INdIGO

INnovative fIshing Gear for Ocean

T4.2 Acceptability : Results

EUROPEAN UNION

Interreg France (Channel Manche) England

European Regional Development Fund

Université Bretagne Sud ubs

NaturePlast L'expert en Bioplastiques

Smel Synergie Mer et Littoral Recherche & développement

filt 1860 Fabricant de filets et de cordons

UNIVERSITY OF PORTSMOUTH

Cefas

UNIVERSITY OF PLYMOUTH

IRMA INSTITUT REGIONAL DES MATERIAUX AVANCES

Ifremer

marine southeast

English Part

WP 4	**Study of the acceptability of biodegradable fishing gear**	**Pilote : UBS** **Partenaires : SMEL, CEFAS**
T4.2	**Acceptability of more sustainable fishing practices**	**Pilot: UBS** **Partners :SMEL, CEFAS**
	Deliverable 4.2: **- Results of final questionnaire**	**Writer: UBS** **Tabatha Thiebaut-Rizzoni** **Julie Lassalle** **Laurent Guillet**

Common Parts – WP 1 / WP 4

7. Introduction

a. Background to this report and objectives

The INdIGO (INnovative fIshing Gear for Ocean) project has been selected by the Interreg VA France (Channel) England (FCE) European Programme, funded by the European Regional Development Fund (ERDF). The project involved a total budget of €4.2 million (including 2.9 million ERDF) and planned for completion in June 2023.

Fishing gear (nets, traps, etc.) are made from plastic materials that have an estimated lifetime of several hundred years, which is an issue if the gear is lost at sea. To tackle this issue, the INdIGO project will reduce the total quantity of plastic present in the FCE area by 3% through the development of biodegradable fishing gear, by contributing to improve water quality and maintain biodiversity. INdIGO will also work to improve the prevention and management of pollution generated by machinery, by identifying existing recycling channels and developing an application to locate fishing gear already lost.

The project will cover the production chain of the fishing gear from formulation, filament manufacturing, to prototype net development. The deployment of the net at sea, durability tests, technical and economic analysis will then be undertaken. A life-cycle analysis will be completed to avoid pollution transfer.

The involvement of small and medium sized enterprises will ensure the economic sustainability of the project by exploiting the results of the project. This expertise of the sector will enable INdIGO to develop products that are adapted to the needs of the market and competitive with current alternatives, while reducing their impact on the environment.

b. Rationale of the WP1: Scope and objectives

The objective of this Work Package is to assess the current situation regarding the pollution generated by the use of plastics in the fishing industry, in order to propose a relevant alternative solution adapted to the needs of the end users.

Investigative work in different fishing ports was carried out in Activity 1 to identify the plastics used on board and quantify the waste generated by the industry. In parallel, a mobile application based on participatory science was developed by Ifremer. It allows users of the marine environment (fishermen, yachtsmen, divers) to report lost gear on the coast or at sea and to correlate the results obtained with the surveys. The collection points for used fishing gear in ports and the existing recycling channels are identified in activity 2. The aim is to improve and facilitate the collection and recycling of fishing gear by pooling knowledge and know-how to promote the expansion of these channels in the FMA area. All these data will be used as a basis in Activity 3 to select prototypes, define their specifications and will be used to influence policy makers. A market analysis on biodegradable plastics will be carried out to highlight supply, demand, needs and price expectations.

The objective of this activity 1 is to take stock of the presence of plastics in the fisheries sector in order to propose relevant solutions for the specifications established in activity 3. UBS, Cefas and SMEL have carried out surveys among fishermen to identify the trades generating the most plastic waste. In order to be more representative, the partnership ensured that the sampling reflected the activities of the FMA area by taking into account the geographical area, the number of professionals surveyed and the types of fishing practiced. The format of the surveys was co-constructed by the partners and the results were used to build a robust database.

This deliverable is a detailed inventory of the use of plastic materials in relation to the fishing industry. The accumulated data allows the establishment of statistics in the FMA area concerning the type of plastic used, the waste generated, the fishing gear brought back to the port (in collection points) or lost at sea. These results will feed into the reflection in activity 3 concerning the type of gear to be redesigned as a priority.

c. Rationale of the WP4: Scope and objectives

The objective of this Work Package is to integrate the end-users in the design process of the new biodegradable fishing gear. The goal is to facilitate the integration of innovation in the professional fishing industry to ultimately facilitate the transition to sustainable practices. If an innovation is perceived as acceptable by the future users, it facilitates its integration into the users' activity. This is why the first work consisted in evaluating the acceptability of the innovation. Acceptability refers to the measure of the a priori evaluation of the tool within the fishing professionals before they use it; the objective being to identify the brakes and levers for the use of the innovation.
A first investigation was carried out using a pilot questionnaire sent to a small sample of fishermen (15 French and 12 English). The method used and the results obtained were presented in deliverable MT4.1.2. The pilot questionnaire was used to construct an acceptability questionnaire consisting of 54 questions grouped into 9 acceptability dimensions.
The objective of the acceptability questionnaire is to identify the barriers and levers to the acceptability of a new biodegradable fishing gear. The results should be used to make recommendations for the design of the biodegradable fishing gear and to implement an action plan to accompany the transition towards sustainable fishing practices.

d. Aim of collaboration of the WP1 and WP4

The objectives of WP1 and WP4 are different, however the target population and the questionnaire method are similar. The partners agreed to join forces to meet their respective objectives by soliciting only once the population likely to use biodegradable fishing gear. The method presented in the following section is common to WP1 and WP4. The construction of the pilot questionnaire and the final questionnaire was carried out together.

8. Method

a. Previous work

Pilot survey

The objective of the pilot questionnaire (see Annex 1) was to obtain information to guide the final technical and acceptability questionnaire for new biodegradable fishing gear. The results of this first study were used to specify the modalities for answering the questions envisaged in the final questionnaire. In order to meet the demands of the project and to optimise the response rate of the fisheries stakeholders, the

choice was made to combine some aspects of WP1 and WP4. The research topics for tasks 1.1 and 4.1 were merged into one questionnaire, in order to avoid over-soliciting professionals whose access is already a challenge in itself. This study also made it possible to collect the first elements of language to address the link between fishing activity, the environment and the preservation of resources. The proposed interview was a qualitative survey method based on a few individuals. These individuals are chosen according to their characteristics and types of fishing activity. The objective was to obtain a representative sample of the diversity of fishing and to study the assumed attitudes towards the object of study. Each individual is considered a representative of his or her category, however this sample is not representative of the overall population. SMEL and Cefas were responsible for selecting the fishing professionals in each sector of activity (gillnetter, trawler, etc.) on the basis of their professional contacts. The fishing professionals were contacted by telephone in order to gather their interest in participating in the study. In total, the sample for this study was made up of 30 fishing professionals, 15 of whom were from France and 15 from the UK. The dimensions addressed were related to COVID-19; the working environment, and questioned the vocabulary used. Within the framework of this study and given the context of the health situation, telephone interviews were chosen to administer the pilot questionnaire. The information collected made it possible to draw up a list of qualities that professionals believe a fishing net should possess. Performance, cost, strength, durability, price, thread strength, water penetration, buoyancy, compactness and catchability of the net are all characteristics that should be taken into account in WP1 activity 3, when drawing up the specifications of the new INdIGO fishing gear. This information also allowed the final questionnaire, presented below, to be drawn up in greater detail.

Main survey

The acceptability questionnaire consisted of 54 questions in 9 dimensions:

- 4 questions concerned leadership
- 8 were about social influence
- 14 were about control
- 3 were about ease of use
- 4 were about perceived usefulness
- 4 were about expected image and professional identity
- 12 were about consistency
- 1 concerned adoption intention
- 4 concerned socio-demographic characteristics (age, gender, level of education, number of years in practice).

The dimensions were explained in the previous deliverable "deliverable MT4.1.2 (interim report)", as well as the back-translation carried out and the administration method implemented. A summary of the dimensions, sub-dimensions and the number of associated questions of the questionnaire are presented in table 6.

Table 6: Dimensions and sub-dimensions

Dimension *Definition*	Sub dimension	Number of variables	
Leadership - Opinion Leader *An informal leader who has the ability to influence the attitude or behavior of others in the desired direction*	Communication within the fishing community (LDS1, LDS2.1)	2	**4**
	Influence on colleagues (LDS2.2, LDS2.3)	2	
Social Influence *Perceived social pressure. Depends on the opinions of others, individuals or reference groups and the individual's willingness to conform to this influence*	Community (INFS1.1, INFS1.2, INFS1.3, INFS1.6)	4	**20**
	Approval (INFS2.1, INFS2.2, INFS2.3, INFS2.4, INFS2.5, INFS2.6, INFS2.7, INFS2.11)	8	
	Family (INFS1.4, INFS2.10)	2	
	Clients (INFS1.5, INFS2.12)	2	
	Society (INFS1.7, INFS2.13, INFS2.8, INFS2.9)	4	
Control *Perceived presence of endogenous (e.g., autonomy, capabilities, resources) and/or exogenous elements (e.g., contextual elements, opportunities, importance of outcomes) that may facilitate or hinder the production of the behavior.*	**Exogenous elements**		**22**
	Financial (C1.2, C3, C4.8, C4.2)	4	
	Performance (C1.3, C2, C4.1, C4.3, C4.6)	5	
	Image (C1.8, C1.10, C4.9)	3	
	Environment (C1.7, C1.9)	2	
	Profession (C1.6)	1	
	Habits (C4.4, C4.5, C4.7)	3	
	Endogenous elements		
	Trialability, power to do, confidence (C1.4, C1.12, C1.11)	3	
	Colleague support (C1.5)	1	
Ease of use *Perception of the level of effort required during use*	Habits (Fut1.3, Fut1.4.5)	2	**7**
	Ease of use (FUt1.1)	1	
	Workload (Fut1.4.2, Fut1.4.4)	2	
	Time investment (Fut1.4.1, Fut1.4.3)	2	
Perceived usefulness *Perceived improvement in job performance through the use of the artifact*	Compatibility (UP1.4, UP2.4, UP2.5, UP2.2)	4	**8**
	Performance (UP1.2, UP1.3, UP2.3, UP2.1)	4	
Professional identity *Expectation of notoriety or respect from peers*	Stress-reward balance (IEIP1.4, IEIP1.1, IEIP1.3)	3	**4**

	Skills development (IEIP1.2)	1	
Consistency *State of balance between thoughts, attitudes and behavior of an individual*	Pro-environmental attitude (Cons1.11, Cons1.12, Cons1.10, Cons1.13)	4	**11**
	Thoughts, power to act (Cons.1.3, Cons1.6, Cons1.7, Cons1.9)	4	
	Pro-environmental behaviour (Cons1.4, Cons1.8)	2	
	Opposite behavior (Cons1.2)	1	
Intent to use	Intent to use (INTU1)	1	**1**
Individual characteristics	Age	1	**4**
	Sexe	1	
	Level of study	1	
	Number of years of practice	1	

The French questionnaire was stopped on april 2021. The English questionnaire was closed on september, 2021.

b. Data coding

A total of 227 people participated in the questionnaire, but 23 participants were excluded from the initial data set due to significant response bias (systematic responses, outliers, missing data) or abandonment of the questionnaire during completion. The results were therefore processed on a dataset consisting of a total of 204 participants.

The French partners, SMEL and UBS, classified net fishing activities according to the type of net used (exclusive straight net, multi-purpose straight net, exclusive trammel net, multi-purpose trammel net) in order to focus the analyses on the main target of the INdIGO project.

The coding of the English data followed a similar process. Incomplete data were removed and the data set was homogenized with the French data format for joint use.

c. Data pre-processing

The analysis was therefore carried out on a dataset consisting of a total of 204 respondents and 115 variables :

- 4 socio-demographic variables: gender, age, degree, number of years of experience in fishing
- 77 variables to study the acceptability dimension
- 29 technical variables questioning the activity profile of the respondent, the associated costs, the management of used fishing gears, the quantities of material lost, discarded or renewed each year, and some questions about fishing gear lost, abandoned or discarded at sea (ALDFG).

d. Sample design

In order to construct the sampling plan, the Regional and Departmental Fisheries Committees (CRP and CDP) were asked to transmit their database concerning their fleet, which had previously been anonymised. In order to corroborate the figures obtained, these data were compared with the number of active vessels registered in the Fisheries Information System (SIH) from Ifremer. The concordance of these data allowed the extraction of a sound sampling plan. For the purposes of the study, and in particular to ensure that the fleet within the study area was representative, it was decided not to take into account the

sieves, boliners, tropical seiners, bottom seiners and the various inshore trades, as these trades were not significantly present within the study area. In view of the statistics collected via the Ifremer and CRP/CDP databases, it appears that the four main trades in the FMA-FRANCE zone are net, trawl, dredge and trap, noting that these trades can be practised exclusively or in a multipurpose manner. It is therefore towards the latter that the questionnaire was directed.
The French sampling was based on all active fishermen in the regions of Brittany, Normandy and Haut-de-France (regions concerned by the project). Among these active fishermen, only those using fishing gear composed of nets were retained, the other trades not being relevant for the project. After processing the available database (SMEL database, 01/09/2020) the reference population totaled 1706 fishermen.

The methodology chosen was to use the online software SurveyMonkey, in order to limit the bias linked to the intervention of the interviewers. The Regional and Departmental Fisheries Committees were again asked to distribute the questionnaire, as well as the Pleine Mer association. Finally, to complete the technical part, telephone calls and field trips were made.

e. Representativeness

The representativeness of the samples in relation to the reference populations could not be checked. The recruitment method aimed to ensure a maximum number of respondents to the questionnaire, which did not allow for the establishment of quotas. However, the representativeness of the samples was studied a posteriori, on the basis of the indicators presented on the following table 7 (fishing activity, age, regional distribution, boat size).

Table 7: Characterization of the three factorial axes extracted from the PCA.

ACTIVITE	N = 168	%	Population mère (Pm = 1670)	%
Filet	3600%	21%	415	25%
Drague	1200%	7%	260	16%
Chalut	1700%	10%	609	36%
REPARTITION REGION	N = 168	%	Population mère (Pm = 1670)	%
Bretagne	5600%	33%	1028	62%
Normandie	4600%	27%	530	32%
Hauts-de-France	800%	5%	112	7%
AGE	N = 168	%	Population mère (Pm = 1670)	%
18-24	1100%	6%	non connu	-
25-34	2900%	17%	non connu	-
35-44	4400%	26%	non connu	-
45-54	4300%	25%	non connu	-
54-65	1300%	8%	non connu	-
65+	0%	0%	non connu	-
TAILLE DU BATEAU	N = 103	%	Population mère (Pm = 1316)	%
< 7m	5	5%	158	12%
7-10m	36	35%	474	36%
10-12m	30	29%	368	28%
12-15m	8	8%	79	6%
15-18m	6	6%	118	9%
18-24m	6	6%	79	6%
> 24m	12	12%	26	2%
SEXE	N = 168	%	Population mère (Pm = 1670)	%
Homme	137	80%	non connu	-
Femme	4	2%	non connu	-

Note 1 : N=168 car l'information sur les indices utilisés pour étudier la représentativité de l'échantillon pour les répondants anglais n'était pas connue (204- 36 (anglais)) = 168

Note 2: la taille de la population mère utilisée pour étudiée la représentativité décompte les activités non étudiées (boleyeursn, senneurs, etc.) et est donc moins élevée que la taille de la population mère initiale (1706)

Note 3 : Indice "Taille du Bateau", N=103 car la partie technique du questionnaire n'a pas été remplie par 65 personnes (168-65)= 103

The table shows that net fishing is correctly represented in the sample studied, but this is not the case for dredging and trawling, which are under-represented compared to the parent population.

The representation of the Normandy and Hauts-de-France regions is correct in relation to the parent population, but the Brittany region is under-represented in the sample.
Concerning the size of the boats, those < 24 meters tend to be correctly represented overall, whereas boats > 24 meters are over-represented in the sample.
Datas on age or experience are not available and the representativeness of the sample could not therefore be studied on these indices. Similarly, no datas on gender was available. However, as fishing activity is predominantly male, it can be concluded that the sample follows the same overall distribution as the parent population.
The sample therefore has some flaws that may need to be considered in the analyses (the under-representation of dredge users, for example, could explain certain trends in the responses). However, the sample appears to be fairly representative for small and medium-sized vessels and for nets.

Analysis of the acceptability questionnaire

9. Pre-processing of data

a. Missing and/or outlier data

A total of 190 participants completed the acceptability portion of the questionnaire. However, 8 respondents were excluded from the initial data set (n°3, 34, 37,41, 150, 166, 158, 8) due to significant response bias (systematic responses, outliers) or abandonment of the questionnaire during completion. The acceptability study was therefore carried out on a data set consisting of a total of 182 participants and 82 variables (variables questioned to study the acceptability aspect of the study):

- 5 variables of a "socio-demographic" nature: gender, age, last degree obtained, years of experience in the fishing activity, position
- 77 variables to study the 8 dimensions of "acceptability" (see section final questionnaire tab. 6)

b. Sample description

Representativeness

The database of active fishermen for the sampling included a total of 1706 French fishermen (Normandy, Haut-de-France, Brittany, SMEL database 01/09/2020). The target sample size was 139 respondents on the French territory and about 80 respondents on the English territory to ensure a good level of representativeness (95% confidence level, 8% margin of error).

The representativeness of the sample in relation to the study population could not be checked. The recruitment method aimed to ensure a maximum number of respondents to the questionnaire, which did not allow for the implementation of quotas. However, the representativeness of the sample was studied a posteriori, on the basis of indicators related to location, type of activity, age, size of boat, number of years of experience, etc.

Characterization

The figures below present the distribution of the sample according to the criteria of gender (cf. figure. 15), age (cf. figure 16), years of experience (cf. figure 17) in the fishing industry, degree (cf. figure 18) and position held (cf. figure 19). They show that the vast majority of the respondents are ship owners/fishermen with a Master 200 certificate, male, over 35 years of age and with over 20 years of

experience in fishing. This figures indicate that, overall, the sample is mainly made up of male owners/managers.

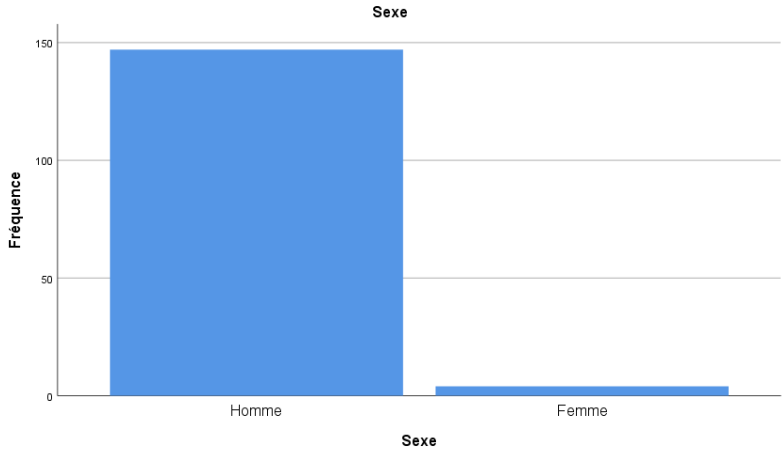

Figure 15: Distribution of the population by gender

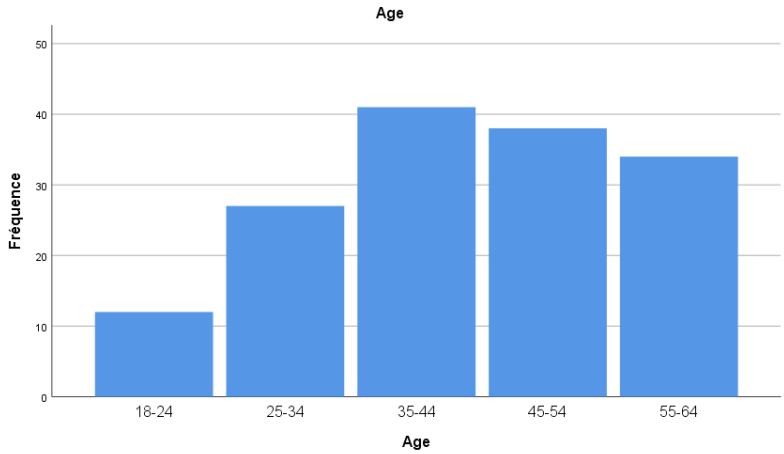

Figure 16: Distribution of the population according to age

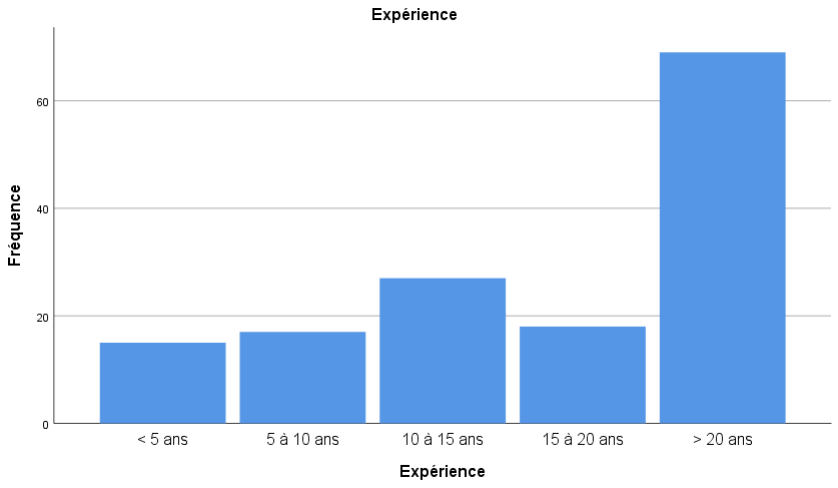

Figure 17: Distribution of the population according to experience level

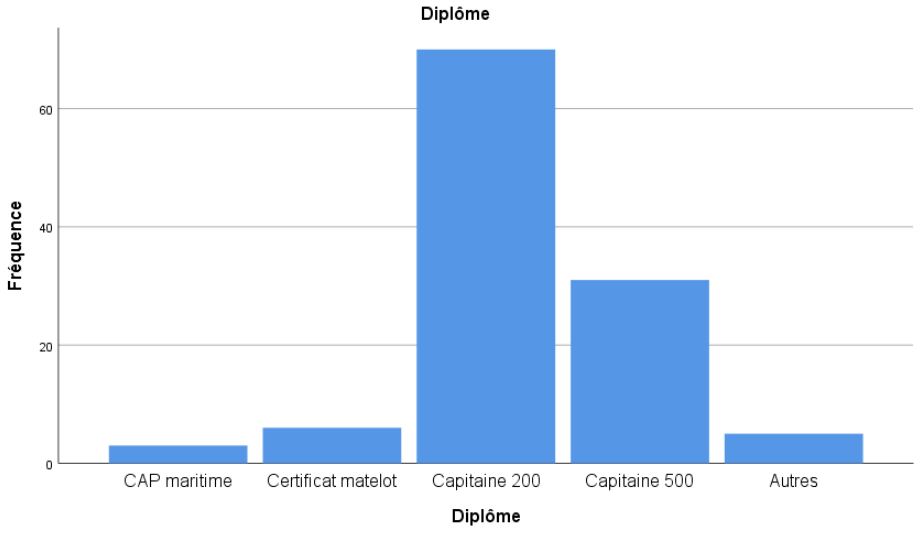

Figure 18: Distribution of the population by level of education

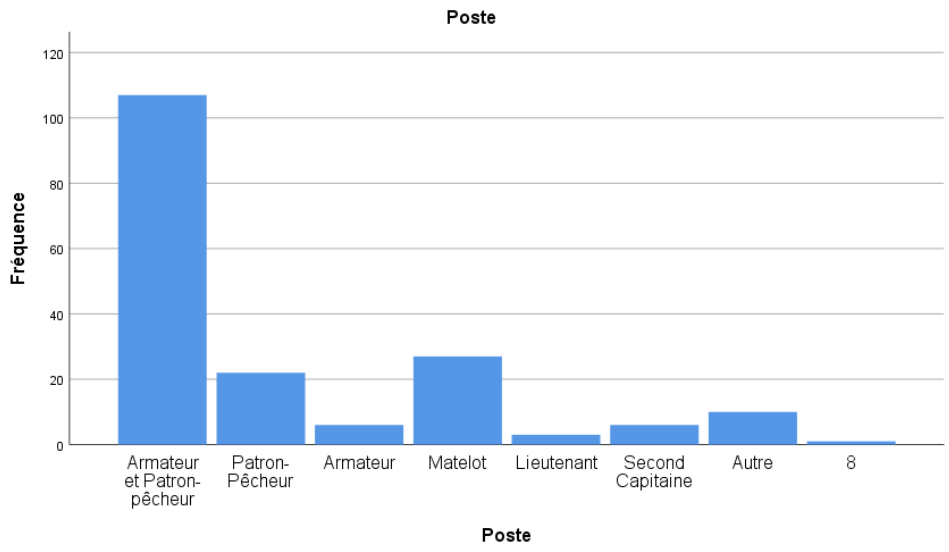

Figure 19: Distribution of the population according to the position held

10. Summary of Dimensions Studied

A total of 9 categories of questions were submitted to respondents. Seven of the questions were about the dimensions of acceptability, one was about the intention to adopt a fishing net, and one was about the socio-demographic characteristics of the sample. These are summarized in Table 1. The set of questions per dimension is presented in Appendix 1.

11. b. Description of the data

The descriptive analyses of the data allowed an initial visualization of the distribution of responses. The mean, median, minimum and maximum, standard deviation, variance of each variable and the skewness and kurtosis coefficients of their distribution are reported in Appendix XX. Normality tests were performed for each variable (Kolmogorov-Smirnov, with Lilliefors and Shapiro-Wilk significance correction) with SPSS v26 software, the results show that they do not follow the normal distribution.

12. c. Descriptive statistics by dimension

a. LeaderShip

As a reminder, the questions related to this dimension aim at identifying opinion leaders. The hypothesis is that engaging opinion leaders in the testing phase of the prototype facilitates the diffusion of the artifact within the community.

The results on this Leadership dimension indicate that the majority of respondents (58.2% of respondents) are not involved in associations, commissions or fishing committees. However, a significant portion of respondents (41.8% of respondents) are involved.

Respondents indicate that they often talk to other fishermen about fishing techniques and gear for sustainable and responsible fishing. 64.3% of respondents "agreed" or "strongly agreed" that they often talk about it. Only 10.4% of the respondents feel that they do not talk about it. Overall, the majority of the respondents (67%) consider themselves to be neither good nor bad advisors with regard to fishing techniques and gear selection. Only 14.7% consider themselves to be good advisors. Concerning their strength of conviction, the respondents consider that they are able to convince their colleagues concerning fishing techniques and choice of gear for 33.5% of them. The rest of the respondents (66.5%) consider that they are not able to do so or do not have an opinion on the subject.

The results on this dimension tend to show that communication between fishermen on the issue of fishing techniques and gear for sustainable and responsible fishing is important. It seems to be a lever to promote the adoption of a new net. Even if membership in associations, commissions or fishing committees is not in the majority, it can be a facilitator for communicating about the new net.

b. Social influence

The questions relating to social influence question the perception of colleagues and the influence of the family sphere.

Overall, the results show that the respondents consider that the approval of their family circle (47% of respondents) and of their clients (63.8% of respondents) regarding their technical and gear choices is important. Conversely, 21.4% of the fishers consider that the approval of their colleagues is important and only 10.4% state that they prefer to use the same fishing techniques and gear as their colleagues (43.4% of the respondents do not agree with this statement).

The majority of respondents felt that environmentalists (95% of respondents), customers (85.8%), family (82.4%) and the younger generation (78%) tended to be the groups of people who would be most supportive of the use of biodegradable fishing nets. The strongest disagreement with this support tends to be reported for dredge (18.1% of respondents), trawl (16.5%) and seine (12.1%) fishermen as well as those belonging to the "older generation" (30.7%) (see figure 20 below).

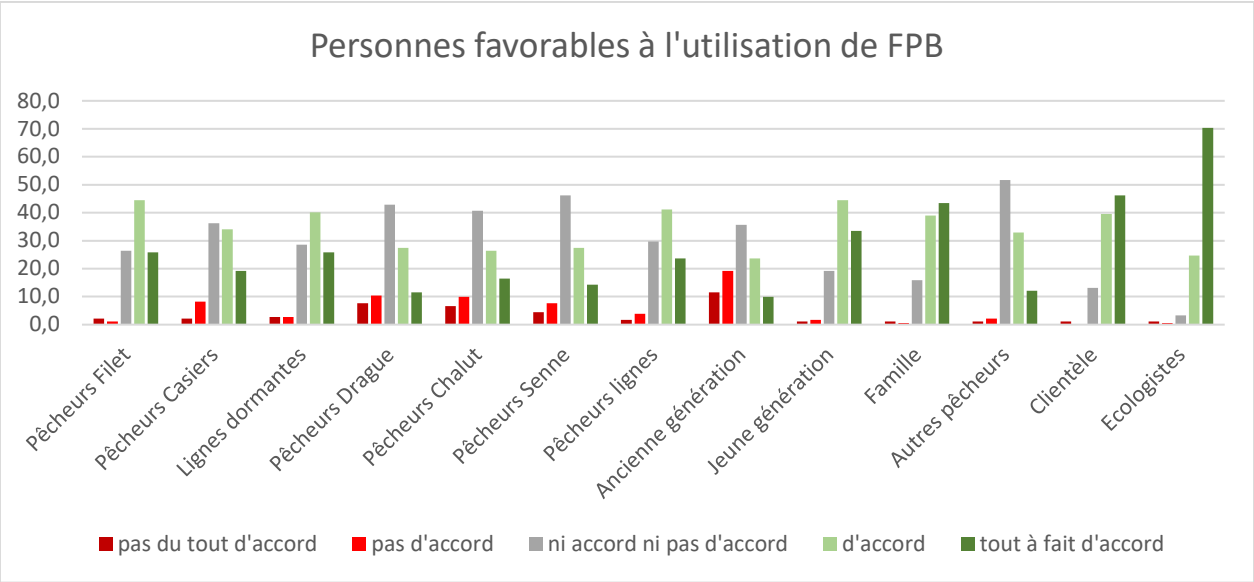

Figure 20: People in favor of using the biodegradable fishing net

In addition, 55% of the respondents consider that the fishermen using the same fishing gear as themselves are interested in equipment that preserves the marine environment, only a small minority of respondents declare the contrary (3.8%). Only 17.5% declared that they do not discuss efforts for sustainable and responsible fishing with others for fear of conflicts (48.3% of the respondents do not agree with this statement). 37.9% of the respondents declare to feel isolated in their will to innovate to preserve the marine environment (48.3% do not agree with this statement).

These results tend to show that the close circle of friends and family and the expectations of the clientele are the two main sources of "social influence" for the integration of a biodegradable net in fishing practices. The influence of the professional sphere did not emerge as an important criterion for facilitating the adoption of a new net.

c. Control

The questions of this dimension include the elements of answer relating to financial aid, the valorization of the sector and the resource, the life span and the performance.

The results indicate that for a very large majority (83% of the respondents) financial aid is essential to start using biodegradable fishing gear. Only 4.3% of the respondents consider that this financial assistance is not essential. The financial aspect also appears important for 73.1% of the respondents, who consider that the use of a biodegradable fishing gear would allow a valorization of the fishing. Concerning the question on a potential increase in the cost of the FPB, 36.3% of the respondents consider that the cost should remain the same (see figure 21), without any additional cost. The same proportion (30.2%) of respondents felt that they would agree to adopt the FPB if the cost is increased by 1-5%. As shown in Figure 22, only 20.7% of respondents felt they would adopt the BPF if the cost was increased by 5-10%. Beyond this increase (more than 10%), only 12.9% of respondents would adopt the biodegradable fishing net. The results for financial incentive were very influential for 25.8% of respondents and extremely influential for 39.6% of respondents. The combined score for these two response modalities represents 65.4% of responses.

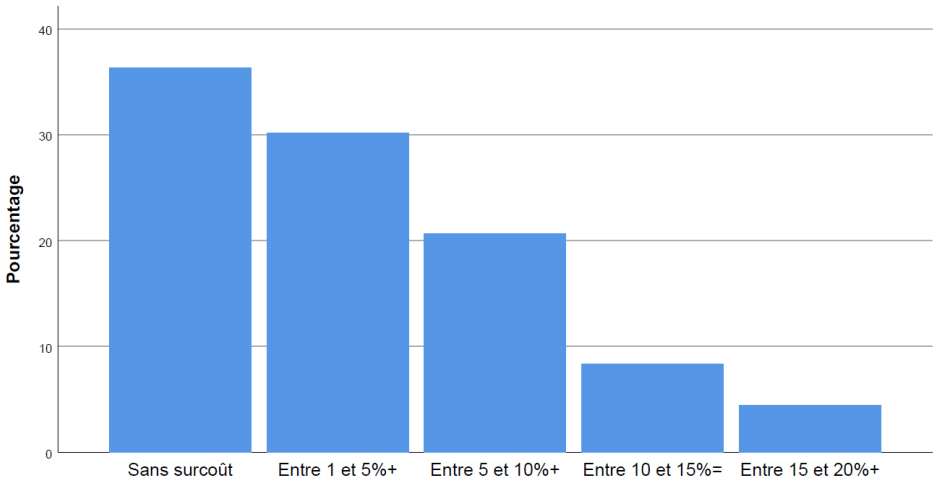

Figure 21: Potential additional cost

In addition, regarding the question on the elements that would influence the decision to invest in or adopt a biodegradable fishing net, it appears that the cost for 92.4% (cumulative score somewhat, very extremely influential) of the respondents is considered at least somewhat influential.

When the guarantee that a biodegradable gear is as fishable as the current fishing gear is considered, the results show that for 91.7 % of the respondents, this guarantee would encourage the use of the biodegradable fishing gear. The question of fishing performance is crucial. Concerning the elements that would influence the decision to adopt a biodegradable fishing net, it appears that the efficiency of this one is determining. Indeed, 30.8% of respondents consider efficiency to be a very influential element and 55.5% consider efficiency to be extremely influential in the decision to adopt a fishing net. The opportunity to try the biodegradable fishing gear beforehand would encourage participants to use the new fishing gear (94.5% of respondents). In addition, most respondents (82.4%) felt that they were capable of using biodegradable fishing gear.

Even if in the leadership dimension only 41.8 % of the fishermen respondents indicate that they are part of an association or committee, the respondents, in their large majority (73.1 %), believe that if they know that they can have support (other fishermen, fishing committees), they would encourage them to use a biodegradable fishing gear. The majority of respondents (89%) consider that the use of biodegradable fishing gear would be a factor that could enhance the image of fishermen with the general public. The use of a biodegradable fishing gear appears as a contributing element to the perpetuation of the future of the fishermen's profession (86.8 % of the respondents) and which could favour the protection of marine resources (92.3 % of the respondents). This result is associated with the answer to the question on the use of biodegradable fishing gear which is perceived as being able to participate in reducing ghost fishing for 86.8% of the respondents. Respondents do not have much confidence in FPB, with only 32.3% of respondents indicating that they would have confidence in biodegradable fishing gear and 48.9% having no opinion on the subject. The willingness of consumers to pay more to buy fish caught using biodegradable fishing gear is a variable that appears to be very influential or extremely influential for 50.3% of respondents on the decision to adopt biodegradable fishing nets.

Regarding the question on the lifespan in the case of adopting biodegradable fishing gear, the results show that for a third of the respondents (34.3%), it is desirable that the new net has an equivalent lifespan (see

figure. 22) in order to adopt it. However, a shorter lifespan of 1-5% does not appear to be prohibitive for respondents. In fact, if we add up the respondents who consider that they can adopt it with a reduced lifespan, the percentage of respondents in favour is 65.7%.

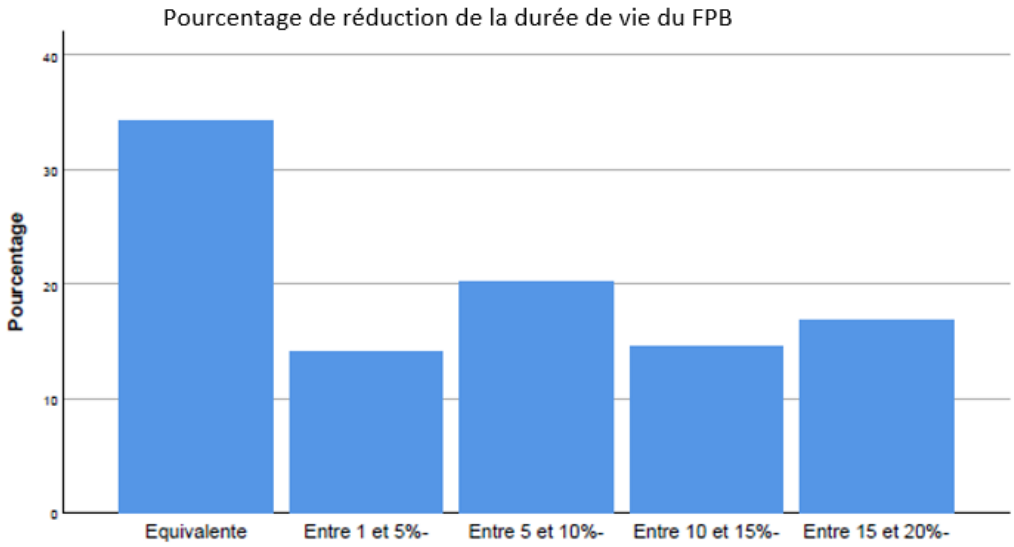

Figure 22: Percentage reduction in FDB life accepted

Furthermore, regarding the question on what would influence the decision to invest in or adopt a biodegradable fishing net, it appears that the product's lifespan is an important element in the intention to adopt the FDB. Only 6.5% of respondents felt that the shelf life of the BDF was little or not influential while 93.5% of respondents felt that the shelf life was at least somewhat influential in the adoption intention of the BDF.

Regarding the characteristics of the biodegradable fishing net, the results show that the strength of the net is an essential element for the adoption of the fishing net. Indeed, 76.4% of the respondents consider the strength as a very or extremely influential element in their adoption intention.

For the weight of the net, the results show that this is a variable to consider. As shown in Figure 23, 36.8% of respondents felt that weight was somewhat influential. The combined results of those who responded somewhat, very and extremely influential represent 71.4%. The proportions of responses related to the influence of the size in relation to the storage conditions are almost identical. Of the respondents, 35.7% felt that the size of the storage conditions was somewhat influential. The combined results of the individuals who answered somewhat, very and extremely influential represent 75.3%. The repairability of the net does not appear to be a fundamental element, however 42.9% of respondents consider this dimension to be at least very influential. The combined score for no or little influence on repairability was 28.5% of respondents.

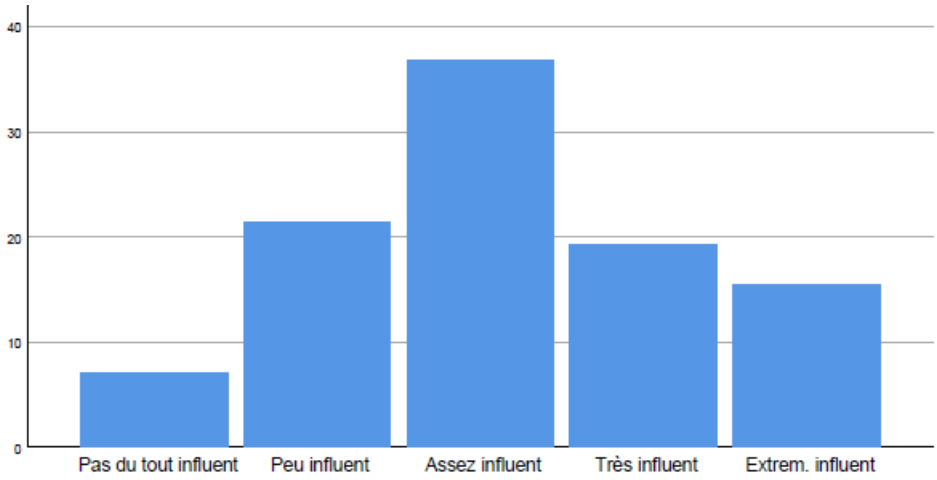

Figure 23 : Influence of the net weight

These results tend to show that the price of the net is a very important dimension. The making of the FDB should be accompanied by financial assistance, but should not result in additional costs. It is important that a new net be adopted. The performance of the FDB should also remain the same and be just as fishable as the current net. Respondents seemed to be sensitive to the environmental impact of the FDB, particularly in reducing ghost fishing. They felt that the FDP would contribute to a good image. A reduction in the life span of the net does not seem to be a deterrent to respondents

d. Ease of use

This dimension exploits the results of the socio-technical system dimension of the pilot questionnaire. The 3 questions ask about habits, ease of use and workload on different aspects of the fisherman's activity (repair, assembly, replacement).

Concerning the dimension on the perceived ease of use of a new biodegradable fishing net, the results show that the respondents globally tend not to position themselves (high rate of choice of the answer modality "Neither agree nor disagree" for the questions related to this dimension, > 41%). This could be explained by difficulties in projecting themselves in the use of a net with untested characteristics.

However, 39.5% of the respondents believe that a biodegradable fishing gear will be as easy to use as a non-biodegradable gear, at the same time, 33% of the respondents state that the change from using a current net to a biodegradable gear will change the habits at sea. In the context of this study, the perception of this change is not accompanied by the perception of an additional workload associated with the use of the new gear. The results show that the respondents tend not to position themselves regarding the criteria of repair time, difficulty of repair, assembly time, and difficulty of assembly. Only the frequency of replacement/repair of the biodegradable net (see figure 24) is perceived to induce an additional workload (for 49.4% of the respondents).

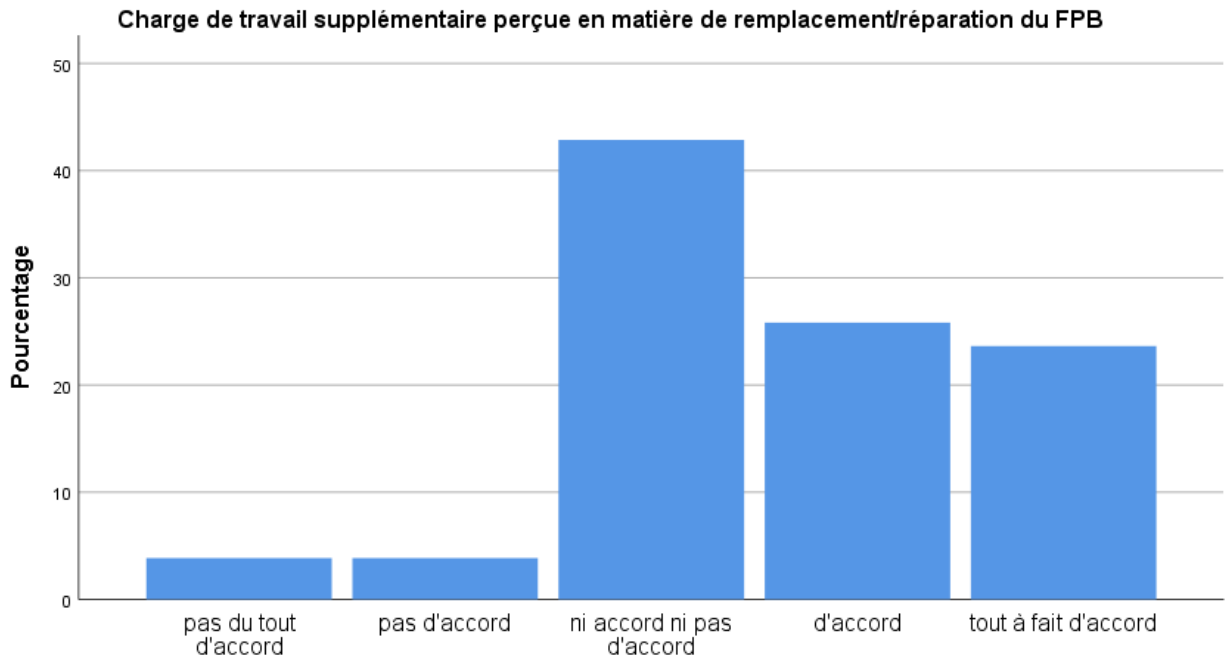

Figure 24: Perceived additional workload for FDB replacement/repair.

The results of this dimension tend to indicate that, according to the criteria studied, the surveyed population does not have specific apprehensions about adopting a biodegradable fishing net. However, it is possible that the fishermen interviewed had difficulties in projecting themselves in the use of a net with unknown and untested characteristics. Only the frequency of replacement and/or repair of the biodegradable net was reported as a possible factor in increasing the workload.

e. Perceived usefulness

In this dimension, the compatibility of the biodegradable fishing gear with the activity, the performance of the gear and its solidity are questioned.

The results obtained for this dimension tend to confirm that the people interviewed do not perceive any blocking points to the integration of a biodegradable fishing net. Indeed, they consider that a biodegradable fishing net will be as fishing (for 40.1% of the respondents) and solid (33.5%) as a fishing net that is not (respectively 9.3% and 19.2% of the respondents disagree) and 52.7% declare that a biodegradable fishing gear will be compatible with their fishing activity.

The results concerning the answers related to the most important information to know in order to use a biodegradable fishing gear show that:

- Cost (for 62.1% of the respondents), durability (for 58.8%) and strength (43.4% of the respondents) are the most important information to know when using a biodegradable fishing net;
- The induced workload and the regulations associated with the adoption of a biodegradable gear are on the other hand reported by the majority as being the least important information to know (respectively for 65.4% and 80.2% of respondents)

The details of this ranking are shown in figure 25 below.

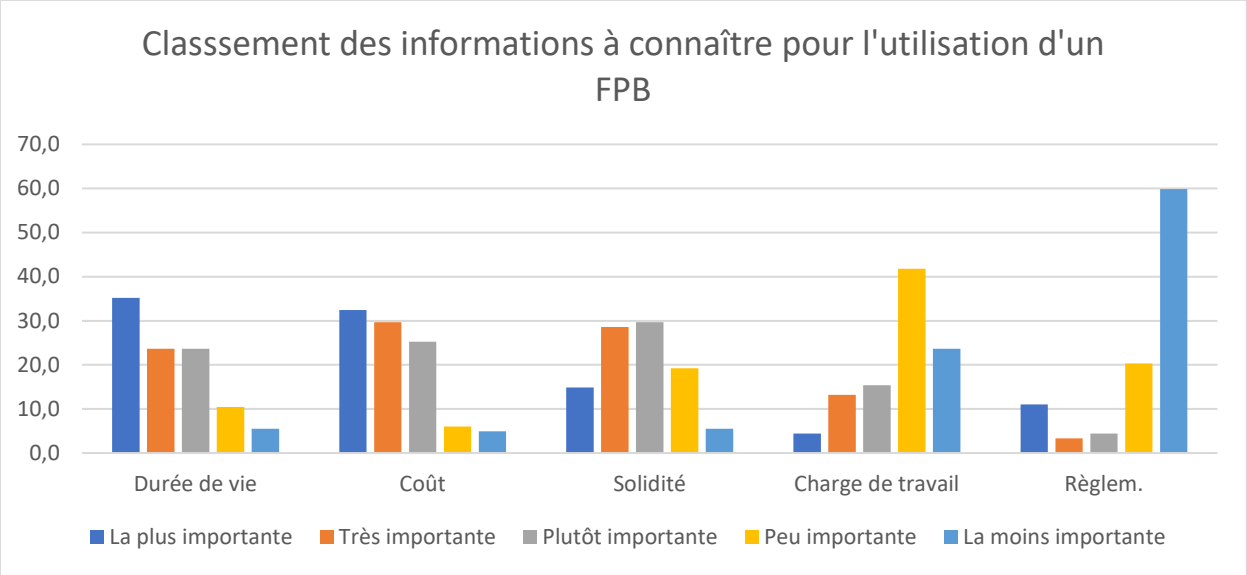

Figure 25: Classification of information to know for the use of an FDB

The results of this dimension tend to confirm that, overall, the people interviewed do not perceive any blocking points to the integration of a biodegradable net in their fishing practices. The information on cost, duration and strength appear to be the most important to disseminate in order to promote the use of the innovation.

f. Expected image

The 4 questions of this dimension question the difference between artisanal fishermen and industrial fishing, the personal valorization mediated or not, and the professional valorization that a biodegradable fishing gear can bring or not.

The vast majority of the respondents (79.7%) believe that being one of the first to use biodegradable fishing gear would be personally rewarding; 44% indicate that the use of biodegradable gear would allow them to develop new skills.

Furthermore, the results show that for 50.6 % of the respondents, the lack of diffusion (media, press, etc.) of their use of a biodegradable fishing net would be a source of disappointment.

Finally, for the majority of the fishermen interviewed (70.9%), the efforts they make for the environment seem derisory compared to the methods used by industrial fishing.

The valorization of the "pioneer" effect could be a lever to use a biodegradable fishing net. On the other hand, the lack of dissemination/mediatization of the adoption of this new gear and a feeling of insignificance/uselessness in the face of industrial fishing activities could, conversely, be sources of devaluation.

g. Consistency

This dimension measures the consistency between individuals' attitudes, behaviors, and beliefs. If an individual's attitudes, behaviors, and beliefs toward the environment are all pro-environment, the gear will be more likely to be adopted. If there are inconsistencies between these three poles, this will highlight disincentives to adoption. The consistency dimension questions the importance that the fishermen have for the environment, the actions and behaviors that they do and have with regard to the environment, their knowledge and interest in gear that allows them to act in favor of the environment.

Interest in the environment

For 96.7% of the respondents, it is important to contribute to the preservation of the marine environment and that it is in their interest (98.3%). Nevertheless, for 59.9% of the respondents, the fact of having to always make efforts to better control their impact on the marine environment is perceived as painful. The change to biodegradable fishing gear is justified by 90.7% of respondents as an action for future generations.

Knowledge

The results concerning this sub-dimension show that globally, the respondents like to know what to do to reduce the effects of the fishing activity on the marine environment (87.3% of respondents) and to know more about the actions to be taken (99%). For 46.1% of the respondents, using biodegradable fishing gear would allow them to develop their knowledge of fishing techniques.

Eco-gestures

Almost all of the respondents declare that they take care to control their impact on the environment (96.2%) but that they do not always know how to contribute more to the preservation of the marine environment (34.6%). In addition, 56.6% of respondents said they were bothered by having little control over their impact on the environment. Changing current practices to biodegradable gear was seen as an interesting challenge for 73.7% of respondents.

It is interesting to note that at the same time, 40.6% of respondents still report knowing how to contribute to the preservation of the marine environment.

Intention to adopt

This dimension covers a single item that questions the intention to use a biodegradable fishing gear in the coming months. This item aims at identifying if the obstacles raised in the previous dimensions are superior to the identified levers. If the intention to use is high, the brakes are more important than the levers, and vice versa.

Regarding the intention to use a biodegradable fishing net (see figure 12), 73% of the participants declare that they would like to use a FPB in the coming months. This high percentage should be viewed with caution. Indeed, the proposal of a declarative indicator of adoption intention is relevant (see method deliverable MT4.1.1) but sensitive to the bias of social desirability (natural inclination of individuals to present themselves favorably in the eyes of society, especially concerning sensitive and/or personal issues) and of response by the affirmative (tendency to acquiesce, attraction towards the yes)

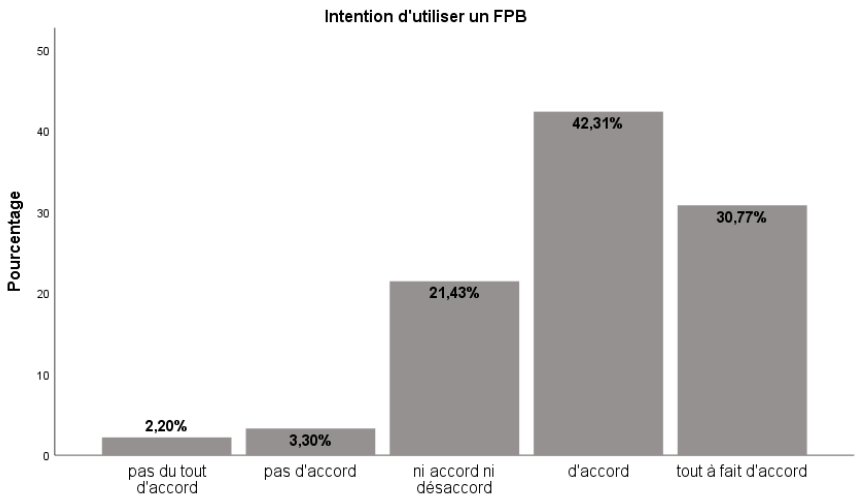

Figure 26: Intention to use a biodegradable fishing net

Table 8: first Brakes and levers identified

Freins	**Leviers**
Additional cost	Communication between fishermen
Less efficient	Close circle / Family
Sense of insignificance	Financial assistance
Lifetime	Customers
Feeling of being isolated	Also fishing
	Pioneer effect
	Solidity

13. Factor analysis

A first step was to perform a Principal Component Analysis (PCA)[9]. This analysis is useful for reducing the number of variables measured and extracting a minimum number of factors to explain as much of the variance as possible. The objective is to identify the variables that best explain the acceptability of the biodegradable fishing net.

The KMO[10], which reflects the ability to effectively summarize the information they contain, is 0.81 (very good) and Bartlett's test is significant, which means that the factorization of the information is possible. The quality of representation (community) of variables is considered sufficient when it is > 0.5 (Jolibert and Jourdan, 2011, 315-316). PCAs were performed with software (SPSS, v26).

Twelve factors emerged from the analysis (variables with an eigenvalue > 1 were retained) and explained 63.79% of the information contained in the data set (factorial matrix reported in Appendix 2.1). Variables with correlations on the factorial axes ("factor loadings") < |0, 3| are eliminated. A PCA with PROMAX[11] rotation (Kappa= 4) was then applied to optimize the saturation of the variables on the factors.

In total, 3 PCAs were performed. The first one eliminated 2 variables (INFS1.3 and C1.5: due to low saturation on several factors) and the second one (CONS1.9: due to low representation quality - < 0.5-). The last PCA stabilized the 11-axis factorization with an explained variance of 64.06%. The projection of the variables on the first 3 axes (components) is given in Figure 27 below.

[9] L'analyse en composantes principales (ACP) est une technique exploratoire qui permet de résumer l'information disponible à l'aide de quelques variables synthétiques appelées facteurs.

[10] L'indice KMO varie entre 0 et 1. S'il est proche de 0, les corrélations partielles sont identiques aux corrélations brutes. Dans ce cas, une compression efficace n'est pas possible. S'il est proche de 1, il est possible d'obtenir un excellent résumé de l'information sur les premiers axes factoriels.

[11] Une possible dépendance entre facteurs été supposée. Ce postulat a été confirmé par l'analyse de la matrice des corrélations entre facteurs (plusieurs facteurs présentent des corrélations > 0.3) et a confirmé le choix de l'utilisation d'une rotation oblique.

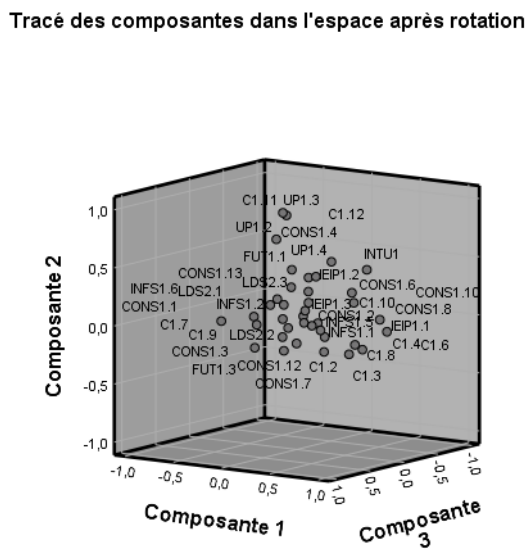

Figure 27: Factorial design of the variables in the dataset for the first three axes.

In order to select the number of factors to be extracted, observation of the Catell bend failure (see collapse plot section; see figure 28) allows for a change after the third factor. Thus, 3 factors (explaining 35% of the variance) are selected to explain the information in the dataset for the study of the acceptability of a biodegradable fishing net.

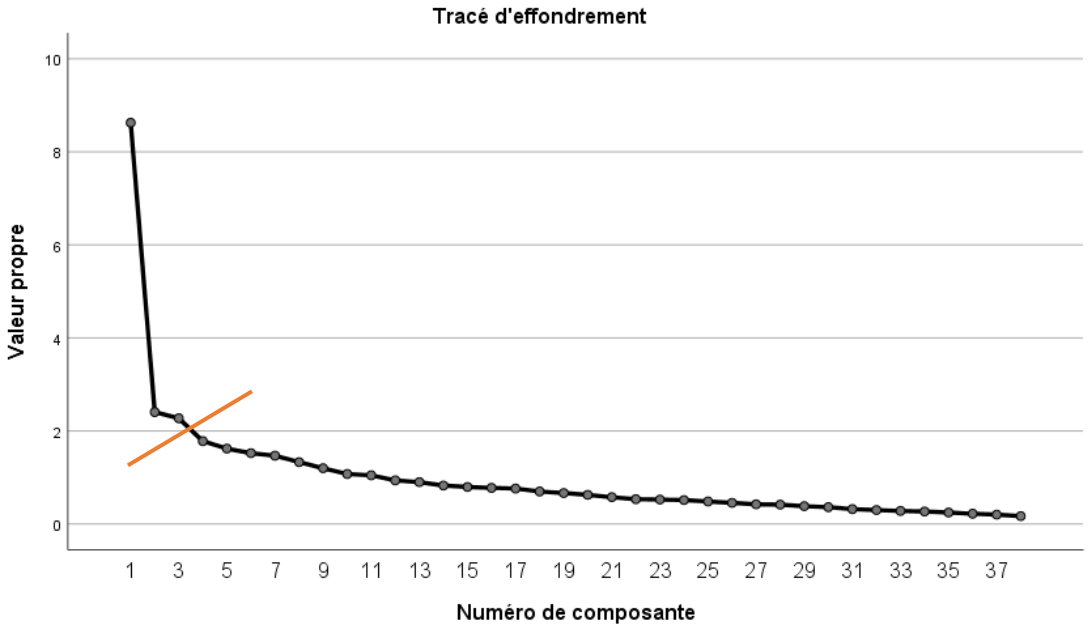

Figure 28: Cross-section at Catell's elbow to determine the number of factorial axes useful to describe the variance

The correlation matrix obtained shows correlations between variables and factors > 0.55 for almost all of them. A Cronbach's alpha was used to check the internal consistency of each factor (reliability of the measure), which is high (> 0.79) for each of the axes obtained (see table below).
In the end, 21 variables distributed within 3 factors were extracted (see Table 4). The factorization obtained is not close to the dimensions constructed a priori[12].
The first factorial axis includes 8 variables:

- 3 variables of possible professional valorization linked to the use of the innovation: perpetuation of the activity, valorization of the image of the fishermen to the general public, valorization of the fishing product;
- 2 variables of experiential motivation: the use of a biodegradable net is perceived as an interesting challenge, personal valorization of being a pioneer of the innovation;
- 2 variables of projection of use: wish to try a biodegradable net before using, wish to use a biodegradable net;
- 1 "reassurance" variable: the use of a biodegradable net would be encouraged by the guarantee of a net that is also fishable.

The second factorial axis is determined by 6 variables. This axis includes variables that relate to fishermen's confidence in the innovation.

- 4 variables specific to the confidence given to the biodegradable net (instrumental confidence): it is perceived as being as fishable, as strong and compatible with the constraints of the fishing activity;
- 2 variables specific to individual skills (internal confidence): confidence in one's own ability to use a biodegradable net (feeling of being able) and to develop new skills as a result of using the innovation.

For these first two axes, an intention to use a biodegradable fishing net in the next few months is declared and presents a fairly high correlation with each of these two factors (see table below). Considering the importance of this variable with regard to the study of acceptability, it was not rejected despite its high level of saturation on 2 distinct axes. However, it appears within the axis for which it presents the highest saturation (axis 1).

The third and last axis is characterized by 7 variables:

- 2 variables related to the protection of the resource and the marine environment: the use of the biodegradable net is perceived as a possible solution to reduce ghost fishing promote the protection of the resource and reduce the effects of fishing on the environment;
- 4 variables relate to environmental motivation: the individual's willingness and interest, in general, to preserve the marine environment;
- 1 variable relates to generativity: corresponds to the concern of adults for the establishment of future generations in order to promote their well-being.

All these variables concern the preservation of the resource, the marine environment and future generations.

[12] Les dimensions a priori ont été construites à partir de l'utilisation partielle de plusieurs modèles théoriques de l'acceptabilité. Ainsi une approche exploratoire plutôt que confirmatoire a été choisie. L'objectif était de faire émerger une structure latente et non de confirmer un modèle théorique.

The summary of the characterization of the 3 extracted factorial axes is given in Table 9 below.

Table 9: Characterization of the three factorial axes extracted from the PCA.

Facteur 1 : Valorisation	Facteur 2 : Confiance	Facteur 3 : Préservation
Motivation expérientielle	Confiance instrumentale	Protection environnement
Valorisation innovation (professionnelle)	Confiance interne	Motivation environnementale
Projection d'utilisation		Générativité
Réassurance		

These results provide insight into the drivers of acceptability. The first axis provides indications on the "resources" to be developed to promote the adoption of the fishing net. For example, it would be a matter of making the use of the net possible through trials; offering the possibility of professionally enhancing the use of the fishing net by making it visible to the public, for example, by obtaining a label; or reassuring people of the net's capabilities with regard to its effectiveness in fishing.

The second axis provides information on the "resources" to be mobilized to build an environment favorable to the use of a new fishing gear. It shows the importance of building a good level of instrumental confidence (guaranteeing solidity, efficiency, compatibility) and of stimulating the feeling of personal efficiency.

The third axis provides information on the motivations to be solicited to promote the adoption of the fishing net. The link between biodegradable nets and environmental preservation is an obvious direction for the arguments. However, motivations of an intrinsic nature were also observed, corresponding to the personal interest of individuals to increase their knowledge and skills in terms of techniques and use of gear that promote sustainable fishing. This finding shows on the one hand the need to solicit these known resources to be at the origin of lasting changes in practices, especially towards sustainable practices, and on the other hand, the need for further analysis.

Hierarchical clustering analyses of the PCA results will be performed to further investigate these initial results and observe the distribution of individuals within the classes obtained. Finally, a structural equation model, for example, should make it possible to define the relations between variables and to identify those which explain, in fine, the intention to use the new biodegradable fishing net.

Table 10: Table of correlations between variables and axes

	Facteur 1 : Valorisation	Facteur 2 : Confiance	Facteur 3 : Préservation
IEIP1.1- Être un des premiers à remplacer mes engins de pêche actuels par des engins de pêche biodégradables serait valorisant personnellement	**0,775**	0,432	0,320
C1.4- Pouvoir essayer l'engin de pêche biodégradable m'encouragerait à l'utiliser	**0,719**	0,360	0,331
INTU1- Je souhaiterai pouvoir utiliser un engin de pêche biodégradable dans les mois à venir	**0,693**	**0,690**	
C1.6- Utiliser un engin de pêche biodégradable pourrait contribuer à pérenniser l'avenir de ma profession	**0,675**		0,485
C1.3- Si on me garantit qu'un engin biodégradable est aussi pêchant que mon engin de pêche actuel, ça m'encouragerait à l'utiliser	**0,672**		0,526
C1.10- Utiliser un engin de pêche biodégradable pourrait valoriser ma pêche	**0,669**	0,462	0,426
CONS1.10 - Modifier ma pratique actuelle pour passer aux engins biodégradables serait un défi intéressant pour moi	**0,668**	0,584	0,425
C1.8- Utiliser un engin de pêche biodégradable pourrait valoriser l'image des pêcheurs auprès du grand public	**0,630**		0,411
C1.11 - J'aurai confiance en un engin de pêche biodégradable	0,370	**0,856**	0,312
UP1.2- Je pense qu'un engin de pêche biodégradable sera aussi pêchant qu'un engin conventionnel	0,329	**0,714**	0,309
UP1.3- Pour moi, un engin de pêche biodégradable serait aussi solide (résistant à l'eau, au soleil, aux crustacés) qu'un engin de pêche conventionnel		**0,690**	
C1.12- Je me sens capable d'utiliser un engin de pêche biodégradable	0,597	**0,683**	
UP1.4- Utiliser un engin de pêche biodégradable sera compatible avec mon activité	0,549	**0,587**	0,408
IEIP1.2- Je pense que je développerai de nouvelles compétences en utilisant un engin de pêche biodégradable	0,462	**0,566**	0,316
C1.9 - Utiliser un engin de pêche biodégradable pourrait participer à réduire la pêche fantôme (un engin de pêche perdu continue à pêcher, ce qui est appelé pêche fantôme)	0,349		**0,792**
C1.7 - Utiliser un engin de pêche biodégradable pourrait favoriser la protection des ressources marines (ex : en cas de perte de l'engin de pêche)	0,477	0,324	**0,750**
CONS1.7- Je pense que cela est dans mon intérêt de préserver l'environnement marin	0,510		**0,678**
CONS1.1- J'aime savoir ce qu'il faut faire pour réduire les effets de l'activité de pêche sur l'environnement marin	0,383	0,331	**0,601**
CONS1.12- J'aime en savoir plus sur les nouvelles techniques et technologies de pêche permettant de réduire l'effet de mon activité sur l'environnement marin	0,561	0,305	**0,588**
CONS1.13- Si j'utilise des engins de pêche biodégradables, je le ferai pour mes enfants ou les futures générations	0,475	0,484	**0,550**
CONS1.3- C'est important pour moi de contribuer à une pêche qui préserve l'environnement marin	0,314		**0,525**
Nb. Variables	8	6	7
α de Cronbach	**0,857**	**0,813**	**0,794**

14. Discussion and conclusion

The acceptability and technical questionnaire of the biodegradable fishing gear was carried out over 17 months, from May 2020 to mid-October 2021 (closing of the final questionnaire). This duration integrates the completion of the pilot questionnaire, which allowed for a more serene approach to the drafting of the final questionnaire.

Two explanatory factors were identified as constraining the data collection:

- the population of fishermen, which remains difficult to access due to their working hours
- the health crisis, which limited the organization of meetings with the fishing community (fisheries committees, training centers).

In total, 182 fishermen participated in the final acceptability study. A time-consuming and tedious task of cleaning up and putting the data into a usable format (matching, homogenization of terms and recoding, anonymization of respondents, etc.) was carried out by UBS for the acceptability part and by SMEL for the technical part

This document reports on a first level of analysis. It is a descriptive analysis of the French and English data collected. The analysis reveals levers likely to favor the adoption of a new biodegradable fishing gear.

The first determinant that can be put forward is the close circle of the fishermen, and more particularly their families. This determinant constitutes an important source of social influence for the integration of a biodegradable net in fishing practices. In the same way, the expectations of the clientele contribute to influence the choice of the fishermen concerning the use of a biodegradable fishing gear.

The financial aspect is central in the intention of adoption. It appears to be both a brake and a lever. It is a brake if the new net generates additional costs, whereas it is a lever if the acquisition of an FDB is accompanied by financial aid.

From an environmental point of view, the use of biodegradable fishing gear appears to contribute to the sustainability of the future of the fishing profession, which could promote the protection of resources and reduce ghost fishing. Globally, the respondents underline that the adoption of a BDF, contributes to have a better image and that the valorization of the "pioneer" effect could be a lever to use a biodegradable fishing net.

From a technical point of view, the results show that the fishing net must be just as efficient, fishing as the current net and have an equivalent life span. That said, if the lifespan is shorter, this is not a major impediment. The weight, strength and resistance of the net are important levers, while the size and reparability are much less important. This is explained in particular by the fact that the gillnetters, for example, do not repair their nets very often.

Changing current practices to biodegradable gear is seen by most as an interesting challenge.

Regarding the intention to use a biodegradable fishing net, the participants declare that they wish to use a FPB in the coming months. The result should be considered with caution, taking into account the social desirability bias (natural inclination of individuals to present themselves favorably in the eyes of society,

especially concerning sensitive and/or personal subjects) and the affirmative response (tendency to acquiesce, attraction towards the yes), but it nevertheless shows an inflection.

The results presented here are only a first level of processing for the time being. They will be clarified and completed by additional factorial analyses.

Annexe 1 : Questionnaire pilote

Dimensions	Questions
Introduction	Je vous remercie de m'accorder du temps. Avant de démarrer notre entretien, je vais vous présenter rapidement le projet INdIGO. Son objectif est de développer de nouveaux engins de pêche ayant la particularité d'être biodégradables. Pour mener à bien ce projet, nous sommes 10 partenaires, français et anglais, à s'être associés. L'objectif est de concevoir un engin de pêche adapté aux futurs utilisateurs en les intégrant dès le début à la démarche de conception. C'est pour cette raison que nous nous adressons à vous et que nous vous remercions d'avoir répondu à notre sollicitation. Afin de faciliter notre échange et si vous êtes d'accord, un / une collègue qui est avec moi retranscrira vos réponses (ENQ 2). Tout ce que vous me direz sera anonyme et confidentiel. Ce qui m'intéresse est ce que vous pensez. Il n'y a donc ni bonne, ni mauvaise réponse. Avez-vous des questions à me poser avant que nous commencions ?
COVID-19	1. Selon vous, comment votre profession est affectée par le COVID-19 ? 2. Pensez-vous que le COVID-19 peut modifier la perception que la société a de votre métier ? Si oui, comment ? 3. Seriez-vous prêt à adopter un nouvel engin de pêche dans le contexte actuel ?
Comportement	1. Selon vous, quels sont les avantages à l'adoption d'un filet de pêche biodégradable ? 2. Selon vous, quels sont les inconvénients à l'adoption d'un filet de pêche biodégradable ? 3. Qu'est-ce qui vous vient d'autre à l'esprit en évoquant cette pratique de pêche avec des filets biodégradables ?
Normes	*Quand il s'agit de votre pratique de pêche, il peut y avoir des individus ou des groupes qui approuvent ou pensent que vous devriez ou ne devriez pas effectuer ce comportement*. 1. Selon vous, quelles personnes approuveraient que vous utilisiez le filet de pêche biodégradable ? Pouvez-vous argumenter vos propositions ? 2. Selon vous, quelles personnes désapprouveraient que vous utilisiez le filet de pêche biodégradable ? Pouvez-vous argumenter vos propositions ?

	3. Pourriez-vous lister les personnes ou groupes de personnes qui seraient les **plus** favorables à intégrer des filets de pêches biodégradable à leur activité ? *Si besoin, pour expliquer = Parfois, quand vous n'êtes pas sûr de ce que vous devez faire, vous regardez ce que d'autres individus font (référent – entourage).* 4. Pourriez-vous lister les personnes ou groupes de personnes qui seraient les **moins** favorables à intégrer des filets de pêches biodégradable à leur activité ? *Si besoin, pour expliquer = Parfois, quand vous n'êtes pas sûr de ce que vous devez faire, vous regardez ce que d'autres individus font (référent – entourage).*
Contrôle	1. Selon vous, qu'est-ce qui vous inciterait ou vous rendrait **plus facile** l'adoption des filets de pêche biodégradables ? 2. Selon vous, qu'est-ce qui vous empêcherait ou vous rendrait **plus difficile** l'adoption des filets de pêche biodégradables ?
Gestion des déchets	1. Connaissez-vous le plan de réception des déchets dans votre port d'attache ? 2. Savez-vous comment les déchets d'engins de pêche en fin de vie sont ensuite traités ? Si oui, pouvez-vous décrire le processus ? Si non, comment pensez-vous que cela fonctionne ?
Environnement	1. Pourriez-vous lister toutes les structures qui vous aideraient dans la gestion de vos engins de pêche usagés ? *Si besoin pour exemple : structures (ex : organisations professionnelles, coopératives maritimes, comptoirs maritimes), Installations (ex : équipements mis en place pour collecter les engins de pêche en fin de vie et autres déchets de bord)* 2. Pourriez-vous lister toutes les structures qui vous gêneraient dans la gestion de vos engins de pêche usagés ? *Si besoin pour exemple : structures (ex : organisations professionnelles, coopératives maritimes, comptoirs maritimes), Installations (ex : équipements mis en place pour collecter les engins de pêche en fin de vie et autres déchets de bord)*

	3. Selon vous, quelles sont les 3 principales qualités d'un filet de pêche en les nommant par ordre d'importance, de la plus importante à la moins importante ? 4. Verriez-vous d'autres qualités ?
Système sociotechnique	1. Pourriez-vous expliquer quelles modifications pourraient survenir dans votre travail si vous décidiez de changer pour un filet de pêche biodégradable ? *Par exemple, les individus (ex : autres les professionnel.les de la pêche) ou structures (ex : fournisseurs, criée) touchées.*
Vocabulaire	**h.** 1. Selon vous, comment est-il possible aujourd'hui de valoriser votre activité professionnelle dans la société ? 2. Quels sont les mots ou expressions qui vous viennent à l'esprit quand je vous dis "activité de pêche et développement durable" ? 3. Quels sont les mots ou expressions qui vous viennent à l'esprit quand je vous dis "activité de pêche et filets biodégradables " ?
Données sociodémographiques	**i.** 1. Votre Nom et prénom 2. Sexe 3. Age 4. Statut du poste occupé 5. Type de pêche pratiquée actuellement 6. Nombre d'année de pratique 7. Type de navire 8. Taille du navire 9. Adresse mail *Remerciements* *Nous vous remercions pour votre participation à ce projet de grande envergure. Si ça vous intéresse de connaître les résultats de l'enquête, nous pouvons prendre votre adresse mail pour vous les communiquer dès qu'on les obtient.*

PILOT-QUESTIONNAIRE - ENGLISH VERSION

Dimensions	Questions
Introduction	Thank you for your time. Before we begin our interview, I'm going to give you a quick presentation of the INdIGO project. Its objective is to develop new fishing gear with the particularity of being biodegradable. To carry out this project, we are 10 partners, French and English, who have joined forces. The objective is to design a fishing gear adapted to the future users by integrating them from the beginning in the design process. It is for this reason that we address ourselves to you and thank you for having responded to our request. In order to facilitate our exchange and if you agree, a colleague who is with me will transcribe your answers (ENQ 2). Anything you tell me will be anonymous and confidential. What interests me is what you think. So there are no right or wrong answers. Do you have any questions for me before we begin?
Impact of COVID-19	1. How do you think your profession is being affected by COVID-19? 2. Do you think that COVID-19 can change society's perception of your profession? If yes, How? 3. Would you be willing to adopt new fishing gear in the current situation?
Behaviour	Thank you for your answers to questions concerning the current context. The following questions will now look at your fishing activity 1. In your opinion, what are the advantages of adopting a biodegradable fishing gear? 2. In your opinion, what are the inconveniences of adopting a biodegradable fishing gear? 3. What else comes to mind when you consider biodegradable fishing gear?
Normative references	*When it comes to your fishing practice, there may be individuals or groups who approve/disapprove of this practice.* 1. Who do you think would approve of you using a biodegradable fishing gear? Can you argue your proposal? 2. Who do you think would disapprove of you using a biodegradable fishing gear? Can you argue your proposal?

	3. Could you list people or groups of people who would be most in favour of incorporating biodegradable fishing nets into their activity? *If necessary to explain: Sometimes, when you are not sure what to do, you look at what other people are doing (colleague / pairs / business environment / family /social network).* 3. Could you list people or groups of people who would be the least supportive of adopting biodegradable fishing nets. *If necessary to explain: Sometimes, when you are not sure what to do, you look at what other people are doing (colleague / pairs / business environment / family /social network).*
Control factors	1. What do you think would encourage you or make it easier for you to adopt biodegradable fishing gear? 2. What do you think would prevent you from adopting the use of biodegradable fishing gear?
Waste Management	1. Do you know the waste reception plan in your home port? 2. Do you know how end-of-life fishing gear waste is then treated? If so, can you describe the process? If no, how do you think it works?
Work environment	1. Could you list list any structures or facilities that would assist you in the management of your used fishing gear? If needed for example: *Structures (e.g. professional organisations, maritime cooperatives)* *Facilities (e.g. equipment set up to collect end-of-life fishing gear and other on-board waste)* 2. Could you list any structures or facilities that would interfere with the management of your used fishing gear? If necessary for example: *Structures (professional organisations, maritime cooperatives)* *Facilities (e.g. equipment set up to collect end-of-life fishing gear and other on-board waste)* 3. Would you see any other qualities?
Socio-Technical System	1. Could you explain what changes may to occur in your work if you decided to change to a biodegradable fishing gear? *For example: Individuals (e.g. other fishing professionals), Structures (e.g. suppliers, fish auction affected, sales)*

Vocabulary	1. In your opinion, how is it possible today to add value to your professional activity in society? 2. What words or expressions come to mind when I say "fishing activity and sustainable development"? 3. What words or phrases come to mind when I say "fishing activity and biodegradable gears"?
Socio-demographic data	1. Your Name and Surname 2. Sexe 3. Age 4. Statut of the position held 5. Type of fishing currently practised 6. Number of years of practice 7. Type of vessel 8. Ship size 9. Your email Thank you: We thank you for your participation in this major project. If you are interested in knowing the results of the survey, we can take your email address to let you know as soon as we get them.

Annexe 2 : Questionnaire final

1 = pas du tout d'accord | 2 = pas d'accord | 3 = ni d'accord, ni pas d'accord | 4 = d'accord | 5 = tout à fait d'accord

Dimensions	**Dénomin.**	**Sous-dimensions**
Leadership (LDS)	LDS1	Etes-vous engagé.e dans différentes commissions, associations ou comités de pêche (oui/non)
	LDS2.1	Je parle souvent aux autres pêcheurs des techniques et engins de pêche pour une pêche durable et responsable
	LDS2.2	Les autres pêcheurs me considèrent comme étant de bons conseils en ce qui concerne les techniques et choix d'engins de pêche
	LDS2.3	Dans une discussion concernant les techniques et choix d'engins de pêche, le plus souvent je parviens à convaincre mes collègues
Influence sociale (INFS)	INFS1.1	Les autres pêcheurs utilisant les mêmes engins et les mêmes techniques de pêche que moi sont intéressés par des équipements préservant l'environnement marin
	INFS1.2	Je préfère utiliser les mêmes techniques et engins de pêche que les autres pêcheurs
	INFS1.3	C'est important pour moi d'avoir l'approbation des autres pêcheurs quant à mes choix de techniques et d'engins de pêche
	INFS1.4	C'est important que ma famille approuve mes choix de techniques et d'engins de pêche
	INFS1.5	Les attentes de la clientèle peuvent influencer mes choix de techniques et d'engins de pêche
	INFS1.6	Dans ma profession, je me sens isolé.e dans ma volonté d'innover pour préserver l'environnement marin
	INFS1.7	Les efforts pour une pêche durable et responsable, je n'en parle pas autour de moi, ça peut être conflictuel
	INF2	Je pense que les personnes ou groupes de personnes suivants sont favorables à mon utilisation d'un engin de pêche biodégradable : (choix multiples)

Contrôle (C)	C1.2	Une aide financière est essentielle pour commencer à utiliser un engin de pêche biodégradable
	C1.3	Si on me garantit qu'un engin biodégradable est aussi pêchant que mon engin de pêche actuel, ça m'encouragerait à l'utiliser
	C1.4	Pouvoir essayer l'engin de pêche biodégradable m'encouragerait à l'utiliser
	C1.5	Savoir que je peux avoir du soutien (autres pêcheurs, comités de pêche) m'encouragerait à utiliser un engin de pêche biodégradable
	C1.6	Utiliser un engin de pêche biodégradable pourrait contribuer à pérenniser l'avenir de ma profession
	C1.7	Utiliser un engin de pêche biodégradable pourrait favoriser la protection des ressources marines (ex : en cas de perte de l'engin de pêche)
	C1.8	Utiliser un engin de pêche biodégradable pourrait valoriser l'image des pêcheurs auprès du grand public
	C1.9	Utiliser un engin de pêche biodégradable pourrait participer à réduire la pêche fantôme (un engin de pêche perdu continue à pêcher, ce qui est appelé pêche fantôme)
	C1.10	Utiliser un engin de pêche biodégradable pourrait valoriser ma pêche
	C1.11	J'aurai confiance en un engin de pêche biodégradable
	C1.12	Je me sens capable d'utiliser un engin de pêche biodégradable
	C2	S'il est possible de créer une version biodégradable de votre engin de pêche actuel (même capacité de pêche, prix proportionnel à la durée de vie, etc.), vous seriez prêt à adopter un EPB d'une durée de vie (choix multiples)
	C3	S'il est possible de créer une version biodégradable de votre engin de pêche actuel (même capacité de pêche, même durée de vie, etc.), combien seriez-vous prêts à payer comparé à votre engin actuel ? (choix multiples)
	C4	Pourriez-vous évaluer sur une échelle de 1 à 5, chacun des éléments du tableau suivant qui influencerait votre décision d'investir dans des engins de pêche biodégradables ou de les adopter

Facilité d'utilisation (Fut)	FUT1.1	Un engin de pêche biodégradable serait aussi facile à utiliser que mon engin de pêche actuel
	FUT1.3	Passer de l'utilisation de mon engin de pêche actuel à un engin de pêche biodégradable va modifier mes habitudes en mer
	FUT1.4	Utiliser un engin de pêche biodégradable me demandera une charge de travail supplémentaire par rapport à l'utilisation des engins non biodégradables en matière de : (déclinaison)
Utilité perçue (UP)	UP1.2	Je pense qu'un engin de pêche biodégradable sera aussi pêchant qu'un engin conventionnel
	UP1.3	Pour moi, un engin de pêche biodégradable serait aussi solide (résistant à l'eau, au soleil, aux crustacés) qu'un engin de pêche conventionnel
	UP1.4	Utiliser un engin de pêche biodégradable sera compatible avec mon activité
	UP2	Pourriez-vous classer par ordre d'importance les informations qui seraient, selon vous, à connaître pour utiliser un engin biodégradable ? (Choix multiples)
Image espérée, ID pro (IEIP)	IEIP1.1	Être un des premiers à remplacer mes engins de pêche actuels par des engins de pêche biodégradables serait valorisant personnellement
	IEIP1.2	Je pense que je développerai de nouvelles compétences en utilisant un engin de pêche biodégradable
	IEIP1.3	Si je change mon engin de pêche actuel par un engin biodégradable et qu'on n'en parle pas (média ; presse etc.), je serais déçu
	IEIP1.4	Dans mon métier, mes efforts pour l'environnement me paraissent dérisoires par rapport aux méthodes pratiquées par la pêche industrielle
Consistance (Cons)	CONS1.1	J'aime savoir ce qu'il faut faire pour réduire les effets de l'activité de pêche sur l'environnement marin
	CON1.2	Toujours faire des efforts pour mieux maîtriser mon impact sur l'environnement marin, c'est pénible
	CONS1.3	C'est important pour moi de contribuer à une pêche qui préserve l'environnement marin

	CONS1.4	De manière générale, je fais en sorte de contrôler mon impact sur l'environnement
	CONS1.6	Dans mon métier, je ne sais pas toujours comment contribuer davantage à la préservation de l'environnement marin
	CONS1.7	Je pense que cela est dans mon intérêt de préserver l'environnement marin
	CONS1.8	Dans mon travail, ça me dérange d'avoir peu le contrôle de mon impact sur l'environnement
	CONS1.9	Pour moi, utiliser un engin de pêche biodégradable me permettrait de développer mes connaissances en matière de techniques de pêche
	CONS1.10	Modifier ma pratique actuelle pour passer aux engins biodégradables serait un défi intéressant pour moi
	CONS1.12	J'aime en savoir plus sur les nouvelles techniques et technologies de pêche permettant de réduire l'effet de mon activité sur l'environnement marin
	CONS1.13	Si j'utilise des engins de pêche biodégradables, je le ferai pour mes enfants ou les futures générations
Intention adoption (INT)	INTU1	Je souhaiterai pouvoir utiliser un engin de pêche biodégradable dans les mois à venir
Caractéristiques socio démo.		Age, sexe, niveau d'étude et nombre d'années de pratique

1 = pas du tout d'accord	2 = pas d'accord	3 = ni d'accord, ni pas d'accord	4 = d'accord	5 = tout à fait d'accord

Influence sociale	INF2 (détail)	Je pense que les personnes ou groupes de personnes suivants sont favorables à mon utilisation d'un engin de pêche biodégradable :

Les pêcheurs au filet (maillant/trémail)
Les pêcheurs au casier
Les lignes dormantes (hameçons)
Les pêcheurs à la drague
Les pêcheurs au chalut (fond ou pélagique)
Les pêcheurs à la senne/ bolinche
Les pêcheurs aux lignes de traine
L'ancienne génération
La jeune génération
Ma famille
Les autres pêcheurs
Ma clientèle
Les écologistes

Facilité Utilisation	FUT1.4 (Détail)	Utiliser un engin de pêche biodégradable me demandera une charge de travail supplémentaire par rapport à l'utilisation des engins non biodégradables en matière de :

Temps de réparation
Difficulté de réparation
Temps de montage
Difficulté de montage
Fréquence de remplacement/réparation

Leadership	LDS1	Etes-vous engagé.e dans différentes commissions, associations ou comités de pêche : ❑oui ❑ non

1 = la plus importante	2 = très importante	3 = plutôt importante	4 = peu importante	5 = la moins importante

Utilité Perçue	UP2	Pourriez-vous classer par ordre d'importance les informations qui seraient, selon vous, à connaître pour utiliser un engin biodégradable ?

1 = équivalente	2 = entre 1 et 5% plus courte	3 = entre 5 et 10% plus courte	4 = entre 10 et 15% plus courte	5 = entre 15 et 20% plus courte	6 = Autre

Contrôle	C2	S'il est possible de créer une version biodégradable de votre engin de pêche actuel (même capacité de pêche, prix proportionnel à la durée de vie, etc.), vous seriez prêt à adopter un EPB d'une durée de vie

1 = pas de surcoût	2 = entre 1% et 5% de plus	3 = entre 5% et 10% de plus	4 = entre 10% et 15% de plus	5 = entre 15% et 20% de plus	6 = Autre

Contrôle	C3	S'il est possible de créer une version biodégradable de votre engin de pêche actuel (même capacité de pêche, même durée de vie, etc.), combien seriez-vous prêts à payer comparé à votre engin actuel ?

1 = pas du tout influent 2 = peu influent 3 = assez influent 4 = très influent = extrêmement influent

Contrôle C4

Pourriez-vous évaluer sur une échelle de 1 à 5, chacun des éléments du tableau suivant qui influencerait votre décision d'investir dans des engins de pêche biodégradables ou de les adopter

Durée de vie
Coût
La résistance
Poids
Encombrement et capacité de stockage
Efficacité (capturabilité)
Réparabilité
Incitations financières à l'achat
La volonté des consommateurs de payer plus cher pour acheter du poisson pêché en utilisant un engin de pêche biodégradable

Annexe 3 : Récapitulatif des observations

	N	Moyenne	Médiane	Minimum	Maximum	Ecart type	Variance	Aplatiss.	Asymétrie
LDS1	182	1,58	2,00	oui	non	,495	,245	-1,907	-,337
CONS1.3	182	4,65	5,00	pas du tout d'accord	tout à fait d'accord	,636	,404	10,810	-2,682
INFS1.1	182	3,65	4,00	pas du tout d'accord	tout à fait d'accord	,826	,682	,445	-,216
IEIP1.4	182	3,95	4,00	pas du tout d'accord	tout à fait d'accord	1,177	1,384	,023	-,973
C1.2	182	4,30	5,00	pas du tout d'accord	tout à fait d'accord	,911	,831	1,804	-1,389
LDS2.1	182	3,71	4,00	pas du tout d'accord	tout à fait d'accord	,996	,992	,414	-,744
UP1.4	182	3,64	4,00	pas du tout d'accord	tout à fait d'accord	1,045	1,093	-,507	-,297
FUT1.3	181	3,12	3,00	pas du tout d'accord	tout à fait d'accord	1,061	1,125	-,383	-,037
CONS1.6	182	2,96	3,00	pas du tout d'accord	tout à fait d'accord	1,081	1,169	-,894	,168
INFS1.4	182	3,25	3,00	pas du tout d'accord	tout à fait d'accord	1,222	1,494	-,811	-,330
CONS1.1	182	4,14	4,00	pas du tout d'accord	tout à fait d'accord	,703	,495	2,096	-,873
C1.3	182	4,53	5,00	pas du tout d'accord	tout à fait d'accord	,748	,560	3,973	-1,875
CONS1.4	181	4,45	4,00	pas d'accord	tout à fait d'accord	,581	,338	,472	-,673
C1.8	182	4,44	5,00	pas du tout d'accord	tout à fait d'accord	,844	,712	3,226	-1,761
LDS2.3	182	3,22	3,00	pas du tout d'accord	tout à fait d'accord	,864	,747	,541	-,182
IEIP1.1	182	4,13	4,00	pas du tout d'accord	tout à fait d'accord	,931	,866	1,762	-1,222
FUT1.1	182	3,45	3,00	pas du tout d'accord	tout à fait d'accord	,961	,923	-,131	,048
CONS1.12	182	4,36	4,00	pas d'accord	tout à fait d'accord	,664	,441	1,722	-1,007
C1.7	182	4,47	5,00	pas d'accord	tout à fait d'accord	,687	,471	1,410	-1,227
UP1.2	182	3,45	3,00	pas du tout d'accord	tout à fait d'accord	,907	,824	-,144	,149
C1.4	182	4,53	5,00	pas d'accord	tout à fait d'accord	,637	,405	1,660	-1,273
INFS1.2	182	2,57	3,00	pas du tout d'accord	tout à fait d'accord	,869	,755	,040	,033
CONS1.2	182	2,41	2,00	pas du tout d'accord	tout à fait d'accord	1,082	1,171	-,411	,535
LDS2.2	182	3,20	3,00	pas du tout d'accord	tout à fait d'accord	,711	,505	1,743	,337
C1.5	182	3,93	4,00	pas du tout d'accord	tout à fait d'accord	,871	,758	,459	-,684
INFS1.3	182	2,51	2,00	pas du tout d'accord	tout à fait d'accord	1,136	1,290	-,747	,352
IEIP1.2	182	3,48	3,00	pas du tout d'accord	tout à fait d'accord	,878	,770	-,211	,093
CONS1.7	182	4,67	5,00	pas d'accord	tout à fait d'accord	,527	,277	2,781	-1,522
C1.6	182	4,21	4,00	pas d'accord	tout à fait d'accord	,875	,766	-,060	-,883
INFS1.5	182	3,72	4,00	pas du tout d'accord	tout à fait d'accord	1,069	1,142	,035	-,710
CONS1.8	182	3,49	4,00	pas du tout d'accord	tout à fait d'accord	1,007	1,014	-,161	-,544
C1.9	182	4,42	5,00	pas du tout d'accord	tout à fait d'accord	,808	,653	1,813	-1,411
IEIP1.3	182	3,39	4,00	pas du tout d'accord	tout à fait d'accord	1,211	1,466	-,614	-,448
CONS1.9	182	3,45	3,00	pas du tout d'accord	tout à fait d'accord	,989	,978	-,211	-,208
C1.12	182	4,14	4,00	pas du tout d'accord	tout à fait d'accord	,846	,716	1,366	-1,041
INFS1.6	182	3,25	3,00	pas du tout d'accord	tout à fait d'accord	1,068	1,140	-,654	,058

C1.10	182	3,98	4,00	pas du tout d'accord	tout à fait d'accord	,969	,939	-,001	-,766
INFS1.7	182	2,55	3,00	pas du tout d'accord	tout à fait d'accord	1,027	1,056	-,558	,190
CONS1.10	182	3,95	4,00	pas d'accord	tout à fait d'accord	,796	,633	-,333	-,377
UP1.3	182	3,19	3,00	pas du tout d'accord	tout à fait d'accord	1,029	1,059	-,068	-,136
C1.11	182	3,44	3,00	pas du tout d'accord	tout à fait d'accord	,857	,734	,144	,030
CONS1.13	182	4,35	4,00	pas d'accord	tout à fait d'accord	,661	,438	-,101	-,633
INTU1	182	3,96	4,00	pas du tout d'accord	tout à fait d'accord	,925	,855	,818	-,856
INFS2.1	182	3,91	4,00	pas du tout d'accord	tout à fait d'accord	,871	,759	1,027	-,729
INFS2.2	182	3,60	4,00	pas du tout d'accord	tout à fait d'accord	,963	,927	-,220	-,285
INFS2.3	182	3,84	4,00	pas du tout d'accord	tout à fait d'accord	,937	,879	,586	-,682
INFS2.4	182	3,25	3,00	pas du tout d'accord	tout à fait d'accord	1,046	1,093	-,099	-,306
INFS2.5	182	3,36	3,00	pas du tout d'accord	tout à fait d'accord	1,077	1,161	-,249	-,282
INFS2.6	182	3,40	3,00	pas du tout d'accord	tout à fait d'accord	,973	,948	,114	-,211
INFS2.7	182	3,81	4,00	pas du tout d'accord	tout à fait d'accord	,897	,805	,236	-,504
INFS2.8	182	3,01	3,00	pas du tout d'accord	tout à fait d'accord	1,137	1,293	-,648	-,090
INFS2.9	182	4,08	4,00	pas du tout d'accord	tout à fait d'accord	,831	,690	,864	-,788
INFS2.10	182	4,23	4,00	pas du tout d'accord	tout à fait d'accord	,815	,665	1,307	-1,005
INFS2.11	182	3,53	3,00	pas du tout d'accord	tout à fait d'accord	,777	,604	,346	,193
INFS2.12	182	4,30	4,00	pas du tout d'accord	tout à fait d'accord	,779	,608	1,980	-1,140
INFS2.13	182	4,63	5,00	pas du tout d'accord	tout à fait d'accord	,684	,467	8,581	-2,512
FUT1.4.1	182	3,24	3,00	pas du tout d'accord	tout à fait d'accord	1,043	1,088	-,242	,015
FUT1.4.2	182	3,09	3,00	pas du tout d'accord	tout à fait d'accord	,959	,920	,410	,126
FUT1.4.3	182	2,98	3,00	pas du tout d'accord	tout à fait d'accord	,860	,740	,972	-,010
FUT1.4.4	182	2,90	3,00	pas du tout d'accord	tout à fait d'accord	,861	,742	,864	-,070
FUT1.4.5	182	3,62	3,00	pas du tout d'accord	tout à fait d'accord	1,011	1,023	-,071	-,303
UP2.1	179	2,26	2,00	La + importante	La - importante	1,210	1,464	-,585	,617
UP2.2	179	2,20	2,00	La + importante	La - importante	1,119	1,251	-,049	,739
UP2.3	178	2,71	3,00	La + importante	La - importante	1,116	1,245	-,730	,167
UP2.4	179	3,68	4,00	La + importante	La - importante	1,114	1,241	-,249	-,725
UP2.5	180	4,16	5,00	La + importante	La - importante	1,329	1,767	1,012	-1,541
C2	178	2,66	3,00	Equivalente	Entre 15 et 20%-	1,492	2,227	-1,338	,284
C3	179	2,15	2,00	Sans surcoût	Entre 15 et 20%+	1,137	1,293	-,132	,800
C4.1	182	3,86	4,00	Pas du tout influent	Extrem. influent	1,002	1,003	,054	-,621
C4.2	182	3,93	4,00	Pas du tout influent	Extrem. influent	1,030	1,061	,061	-,745
C4.3	182	4,14	4,00	Pas du tout influent	Extrem. influent	,893	,797	,402	-,851
C4.4	182	3,14	3,00	Pas du tout influent	Extrem. influent	1,138	1,294	-,689	,057
C4.5	182	3,21	3,00	Pas du tout influent	Extrem. influent	1,132	1,282	-,595	-,166
C4.6	182	4,33	5,00	Pas du tout influent	Extrem. influent	,947	,896	2,559	-1,652
C4.7	182	3,20	3,00	Pas du tout influent	Extrem. influent	1,165	1,356	-,805	-,171
C4.8	182	3,95	4,00	Pas du tout influent	Extrem. influent	1,037	1,075	-,442	-,622

C4.9	181	3,42	4,00	Pas du tout influent	Extrem. influent	1,220	1,489	-,765	-,368