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Article

Tuna: Investigations of value addition and potential EU investments in tuna fisheries in Africa

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Abstract: This research studies investment opportunities within the tuna fish pole and line fishery along the coast of the African Atlantic Façade (mainly SW-Senegal) and the associated value chains. Also, a section is dedicated to investigating the specific case of the investment of French capital in tuna fisheries in the Seychelles in the Indian Ocean. The investigation was conducted under the FarFish project, whose overarching objective is to provide knowledge, tools, and methods to support responsible, sustainable, and profitable EU fisheries outside European waters, both within the jurisdiction (EEZ) of non-EU coastal states as well as in international waters and high seas. In order to achieve this, the aim of this research is to identify, study, and potentially recommend investment opportunities for EU operators within some of the project's case study countries. The investigations into tuna fisheries were based on interviews with relevant stakeholders, including shipowners and key personnel from public bodies and institutions both in West Africa and Europe (see Appendix A for the list of stakeholders consulted). In addition, most of the data presented in this section was acquired from DG-Mare in a non-public dataset compiling every fishing lot from EU vessels operating within SFPAs in Senegal. A second case study in tuna fisheries, in this case in the Indian Ocean, investigates the investment from the French company SAPMER to improve the land infrastructure in the Port of Victoria (Seychelles), as this would be the only notable investment by European interests in recent years for tuna fishing in Africa. These sections conclude that the fishing area where EU pole-and-line vessels are active is becoming less productive, decreasing the profitability of European-flagged vessels as well as of Senegalese-flagged vessels that maintain close partnerships with Europe. As a response, they have attempted to extend their fishing grounds. Additional fishing opportunities are opening in The Gambia (whose EEZ is restricted), and other countries are expected to follow. Contrastingly, the EU sustainable partnership fisheries agreement with Senegal or Mauritania could include fewer fishing opportunities in terms of tonnage as well as increasingly restrictive conditions for access and landings. European operators have reacted so far by considering the switch to a private regime instead of operating under SFPA as a preferred strategy.

Keywords: climate change; adaptation measures; vulnerability; co-creation; sustainability

1. Introduction

European tuna fisheries within SFPAs are widespread along the African coasts; 11 African coastal states currently have such an agreement with the EU. However,

difficulties are growing for the three major European purse seine, longline, pole, and line fleets targeting tropical tuna and tuna-like species operating in West African waters. Challenges for their operation arise mainly due to the overall decrease in fishing opportunities contained in SFPAs signed with West African countries. This decrease has been exacerbated by the non-renewal of the largest European tuna agreement in Africa (in reference to tonnage and reported catch) with the Coastal State of Gabon in 2017 and by the access restrictions (derived from technical measures and zoning) to the small pelagic fisheries in Mauritania, which is the largest EU fisheries agreement in terms of tonnage.

According to tuna shipowners, there would be a stagnation in European fisheries activities within SFPAs. Despite the above-mentioned trend, tuna-related activity carried out by pole and line vessels seems to be increasing in Dakar, mostly due to economic-related activities. On the one hand, the operation of the European pole-and-line vessels in the Atlantic Ocean is stable, while the national Senegalese fleet is growing to a large degree through foreign investments, including from Spanish operators. On the other hand, EU activities in the Indian Ocean have a different outlook than those in West Africa, with higher catches and even an investment in land that is planned by a French company in the Seychelles.

The purpose of this section is to carry out an analysis of the possibilities for tuna activity investments in African waters for some of the most relevant case studies in FarFish. First, an analysis of the recent increase in economic activity from the pole-and-line vessels based in Dakar. This is in order to investigate how the European and Senegalese-associated vessels are operating, through evaluating the economic profitability and distribution of income from the activity and finally drawing a summary of advantages and disadvantages for vessels operating under the SFPA and Senegalese flag. A second study is investigating the investment from the French company SAPMER to improve the land infrastructure in the Port of Victoria (Seychelles), as this would be the only notable investment by European interests in recent years for tuna fishing in Africa.

The analyses are based on literature describing the performance of the fisheries agreements in Senegal, Cabo Verde, ad Guinea Bissau over the last 2 decades (mainly the EU ex-post evaluation of fishing agreements) and interviews with relevant stakeholders, including shipowners, institutions, and experts both in West Africa and Europe (see Appendix A for the list of stakeholders consulted). In addition, it relies on the DG-Mare dataset, which compiles every fishing lot from EU vessels operating within SFPAs performed in Senegal [1].

2. Economic activity of the EU Pole-and-line Vessels in West Africa

2.1. Context of the EU tuna fleet operating in West Africa

In the Atlantic Ocean, three European tuna fleets are active. The first and largest fleet segment is the industrial purse seiners targeting tropical tuna species (i.e., bigeye, skipjack, and yellowfin), whose great mobility makes it possible to extend their fishing grounds from Mauritania to the north to Angola in the south of the Atlantic façade in Africa. The main landing ports for this fleet are Abidjan on the Ivory Coast, Tema in Ghana, and Dakar in Senegal. The annual catches of the European industrial fleet of

purse seiners are around 40,000 tonnes [1]. The second fleet segment is the pole-and-line vessels operating in the far west of Africa, whose port base is Dakar. Their annual catch volume is around 10,000 tonnes [1]. Finally, the third fleet segment is composed of longliners with the main port base in Mindelo (Cabo Verde), focusing on tuna-associated species such as blue shark, shortfin mako, and swordfish. Catch volumes are more modest than the purse seiners, summing up to around 2000 tonnes annually. These three fleets are essentially composed of Spanish and French vessels. Spanish shipowners are represented within the groups OPAGAC, ANABAC, and Dakar Tuna. French ships are represented by the group ORTHONGEL.

2.2. European pole-and-line vessels based in Dakar and operating in West Africa

The pole-and-line vessels from the EU are all based in Dakar, which is also their landing port (see Appendix B). The fleet consists of seven Spanish pole-and-line vessels represented by the shipowners' group ANABAC and one French vessel represented by ORTHONGEL. In addition to the EU vessels, 16 tuna vessels flying the Senegalese flag are also based in Dakar [2]. Six out of the 16 tuna vessels are owned or controlled by the Spanish capital, including five bait boats and one purse seiner. Thus, overall, there are 13 pole-and-line vessels and one purse seiner of European flag or capital (see Appendix C for the list of Tuna vessels based in Dakar). The other ten Senegalese-flagged vessels have beneficial ownership from South Korea. The whole pole-and-line fleet is active in Senegal, while less than half of seiners are regularly present in Senegalese waters (10 out of 25 vessels active in West Africa between 2014 and 2019—DG MARE, 2020), as seen in **Table 1** below.

Table 1. Number of EU tuna vessels by gear type fishing in Senegal 2015–2017 [3].

Year	Country	Number of Tuna seiners	Number of Pole and line Tuna vessels
2015	France	5	1
	Spain	4	7
	Total	9	8
2016	France	0	1
	Spain	8	7
	Total	8	8
2017	France	1	1
	Spain	9	7
	Total	10	8

Total catches from the EU-owned and associated pole-and-line vessels flagged in Senegal have varied from 13,000 to 18,000 tons annually between 2014 and 2018 [4]. The average catches of Spanish and French-flagged pole-and-line vessels are 10,000 tons per year in the region [1]. These catches are mainly composed of skipjack tuna (see **Figure 1**) linked to FADs. The catch composition of the EU purse seiners and pole-and-line vessels is quite similar, after showing considerable differences until 2015; since then, the latter also focuses on Skipjack tuna. This fleet has left yellowfin tunas found in free schools because of the decrease in the number of large yellowfin

[5,6]. The two fleets (seiners and pole-and-line vessels) collaborate by sharing information about the location of tunas (information collected from interviews).

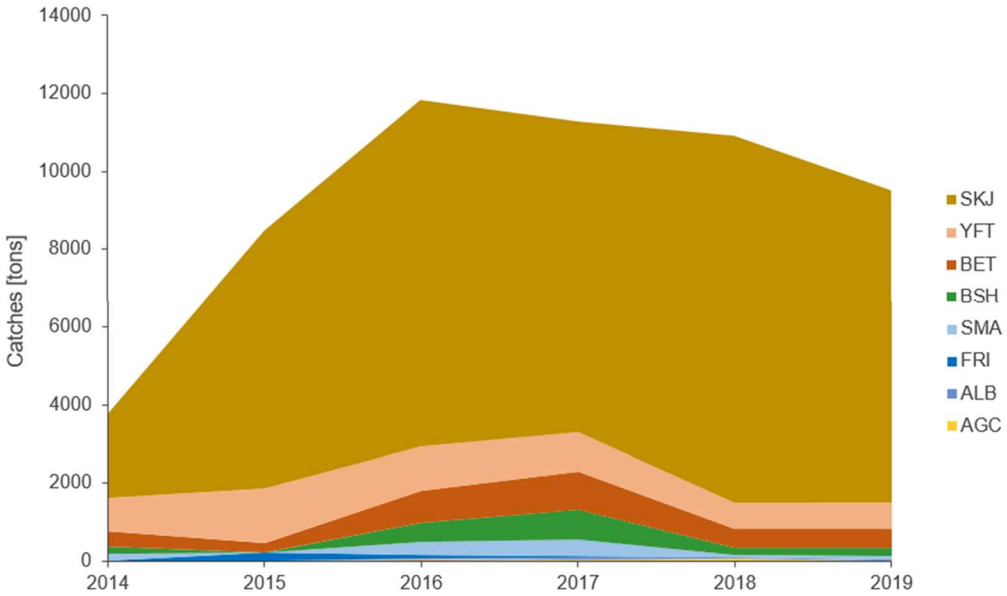

Figure 1. Total catches by EU bait boats based in Dakar according to species.
Source: DG-Mare.

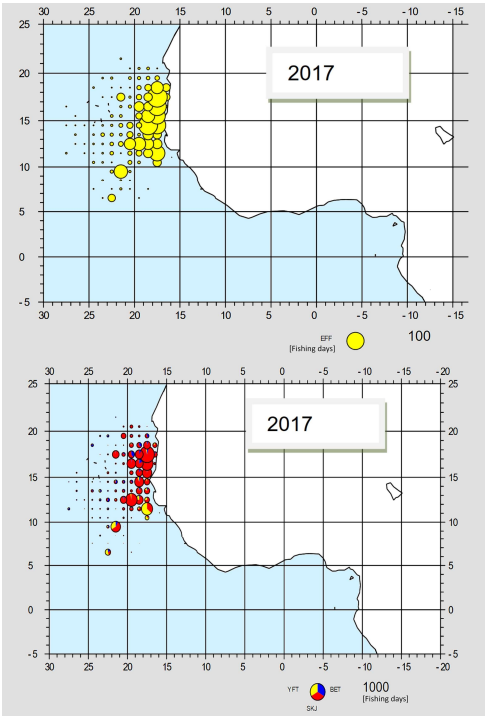

Figure 2. Fishing zone for Spanish bait boats according to fishing effort and amount of catches [8].
Note: There are seven Spanish bait boat, and only one French. Considering Senegalese bait boats linked to European Investments, they share more or less the same fishing areas (collected from interviews).

The EU pole and line vessels are of medium size, generally between 30 and 40 m LOA [7]. As they are not very mobile and have limited autonomy, their activity is concentrated in a geographical area of neighbouring countries located within reach of the port of Dakar. In this way, the EEZs of Senegal, Mauritania, Cabo Verde, and

Guinea-Bissau, as well as the adjacent international waters, are the main fishing areas where most catches take place (see **Figure 2**). In terms of volume of catches, Senegal is the main fishing area (47% of total catches between 2016 and 2019, according to the DG-Mare database), followed by Mauritania (32%), Cape Verde (17%), and Guinea-Bissau (3%).

The share of yellowfin tuna in catches increases as vessels move south. The development of the Senegalese national fleet, partially linked to Spanish interests/capital, has led to the emergence of competition disputes between foreign vessels and investors in Senegal. The rapid incursion of the Korean fleet in the region, among other drivers, led to the creation of GAIPES (shipowners and fisheries manufacturer groups in Senegal), where the main tuna shipowners in Senegal have a platform to voice their concerns and defend their interests in the face of foreign fleets. Another factor of tension in these fisheries is the stock status of the three species of tropical tuna targeted (yellowfin, skipjack, and bigeye), which are under considerable pressure, according to STECF [9]. In response, some shipowners are considering extending their fishing area towards Guinea-Conakry, Sierra Leone, and even Liberia (collected from interviews).

2.3. Economic considerations: Gross value addition in West African coastal states under SFPA

In terms of further operations and economic activities, the pole-and-line vessels generally store their catches frozen in brine on board for subsequent processing in canneries [1]. A notable difference is found for products exported from the port of Dakar, where tuna products are mainly processed into loins or whole frozen tunas [10], which is only a small part of the whole product transformation. These products would then be shipped to Thailand and Europe mainly, according to interests from Princes Group (UK) and Thai Union Group PCL (Thailand) in launching a “Pole and Line Tuna Fishery Improvement Project” (FIP) in Senegal in order to reach Marine Stewardship Council Standards. Also, a small portion of the catch irregularly supplies the two canneries present in Dakar (SCASA and CONDAK). In addition, the Senegalese bait boats linked to European investments only supply these canneries sporadically (collected from interviews). They mostly supply Spanish operators based in Spain (Pereira Armadora and FRINSA in particular).

Since the fishing area for these vessels has been distributed over four countries through SFPAs (Mauritania, Senegal, Cape Verde, and Guinea-Bissau) since 2014, the main features within each country are presented next.

Senegal:

The prospective and retrospective analysis of the last SFPA agreement between the EU and Senegal [11] provides information about the economic performance of the EU vessels. The turnover of European bait boats was €7.838 million per year on average between 2015 and 2018 in Senegalese waters. On the cost side, intermediate consumption is estimated at €4.7 million, the details of which would be estimated as follows in **Table 2**:

Table 2. Comparative costs between Senegalese SFPA and Regional costs for European flagged pole-and-line vessels.

Cost item	2015-2019 average costs (million Euro) in Senegalese EEZ according to European Commission [11]	Fleet costs (according to interview with Dakar Tuna 2020)
Fuel and lubricant	1.023 (13.05% of the turnover)	15%–20%
Repair and maintenance	0.599 (7.64%)	
Other variable costs: Total Including crew member salaries Licenses	 2.699 (34.43%) 1.526 (19.47%)	 35% 10%–15%
Other fixed cost	0.379 (4.84%)	
All fixed & unfixed charges		Previous years: 70%–80% At the time of the interview: >90%

The added value would therefore be €3.138 million, i.e., 40% of the turnover. Deducting salaries and various taxes, mainly access rights, the gross operating profit would be €1.264 million, or 16% of turnover. At the same time, the average gross operating profit for European fleets fishing outside the EU is 22%, according to STECF [11]. In addition to **Table 2** summarizing the costs for intermediate consumption, a summary of the main economic features developed in this sub-section is presented in **Table 3** of subsection "Countries Synthesis", along with features from the other countries where European bait boats based in Dakar operate.

Among the main costs deducted from the added value, access costs for EU bait boats in the current agreement are around €400,000 per year. For all technical categories combined (purse seiners, pole-and-line, and trawlers targeting hake), the SFPA, including approximately 35 vessels, generates around €1.7 million per year for Senegal (EU counterpart plus shipowners' fees). This excludes sectoral support at about €750,000 annually. At the same time, the hundreds of Senegalese industrial vessels directly bring about €1.2 million per year to Senegal in royalties [11].

From the shipowners' point of view, the 4003 tons fished in Senegalese waters in 2017 [3] would represent €268,000 in access costs according to the increasing fees, or €64 per tonne (according to DG Mare Dataset, all bait boats exceeded the initial catches agreed upon within the advance payment). If the costs paid by the EU are included and distributed in proportion to the total tonnage following the data contained in the JSC report [3], 46% of the financial contribution and sectoral support (i.e., €800,000) are added. The access price for bait boats in Senegalese waters would then correspond to €264 per ton.

The indirect added value upstream of the activity generated by pole-and-line vessels would be €559,000 per year, while the indirect added value downstream from the fishery would be €1.96 million euros [7,11]. On average, over the four years, 50% of the total added value (direct and indirect) is for the benefit of the EU, 32% for the benefit of Senegal, and 18% for the benefit of other African ACP countries. The comparatively modest share of Senegal in the distribution of added value is explained by the fact that catches from EU vessels under agreement do not enter far into the marketing/processing chain of Senegal, limiting the process to freezing, storing, and transformation into tuna loins. Therefore, relatively little of the value added by this sector goes to the Senegalese processing/canning/marketing industries.

Table 3. Summary of some key figures of EU bait boats activities according to fishing areas.

Turnover (millions of euros)		**Added value** (millions of euros)	**Gross operating** surplus (EU average outside European waters: 22%)	**Shipowners'** access costs (per ton)	**EU access costs** (per ton)	**Indirect added value** upstream/downstream	**Added value redistribution** (direct + indirect)	**Jobs created (estimate** equivalent to full-time annual employment)
Senegal 7.838 • 32% Senegal (3.244 million)		3.138 (40%)	1.264 (16%)	91 euros	200 euros	559 000/1.96 million	• 50% EU (5.01 million euros) • 16% other west African countries (1.863 million)	101 (10 EU)
Mauritania	4.611	1.791 (39%)	638 (14%)	70 euros	integrated with other categories	Total: 1.975 million	Undetermined (but mostly EU and Senegal)	90 (9 EU)
Cabo Verde	1.851	0.88 (47.54%)	0.273 (14.75%)	48 euros	integrated with other categories	130 000/506 000	Undetermined (but mostly EU and Senegal)	27 (5)
Guinea Bissau	1.002	0.372 (37.16%)	0.105 (10.49%)	25.06 euros	integrated with other categories	10 000 euros/178 000 euros	• 57% EU (107 000 euros) • 43% west African countries (81 000 euros)	8 (1 EU)

Finally, the estimated number of equivalent annual jobs on board for EU pole-and-line vessels during their fishing campaigns in Senegalese waters would be 101 jobs, including 10 nationals from the EU [7,11]. The remuneration costs for the employees on board the pole-and-line vessels during their activity in Senegalese waters would be €1.526 million annually during the period 2015–2018. In addition, there are 34 equivalent full-time indirect jobs upstream (including 7 from the EU) and 126 equivalent full-time indirect jobs downstream, including 38 from the EU (and only 16 from Senegal).

Mauritania:

The prospective and retrospective analysis of the last SFPA agreement between the EU and Mauritania [12] provides information about the economic performance of the EU vessels. The turnover of European bait boats was €4.611 million per year on average between 2016 and 2018 in Mauritanian EEZ waters (there were no active European bait boats in 2015). On the cost side, intermediate consumption is estimated at €2.82 million, the details of which would be estimated as follows in **Table 4**:

Table 4. Comparative costs between Mauritanian SFPA and Regional costs for European flagged pole-and-line vessels.

Cost item	2016–2018 average costs (million Euro) in Mauritanian EEZ according to European Commission [12]	Fleet costs (according to interview with Dakar Tuna 2020)
Fuel and lubricant	0.56 (12.14% of the turnover)	15%–20%
Repair and maintenance	0.37 (8.02%)	
Other variable costs: Total Including crew member salaries Licenses	 1.669 (36.2%) 0.916 (19.87%) 0.237 (5.14%)	 35% 10%–15%
Other fixed cost	0.222 (4.81%)	
All fixed & unfixed charges		Previous years: 70%–80% At the time of the interview: >90%

The added value would be €1.791 million, or 38.84% of turnover. Deducting salaries and various taxes, mainly access rights, the gross operating profit would be €0.638 million and 13.84% of turnover. According to STECF, the average gross operating profit for European fleets fishing outside the EU is 22% [12]. Alongside **Table 4** summarizing the costs for intermediate consumption for EU bait boats operating in Mauritania, a summary of the main economic features for Mauritania as well as Senegal, Cabo Verde, and Guinea-Bissau is recapitulated in **Table 3** of subsection "Countries Synthesis".

From the shipowners' point of view, the 4347 tons fished in Mauritanian waters in 2019 [1] by EU pole-and-line vessels would represent €304,290 in access costs, according to the increasing fees. Since one vessel out of eight has caught less than the annual flat-advance (calculated to be equivalent to 35 tons), the price per ton in 2019 would be slightly superior to €70 per tonne.

The indirect added value upstream of the activity generated by pole-and-line vessels would be €341,000 per year, while the indirect added value downstream from the fishery would be €1.634 million [12]. On average, over the four years, 44% of the

total added value (direct and indirect) is for the benefit of the EU, 43% for the benefit of Senegal, and 13% for the benefit of other countries (mainly in West Africa). The comparatively modest share of Mauritania in the distribution of added value is explained by the fact that catches from EU vessels under agreement do not enter far into the marketing/processing chain of Mauritania, limiting the process to transhipping, landing, freezing, and storing. Therefore, most of the total added value for Mauritania comes from access compensations.

Finally, the estimate of the number of equivalent annual jobs on board for EU pole-and-line vessels during their fishing campaigns in Mauritanian waters would be 90 jobs, including 9 from the EU [7,12]. The remuneration costs for the employees on board the pole-and-line vessels during their activity in Mauritanian waters would be €0.916 million annually during the period 2015–2018. In addition, 100 equivalent full-time indirect jobs would be generated by EU pole-and-line tuna vessels, but none of them would happen in Mauritania, and only 17 would be in the EU.

Cabo Verde:

The average annual turnover for the period 2015–2017 would be €1.851 million [13], while the average catch volume was 1570 tons during the same period [1]. The estimated added value would be €0.880 million, or 47.54% of turnover. About the gross operating surplus, it would be €0.273 million, or 14.75% of turnover.

In terms of the main charges for European flagged pole-and-line vessels, license costs would represent 4% of turnover and 9% of added value (which would be around €75,000 and around €48 per ton), despite the fact that the fact that details about these charges aren't available in the current Ex-post and Ex-Ante Analysis [13]. In addition, the indirect added value generated downstream would be 506,000 euros, while the one generated upstream was estimated at €130,000. Main economic features are summarized in **Table 3** of subsection "Countries synthesis", along with features from other countries where European bait boats based in Dakar are active.

The European flagged pole-and-line generated 27 direct jobs, of which 5 were for European workers and 4 for workers from Cape Verde; the remaining 18 are for West African workers. In addition, according to the latest ex-ante and ex-post SFPA analysis in Cape Verde, these vessels generated 39 indirect jobs (9 upstream and 30 downstream), but none of these indirect jobs occurred in the EU or Cape Verde [13]. However, a part of the processing of tuna catches in Cape Verde by European vessels is still carried out in Europe.

Guinea Bissau:

European-flagged pole-and-line vessels would not generate direct employment in Guinea-Bissau. Out of 120 people on board in 2015, 24 crew members were from the EU and 96 from the West African region (excluding Guinea-Bissau and mainly from Senegal). In addition, 18 people were employed in the EU as management staff [14]. Related to the proportion of the catches in Guinea-Bissau, the number of jobs generated would be 8 direct jobs and 21 indirect jobs, with most of these jobs generated in West African countries other than Guinea-Bissau (Senegal, Ivory Coast, and Ghana mainly) and in the EU.

The turnover of European pole-and-line vessels would be €1.002 million in 2015 (for 838 tons of catches [14]). Afterwards, these vessels seemed to be less present [1]. The intermediate costs were estimated to be €0.630 million, detailed in **Table 5** (while

the main economic features are recapitulated in **Table 5** of subsection "Countries Synthesis", alongside features from Senegal, Mauritania, and Cabo Verde):

Table 5. Comparative costs between Bissau-Guinean SFPA and Regional costs for European flagged pole-and-line vessels.

Cost item	2016–2018 average costs (million Euros) in Guinea Bissau EEZ according to European Commission [14]	Fleet costs (according to interview with Dakar Tuna 2020)
Fuel and lubricant	0.182 (18.18% of the turnover)	15%–20%
Repair and maintenance	0.065 (6.49%)	
Other incompressible intermediate consumptions	0.014 (1.4%)	
Other variable costs:		
Total	0.359 (35.86%)	
Including crew member salaries	0.246 (24.58%)	35%
Licenses	0.021 (2.1%)	10%–15%
Other fixed cost	0.222 (4.81%)	
All fixed & unfixed charges		Previous years: 70%–80% At the time of the interview: >90%

Among the main charges, fuel would have cost €182,000 in 2015 (18.18% of turnover), and various taxes would have cost €10,000 (1%). Other variable costs would have been €359,000 (35.86%) in total. In this way, the cumulative variable intermediate consumption would be €551,000, or 55.04% of turnover. At the same time, the incompressible intermediate consumptions would be distributed as such: maintenance and repair would have cost €65,000 (6.49%) within the year 2015, while the other incompressible intermediate consumptions were estimated at €14,000 (1.4%).

When all these charges are subtracted from turnover, the added value would be €372,000, or 37.16% of turnover.

From this added value, the access costs for fishing are deducted (€21,000 for 838 tons in 2015, which means 2.1% of turnover and a cost of €25.06 per ton) and the costs inherent in salaries for the crew members (€246,000 representing 24.58% of turnover) to calculate the gross operating surplus. In this way, this surplus would have been €105,000 in 2015, or 10.49% of turnover.

Finally, the indirect added value linked to the supply of fuel in 2015 would have been €5000, mostly profitable for the port of Dakar. Considering the indirect added value linked to ship maintenance and repair activities in 2015, this was also estimated at €5000 in favour of Senegal. Regarding the indirect added value linked to the processing of the catch within the Guinea-Bissau fishing zone in 2015, this would have been equivalent to €107,000 for the EU and €71,000 for West African countries. Since no vessel had economic interaction with Guinea-Bissau (except for fishing), no indirect added value was generated upstream or downstream (this economic activity linked to landings and processing in West Africa is mainly concentrated in Senegal and Côte d'Ivoire).

Countries Synthesis:

Key figures from national waters constituting the EU pole-and-line vessel fishing zone are recapitulated in **Table 3**. Added value and gross operating surplus seem globally homogenous, despite big differences in license costs. The access price varies greatly, with the most frequented areas being the most expensive. According to the DG-Mare dataset, Senegalese and Mauritanian EEZs were the most frequented by

pole-and-line vessels under French and Spanish flags between 2014 and 2019 (25,000 and 15,000 cumulative tons). Guinea-Bissau is not a common fishing area for the moment, despite the low cost of access; the abundance of tuna takes priority over the access costs. On the other hand, Cape Verde is a regular fishing area (10,000 tons accumulated between 2014 and 2019), with a very low access cost for pole-and-line vessels. However, this country faces a lack of bait species, which is decisive for the establishment of the home port.

2.4. Perspectives from EU investors in West African tuna fisheries

The fishing area where EU pole-and-line vessels are active is becoming less and less productive, which decreases the profitability of European-flagged vessels as well as of Senegalese-flagged vessels that maintain close partnerships with Europe. The fleet informants reported that the pole-and-line fleet has responded by extending their fishing grounds. Which also concurred with the increasing price of fuel, which further reduced the profitability and attractiveness of fishing in areas far from the landing ports.

Regarding additional fishing opportunities, The Gambia (whose EEZ is restricted) has had a tuna agreement with the EU since 2019. Other countries are expected to follow. Contrastingly, the EU sustainable partnership fisheries agreement with Senegal or Mauritania could include fewer fishing opportunities in terms of tonnage as well as increasingly restrictive conditions for access and landings. European operators have reacted so far by considering switching to a private regime instead of operating under SFPA as a preferred strategy.

The development of the port of Mindelo is interesting for tuna vessels, since more of them are landing there. The infrastructure is adequate, and the port is located near the fishing area. However, in the case of pole-and-line vessels, the factor limiting their installation is the need to provide bait along the coasts of Senegal. In Las Palmas, the port is a hub for maintenance and repair. However, it is situated relatively far from the main fishing areas.

Another point is the constitution of a Fisheries Improvement Project (FIP) for pole-and-line tuna Fishery in Senegal [15]. Jointly led by Dakar Tuna shipowner group (in charge of pole-and-line vessels under European flags), Senegalese shipowner TUNASEN (under Spanish capital), WWF-UK, and some manufacturers (Thai Group from Thailand, Princes Group from the UK, and SENEMER from Senegal), the project aims to improve stock management, environmental impacts, and efficiency in the sector in order to achieve Marine Stewardship Council (MSC) standards. Therefore, the products would be valued in order to reach demanding markets in terms of quality.

Some other challenges are the lack of specialized crew members, which adds to the problem of crew rotation. This could be mitigated by the establishment of a regional agency. There are also growing issues linked to the emergence of Korean tuna vessels fishing under the Senegalese flag. The latter have opaque practices, and the government has only little control over them. There are now 10 Senegalese tuna vessels under Korean capital (6 purse seiners and 4 long liners; see Appendix C).

2.4.1. Joint ventures and Senegalese societies linked to European investments

Some key facts and figures:

Bait boats (pole and line vessels):

Out of the six Senegalese tuna vessels linked to European ownership interests, five are bait boats. Out of these 5, 4 are owned by the same group (Société d'exploitation des ressources thonières, SERT/Dakar Thon/Sénégalaise de la pêche thonière), whose direction is the same for all of them. The last pole-and-line vessel belongs to the company TUNASEN, which relies on Spanish investment. The Senegalese company Sénégalaise de Thon, which owns the last Senegalese vessel linked to European investments, is owned by SOPERKA, a Spanish fishing operator also present in Dakar and who shares the same office.

The SERT group is large and generates an annual turnover of around 5 to 6 million euros, with annual catches of around 3500 to 4000 tons. According to its head director and expressed to the author of this report important charges to the operation, although not in detail. However, some of the charges mentioned have been described as follows:

- The handling and transport costs at the port are €600 per shipment and per container. A shipment consists of 2 to 15 containers, which are serviced on an irregular basis timewise (approx. once every week).
- The monthly costs of storing fish in the only cold warehouse in the port of Dakar (Socofroid, owned by the French group Bolloré) are around €914 for 300 tons (€3.04 per ton) per month, or around €11,000 per year.
- License prices represent only a small share of the total charges, since there are official agreements between governments in Senegal, Cabo Verde, and Guinea-Bissau. In this way, the shipowner would only pay €500 per year for the license fee in Cabo Verde. The sum of all licenses would not exceed a few thousand euros annually.

Industrial tuna purse seine vessels:

Regarding the Senegalese tuna purse seiner, it generates a turnover of 7 to 8 million euros annually. The license fees in foreign countries are up to 1 million euros per year, since the fishing area extends from Mauritania in the north to Angola in the south. On the other hand, the salary expense is only 600,000 euros, or less than 10% of turnover. In addition, material costs are estimated at 300 to 400,000 euros, which corresponds to 5% of turnover.

2.4.2. Perspectives from Joint ventures and Senegalese societies linked to European investments

For Senegalese shipowners who are in close partnerships with Europe, there is a challenge linked to unfair competition with other fleets. Among others, the group of shipowners and fishermen in Senegal (GAIPES) is trying to highlight to the government the unfair competition with European vessels, including the purse seiners. But above all, the local shipowners are concerned about the rapid emergence of a South Korean fleet. This fleet has several purse seiners and longliners, partially linked to the SCASA cannery based in Dakar. In addition, these Korean vessels under the Senegalese flag have opaque activity since they show a lack of will in collaboration with the institution responsible for the monitoring of landings in Senegal. According to local actors, it is said that Korean vessels supply the local fake tuna market (damaged or undersized tuna as well as by-catches that are not used by canneries) and

that they also supply fishmeal factories. In this way, the action undertaken by Senegalese companies maintaining close partnerships with European companies is mainly aimed at protecting their activities against competition from foreign investors who can mobilize greater financial resources. However, TUNASEN (a Senegalese shipowner under Spanish capitals) joined a Fisheries Improvement Program for Pole-and-Line Tuna Fishery in Senegal jointly with European and Asian stakeholders in order to reach MSC's standards.

Because of the perceived decrease in productivity in the area, the SERT group is considering extending its fishing zone to Liberian waters (they are already active in Sierra Leone), implying more fuel consumption and less time available for fishing.

Finally, Senegalese shipowners worry about gas and oil prospects in the region because they do not know how this could impact fishing. Purse seiners' shipowners keep in mind that Angola and Gabon have compromised their own fishing prospects in this way.

2.4.3. Advantages and disadvantages: SFPA vs. private status

As a European shipowner, there should be no alternatives to SFPA for European fisheries within a country where an agreement is pending. The financial arrangements that use the Senegalese flag will therefore leave direct room for maneuver within the European Union, with the risks that this implies. **Table 6** shows that our advantages as shipowners are very interesting: low fees and a clear and transparent framework. However, the additional obligations and contractual restrictions are perceived as disadvantages from an investor's perspective.

Table 6. Advantages and disadvantages: SFPA vs private status. Investor's perspective.

	SFPA	Private
Advantages	• Stability during several years • Low license fees (EU contribution) • Clear legal framework, protection under the SFPA protocol • Solidarity in terms of allocation of fishing possibilities and information exchange between the different EU fleets (communications between bait boats and purse seiners)	• Selected legal framework • Independence from limited perspectives under the SFPA • Autonomy, freedom to pursue access to all countries • Possibility of elaborating a financial "package set up" following the principle of "communicating jars" by involving foreign companies (i.e. SOPERKA/Sénégalaise de Thon) • The supply chain structure is clear and well-established (long-time Spanish partnerships) • For pole-and-line vessels where the fishing area is limited to a few countries, the costs of accessing foreign EEZs are relatively low. In addition, some agreements are in force with other countries in the region, which further lower the costs allocated to license fees.
Disadvantages	• Compromised access in countries where agreements are suspended • Subject to SFPA negotiations hazards, whose prospects for fishing possibilities are "downing" • Contractual restrictions (reduced fishing zones, landing obligations, obligations to employ local staff although some EEZs are only sparsely frequented and situated far from home ports...) • Obligations to work closely with unplanned partners (i.e. intermediate agencies in Mauritania) • Potential risk of carding system linked to implementation of IUU Regulation (e.g. red card for Guinea Conakry in the past forbidding fishing and trading products into the EU market)	• No protection in case of dispute with administration (boarding, seizures, fines …) • Unsuitable or uncertain legal framework (can be patchy, outdated, unclear or incomplete due to lack of transparency) • High license fees for purse seiners, whose fishing area is extended to many countries (but possibility of "circumvention" of these commitments, and preferential agreements are in force in certain neighbouring countries) • "Unfair" competition from European fleets which communicate with each other • Dependence on one or few customers for the sale of the products, vulnerability of the supply chain.

2.5. Conclusions on bait boats fishing in West Africa

It might be interesting to analyse in the same way, the national tuna fleets in other West African countries. For example, Ghana and Liberia also have national tuna vessels (Ghana even has a bigger fleet), although these countries go beyond the scope of this project and some do not have a SFPA (i.e., Ghana). However, we recommend that further investigations be made in countries that have national tuna fleets and which have SFPA in order to make a more complete comparison, which could also extend to seiners and long liners.

The pole-and-line vessels under the European flag, as well as the pole-and-line vessels under the Senegalese flag, who are in close partnerships with European interests, are all subject to transparency requirements. Thus, they all meet ICCAT's conditions, including the use of VMS. By the way, European-flagged tuna vessels are also monitored by an AIS system. In addition, European and associated shipowners actively participate in the initiative for the transparency of the tuna fishery (TTI), led by the Ministerial Conference on Fisheries Cooperation between African States Bordering the Atlantic Ocean (COMHAFAT). Among others, the initiative stipulates that the coverage with on-board observers has to be fully complete [16,17]. Although this coverage has declined since then (collected from interviews), it remains relatively high.

3. Conclusions on investigations in tuna fisheries in Africa

As tuna fisheries continue to be highly profitable, limitations arise for European investors in West Africa with the reduction of fishing opportunities contained in SFPAs signed with these coastal states. The largest European tuna agreement in West Africa with Gabon has now ended with non-renewal renewal, and new agreements have been contracted in order to compensate. In addition, other foreign fleets are rapidly growing, some of them not adhering to the same rules and requirements that the European fleet abides by through the SFPAs. This growing competition affects the business environment and profitability, as well as an even playing field in West African fisheries. National companies, particularly in Senegal, with European relations are forced to focus on protecting their activities against competition from foreign investors who can mobilize greater financial resources.

Moreover, fishing areas where EU baitboats are active are becoming less productive, further affecting the profitability of European flagged vessels, as well as of national flagged vessels, in the analysed case from Senegal, that maintain close partnerships with Europe. The response of these actors is then to extend their fishing grounds. Yet if the price of fuel increases, this can further reduce the profitability and attractiveness of fishing in areas far from the landing ports.

Nevertheless, when analysing the costs that the European fleets incur to operate in this area, the added value and gross operating surplus seem globally homogenous, despite big differences in license costs. The access price varies greatly, with the most frequented areas being the most expensive. According to the DG-Mare dataset, Senegalese and Mauritanian EEZs were the most frequented by pole-and-line vessels under French and Spanish flags between 2014 and 2019 (25,000 and 15,000 cumulative tons). Guinea-Bissau is not a common fishing area for the moment, despite

the low cost of access. This analysis concurs that the abundance of tuna takes priority over access costs. Yet, with fewer fishing opportunities as well as increasingly restrictive conditions for access and landings under SFPA, European operators are considering whether to shift to the private regime, further threatening the sustainability and transparency of the tuna fisheries.

On the other side of the continent, in the tuna fisheries taking place in the Seychelles, European investors are facing similar factors, but mostly the need to extend their turnover. Private investors, in particular from the French group SAPMER, have adopted the clear strategy of developing their presence with large modern seiner as close as possible to the fishing areas. To this end, investments are made in the relevant landing ports to build the necessary infrastructure, such as landing docks, storage halls, etc. In this way, developing a strong tuna fishing fleet entails a mobile fleet with landing ports close enough to the fishing areas, even investing in them to be adequate for the operation. The particular case of the Seychelles, a country with an active SFPA, might be an interesting one to evaluate how to overcome the challenges currently growing for tuna fishing on the west coast of Africa and potentialize a closer collaboration with West African coastal states with the potential to extend the available fishing grounds for foreign investors and benefit from it. The question remains on how to promote the utilization of a clear and transparent framework, such as the SFPA, when competition arises under different conditions.

4. Final remarks

The research reports important challenges on all of the fishing grounds, analyzes them, and highlights different strategies that investors are preferring under the growing competition and productivity of the fishing areas. In the centre of the investigations stand the Sustainable Fisheries Partnership Agreements (SFPA), which aim to create a transparent and clear framework to operate in these areas. However, the growing presence of large fleets entering the fishing areas under different, sometimes not transparent, conditions may deteriorate the business environment, potentially threaten profitability, and even affect the sustainability of these fisheries.

In tuna fisheries, investigations were based on FAO and the EU for the ex-post evaluation of fishing agreements, as well as on interviews with relevant stakeholders, including shipowners and key personnel from public bodies and institutions both in West Africa and Europe. The data analysed was accessed from unpublished raw data provided to the FarFish project by DG-Mare. The investigations show that the fishing areas where European vessels are active on the west coast of Africa are becoming less productive. Both European-flagged vessels and national-flagged vessels with close ties to European interests are showing less profitability. As a response, these investors are seeking to expand their fishing grounds, which can potentially lead them to incur additional costs when the landing ports are farther away and some of the closer ones do not have the capacity to handle the landings. Additional fishing grounds are opening up; however, the restrictive conditions for accessing fishing rights and landings are pushing European investors to consider whether to continue abiding by the SFPAs or to shift to the private regime, especially in light of emerging competition

from third-party nations, including host countries, that are not abiding by the same regulations.

Yet, on the other side of the continent in the Indian Ocean, facing similar circumstances, a clear strategy has been adopted by private European investor SAPMER Group. They seek to develop their presence as close as possible to the fishing areas, investing in the necessary facilities in the relevant landing ports. This strategy indicates a closer collaboration with the coastal states as well as a long-term investment approach to establishing and consolidating a large, mobile fleet with supportive landing ports close to the fishing grounds. They prioritize access to the tuna over the current additional burden of investing in adequate landing ports. The contrasting prospective in these two areas, West Africa and the Indian Ocean, invites us to further reflect on the different factors that might be contributing to adopting a more long-term investment strategy under the SFPA framework. Instead of retreating from it and seeking to operate under the private regime, an initial analysis was presented here; however, as concluded in the relevant section, extending this analysis to other coastal states will provide a broader and clearer picture of the potential to continue to expand and establish long-term investment in profitable and sustainable tuna fisheries on the African coast.

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Appendix A

Table A1. Stakeholders consulted.

Contact	Institution
Moustapha Deme	Fisheries Economist, CRODT (Senegal), in charge of the economic Component of the World Bank Project for the Free Economic Zone of Nouadhibou
Sidy Mouhamed Kandji	Director/Shipowner, Sénégalaise de thon (Senegal)
Adama Mbaye	Fisheries Economist, CRODT (Senegal)
Khallahi Brahim	IMROP
Abu Elimane Kane	IMROP
Marie Traore	General Secretary, RAMPAO (Regional Network for Marine Protected Areas in West Africa)
Ndiaga Thiam	CRODT
Fambaye Ngom Sow	Tuna Specialist, CRODT (Senegal)
Renaud Bailleux	IUCN (Marine & Coastal Program, IUCN West & Central Africa)
Ibrane Ndao	Director, SERT Group (Senegal)
José Maria Aurtenetxe	Dakar Tuna (EU – Senegal) Representative
Patrick Furic	Fleet Director, Saupiquet (France)
Vincent Defaux	DG-Mare (EU) consultant, Poseidon Aquatic Resource Management Ltd.
Didier Moisan	Ex-ORTHONGEL (France)
Michel Goujon	Director, ORTHONGEL (France)
Miguel Herrerra	Director, OPAGAC (Spain) – E-mails exchanged only
Anthony Claude	Saupiquet (France)
Alain Fonteneau	Tuna Specialist, Institut de recherche pour le développement - IRD (France)
Pierre-Alain Carre	Fleet Director, CFTO (France)
Philippe Lallemand	Poseidon Aquatic Resource Management Ltd.
Abdou Daïm Abdoul Aziz Dia	Socio-Anthropologist, IMROP (Mauritania)
Mohamed Ould Lemine Tarbia	Economiste, Adviser to the ministry of Fishery, Mauritania
Mohamed Vall	Director, IUCN Mauritania
Ad Corten	Biologist, Scientist in charge of small pelagic CECAF working group
Hachim El Ayoubi	Former COMHAFAT Excecutive Secretary
Mikia Diop	CSRP Adviser for small pelagic fishery management
Peter Wekesa	OACP Secretariat Fishery expert

Appendix B

Table B1. List of EU flagged Tuna vessels operating in Senegal.

NAME	MMSI	FLAG	BASE PORT	FS GEAR
STERENN	226180000	FRANCE	CONCARNEAU	PS
GUEOTEC	227549000	FRANCE	CONCARNEAU	PS
GUERIDEN	227550000	FRANCE	CONCARNEAU	PS
GEVRED	228066900	FRANCE	CONCARNEAU	PS
PENDRUC	228071900	FRANCE	CONCARNEAU	PS
CAP BOJADOR	228280000	FRANCE	CONCARNEAU	PS
CORONA DEL MAR	228967000	FRANCE	BAYONNE	HL
PEGASO	247083500	ITALY	MESSINA	LL
SALVATORE PRIMO	247110330	ITALY	MARTINSICURO	LL
AITA FRAXKU	224070000	SPAIN	Ex-HONDARRIBIA	PL
GAZTELUGAITZ	224073650	SPAIN	BERMEO	PL
KERMANTXO	224089000	SPAIN	HONDARRIBIA	PL
SAN FRANCISCO	224098930	SPAIN	HONDARRIBIA	HL
RIO LANDRO	224295000	SPAIN	A GUARDA	PL
PLAYA DE BAKIO	224405000	SPAIN	BERMEO	PS
SIEMPRE NUEVO ANGEL	224452000	SPAIN	FOZ	PL
PLAYA DE NOJA	224531000	SPAIN	BERMEO	PS
EGALUZE	224580000	SPAIN	BERMEO	PS
ZUBEROA	224587000	SPAIN	BERMEO	PS
ALBACORA QUINCE	224727000	SPAIN	VIGO	PS
MAR DE SERGIO	224733000	SPAIN	CÁDIZ	PS
ALBONIGA	224745000	SPAIN	BERMEO	PS
PILAR TORRE	224896000	SPAIN	BERMEO	PL
PLAYA DE RIS	225459000	SPAIN	BERMEO	PL

Data source: LDAC/GFW 2012-2016/ICCAT Vessel Finder (up to 2019)/WhoFishesFar Database
Other flags but linked to European Interests between 2015–2020 (data source: Joint Scientific Committee 2019/ISSF database): No bait boats. Seiners from Belize (2), Cabo Verde (3), Curaçao (5), Salvador (4), Guatemala (2) and Panama (2).

Appendix C: List of Tuna vessels based in Dakar

Table C1. Senegalese flag.

No.	Vessel name	Vessel type	Shipowner	Equity	Remark
1	PRESIDENT MAGATTE AYA DIACK II	PL	SERT (Société d'Exploitation des Ressources Thonières)	According to shipowner: Senegal (but exclusive partnership with Spain: FRINSA)	
2	PRESIDENT MATAR NDIAYE II	PL	SERT (Société d'Exploitation des Ressources Thonières)	According to shipowner: Senegal (but exclusive partnership with Spain: FRINSA)	Same group. Contacted
3	COMMANDANT BIRAME THIAW	PL	DAKAR THON	? (exclusive partnership with Spain: FRINSA)	
4	RAMATOULAYE	PL	SENEGALAISE DE PECHE THONIERE	? (exclusive partnership with Spain: FRINSA)	
5	LIO I	PL	TUNASEN	Supposed: Spain, as TUNASEN is member of the organisation Dakar Tuna along with EU pole-and-line vessels	No answers
6	PONT SAINT LOUIS (UVI Number 8222422)	SEI	SENEGALAISE DE THON	Spain (SOPERKA/Perreira Almadora)	Contacted
7	GRANADA (UVI Number 8102907)	SEI	CAPSEN SA	South Korea (Dongwon)	
8	WESTERN KIM (UVI Number 8003242)	SEI	CAPSEN SA	South Korea (Dongwon)	
9	XIXILI (UVI Number XIXILI)	SEI	CAPSEN SA	South Korea (Dongwon)	No answers
10	ORIENTAL KIM (UVI Number 7827495)	SEI	CAPSEN SA	South Korea (Dongwon)	
11	SOLEVANT (UVI Number 8104204)	SEI	GRANDE BLEUE (formerly CAPSEN SA)	South Korea (supposed: Dongwon)	
12	SEA DEFENDER (UVI Number 8996190)	SEI	GRANDE BLEUE (formerly CAPSEN SA)	South Korea (supposed: Dongwon)	No answers
13	LISBOA	LL (supposed)	HSIN-FEI TRADING & INVESTMENT Co. LTD (NATIC) (formerly JUH JAN ENTERPRISE CO.LTD)	South Korea	
14	MAXIMUS	LL (supposed)	HSIN-FEI TRADING & INVESTMENT Co. LTD (NATIC) (formerly JUH JAN ENTERPRISE CO.LTD)	South Korea	
15	MARIO 7	LL (supposed)	HSIN-FEI TRADING & INVESTMENT Co. LTD (NATIC) (formerly JUH JAN ENTERPRISE CO.LTD)	South Korea	No answers
16	MARIO 11	LL (supposed)	HSIN-FEI TRADING & INVESTMENT Co. LTD (NATIC) (formerly JUH JAN ENTERPRISE CO.LTD)	South Korea	

Table C1. (*Continued*).

No.	Vessel name	Vessel type	Shipowner	Equity	Remark
17?	CAP ATLANTIQUE?	PL		Japan?	Source: ISSF ProActive Vessel Register (PVR)
18?	LIO II?	PL		TUNASEN (supposed Spain)?	Source: ISSF ProActive Vessel Register (PVR

Table C2. European flags.

No.	Name	Type	Flag	Shipowner	Equity
1	CORONA DEL MAR? (UVI Number 9093206)	PL	France		Source: ISSF ProActive Vessel Register (PVR)
2	AITA FRAXKU (UVI Number 9212943)	PL	Spain		Source: ISSF ProActive Vessel Register (PVR)
3	BERRIZ SAN FRANCISCO (UVI Number 9297450)	PL	Spain		Source: ISSF ProActive Vessel Register (PVR)
4	GAZTELUGAITZ (UVI Number 9200249)	PL	Spain		Source: ISSF ProActive Vessel Register (PVR)
5	IRIBAR ZULAIKA (UVI Number 9154373)	PL	Spain		Source: ISSF ProActive Vessel Register (PVR)
6	KERMANTXO (UVI Number 9212955)	PL	Spain		Source: ISSF ProActive Vessel Register (PVR)
7	NUEVO SAN LUIS (UVI Number 6403979)	PL	Spain		Source: ISSF ProActive Vessel Register (PVR)
8	PILAR TORRE (UVI Number 6403979)	PL	Spain		Source: ISSF ProActive Vessel Register (PVR)