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The influence of ecolabels and environmental information on fishery and aquaculture consumption

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Outline

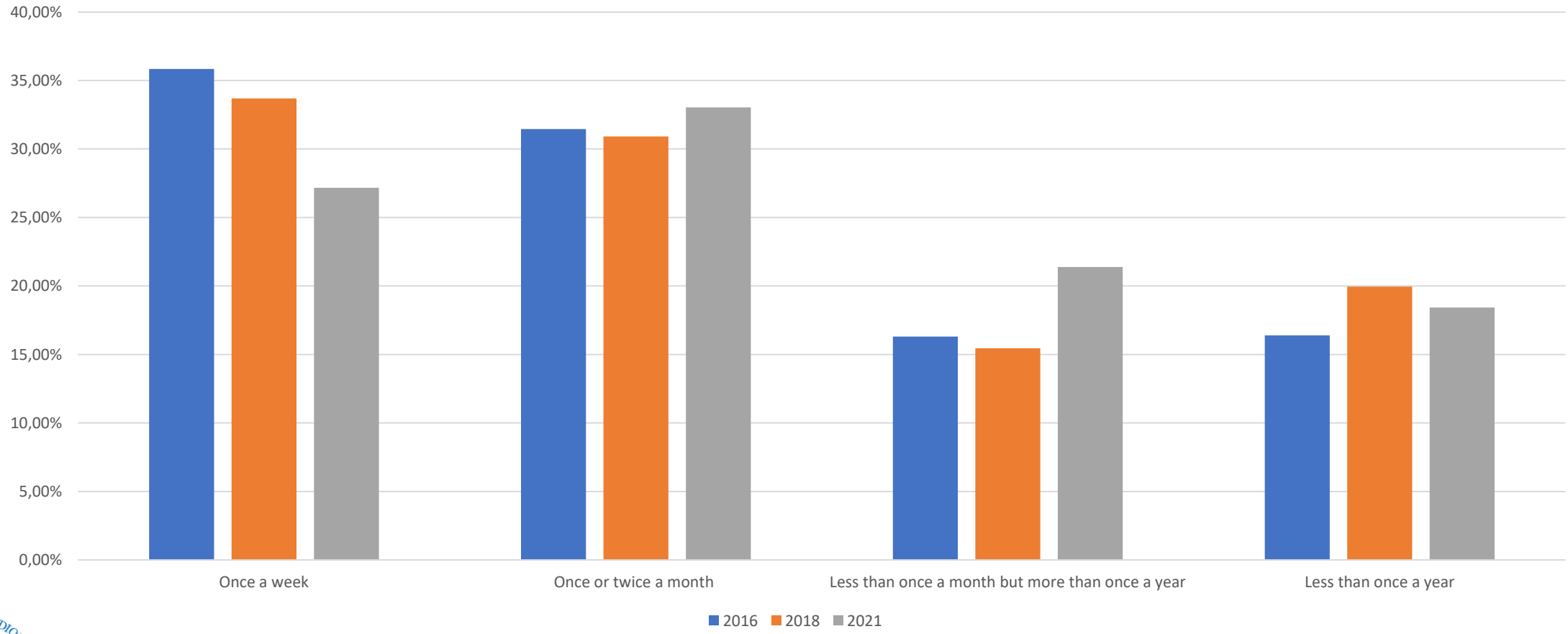
- Fish consumption and ecolabel – literature review.
- Data: Eurobarometer survey "EU consumer habits regarding fishery and aquaculture products“ (28 countries, about 21000 respondents/records)
  - 2021: ebs-95.1[1];
  - 2018: ebs-89.3[2];
  - 2016: ebs-85.3[3].
- Countries level analysis
- Label vs changes
- Conclusion

[1]https://www.gesis.org/en/eurobarometer-data-service/survey-series/standard-special-eb/study-overview/eurobarometer-951-za7781-march-april-2021
[2]https://www.gesis.org/en/eurobarometer-data-service/survey-series/standard-special-eb/study-overview/eurobarometer-893-za7483-june-july-2018
[3]https://www.gesis.org/en/eurobarometer-data-service/survey-series/standard-special-eb/study-overview/eurobarometer-853-za6695-june-2016

Fish consumption and ecolabel

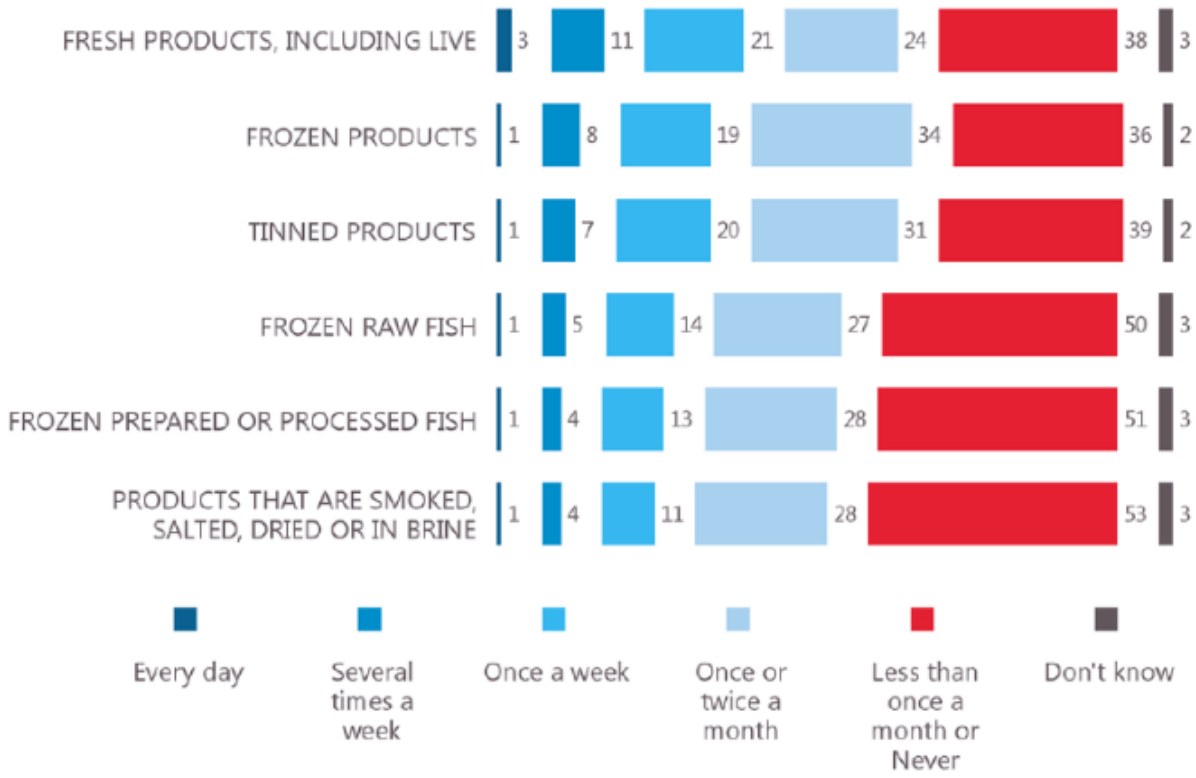
- The FAO report on the State of World Fisheries and Aquaculture 2020 (FAO, (2020)) tracks an +1%/year in the production and consumption of fish (which is expected to reach 21.5 kilograms per capita by 2030)
- Several recently published studies (Alamsyah et al. (2020); Cana (2020); Hussain et al. (2020); Mehta et al. (2020); Stanciu et al. (2020); Yang et al. (2020)), report the interest of consumers is oriented towards a consumption that paying close attention to sustainability , to reduce food waste and to adopt a healthier lifestyle.
- This seems also true for seafood (e.g.,Zander and Feucht, 2019; Bronnmann and Asche, 2017; Carlucci et al.,2015; Kalshoven and Meijboom, 2013, Whitmarsh and Palmieri, 2011,Olesen et al., 2010; Jaffry et al., 2004).
- Fish consumption has shown changes due to the Covid19 pandemic (Hendriarto et al. (2020); Kemp et al. (2020); Telukdarie et al. (2020); Dangelico et al. (2022)).
- **Research Question**: Are the changes in fish product consumption always going toward greater attention to eco-label?

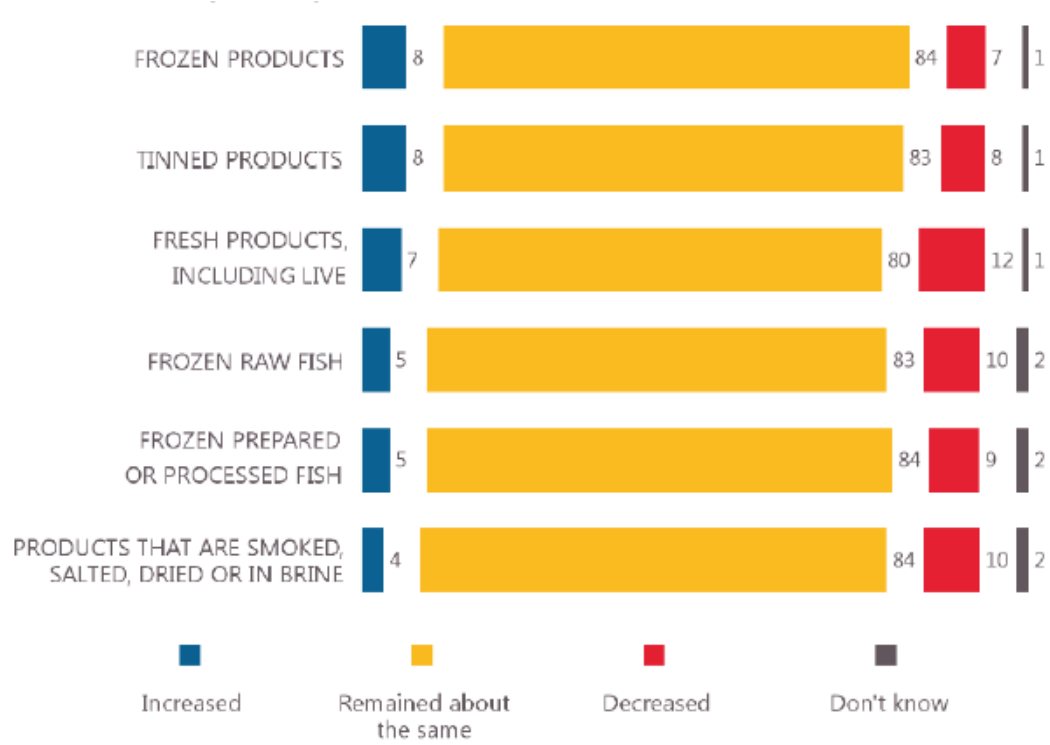
Trend in frequency of fish products consumption



(our elaborations on ebs-95.1, ebs-89.3. Ebs-85.3)

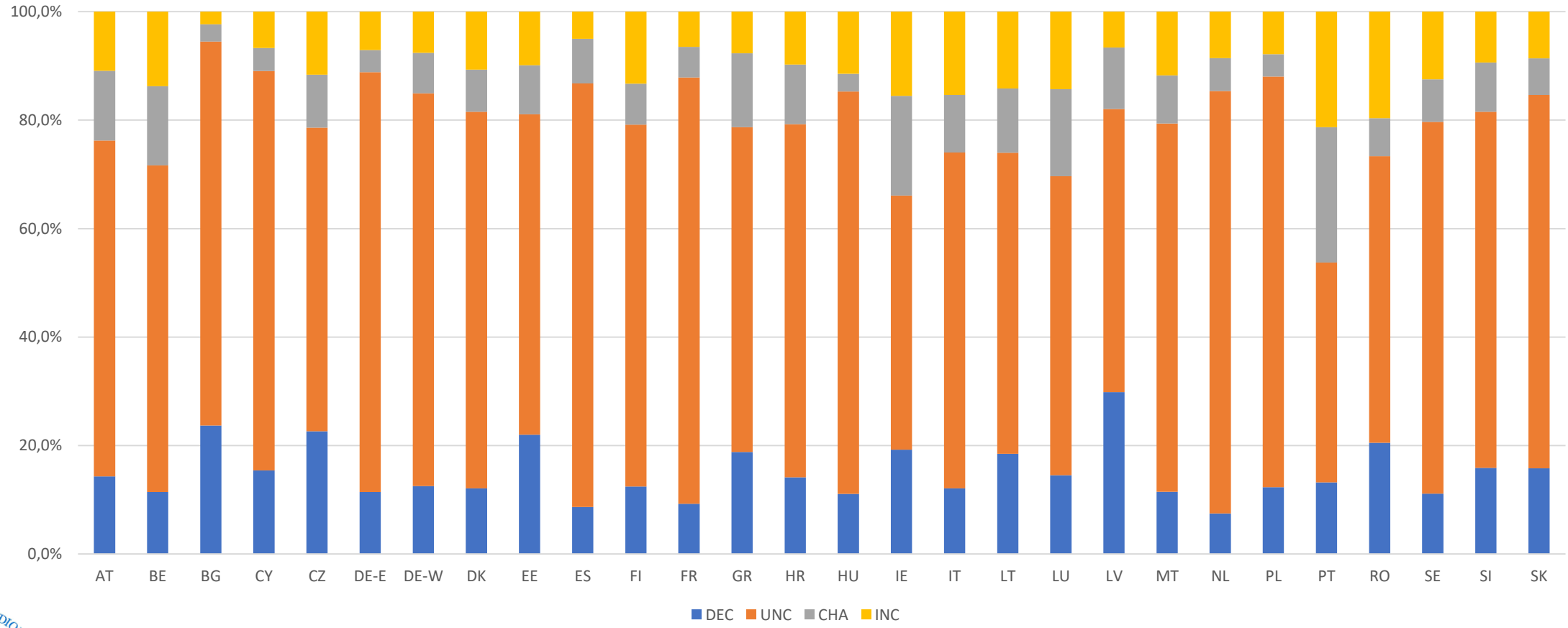
Changes during (due?) the Covid19 pandemic





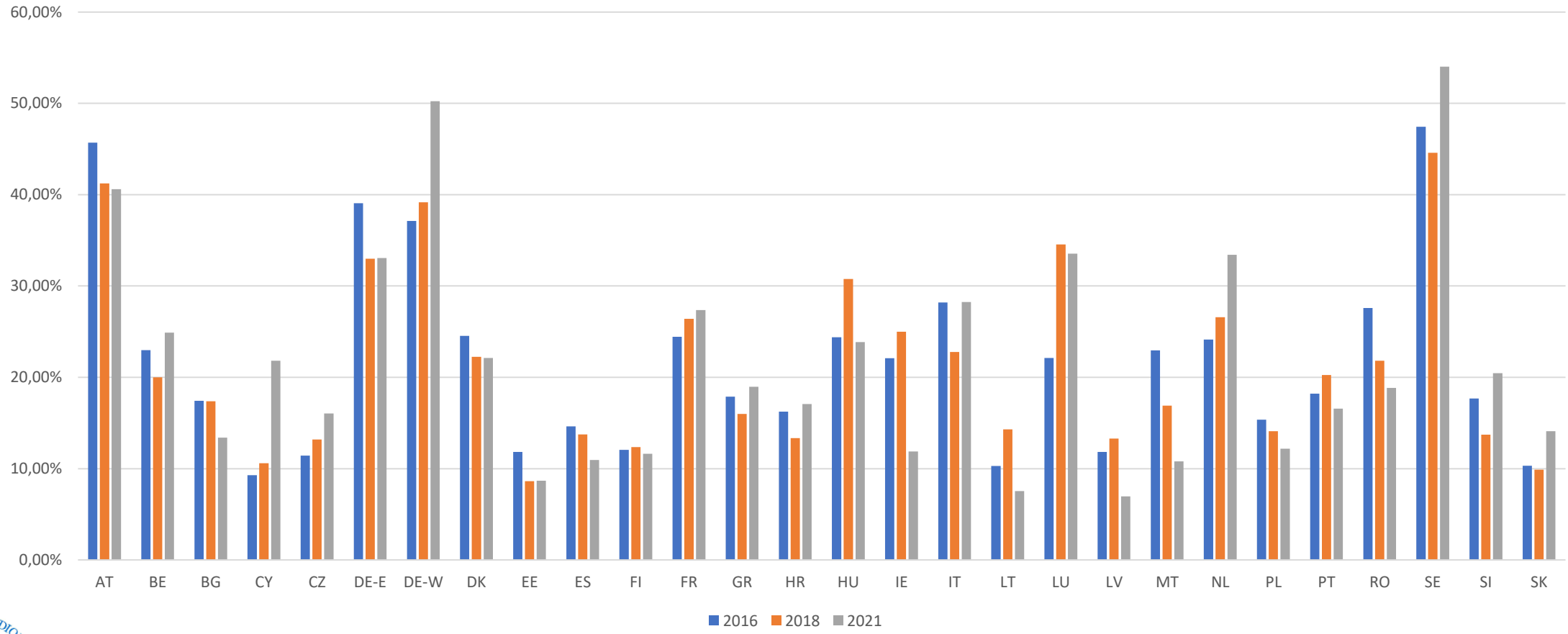
(source ebs-95.1)

*Fraction of respondent for country that declaring **unchanged** consumption of fish products (**UNC**), **increasing** the consumption of one or more types of products **without decreasing** any other (**INC**), **decreasing** the consumption of one or more types of products **without increasing** any (**DEC**), decreasing the consumption of one or more types of products and, at the same time, has increased the consumption of others (**CHA**).*



(our elaborations on ebs-95.1)

Fraction of respondents who consider the brand and the quality label as an important aspect in the decision to buy fish products by year



(our elaborations on ebs-95.1, ebs-89.3. Ebs-85.3)

Correlation distance between countries

A threshold value has been choosen as the one corresponding to the maximum value among the minimum values for each country (0.085 for LU)

Using only the under-threshold values, we can define a weighted adjacency matrix for a complex network between the various countries where each of them is linked only with those that are less distant than the threshold value.

We decided to measure the "distance" between countries X and Y, using "correlation distance" defined as:

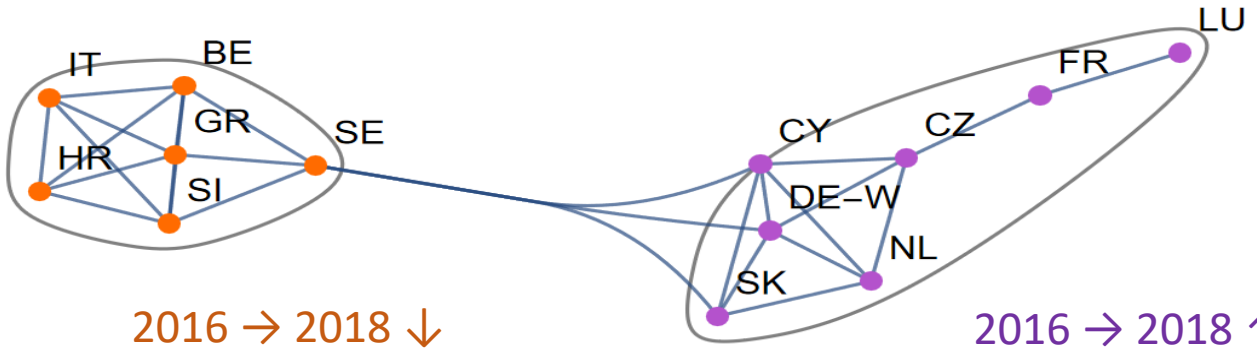
$$d(X,Y) = 1 - \rho_{X,Y}$$

Where $\rho_{X,Y}$ is the Pearson correlation coefficient:

$$\rho_{X,Y} = \mathrm{cov}(X, Y) / \sigma_X \sigma_Y$$

Dist	AT	BE	BG	CY	CZ	DE-E	DE-W	DK	EE	ES	FI	FR	GR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK
AT		0,99	0,39	1,67	1,86	0,01	1,71	0,00	0,01	0,23	0,78	1,98	0,96	0,80	1,33	0,59	0,61	0,99	1,98	0,59	0,08	1,78	0,13	0,95	0,03	1,34	1,01	1,52
BE	0,99		1,79	0,26	0,49	0,87	0,30	0,93	0,87	1,64	1,97	0,79	0,00	0,02	1,95	1,91	0,08	2,00	1,19	1,91	1,39	0,38	1,49	2,00	1,22	0,06	0,00	0,15
BG	0,39	1,79		2,00	1,93	0,50	1,99	0,45	0,50	0,02	0,09	1,77	1,77	1,66	0,45	0,03	1,50	0,20	1,45	0,03	0,13	1,97	0,08	0,18	0,23	1,95	1,80	1,99
CY	1,67	0,26	2,00		0,04	1,57	0,00	1,62	1,57	1,99	1,87	0,19	0,29	0,40	1,48	1,95	0,58	1,75	0,48	1,95	1,91	0,01	1,95	1,78	1,82	0,08	0,25	0,02
CZ	1,86	0,49	1,93	0,04		1,78	0,03	1,82	1,78	1,99	1,69	0,05	0,52	0,66	1,20	1,82	0,86	1,52	0,25	1,82	1,99	0,01	2,00	1,56	1,95	0,23	0,47	0,11
DE-E	0,01	0,87	0,50	1,57	1,78		1,61	0,00	0,00	0,32	0,91	1,94	0,83	0,68	1,45	0,71	0,50	1,12	2,00	0,71	0,14	1,70	0,20	1,08	0,06	1,21	0,88	1,41
DE-W	1,71	0,30	1,99	0,00	0,03	1,61		1,66	1,61	2,00	1,84	0,16	0,32	0,44	1,43	1,94	0,62	1,71	0,44	1,93	1,93	0,01	1,97	1,74	1,85	0,10	0,28	0,03
DK	0,00	0,93	0,45	1,62	1,82	0,00	1,66		0,00	0,28	0,85	1,96	0,89	0,74	1,39	0,65	0,55	1,06	1,99	0,66	0,11	1,74	0,17	1,01	0,04	1,27	0,95	1,46
EE	0,01	0,87	0,50	1,57	1,78	0,00	1,61	0,00		0,32	0,91	1,94	0,83	0,68	1,45	0,71	0,50	1,12	2,00	0,71	0,14	1,70	0,20	1,07	0,06	1,21	0,89	1,41
ES	0,23	1,64	0,02	1,99	1,99	0,32	2,00	0,28	0,32		0,21	1,89	1,61	1,48	0,65	0,10	1,29	0,35	1,63	0,10	0,04	2,00	0,02	0,32	0,11	1,86	1,65	1,95
FI	0,78	1,97	0,09	1,87	1,69	0,91	1,84	0,85	0,91	0,21		1,42	1,97	1,91	0,15	0,02	1,82	0,02	1,03	0,02	0,41	1,78	0,32	0,01	0,57	1,99	1,98	1,95
FR	1,98	0,79	1,77	0,19	0,05	1,94	0,16	1,96	1,94	1,89	1,42		0,83	0,98	0,88	1,60	1,18	1,22	0,08	1,59	1,98	0,10	1,95	1,27	2,00	0,47	0,77	0,31
GR	0,96	0,00	1,77	0,29	0,52	0,83	0,32	0,89	0,83	1,61	1,97	0,83		0,01	1,96	1,89	0,06	2,00	1,23	1,90	1,36	0,41	1,46	2,00	1,18	0,07	0,00	0,17
HR	0,80	0,02	1,66	0,40	0,66	0,68	0,44	0,74	0,68	1,48	1,91	0,98	0,01		1,99	1,81	0,02	1,98	1,38	1,82	1,21	0,54	1,32	1,97	1,03	0,14	0,02	0,27
HU	1,33	1,95	0,45	1,48	1,20	1,45	1,43	1,39	1,45	0,65	0,15	0,88	1,96	1,99		0,28	2,00	0,06	0,50	0,27	0,93	1,33	0,82	0,08	1,11	1,78	1,94	1,63
IE	0,59	1,91	0,03	1,95	1,82	0,71	1,94	0,65	0,71	0,10	0,02	1,60	1,89	1,81	0,28		1,68	0,09	1,24	0,00	0,26	1,89	0,19	0,07	0,39	2,00	1,92	1,99
IT	0,61	0,08	1,50	0,58	0,86	0,50	0,62	0,55	0,50	1,29	1,82	1,18	0,06	0,02	2,00	1,68		1,92	1,55	1,68	1,01	0,73	1,12	1,90	0,83	0,26	0,08	0,41
LT	0,99	2,00	0,20	1,75	1,52	1,12	1,71	1,06	1,12	0,35	0,02	1,22	2,00	1,98	0,06	0,09	1,92		0,82	0,08	0,59	1,63	0,49	0,00	0,77	1,94	2,00	1,86
LU	1,98	1,19	1,45	0,48	0,25	2,00	0,44	1,99	2,00	1,63	1,03	0,08	1,23	1,38	0,50	1,24	1,55	0,82		1,23	1,83	0,35	1,76	0,87	1,92	0,85	1,17	0,65
LV	0,59	1,91	0,03	1,95	1,82	0,71	1,93	0,66	0,71	0,10	0,02	1,59	1,90	1,82	0,27	0,00	1,68	0,08	1,23		0,26	1,89	0,19	0,07	0,40	2,00	1,92	1,99
MT	0,08	1,39	0,13	1,91	1,99	0,14	1,93	0,11	0,14	0,04	0,41	1,98	1,36	1,21	0,93	0,26	1,01	0,59	1,83	0,26		1,97	0,01	0,55	0,02	1,68	1,41	1,82
NL	1,78	0,38	1,97	0,01	0,01	1,70	0,01	1,74	1,70	2,00	1,78	0,10	0,41	0,54	1,33	1,89	0,73	1,63	0,35	1,89	1,97		1,99	1,66	1,90	0,15	0,37	0,06
PL	0,13	1,49	0,08	1,95	2,00	0,20	1,97	0,17	0,20	0,02	0,32	1,95	1,46	1,32	0,82	0,19	1,12	0,49	1,76	0,19	0,01	1,99		0,46	0,04	1,76	1,51	1,88
PT	0,95	2,00	0,18	1,78	1,56	1,08	1,74	1,01	1,07	0,32	0,01	1,27	2,00	1,97	0,08	0,07	1,90	0,00	0,87	0,07	0,55	1,66	0,46		0,73	1,96	2,00	1,88
RO	0,03	1,22	0,23	1,82	1,95	0,06	1,85	0,04	0,06	0,11	0,57	2,00	1,18	1,03	1,11	0,39	0,83	0,77	1,92	0,40	0,02	1,90	0,04	0,73		1,54	1,24	1,70
SE	1,34	0,06	1,95	0,08	0,23	1,21	0,10	1,27	1,21	1,86	1,99	0,47	0,07	0,14	1,78	2,00	0,26	1,94	0,85	2,00	1,68	0,15	1,76	1,96	1,54		0,05	0,02
SI	1,01	0,00	1,80	0,25	0,47	0,88	0,28	0,95	0,89	1,65	1,98	0,77	0,00	0,02	1,94	1,92	0,08	2,00	1,17	1,92	1,41	0,37	1,51	2,00	1,24	0,05		0,14
SK	1,52	0,15	1,99	0,02	0,11	1,41	0,03	1,46	1,41	1,95	1,95	0,31	0,17	0,27	1,63	1,99	0,41	1,86	0,65	1,99	1,82	0,06	1,88	1,88	1,70	0,02	0,14	

Country-network obtained using correlation distances

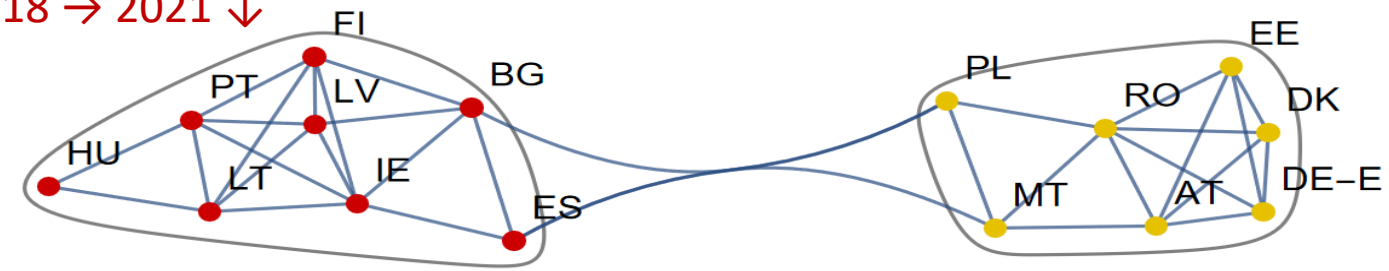


2016 → 2018 ↓
2018 → 2021 ↑

2016 → 2018 ↑
2018 → 2021 ↑

It is possible to highlight the presence of four distinct communities that differ in the temporal trend of the fraction of respondents who consider the brand and labels important at the time of purchase

2016 → 2018 ↑
2018 → 2021 ↓

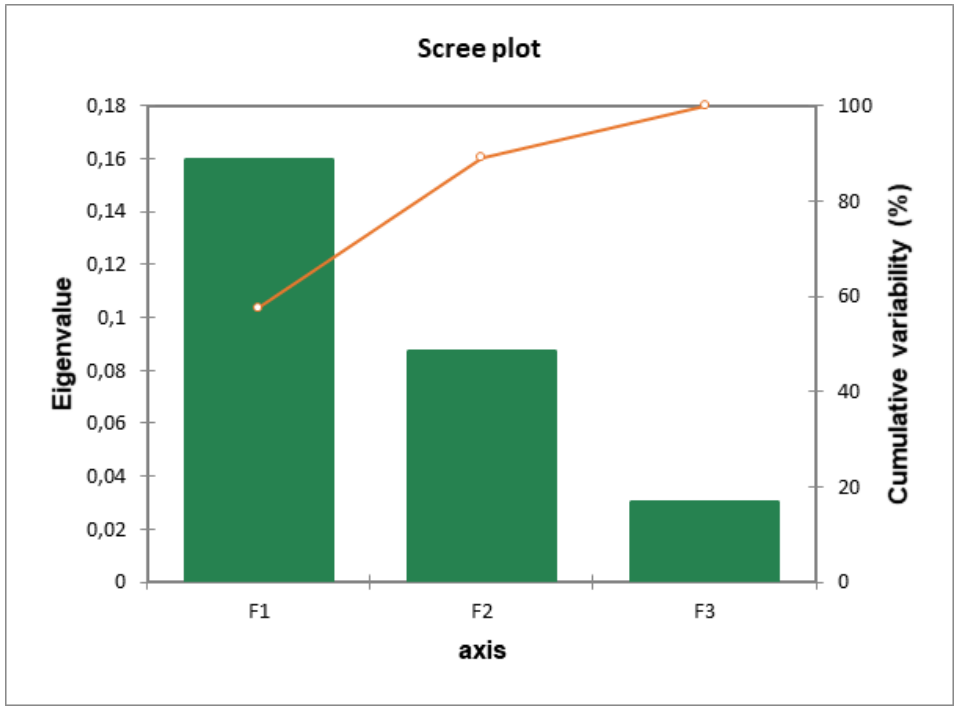


2016 → 2018 ↓
2018 → 2021 ↓

We want to understand if there is a correlation between changes in the consumption of fish products at country and communities

Factorial space obtained from Discriminant Analysis (Fisher, 1936)

The principle of DA is to model a qualitative dependent variable (Communities) from some variables, called discriminants, based on linear combinations of predictor variables (fraction of CHA, UNC, DEC, INC) that provide the best discrimination between the communities.



Analising the distributions of the respondents' answers about the reasons behind the changes[4], we can infer that:

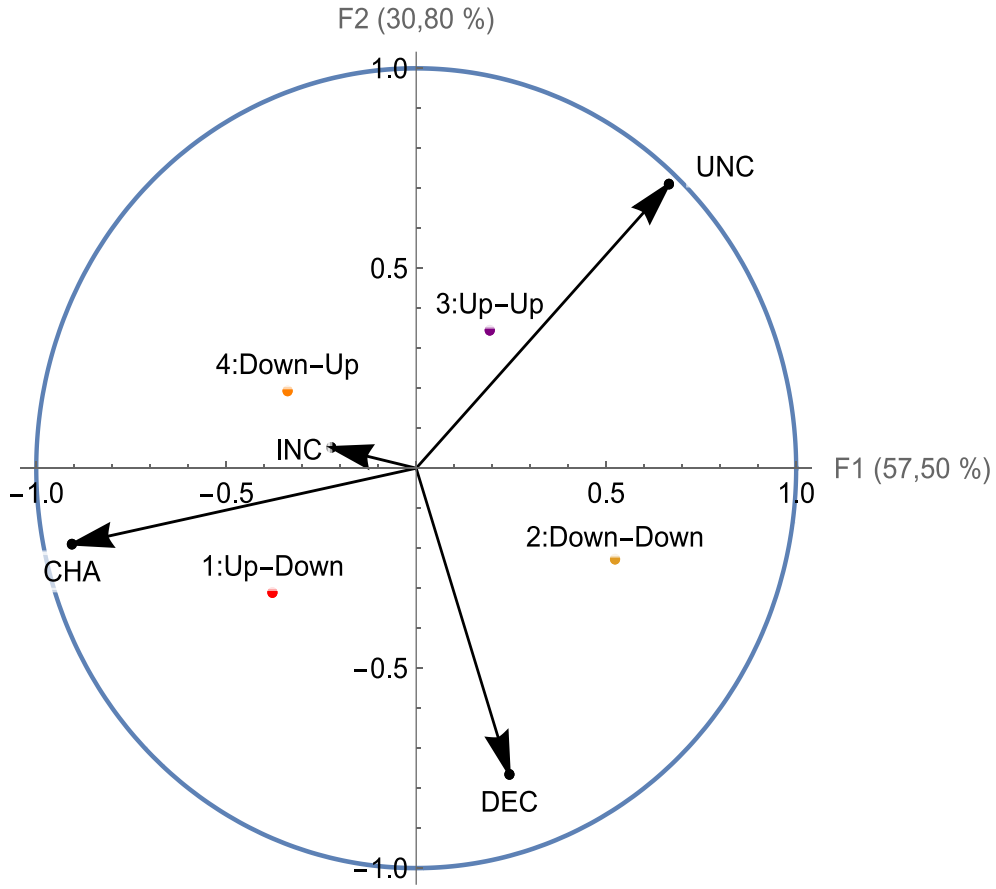
F1 is negatively related to the impacts of COVID on economic dynamics (***Some fishery products have become more/less expensive - Your financial circumstances have changed - You cannot find certain fishery products in stores***)

F2 is positively correlated with greater attention to the healthy aspects of a diet richer in fish products (***You are now more health conscious - You have changed your diet***)

[4] *ebs-95.1 – QD6a/b/c*

Factorial space and communities

- For countries where the percentage of UNC is higher, it leads to a constant increasing trend not influenced by the pandemic
- In countries where the percentage of respondents declaring a net decrease in the consumption of fish products is significant, the attention to ecolabel continues to decrease
- The countries where there is a reversal of the growing trend of attention towards ecolabels are those where the pandemic has changed consumption habits essentially for economic reasons
- When the percentage of respondents declaring a net increase in the consumption of fish products is significant, there is an increase in the percentage of consumers who use brands and labels as an important variable in their purchase choice.



Factorial space identified using the first two factors, the four explanatory variables (CHA, UNC, DEC, INC) and the centroids relating to the four communities are reported.

Conclusion

- In general, we can say that 1 out of 4 Europeans, when buying fish products, believes that the brand and the information contained on the labels are important aspects.
- There is not a single trend per country but rather, within the European panorama, there are also conflicting situations.
- The dynamics in the various countries was heterogeneous and strongly linked to the macro-economic dynamics related to the purchasing power perceived in the various countries
- Marked differences between countries exist regarding the preferences for the content of a fisheries label