

The Economic, Social and Ecological Performance of the Industrial Trawl Fishery in Ghana

Application of the FPI's

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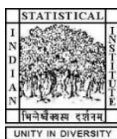
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The Economic, Social and Ecological Performance of the Industrial Trawl Fishery in Ghana: Application of the FPI's

Wisdom Akpala and Håkan Eggert*

Abstract

To ensure that benefits from capture fisheries accrue to nationals, fisheries regulations and acts prioritize local access and harvest rights in near and distant waters within a nation's exclusive economic zone (EEZ). The lack of local capital to finance industrial fishing, such as trawling, has compelled developing coastal countries' fishermen to access foreign investment through contractual agreement such as hire-purchases. In Ghana, this provision in the Fisheries Act (Act 625) has inadvertently granted foreign owners de facto 'recurring' ownership and control rights over the trawl fisheries, with the nationals holding fishing licences retaining de jure rights. The insecurity of the de facto rights may result in overfishing and stock depletion. Using data collected with the Fisheries Performance Indicators (FPIs) toolkit, the ecological, economic, and community outcomes of the industrial trawl fishery in Ghana are analysed and compared with the continent's average performances. Except for community (social) outcomes, which were high and marginally exceeded Africa's average, the overall ecological sustainability and the associated economic outcomes are performing at suboptimal levels.

Keywords: industrial trawling; foreign capital; fisheries performance; Africa

JEL Codes: Q22

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1. Introduction

Capture fish stocks, like other biological resources, can replenish themselves and generating wealth in perpetuity if predation levels are within reasonable limits. In developing coastal countries, the capture fisheries sector provides animal protein, creates jobs, and sustains the livelihoods of communities, generates export earnings, and makes a significant contribution to agricultural Gross Domestic Product (GDP). In Ghana, the capture fisheries sector has four fleets: artisanal or small-scale, which lands about 70% of the total landings (biomass) in marine fisheries; semi-industrial or inshore (4%); industrial trawlers (6%); and tuna fleets (20%) [1]. The sector employs about 20% of the active labour force [2], of whom an estimated 18% (who are women) are engaged in post-harvest value chain creation. In addition, the value added of the capture fish production is estimated at 15% of agricultural GDP [3] and contributes over 60% to the much-needed animal protein [4, 5].

With the ratification of the United Nations Convention on the Law of the Sea (UNCLOS) in 1982, the management area of each nation, i.e., the exclusive economic zone (EEZ) clearly defined domestic waters as 200 nautical miles from the coastline or major islands. Over time, inshore stocks, made up of small pelagic species, have been biologically overexploited owing to open access conditions with intensive use of simple but often efficient fishing technologies within limited fishing distances from the shore along narrow continental shelves [5]. A common interpretation of UNCLOS is that coastal developing countries that lack the capacity to fish in their distant waters or offshore, potentially leaving a fish surplus to be harvested, shall provide access to this surplus to other nations through diverse access agreements [6].

However, a coastal state has broad discretion to decide on which states get access to any surplus and there is no recognition of historic fishing rights in the EEZ [7]. Still, studies have found that the ensuing appropriation agreements have resulted in over-capitalization and depletion of large pelagic stocks and demersal species (e.g., groupers, sparids, cuttlefish, snappers, croakers, breams), with hardly any benefit accruing to the coastal developing nations [2,6,8-10]

To retain resource rents that, otherwise, flow out to foreign distant water fleets, coastal nations enacted laws and regulations that restrict foreign capital to only specific fisheries, such as tuna fishing in Ghana and other West African coastal countries [3]. Thus, artisanal or small-scale fisheries, semi-industrial or inshore fisheries, and industrial trawling are exclusively preserved for the nationals. While artisanal and semi-industrial fisheries are fully financed with domestic capital, industrial trawling is capital intensive, compelling nations to make provisions for the acquisition of trawl vessels through hire-purchase agreements, specifying stipulated periods within which the national takes full possession of the vessels.

In Ghana, the latitude of hire-purchase arrangements has led to tacit contractual agreements between local fishermen and foreign investors. The contracts are characteristically in the form of 5-year hire-purchase agreements, with a Ghanaian owning the license while the greater portion of the resource rents accrues to the owners of the capital who captain and control the vessels at sea [3,11]. Moreover, new agreements are constantly renegotiated by the owners of the vessel to enable them to retain the ownership and control of the vessels. This has, consequently, generated a protracted discussion about amending the Fisheries Act (Act 625) to forestall the unhealthy practice. Hypothetically, the elevated perceived risk of losing the *de facto* right to a renewable resource could jeopardize its sustainable management. Thus, fishing efforts are likely to intensify, culminating in high levels of stock depletion, as well as promoting the use of destructive fishing technologies that can harm the environmental carrying capacity of the ocean [3,12]. This study explores data collected on triple bottom line (TBL) outcomes (i.e., ecological, social and economic performance) of such a fishery (i.e., the trawl fishing in Ghana) by employing the fisheries performance indicators (FPIs) toolkit developed by Anderson et al. [13]. Furthermore, the study discusses the data on enabling conditions, including exogenous factors and management institutions, which produced the TBL outcomes.

Most fisheries managers aim for ecological or biological sustainability as the sole criterion for capture fisheries management. This is a necessary but not a sufficient condition for sustaining livelihoods. For a biologically sustainable managed fishery to maximise social welfare, it must also deliver sustainable economic benefits to communities that depend on the resource [14]. Thus, effective fishery management should broadly consider the sustainability of an entire socio-ecological system, and this is the focus of FPIs. As a result, factors such as quality of institutions (including fisheries governance and property rights), post-harvest infrastructure, and exogenous factors are critical in determining the ecological, economic and social performance of fisheries.

The paper unfolds as follows: The next section gives a brief evolution of industrial trawl fishing, emphasizing catch and effort levels. Next, the methodology section presents the data collection tool (FPIs), followed by a discussion of the data on the triple bottom line (i.e., Ecology, Economics and Community) performance of the trawl fishery in Ghana. Section 4 discusses the scores of the enablers or inputs for wealth creation within the fishery. The penultimate section compares the performance of the industrial trawl fishing in Ghana to the average of 14 countries in Africa, and the final section (Section 5), contains the concluding remarks of the study.

2. The Evolution of Trawl Fishing in Ghana

Ghana has a coastline of 550km with an Exclusive Economic Zone (EEZ) area of 228,000 km². The marine capture fisheries sector has four sub-sectors: the artisanal or small-scale fishery, the semi-industrial or inshore fishery, the tuna fishery, and the industrial trawl fishery. The industrial trawling contributes about 6% (about 25,000mt in 2016) of total marine landings and a third of total industrial landings [1,3]. As per the Fisheries Act 625 of 2002, the trawl vessels (made up of steel hull) are supposed to be owned and control by Ghanaians, the government, or a company or partnership that is registered in Ghana and owned wholly by Ghanaians. They are licenced for bottom-trawling and are supposed to target only demersal (bottom-dwelling) species in the nation’s waters beyond the Inshore Exclusive Zone (IEZ) (i.e., 6 nautical miles from the shore or deeper than 30 meters if the latter is farther). Thus, these are waters within the nation’s Exclusive Economic Zone but beyond the IEZ [3].

Trawling started in Ghana prior to the nation’s independence in 1957 and Ghanaian vessels were noted to fish in distant waters, including inshore waters of the neighbouring countries [5]. By 1971, the nation had 34 vessels owned by the state but the number declined steadily to about one-third by the time the UNCLOS was ratified in 1982, owing to the downturn of the national economy. However, the trend reversed as the nation embarked upon economic recovery and structural adjustment programs from the mid-1980s, which made it easier to import vessels, coupled with the repatriation of the Ghanaian distant water fleet [2]. Although all vessels in Ghana are registered and flagged as Ghanaian, resource rents benefit the owners of the vessels, who are predominantly Chinese [3,15]. By the time the Fisheries Act of 2002 was enacted, 54 trawlers were operating in Ghana and the number continued to rise over time. The highest number of active vessels (103) was recorded in 2014, after which it started to decline due to pressure from donors, including the World Bank, to reduce the number to sustainable levels [3].

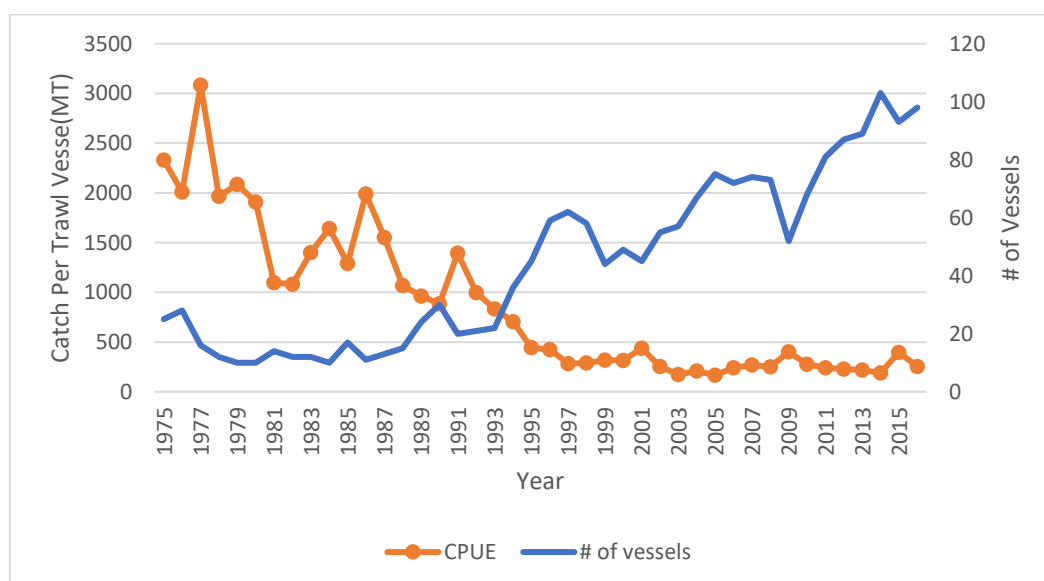


Figure. 1. Catch Per Industrial Trawl Vessel and Number of Trawl Vessels in Ghana (1971-2016) (Source: Fisheries Scientific Survey Division of MoFAD, Ghana)

The intensification of fishing effort (i.e., number of vessels) resulted in a tenacious decline in catch per unit effort (i.e., catch per vessel) beginning in 1977 through 2016, with the corresponding values of about 3080 and 250 MT, respectively, as shown in Fig. 1. In addition to overexploiting the targeted species, the vessels illegally land large quantities of small pelagic species, as well as damaging the benthic floor of the ocean during harvesting [3,11,16]. According to the most recent 5-year management plan (2015-2019) of the Ministry of Fisheries and Aquaculture Development (MoFAD), the fishing pressure is far in excess of what is required at sustainable levels [17]. As a result, in the absence of catch quotas, it has been recommended that the fleet capacity should be halved to maximize rents [17].

3. Methods

As indicated earlier, the study employs the FPIs to ascertain the performance of the industrial trawl fishing in Ghana. The Fishery Performance Indicators (FPIs) [14] are designed to measure fishery performance in the ecological, economic and social dimensions, and have been used to compare fisheries on a global scale [18], within a certain sector [19], and specific projects [20]. The three dimensions are interrelated, and a truly sustainable fishery requires achieving objectives within each of the three dimensions [13]. As a result, the FPIs are multidimensional indicators, with both input and output components that have 54 and 68 metrics, respectively. The input indicators entail the enabling conditions, including fisheries management institutions such as governance and property rights – factors that are external to the resource management – and post-harvest infrastructure, which incentivizes socio-ecologically sustainable management of a fishery. The output or outcome schedule includes stock performance, which is a proxy for ecological sustainability; harvest sector performance, which measures economic performance; and post-harvest sector performance, which reflects social or community sustainability.

To score the metrics, the FPIs rely on primary and secondary data sources, evidence from published works, focus group discussion, and personal communication with experts, among others. Thus, using the FPIs, reliable evidence or data is generated on fisheries that have low-quality data by simply relying on experts' opinions. For the purpose of this study, secondary data was collected from the Fisheries Scientific Survey Division of MoFAD. In addition, all relevant sources were consulted. Specifically, discussions were held with executive members of the Ghana Industrial Trawlers Association (GITA), chief fishermen, executive members of fish processors association, senior management and selected board members of MoFAD, fisheries enforcement officers, and NGOs. The data was analysed to obtain the scores of the relevant metrics. Some models were employed when analysing the

data, including Gordon-Schaefer harvest and cost functions to obtain sustainable and economic yields [21-23].

3.1 Data Collection and Analysis

3.1.1 FPIs-Output (Triple Bottom Line Outcomes)

The scores of the output indicators of the industrial trawl fishing are presented in Table 1. Each indicator has several dimensions and each dimension has a set of metrics. The average scores are calculated based on secondary data and information obtained from experts. The indicators are discussed in turn beginning with the ecological indicator.

INDICATOR	DIMENSION	AVERAGE SCORE	TBL SCORE
Ecology	Stock Health	2.13	2.13
Economics	Harvest	1.75	2.50
	Harvest Assets	1.83	
	Risk	3.50	
	Trade	1.75	
	Product Form	3.83	
	Post-Harvest Asset Performance	2.33	
Community	Managerial Returns	3.83	3.81
	Labour Returns	2.83	
	Health & Sanitation	4.17	
	Community Services	4.17	
	Local Ownership	3.50	
	Local Labour	4.50	
	Career	3.67	

Table 1. Fishery Performance Indicators: Outputs by TBL Indicator of Ghana's Industrial Trawl Fishery. Source: Authors computations.

3.1.1.1 Ecological Performance

On a 5-point scale, the trawl fishery in Ghana scored 2.1, which is less than half, on the ecological sustainability indicator of the fishery. This indicator is a composite index of stock overfishing; the status of the critical habitat; illegal, unreported and unregulated (IUU) fishing; and third-party certification of catch. The fishery has no quotas or catch-size restrictions. To determine the extent of stock overfishing, a biomass model was estimated using data catch volumes and operational vessels from 1971 through 2016. It was found that the number of vessels that corresponds to the maximum sustainable yield (MSY) is 54, which is much lower than the current level of effort in the fishery and about one-half of the highest number of vessels

(107) recorded in 2014. Moreover, the high number of vessels currently operating in the fishery induces a rapid declining stock, putting the ratio of current biomass to the corresponding figure at the MSY level within the range of 25 and 50%.

The Fisheries Act (Act 625) prohibits trawl fleet from targeting pelagic species, fishing within the territorial sea of Ghana (within 6 nautical miles or a depth of less than 30 meters if it is farther) and trans-shipping catches at sea. Until a vessel monitoring system (VMS) was introduced recently, the trawlers were actively fishing within the territorial sea of Ghana [3]. In addition, the trawlers persistently target small pelagic species (anchovies, mackerel and sardines) in large quantities, often exceeding their normal landings. These illegal harvests are often disguised as bycatches. In 2017, the ratio of the normal to the 'bycatches' was 10 to 6.7. Furthermore, the illegal catches are frozen in pallets/blocks and trans-shipped to artisanal canoes at sea to be retailed at landing sites. The practice is locally known as *Saiko* and the frozen block/pellet of fish is called *Saiko* fish. Since small pelagic species are the main species targeted by artisanal fishermen, *Saiko* activities have negatively impacted artisanal landings and the livelihoods of people in fishing communities. In 2017, the *Saiko* catch exceeded 100,000 metric tons, hence amounting to 57% of the annual landings of the artisanal fleet [11,16].

3.1.1.2 Economics Performance

The economic performance indicator is made up of the following dimensions: harvest and harvest assets, risk, trade, product form and post-harvest asset performance. As indicated earlier, the trawl fishery is over-capitalized, with the excess capacity around 100%. Although the official statistics indicate that 76 vessels were in operation in 2019, personal communication with officials in the industry revealed that this figure is the number of licenses renewed at the time of publishing the data. Thus, often, all 107 vessels that are registered are operational in the Ghanaian waters each year. The most recent statistics show the catch levels are more than double the maximum catch level that can sustain the demersal stock in perpetuity (MSY). In addition, when profits in the trawl fishery are considered, it has been estimated that the excess capacity has led to a potential loss of resource rents of over 50% [3].

The average score of the economic indicator is about 50%, with harvest and trade performance obtaining the lowest scores while production form scores the highest. This is because harvest performance involves excess capacity and extraction levels, both of which performed weakly. The feasible length of the fishing season for trawlers is about 92 days, but the vessels fish for 40 days a year on average, which scores well. Only about 30% of the landings are exported and personal communication with a member of the fish smokers' association revealed that the final product is of good quality for human consumption locally. In addition, the proportion that is exported meets all the standardized tests and is certified for international market. Processed fish generates over 67% profit margins.

Furthermore, intra-annual, annual and spatial price volatility; revenue volatility; and intra-annual and annual landing volatility have been quite low, on average scoring 3.75 out of 5.0, which is a desirable outcome (i.e., least volatile). The implication is that the industrial trawl fishery generates modest secure income over time, hence can be considered a moderately secure investment. This partly explains the growing foreign interest in the fishery.

As a final point, post-harvest asset performance, which combines borrowing rates relative to risk-free rates, sources of capital for the processing business, and the age of the processing facilities, had a moderate score of 2.33/5. While interest rates on loans compare favourably with risk-free rates, at the level of a personal bank loan, the fish processors rely on friends and family for financial support, owing to lack of collateral to support loans from formal financial institutions. As a result, they employ obsolete technologies (25-30 years old) for smoking fish.

3.1.1.3 Community Indicator

The community performance indicator measures the social benefits derived from the fishery. Its dimensions include returns to labour and management, health and sanitation, community services, local labour and ownership, and career development. This indicator had the score of 3.81 out of 5 making it the highest among the three (i.e., ecology, economics and community indicators). There are, however, some issues worth noting. The first is the local ownership dimension, which has a score of 2 based on *de facto*, rather than *de jure*, ownership. As noted earlier, the vessels are Ghana flagged and the fishing licences are held by Ghanaians; hence Ghanaians are the (*de jure*) sole owners of the fishing vessels as prescribed by the Fisheries Act (Act 625). If *de jure* ownership were rather considered and a score of 5 out of 5 assigned, the community indicator score would have increased significantly to 4.02.

In practice, over 70% of the trawl vessels are effectively Chinese owned with the Ghanaian licence holder fronting for the foreigner [3,24]. The vessels are captained and controlled by the foreign owners, who occupy the management positions, while the Ghanaians, making up the remainder of the crew, operate at the lower positions and take orders from owners [3]. The licence holder receives US\$1,000 a month, which is less than 5% of the average rents per vessel, plus a portion of the *Saiko* catch [3]. As a result, the returns to management dimension (3.83/5) reflects the average earnings and social standing of foreign vessel owners and local managers of fish processing facilities. On the other hand, the returns to labour (2.83/5) signify the earnings and social standing of Ghanaian crew and workers at fish processing facilities. This explains the difference of 20% in earnings and social standing accrued to the foreign owners of the trawl vessels.

Furthermore, regarding the employment of local labour, at least 80% of the fishing crew and all fish processing workers are Ghanaians. While the fish processing workers are hired on

a seasonal basis, the trawl crew who are adults (24-60 years) migrated from artisanal to trawl fishing, and hence have 10 years of fishing experience, on average. Trawl fishing in Ghana is safe, with hardly any deaths reported, and the fishing crew as well as fish smokers have access to good quality and affordable healthcare services within the country. In addition, the proportion of the harvest that is exported meets set international standards.

The community services dimension, which covers access to formal education, legal challenges faced by the trawl vessels, and the availability of support services to the fishing industry, received a high score of 82%. Ghana has a good educational system from the basic to the tertiary level and, currently, the cost of public secondary education is borne by the state. These benefits are available to the fishing crew, fish processors and workers. Also, the trawl fleet enjoys efficient and effective support services, including maintenance and supply of inputs, but encounters legal challenges when they violate fishing regulations. The violations include targeting juvenile and pelagic stocks, trawling within the territorial sea, and trans-shipment of catches at sea. From the available statistics, when crimes are detected, the prosecution is typically done at an alternative dispute resolution arrangement instead of the law court due to vested political interests, and the fines are often very low [3,16]. For example, the average fine for fishing within the inshore exclusion zone (IEZ) was about US\$18,600.00, which is approximately 7% of the revenue per vessel in 2016 [16]. Three regulations violated a total of 27 times and recorded within a 3-year period (2013-2015) comprised targeting of juvenile stocks, fishing within the inshore exclusion zone (IEZ), and trans-shipment at sea [16]. A simple average of the minimum and maximum allowable fines (stipulated in Fisheries Act 625) was calculated and compared with the fine that was imposed. As shown in Fig. 2, the trawlers that fished within the IEZ were only fined 34% of the average fine, while trans-shipment at sea and targeting juvenile stocks were fined as low as 3% and 9%, respectively. It is noteworthy that in some cases only a fraction of the fines imposed were actually paid by the offending trawlers.

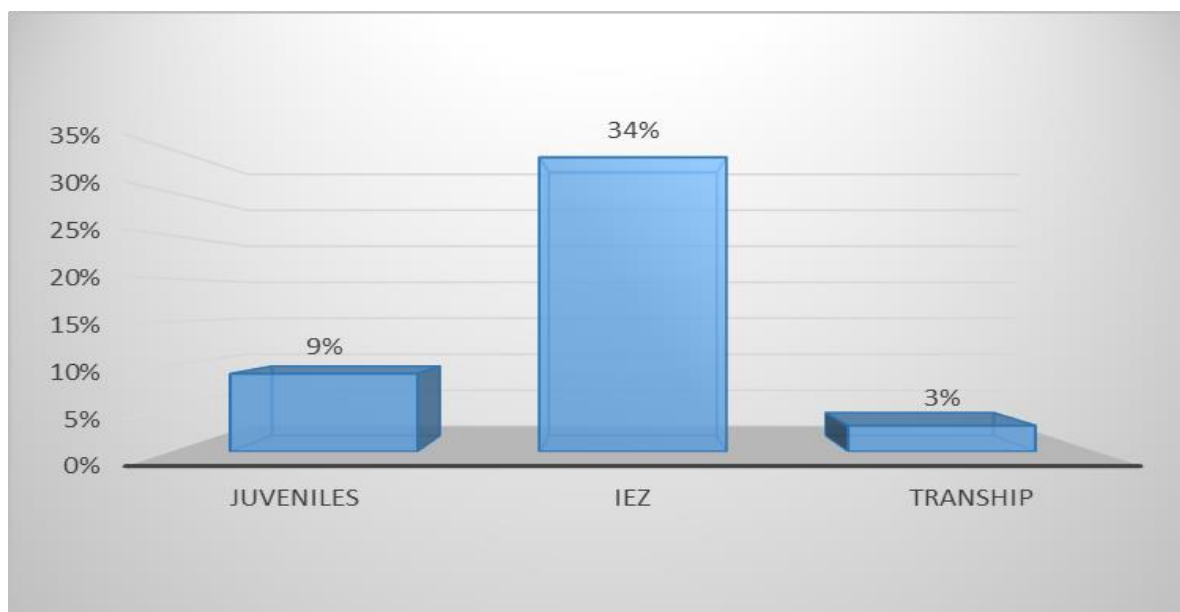


Figure 2. Paid vs Mean Penalty of Violating Industrial Trawl Vessels in Ghana: Catching of Juvenile fish (JUVENILES); Fishing within the Inshore Exclusive Zone (IEZ); Trans-shipment of catch at sea (TRANSHIP). Source: EJF, 2018.

4. Results

4.1 Comparing the TBL Outcomes

Comparing the TBL outcomes (see Fig. 3), the lowest score for the trawl fisheries (43%) is the stock (ecological) performance, while the highest (80%) is community or social benefits. This can largely be attributed to employment opportunities for the local fishing crew and fish processors, occupational safety, considerable earnings, and adequate access to health care services and formal education. Furthermore, the harvest sector outperforms the post-harvest sector by about a 7% margin, despite foreigners controlling the trawl vessels at sea and appropriating to themselves disproportionate amounts of the resource rents [3]. Unfortunately, the FPIs are not constructed to distinguish between *de jure* and *de facto* ownership and control of the fishing gear (trawl vessels), hence the fisheries resources.

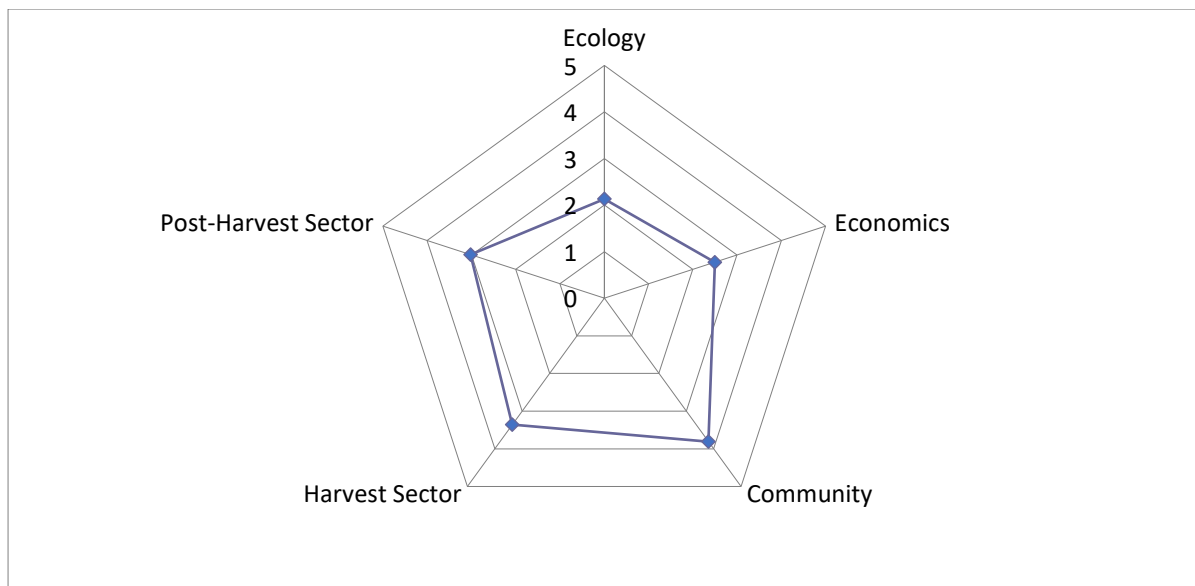


Figure 3. The Benefits of Ghana's Industrial Trawl Fishing.

4.2 Fisheries Performance Indicators (FPIs) - Inputs or Enablers for Wealth Creation

The TBL outcomes (i.e., ecological, economic, and social performance) of the trawl fishery in Ghana are influenced by an environment capable of creating resource rents. Based on the FPIs, these inputs include macro factors, fishing rights and responsibilities, management and co-management, and post-harvest facilities [13, Table 2]. The macro factors (see Table 2) are exogenous and include national environmental performance, environmental risk, national governance, and national economics. Of these dimensions, environmental risk considers the effect of exogenous pollution, diseases, and pathogens on harvest values. It received the highest score owing to the absence of evidence of runoffs from agriculture, which is typically of a smallholder nature, and pollution from industries or oil spills from the offshore oil rigs.

Furthermore, Ghana is a middle-income country with a modest level of economic freedom and relatively weak resource governance institutions. As per the Fisheries Act (Act 625) and the Fisheries Regulations (L. I. 1968), the Fisheries Commission (FC) of MOFAD implements fishing policies and regulations within the country. However, owing to staffing challenges and inadequate complementary resources, coupled with intense political interference, the FC is ineffective at enforcing fishing regulations. The few cases prosecuted are often settled out of court, and the fines are too low to mitigate recidivism [3]. Although most individuals and corporate trawl fishing operators belong to the Ghana Industrial Trawlers Association (except the vessel owners, who are foreigners), the association does not promote sustainable management of the fish stocks. This is expected since the Ghana Industrial Trawlers Association works for the short-term rent-seeking interest of the vessel owners. As a result, the weak resource governance institutions and the availability of cheap labour have intensified the

rate of stock depletion, owing to the lack of other employment opportunities among artisanal fisher-folks. It is worth mentioning that Ghana has weak environmental protection indicators (as per the FPI scores) due to elevated levels of destruction of biodiversity, and inefficient management of natural resources, including capture fish stocks.

COMPONENT	DIMENSION	AVERAGE SCORE
Macro Factors	National Environmental Performance	2.0
	Environmental Risk	5.0
	National Governance	3.0
	National Economics	2.0
Property Rights & Responsibility	Fishing Access Rights	3.5
	Harvest Rights	1.0
Co-Management	Collective Action	2.7
	Participation & Support	2.0
	Leadership & Cohesion	2.0
	Gender	3.5
Management	Management Capacity	3.3
	Data	3.5
	Management Methods	1.0
Post-harvest	Markets & Market Institutions	2.5
	Infrastructure	4.2

Table 2. Enabling Conditions (Inputs) for Wealth Creation in Ghana's Industrial Trawl Fishery.

Furthermore, concerning the management of the demersal fish stocks targeted by the trawl fleet in Ghana, the Fisheries Act (Act 625) does not impose catch quotas on licenced vessels. Thus, the only management tool prescribed in the fisheries management plan (2015-2019) is limiting the number of vessels, assuming the current fishing intensity will remain unchanged over time. Although the industrial trawlers do not have the legal right to exclude other fleets from targeting demersal stocks, due to technological constraints they have a natural monopoly over the targeted stocks. On the contrary, the trawlers are noted to purposely target small pelagic species, crowding out the artisanal fishers who use simple fishing technologies.

Post-harvest activities within the entire capture fisheries industry, including fish processing and marketing, are undertaken by women in Ghana [25]. Thus, landings are not auctioned but sold directly to specific women fish traders. A small proportion of the fish is retailed fresh and a significant proportion (about 75%) is smoked using efficient stoves that are mostly locally made. Processing losses range from none to moderate. It has been estimated that the revenue from the post-harvest value-chain amounts to 2.5 times the 'beach-gate' value [26].

The processors rely on family and friends for financial support, and neither the trawl vessel operators nor the processors benefit from any form of government subsidy.

Ghana has efficient international shipping services, and there are no tariff barriers to the export of demersal fish to the European Union (EU). As noted earlier, about 30% of the trawl landings are exported. In addition, there is adequate infrastructure, including refrigeration, ice and storage hulls to maintain the quality of the fish prior to export. The high-quality infrastructure and the zero-tariff incentive have led to a rise in export volumes over the years. Total fish export averaged US\$13.65m annually from 2010 through 2016.

4.3 Ghana's Industrial Trawlers vs Africa's Average -FPIs – Output

In this section, the FPIs for Ghana's industrial trawl fishing are compared with Africa's average. A total of 14 African countries, including Ghana, were considered (i.e., Gambia, Ghana, Guinea-Bissau, Kenya, Liberia, Malawi, Morocco, Nigeria, Senegal, Seychelles, Sierra Leone, South Africa, Tanzania, and Uganda). Regarding the TBLs, the continent, on average, performed better than Ghana at sustaining the ecology of capture fisheries and keeping stocks at healthy levels by regulating the rate of human predation and protecting habitats (see Fig. 4). In addition, the economic returns were also higher, on average, for the continent relative to what is generated from the industrial trawl fishing in Ghana, owing to high earnings on investment as stocks are kept closer to the maximum economic yield levels. The trawl fishing, however, outperformed Africa's average, albeit marginally, as a result of the relatively good quality and affordable healthcare services and formal education system, including free high school education that is enjoyed by the fishing communities as well. Furthermore, no significant difference was found between the scores for Africa and that of the trawlers in Ghana as regards the harvest and post-harvest sectors' benefits.

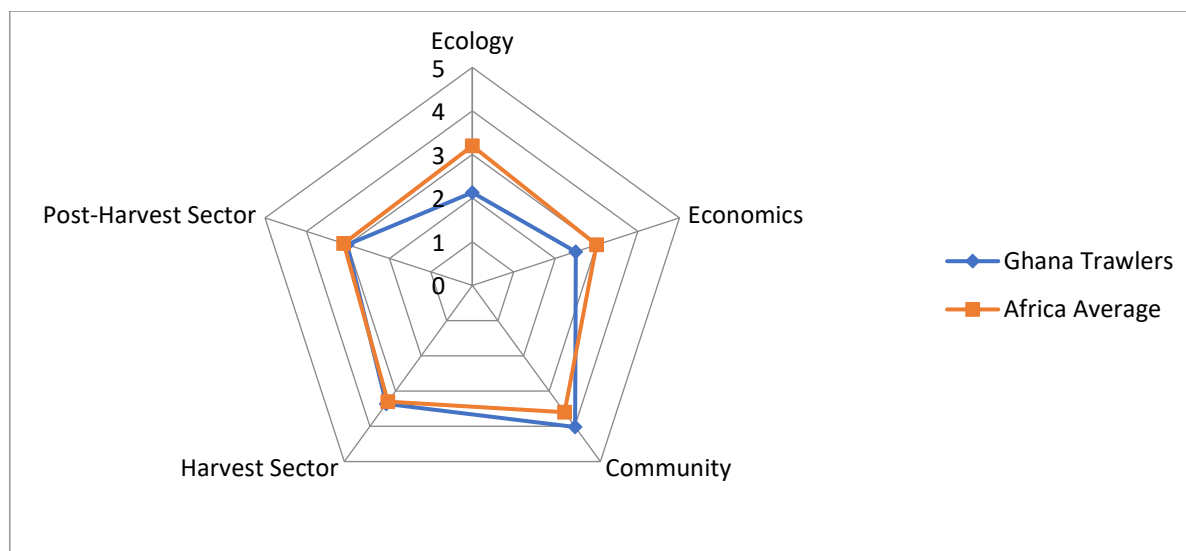


Figure 4. The Benefits of Ghana's Industrial Trawl Fishing and Africa's Average

4.4 FPIs-Inputs

Fig. 5 compares the enabling wealth creation elements for industrial trawl fishing in Ghana and the average of the 14 African countries. The scores for fishing access, harvest rights and resource management are similar, implying that African countries employ identical fisheries management strategies and experience comparable data quality constraints. However, the exogenous or macro factors impacting capture fisheries on the continent, as well as market related institutions and infrastructure (post-harvest), are ranked marginally higher on average (3.35 vs 3.03 and 3.0 vs 2.64, respectively) in Ghana's trawl fisheries than for the entire continent. On the other hand, the index of inclusiveness, including gender participation in fishing activities, is scored slightly higher for the continent than for the trawl fisheries in Ghana. This may be partly due to the differences in the participation in association meetings and financial support for fisheries, which is relatively low in Ghana. Moreover, as noted earlier, the Ghana Industrial Trawlers Association (GITA) does not play any effective role regarding the management of the capture fisheries resource.

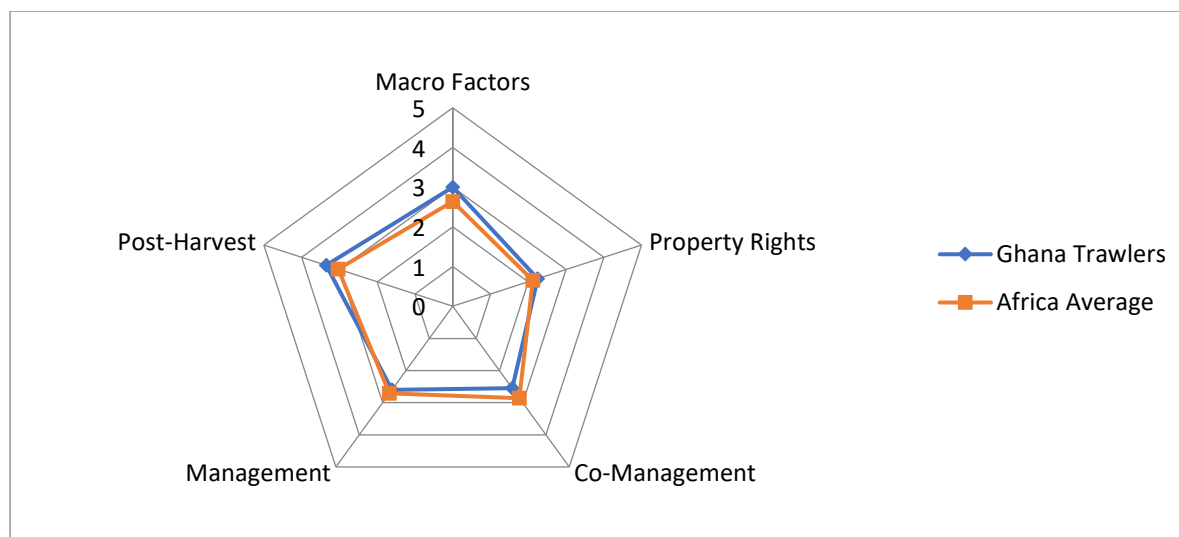


Figure 5. The Benefits of Ghana's Industrial Trawl Fishing and Africa's Average

5. Conclusion

The current hire-purchase arrangement in Ghana has led to excess foreign trawlers not only overexploiting demersal stocks off-shore within Ghana's EEZ but also illegally catching significant amounts of small pelagic species. This imposes a negative externality on small scale coastal inshore fishers, and in the end threatens sustainable livelihoods in fishing communities in Ghana. Recognizing the key role of the fisheries sector in national development, the fisheries Act (Act 625) was drafted to ensure that rents in all marine capture fisheries, including industrial trawl fisheries, accrue to the nationals. The domestic regulation that a local must own the fishing license combined with the high capital cost for trawl vessels have created a development with undesirable effects. Acquiring trawl vessels on a hire-purchase basis has created the prospect for rent-seeking foreign investors to illegally own and have control of the vessels, while locals own the fishing licenses. Such arrangement reduce the incentives for long-term stewardship regarding the stocks, but reinforce myopic (short-term) focus on profits both for investors and locals. The short-term hire-purchase contract creates *de facto* tenure insecurity which can speed up the rate of stock depletion and promote the use of technologies that are harmful to the seabed. This study therefore analyses the ecological, economic and social performance of the trawl fishery in Ghana, using data obtained with the Fisheries Performance Indicators (FPIs) toolkit. The scores are then compared with the averages in 14 fisheries in Africa countries.

Clearly, the scores indicate that demersal stocks targeted by the trawlers are biologically overexploited, with the habitat of the stock severely degraded owing to the type of fishing technology employed. In effect, the current fishing practices are not ecologically sustainable. Furthermore, the economic returns from the fishery are barely one-half of the potential of the

fishery. Nevertheless, the fishery continues to generate significant amounts of social benefits in terms of generating employment and income for the fishing crews and fish processors, which in turn improve their access to healthcare and formal education.

A comparison with the average scores for Africa and Ghana indicates that, while Ghana's trawl fishery generates better social outcomes, the continent as a whole outperforms Ghana at management of the fish stocks, including restricting fishing efforts and protecting the environmental capacity of the stocks, and consequently generating superior economic returns.

The findings provide some evidence of fast depletion of the demersal fish stock owing to the tacit contractual agreement between the trawl vessel owners, who are foreign investors, and the Ghanaian licence holders, who have *de jure* but not *de facto* harvest and access rights. To improve the health of the stocks and prevent it from imminent collapse, the number of fishing vessels must be cut down as specified by the fisheries management plan (2015-2019). In addition, the Fisheries Act (Fisheries ACT 625 of 2002) may have to be revised to either provide for forging formalized partnerships with foreign investors, or to outlaw the recurrence of a hire-purchase agreement when it expires.

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