PUBLICATIONS OF THE HAZARD PROJECT
34:2020

COMMUNICATION AND REGULATORY CHALLENGES IN THE BALTIC SEA REGION PORTS – Update 2020

Vesa Kilpi

Interreg Baltic Sea Region
EUROPEAN REGIONAL DEVELOPMENT FUND
EUROPEAN UNION
ResQU2
HAZARD

34:2020

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Turku 2020

ISBN 978-951-29-8216-5

2020

PUBLISHED BY:
HAZARD Project under the ResQU2 Project Platform
Turku School of Economics
University of Turku
Rehtorinpellonkatu 3, FI- 20014 University of Turku, Finland
http://blogit.utu.fi/hazard/

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This report has been published under the ResQU2 Platform Project

ResQU2 Platform Project is an Interreg BSR Flagship Project from October 2018 till March 2021 with a budget of 1 million euros. ResQU2 stands for "Enhancing the durability of learning experiences gained in ChemSAR, HAZARD, DiveSmart Baltic and Mirg-Ex projects on guidelines, operational plans and procedures and exercises related to incidents at sea and in ports".

The objective of ResQU2 is to increase rescue authorities' and services' preparedness and reduce the effects of possible large-scale incidents at sea or in ports. ResQU2 will ensure that the learning experiences gained from the aforementioned four projects and existing guidelines are communicated, discussed and demonstrated to the national rescue authorities around the Baltic and North Sea areas.

Keywords

Safety, Security, Seaports, Dangerous goods, Communication, Regulations

Abstract

Over the years, IMO, EU and national authorities have issued an extensive body of regulations, standards, and legislation concerning the prevention of accidents in the shipping of dangerous goods, and actions to be taken should the worst happen at seaports.

In 2017, Ahokas & Laakso (2017) carried out a Delphi study for the HAZARD project to identify the challenges in the implementation and communication of the safety and security regulations and accident communication at seaports in the Baltic Sea Region. The report at hand is a status follow-up for the Ahokas & Laakso (2017) study. In this study, the current state is also compared to the 2017 results.

A survey questionnaire was sent in June 2020 to over 100 seafaring and seaport organizations and authorities operating in the Baltic Sea Region. A total of 43 replies was received from seaport and shipping operators, research institutes, and authorities.

Results of the new survey indicate progress both in implementation and communication when compared to the results of the earlier study. In spite of clear progress, there is still work to do. Interpretation and terminology of regulations and rules vary between countries and regions. Also, the integration of various communication systems should be better, and seaport site information availability should be improved. At seaports, the increasing automation in vessels and seaports should be included in safety and security planning already now.

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1 INTRODUCTION

The development of seaport safety and security is continuous and increasingly important. The University of Turku is participating in the EU-part funded ResQU2 project, which aims to improve compliance of maritime and seaport safety and security regulations and to enhance risk management practices in maritime traffic.

There is a large body of EU-level safety and security codes, standards, and related regulations for shipping and port operations concerning the transportation of Hazardous and Noxious Substances (HNS) or with Dangerous Goods (DG). The regulation body comes from the IMO[1] and the EU[2] , which are complemented with national-level enforcement and control, e.g., through the so-called Port State Control mandated by IMO. At seaports, operators, authorities, and shipping companies implement these demanding and detailed rules to mitigate accidents.

In this report, the regulation status of compliance and communication among seaport actors is compared to the results of a similar survey done in 2017 (Ahokas & Laakso, 2017). The progress is measured using a survey sent to shipowners and seaport organizations operating in the Baltic Sea Region.

Accumulated knowledge on new regulations and the status of practical implementation makes it possible to support both shipowners and seaports to develop their compliance efforts also in view of enhanced risk management practices (Liu et al., 2019) and develop new innovations (Acciaro et al., 2018). Joint safety and security investments between seaports is always a good strategy (Liu et al., 2018). The research done adds value in particular in highlighting the most problematic issues or procedures hindering better compliance.

To support the actors, the current status of regulation compliance is compared to the results of the earlier study. Seaport safety is a system issue requiring active participation of ship and seaport operators, authorities, and regulators (Zhang et al., 2020; Liu et al., 2019). This helps them in developing their compliance efforts in view of enhanced risk management practices (Akyuz et al., 2018; Liu et al., 2019). In addition to progress measures also the preparedness of new technologies is approached in the survey. Automation at ports and onboard will change job requirements (Kooij & Hekkenberg, 2020). In the development of safety and security the co-operation of seaports is viable in all cases.

[1] IMODOCS, https://webaccounts.imo.org/
[2] EU-Lex, https://eur-lex.europa.eu/homepage.html

2 SURVEY

One of the work packages of the ResQU2 project was a survey addressed to personnel working in areas of safety and security in seaports and shipping companies and/or are involved in the handling of hazardous and noxious substances (HNS) and dangerous goods (DG).

The statements concerning regulations and communication were similar to what was used in the HAZARD survey 2017. New technology statements were selected from the highlighted issues of recent IMO MSC and MEPC meeting documents and resolutions. In the fourth subsection of the survey, respondents were asked to rank eight actions in order of importance. A list of critical development actions was formulated based on the Delphi 2 section of the HAZARD project. The complete survey form is enclosed in *Appendix 1*.

The survey questionnaire consists of the following topics:

1. Implementation of regulations (9 statements)
2. Communication on safety and security (10 statements)
3. Preparedness to new technologies (4 items)
4. Importance of development actions (8 statements)

The launch of the survey was delayed by three months due to the Covid-19 outbreak. It was assumed that the rapidly changed situation will occupy safety and security personnel, and therefore survey attendance was assumed to remain low if sent earlier.

The survey was launched 8th of June 2020. In the first delivery batch, 111 email survey invitations were sent to addresses of HAZARD project participants. During the survey, the list was updated, obsolete addresses were removed, and new addresses were added. In total successful 156 email survey invitations were sent out. A reminder mail was sent to non-respondents on the 7th of July. In addition to the reminder, 95 respondents were contacted by phone during the survey to ensure that the email invitation had been noticed.

Table 1 shows the geographical distribution of the received responses. The majority of responses (62%) came from Finland, but the shores of the Baltic Sea were reached as expected. Only Denmark and Norway (which is not BSR country to be precise) did not provide any responses. By the end of July, 43 surveys were completed, which gives a 28% response rate. In the analysis, one should bear in mind that the number of responses is small, and the applicability of statistical analysis is indicative.

Table 1: Geographical distribution

Country	*Frequency*	*Response Percent*	*Share of invitation*
Finland	27	62.8%	38%
Estonia	4	9.3%	9%
Germany	6	14%	4%
Lithuania	1	2.3%	3%
Sweden	2	4.7%	18%
Latvia	2	4.7%	6%
Poland	1	2.3%	8%
Other (EU)			14%
Total	**43**	**100%**	**100%**

Of the respondents, 23% represent government and regional authorities and rescue services. Responses from seafaring and seaport operations represented 65% of total, and the share of research personnel responses was 12%. Respective share of invitation emails was 20% to authorities, 73% to seafaring actors, and 7% to research institutes. *Table 2* shows the share of respondents who are directly in charge of safety and security in their organizations. Altogether, 42% are in charge of security issues either onboard or at a seaport.

Table 2: Security role

SECURITY ROLE	*COUNT*	*PERCENT*
Port Facility Security Officer	12	27.9
Company Security Officer	6	14
No security role	25	58.1
Total	**43**	**100**

3 RESULTS OF THE SURVEY

The statements of the survey were assessed using a eight-point Likert scale from 1 to 7 using verbal statements - Strongly disagree (1), Disagree (2), Somewhat disagree (3), Neither agree or disagree (4), Somewhat agree (5), Agree (6), and Strongly agree (7).

3.1 Statements concerning the implementation of regulation

Mean values of answers given to statements concerning the implementation of regulations (*Figure 1*) imply that national and regional variations of administrative demands are on top of the list, followed by problems caused by different terminology. Regulations as such are at an adequate level, or at least inadequacy is the least agreed statement in the list. Answers of security officers (n=18) and other (n=25) do not differ statistically.

*Figure 1: Implementation of regulation related statements, mean values (n=43, *n=42)*

3.2 Statements concerning communication

The mean values of statements concerning communication are shown in *Figure 2*. In communication, there seem to processes in place. However, the development of interoperability of systems and co-operation in general are on top of the list. Training, and specifically training in the use of social media, are also considered important, and broader use of seaport experts in command centers could be more widely utilized. Also, in the communication group, answers do not differ between security officers and others.

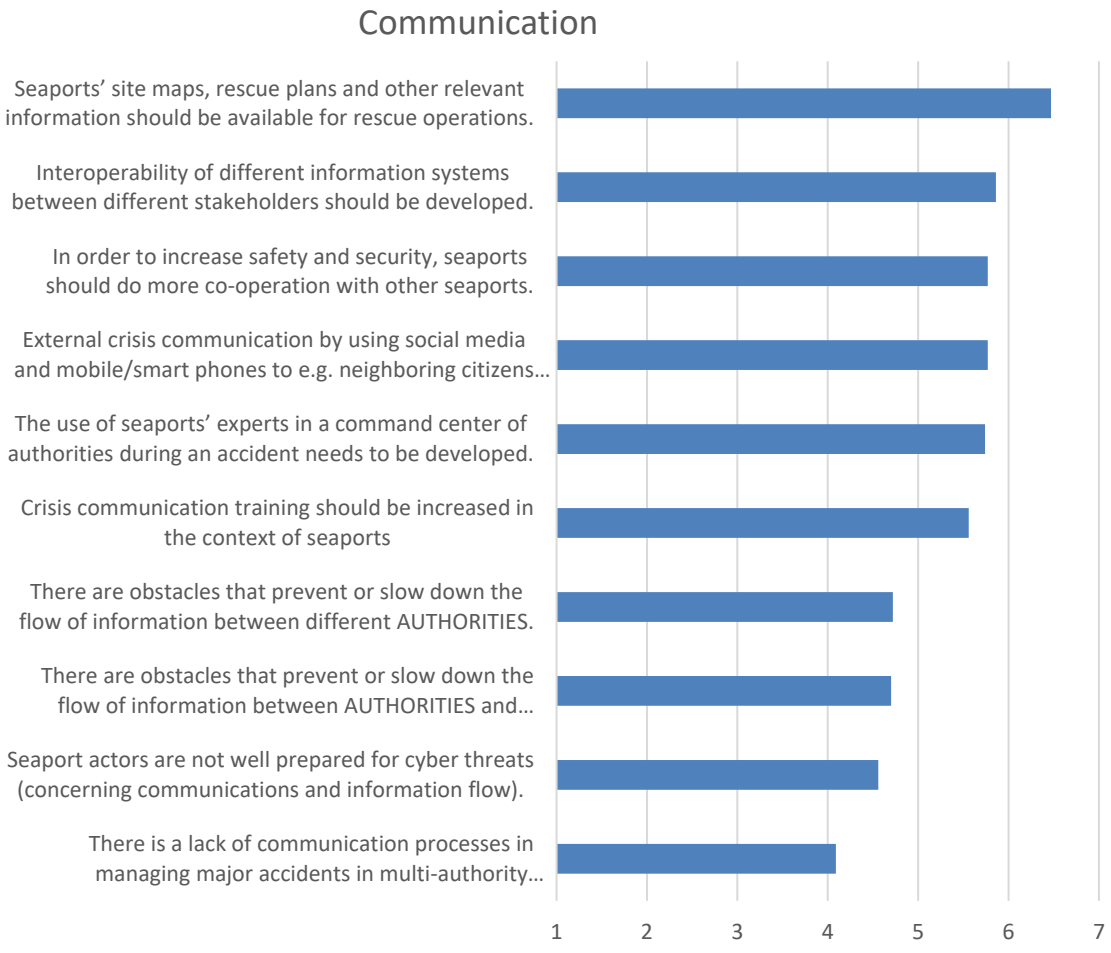

Figure 2: Communication related statements, mean values (n=43)

3.3 Statements concerning preparedness to adopt new technologies

The mean values of answers of preparedness to new technologies are shown in *Figure 3*. New automation technologies in seaports and on vessel safety should get more attention already now. Also, the preparedness to increasing volumes of hydrogen and lithium batteries could benefit from a closer look.

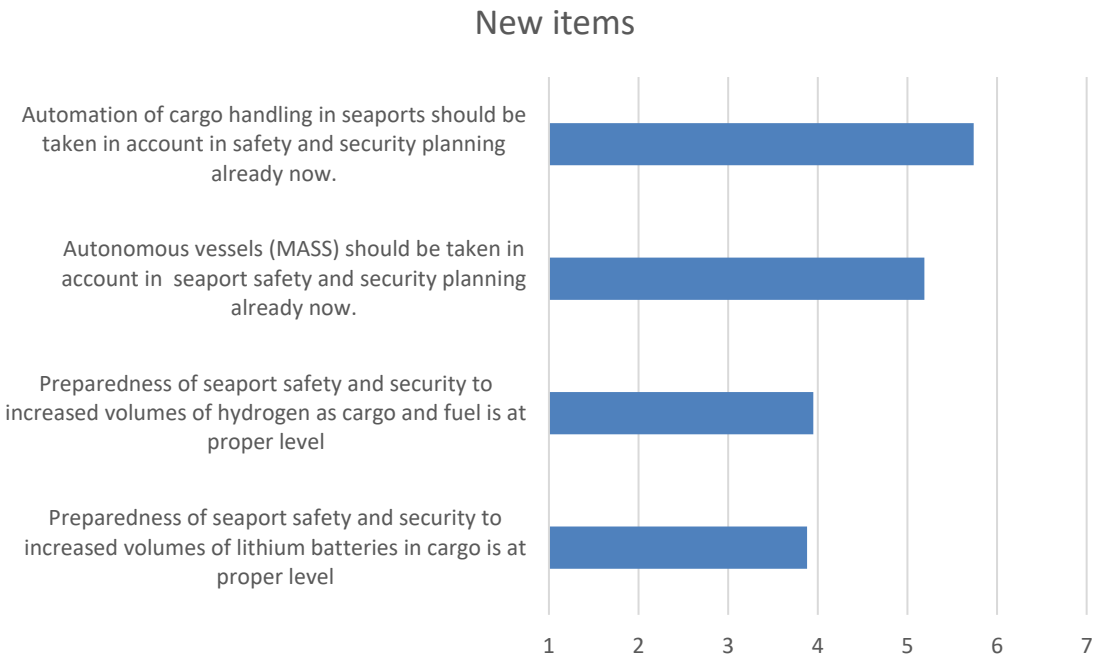

Figure 3: Preparedness of new technologies related statements, mean values (n=43)

3.4 Development from 2017 to 2020

The development from 2017 to 2020 is compared in *Table 3*. The comparison shows that all items have developed in a positive direction, with the exception of seaport site maps and related information of which need has increased. Keeping in mind the statistical limitations, there is support for a positive development of regulation implementation and accident communication at seaports – and a higher need for more site maps and information.

Table 3: Mean values 2017–2020 and t-test statistics

	2017	2020
Regulation related to major accidents is inadequate in seaports. (*)	4.81	3,9 (*
It is a problem that different administrative branches have their own terminology.	5.33	4,91
Regulation related to preparedness for cyber threats is inadequate in seaports. (***)	5.78	4,47
It is challenging that there is national variation in implementation of safety & security regulations and administrative demands between the EU countries within the Baltic Sea Region. (**)	5.85	5,14
It is challenging that there is regional variation in the interpretation of safety & security regulations and administrative demands within a country.	5.48	5.23
Safety and security regulations are inconsistent and fragmented which causes problems for seaports. (***)	5.81	4.53
Interpretation of safety and security regulations is challenging for seaports. (***)	5.62 (*	4.28
Seaport safety and security regulation is inadequate, because it does not clearly define the responsible authorities. (***)	4.85	3.67
Regulations are not always up-to-date, because national legislative processes are too slow. (***)	5.52	4.56
There are obstacles that prevent or slow down the flow of information between different AUTHORITIES.	5	4.72
There are obstacles that prevent or slow down the flow of information between AUTHORITIES and SEAPORT ACTORS.	5.35 (*	4.7
There is a lack of communication processes in managing major accidents in multi-authority operations at seaports.	4.74	4.09
Seaports' site maps, rescue plans and other relevant information should be available for rescue operations.	6.22	6.47
Interoperability of different information systems between different stakeholders should be developed.	6.26	5.86
The use of seaports' experts in a command center of authorities during an accident needs to be developed.	6.07	5.74
External crisis communication by using social media and mobile/smart phones to e.g. neighboring citizens and/or companies should be trained more.	5.81	5.77
In order to increase safety and security, seaports should do more co-operation with other seaports. (**)	6.3	5.77
Seaport actors are not well prepared for cyber threats (concerning communication and information flow). (***)	5.81	4.56
Crisis communication training should be increased in the context of seaports. (***)	6.19	5.56
* P<.1 ** P < .05 *** P<.01		
	N=27 *) 26	N=43 *) 42

3.5 Implementation of regulations

In the following, the statements related to the implementation of regulations are presented one by one. Answers are shown at the respondent group level on the left-hand side panel, and the comparison to the previous results is shown on the right-hand side panel.

Figure 4 indicates an improvement in the adequacy of regulation, which also has statistical significance. From 2017 to 2020, the share of respondents who strongly agreed that regulation concerning major accidents was inadequate, has reduced from 19% to 5%. In the 2020 answers, authorities are more in line with regulations than those who represent research organizations.

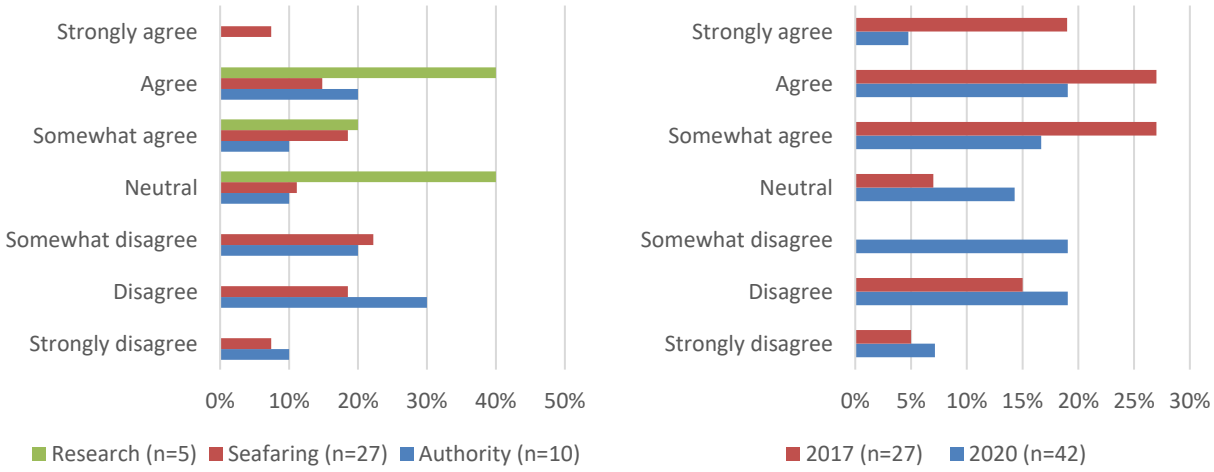

Figure 4: "Regulation related to major accidents is inadequate in seaports". The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

Problems related to different terminology used by other administrative branches are still present, as shown in *Figure 5*. The ratio of 'strongly agree' answers is less in 2020 than in 2017, but nevertheless rather few disagree. Obviously, this is more bothering to those who are working with multiple authorities as 40% of the authority answers either disagree or are at a neutral stance.

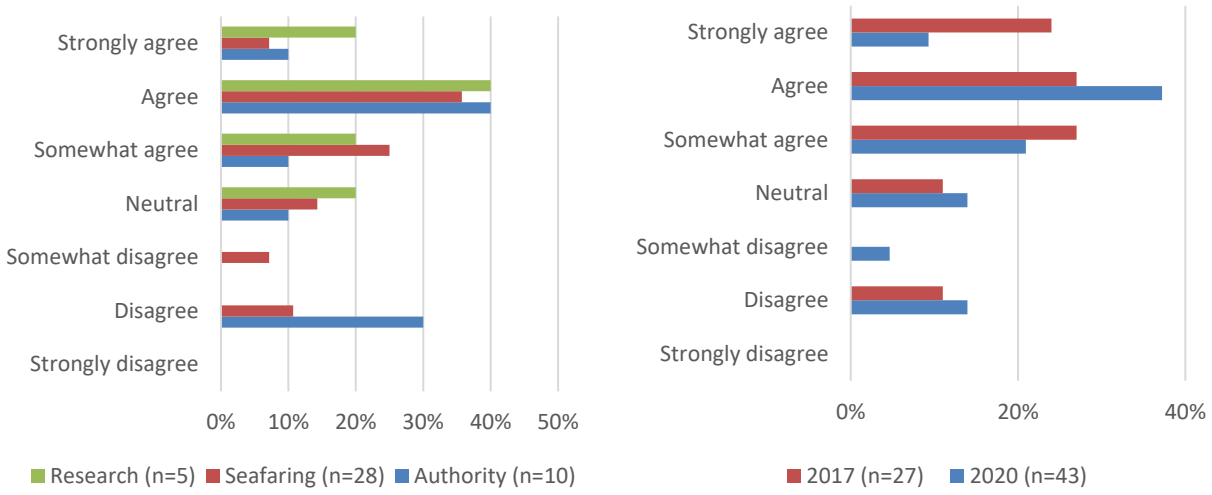

Figure 5: "It is a problem that different administrative branches have their own terminology." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

Regulation related to preparedness for cyber threats has slightly improved during the observation period (*Figure 6*). In the 2017 study, 64% of respondents agreed or strongly agreed that cyber thread regulation is inadequate. In 2020, the percentage is 40. Also, the share of those disagreeing inadequacy has grown from 8% to 33%.

In this statement, the responses of the research group are relatively more critical compared to other groups, bearing again in mind the limited sample size.

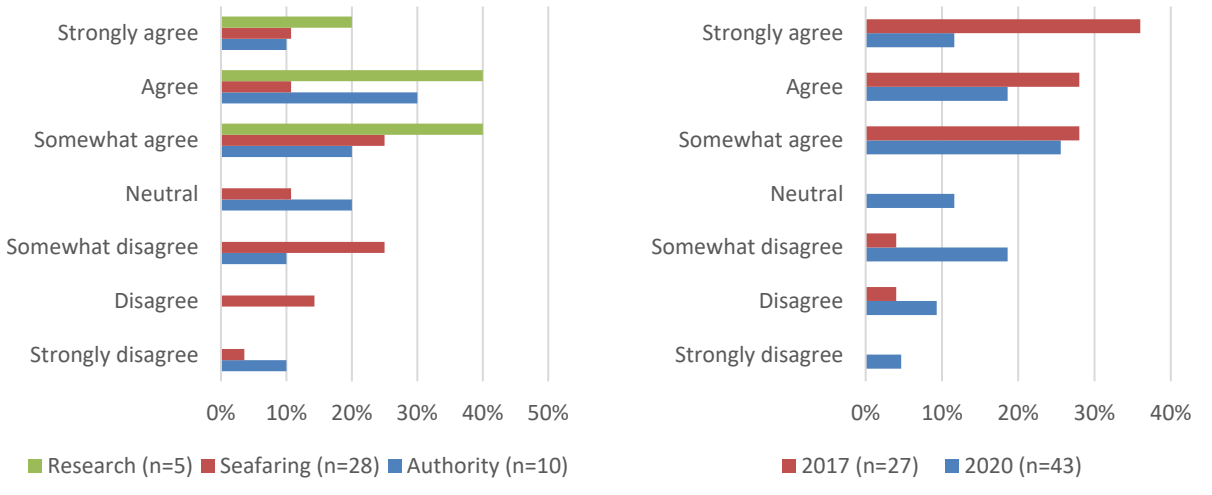

Figure 6: "Regulation related to preparedness for cyber threats is inadequate in seaports." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

The next question was about the variation of the implementation of safety and security regulations and related national administrative tasks between EU countries. According to the survey responses, there is less variation than before (*Figure 7*). In 2017, 78% agreed that the variation is challenging, and by 2020, that ratio has dropped to 46%. However, there are still over 50% of respondents who find the situation at least somewhat challenging.

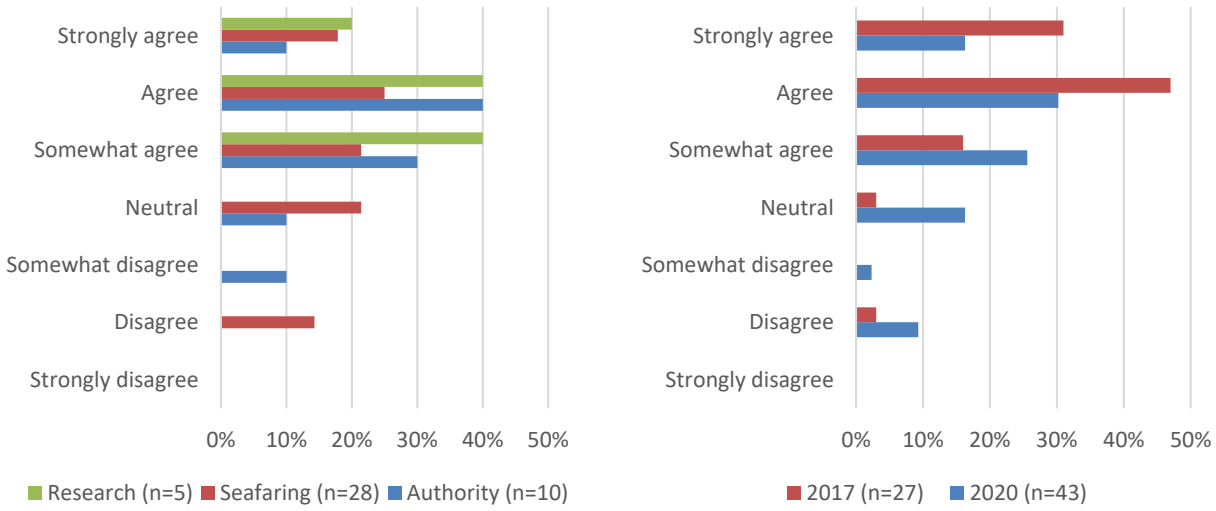

Figure 7: "It is challenging that there is national variation in the implementation of safety & security regulations and administrative demands between the EU countries within the Baltic Sea Region." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

In addition to the variation between countries in how the regulations are being implemented, there are variations between regional authorities at the country level (*Figure 8*). In that area, the development is a bit less than at the country level assessment. In the occupation group comparison, it seems that seafarers consider the implementation discrepancy more challenging.

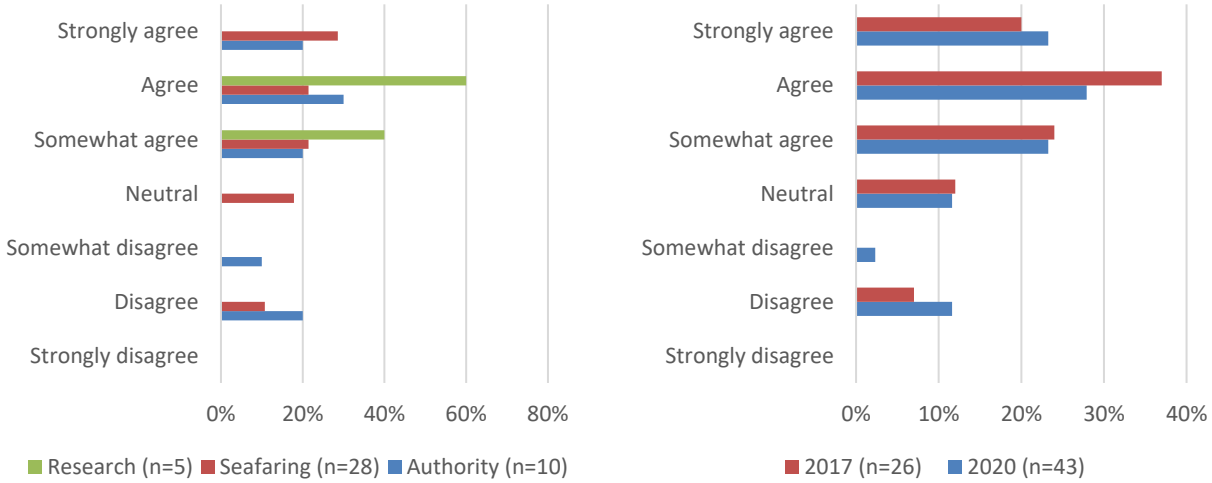

Figure 8: "It is challenging that there is regional variation in the interpretation of safety & security regulations and administrative demands within a country." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

Safety and security regulations are inconsistent and fragmented, which causes problems for seaports was considered rather problematic in the 2017 survey (*Figure 9*). According to the 2020 results, the situation has clearly improved, which is also statistically significant. Three years ago, 81% of respondents agreed or strongly agreed that fragmentation is problematic, whereas in recent results, only 21% share that opinion. At the group level, there is no remarkable difference between the authority and seafaring groups. Researchers are a bit more critical, but the smaller group size may distort the results.

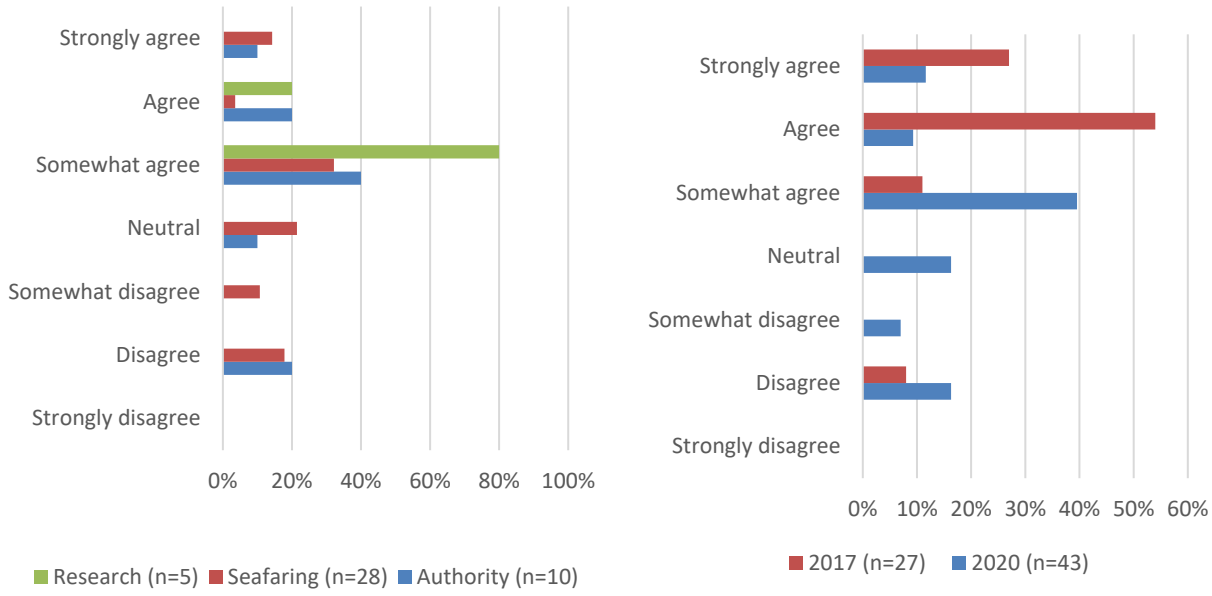

Figure 9: "Safety and security regulations are inconsistent and fragmented, which causes problems for seaports." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

The interpretation of safety and security regulations is considered challenging for seaports, as shown in *Figure 10*. In 2017, it was agreed by 30% of respondents as well as in the 2020 results. However, the ratio of strongly agreeing has reduced as well as the share of somewhat agreeing, which also shows as the significance of statistically lower mean value. Accordingly, the share of those who do not consider interpretation challenging has risen from 9% to 40%. The share of those who do not see it as a challenge has increased from 9% to 40%.

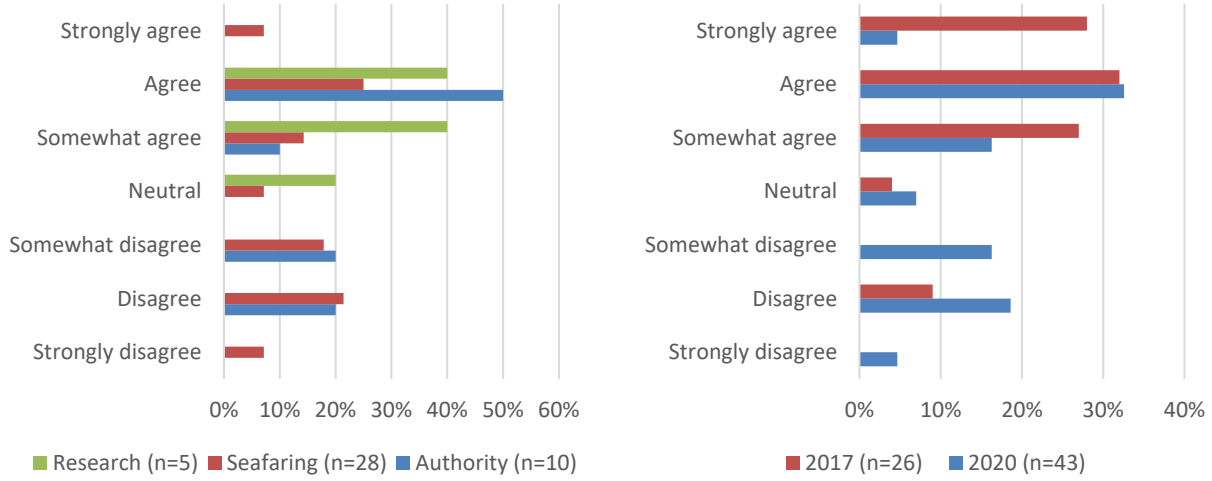

Figure 10: "Interpretation of safety and security regulations is challenging for seaports." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

Figure 11 shows the results of the statement about how seaport safety and security regulation is inadequate because it does not clearly define the responsible authorities. There has been a clear and statistically significant shift to more comprehensive regulations and clarity in the share of responsibilities. The share of those agreeing or strongly agreeing has reduced from 42% to 14%, and the share of those disagreeing has risen from 9% to 35%.

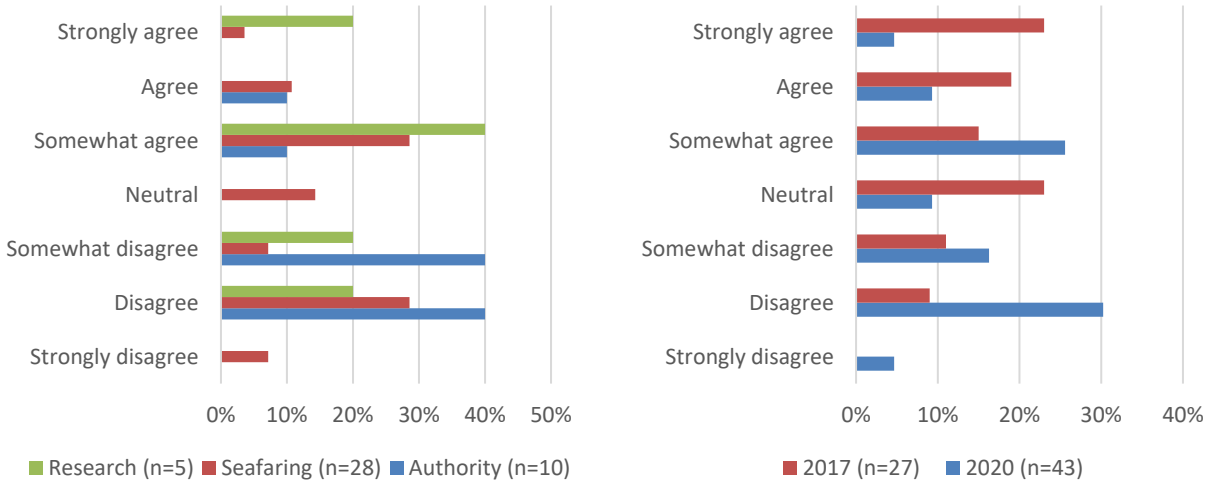

Figure 11: "Seaport safety and security regulation is inadequate; because it does not clearly define the responsible authorities." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

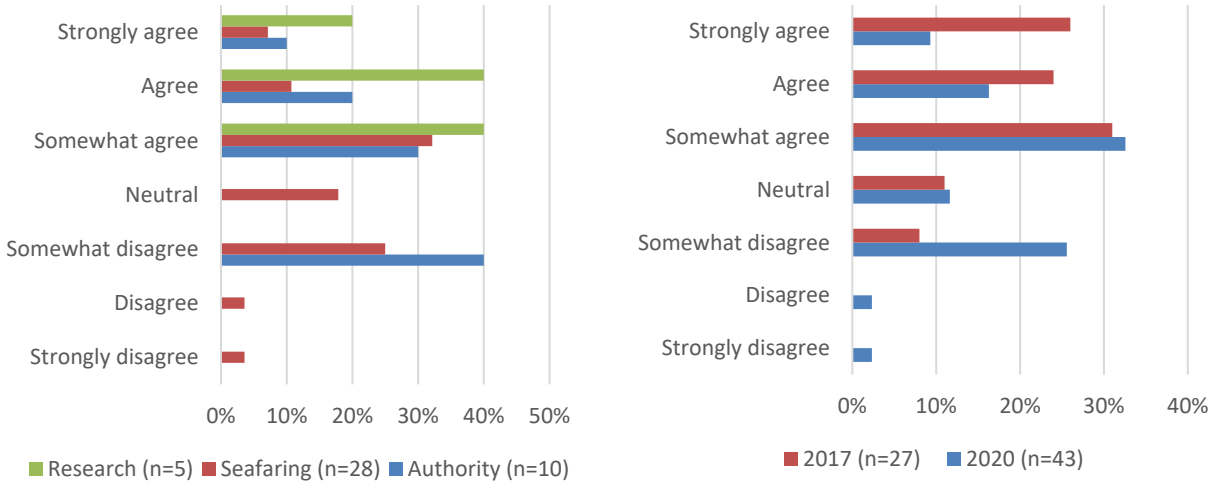

Figure 12: "Regulations are not always up-to-date because national legislative processes are too slow." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

The update speed of regulations is considered still low, although it is possible to see a move from strong agreement towards somewhat disagreeing *(Figure 12*). Only 4% of respondents state that this process is fast enough.

3.6 Communication of safety and security

In the following, the statements regarding communication related to safety and security at seaports are presented one by one. Respondent group-level responses are on the left-hand side panel, and comparison to the results of 2017 is shown on the right-hand side panel.

In *Figure 13*, there are answers to the first communication statement "There are obstacles that prevent or slow down the flow of information between different AUTHORITIES." In the responses, there is a shift towards fewer obstacles in information flow, but still 61% of respondents agree more or less that obstacles persist. The share of those disagreeing that there are obstacles is even slightly lower (16%) in 2020 than in 2017 (20%).

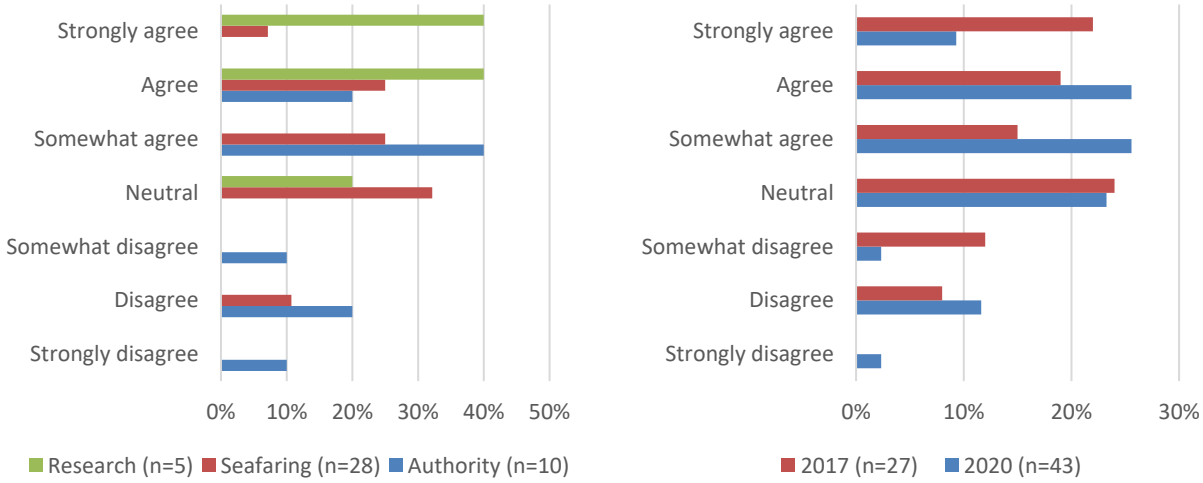

Figure 13: "There are obstacles that prevent or slow down the flow of information between different AUTHORITIES." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

Figure 14 shows the responses to the statement that there are obstacles that prevent or slow down the flow of information between authorities and other actors at seaports. Obstacles are less in 2020 than in 2017, but still over half of the respondents agree to some level that obstacles to be removed exist.

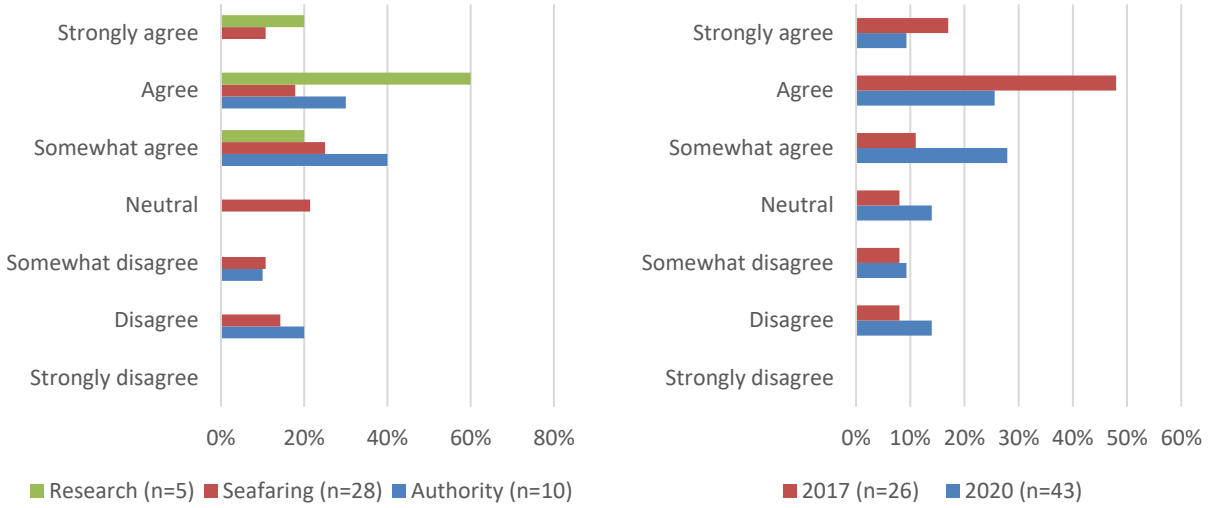

Figure 14: "There are obstacles that prevent or slow down the flow of information between AUTHORITIES and SEAPORT ACTORS." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

In the *Figure 15* there are shown the responses concerning lack of communication process have shifted to the neutral middle from strongly agree. Also, the share of those disagreeing has reduced, and 37% of responses fell to the middle point (8% in 2017) .

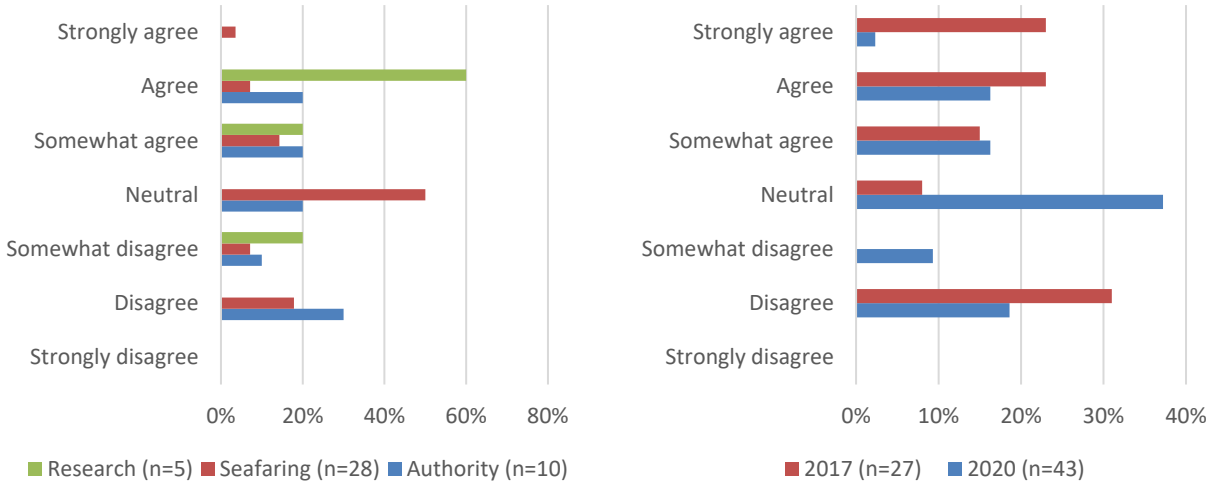

Figure 15: "There is a lack of communication processes in managing major accidents in multi-authority operations at seaport." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

The importance of seaports' site maps, rescue plans, and other relevant information seems to be ever more important and should be available for rescue operations *(Figure 16).* The difference between 2017 and 2020 is not significant, but this is only a survey item where a larger share of responses are more strongly agreeing, and therefore indicating an increased need for improvement.

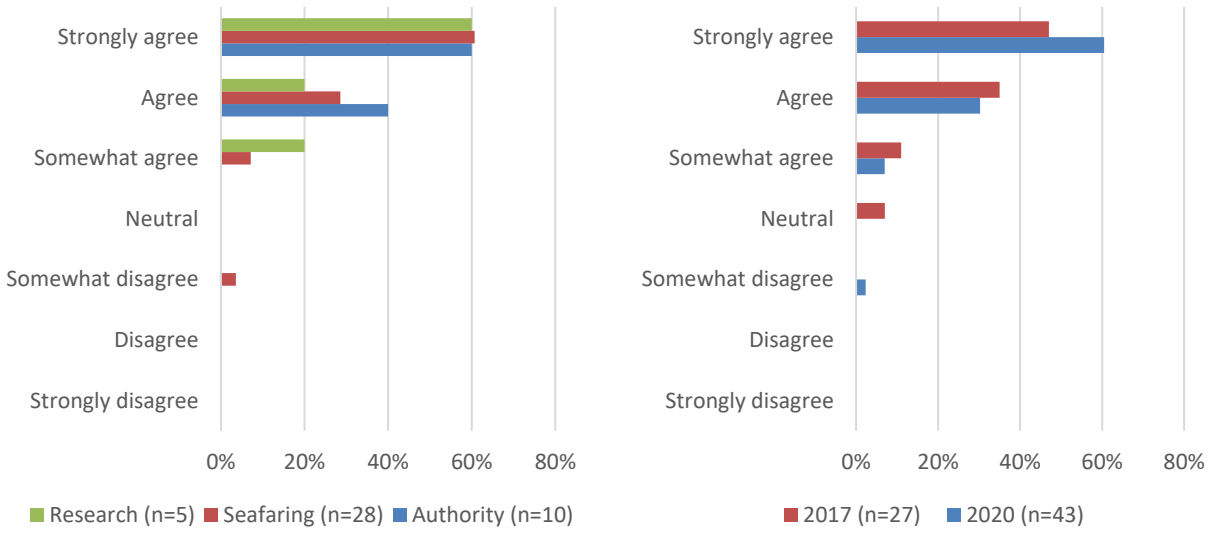

Figure 16: "Seaports' site maps, rescue plans and other relevant information should be available for rescue operations." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

Interoperability between different communication systems seems to be a persistent issue. As shown in *Figure 17* in 2017, the share of responses agreeing or strongly agreeing was 88%, and in the 2020 survey, the percentage was still 73%. No one disagrees that interoperability should be further developed.

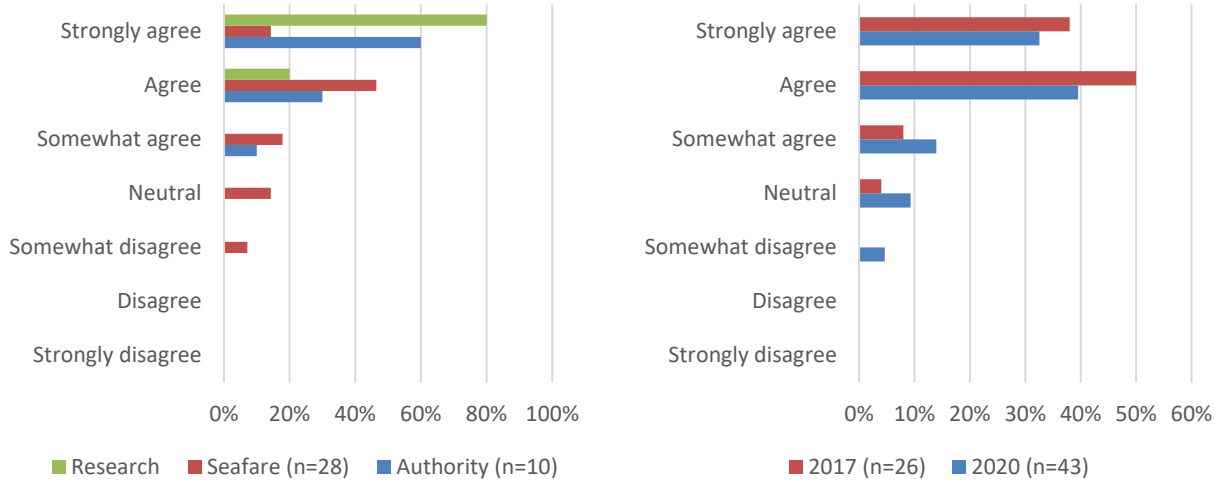

Figure 17: "Interoperability of different information systems between different stakeholders should be developed." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

In the *Figure 18* are shown responses to the statement that the use of seaports' experts in a command center of authorities during an accident needs to be developed is agreed or strongly agreed by 67% in 2020 and 80% three years earlier. Authorities and researchers are slightly more favorable, but no one disagrees with the need for development.

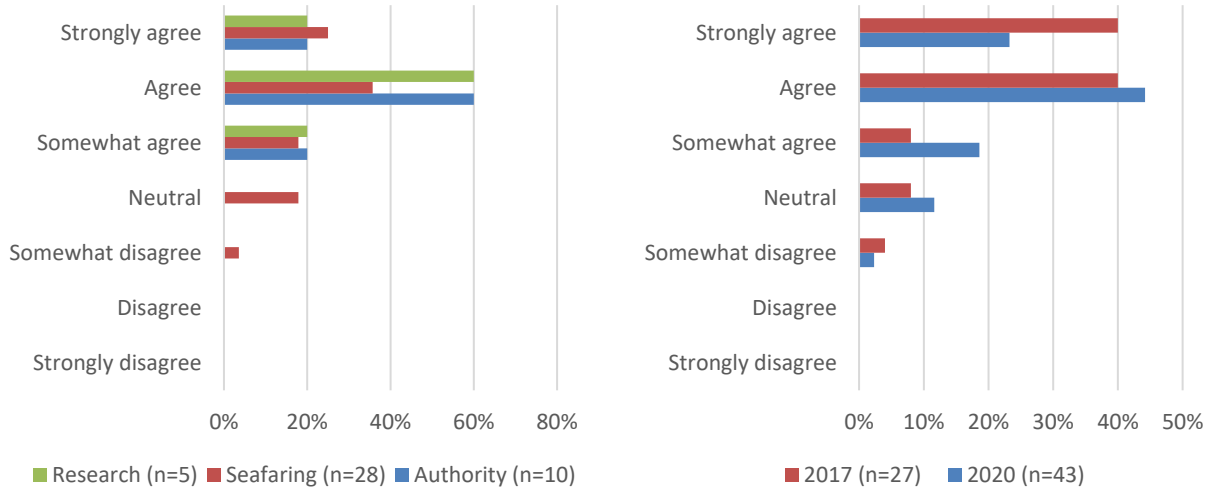

Figure 18: "The use of seaports' experts in a command center of authorities during an accident needs to be developed." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

In 2017, 7% of respondents disagreed that external crisis communication using social media and mobile/smart phones should be trained more. At the same time, 77% agreed with the social media training needs. In the 2020 results, almost all (90%) agree with the training need, and no one disagrees with it *(Figure 19).*

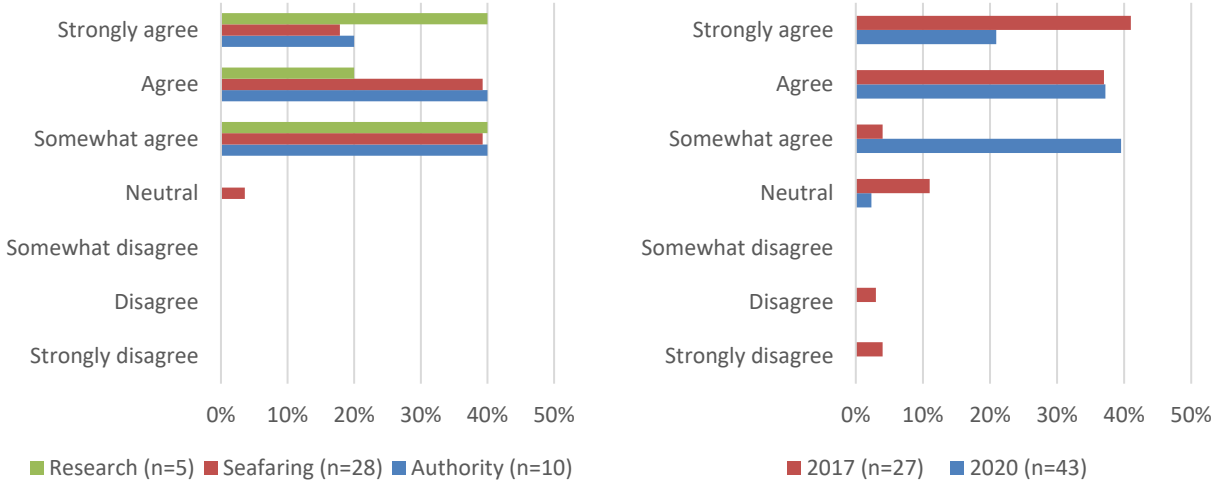

Figure 19: "External crisis communication by using social media and mobile/smart phones to e.g. neighboring citizens and/or companies should be trained more." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

Increased co-operation may explain the shift of responses to the statement that in order to increase safety and security, seaports should do more co-operation with other seaports (*Figure 20).* The difference in mean values between 2017 and 2020 responses was statistically significant. The share of responses strongly agreeing has reduced from 52% to 23%, and there were 88% agreeing that co-operation should be increased.

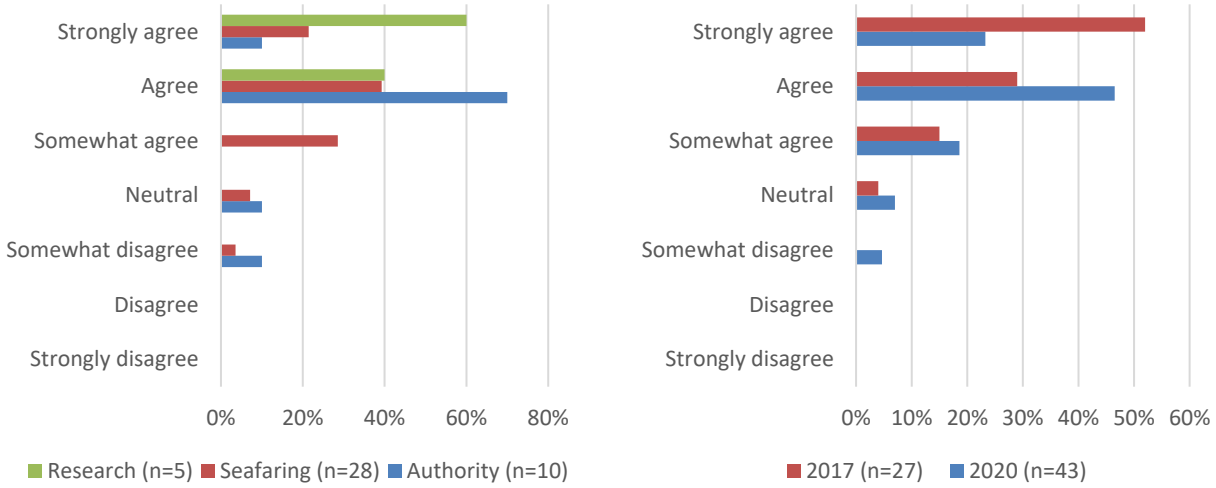

Figure 20: "In order to increase safety and security, seaports should do more co-operation with other seaports." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

Unreadiness to meet cyber threats was more or less agreed by 92% of respondents in the 2017 survey (*Figure 21*). In the more recent survey, this share has reduced to 56%, which was a statistically significant change. As the threat has most obviously not disappeared, it is possible that the preparedness has improved. In the 2020 results, the researcher group is more critical than others, but overall the peak is in somewhat agree and neutral answers.

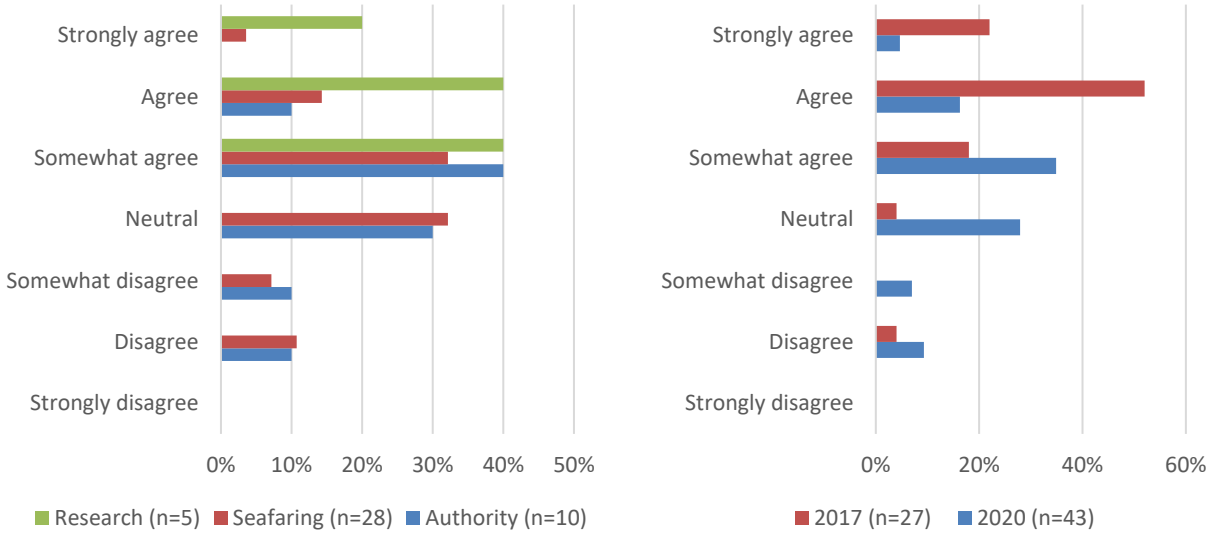

Figure 21: "Seaport actors are not well prepared for cyber threats (concerning communication and information flow)." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

Even if the overall mean value of responses is lower in 2020 when compared to the level of 2017, the vast majority still agrees with the need to increase training. Crisis communication training should be increased in the context of seaports, and 73% agree or strongly agree that communication training should be increased (*Figure 22*).

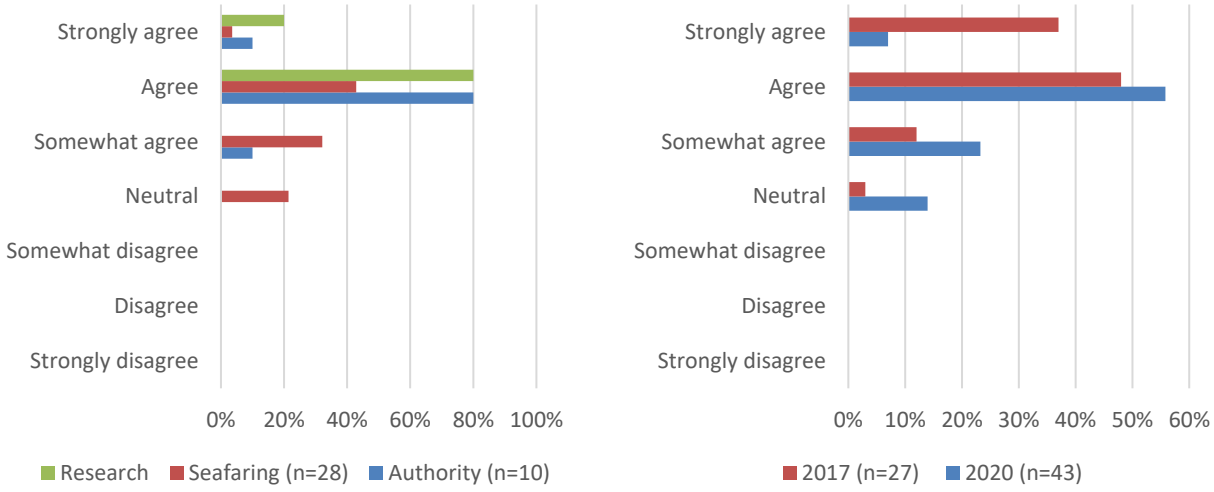

Figure 22: "Crisis communication training should be increased in the context of seaports." The graph on the left shows the 2020 results, and the graph on the right compares the 2017 and 2020 results.

3.7 Preparedness to adopt new technologies

The following four statements about new technologies were used only in the 2020 survey. The items were selected from the IMO MSC (e.g. MSC 99 2018) documents. Lithium, for example, is used in increasing volumes in vehicle batteries. The volumes of hydrogen, as well as other flammable gases, will increase in transport and will need special arrangements at seaports. In addition to the increased volumes of new dangerous goods in transport, there is also an increase in the automation of both vessels and seaport operations.

The first new item of the survey is about the preparedness of seaport safety and security to the increased volumes of lithium batteries in cargo. As shown in *Figure 23*, the need is not yet considered urgent, and 56% of the responses are neutral. 28% of respondents disagree that preparedness is adequate, and slightly less (16%) agree that the level is sufficient at the moment.

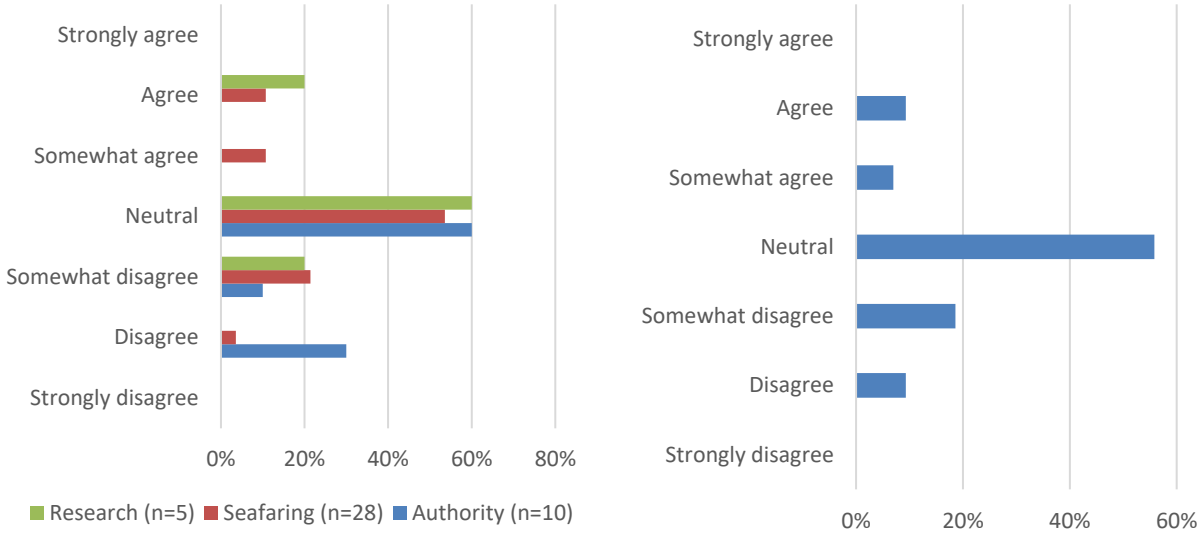

Figure 23: "Preparedness of seaport safety and security to increased volumes of lithium batteries in cargo is at proper level." The graph on the left shows the 2020 group results, and the graph on the right shows sum of all groups.

Hydrogen as a new energy source may increase in vessel use and as cargo, and the use of hydrogen will require plenty of new infrastructure and safety installations at seaports. The response to the statement about the preparedness of seaport safety and security to increased volumes of hydrogen as cargo and fuel is at proper level is shown in *Figure 24*. Those working on seafaring seem to be more confident than other groups on the level of preparedness. The largest portion (44%) of answers falls in the neutral category.

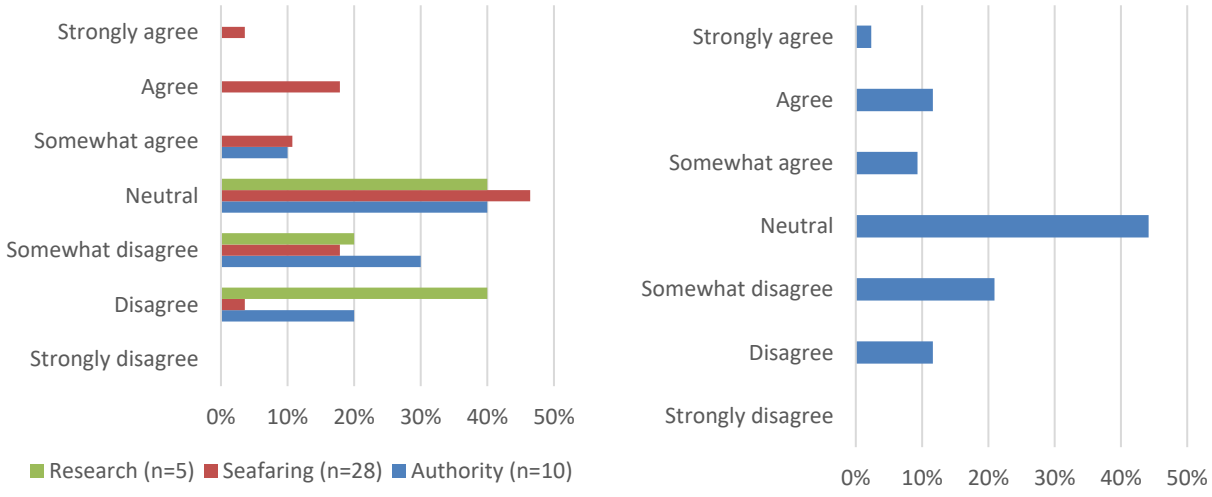

Figure 24: "Preparedness of seaport safety and security to increased volumes of hydrogen as cargo and fuel is at proper level." The graph on the left shows the 2020 group results, and the graph on the right shows sum of all groups.

Responses to statements concerning increased automation in vessels and in seaports are shown in *Figure 25* and *Figure 26*. They both underline the need to begin actively adapting safety and security plans and processes to the new operational environment.

In *Figure 25*, answers to the statement on how autonomous vessels (MASS) should be taken into account in seaport safety and security planning are displayed. 77% of the respondents share the opinion that vessel automation should be included in safety planning already now.

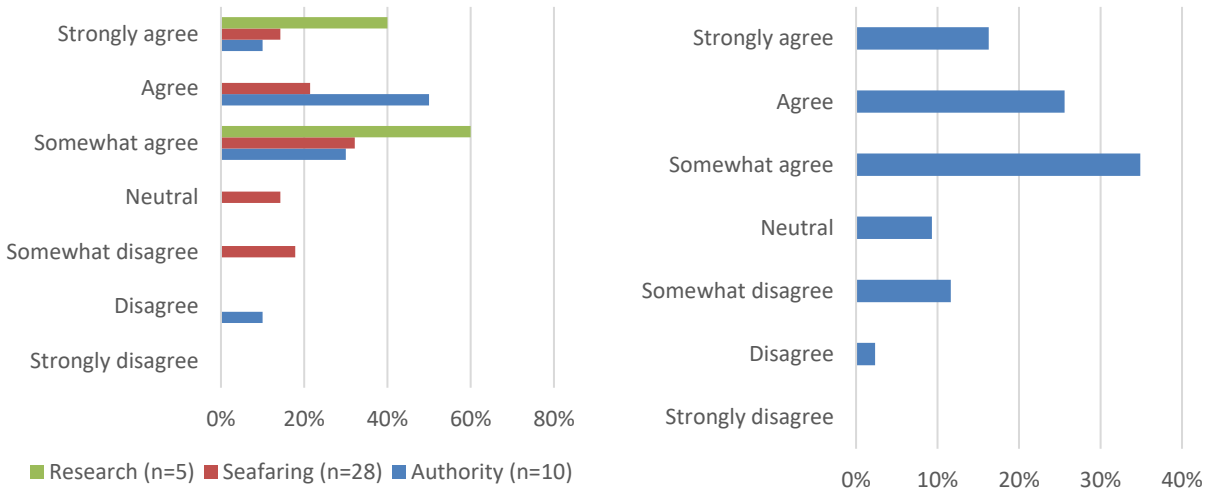

Figure 25: "Autonomous vessels (MASS) should be taken into account in seaport safety and security planning already now." The graph on the left shows the 2020 group results, and the graph on the right shows sum of all groups.

In seaports, the adaptation of safety and security processes related to emerging needs brought up by automation is broadly agreed upon. 90% of respondents agree that automation systems, such as cargo handling in seaports, should be taken into account in safety and security planning already now.

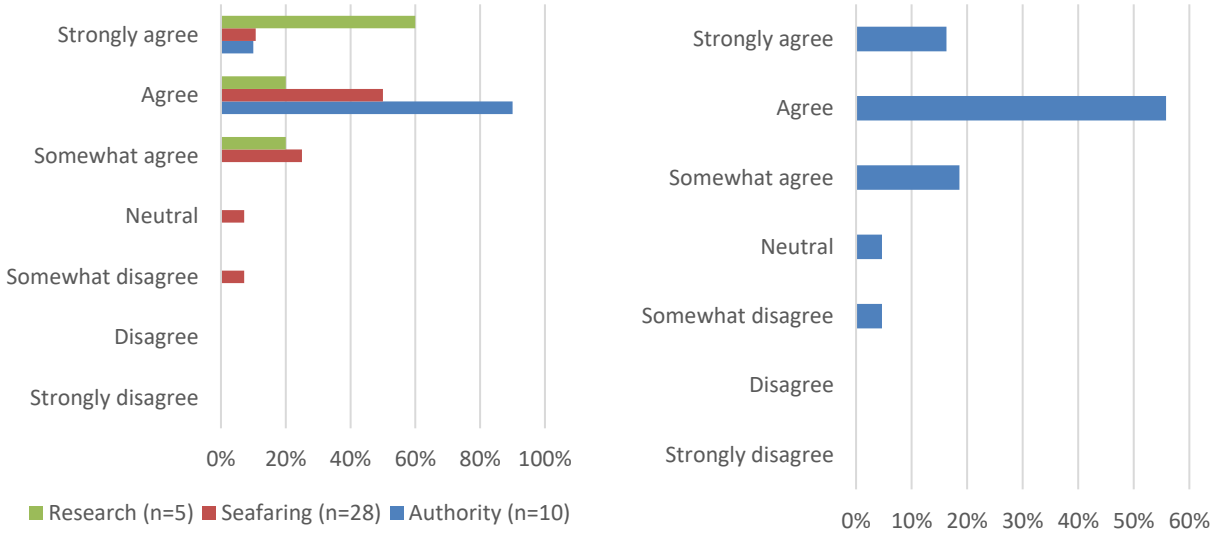

Figure 26: "Automation of cargo handling in seaports should be taken into account in safety and security planning already now." The graph on the left shows the 2020 group results, and the graph on the right shows sum of all groups.

3.8 Importance of development actions

The importance list of development actions was prepared originally in the Delphi process carried out in the HAZARD project. The respondents were asked to rank eight actions in order of importance. The ranking order is shown in *Table 4*. In the second column, there is the original ranking order from the 2017 report. In the next column, there are the current 2020 ranking results based on the number of the 1st places.

In 2017, the most important was communication training, which is now in place 8. Earlier, the 7th place was held by up-to-date regulations, which is now the most important. Almost 30% of respondents placed the compressive and up-to-date regulations as the most important development task. Co-operation between seaports has maintained its 2nd place in the ranking list. Cyber-threat preparedness has risen from 8th place to 3rd in the 2020 results.

Table 4: Importance of development actions

	Ranking order 2017 (n=18)	*Ranking order 2020 (n=37)*	*Count of 1st importance*
Crisis communication training should be increased in the context of sea-ports	1	8	1
Seaports should co-operate more with other seaports in safety and security development	2	2	7
Safety and security regulation should be more consistent.	3	6	3
The use of seaports' experts in authorities' command center during an accident needs to be developed.	4	7	3
Better accident scenarios based on risk analysis are needed.	5	4	4
The interoperability of IT systems between stakeholders should be developed	6	5	4
Safety and security regulations should be more comprehensive and up-to-date.	7	1	11
Preparedness for cyber threats should be developed	8	3	4

4 DISCUSSION

The purpose of this study was to analyze communication practices and the status of the implementation of safety and security regulations at seaports. The objective is to support both shipowners and seaports in their endeavor to develop regulation compliance and enforce risk management practices. The value added here lies in particular in highlighting the most problematic issues or procedures hindering better compliance.

The overall results of the survey suggest that there has been an improvement in many areas of regulation implementation and safety communication when compared to the results of the 2017 study. In general, there is no evidence that maritime transportation environment has become any simpler. Therefore, it may be concluded that regulation concerning major accidents has become more adequate and preparedness for accident handling is in better shape.

The general outlook is that almost all measures have improved with the exception of the statement "Seaports' site maps, rescue plans, and other relevant information should be available for rescue operations." The new survey indicates that the need for up-to-date site information is even more important than before.

In 2020, the regulation concerning major accidents is considered to be more adequate than before, and the preparedness regulation towards cyber threats has improved according to the responses. Also, the speed of the national legislative process is now faster improving the adaptation of changes. The share of responsibilities has also become clearer. Based on the survey responses, there are less obstacles between authorities and seaports in communication, and communication processes are better in place.

However, safety and security processes are results, not the reason for regulation, and therefore all layers from legislators to seaport operators must share a common view on the safety system (Zhang et al., 2020). In the summarized results of the survey responses, it can be seen that variation in the interpretation of regulations both regionally and between countries is found as the most challenging item concerning the regulation implementation

In the communication group, information availability is on top of the list, whereas cyber threat and communication processes need somewhat less attention at the moment – this is not to say that no attention is needed. Although, based on the surveys, cyber threat regulation has improved in adequacy level, its ranking rose in the critical task list.

The need for easy access and availability of the seaport site information is even more important than before. This notion is in line with the need to improve the interoperability of information systems. The use of social media communication has improved. However, in order to improve communication, the respondents agree on a need to increase training to use these channels more effectively. The respondents also agree that there should be more use of seaport experts during accidents. This is made possible as co-operation between seaports has increased.

The ranking gives a baseline to ideas for the innovation process (Acciaro et al. 2018) and a possibility to find creative solutions utilizing latent capabilities of functional resources in the seaport environment (Pettersen et al., 2020).

In the third section, respondents were asked to evaluate four emergent issues from a seaport safety and security point of view. Hydrogen (and LNG) is increasingly as cargo in transportation and used as fuel , which is indicated in the responses. In this area safety planning should be enhanced already now.

More importantly, automation in various phases of transport should be noticed in safety and security preparedness. As Kooji et al. (2020) remark, automation in seafaring will change the crew size and responsibilities on board. Less workforce may increase the time constrain, which in turn is a major factor behind the occurrence of dangerous situations onboard (Rajapakse et al., 2019).

In sum, the co-operation between seaports in investing in safety and security pays back (Liu, 2018), and it would be beneficial to continue the common training and knowledge sharing processes established during the HAZARD project.

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APPENDIX 1: SEAPORT SAFETY SURVEY

Seaport safety

Improving compliance of the regulatory framework on maritime and seaport safety and security and enhanced risk management practices

The survey addresses personnel working with safety and security in seaports and shipping companies and/or are involved in handling of hazardous and noxious substances (HNS) and dangerous goods (DG).

REGULATIONS

R1 Please assess the following statement; Regulation related to major accidents is inadequate in seaports.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

R2 Please assess the following statement; It is a problem that different administrative branches have their own terminology.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

R3 Please assess the following statement; Regulation related to preparedness for cyber threats is inadequate in seaports.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

R4 Please assess the following statement; It is challenging that there is national variation in implementation of safety & security regulations and administrative demands between the EU countries within the Baltic Sea Region.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

R5 Please assess the following statement; It is challenging that there is regional variation in the interpretation of safety & security regulations and administrative demands within a country.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

R6 Please assess the following statement; Safety and security regulations are inconsistent and fragmented which causes problems for seaports.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

R7 Please assess the following statement; Interpretation of safety and security regulations is challenging for seaports.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

R8 Please assess the following statement; Seaport safety and security regulation is inadequate, because it does not clearly define the responsible authorities.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

R9 Please assess the following statement; Regulations are not always up-to-date, because national legislative processes are too slow.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

COMMUNICATION

In the following there are ten statements about safety and security communication in seaports in Baltic Sea Region.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

C1 Please assess the following statement; There are obstacles that prevent or slow down the flow of information between different AUTHORITIES.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

C2 Please assess the following statement; There are obstacles that prevent or slow down the flow of information between AUTHORITIES and SEAPORT ACTORS.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

C3 Please assess the following statement; There is a lack of communication processes in managing major accidents in multi-authority operations at seaports.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

C4 Please assess the following statement; Seaports' site maps, rescue plans and other relevant information should be available for rescue operations.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

C5 Please assess the following statement; Interoperability of different information systems between different stakeholders should be developed.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

C6 Please assess the following statement; The use of seaports' experts in a command center of authorities during an accident needs to be developed.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

C7 Please assess the following statement; External crisis communication by using social media and mobile/smart phones to e.g. neighboring citizens and/or companies should be trained more.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

C8 Please assess the following statement; In order to increase safety and security, seaports should do more co-operation with other seaports.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

C9 Please assess the following statement; Seaport actors are not well prepared for cyber threats (concerning communication and information flow).

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

C10 Please assess the following statement; Crisis communication training should be increased in the context of seaports

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

NEW ITEMS

New In the following there are four statements about new technologies and ranking of eight development actions in seaports of Baltic Sea Region.

N1 Please assess the following statement; Preparedness of seaport safety and security to increased volumes of lithium batteries in cargo is at proper level

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

N2 Please assess the following statement; Preparedness of seaport safety and security to increased volumes of hydrogen as cargo and fuel is at proper level

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

N3 Please assess the following statement; Autonomous vessels (MASS) should be taken in account in seaport safety and security planning already now.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

N4 Please assess the following statement; Automation of cargo handling in seaports should be taken in account in safety and security planning already now.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

CH2 Please rank the following development activities by dragging the statements in order of importance in mitigating major accidents in seaports. (1=the most important)

_Safety and security regulations should be more comprehensive and up-to-date. (1)
_Safety and security regulation should be more consistent. (2)
_Preparedness for cyber threats should be developed. (3)
_The use of seaports' experts in 'authorities' command center during an accident needs to be developed. (4)
_The interoperability of IT systems between stakeholders should be developed (5)
_Seaports should co-operate more with other seaports in safety and security development. (6)
_Crisis communication training should be increased in the context of seaports. (7)
_Better accident scenarios based on risk analysis are needed. (8)

Please provide following background information

Q1 Select your organization or occupation from the following list

▼ Seaport management (291) ... NGO (299)

Q2 If you are working as a security officer, please select the position from the following list

▼ No, I'm not in charge of security issues (4) ... CSO, Company Security Officer (3)

Q3 Select the country you are working in

▼ Finland (1) ... Poland (8)

Q37 We ask your contact information (email and phone number) to be able to contact you for possible follow-up and clarifications. We respect your trust and protect your privacy and will never sell or share this data with any third party.

Your contact email Your contact phone number

Q33 Thank you for your participation, you can now submit your answers,

SUBMIT

The HAZARD project had 15 full Partners and a total budget of 4.3 million euros when it was executed from spring 2016 till spring 2019.

The learning experiences gained in the project are enhanced under **the ResQU2 Project Platform** (October 2018 – March 2020). ResQU2 is an Interreg BSR Flagship Project with a budget of 1 million euros. Both HAZARD and ResQU2 have been co-funded by the EU's Baltic Sea Region Interreg programme.

HAZARD aimed 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 dealt with these concerns by bringing together Rescue Services, other authorities, logistics operators and established knowledge partners.

HAZARD enabled 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/
https://blogit.utu.fi/resqu2/

HAZARD

Interreg Baltic Sea Region
EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND
ResQU2

EU STRATEGY FOR THE BALTIC SEA REGION
FLAGSHIP