Value Chain Analysis Of Small-scale Billfish Fisheries In Mainland Tanzania: Implication For Management And Sustainable Use.

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Background
Small-scale billfish fisheries provide a significant contribution to the livelihoods of the majority of coastal communities in Tanzania. The fisheries are a source of employment, income, food security and revenue generation all of which are crucial for the attainment of the Sustainable Development Goals (SDGs). Despite this significant contribution, SSF targeting billfish have received little attention particularly in the Western Indian Ocean (WIO) region. While much of the information collection on large pelagic species around the coastal areas has concentrated on tuna species, there is limited information on socio-economic status of the billfish fisheries to local communities, their socio-economic contribution, the governance structure and who gets to benefits from participating in the value chain. This study intends to fill such an existing gap of information and contribute to the identification of management needs which could support sustainable use of billfish resources. The main goal of this study was to identify the value chain framework of small-scale billfish fisheries in Mainland Tanzania. Specifically the study intends to (i) map the key actors participating in the value chain and their socio-economic characteristics (ii) examine income distribution among actors involved in the value chain (iii) identify the key roles performed by actors and the value adding activities and (iv) examine the governance structure operating in the chain.

Method
The study was conducted in two main locations including Mafia Island and Dar es Salaam. We also visited Mtwara and Zanzibar to document additional value chain information given the observation that billfish were transported to these locations by some trading agents. The structure of the value chain was mapped, differences in income between fishers and traders tested, and income inequalities among actors examined. Snowball sampling method was used to select respondents for this study. Data collection was mainly done by using semi-structured questionnaires, focus group discussion, key informant interviews, direct observation and informal discussions. Net incomes for each actor category were calculated prior to performing income distribution analysis. Lorenz concentration curves were constructed to illustrate income distribution among actors and the corresponding Gini coefficients were calculated to measure income inequalities. Kruskall Wallis and Mann–Whitney U tests were performed to test for the difference between incomes of fishers and trading agents. Governance data were analyzed qualitatively and presented in narrative form.
Results
Findings showed that the billfish value chain comprises five nodes which include: input supply (fishing gears and boats), production (fishers), trading (wholesalers, retailers and auctioneers), processing and consumption (hotels, restaurants and local individuals). Processing is entirely not performed at the production node of the chain. Minor processing such as cleaning, scaling and filleting is mainly done by traders at landing sites prior to sending to the selling points. Few traders in Mafia performed some processing including salting and sun-drying to avoid spoilage during transportation to Southern regions markets.
On average, fishers in both locations had lower daily income compared to traders. Mafia fishers received the lowest average income (of US$ 23 per day) of all groups. Overall, traders in Dar es Salaam have high average daily incomes (US$ 37) followed by fishers in the same location. Results show that there is a significant difference in income between fishers in Mafia and Dar es Salaam (p < 0.05), while other actor groups showed no significant difference in income distribution (p > 0.05). Examination of income inequality among fishers and traders in both locations showed a lower Gini coefficient, indicating that at the level of the entire market system income inequality was low. Traders in Mafia had the lowest inequalities among respondents (G=0.14) while a slightly higher income inequality was observed among fishers in Dar es Salaam (G=0.30). The trading node had a relatively low Gini index indicating that there were no major differences within incomes among the traders in both study locations.
Results on governance showed that there are no specific regulations to manage billfish fisheries. The fisheries are regulated by the general fisheries management act in Tanzania through the fisheries department which is under the Ministry of Livestock and Fisheries. Marketing is generally done through auction where fishers are required to pay auxiliary tax upon selling their catch. Other general regulations include registration of fishing vessels, fishing license and Beach Management Unit (BMU) membership.

Conclusion
This study has key implications for the management and sustainable use of billfish fisheries in mainland Tanzania. Understanding the benefit distribution among actors is important in identifying gaps and opportunities within the billfish value chain hence providing a room for improvements and sustainable development. Likewise, identifying the value chain node which benefits more from participating in the chain could help to identify possible causes of resource over-exploitation and user conflicts, hence enabling fisheries managers to formulate effective management interventions. Given the growing interest by the government of Tanzania and fisheries stakeholders to invest in the fishing sector under the Blue Economy, appropriate government structures should be put in place to ensure the sustainable use and management of billfish fisheries.