PUBLICATIONS OF THE HAZARD PROJECT

31:2019

Transport damage analysis of dangerous goods —stakeholder update for Baltic ports

Håkan Torstensson

Daniel Ekwall

EU STRATEGY FOR THE BALTIC SEA REGION FLAGSHIP

Interreg Baltic Sea Region

EUROPEAN UNION EUROPEAN REGIONAL DEVELOPMENT FUND

HAZARD

31:2019

Transport damage analysis of dangerous goods —stakeholder update for Baltic ports

Håkan Torstensson

Daniel Ekwall

Turku 2019

ISBN 978-951-29-7661-4

2019

PUBLISHED BY:
HAZARD Project
Turku School of Economics
University of Turku
Rehtorinpellonkatu 3, FI-20014 University of Turku, Finland
http://blogit.utu.fi/hazard/

This publication has been produced with the financial assistance of the European Union. The content of this publication is the sole responsibility of the publisher and under no circumstances can be regarded as reflecting the position of the European Union.

The content of this publication reflects the authors' views. The Investitionbank Schleswig-Holstein is not liable for any use that may be made of the information contained herein.

Photo credits for the cover: Mr. Esko Keski-Oja, Finland

Keywords:

Cargo damage, Dangerous goods, Risk management, Port facilities, Transport conditions

Abstract

The transport of dangerous goods incorporates hazards, which may seriously affect people, property and the environment in various adverse ways. In a previous HAZARD project report, transport stresses were addressed, in particular concerning their impact on dangerous goods transport and the risk of subsequent accidents. The report referred to essential results from the vast research and regulatory work, which was carried out by the end of the 20th century in order to provide guidance for designing and testing packagings and packages for the transport. There is now a need to scrutinise those results with regard to possible changes over time. The present report therefore addresses some of the issues again, now based on a questionnaire to stakeholders, aiming to identify whether conditions are sufficiently stable to validate the results of the first report.

The results presented here are based on a questionnaire to stakeholders which, with reservation for its very limited response, essentially confirms that the previous findings are still valid. As always, organisational issues and human error are the primary causes of adverse events, but may still not be adequately addressed in activities for prevention of cargo loss and damage. Education, instructions, training and, where necessary, supervision are therefore of crucial importance. In addition, ensuring that equipment and technology are in order and not malfunctioning, is essential. Appropriate quality routines, inspections and testing should be in focus.

While previous research thus to a large extent is still applicable, there is always a need for refinement. At the organisational level as well as in associated research, relevant risk analyses should be carried out. As noted in the previous report, a first step for future research in this area should be a simple risk assessment for the most common causes of cargo damage (shock and impact, vibration, stacking overload, torn packaging, moisture, mould, wet packaging, overheating, freezing, overpressure, leakage and fire) but also in relation to other reasons for cargo loss such as theft or jettison. The present report contributes to the understanding of whether the trends regarding cargo damage and loss are changing or remain stable over time, which helps to assess the relevance of available data and the need for further investigations. Nothing in this report contradicts or falsifies the findings summarised in the previous report, which in a way, however limited, can be considered validated.

List of acronyms

IBC	Intermediate Bulk Containers
BSR	Baltic Sea Region
RPN	Risk Priority Number
IMDG	International Maritime Dangerous Goods Code
ISPS	International Ship and Port Facility Security Code

TABLE OF CONTENTS

List of Tables

1 OBSERVED PROBLEM AND REPORT OBJECTIVES

1.1 Introduction

In HAZARD Report 29:2019, Torstensson and Ekwall (2019) addressed the issue of transport stresses, in particular concerning their impact on dangerous goods transport and the risk of subsequent accidents. Also, for other types of cargo, adverse transport conditions can imply damage and loss. It is essential to both avoid such conditions and design adequate protection for the cargo. The field of technology addressing difficult mechanical, climatic and other environmental influence on products, such as during transport, and how to protect the products from such influence is often described as Environmental Engineering (CEEES 2013).

The report demonstrates how transport damage can have different causes such as accidents, unsatisfactory packaging, rough transport conditions, unprofessional stowage, stacking and segregation, displaced lashings, and many varieties of negligence and ignorance. Transport damage can also have different consequences, for example malfunction of equipment, material fracture, overheated or frozen cargo, mildew overgrowth, leakage of liquids and many other outcomes. In the case of dangerous goods, broken packagings and subsequent leakage of the dangerous substances may lead to severe damage and in the worst case to a disaster.

Very focused research work was made by the end of the 20th century, regarding the characterisation and measurements of transport stresses, the chains of events leading to different damage modes, as well as methods to reduce such stresses and to design appropriate protection. In the case of dangerous goods, committed work was made to amend the UN Model Regulations, in particular on the topic of relevant construction and performance requirements for packagings, tanks, Intermediate Bulk Containers (IBCs) and tank containers. These were also implemented in the mode regulations for road, rail, sea and air transport.

The report has captured essential results from this research and regulatory work, in order to provide guidance for designing and testing packagings and packages for the transport. However, over a period of about 20 years, conditions may change for a number of reasons, and in order to, sort of, calibrate the presented results in the report, an update was deemed appropriate. The present report therefore addresses some of the issues again, now based on a questionnaire to stakeholders, aiming to identify whether conditions are sufficiently stable to validate the results of the first report.

1.2 Background

The HAZARD project aims at mitigating the effects of major accidents and emergencies in major multimodal seaports in the Baltic Sea Region (BSR), all handling large volumes of cargo and/or passengers. Ports, terminals and storage facilities are often located close to residential areas, thus potentially exposing a large number of people to the consequences of accidents.

Topics include harmonisation and implementation of safety and security standards and regulations, communication between key actors, the use of risk analysis methods and adoption of new technologies. Leakage of hazardous materials, fire on a passenger ship at a port, oil spill in port areas as well as explosion of gases or chemicals are types of disastrous events that are addressed in the HAZARD project.

There is also a problem of cargo damage, which may or may not have disastrous consequences, partly depending on whether dangerous goods are involved. Accidental events leading to cargo loss or damage, may occur anywhere in the transport chain, when cargo is carried on board ships, in trains or in lorries. Risk for an accident to occur is not certainly the least in transhipment nodes i.e. harbours, terminals or intermediate storage facilities, where the goods are handled, loaded, unloaded and transferred, thus making seaports a focal point in this respect. In the ports, damaged packages and containers must be identified and relevant mitigating and preventive safety measures taken.

The transport of dangerous goods incorporates hazards, which may seriously affect people, property and the environment in various adverse ways. One preventive measure is to require sturdy, certified packaging and tanks, which can withstand occurring transport stresses and thus reduce the likelihood of leakage and damage. For non-dangerous goods, there is also a risk of damage by excess transport stresses, and the same challenge of designing an adequate protection, now primarily for the goods themselves, is obvious.

Nevertheless, transport damage occurs with different causes such as accidents, unsatisfactory packaging, rough transport conditions, unprofessional stowage, stacking and segregation, displaced lashings, and many varieties of negligence and ignorance. In a previous HAZARD report, an overview was given of a large number of transport stress types and modes of cargo damage (Torstensson & Ekwall 2019).

As mentioned in the above introduction, several research and regulatory efforts were made by the end of the last century and for example the performance testing scheme of the UN Model Regulations (2017) has not seen any significant changes since then. Many results of those investigations and their interpretation were summarised in the report. It is essential, however, to revalidate them after a period of time, as transport conditions, packaging technology and a number of other factors chage with time.

This report is based on a limited number of stakeholder views and conclusions, regarding the conditions in 2019 in the BSR. As it was not feasible to collect very broad views on the current situation, the results in the present report must be seen as indicative, only.

2 THE TRANSPORT ENVIRONMENT

The underlying report presents the list of transport stresses of **Table 1**.

Table 1: *Types of transport stresses and their causes (compiled by authors)*

Mechanical	
Impact, vertical	Packages fall to the floor during loading and unloading, from nets, pallets, conveyors, vehicles etc. Toppling. Throwing.
Impact, horisontal	Vehicles braking or accelerating. Swinging cranes. Rapid deceleration of conveyed or rolling packages. Throwing
Vibration	From handling equipment. Engine and transmission in road vehicles. Wheels, suspension and rail condition in railway vehicles. Machine vibrations in ships. Engine and aerodynamic vibrations in airplanes.
Compression	Stacking. Transient loads during transport. Compression from lashings, crane lifting, slings, grappler arms etc.
Shearing	Uneven storage conditions. Uneven lifting by inadequate methods or equipment.
Penetration, puncture and tearing	Hooks, protruding objects. Inadequate handling or handling equipment.
Climatic	
High temperature	Sunlight. Nearby boilers, heating systems, etc. Solar heat in warehouses or uninsulated vehicles. High ambient temperature.
Low temperature	Unheated storage space. Air transport in unheated cargo space. Refrigerated storage.
Low pressure	Increasing altitude, in some airplanes with non-pressurised cargo holds.
Light	Sunlight, ultraviolet radiation. Artificial light.
Water, fresh	Rain, during movements, loading, unloading, warehousing and storage. Puddles and flooding. Condensation.
Water, contaminated	Salt water spray on deck. Salt water accumulated in docks, cargo holds etc. Bilge water. Industrially contaminated water.
Dust	Wind-borne particles of sand etc.
Water vapour	Atmospheric moisture, natural or artificial.
Biological	
Micro-organisms, fungi, mildew, bacteria	Ubiquitous, adapting to various conditions. Require moisture, will usually not grow or proliferate below 70% R.H. Grow in a broad temperature interval.
Beetles, moths, flies, ants, termites	Development unlikely below 15° C. Relative humidity of 70 % favours most insects, but some develop in drier conditions. Source is usually eggs in packaging material or influence from other packages or the environment.
Mites	Like insects, but more sensitive to dry conditions (below 60 % R.H. critical).
Rodents	Present in warehouses, sheds, storage areas, cargo holds etc. Attack most materials.
Contamination from other cargo	
Packaging materials	Deleting marking, printing etc. by rusty metal straps or wires. Moist packaging material influencing water-sensitive materials, glue, or metal components.
Leaking contents	Damaged container for liquids or solids. Adjacent packages may be partly or totally destroyed.

There is no indication that any significant changes to this list have taken place during the past 20–30 years. There are neither types to be added nor any that can be removed. Some very rare environmental stresses have not been considered, such as radioactive radiation or magnetic influence.

The table will form the basis for the present analysis, where stakeholders' responses to a questionnaire are taken into account. There were in total seven questionnaires filled in and returned, so the result must be regarded as indicative only. The respondents (identified as R1, R2…R7) represented the following type of organisations, where identifiable. They had the option of answering anonymously.

R1	Port	Finland
R2	Oil harbour	Finland
R3	Retailer	Sweden
R4	Anonymous	Withheld
R5	Anonymous	Withheld
R6	Insurance	Finland/Europe
R7	E-commerce retailer	Sweden

The questionnaire is attached to this report as Annex 1.

2.1 Perceived development

The principal question is whether the situation has improved or worsened regarding cargo damage and loss and regarding severity of stresses. There is little reason to expect it to become more severe, considering that the earlier efforts of measuring and analysing the transport environment and cases of loss and damage. Technological development, which resulted in a number of preventive measures including awareness-building, rule-making, increase in containerisation and automated handling, development in packaging technology and better packing and securing practices, can also be seen as a factor preventing the situation from becoming worse. On the other hand, supply chains have become longer, global trade has increased and the added value of goods is often higher, which could have had an adverse effect.

The questionnaire generated the following views by responding stakeholders, concerning the perceived development over time:

The risk for cargo loss has

- remained static: 4
- increased slightly: 0
- decreased slightly: 1
- increased significantly: 0
- decreased significantly: 1
- not been an issue: 1

Clearly none of the respondents feel that the risk has increased.

2.2 Mechanical stresses

The presence of cargo damage by mechanical stresses was addressed in two questions, for non-dangerous goods and dangerous goods, respectively. The result is displayed in **Table 3**.

Respondents were asked to estimate the frequency and the impact (consequence) of each factor at a scale 1–5, 1 being the most important. By multiplying the frequency and the impact severities, a Risk Priority Number (RPN) is calculated and a corresponding assessment is presented in **Table 3**. Coarsely, the following estimate of the risk applies (**Table 2**).

Table 2: *Risk levels, summarised from frequency and impact indicated by the scale of the corresponding risk priority number, RPN (compiled by authors)*

RPN	Risk level
1–5	Very high
6–10	High
11–15	Medium
16–20	Small
21–25	Very small

Table 3: *Severity of mechanical stresses on transported goods (compiled by authors)*

Respondent vs. Type of stress	R1	R2	R3	R4	R5	R6	R7
Shock and impact	None	None	Medium	Very high	Very high	High	None
Vibration	None	None	Small	None	Small	Very high	None
Compression (stacking)	None	None	Small	High	High	Small	Medium
Tear	None	None	Small	High	Medium	High	None

Relevant answers refer mainly to packaged goods. Some types of cargo, such as electronics, are very sensitive to shock and vibration. Dangerous goods must have packaging that is certified (UN marked) to withstand shock and compression/stacking, for some types (such as Intermediate Bulk Containers, IBC) also vibration and for flexible IBC tear.

2.3 Climatic stresses

The presence of cargo damage by climatic stresses was addressed in two questions, for non-dangerous goods and dangerous goods, respectively. The result is displayed in **Table 4**.

Table 4: *Severity of climatic stresses (compiled by authors)*

Respondent vs. Type of stress	R1	R2	R3	R4	R5	R6	R7
Water, moisture	None	None	Very high	High	Small	Medium	Medium
High temperature (Overheating)	Medium	None	Very small	None	Small	Very high	None
Low temperature (freezing)	None	None	Very small	None	Very small	Very high	None

No specific conclusion can be drawn from this result. Stakeholders have varying experience and manage different types of cargo.

2.4 Other stresses and damage modes

Theft, fire and jettison were brought up as causes of cargo loss, together with leakage and overpressure, which may be consequences of various transport conditions. Results are presented in **Table 5**.

Table 5: *Other stresses and damage modes (compiled by authors)*

Respondent vs. Type of stress or damage mode	R1	R2	R3	R4	R5	R6	R7
Theft	None	None	Very high	High	Small	Medium	None
Fire	Medium	None	Very small	None	Small	Very high	None
Jettison	None	None	Very small	None	Very small	Very high	None
Overpressure						Very high	None
Leakage						Very high	Very small

Also, this result merits no specific conclusions. Again, stakeholders have varying experience and manage different types of cargo.

2.5 Causes of cargo loss and damage

For risk analysis and preventive safety work, the immediate and underlying causes of adverse events are essential to know. A number of typical causes were ranked by the respondents, according to ***Table 6***. The scale is from 1, most important, to 5, least important. For no ranking, a '6' has been added to facilitate averaging.

Table 6: *Causes of cargo loss and damage (compiled by authors)*

Cause | Respondent N:o	R1	R2	R3	R4	R5	R6	R7	Average
Insufficient cargo securing (incl. missing dunnage)	1	-	1	2	4	1	5	2.3
Insufficient packaging	1	-	3	6	3	1	4	3.0
Failure to predict adverse conditions in transport	6	-	6	6	5	3	3	4.8
Faulty stacking	3	-	4	3	6	2	2	3.3
Mechanical handling	1	-	2	4	1	2	6	2.7
Manual handling	1	-	5	1	2	1	2	2.0
Access by unauthorised persons	4	-	6	6	6	1	6	4.8
Other	-	-	-	-	-	-	-	6.0

The result confirms earlier findings that manual handling and insufficient cargo securing are the most common causes of cargo loss and damage.

2.6 Need for support

Information and training are often asked for by stakeholders. Several training programmes exist and are in many cases required such as for dangerous goods transport. However, on asking whether there is a need for support related to regulations (IMDG Code, ISPS Code, etc), or a need for support related to specific procedures (dangerous goods handling, packing, stowage and segregation, etc), the following response was collected (**Table 7**). Left blank is interpreted as no need.

There was also an option to consider the need of a handbook in either 1) cargo securing, 2) packing and stowage of dangerous goods, 3) cargo damage mitigation or 4) theft prevention.

The answers indicate that there is an interest in having access to some sort of decision support in these matters. Clearly, such material is available, but it may require updating and adaptation to current supply chain types.

Table 7: *Expressed need of support, out of 7 respondents (complied by authors)*

	Regulations			**Procedures**		
	Yes	***Maybe***	***No***	***Yes***	***Maybe***	***No***
Web-based support	3	1	3	2	1	4
Printed explanatory material	1	1	5	3	1	3
Courses, training	2	0	5	2	0	5

Table 8: *Expressed need of a handbook support for specific topics, out of 7 respondents (compiled by authors)*

	Yes	**No answer**
Cargo securing	2	5
Packing and stowage of dangerous goods	3	4
Cargo damage mitigation	3	4
Theft prevention	3	4

2.7 Specific dangerous goods issues

Respondents were asked to describe problems related to dangerous goods, in particular with regard to transport stress issues. Answers were not exhaustive, but some observations of interest were noted, viz. that *theft* has decreased significantly, due to unitised cargo, *overheating* may occur, and *leakage* was observed once in a year. Some remarked that damage is due to the transport system, which is unsurprising.

2.8 Quality assurance work

Some items of the questionnaire were related to preventive or quality assurance efforts carried out. The results per respondent are summarised in **Table 9**.

Table 9: *Preventive and quality assurance actions (compiled by authors)*

Actions for cargo loss prevention	R1	R2	R3	R4	R5	R6	R7
Property and equipment maintenance programme	Yes (by operator)	-	No	-	-	Yes	No
Staff training programme	Yes	-	No	-	-	Yes	No
ISPS Compliance checks	Yes	-	No	-	Yes	Yes	No
Written procedures for managing damaged or lost cargo	Yes (by operator)	-	Yes	-	-	Yes	No
24-hour security guards	Yes	-	No	-	Yes	Yes	No
All buildings/perimeter fences/gates alarmed	'Mainly'	-	No	-	-	Yes	Yes
Close Circuit TV	Yes	-	Yes	-	-	Yes	Yes
Continual documentation security checks	Yes	-	Yes	-	Yes	Yes	No
Other		-		-			
Risk analyses about cargo handling	For rescue plans	-	No	-	Yes (Seveso III guideline)	Yes	N/A
Transport stress measurements	Not known	-	No	No	No	Yes	No

Due to the different types of respondents, some may not have a reason or position to carry out activities to prevent cargo damage and loss. However, the result indicates that there is room for improvement regarding such preventive safety and security work.

3 CONCLUSIONS AND RECOMMENDATIONS

Comparing with published observations from the maritime insurance sector, there is an indication that frequency and cost of damage and loss increase slightly (The Swedish Club 2016). This material covers P&I claims related to cargo, thus covering the ship owner's responsibility for the ship operation, while loss and damage not attributed to the ship operation are not included.

But the picture is ambiguous; at the same time, it is stated that for claims below USD 5,000 there is actually a drop in frequency. Estimated reason for the increase of larger claims is that more intense trade with less time on board to prepare for critical operations has resulted in a higher number of crew-related incidents. ***Table 10*** shows the frequency of different causes for loss or damage. "Inherent vice" means that the cargo is not in proper condition when it is loaded. The frequency of inherent vice is rather high, but it is also the primary cost driver in claims, representing 12.2 % of the claims cost.

Table 10: *Frequency of causes per loss code, years analysed: 2005–2014 (The Swedish Club 2016)*

Improper cargo handling, shore-side 21.4 %	Poor stowage 1.92 %
Improper cargo handling, shipside 9.47%	Collision 1.92 %
Poor tally 8.23%	Insufficient lashing/securing by shipper 1.92 %
Damage prior to loading 6.17 %	Insufficient lashing/securing by stevedore 1.78 %
Heavy weather 6.04 %	Leaking vents 1.78 %
Flooding of hold 5.90 %	Grounding 1.65 %
Multiple causes 5.35 %	Fire 0.82 %
Leaking hatch covers 4.39 %	Insufficient lashing/securing, shipside 0.82 %
Insufficient cleaning 4.25 %	Leaking pipes 0.82 %
Inherent vice 3.29 %	Leaking cargo 0.69 %
Poor monitoring/maintenance of reefer unit 2.61 %	Loading heavy containers on top of light 0.55 %
Reefer mechanical failure 2.61 %	Blocked bilges 0.41 %
Damage post discharge 2.61 %	Contact 0.27 %
Leaking container 2.33 %	

Note *Claims: USD 5,000–3,000,000. Types of vessels: Bulk carriers, containers and tankers*

The present investigation is very limited in terms of received response, but it does not indicate that conditions have become significantly more severe during the past 20 years. The perception is that the level is approximately the same, or, if anything, slightly decreased.

Recommendations that can be highlighted address all nodes and links in the supply chain. The responsibility of all must be emphasised by the management being a role model.

- Better and recurring training on procedures and practical skills. This comprises packing, securing, loading and stowage, regulatory issues, transport operation, and a lot more.
- Improved risk awareness
- Improved communication routines and skills, in particular risk and safety communication
- Enforcing best practices and approved procedures, and avoiding complacency
- Acknowledging cultural differences between nationalities, company and professions.
- Proper testing procedures to ensure the cargo is within the specifications

Table 11: *Underlying causes of dangerous goods accidents in Sweden during 2007–2012? (MSB, 2014)*

Background causes	No. of accidents	Background causes	No. of accidents
Equipment issues	***135***	Bad working conditions	1
Component of equipment faulty	16	Lack of commitment or knowledge in management	0
Inadequate maintenance	13	Other organisational issue	35
Faulty design	8	***Human error***	***172***
Technology-related problems	8	Mistakes or negligence	46
Incompatible material vs. substance	5	Rules or instructions not observed	21
Foreign object or substance	3	Misunderstanding	21
Other technological or equipment fault	71	Intentional action	3
Organisational issues	***80***	Missed signal, indication or symbol	2
Inadequate self-inspection	20	Illness	2
Lack of training, information or instructions	16	Stress	2
Inadequacies in work supervision or management system	6	Alcohol or drugs	0
Inadequate legislation or regulation	2	Other human error	75
		Total	**387**

In this context it is also of interest to look at ***Table 11*** again. Here, there are no specific restrictions to ship operation, instead the restriction is to dangerous goods only. The compilation is from the Swedish authority MSB and ranks the causes of events in a human-technology-organisation perspective (MSB 2014).

The ***Table 11*** underpins the list of recommended actions above. Obviously, the conclusion here, as in almost all cases, is that organisational issues and human error are the primary causes of adverse events. Therefore education, instructions, training and, where necessary, supervision are of crucial importance. In addition, ensuring that equipment and technology are in order and not malfunctioning, is essential. Appropriate quality routines, inspections and testing should therefore be in focus.

At the organisational level as well as in associated research, relevant risk analyses should be also carried out. As noted in the previous report, a first step for future research in this area should be a simple risk assessment for the traditionally most common causes of cargo damage (shock and impact, vibration, stacking overload, torn packaging, moisture, mould, wet packaging, overheating, freezing, overpressure, leakage and fire) but also in relation to other reasons for cargo loss, such as theft or jettison (Torstensson & Ekwall 2019).

The present report contributes to the understanding of whether the trends regarding cargo damage and loss are changing or stable over time, which helps assess the relevance of available data and the need for new investigations. Nothing in this report contradicts or falsifies the findings summarised in the previous report, which in a way, however limited, can be considered validated.

PUBLICATION BIBLIOGRAPHY

CEEES (2013), Confederation of European Environmental Engineering Societies, www.ceees.org/downloads/brochure/CEEES%20Broschure%202014_1.pdf, accessed 11/4/2019.

MSB (2014), Transport av farligt gods, Händelserapportering 2007-2012 (Transport of dangerous goods, Event reporting 2007-2012, in Swedish), MSB786, Myndigheten för samhällsskydd och beredskap, Karlstad (www.msb.se/RibData/Filer/pdf/27510.pdf).

The Swedish Club (2016), P&I Claims Analysis, www.swedishclub.com/media_upload/files/Publications/P%26I%20Claims%20Analysis%20web.pdf, accessed 3/4/2019.

Torstensson, H and D. Ekwall (2019), Transport Damage Analysis of Dangerous Goods: State-of-the-art Report for Baltic Ports, Publications of the HAZARD project 29:2019.

UN Model Regulations (2017), UN Recommendations on the Transport of Dangerous Goods – Model Regulations, 20th revised edition, United Nations.

ANNEX 1

QUESTIONNAIRE - Cargo loss prevention, general and dangerous goods

1. ***What types of cargo loss and damage do you experience in port? Please rank the following, with regards to frequency (likelihood) and impact (consequences). (1= Most important, 5= Least important)***

	Frequency	Impact
Shock and impact damage		
Vibration damage		
Stacking overload		
Torn packaging		
Moisture, mold, wet packaging		
Overheating		
Freezing		
Overpressure		
Leakage		
Theft		
Fire		
Jettison		

Other:

Free text:

2. ***Based on your experience over the past 3 years, the risk for Cargo loss of general and dangerous goods, for your organisation has (pick one):***

   a) Remained Static ☐
   b) Increased Slightly ☐
   c) Decreased Slightly ☐
   d) Increased Significantly ☐
   e) Decreased Significantly ☐
   f) Not been an issue ☐

3. ***Can you describe problems with dangerous goods, especially, regarding issues linked to:***

- Shock and impact damage:
- Vibration damage:
- Stacking overload:
- Torn packaging:
- Moisture, mold, wet packaging:
- Overheating:
- Freezing:
- Overpressure:
- Leakage:
- Theft:
- Fire:

Free text:

4. ***Rank the different reasons for cargo loss and damage? (1= Most important, 5= Least important)***

- Insufficient cargo securing (incl. missing dunnage):
- Insufficient packaging:
- Failure to predict adverse conditions in transport:
- Faulty stacking :
- Mechanical handling:
- Manual handling:
- Access by unauthorized persons:
- Other

5. ***Is there a specific programme for cargo loss prevention in force? Please tick applicable elements. (Yes/No answers on each statement)***

- A property and equipment maintenance programme?
- A staff training programme?
- ISPS Compliance checks?
- Written procedures for managing damaged or lost cargo?
-
- Security precautions like:
  - 24 hour security guards?
  - All buildings/perimeter fences/gates alarmed?
  - Close Circuit TV?
  - Continual documentation security checks?
- Other? Please describe details.

6. ***Are risk analyses carried out, related to cargo handling in port?***

- Yes (what type?):
- No:
- Not known:

7. ***Is there a need for a handbook in any (one or more) of these subjects? (Yes/No answers on each statement)***

- Cargo securing
- Packing and stowage of dangerous goods
- Cargo damage mitigation
- Theft prevention

8. ***Are transport stress measurements carried out in your organization's goods flow?***

- Yes (shocks, vibrations, moisture?)
- No
- Not known

9. ***Is there a need for support related to regulations (IMDG Code, ISPS Code, etc)? Please specify.***

- Web-based support:
- Printed explanatory material:
- Courses, training:

10. ***Is there a need for support related to specific procedures (dangerous goods handling, packing, stowage and segregation, etc)?***

- Web-based support
- Printed explanatory material
- Courses, training

11. ***Based on your company's experience over the past 3 years, how would you rate the performance of the following stakeholders in combatting Cargo loss and damage, for general and dangerous goods, respectively? (1 = Best performance, 5 = Least good performance)***

a) Carriers
b) Logistic Security Providers
c) Manufacturers
d) Port operators
e) Industry Bodies
f) Law Enforcement
g) Governmental Bodies

12. ***Which of these stakeholders would you like to see playing a greater role in combatting Cargo loss and damage, for general and dangerous goods, respectively, in the future?***

a) Carriers
b) Logistic Security Providers
c) Manufacturers
d) Port operators
e) Industry Bodies
f) Law Enforcement
g) Governmental Bodies

13. ***Do you have any further comments about present and future trends, concerns and policy suggestions for Cargo loss prevention, general and dangerous goods:***

Background question for scientific review purpose only (answers will not be part of project analysis nor results):

Organisation Name:

Main activity for the organisation:

HAZARD project has 14 full Partners and a total budget of 4.3 million euros. It is executed from spring 2016 till spring 2019, and is part-funded by EU's Baltic Sea Region Interreg programme.

HAZARD aims at mitigating the effects of major accidents and emergencies in major multimodal seaports in the Baltic Sea Region, all handling large volumes of cargo and/or passengers.

Port facilities are often located close to residential areas, thus potentially exposing a large number of people to the consequences of accidents. The HAZARD project deals with these concerns by bringing together Rescue Services, other authorities, logistics operators and established knowledge partners.

HAZARD enables better preparedness, coordination and communication, more efficient actions to reduce damages and loss of life in emergencies, and handling of post-emergency situations by making a number of improvements.

These include harmonization and implementation of safety and security standards and regulations, communication between key actors, the use of risk analysis methods and adoption of new technologies.

See more at: http://blogit.utu.fi/hazard/

EU STRATEGY FOR THE BALTIC SEA REGION FLAGSHIP

Interreg Baltic Sea Region

EUROPEAN UNION EUROPEAN REGIONAL DEVELOPMENT FUND

HAZARD