Mapping the Risks and Vulnerabilities in the EU Food Supply Chain

Main results and conclusions for the Fishery and Aquaculture sector

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Content of the presentation

- Objective and scope of the study
- Data and methods
- Results:
  - Risks
  - Factors of vulnerability
- Conclusions

Key definitions

RISK: An uncertain circumstance that can result in negative consequences for a potential outcome (Hardaker et al., 2015; Chavas, 2004), and involves a potential impact and a certain likelihood of occurrence.

VULNERABILITY relates to the (in)capacity to respond to the negative impacts deriving from risks. As such, vulnerability can be intended as the opposite of resilience (Matthews, 2021). **A factor of vulnerability** is a characteristic of the supply chain determining or increasing vulnerability to risks.

Objective and scope of the study

Objectives:

- To identify and characterise potential risks affecting EU food supply and security, and define a risk typology.
- To assess the vulnerability of the EU food supply chain in relation to the risks identified and define the factors determining such vulnerability.
- To identify the key risks threatening the most the EU food supply chain.

The scope of the study covers:

- All EU-27 (including outermost regions)
- The heterogeneity across sectors, stages of the supply chain, countries, and types of stakeholder

  ➔ **Including fishery and aquaculture**

Stakeholders involved:

- Business stakeholders (single businesses and organisations)
- EU agencies and national competent authorities
- Research and academics
- International organisations and NGOs

Data and methods

Systematic literature review:
183 scientific and institutional papers

Semi-structured interviews:
152 stakeholders
(53 related to F&A, 28 specific to F&A)

Online survey:
278 participants
(96 related to F&A, 54 specific to F&A)

Risk and vulnerability identification:

- Short list of 28 risk categories, further grouped into 6 risk types.
- Nine main factors of vulnerability

Risk and vulnerability analysis:

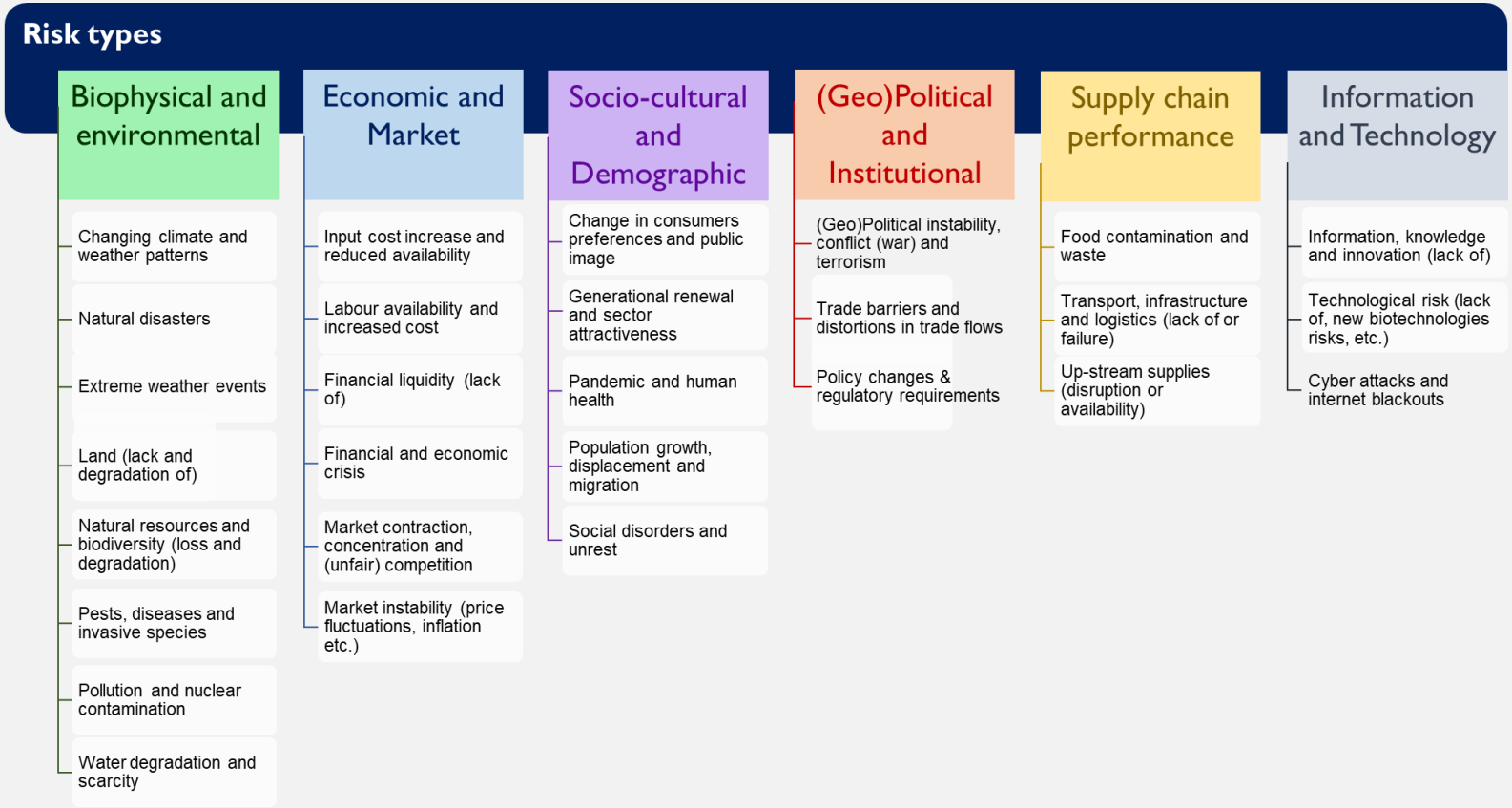
- Content analysis of interviews and literature
- Frequency analyses (relative importance, origin, time horizon)
- Likert scales (impact, likelihood, vulnerability, exposure)
- Econometrics
- Risk Index (Impact X Likelihood X Vulnerability)

Limitations to account for

- Stakeholders' perceptions can be influenced by the context in which the interviews and the survey have been conducted (e.g. Covid-19, Ukraine conflict).
- The analysis was conducted with aggregated data, whereas stakeholders and regions are not equally represented; therefore, the results might not reflect the specificities of each sector or stage of the supply chain and should be carefully interpreted.

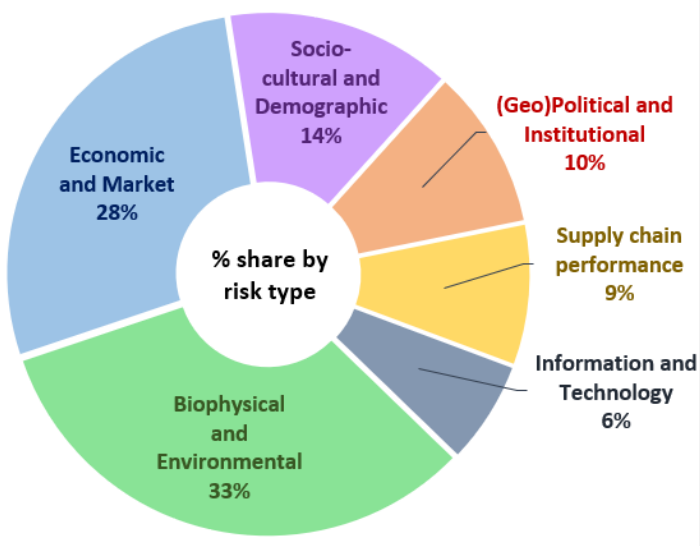
Results

Risk typology

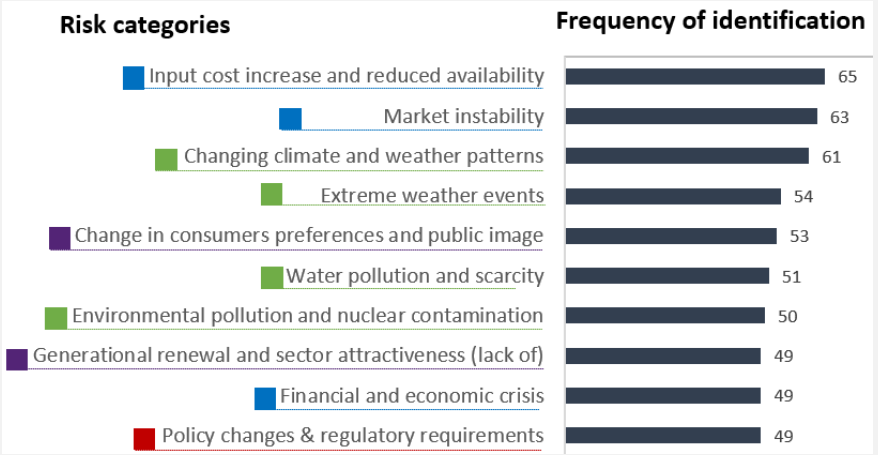


What are the risks that stakeholders identify most frequently in Fishery and Aquaculture sector?

Share of risk types mentioned by respondents (online survey).



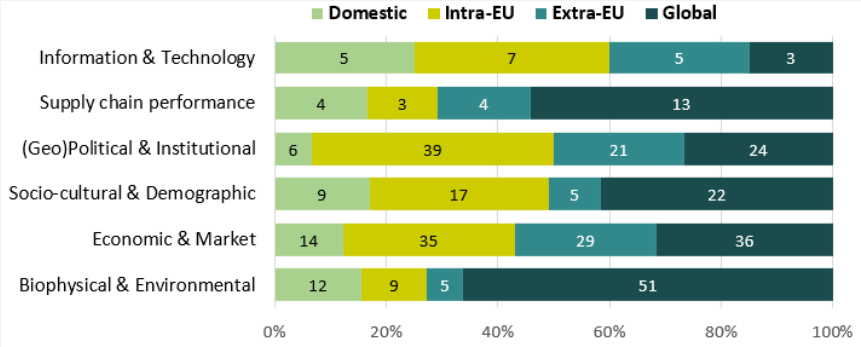
Ten most frequently identified risk categories (online survey).



- Biophysical-Environmental and Economic-Market risk types are generally the most frequently identified. Results are similar in other sectors.

What is the perceived origin and time horizon of the risks identified within the Fishery and Aquaculture sector?

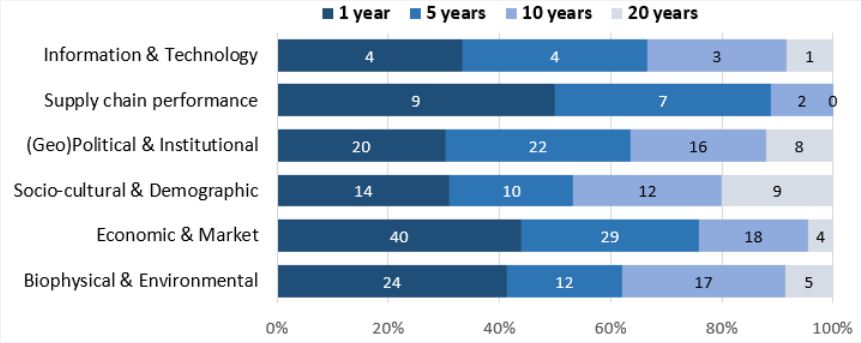
Origin of different risk types (interviews).



% share and no. of respondents

- Risks related to lack of financial liquidity, generational renewal, and market instability are perceived mainly of domestic and intra-EU origin.
- Risks related to changing climate, extreme weather events, food contamination, pandemics and geopolitical instability are mainly perceived as extra-EU or global.

Time horizon of occurrence of different risk types (interviews).

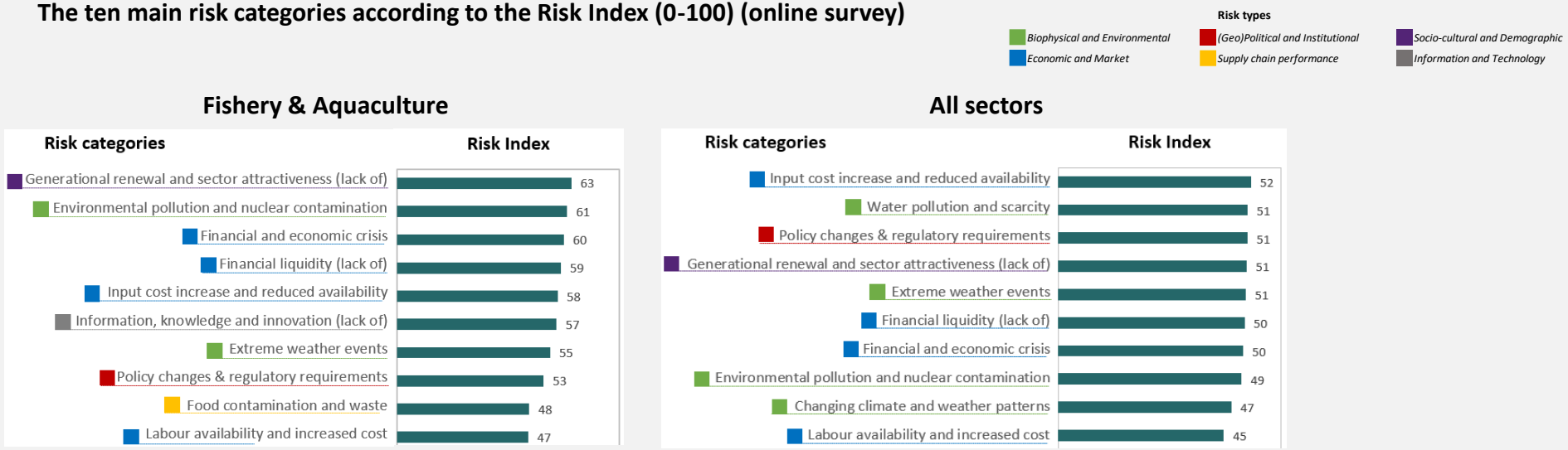


% share and no. of respondents

- Risks related to extreme weather, water pollution, labour availability, cyber-attacks, and trade and input supplies disruptions are expected in the short term (1-5 years).
- Risks related to pandemic and human health, generational renewal, changing consumer preferences, and technological risks are expected in the medium and long term (5-20 years or more).

What are the risks that are perceived to be the most threatening? Comparison among Fishery & Aquaculture and the whole Food Supply Chain

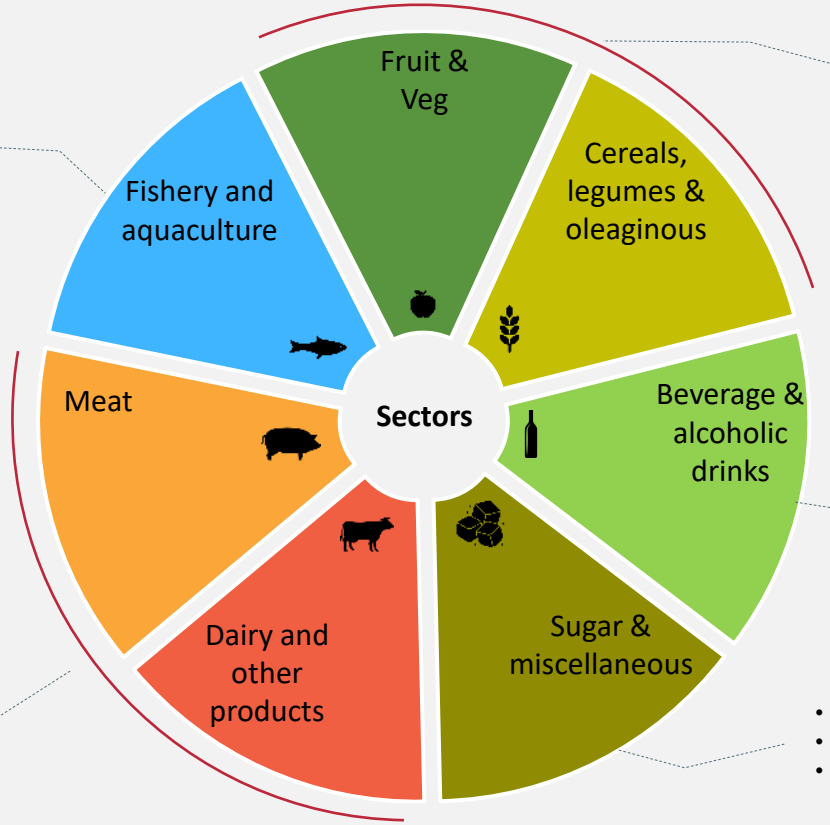
The ten main risk categories according to the Risk Index (0-100) (online survey)



- Overall, perceived risk is significantly higher in fishery and aquaculture than in other sectors.
- The are evident differences among Fishery and Aquaculture and other sectors.
- Generational renewal is perceived as the main threat overall in fishery and aquaculture.
- Lack of knowledge and innovation and food contamination are more threatening in fishery and aquaculture than in other sectors.

Which risks are perceived as most threatening? Comparison among sectors

- **Innovation gaps in light of climate adaptation and sustainability goals.**
- **Climate change and extreme weather impacts on fishing stocks and migration patterns.**
- **Financial liquidity constraints, rising input costs (e.g. fuel, feed) and exposure to liberalisation.**
- **Lack of generational renewal, linked to negative economic perspectives and low quality of life on the vessels.**
- **Environmental pollution (e.g. plastics, heavy metals), leading to food contamination, potentially leading to reducing consumer demand.**



- Adverse effects of extreme weather events
- Water scarcity
- Global market disruptions
- Geopolitical instabilities

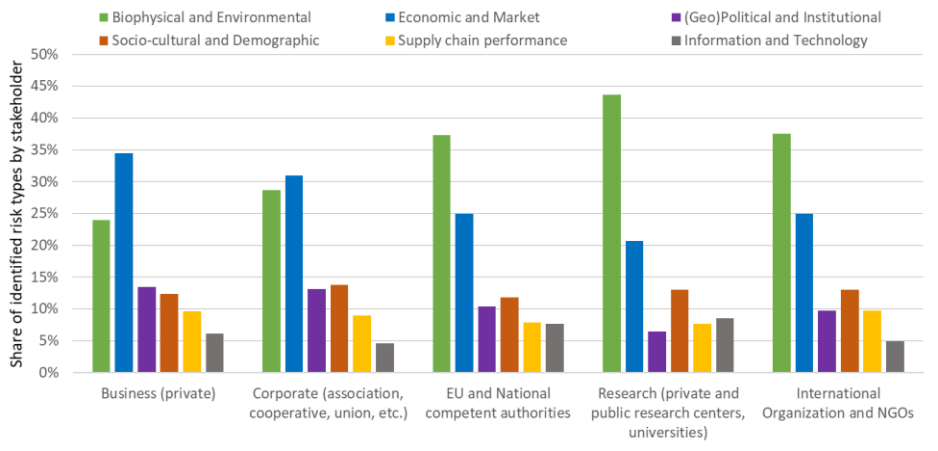
- Evolving consumer preferences risks
- Evolving policy and regulation

- Escalating costs and unavailability of crucial ingredients
- Intensified market competition
- Food contamination risks within the supply chain

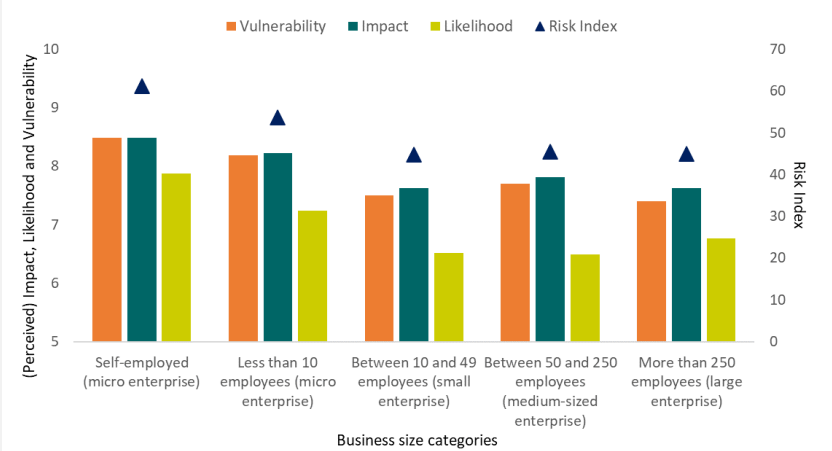
- Animal diseases
- Inherent food contamination
- Climate-induced impacts on animal health and productivity
- Shifting consumption trends

How does risk perception differ across different types of respondents?

Frequency of identification of risks by type of stakeholder (online survey)



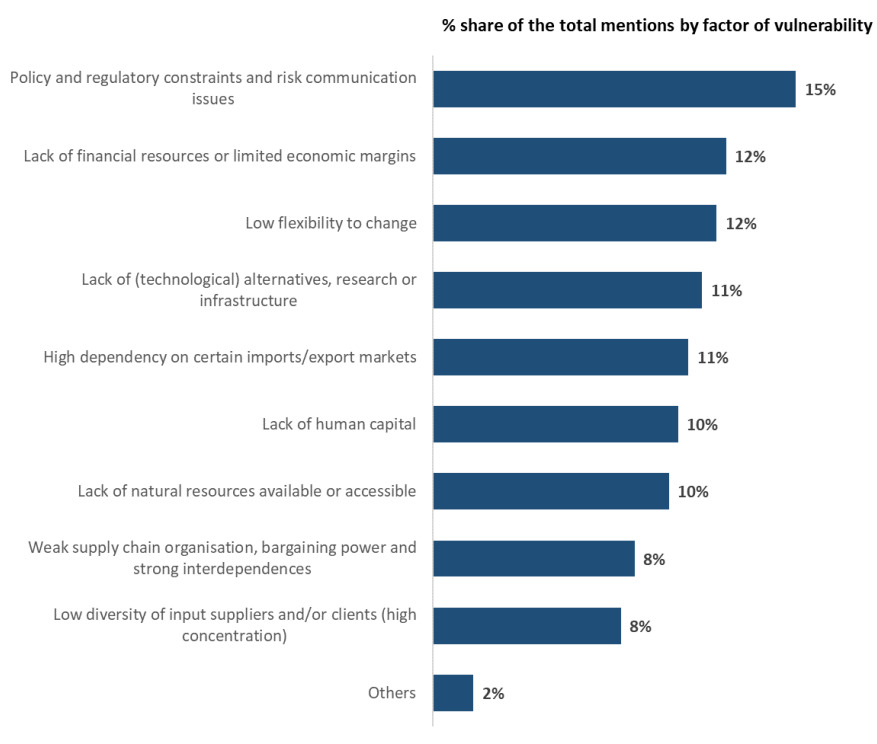
Risk perception by business size (online survey)



- Business stakeholders are relatively more concerned about Economic-market and Geopolitical risk types.
- Other stakeholders are more concerned about Biophysical-environmental risk types.
- Risk perception (impact, likelihood, vulnerability) decreases with increases business size.

What are the main factors that are perceived to determine vulnerability? 1/2

Frequency of identification of factors of vulnerability (online survey).



- There is no strong predominance of any factors of vulnerability overall.

What are the main factors that are perceived to determine vulnerability? 2/2

Correlation between factors of vulnerability and perceived vulnerability to different risk types (online survey)

Factors of vulnerability	Risk types: Biophysical and Environmental	Economic and Market	(Geo)Political and Institutional	Socio-cultural and Demographic	Supply chain performance	Information and Technology
Low diversity of input suppliers and/or clients						
High dependency on import/export						
Low flexibility to change		▲		▲		▲
Lack of financial resources or limited economic margins	▲	▲		▲		▲
Lack of natural resources available/accessible	▲	▲	▲			
Lack of human capital				▲		▲
Lack of (technological) alternatives, research or infrastructure	▲				▲	
Weak supply chain organization	▲				▲	
Policy and regulatory constraints and risk communication			▲		▲	

▲ Significant correlation among the factor of vulnerability and the vulnerability to the risk type

- **Factors of vulnerability are relevant to specific risk types.**
- Lack of financial and natural resources, and low flexibility to change determine the vulnerability to most risk types.
- High dependency on trade and low diversity of suppliers/clients do not appear relevant to any risk type.

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- A large diversity of risks affect fishery and aquaculture: Economic and market and Biophysical and environmental risk types stand out as prominent threats overall. Yet, risks related to generational renewal, technological gap and food contamination are very important.

- Risks are perceived much higher in fishery and aquaculture compared to other sectors. Some risks are particularly relevant (peculiar) in fishery and aquaculture, like the technological gap and food contamination, while they are less relevant in other sectors.

- Risks are perceived mostly in the short term (within the next 5 years), which might suggest a certain urgency to further assess risks and take actions accordingly.

- Risks are interrelated and have important cascade effects to be accounted for, such as from environmental pollution to food contamination and reducing consumer demand, or between raising input costs, decreasing financial capacity and increasing technological/innovation gap. This suggests the risks will need to be dealt with comprehensively and in a holistic way (dealing with single risks separately might be ineffective).

- No factor of vulnerability appears to be the most relevant overall. Vulnerabilities are contingent on the type of risk, with lack of financial and natural resources determining most of the risk types. Surprisingly, dependency on trade routes or suppliers/clients does not appear important to any type of risk.

Conclusions

- There is a large diversity of risks that can affect fishery and aquaculture: Economic and market and Biophysical and environmental risk types stand out as prominent threats overall. Yet, risks related to generational renewal, technological gap and food contamination are very important.

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Thanks for your attention

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For further details:

Bertolozzi-Caredio D., Severini S., Pierre G., Zinnanti C., Rustom R., Santoni E. and Bubbico A., *Risks and vulnerabilities in the EU food supply chain*, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/171825, JRC135290.

JRC EXTERNAL STUDY REPORT

Risks and vulnerabilities in the EU food supply chain

Mapping and analysis based on a stakeholder survey

Bertolozzi-Caredio, D., Severini, S., Pierre, G., Zinnanti, C., Rustom, R., Santoni, E., Bubbico, A.

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