in significant cargo loss and in some cases loss of life (Nightingale, 2019). Other recent serious accidents include the fire on the *Maersk Honam* container ship in 2018 (Transport Safety Investigation Bureau, 2020) and the fire on the *Cosco Pacific* container ship in 2020 (Maritime Executive, 2020a). Although the cause of these fires can sometimes be difficult to identify, Costa (2019) states that the marine insurer TT Club estimates that around two-thirds of such incidents can be attributed to poor practices related to dangerous goods, where the dangerous goods can be misidentified or undeclared.

The pre-study described in this report had the overall goal of investigating how to reduce the risk of accidents resulting from dangerous goods transport on container and RoRo (including RoPax) vessels. The focus is on misdeclared and undeclared dangerous goods, in the context of transparent information flow, coordination among stakeholders, and improved safety throughout the transport chain. The pre-study developed from the research project "Transparent Information Management and Collaboration for Increased Safety in the Transport of Dangerous Goods", which is focused on the safety of road and rail transport of dangerous goods. As a complement, this pre-study targeted safer transport and handling of dangerous goods by sea, in ports, and the land connections to and from the port.

This report has three main sections. The first section presents an overview of the regulations and logistics operations, including information flow, with respect to dangerous goods carriage on container and RoRo vessels. Results of a literature review on noncompliance with regulations, focusing on misdeclaration of goods, and selected accidents involving dangerous goods, are also described in the first section. The second section describes the main results from interviews with representative stakeholders. The interviews were focused on understanding reasons for misdeclaration, information management systems, practices and regulations implemented in Sweden. The last section sets out a discussion and main conclusions and provides recommendations for further research.

The aim of this pre-study was to investigate phenomena associated with multi-modal (road, sea and rail) dangerous goods transport which may be the basis for incorrect declaration and transport.

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<sup>1</sup> In this study, "dangerous goods" mean the substances, materials and articles covered by the IMDG Code.



Operations in both container and RoRo traffic were investigated. The pre-study also included an initial investigation of the following questions with regards to misdeclared dangerous goods:

1. Is misdeclaration related to lack of attention or knowledge or is it a conscious act and which actor in the transport chain is behind the misdeclarations?
2. Does the total transport cost, for land-sea-land, have an influence?
3. What is gained by actors from incorrect declaration of goods and what incentives could influence the actions of the actors whose incorrect behavior can lead to accidents?
4. Do the logistics for loading cargo on ships, such as large container vessels, have an impact on the cost by goods type (dangerous goods / non-dangerous goods)?
5. Are the regulations in the IMDG code and ADR / RID in connection with the transition between the transport modes difficult for actors in the transport chain to apply?
6. What possibilities does a transparent information management system provide for strengthening regulatory compliance in the transport industry, and thereby lead to safer transport, more efficient cooperation between authorities, and improved opportunities for control and inspection?

## 2. Method

The literature review phase of the study included collecting and reviewing scientific literature, existing regulations, International Maritime Organization (IMO) documents, “grey” literature such as reports and information from trade organizations and firms. This review was carried out to establish the current “state of play” regarding goods and information flows (with a focus on ports and ship operators), accidents and incidents involving dangerous goods on board or in ports, and compliance with existing regulations and procedures (with a focus on provision of information).

The second phase of the work involved collection of information from different members and stakeholders of the project group through online interviews. However, due to the corona pandemic the study was limited to on-line interviews and was not able to conduct a workshop as was originally planned. As a result, we conducted eight interviews. Stakeholders interviewed, by type of entity, were as follows:

- Ship operators: Stena Line Freight
- Regulatory/Inspection: The Swedish Coast Guard (Kustbevakningen, KBV) / The Swedish Transport Agency (Transportstyrelsen)
- Ports: Port Authorities (Trelleborgs Hamn, Hallands Hamnar, Karlshamns Hamn) and a container terminal (APM Terminals).
- Protection & Indemnity Insurance (P&I) Club: The Swedish Club.

### 3. Current status of transport of packaged dangerous goods<sup>2</sup> by sea

This section describes the main regulatory requirements applicable to the transport of dangerous goods by sea, the problems with compliance with these regulations (particularly with respect to declaration), and some of the potential consequences resulting from dangerous goods misdeclaration. Measures and initiatives for improving compliance as identified in a literature review are also described.

This review and mapping of the current status of packaged dangerous goods<sup>3</sup> transport covered the following main areas:

1. Regulations and current standard procedures, including:
  - Regulations for transport of dangerous goods
  - Logistics: flow of goods starting from the shipper, to acceptance at the port, and loading onto the vessel
  - Information flow and IT Security
  
2. Safety and Compliance
  - Accidents and incidents involving dangerous goods transport, focused on those involving undeclared and misdeclared goods, where lack of correct information on the cargo was identified
  - Non-compliance with regulations and best practice
  - Measures and initiatives for reducing non-compliance with regulations and reducing accidents/incidents (both probability and consequence)

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<sup>2</sup> “Packaged dangerous goods” refers to transport of dangerous goods in containers and cargo transport units

<sup>3</sup> “Packaged dangerous goods” refers to transport of dangerous goods in containers and cargo transport units

## 3.1 Regulations and guidelines

This subsection describes the regulations applicable to the transport of packaged dangerous goods and non-binding guideline documents that have been prepared to increase understanding and compliance with the regulations for maritime transport of dangerous goods.

### 3.1.1. Regulations

Transport of dangerous goods is carried out according to international regulations developed with the aim of preventing harm to people, property (including other goods and the transport means), and the environment. Dangerous goods regulations are partly harmonized across transport modes based on the “UN Recommendations on the Transport of Dangerous Goods - Model Regulations” (UNECE, 2019). These were first published by the United Nations Committee of Experts in 1956 and are updated every two years. The most recent version at time of writing is the twenty-first revised edition, published in 2019 by the United Nations Economic Commission for Europe (UNECE, 2019).

Topics covered by the model regulations are as follows:

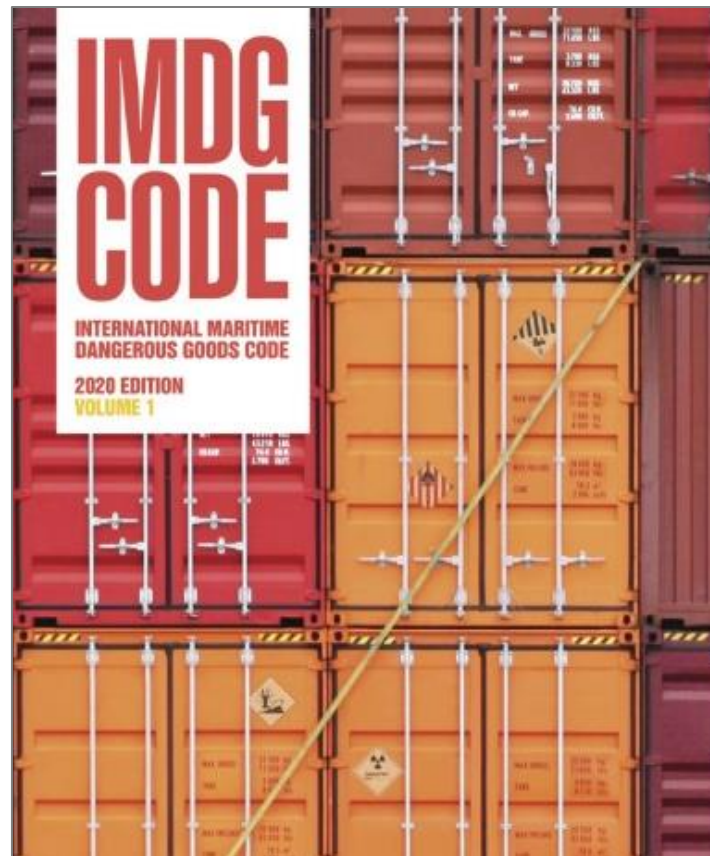
- General provisions, definitions, training, and security
- Classification
- Dangerous goods list
- Packing and tank provisions
- Consignment procedures
- Requirements for the construction and testing of packaging, containers, and tanks
- Provisions concerning transport operations

Detailed regulations are developed for the various transport modes based on the model regulations. They may also include topics that are specific for the transport mode. For example, for sea transport, stowage requirements (on deck, under deck, etc.) are specified. Transport mode specific regulations are as follows:

#### Sea Transport

- International Maritime Dangerous Goods (IMDG) Code: This is applicable for transport of packaged dangerous goods by sea. The code was initially adopted as a recommendatory instrument by the IMO in 1965, but was made mandatory in 2004 by the IMO general Assembly and is incorporated into IMO’s International Convention for the Safety of Life at Sea (SOLAS) and MARPOL treaties (Güner-Özbek, 2008). The development of the IMDG code dates back to the Safety of Life at Sea Conference in 1960, and an IMO working group began preparing the code in 1961 (IMO, 2010). The code specifies requirements for packing, consignment, and transport operations, including packaging to be used, marking, labelling, placarding, stowing, segregation, and transport documentation. The code is updated every two years. Amendment 39-18 came into effect 1 January 2020. Implementation of the IMDG code into Swedish legislation and the debate about the legal validity of the English text in Sweden is described in detail in Section 3.7. Figure 1 shows the cover of the IMDG Code, Volume 1, published in 2020.

Figure 1. Cover of the IMDG Code



- RoRo transport in the Baltic Sea: Memorandum of Understanding for the Transport of Packed Dangerous Goods on Ro-Ro Ships in the Baltic Sea (Baltic Sea MoU). The Baltic Sea MoU is a multilateral agreement on the transport of dangerous goods in packaged form between Baltic Sea countries. It was developed in the 1980s when there were greater differences between transport mode (road and sea) regulations than what currently exist. The purpose of the Baltic Sea MoU was to facilitate the transport of dangerous goods on ro-ro ships in the Baltic Sea by allowing transportation according to land transport rules, with some departure from the IMDG code rules. Without this agreement, documentation and marking needed to be changed when transferring from road to sea, perhaps several times for a multi-modal journey (Transportstyrelsen, 2010).

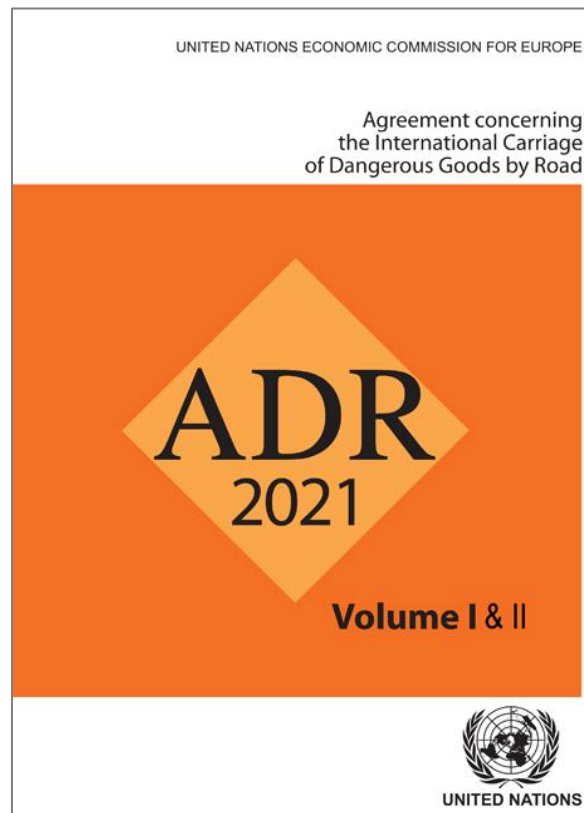
In Sweden the Baltic Sea MoU is enacted by “Transportstyrelsens föreskrifter och allmänna råd (2009:131) om transport av förpackat farligt gods på rorofartyg i Östersjön (Östersjöavtalet)”. RoRo ships in the area covered can choose between complying with the IMDG code or the Baltic Sea MoU (Chapter 1 §1).

#### Road transport

- ADR - Agreement concerning the International Carriage of Dangerous Goods by Road: this is implemented into Swedish national legislation by”Myndigheten för samhällsskydd

och beredskaps föreskrifter om transport av farligt gods på väg och i terräng (ADR-S)” (MSBFS 2018:5). Figure 2 illustrates the cover of the ADR published in 2021.

*Figure 2. Cover of the ADR*



#### Rail transport

- RID - Regulations concerning the International Carriage of Dangerous Goods by Rail: this is implemented into Swedish national legislation by "Myndigheten för samhällsskydd och beredskaps föreskrifter om transport av farligt gods på järnväg (RID-S) (MSBFS 2018:6).

### 3.1.2. Guidelines

Guidelines and best practice documents have been developed to provide guidance to shippers and carriers. The overall purpose of the guidelines is to improve safety of dangerous goods transport, either through providing a more “user friendly” description of regulations to improve understanding and compliance, or to provide non-mandatory advice that is not covered in the regulations. Examples of guidelines are as follows:

- IMO/ ILO//UNECE Code of Practice for Packing of Cargo Transport Units (CTU Code) (IMO/ILO/UNECE, 2014): The aim of this document is “to give advice on the safe packing of cargo transport units to those responsible for the packing and securing of the cargo and by those whose task it is to train people to pack such units.” (IMO/ILO/UNECE, 2014). It is not mandatory and does not supercede any national or international regulations. It is freely available to download or to consult in a searchable web site.
- “Book it right and pack it tight – Guidance on packing dangerous goods for carriage by sea – IMDG Code Amendment 39-18” (UK P&I and TT Club, 2020). This is based on the IMDG code and is updated regularly to be current with the latest edition of the code. It presents the information in a more “user friendly” format than the code. The purpose of the guide is stated to be “to support shippers, forwarders, shipping line booking staff and those who pack dangerous goods into cargo transport units for carriage by sea in the technical aspects of the IMDG Code.” It is freely available to download. The foreword to the document notes the consequences of poor understanding and practices related to dangerous goods carriage requirements and presents the guide as a way of improving this for all actors along the global freight supply chain. The guidance document is published by two P&I Clubs – these insurers have a strong interest in reducing claims related to dangerous goods accidents.
- “Safety Considerations for Ship Operators Related to Risk-Based Stowage of Dangerous Goods on Containerships, Part 1. Version 1.00. November 2019”. This is a publication by the Cargo Incident Notification System (CINS), a group whose membership includes over 85% of the global container slot capacity (CINS, 2019). The target audience is stated to be ship operators, cargo carriers, and port personnel, and the overall goal is to enhance safety on container vessels and is an initiative partly in response to serious fire incidents related to deficiencies in cargo declaration and packing.
- “Risk Based Dangerous Goods Stowage”: Maersk developed these in response to the fire on the *Maersk Honam* that resulted in the deaths of five crew members and significant costs for lost cargo and salvage and repair of the vessel. Principles were developed for dangerous goods stowage to reduce the risk to crew, the ship, and the environment in the event of a fire (Maersk, 2018). They are being applied on all of Maersk’s 750 container vessels.

## 3.2. Logistics – flow of goods

Shipping is the most cost-effective system to move goods across long distances (Butt, 2007). Hence, over 80% of global trade is handled by seaports worldwide (UNCTAD, 2017). Consequently, port infrastructure has become essential for industries and consumers, as well as a key element in the control of dangerous goods in the logistics chain. This section describes how logistics participants control the movement of dangerous goods in the supply chain process.

Firstly, in the case of port authorities, some seaports have developed particular mechanisms to handle dangerous goods in their port areas to prevent accidents and incidents. The IMO publishes the Recommendations on the Safe Practice on Dangerous Goods in Ports and Harbors<sup>4</sup> for guidance to port operators (IMO MSC, 1973). This non-mandatory instrument aims to provide a standard framework of the rules relating to dangerous goods within the port area in order to avoid misunderstandings between ship operations and port activities.

In general, ships have to notify the movement of dangerous cargo to port authorities at least 24 hours before entrance to port facilities. Consequently, ports can plan the specific storage and handling of such cargo at the terminal. According to the Port of Gothenburg (2021) a part of ships' registration, carriers with dangerous goods arriving at port facilities by land, that is, road or rail, have to inform authorities in advance and consider their specific regulations, namely ADR or RID, specifically.

The use of new technologies, like scan identification systems, have facilitated the management of containers in the port area. For instance, in 2015, the Port of Tianjin suffered several explosions at the container storage area. Consequently, this port has developed a monitoring system through Internet of Things technology to create a location framework for dangerous goods and to facilitate their location in the container yard (Ding et al., 2016).

Finally, in the case of terminal operators, private companies (like APM Terminals) implemented specific procedures to control the movement of containers in their facilities. Thus, based on the standard dangerous goods classification, the company determines how long these goods may stay on their terminal facilities. Figure 3 illustrates this classification.

*Figure 3. Dangerous goods' limited time in the APM Terminals*

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<sup>4</sup> *The Recommendations* was adopted in the 8<sup>th</sup> Assembly Session (20 November, 1973) as resolution A.289. It has been revised on several occasions. The last revision was published in 2007.



Rules	Dangerous Goods – APM Terminals Gothenburg	Comments
Transported in and out from the terminal when the vessel is alongside.		With any of the letters: A, B, C, D, E, F, H, J, K, L, N
Transported in and out from the terminal when the vessel is alongside.		Exemption from the rule is UN 2908-2911 (Three days* accepted)
Can be stored Max one day* at the Terminal.		
Can be stored Max three days* (five days if weekend is included)		
Can be stored Max three days* (five days if weekend is included)		
Can be stored Max three days* (five days if weekend is included)		*before loading or after unloading.

Source: APM Terminals, 2019

### 3.3. Information flows and IT security

In addition to the physical goods flows, another important aspect related to dangerous goods control is the information flow between stakeholders. In this regard, in order to know the container contents, the information exchange between the consignor, port authority, terminal operators, and vessel master is crucial. In general, port authorities require an information flow procedure to take place before a container is delivered to the port area. Generally, the carrier has to send a dangerous goods declaration to the terminal that indicates the container number and cargo specifications.

Several port authorities and terminal operators have developed specific initiatives to control the movement of dangerous goods and enhance security in their facilities. This study has considered some successful practices within Europe.

Firstly, the Port of Rotterdam has developed an online platform called “Portinsider”, permits port agents, port authorities, terminals, freight forwarders, and cargo owners to control all cargo declarations for ships, clearance statuses, and track cargo movements (The Port of Rotterdam, 2020). Secondly, the Port of Amsterdam has developed the MOBI platform<sup>5</sup> to facilitate cooperation between public and private institutions for port security activities. Through a smartphone application, this initiative aims to carry out real-time documents and security certifications for port terminals and authorities (WPSP, 2021a). Currently, the platform is used by all Dutch seaports<sup>6</sup>. Thirdly, the Port of Antwerp has used its the Port Information Network

<sup>5</sup> MOBI is the Dutch abbreviation for Methodology for Impartial Security Assessments

<sup>6</sup> Since 2019, all seaports in the Netherlands use this port security platform. Specifically, Groningen Seaports, North Sea Port, Port of Den Helder, Port of Moerdijk, Port of Rotterdam and Port of Amsterdam (WPSP, 2021c)

(PIN) since 2015 to exchange suspicious information in real time among companies, local authorities, and the police (WPSP, 2021b).

Likewise, some ports integrate digitalization and new technology, such as monitoring systems using wireless sensor networks or Internet of Things technology, to control dangerous goods. In this regard, concepts such as the Intelligent Containers Network (Jakovlev et al., 2018) and Smart Containers (UNECE, 2009) facilitate inspections and reduce examination process times. Furthermore, these solutions can monitor specific data, identify high-risk containers, and assist stakeholders in the supply chain. Likewise, in 2016, the JadeWeserPort in Germany introduced an online-based system, called RapidReach, to respond in emergency situations without using special devices. Thus, through a cellphone or computer with internet access, this system alerts personnel and institutions in an emergency and in a short time (WPSP, 2021c).

Finally, in the case of ships operating in Swedish waters, the Swedish ship reporting system: the Maritime Single Window (MSW) reports vessel information to the government authorities. The Swedish Maritime Administration, in collaboration with the Swedish Coast Guard, the Swedish Customs, and the Swedish Transport Agency, manages this mandatory electronic procedure. Specifically, vessels calling in Swedish ports that are carrying dangerous goods must report cargo information electronically by the MSW (Transportstyrelsen, 2021). Likewise, at the European level, the European Maritime Single Window (EMSW) aims to simplify information procedures and coordinate between member states (European Maritime Safety Agency, 2021).

### 3.4. Accidents and incidents involving undeclared dangerous goods

Even with regulations and guidance for dangerous goods transport and handling in place, accidents and incidents still occur. An understanding of these can potentially help with prevention of future similar occurrences. There have been several high-profile fires on container and RoRo ships involving dangerous goods in 2019 and 2020. A brief summary of some of these is provided in Table 1.

**Table 1. Summary of selected recent fires on RoRo and container ships**

Vessel Name	Date of Accident	Vessel Type and Brief Description of Accident
<i>Grande America</i>	2019-03-10	RoRo Cargo (ConRo) Vessel – total loss of vessel and cargo, and pollution of the marine environment. The fire resulting in vessel loss started between two containers on the “weather deck” (Italian Directorate General for Rail and Maritime Investigations, 2020).
<i>Yantian Express</i>	2019-01-03	Container Ship - believed to be caused by a misdeclared shipment of charcoal (Maritime Executive, 2020b; German Federal Bureau of Maritime Casualty Investigation (BSU, 2020)
<i>APL Vancouver</i>	2019-01-31	Container Ship – Fire in Cargo Hold (Safety4Sea, 2019)
<i>ER Kobe</i>	2019-02-14	Container Ship – Fire in three containers of charcoal on the upper deck of the vessel (Lo, 2019).
<i>Cosco Pacific</i>	2020-01-04	Container Ship – Fire started in a container carrying lithium ion batteries that had been misdeclared as spare parts (Maritime Executive, 2020a)
<i>KMTC Hongkong</i>	2019-05-25	Container vessel – fire broke out in containers alleged to be carrying calcium hypochlorite – currently believed to be not declared or misdeclared as “non-hazardous” (Voytenko, 2019)

A submission to the IMO by the International Cargo Handling Coordination Association (ICHCA) stated that it was widely suspected that fires onboard the container vessels Yantian Express, APL Vancouver, Grande America and ER Kobe started in containers with undeclared or misdeclared dangerous goods (IMO CCC 2019a). Undeclared dangerous goods have been linked to previous serious fire/explosion incidents – a study in 2010 (Ellis) described six serious fires on container ships occurring during the period from 1998 to 2008.

Baalisampang et al. (2018) carried out a review of fire and explosion accidents in the maritime transport sector from 1990 to 2015 to identify underlying causes. They studied accidents on all types of vessels (including cargo vessels and others not carrying dangerous goods). Four causal factors for the accidents were considered: human error, thermal reaction, mechanical failure, and electrical fault. Under the category “thermal reaction”, the listed root causes included negligence, incorrect stowage, and breach of relevant codes. Proposed preventative or control measures suggested by the authors include: “adequate training for storing and handling Hazardous and Noxious Substances (HNS) goods, effective hazard and safety analysis, and adequate supervision”. This adequate supervision would presumably target cases where lack of knowledge and/or ignoring the rules had occurred. They state that breach of policy and guidelines is a main root cause in fire and explosions that have resulted from thermal reaction.

## 3.5. Non-compliance

As described in the previous section, there have been serious accidents resulting from non-compliance with dangerous goods transport regulations. This section describes information on non-compliance as obtained through inspection program results reported to the IMO and to the Baltic Sea MoU, and from a literature search.

### 3.5.1 Inspections of cargo transport units carrying dangerous goods

Inspections of cargo transport units known to be carrying dangerous goods are done on a regular basis in some countries, but they typically only target a very small percentage of these units. A small number of member countries report their results to the IMO. For example, in 2018, only 7 of 173 member states reported results to the IMO's Committee on Carriage of Cargoes and Containers (CCC) (IMO CCC, 2019b). The percentage of units with deficiencies reported ranged from less than 1% to 42%. The most common category of deficiencies was placarding and marking of Cargo Transport Units (CTU), marking and labelling of packages, and stowage/securing inside the freight containers.

In 2017, inspections under the Baltic Sea MoU showed that 20.5% of the trailers had deficiencies, a majority relating to stowage/securing inside the trailers and placarding and markings. About 4% of the inspected trailers had deficiencies in the documentation (MoU, 2018).

Non-compliance with dangerous goods regulations is a continuing problem that has been present for many years - according to Lloyd's Practical Shipping Guides (2008), between 1987 to 1990, the average safety claims reported by the UK P&I club were: 23% because of incorrect stowage, 8% due to bad handling, 2% because of fraud and 1% failure to collect cargo.

### 3.5.2 Undeclared dangerous goods

The inspection results reported to the IMO's CCC do not give any indication of undeclared dangerous goods as only cargo transport units declared to be carrying dangerous goods are inspected. Detecting undeclared dangerous goods requires inspections of cargo transport units carrying general cargo and information on this type of inspection is very sparse. Dupin (2019) reported on a special project where 500 containers selected by a group of four major container shipping lines were inspected at US ports. The containers inspected included both import and export containers, and those identified to be carrying dangerous goods as well as some noted to be only carrying general cargo. The study found that 55% of the containers had one or more deficiencies. 8% of the import containers and 5% of the export containers had misdeclared cargo. Results of the inspection program were reported to the IMO's Committee on Carriage of Cargoes and Containers (IMO CCC, 2019a).

The German container line Hapag-Lloyd stated that they get around 3,000 undeclared or misdeclared containers per year, according to an article by Paris (2019).

Specific reasons for non-compliance with dangerous goods regulations were difficult to find in the literature, but one of the accident investigation reports provided possible reasons for the specific case investigated. The investigation report for the *Yantian Express* accident (German Federal Bureau of Maritime Casualty Investigation (BSU) stated that if the biochar (which was considered to have

been the cause of the fire) had been correctly declared, it would have required testing by an accredited laboratory to establish that it had a limited ability to self-heat. (BSU, 2020). If it had not passed the test, it should have been declared as dangerous goods class 4.2. The testing incurs a cost. The transport of a Class 4.2 dangerous goods would also have incurred an additional cost as compared to the cost of transporting the material as “coconut pellets” (which is what the contents of the container was incorrectly declared to be).

### 3.6. Measures and initiatives for improving compliance and safety

Measures and initiatives have been developed to reduce the incidence of undeclared and misdeclared dangerous goods, with the intent to improve safety and reduce losses. Through a literature review, measures were found for the following main stakeholder groups:

- Authorities and regulatory bodies
- Carriers (individuals and associations)
- Ports and terminal operators

#### 3.6.1. Authorities and regulatory bodies

Regulations for transport of dangerous goods by sea are established on an international or multi-national level, as described in the previous discussion of the IMDG code and the Baltic Sea MoU. Enforcement of the IMDG code and the Baltic Sea MoU are carried out on a national level, according to national procedures and regulations.

##### Inspections as a means of improving performance

Inspections and checks to ensure enforcement of regulations are carried out on a national level by authorities. Guidance for inspection programmes for cargo transport units carrying dangerous goods have been put forward by the IMO’s Maritime Safety Committee (MSC) (see MSC.1/Circ. 1442, (IMO MSC, 2012). The IMO MSC Circular states that “in those countries where regular inspection programmes have been implemented, a considerable improvement has been experienced in the general compliance with those standards”. However, it should be noted that only a small percentage of member states report inspection results to the IMO. In 2018, only 7 of 173 member states reported results to the IMO CCC (IMO CCC, 2019, CCC6/INF 2). The number of inspections per member state is also very low in many cases. In Sweden, for example 822 units inspected were reported to the IMO in 2018, which is quite a low percentage of the cargo transport units moved.

In 2019, the International Cargo Handling Coordination Association (ICHCA) submitted a proposal to the IMO CCC (see CCC6/10/3) encouraging member states to take into account the importance of implementing, facilitating, and reporting on inspection programmes. It was stated that shipping lines may also carry out inspection activities, although this may not be permitted in every member state. This is an example of how an authority, or a regulatory body may bring in measures that could improve compliance with regulations.

In Sweden, inspections of cargo transport units for compliance with the IMDG code are carried out by the Swedish Coast Guard, according to the regulation “Kustbevakningen (KBV) FAR

2007:9 (RS) ”Kustbevakningens föreskrifter och allmänna råd om Kustbevakningens tillsyn över transporter av farligt gods.” In 2019, there were some court judgements questioning whether the Coast Guard can carry out inspections and report violations based on the IMDG code, because the authorities have not provided a version of the code in the Swedish language. This is discussed in detail in Section 3.7 of this report.

#### Updated guidance to allow information sharing

Amendments to the MSC.1/Circ. 1442 on inspection programmes for cargo transport units carrying dangerous goods encouraged competent authorities to alert other competent authorities when severe infringements of the code had been discovered. The information sharing was noted to be particularly of interest regarding undeclared and misdeclared dangerous goods.

#### Targeted inspections and undeclared dangerous goods

The IMO guidance in MSC1./Circ. 1442 (IMO MSC, 2012) also states that inspections should be targeted towards those containers where there is considered to be a greater risk of non-compliance. It notes that undeclared dangerous goods are a problem, and a targeted selection method should be used to identify general cargo transport units for inspection, to help find undeclared dangerous goods.

#### Non-declared dangerous goods identification system tested in the Republic of Korea

The Republic of Korea developed and tested a non-declared dangerous goods identification system to identify non-declared/misdeclared dangerous goods prior to loading. This was reported to the IMO CCC in 2015 (CCC2/INF 19). The system compares dangerous goods cargo information reported to the port authority with information provided by shippers to the Customs Agency (see IMO CCC 2015). The system identified any cargo where the information for customs suggested the cargo may be dangerous goods and compared it with the dangerous goods declaration system operated by the port authority. Cargos identified to potentially be undeclared dangerous goods were flagged for a joint inspection by both involved agencies. The IT system was implemented in April 2020 (Li, 2020).

Such an approach could potentially work in other countries but would depend on the legal basis for carrying out the inspection and sharing of data. Cooperation between various agencies such as customs, police responsible for ADR / RID checks may help to identify higher risk shippers that could be targeted by IMO inspections. Whether such an approach would work in Sweden would be interesting to investigate in the next phase of the study.

### 3.6.2. Carriers – individual firms, alliances and associations

Initiatives by individual carriers to improve safety with dangerous goods carriage as identified in a literature search included risk investigation, IT solutions to identify cargo, and implementing fines, as described in the following examples:

- Maersk risk guidelines: The guidelines “Risk Based Dangerous Goods Stowage” were developed after the Maersk Honam Accident (Maersk, 2018). These guidelines include recommendations that are more stringent than the IMDG Code – for example they

recommend that stowage of dangerous goods should not be allowed next to the accommodations block of the ship. Although these recommendations are not mandatory for other carriers, they have been presented to the IMO and the Danish Maritime Authority (Maersk, 2018).

*Figure 4. The Maersk Honam accident*



- Maersk stowage requirement: Maersk specified that methyl ethyl ketone peroxide (MEKP) transported on their own vessels should be in a reefer container at maximum of 10 degrees C (likely at a significantly higher cost). This was in response to the fire on the *Charlotte Maersk* that occurred in 2010, that was considered to be caused by self-ignition of MEKP (DMAIB, 2012). A discussion was also raised at the IMO about requiring MEKP to be transported at controlled temperatures.
- Cargo scanning IT tool: Hapag-Lloyd developed a software program called “Cargo Patrol” in 2012 to address the issue of undeclared dangerous goods. The program scans the booking documents of cargo that hasn’t been declared as dangerous goods and searches for anomalies (Hapag-Lloyd, 2019).
- Fines: Fines are now being issued by many shipping lines for undeclared dangerous goods that are discovered. Hapag-Lloyd announced that they would implement a fine of USD 15,000 per container for misdeclaration of dangerous goods (Manaadiar, 2019). Evergreen, Maersk, Hyundai Merchant Marine and OOCL have also announced that they will implement fines (Manaadiar, 2019). ZIM announced in 2019 that it would impose a charge of USD 12,000 per container for misdeclaration, noting that misdeclaration was a breach of contract (Zim, 2019).

In 2011, five of the largest container shipping lines together initiated the Cargo Incident Notification System (CINS), which has the stated intent of increasing safety in the supply chain, reducing cargo incidents, and highlighting issues with particular cargoes and packaging (CINS, 2020). There are currently 17 members. Members upload data on cargo incidents to the CINS database, which is accessible to all members. An analysis is carried out of the data to assess incident trends and in some cases to identify actions to be taken.

### 3.6.3 Port initiatives

Although shipping lines are responsible for carrying dangerous goods and suffering the consequences of any accidents on board, ports may also suffer the effects of accidents if they occur on their property. Several ports have started to implement penalties to reduce undeclared dangerous goods.

Based on a review of fifty port authorities around the world, two port authorities located in New Zealand are implementing penalties. In this regard, the Port of Napier has announced that they will implement a dangerous goods handling charge of \$630 for misdeclared cargo and cargo with an incorrect placard (The Port of Napier, 2020).

Similar, the Port of Auckland is charging a fee of \$1,081.01 + GST for misdeclared cargo. This fee is to cover costs of audits (The Port of Auckland, 2020).

In summary, all actors involved on the transport of dangerous goods are implementing strategies to improve safety and reduce accidents and incidence of undeclared and misdeclared dangerous goods. Measures taken by authorities and regulatory bodies include introducing changes in regulations, changing inspection frequencies, and setting and assessing penalties for non-compliance with the regulations. Carriers may act individually to develop their own procedures and programs for identifying misdeclared dangerous goods and for implementing disincentives such as fines for non-compliance. Carriers may also act collectively through associations to share information and lobby for change. Port and terminal operators have also developed initiatives to improve safety and reduce and detect the incidence of non-compliance with dangerous goods regulations.



## 3.7 The IMDG Code in Sweden – English or Swedish version allowed?

The IMDG Code has been debated in Sweden for many years. This debate was intensified after a ruling by the Supreme Court of Sweden (Högsta domstolen) in June 2019. The problem is directly related to the safety of transport of dangerous goods, especially onboard ships, and is therefore of importance for this particular project.

Section 3.7 is based on an article by Sallander and Nuldén, concerning the problems related to the IMDG Code, published in 2020 in *Förvaltningsrättslig tidskrift*.

### 3.7.1. Implementation of the IMDG Code in Sweden

To begin with, the IMDG Code is an international convention, which means that it has to be implemented into Swedish legislation to be applicable on a Swedish national level. Originally, the Swedish Maritime Administration (Sjöfartsverket) was responsible for the implementation process. The Swedish Maritime Administration also translated the IMDG Code into Swedish.<sup>7</sup> This was the 33<sup>rd</sup> amendment of the IMDG Code, while currently the 39<sup>th</sup> amendment is in force.

The national responsibility of the IMDG code was later transferred from the Swedish Maritime Administration to the Swedish Transport Agency (Transportstyrelsen), which implemented the code in 2013<sup>8</sup>. The Swedish Transport Agency also translated the IMDG Code from English into Swedish. Since the code is updated biannually, the Swedish Transport Agency had to implement the code again in 2015. However, this time the authority selected another implementation method, the incorporation method, which means that the international convention is made part of national law in its entirety. That implied that no translation was made into Swedish, instead the full English version of the text constituted the national legal text. The authority also chose to publish a non-consolidated version of the code, which means that the amendments to the code only show in a separate document that has to be consulted when applying the code. The same method was used when updating the code in 2017 and 2019.

There were several reasons for not translating the code. First, all enterprises that carry out transports of dangerous goods, or leave such goods for transport, are required by law to register a dangerous goods safety advisor. Such safety advisors possess in-depth knowledge about the legal framework related to transport of dangerous goods. Second, the Swedish Transport Agency claimed that all actors within sea transport are comfortable using English. Third, it is probably a substantial economic burden to the authority to maintain an updated translation of the code. The code consists of complex regulations covering almost 1,300 pages.

### 3.7.2. New case law from the Supreme Court of Sweden

In June 2019 the Supreme Court of Sweden ruled in the case NJA 2019 s. 577, referred to as “Laserpekaren III” in Swedish. The case involved an international standard written in English that had been incorporated into national legislation without any translation into Swedish. The standard was about 100 pages of technical nature. The Supreme Court examined the standard in relation to

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<sup>7</sup> SJÖFS 2007:20 Sjöfartsverkets föreskrifter om transport till sjöss av förpackat farligt gods, IMDG-koden, Band 1-2.

<sup>8</sup> TSFS 2013:106 Transportstyrelsens föreskrifter och allmänna råd om transport till sjöss av förpackat farligt gods, IMDG-koden, Band 1-2.

provisions in the law of Swedish language, the law about making provisions public, preparatory works, case law, etcetera.

However, it seems that the court gave highest priority to the principle of legality. The principle is found in the Instrument of Government and in the Penal Code. It is also found in the Treaty of the European Union, the EU Charter of Fundamental Rights, and the European Convention of the Human Rights. More specifically the court focused on the principle of legality in penal law, “*nullum crimen sine lege*”, which means no punishment without legislation. The principle consists of one demand and three prohibitions. In order to be punished: 1. there has to be legislation stating both the crime and the punishment; 2. no retroactive application of legislation; 3. no analogies between laws; and 4. clear and precise formulation of laws. The court also stated the importance of legal certainty. Consequently, the court concluded that it must be possible to understand the content of a provision and therefore legal provisions, connected to penalty, must be written in Swedish.

### 3.7.3. What happened then?

Several public authorities acted upon the case of “*Laserpekaren III*”. First, the Swedish Prosecution Authority (Åklagarmyndigheten) ceased investigating and prosecuting individuals and companies breaching the IMDG Code, with reference to the lack of translation of the IMDG Code. Second, the Swedish Coast Guard instructed their inspectors not to report any suspected breaches of the IMDG Code, due to the position taken by the Swedish Prosecution Authority. Third, the Swedish Prosecution Authority did not show any particular interest in translating the code.

However, a number of Coast Guard inspectors persistently continued to report suspected breaches in an attempt to get the prosecutors to change their position. The question was even tried by the prosecutor general (Riksåklagaren) on June 17, 2020, who decided that no further measures were to be taken.

It is clear that understanding of the public authorities’ view on this matter could be seen as a ‘green light’ to those transporting dangerous goods at sea. A green light to not comply with the legal framework and thereby creating risks for the safety onboard cargo ships. This was also the reason for the researchers to engage in this particular problem which really needed to be solved. As a starting point interviews were conducted and a debate article was written by Sallander and Nuldén, which was accepted by the national newspaper Svenska Dagbladet. The article was published digitally May 21, 2020 and in the paper version May 22, 2020: “*Misstänkta brott med farligt gods utreds inte*”. The Swedish Coast Guard, represented by Head of operational department, J. Norrman, replied in SvD May 26, 2020. Several other newspapers and trade journals also began to write about the problem. It is also clear that several public authorities have tried to persuade the Swedish Transport Agency to produce a translation. There were also debates in the Parliament regarding the language question. In November 2020, Sallander and Nuldén also published a scientific article in *Förvaltningsrättslig tidskrift* about the problems related to the IMDG Code: “*HD om författningstext på annat språk än svenska – Återverkningar även för IMDG-koden?*”.

To conclude, there are now indications that the Swedish Transport Agency has taken a decision to initiate a translation of the code into Swedish. This information is also supported by the trade magazine Proffs (2021) and this is a highly appreciated and welcome decision with regard to the safety when transporting dangerous goods at sea, since transport of dangerous goods is a public concern



## 4. Stakeholder input – interviews

This section analyzes the main results from the online interviews conducted with seven stakeholders involved in the project. Specifically, the interviews were conducted with a ship operator (Stena Line Freight), port authorities (Trelleborgs Hamn, Hallands Hamnar, Karlshamns Hamn), a container terminal (APM Terminals), a P&I club (the Swedish Club) as well as government agencies (the Swedish Coast Guard and the Swedish Transport Agency).

These interviews aimed to collect information to formulate responses to the six questions described previously (see section 1.2), to get an overview of the problem of undeclared and misdeclared packaged dangerous goods transported on ships calling Swedish ports. Based on the six main objectives of this study, all interviews were designed in relation to four main subjects:

- Reasons for misdeclaration of dangerous goods:
  - Is misdeclaration related to lack of attention or knowledge or is it a conscious act and which actor in the transport chain is behind the misdeclarations?
  - Does the total transport cost, for land-sea-land, have an influence?
  - What is gained by actors from incorrect declaration of goods and what incentives could influence the actions of the actors whose incorrect behavior can lead to accidents?
- Terminal operations and logistics organization:
  - Do the logistics for loading cargo on ships, such as large container vessels, have an impact on the cost by goods type (dangerous goods / non-dangerous goods)?
- Regulation of dangerous goods:
  - Are the regulations in the IMDG code and ADR / RID in connection with the transition between the transport modes difficult for actors in the transport chain to apply?
- Information management systems:
  - What possibilities does a transparent information management system provide for strengthening regulatory compliance in the transport industry, and thereby lead to safer transport, more efficient cooperation between authorities, and improved opportunities for control and inspection?

In continuation, the main results and comments related to all interviews are described in the following sections, grouped by main subject.

## 4.1. Reasons for misdeclaration of dangerous goods

As mentioned previously, misdeclaration of dangerous goods has resulted in some serious accidents with major consequences for the crew, the vessel, and the cargo. The interviewees described a number of reasons for misdeclaration of dangerous goods as follows:

Firstly, reliable information flow is necessary for all actors in the transport chain. If the information provided by the client is not accurate, the entire chain will use incorrect information, which results in the incorrect treatment of dangerous goods. The motives behind this misdeclaration of dangerous goods are not clear, but some interviewees suggest that this behavior could diminish administration processes and reduce the risk of being stopped in inspections. Furthermore, misdeclaration of dangerous goods could result in fewer constraints in the transport because these types of cargo requires special departures. To avoid incorrect use of information, it is important to enhance coordination between actors in the transport chain. In practice, port authorities, terminals, and shipping operators are checking and matching documents provided by the client with marks (i.e., labels) on the containers.

Secondly, another interesting comment suggests that misdeclaration of dangerous goods can be related to that the regulations for different transport modes are partly different. In particular, actors in the transport chain could make mistakes in intermodal transport where different regulations should be applied at different steps of the transport system, e.g., ADR (road), RID (rail) and IMDG Code (sea). This result could be related to the fact that new or small companies often do not know the regulations related to transporting dangerous goods. Large companies, on the other hand, face a challenge in that dangerous goods often constitute only a small part of their cargo. Furthermore, as pointed out previously, the Swedish legal system can only prosecute based on legal texts in Swedish and as long as this is the case, the courts are toothless against violation of the IMDG code until it is translated into Swedish<sup>9</sup>.

Finally, movement of dangerous goods requires a special fee that should be paid as a consequence of the risk of carrying these goods in dedicated areas in the terminal. This extra fee is normally not perceived as the main reason for misdeclaration of dangerous goods, except for some specific situations. One such situation mentioned by the respondents is RoRo vessels traveling to the Baltic States with low-paid Eastern European truck, who are tempted to save the money for the dangerous goods fee. However, instead of the special fee, the economic incentives are more related to disruptions in the operations, such as being forced to wait for specific ferry departures, increased administrative cost etc.

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<sup>9</sup> For further details, see section 3.7.

## 4.2. Terminal operations and logistics organization

In order to explore the causes of dangerous goods accidents and incidents, this study has considered logistics organization related to the movement of dangerous goods. Findings are presented as follows.

First, port authorities and terminal operators have to deal with an extra cost related to safety. Thus, these actors have to plan and separate dangerous goods in specific areas in the terminal. Furthermore, handling dangerous goods implies extra work and investments in dedicated areas in the terminal.

Second, according to shipping operators, there has been a development towards more mixed loads on trucks in the intra-European trade in recent years. Thus, each truck typically contains a greater mix of cargo and consequently, there is more fragmentation, with smaller consignments and more steps via terminal handling. In order to prevent potential incidents, it is important to get correct information and enhance communication among all actors in the transport chain.

Finally, usually, the logistics process and restrictions on the number of dangerous goods in the vessel it is not a major problem, specifically for the frequent routes because they have regular lines, but it is worse for non-frequent routes. Instead of an insufficient capacity problem, the most common problem is waiting when the dangerous goods area in the port terminal is full.

## 4.3. Regulation of dangerous goods transport

Specific directives related to dangerous goods are implemented in order to control and avoid potential incidents and accidents. In this regard, it is important to understand how this relevant aspect is considered among all actors.

One of the main problems identified is the existence of different types of laws, ordinances, and regulations connected to shipping and other transport modes. Different regulations applied at different steps of the transport chain with partly different requirements could confuse transport actors. For example, the movement of dangerous goods by road is controlled by the ADR, while transport of dangerous goods by sea is regulated by the IMDG Code. Consequently, there are different regulations that need to be followed and all the actors in the transport chain need to ensure good internal communication and possession of the proper shipping documents.

Finally, shipping operators or port agents can implement regulations differently. On the one hand, at the shipping line level, some use the Baltic Sea MoU while others implement the IMDG Code. On the other hand, at the port level, sometimes it is difficult to know if the port applies the ADR (road) or the RID (rail) requirements or, in contrast, the IMDG Code for maritime transport. This result is in line with a study conducted by Lindberg and Simonsson (2017). Through a survey of different ports in Sweden, the authors investigate if port authorities differentiate between all the different regulations, i.e., the ADR, the RID, and the IMDG Code, when moving dangerous goods. Their results suggest that, in practice, there is a mix of implementation. Thus, while some ports use only the IMDG Code for moving dangerous goods in their facilities, other ports partially implement the ADR and IMDG Code (Lindberg and Simonsson, 2017).

## 4.4. Information management systems

Developing a transparent information management system is crucial to increase regulatory compliance, managing safer transport, enhancing cooperation between transport chain actors, and facilitating efficient inspection and control of dangerous goods.

As a general result of the interviews, all stakeholders conclude that it is important not only to enhance the integration of information flow but also to develop digitalization and electronic booking systems to facilitate the flow of information along the transport chain.

Likewise, a proper information management system is the key to having a good “match” or coordination of information provided by customers, labels on the container, and booking numbers.

In summary, the main results suggest that the existence of different regulations for land transport (ADR or RID) and sea transport (IMDG Code) for dangerous goods, can be a risk for controlling these goods. Furthermore, it is important to enhance coordination between different actors and increase digitalization to control information flows.

## 5. Discussion, conclusions and next steps

This research aims to investigate the problem of undeclared and misdeclared dangerous goods transport on container and RoRo vessels and investigate the circumstances and causes that lead to incorrect declaration. In order to analyze this situation, this study conducted a literature review and conducted several interviews with transport chain representatives of stakeholders in Sweden. Relevant issues such as contribution of undeclared/misdeclared dangerous goods to accidents, applicability and effectiveness of regulations, compliance, enforcement, and reasons for incorrect or lack of declaration were investigated.

Undeclared and misdeclared dangerous goods transport continues to be a problem internationally, as evidenced by a number of recent accidents. This has also been a problem in the past, as shown through a literature review, and accidents attributed to undeclared or misdeclared dangerous goods have resulted in significant consequences such as fatalities and loss of ship and cargo. The extent of undeclared dangerous goods transport is difficult to quantify as most inspections carried out for the IMO, including those carried out in Sweden, are carried out on Cargo Transport Units (CTUs) that are already known to be carrying dangerous goods. Thus, misdeclared dangerous goods can be identified in the inspections, but undeclared dangerous goods in unmarked containers, semi-trailers and trucks would require an inspection program that targets all types of CTUs. An initiative that involves cooperation between various agencies such as customs and police responsible for ADR / RID checks may help to identify higher risk shippers that could be targeted by inspections to find undeclared dangerous goods. This could be investigated in more detail in a future study.

Regarding the reasons for not declaring or misdeclaring dangerous goods, the stakeholders interviewed suggested several possible causes such as reduced costs and administrative burden for the transporter or consignor, or fewer constraints regarding the number of departures where the CTU could be carried.

The importance of standardizing information flows among actors in the transport chains was raised in the interviews. For this purpose, implementing proper information management systems through digitalization and electronic booking systems can facilitate the availability of reliable information for the correct treatment of dangerous goods.

Measures aimed at improving compliance with dangerous goods declaration requirements, as found in the literature review, include increased and more targeted inspection by authorities, improved information flows and cross-comparison between agencies such as port authorities and customs agents. The problem with legally enforcing the international IMDG code in Sweden, linked to issues requiring translation from English into Swedish for the code to be enforced according to Swedish law, was described and illustrates the difficulties in enforcing compliance measures such as inspections and fines.

Stakeholders interviewed in Sweden identified improved understanding of regulations across different transport modes as a way forward. Thus, to avoid confusion regarding the cargo and related sea transport regulations (IMDG Code) and other transport mode regulations (ADR/RID), public authorities might outline clear procedures for the application of different regulations related to dangerous goods among the transport chain.



Finally, to conduct efficient movement of dangerous goods and reduce waiting times and administration processes for customers, it is important to enhance planning and coordination between freight forwarders and port authorities.

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## **Legislative acts**

1962:700 Brottsbalken

1974:152 Regeringsformen

1976:633 om kungörande av lagar och andra författningar

2009:600 Språklagen

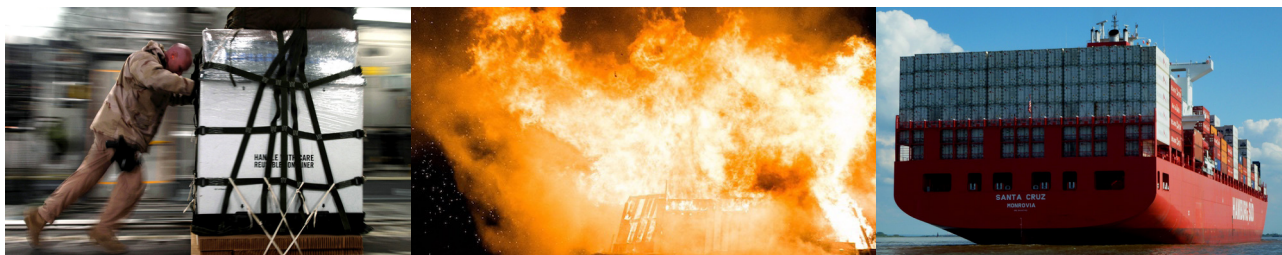
SJÖFS 2007:20 Sjöfartsverkets föreskrifter om transport till sjöss av förpackat farligt gods, IMDG-koden, Band 1-2

TSFS 2013:106 Transportstyrelsens föreskrifter och allmänna råd om transport till sjöss av förpackat farligt gods, IMDG-koden, Band 1-2.



Lighthouse samlar industri, samhälle, akademi och institut i triple helix-samverkan för att stärka Sveriges maritima konkurrenskraft genom forskning, utveckling och innovation. Som en del i arbetet för en hållbar maritim sektor initierar och koordinerar Lighthouse relevant forskning och innovation som utgår från industrin och samhällets behov.

**Lighthouse – för en konkurrenskraftig, hållbar och säker maritim sektor med god arbetsmiljö**



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