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Sustainable Contracts in the Bottled Tawilis Value Chain in Taal, Batangas, Philippines

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ABSTRACT

This research was conceptualized to investigate the potential impact of contracts on the sustainability of the bottled tawilis supply chain, i.e. sustainability in terms of environmental protection, well-being of the people whose livelihood depends on tawilis production, processing and marketing; and enhanced economic gains from the chain. A survey amongst fishermen, middlemen and processors was performed in the lake Taal area. The study concludes that formal contracts, with specific demands to gear used and the handling of fish, may stimulate the catch of minimum and uniform sized fish. Such contracts may also stimulate delivery of higher quality fish by fishermen. These contracts thereby enhance sustainable fishing and increase in fishermen's income. Direct (win-win) contracts between processors and fishermen seem to be the best way to stimulate delivery of sustainably caught fish. Government should strongly increase enforcement of sustainable fishing practices and stimulate contracting for sustainable fishing in this chain.

Keywords: tawilis fish chain, contracts, sustainability, developing country value chain

1 Introduction

There is only limited attention in the literature to contracts as a governance mechanism that can stimulate sustainable development (Kambewa, 2007). This study investigates whether this form of governance mechanism may be effective in stimulating sustainable development in a developing country value chain, focusing on the fish sector. The study case is the bottled tawilis value chain in the Philippines.

Tawilis is the major fish caught in Taal Lake accounting for 57 percent of the total fish production in the lake from 1996 to 2000 (Mutia, 2001). Tawilis is the only freshwater sardines in the Philippines and one of the few freshwater sardines in the world. In 2001, total tawilis production was 431 metric tons. Production increased since 2005 till it reached a total production of 1,650 metric tons in 2008 (Bureau of Agricultural Services website, 2009).

Tawilis is heavily exploited and caught using various fishing gears such as motorized push nets (suro) and "superlights" a very strong artificial illumination used to attract the fish at night (Castillo, 2005). This has contributed to the decline in income of fishermen along the lake (compare 'tragedy of the commons').

Tawilis are sold fresh and processed (bottles). Over a decade, processing of tawilis had been practiced by small and medium enterprises (SMEs). To date, there are four processing plants operating on small scale, ranging from 400 kilograms a month to 250 kilograms of fresh tawilis a day.

This paper investigates how the value chain's sustainability is affected by its governance mechanisms, the way value is added throughout the chain and by the market channel through which the fish is delivered to the market. Sustainability is defined in terms of (i) protecting the environment (tawilis fishery); (ii) well being of the people (main chain actors) whose livelihood depends on tawilis production, processing and marketing; and (iii) enhanced economic gains from the bottled tawilis supply chain (BTSC).

2 Framework of Analysis

Fig. 1 shows a proposed framework for analysis of this value chain (Trienekens, 2011). The framework is made up of three components. The first consists of identifying major constraints for value chain upgrading: market access restrictions, weak infrastructures, lacking resources and institutional voids. In the second component three elements of a value chain are defined: value addition, horizontal and vertical (network) structure and value chain governance mechanisms. These elements form the basis for the categorization of upgrading options, which is the third component of the framework.

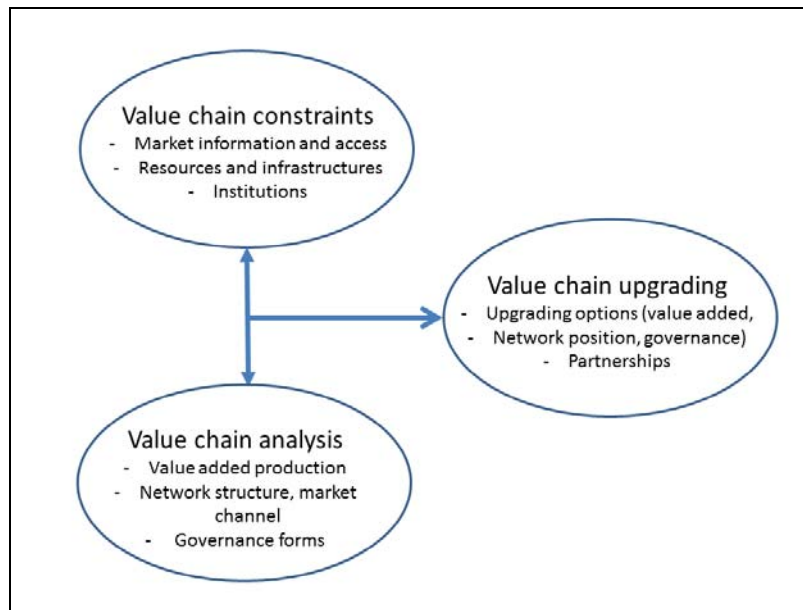


Figure 1. Framework for value chain analysis, adapted from Trienekens, 2011.

2.1 Value chain constraints

The main aim of a value chain is to produce value added products or services for a market, by transforming resources and by the use of infrastructures – within the opportunities and constraints of its institutional environment. Therefore, we investigate constraints for value chain development that are related to market access (local, regional, international) and market orientation (Grunert et al., 2005), available resources and physical infrastructures (Porter, 1990) and institutions (regulative, cognitive and normative) (Scot, 1995).

In our research case degradation of the sector has not been stopped through new government legislation or enforcement of current regulations. Fishermen also lack the means to buy the right gear or share in boat ownership. They depend on the informal sector for credit, which prevents them from buying new fishing gear or using ice. Moreover small fishermen in particular are confronted with decreasing catches of fish, in part because of competition from larger fishing companies, leading to lower incomes and poverty in the fishing community (Kambewa, 2007).

2.2 Value chain analysis

Value chain analysis consist of 3 key elements (Trienekens, 2011):

a. Value added is created at different stages and by different actors throughout the value chain. Value added may be related to quality, costs, delivery times, delivery flexibility, innovativeness, etc. The size of value added is decided by the end-customer's willingness to pay. Opportunities for a company to add

value depend on a number of factors, such as market characteristics (size and diversity of markets) and technological capabilities of the actors (Ruben et al., 2007).

In the tawilis case the use of ice, sorting (size) and cleaning are the most important value adding processes at farmer level.

b. The network position of a company depends on its horizontal relationships (with other fishermen) and on its position in one or more market channels. A company's position in a market channel depends on the following key decisions (Stern et al., 1996): which products or services will be delivered to which market; whether the company will adopt a single or multi-channel strategy; the number of stages in the channel. For example, a producer can deliver directly to customers further downstream the channel or through intermediary partners. Channel choices are greatly constrained by market access limitations such as supporting infrastructures to reach markets, access to demand and price information, and bargaining power. Specific demands from markets such as production according to quality standards also limit channel choices. In this respect finding value adding opportunities is related to: (a) the relaxation of market access constraints in existing market; (b) finding opportunities for new markets; and (c) setting up new market channels to address these markets

In our research we focus on access to market information and bargaining power of the actors in the chain.

c. Governance forms range from (spot) market relationship, through hybrid governance forms (contracts) to vertical integration or hierarchy (meaning bringing the activities of various companies together within one legal entity) (Williamson, 1999). In our study we focus on hybrid governance forms, formal or informal agreements or contracts (Grandori, 1997; Gulati, 1998).

As this research investigates the role of contracts in sustainable fishery, we focus on contracts as the formal governance mechanism. Contracts may include quality, quantity, price and delivery time and arrangement concerning the time of payment, but also, delivery of input materials which is very important for smallholders (fishing gear and ice). We include as informal governance mechanism trust and commitment

2.3 Value chain upgrading

Upgrading options are grouped according to the value chain elements of our framework: value added production, chain-network structure and governance (Fig. 2).

a. Upgrading of value added production: through innovative products and product differentiation, innovative processes and innovative marketing activities;

b. Value chain-network upgrading: targeting the right market and being part of the right market channel;

c. Upgrading of governance form: choosing the right organizational form with horizontal and vertical value chain partners.

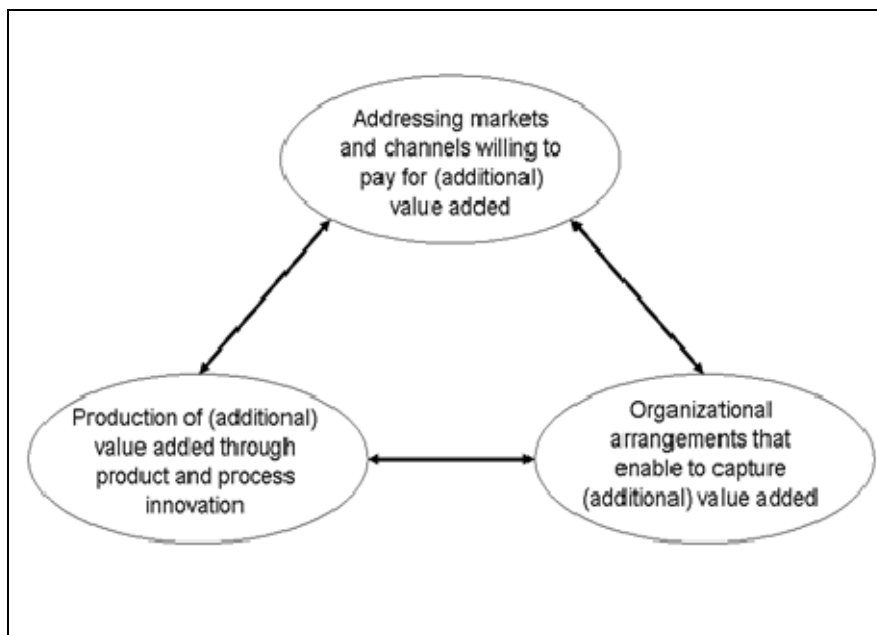


Figure 2. Upgrading options in value chains (Trienekens, 2011).

Upgrading in value chains can only be achieved through partnerships: private-private (between actors in the value chain) and public-private (between actors in the value chain facilitated by an external actor). In most cases, upgrading in value chains is achieved through private-private partnerships initiated by the lead actor (Gereffi et al., 2005). The options for upgrading sustainability we focus on in our research are: prevention of overfishing, protection of juveniles and spawners, prohibition of destructive practices, use of sustainable gears, higher quality fish and adequate compensation for fishermen. Upgrading partnerships may include value chain actors such as fishermen, middlemen and processors as well as outside partners such as the government. Fig. 3 depicts the variables included in our research.

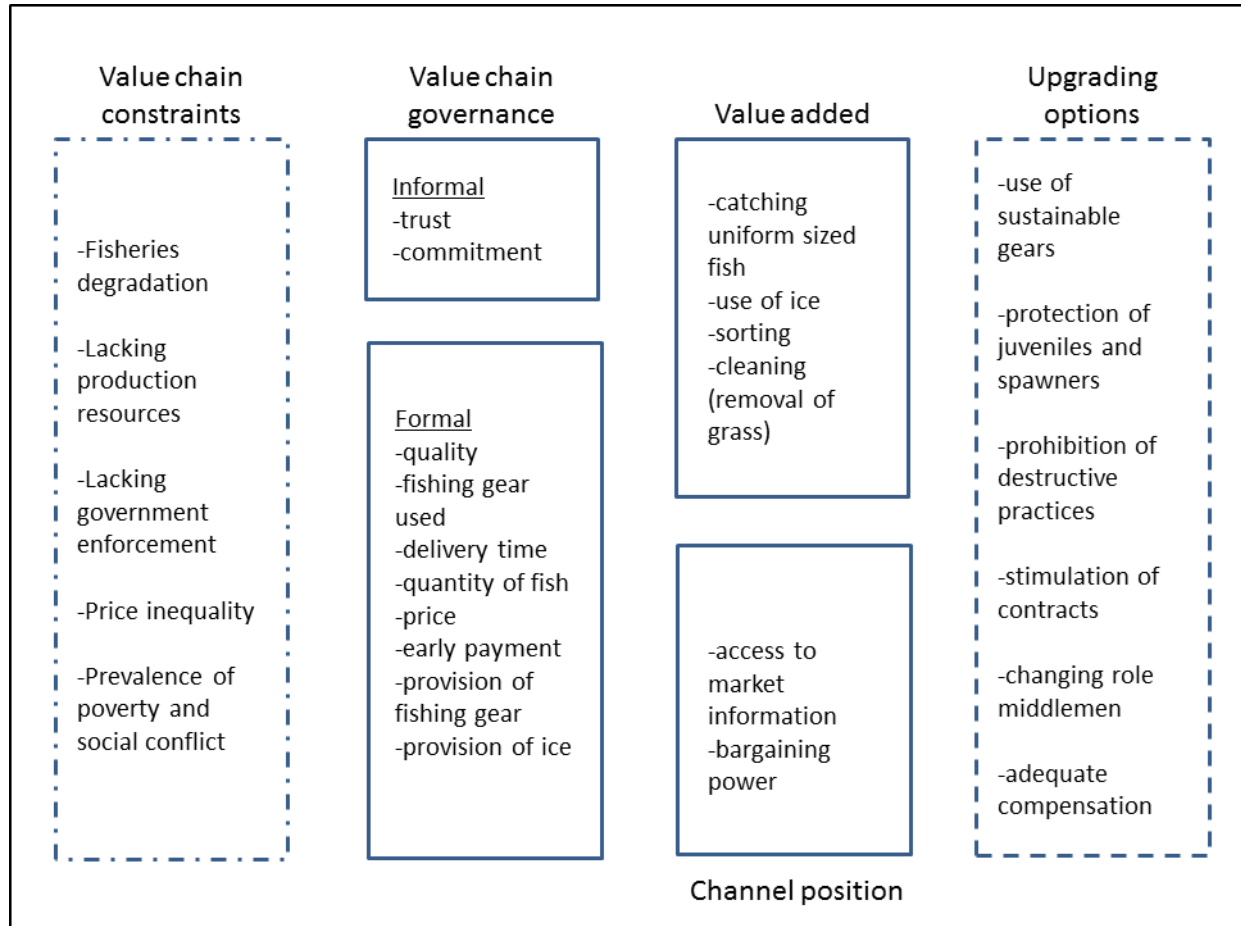


Figure 3. Variables included in the research (variables in boxes with dashed lines were measured in expert interviews and through open questions)

3 Materials and Methods

A survey was carried out covering fishermen, middlemen/traders and processing plants. Three sets of interview questionnaires were used (fishermen, middlemen and processors). Questionnaire interviews were conducted in Filipino. An experienced enumerator helped in locating the tawilis fishermen. Variables in the questionnaire consisted of multi-item scales measuring trust, commitment, content and perception of contracts, access to market information and bargaining power, delivery of quality fish, use of recommended fishing gears and perception on the economic gain from tawilis fishery. Demographic characteristics were also included in the questionnaire. Moreover, the closed questions were complemented with a number of open questions regarding perceptions and expectations on sustainable production in this fish chain. A five point Likert scale was used, 1 for strongly disagree and 5 for strongly agree. Questions were mostly adapted from Kambewa (2007).

3.1 Sample

There was no sampling frame that reflects the actual number of tawilis fishermen in Taal Lake. Sampling was based on the key informant interviews with the officials of the Bureau of Fisheries and Aquatic Resources Region IV. Seven municipalities (specifically the barangays/beaches) were identified, where most of the tawilis fishermen reside. These were: Tanauan, Talisay, Mataas na Kahoy, Balete, Lipa, Cuenca and Agoncillo. A stratified random sampling was applied in the survey.

Tawilis fishermen can be classified as gillnet, beach seine, push net or ring net operators. Only gillnet and beach seine fishermen were operational at the time period when research was conducted. A total of 109 tawilis fishermen participated in the survey: 45 beach seine operators and 64 gillnet operators.

A total of 18 middlemen were interviewed. There are three types of middlemen, these are the 'maglalako' or peddlers, the primary middlemen and the contracted middlemen (contracts with processors). There were four processors of bottled tawilis during the time of interview. The processing plants were managed respectively by: (a) a fishermen association; (b); a private school; (c) a private company; and (d) a convent. Three of the processing plants can be found in two municipalities in Batangas while the other one is located in Tagaytay, Cavite. All four were interviewed.

3.2 Analysis

Triangulation of data was performed by analyzing secondary reports from government and sector organizations and by a series of interviews with key informants such as researchers and government officials. Key informants include government officials such as the Local Government Municipal Aquaculturist, Bureau of Fisheries and Aquatic Resources officials, and researchers who are involved in tawilis researches.

Exploratory factor analysis was performed using SPSS. Reliability and validity measurements showed that most constructs (after cleaning) were consistent and stable. Pearson correlation coefficients were calculated to test the relationships among the various research elements presented in Fig. 3.

4 Results and Discussion

4.1 Descriptive Results

4.1.1 Respondent characteristics

Most of the respondents were between ages 41 to 50 (30%), youngest fishermen-respondents aged 18 while the oldest aged 80. Most of the respondents (58%) have primary educational level, while others have secondary (35%) and vocational college level (4%). Only few of them (3%) have no schooling at all. Fishing experience ranges from as low as three years to over 60 years. On the average, fishing experience is about 27 years. About 48% of the fishermen respondents do not have other income than from fishing. Most (78%) of the respondents had kinship relations (brother, sister, parent, aunt, uncle) with middlemen.

4.1.2 Value adding

It was found out that the value adding processes include: removal of grasses after harvesting the fish; use of ice to keep the tawilis fresh; use of ice box/cooler as a container for the tawilis carrying a maximum amount of 20 kilograms; use of bottle as a packaging material; and cooking of tawilis with oil, garlic, pepper and salt. Trucks with cooling facilities were not necessary due to the proximity of the landing sites to the processing plants.

4.1.3 Value chain governance

Most relationships in the value chain are long term, with family members or intermediaries who are members of the same community, and are based on trust and commitment. Many fishermen are dependent for credit on these intermediaries and remain with the same ones for years. Due to relatively low volume of catch, most fishermen have very few buyers. Most of them are indebted to them and out of gratitude they keep selling their catch to the same intermediaries.

Larger-scale fishermen often have formal contracts that specify product quality (size), delivery conditions, payment, and in some cases provision of fishing gear and ice.

Fishermen prefer a contract that outlines quality, use of good fishing gears, early payment, provision of ice and fishing gears. Middlemen prefer a contract that outlines quality and delivery time, while processors preferred a contract that outlines quality, delivery time and size requirement for tawilis.

4.1.4 Chain-network structure

Information on local prices is well known by most actors. However, information about prices and requirements for bottled tawilis in regional, and recently in national markets, is not shared broadly in the community.

In this study, market power refers to the firm's ability to influence the actions of others in a transaction (Shervani et al. 2007) while bargaining power refers to the ability to secure an agreement on one's own terms (Habtom et al., 2009).

In terms of market and bargaining power, middlemen dominate the chain. This is mainly due to the domestic demand for fresh tawilis. Middlemen have high access to market information in terms of tawilis prices. Aside from this, the low volume of catch of fishermen, specifically the gillnet operators and the small scale production capacity of the processing plant give them the power of setting the price of tawilis.

4.1.5 Chain output and upgrading

Chain actors were able to deliver quality fish in terms of freshness, however the demand for uniform (right) size fish is not being met. In terms of economic gains derived from tawilis fishery, gillnet operators were not earning much. Low volume of catch, informal credit and low access to market information causes the gillnet operators to be tied up to the middlemen. The relatively larger volume of catch of the beach seine operators gives them a little bit better profit than the gillnet operators. However, just like the gillnet operators, bargaining power tend to be low due to lack of access to facilities such as fishing gear and boats. Informal credits provided by middlemen, likewise, lower their bargaining power.

It was also found out that chain actors were aware of the degradation of the tawilis fishery due to bad fishing methods but none of them was really doing something to address this problem.

4.2 Propositions

A number of propositions were formulated, focusing on (formal and informal) governance, value added production and channel position (Fig. 3).

4.2.1 Trust, commitment and contracts

It is hypothesized in this study that there is a correlation between fishermen's trust to their buyer and their decision to enter into a contract. The study also analyzed the correlation between fishermen's commitment to their buyer and their decision to enter into a contract. Long term relationships translate into contracts that reflect good reputation, commitment to fulfilling promises, dependability and satisfaction. Trust may develop into commitment, i.e. contract partners will put more effort in each other's business, are willing to accept conditions in the arrangement and help each other to work better.

P_{1a}: *The higher the trust of fishermen to middlemen, the higher the chance that they will enter into a contract.*

P_{1b}: *The higher the commitment of fishermen to middlemen, the higher the chance that they will enter into a contract.*

4.2.2 Contract, information access and bargaining power

It is hypothesized that when fishermen lack resources to acquire appropriate information, governance through contracts may facilitate information exchange. In this respect social processes confirmed by formal contracts tend to be a mechanism that promotes norms of flexibility, solidarity, and information exchange between contracting partners. With this regards, the study investigated whether contractual arrangements can enhance the accessibility to market information for the fishermen.

P₂: *The more fishermen engage in contracts, the higher is their access to market information.*

Price is transmitted from link to link in this chain leaving price transparency to be low. This is coupled with the uncertainty of daily catch and high perishability of fish. These might lower the bargaining power of fishermen in relation to the buyers. Power asymmetry is prevalent in the fish supply chain wherein those in the downstream channel have market and bargaining power over the upstream channel actors. The study investigated if access to market information can enhance market and bargaining power of the fishermen.

P₃: *The higher fishermen's access to market information, the higher their market and bargaining power in relation to middlemen.*

4.2.3 Value adding processes and contracts

Value adding processes such as use of ice, sorting according to size and quality and use of recommended fishing gears are some of the factors that might help in stimulating a sustainable development in the BTSC. It is hypothesized that fishermen will be motivated to practice value adding processes if they will get a profit out of it. Incentives such as access to formal credit and production inputs, better price for their fish and market access are some of the factors that might enhance economic gains of the fishermen. Contracting partners through formal contracts might provide such incentives if they too will have better economic gains from such contracts. Incentives for buyers of tawilis to engage in such contracts may include good quality fish with the right size, which in turn will give a higher price in the market for these buyers. It is hypothesized that the more a contract partner stipulates the quality and size of fish in a contract, the more the fishermen will practice value adding processes.

P₄: *The more fishermen engage in contracts, the more they will practice value adding processes.*

4.2.4 Contracts, delivery of quality fish and use of recommended fishing gears

In this study it is hypothesized that contracts will help stimulate a better balance between people, profit and planet issues in the BTSC. Contract partners can act as a financial institution for small holders like fishermen. The fishermen will not only benefit from the provision of formal credit but they can also benefit from a fixed price. In addition, they may also be guaranteed a ready market for their catch. Loans may also take the form of production inputs such as ice or fishing gear. These inputs will help fishermen to increase their catch and enhance quality of their catch. On the other hand, contract partners (buyers) will benefit in terms of quality fish that they will obtain from fishermen which in return will give a higher price in the market.

Given the incentives that were discussed above for the fishermen and middlemen it is also worth mentioning that these chain actors are gaining awareness that resources have to be protected so that their livelihood will also be sustained. Fishermen are highly dependent on the sustainability of the tawilis fishery, hence this study envisions that protection of tawilis fishery will motivate them to engage in contracts that outline sustainable practices to safeguard their livelihood and future. The same argument was also presented by Kambewa (2007). This study investigated how the other actors such as middlemen and processors may jointly take responsibility for protection of fish through sustainable practices such as use of recommended fishing gears.

Outlining details on the fish quality (freshness and size) in a contract will address the welfare (people) dimension of sustainability, i.e. fresh and big size tawilis will be supplied and processed into Spanish sardines, with better prices. Contracts that outline details on the use of recommended fishing gear and catching only right sized fish will address the planet dimension of sustainability. Such contracts will help in the prevention of overfishing, protection of juveniles and spawners and prohibition of destructive practices. The following propositions are explored:

P_{5a}: *The more fishermen engage in contracts, the more tawilis fishery is protected.*

P_{5b}: *The more fishermen engage in contracts, the more quality fish is delivered.*

P_{5c}: *The more fishermen engage in contracts, the more adequate their compensation from the tawilis fishery*

4.3 Results analysis

Based on the data analysis and propositions, the following results were found. Table 1 shows the summary of propositions, Pearson correlation coefficients, support of propositions and their respective (statistical) level of significance.

4.3. Trust, commitment and contracts

The analysis shows a strong correlation between fishermen's trust and their decision to enter into a contract (P_{1a}). Likewise, a strong correlation exists between fishermen's commitment and their decision to enter into a contract (P_{1b}). Both correlations were significant ($p < .01$). This proves the assumption that fishermen may enter into a contract if they trust and have commitment to their contract partners. It was noted by Habtom (2009) that to win the confidence of artisanal fishermen and to develop trust,

buyers should be able to provide credit and set an attractive fish price.

4.3.2 Contracts and market information

A very weak correlation between fishermen's decision to enter into a contract and access to market information (P_2) was obtained. This correlation was insignificant ($p > .01$). This is supported by the findings of expert interviews that gillnet operators who have long term contracts with middlemen do not have better access to market information. This is contradictory to Fiala (2004) who finds that partnership in a supply chain leads to increased information flows

Table 1.
Proposition and results of Pearson correlation analysis.

| Proposition | Pearson Correlations | Supported |
|--|----------------------|-----------|
| <i>P_{1a}: The higher the trust among chain actors, the higher the chance that they will enter into a contract.</i> | 0.69* | Yes |
| <i>P_{1b}: The higher the commitment among chain actors, the higher the chance that they will enter into a contract.</i> | 0.67* | Yes |
| <i>P₂: The more fishermen engage in contracts, the higher is their access to market information.</i> | 0.17 | No |
| <i>P₃: The higher fishermen's access to market information, the higher their bargaining power in relation to middlemen.</i> | 0.066 | No |
| <i>P₄: The more fishermen engage in contracts, the more they are practicing value adding processes</i> | 0.461* | Yes |
| <i>P_{5a}: The more fishermen engage in contracts, the more the tawilis fishery is protected</i> | 0.81* | Yes |
| <i>P_{5b}: The more fishermen engage in contracts, the more quality fish is delivered</i> | 0.594* | Yes |
| <i>P_{5c}: The more fishermen engage in contracts, the more adequate their compensation from the tawilis fishery.</i> | 0.811* | Yes |

*The correlation coefficient is significant at 5% level of significance

4.3.3 Market information and bargaining power

There was a weak correlation between fishermen's access to market information and bargaining power (P_3). This correlation was insignificant ($p > .01$). This disproved the assumption that access to market information might enhance market and bargaining power of the fishermen. Beach seine operators have high access to market information. However, they didn't have extra market and bargaining power over middlemen. Instead, prices were set by the middlemen. The network that exists among middlemen gives them control over pricing and lowers bargaining power of the fishermen. The same findings were noted in the study of Kambewa (2007) wherein middlemen collude with each other to lower the price of fish.

4.3.4 Contracts and value adding processes

There was a moderate and significant correlation ($p < .01$) between fishermen's decision to enter into a contract and the application of value adding processes (P_4). Fishermen with contract relationships apply value adding practices such as use of ice, sorting, cleaning, and catching uniform size fish. Outlining such an agreement in a contract will force the fishermen to comply with the required specifications.

Table 2 shows the preferences of fishermen for contracts.

Table 2.

Fishermen's preference for a contract, based on the results of the survey.

| Preference for a contract that outlines: | |
|--|-----|
| Quality of fish | Yes |
| Use of good fishing gear | Yes |
| Size of fish | No |
| Delivery time | No |
| Quantity of fish | No |
| Fixed priced of fish | No |
| Early payment | Yes |
| Provision of fishing gears | Yes |
| Provision of ice | Yes |

It can be noted that fishermen prefer contracts that provide early payment, fishing gears and ice. Preference for such contracts might be explained by their experience of being tied up to informal credits provided by middlemen and having "pay-later" arrangements. Informal arrangements with middlemen lower the market and bargaining power of the fishermen. This is supported by the findings of our study that fishermen were willing to let the middlemen decide on their catch (i.e. price). This is in concordance with the study by Loc, et al. (2009) who found out that fishermen rely heavily on credit provided by middlemen as important source of short-term finance.

4.3.5 *Contracts and tawilis protection, delivery of quality fish and adequate compensation*

There was a strong correlation between fishermen's decision to enter into a contract and the protection of the tawilis fishery and adequate compensation (P_{5a} and P_{5c}). A moderate correlation exists between the engagement in contracts and the delivery of quality fish (P_{5b}). Both correlations were significant ($p < .01$). This implies that contracts might be an interesting governance mechanism for fishermen and their buyers to address sustainability of the tawilis fishery. Likewise, delivery of quality fish and having adequate compensation might be addressed by contracts. The analysis also supports the assumption that the more the fishermen are engaged in contracts the more quality fish is delivered. Having ice to keep the tawilis fresh not only enhances the bargaining power of fishermen but it also helps in delivering fresh fish to the buyer. Catching uniform size tawilis doesn't only address the sustainability issue of the tawilis fishery, but also means meeting the requirement of the buyer. Contracts likewise improve the economic gains of fishermen from tawilis fishing, as higher quality and better and uniform sized fish probably will give a better price at the processors. In line with this, the analysis also supported the assumption that entering into a contract might give adequate compensation to the fishermen.

5 Conclusion

Results show that fishermen are likely to enter into a (formal) contract if they trust and are committed to their contract partners which in general are middlemen. Contracts, however, are not a guarantee that fishermen will have better access to market information. Likewise, having access to market information may not help fishermen to gain more bargaining power. The network that exists among middlemen gives them control over pricing of fish and likewise lowers the bargaining power of the fishermen.

The analysis also shows that fishermen that are engaged in contracts are more motivated to practice value adding processes. Fishermen prefer contracts that will provide early payment, fishing gears and ice. This is in concordance with the study of Loc et al. (2010) who found that fishermen rely heavily on credit provided by middlemen as important source of short-term finance. However, such informal credit limits their ability to adapt to changing market prices and lowers their bargaining power. Contrary, having easier access to fishing gears and ice might ease this dependence relationship. Therefore, being free from informal credit might enhance their bargaining power, giving them a chance to sell fish to other buyers. Moreover, having ice in their operation might give them time to look for buyers that have a better price and payment arrangement (i.e. in cash).

In general, middlemen outline quality and delivery time in contracts with fishermen. However, in most cases middlemen do not practice sorting, making it hard for the next link in the value chain, the processors, to obtain uniform sized tawilis for their production. Low bargaining power of processors against middlemen might explain why in most cases small size tawilis are making up a large part of the supply, even though there are agreements on minimum size. Indeed, middlemen do not depend on processors due to the small production capacity of the latter. Moreover, aside from being the only freshwater sardines of the country, tawilis production is seasonal. This implies that even in the future, a stronger demand for minimum size tawilis by the processors will not guarantee that middlemen will supply these. Unless, there will be a law restricting the size of tawilis to be traded and processed. However, currently similar laws are not well enforced in this sector.

In this regards processors were more concerned than middlemen when it comes to the sustainability of the tawilis fishery. If uniform size tawilis is supplied, production time is lessened in terms of time devoted to putting smaller fish in the middle of the bottle, which is current practice. In addition, uniform sized tawilis will mean increased quality delivered to consumers. Because the processors would benefit a lot of better sized and therefore sustainable caught fish, contracts with these actors would be the best solution for the fishermen and for sustainable fishery in the long term.

The analysis supports the assumption that contracts with demands toward size and quality of fish might stimulate sustainable fishing. Fishermen are stimulated to use recommended fishing gears (with the right mesh size), which, at the same time, will lead to the delivery of more uniform sized fish. Through the middlemen, processors will be supplied with more uniform sized fish which is advantageous for their production. Therefore, these contracts may help to sustain future tawilis supply and better meet customer and consumer demand. These contracts likewise improve the economic gains of fishermen.

However, in the short run, contracts between fishermen and processors are not feasible. Fishermen are loyal to their middlemen, who in many cases are relatives or people from the same village. This means that processors find it difficult to approach the fishermen due to the presence of middlemen in the area where the fishermen are operating. In addition, they have trading relationships with these middlemen. Based on the results from the survey, very few gillnet operators would like to try supplying fish directly to processors. Besides their loyalty to middlemen, due to low production, gillnet operators are hesitant in supplying the processors because they may not meet their volume requirement. The authors recommend that to overcome this obstacle, one possible future arrangement between processors and fishermen would be through a fishermen's association. A fishermen association can act as a business partner to processors. Through an association, an adequate quantity of fish could be collected to supply the processor. Such arrangement could enhance the bargaining power of fishermen.

6 Further Research

A limitation of the study is the non-participation of the retailers in the survey. The views and notions of non-governmental organizations were also not included in the study. Further research into the tawilis value chain should be extended to these parties.

Further research in general can have a focus on how contracting between different chain actors can serve mutual interests, lead to increase of value added and at the same time to sustainable production in value chains in developing countries. How different types of vertical and horizontal governance forms can support sustainable production in these chains is a highly topical and interesting field of research.

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