

## The relationship between intermediary actors in the aquaculture supply chain at Tam Giang Lagoon, Central Vietnam

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Aquaculture's profitability depends on a whole linkage chain involving all stages of producing, distributing and commercializing the product to reach final consumption. The efficiency of a supply chain is affected by the types of relationships among actors. This study aims to explore the nature of intermediary actors' relationship in the aquaculture supply chain and the determinants of this relationship. Tam Giang Lagoon, Thua Thien Hue province, Central Vietnam, was selected as a case study. Fifty-five semi-structured interviews were conducted to collect primary information, while secondary information was collected from statistical data. The relationship between collectors and their buyer group plays a vital role in the product flow, and each collector has one wholesaler and retailer group. Their long-term business relationship is based on trust and informal transactions. Fair commercial treatment and willingness to lend without interest have created a binding relationship.

**Key Words:** *aquaculture, collector, fish and fish products, retailer, Tam Giang lagoon, wholesaler.*

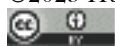
**Article Info:** Received: *October 31, 2021*; Revised: *April 17, 2023*; Accepted: *April 23, 2023*; Online: *May 31, 2023*.

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## Introduction

Aquaculture has been playing an essential role in global food security due to the nutritional value of fish and fish products (Pradeepkiran, 2019) responding to the growing human population (Froehlich et al., 2018). Moreover, the contributions of aquaculture have been indicated by employment opportunities, income improvement, and economic growth (Subasinghe et al., 2009). Therefore, this sector is strongly developed in most parts of the world (Godfray, 2010), and the largest producers of fish and fish products are in Asia, such as China, India and Vietnam (Food and Agriculture Organization, 2020). The volume of exported fish and fish products has increased significantly in developing countries, while the European Union is the world's largest market for aquaculture commodities. The demand for high-value products, such as shrimp, salmon, and tuna, tends to grow, opening opportunities for aquaculture development in developing countries (Food and Agriculture Organization, 2019).

Vietnam aquaculture has become a vital commodity production industry; all types of water bodies, including freshwater, brackish water and marine, are used in aquaculture. Production of species with high economic and export value is concentrated development. Consequently, aquaculture has significantly contributed to the transformation of economic structures in agriculture, as well as hunger elimination and poverty reduction in regions of the country (Department of Fisheries, 2021). In 2017, Vietnam was fourth and third in global producer and exporter countries, respectively. The aquaculture production of Vietnam has increased from over 500 thousand tons in 2000 to 3.8 million tons in 2017, while its export value has grown from US\$ 1.5 billion to US\$ 8.5 billion in the same period (Food and Agriculture Organization, 2019).

The profitability of aquaculture depends on a whole linkage chain, which involves all stages of producing, distributing and commercializing the product to reach final consumption (Valenti et al., 2010). Although each actor in the chain undertakes various functions, their common aim is to respond to customers' needs (Lem, 2004). A good supply chain performance results from improved market access and competitiveness that lead to sustainable food production (Anane-Taabeah et al., 2016). Moreover, the efficiency of the supply chain can be affected by the types of relationships among actors in it (M4P, 2008). Vertical coordination has become typical in most agri-food sectors, and closer vertical coordination is mainly tendency of many countries (Aramyan et al., 2006; Hobbs & Young, 2000). Closer vertical coordination has been concentrated in input supply, processing and distribution. But disadvantaged position belongs to producers in the bargaining aspect, resulting in inefficient allocation of resources and a loss in social welfare (Young & Hobbs, 2002; Chander, 2017; Widyaniingsih et al., 2020). Meanwhile, intermediary actors can better understand the final consumption of products and services; therefore, they quickly determine the demand of customers to respond to diversified needs (Nicovich & Dibrell, 2007; Guan & Rehme, 2012; Purcell et al., 2017).

Value creation can result from buyer-seller relationships that divide into direct functions, including cost reduction, suitable quality and volume and safeguard, and indirect functions, such as innovative solutions, marketing and social support (Walter et al., 2003). Besides, constraints are solved by raising the linkages between the different actors in the chain. Based on these linkages, mechanisms can be identified to improve capabilities in distribution and grow added value in the chain. The value chain is improved or upgraded through a better understanding of the linkages in the chain (Pomeroy et al., 2017).

Moreover, together with traditional supplier selection criteria such as price, volume and quality, trust, reliability, and information sharing also influence the long-term relationship that leads to market success within the conventional food supply chain. Thus, information-sharing capacity, trust-based relationships and linkages are crucial factors in accessing markets (Hennig-Thurau et al., 2002; Ulaga & Eggert, 2006; Fritz & Fischer, 2007; Abate Kassa & Peterson, 2011). Similarly, in building a relationship commitment, the supplier tends to be committed to the relationship with buyers when they get more efficient and effective in providing products from information sharing of buyers. In contrast, buyers tend to be committed to suppliers when they trust suppliers to offer suitable products or services (Nyaga et al., 2010). Therefore, reaching the trust and reputation of the buyers is necessary to make a sustainable long-term market channel and better relationship (Abate-Kassa & Peterson, 2011).

In Vietnam, many different actors have participated in the aquaculture supply chain. However, the main actors are input suppliers, producers, collectors and processors. Specifically, input suppliers have the responsibility to provide fingerlings, feed, aquatic medicine and other materials; producers mainly participate in the production process to create fish and fish products. Meanwhile, collectors and processors undertake the output market for producers by distributing fish and fish products to subsequent buyers or consumers (Van Duijn et al., 2012; Ho & Burny, 2016). Intermediaries, who are downstream actors, have played a key role in distributing fish and fish products to final consumers. Intermediaries' participation influences market access and efficiency of the supply chain (Tran et al., 2013; Van Nguyen et al., 2021). Therefore, the aquaculture supply chain also creates relationships among the chain actors, in which intermediaries always have strong linkages to farmers and are always dominant, while the farmers have less bargaining power and become dependents (Ha et al., 2013; Ho & Burny, 2016; Lan, 2013; Tran et al., 2013; Van Duijn et al., 2012; Van Nguyen et al., 2021).

Although the relationships between farmers and intermediaries have been mentioned in many kinds of research, the relationship among intermediary actors in the aquaculture supply chain is not popular. However, they are necessary to ensure the operation of fish and fish products, information, and finance flows. The intermediary actors' relationship is also considered similar to a supplier and buyer relationship. As a result, the operation of the aquaculture supply chain and the development of aquaculture are strongly dependent on the intermediary actors' relationship. As such, this study aims to explore the nature of intermediary

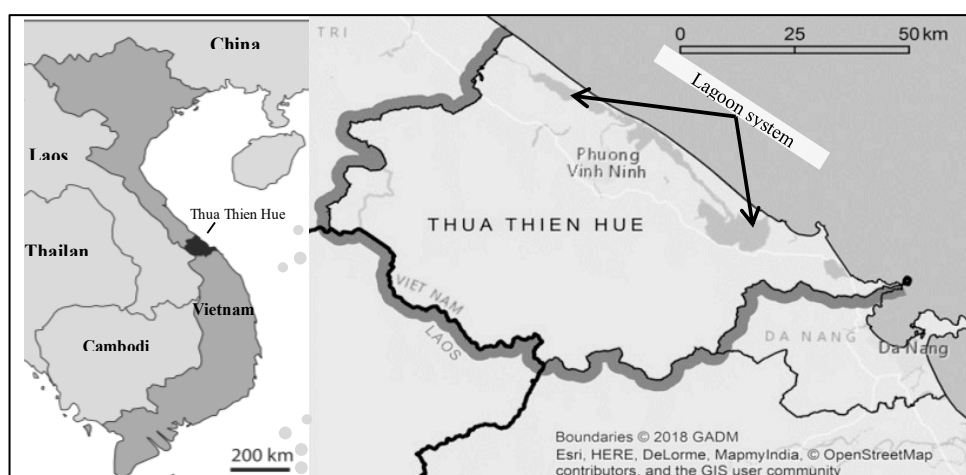
actors' relationship in the aquaculture supply chain and identify its determinants. Specifically, the relationship between collectors and wholesalers, and retailers will be described and analysed. The study concentrates on answering research questions: How is the aquaculture supply chain in Tam Giang Lagoon? What is the relationship among intermediary actors in this supply chain? What are the determinants of the relationship?

## Methodology

The research was conducted in Tam Giang Lagoon, Thua Thien Hue province, Central Vietnam, which is viewed as the largest brackish lagoon in Southeast Asia (Figure 1).

The area of the lagoon is about 22,000 hectares, and it runs along 68 km of shoreline. The lagoon is home to 33% population of the province (Van Tuyen, 2010; Hoang et al., 2020). The main livelihood of local people depends on fishing and aquaculture. Aquaculture has been playing an essential role in providing income for 10,000 households with about 21,000 labourers (Van Chung et al., 2021). However, small-scale aquaculture and informal market are still prevalent in the lagoon.

Qualitative research was applied in this investigation to develop an in-depth understanding of the research topic. For this, primary information was collected from 55 semi-structured interviews: smallholder fish farmers, collectors, wholesalers, retailers and representatives of government levels. Of the total of respondents, the rate of males accounts for 76.4%, and the rest is the rate of females, and the average age of all respondents is 52.4 years old (Table 1).



**Figure 1.** Location of Tam Giang lagoon

Source: Compiled by authors

**Table 1.** Details of interviewees

Interviewees group	Group size (persons)	Gender		Average age (year old)
		Males (%)	Females (%)	
Aquaculturists	25	100	-	54.4
Collectors	10	20	80	51.3
Wholesalers and retailers	3	-	100	46
Key informants (head of the village)	6	100	-	56.7
Representatives of government levels from provincial to commune government	11	81.8	18.2	48
Total	55	76.4	23.6	52.4

*Source:* Compiled by authors from stakeholder interviews

The interview process started with the interviewee's general information, then focused on the status of fish and fish product production and consumption, characteristics of actors in the aquaculture supply chain, and the power relationship between actors. Each interview took about one hour. The interview process was recorded and transcript into Microsoft Word for analysing. In line with primary information, secondary information was gained from reports, statistical data of government levels, functional units, and published research. Information relating to aquaculture production and consumption in Tam Giang Lagoon and the aquaculture supply chain was collected.

The study applied a snowball approach to finding the interview partners based on their relevance to the research objectives. Specifically, this interview partner will introduce further interviewees, those who are actors of each phase of the fish and fish products supply chain or support actors. Specifically, fish farmers were the starting point of the snowball. After that, fish farmers introduced collectors, while collectors and fish farmers also found wholesalers and retailers. This approach contributes to finding suitable respondents and ensuring the accuracy and completeness of the information.

## Results

### ***Aquaculture in Tam Giang Lagoon, Thua Thien Hue Province***

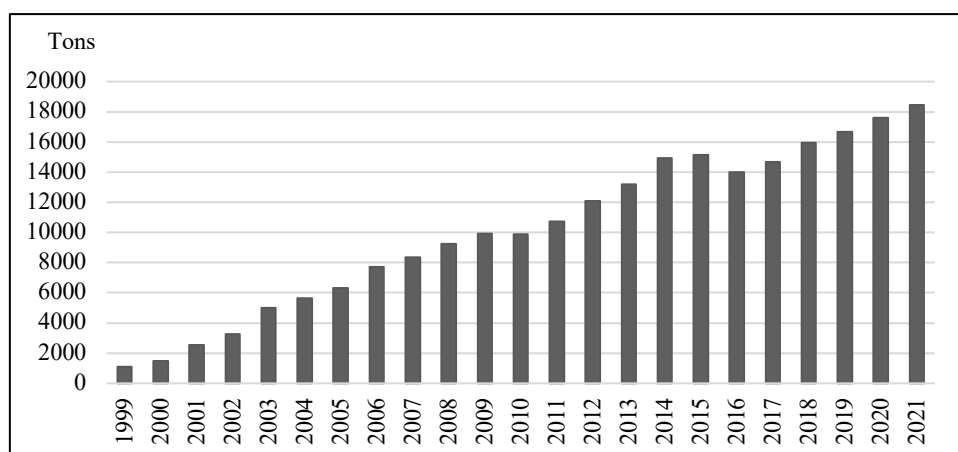
Tam Giang Lagoon is a typical brackish water system in Southeast Asia. It runs along the shoreline and is separated from the sea by sand dunes. Tam Giang Lagoon is home to 265,248 residents of 33 communes, those who mainly have fishery and aquaculture-based livelihoods (Department of Agriculture and Rural Development of Thua Thien Hue province, 2021). Aquaculture started to develop in Tam Giang Lagoon in 1990, and black tiger shrimp (*Penaeus monodon*) has been the main specie in aquaculture production. After that, the number of participants in aquaculture and aquaculture areas sharply increased from 1995 to 1999 and developed most robustly from 2001 to 2003 when local governments had the policy to convert from agricultural land into aquaculture. In the first

three years of black tiger shrimp farming, most farmers earned high profits, which most farmers had never seen before. However, white spot and yellow head disease have started appearing, and the rate of losers has increased since 2004. Many households have fallen into debt.

*“At that time, the price of one kg black tiger shrimp was equal to the price of 100 kg rice; our life had positive changes because of black tiger shrimp, as well as becoming poorer because of black tiger shrimp”*, farmer, male, 45 years old, An Gia village, Sia town

In this context, poly-culture became an excellent solution to reduce losses in aquaculture. Poly-culture was established in Tam Giang lagoon in 2008, which is the combination of black tiger shrimp, crab (*Brachyura*) and fish (such as rabbitfish (*Siganus*), spotted scat (*Scatophagus argus*), barramundi (*Lates calcarifer*) or red drum (*Sciaenops ocellatus*)). The effectiveness of poly-culture was demonstrated when farmers do not experience losses as, if one species dies, they still have other species, and the number of bank debtors tends to be reduced. Poly-culture has two seasons per year, namely, the winter season and the summer season. Summer is the primary season from March to August, and after August is the winter. The development of poly-culture in Tam Giang Lagoon has led to a significant change in aquaculture production in Thua Thien Hue province, which contributes to improving the local farmers' income (Figure 2).

The aquaculture production of Thua Thien Hue province has strongly increased from 1999 to 2021. The aquaculture production was slightly over 1,000 tons in 1999, but it rose 18 times higher after 23 years. The increased production results from expanding the aquaculture area and changing aquaculture species in the Tam Giang lagoon. Instead, the provincial government has concentrated investments in this domain and considered it a key economic sector in rural economic development.



**Figure 2.** The aquaculture production of Thua Thien Hue province in 23 years

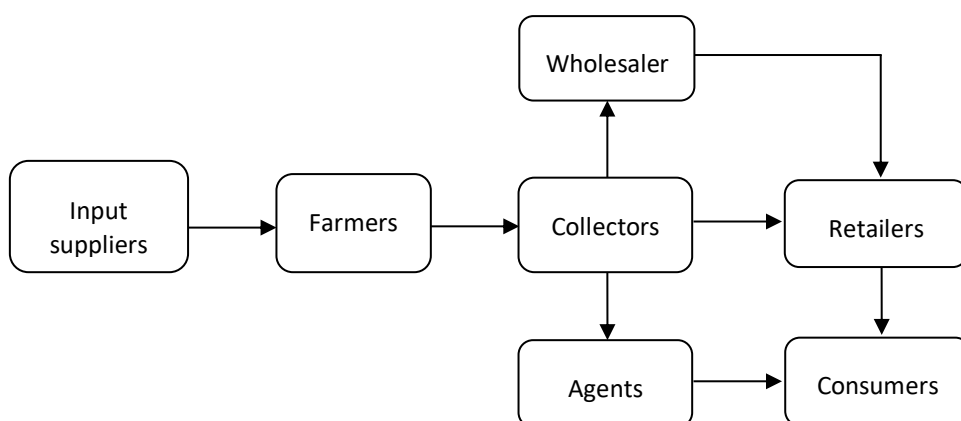
Source: General Statistics Office of Vietnam

As a result, in the development planning of the provincial government toward its 2030 vision, the aquaculture area and production in Tam Giang Lagoon will reach 3,496 ha and 10,340 tons, respectively (Ministry of Agriculture and Rural Development of Vietnam, 2015).

### **Aquaculture supply chain in Tam Giang Lagoon**

After stocking fingerling 3 or 4 months, farmers harvest fish, black tiger shrimp and crab (fish and fish products). Farmers collect fish and fish products for one month, and each day, they will decide the quantity and type of fish and fish products suitable for market demand and price. Additionally, there is a rule in poly-culture that the bigger-sized fish and fish products will be caught first and smaller-sized ones later. Almost all farmers can get from 5 to 10 kg of fish and fish products daily. Farmers tend to prioritise harvesting black tiger shrimp in higher amounts than others because black tiger shrimp is a more susceptible to disease than others. After catching fish and fish products, collectors will buy all the products at the farmer's fish pond. Each collector has a particular group, who always provide their products for the collector. Consequently, the product flow has to cross collectors before moving to the next buyers.

After buying fish and fish products, collectors will sell most of them to local wholesalers and retailers. Each collector has a wholesaler and retailer (buyer) group to sell their products. This relationship was formed from long-term business activity between them; they have interdependences to ensure the benefits of their business. The price of fish and fish products depends on the agreement between the collector and buyer group, and selling price is similar among buyers in the collector group (there is no difference in price between wholesalers and retailers). After getting the products from collectors, wholesalers will sell the products to retailers in other local markets of Thua Thien Hue province, and then, retailers will deliver them to consumers.



**Figure 3.** Aquaculture supply chain in Tam Giang Lagoon

Source: Compiled by authors from stakeholder interviews

*“my group has 3 wholesalers and 2 retailers; they always wait for my products at a local market. They will buy all my products first; if I do not have enough of the products, they can buy extra products from other collectors”, collector, female, 56 years old, Phu Xuan commune*

Together with wholesalers and retailers, collectors can sell the products to agents in Thua Thien Hue province, who then distribute them to consumers in other areas of Vietnam. Agents can buy a high quantity of the products, and they will buy from many collectors, but they only purchase black tiger shrimp and crab; because the demand for shrimp and crab is high. However, there is no difference in price between the buyer group and agents when collectors sell to them.

### ***The criteria for selecting partners of collectors, wholesalers and retailers***

Each commune of Tam Giang Lagoon has many collectors, and each collector has one wholesaler and retailer group (5-10 buyers), who are given priority to buy fish and fish products. The wholesalers and retailers have a connection with collectors through a business relationship and a partner selection process. The collectors have criteria to select wholesalers and retailers, including, firstly, the attitude of buyers (in calculating kilogram precisely and timely in payment); secondly, the availability of wholesalers and retailers (buyers are always willing to buy fish and fish products from collectors when they can or cannot sell their product, or when the price of products is high or low). Besides this, wholesalers and retailers select collectors when collectors can respond to their requirements on product quality and quantity; they are always first prioritised by collectors, and they can borrow money without interest from collectors. Therefore, the collector and the buyer group always have trust and believe in each other to maintain the relationship.

*“I have one buyer group; we have a long-term to work together. They always buy fish and fish products from me. They will not buy from other collectors if I have the products. Because they scare that I will not sell the products to them next time and they do not have enough products for selling. They can buy from other collectors when I do not have enough quantity to provide for them. In contrast, I must sell to the buyers in my group first, even when I have a high amount of fish and fish products”, collector, male, 53 years old, Phu Xuan commune*

### ***The binding between the intermediaries***

The number of buyers in the group of collectors is different and depends on each collector's ability to respond to demands. Thus, the collectors' response ability will affect the satisfaction of the buyer group and the sustainable relationship. In order to maintain the relationship, collectors always attempt to provide enough products for their buyer group. If the products are insufficient, the collectors will try to buy from farmers in other villages or from other collectors at higher prices. However, the collectors cannot readily buy from them because each farmer or



collector has particular buyers to buy all their products, and they always want to give the best services for their group to maintain their linkages.

*“Sometimes, I have to refuse the order of wholesalers or retailers when they want to buy high amounts of fish and fish products. Because, if I accept their order while I cannot provide for them, which negatively impacts on our relationship”, collector, female, 48 years old, Hai Duong commune.*

Furthermore, when fish and fish products are increasingly scarce in the winter, all wholesalers and retailers have to accept that they will not have enough of them. In order to maintain the linkages between collectors and the buyer group, the collectors will divide the quantity of fish and fish products and provide equally for all buyers. Even if one wholesaler wants to buy all available amounts, the collectors will not agree; sharing the products among buyers is a sustainable solution. Thus, if collectors cannot provide high quantities of products, they will not try to increase the number of buyers; instead, they will remain in the relationship with available buyers.

*“I always try to satisfy my buyer group when I do not have enough fish and fish products. If I do not satisfy them, how can they come to me when I have a high amount of fish and fish products”, collector, female, 55 years old, Quang Cong commune*

Notably, there are differences in the price and demand of consumers for black tiger shrimp, crab and fishes; and wholesalers and retailers can get different profits from them. However, wholesalers and retailers are not chosen the fish and fish products, which have the high value; and the rest, they do not buy and leave for the collectors. Besides, collectors have never accepted that each buyer select one kind of fish and fish products or competes together to buy the highest value product. All types of products are equally divided by the collectors to provide for the buyer group.

*“Sometimes, my buyers only want to buy fish or crab, but I cannot sell like that. Because if they only select one kind of product because of market demand, how can I sell other types of products? Thus, they have to buy all kinds of the products from me; because they scare that I will not sell to them next time”, collector, male, 53 years old, Phu Xuan commune*

On the other hand, although wholesalers and retailers know exactly who the farmers are and what the selling price of the farmers is and that it is lower than the price of the collector, they cannot directly buy fish and fish products from farmers. As a result, each farmer only provides a small quantity of fish and fish products in each day. Meanwhile, the demand of wholesalers and retailers is higher than farmer's ability to respond to it. Almost none of the wholesalers and retailers have enough capital to lend interest-free capital; but this can be done by

collectors. Furthermore, almost all collectors and farmers have lived in the same village, which has created a good and close emotional relationship between them.

Consequently, farmers cannot sell their products to other buyers without the acceptance of the collector because collectors will stop buying their products or buy at lower prices than other farmers, while the wholesalers or retailers are not always willing to purchase all products that farmers can offer. As a result, there is interdependence between collectors and wholesalers, retailers, and all of them always want to maintain the relationship, which is the foundation to guarantee profits and competitiveness in their business activity.

*“I sell my fish and fish products to collectors in my village; because I easily discuss or bargain the price with them, and collectors are from my village, they will have to respect me”, farmer, male, 57 years old, Quang Cong commune*

## **Discussion**

With a traditional market in aquaculture at Tam Giang Lagoon, the participation of intermediary actors such as collectors, wholesalers, and retailers plays a key role in distributing fish and fish products to consumers, and the success of the supply chain depends on the relationship between them. In doing so, vertical integration mentions the interaction between fish farmers and collectors and between collectors and subsequent buyers. These interactions are necessary to operate the flows of products, information and finance in aquaculture production, as well as establish the relationships between actors of the supply chain.

Various research indicated that satisfaction, trust and commitment determine the relationship between sellers and buyers (Hennig-Thurau et al., 2002; Ulaga & Eggert, 2006; Fritz & Fischer, 2007; Abate-Kassa & Peterson, 2011). These factors are often established through long-term business relationships between actors, and each actor has various strategies to maintain and develop the relationship. But this relationship depends on product types and characteristics, the products and the geography of each region. Poly-culture in Tam Giang Lagoon is an evidence that creates a typical feature in the relationship between collectors, wholesalers, and retailers. In this relationship, collectors are considered sellers, but they have higher power than their buyers when each collector can create a buyer group as a market share of each collector.

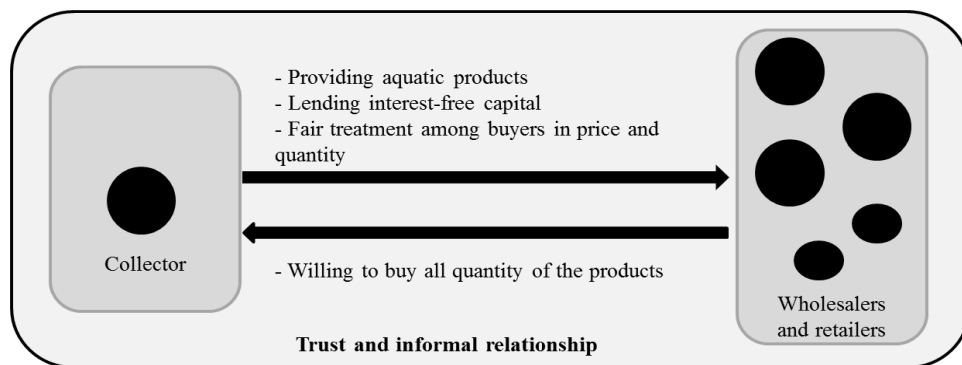
Moreover, buyers cannot decide to buy the type or quantity of fish and fish products with high demand; the decision-making is owned by collectors (sellers). This research finding is different from the relationship between producers and intermediaries mentioned by Ha et al. (2013), Tran et al. (2013), Ho & Burny (2016), or Van Nguyen et al. (2021). Producers are viewed as sellers, but they do not have power and rights in bargaining and decision-making, which totally depend on buyers. From this perspective, producers and collectors are also sellers but have different power and status in their relationship with buyers. Therefore,

developing strong relationships is considered a strategy to promote the power of each actor in the supply chain (Benton & Maloni, 2005). As a result, wholesalers and retailers still maintain this relationship while their influence is lower than collectors.

Otherwise, wholesalers and retailers cannot directly connect to fish farmers because of their disadvantages compared to collectors when fish farmers always have a binding relationship with collectors in emotion, finance and responsibility. These situations come from characteristics of poly-culture while farmers cannot provide high quantities per time (only harvesting 5-10 kg per day) to market, and collectors have to collect from individual farmers (their farmer group) to distribute to the buyers. Moreover, lending interest-free capital is a typical feature of the relationship between actors in the aquaculture supply chain. Collectors are lenders, while fish farmers, wholesalers and retailers are borrowers. Therefore, the binding and interdependence among actors are constantly maintained, which creates a long-term relationship between them, as well as there is a dependence of wholesalers and retailers on collectors. Moreover, suppose wholesalers and retailers try to buy fish and fish products from farmers. In that case, collectors will put pressure on the debt of wholesalers and retailers, or collectors will stop selling the products to them. Besides, wholesalers and retailers do not want to break the relationship and their reputation, affecting their business profits. Thus, the benefits have been determined from the interaction between actors that contributes to creating a long-term relationship (Nyaga et al., 2010); and, although the relationship is affected by various factors (Abate-Kassa & Peterson, 2011; Powers & Reagan, 2007), trust-based interactions are the foundation of the relationship between collectors and their buyer group in Tam Giang Lagoon. Trust is considered an intangible contract between collectors and their buyers. As a result, transactions in aquaculture are informal transactions that mainly depend on price and trust.

This research finding contributes to clarifying five types of linkages and their characteristics that were mentioned by Gereffi et al. (2005) and Ponte & Sturgeon (2014). Five types of linkage include: (i) “simple market linkage” is established by price; (ii) “modular linkage” is established by standards; (iii) “relational linkage” is established by trust and reputation; (iv) “captive linkage” is established by buyer power; and, (v) “hierarchy linkage” is established by vertical integration. “Simple market linkage” and “relational linkage” are two models in the relationship between collectors and their buyers. Notably, these two types of linkage do not stand independence; they exist together in the relationship between intermediary actors in aquaculture activity.

In line with trust, the relationship’s determinants also depend on the actors’ attitudes and behaviour. The research indicated that fair treatment among buyers in the group in proving similar quantity and price, as well as a willingness to lend finance without interest, has established good behaviour of collectors and the satisfaction of buyers. Thus, the attitudes and behaviour of sellers are the key elements to set up a strong relationship between them which was also mentioned by Wang (2009) and Töllner et al. (2011).



**Figure 4.** Interaction pattern between collectors and wholesalers, retailers

Source: Compiled by authors from stakeholder interviews

However, these can also be seen as a binding of buyers in emotional aspect, as well as preventing the competition among buyers while competition can lead to improving poly-culture production and value-added of fish and fish products. The interaction pattern between intermediary actors of the aquaculture supply chain in Tam Giang Lagoon is indicated in Figure 4.

This research explored the relationship between intermediary actors and analysed the nature and determinants of the relationship. However, it has not yet examined the role of local government and relevant actors in the aquaculture supply chain, which can influence the relationship between intermediary actors. This statement opens an orientation for the next research to promote the effectiveness of the aquaculture supply chain in Tam Giang Lagoon.

## Conclusion

Poly-culture is increasingly playing an essential role in the aquaculture of Tam Giang Lagoon. It has opened a suitable solution to replace black tiger shrimp farming and improve the livelihood of farmers. Poly-culture has attracted the participation of various actors in the fish and fish products supply chain. Fish farmers, collectors, wholesalers and retailers are the main actors of the supply chain, undertaking the main marketing channel of fish and fish products. The participation of the actors has established the linkages and relationships between collectors and fish farmers and between collectors and wholesalers, and retailers. The collectors play a crucial role in the distribution of fish and fish products, while all products from the farmers have to cross the collectors before moving to different marketing channels. This situation leads to a monopoly role of collectors, who can control both sides, including sellers and buyers. Notably, the relationship between collectors and wholesalers and retailers is a key factor in ensuring product flow and promoting collectors' status in the supply chain. In addition, there is an interdependence between collectors and their buyer groups.

Due to this, collectors will provide input for their buyer group, which will deal with output for collectors, and the interaction between them will create profits for

both sides. Consequently, a strong relationship between collectors and their buyer group has been established and maintained over time. The feature in this relationship is the group's division, while each collector has one buyer group.

The number of members in each buyer group depends on the response-ability of each collector, which was built through long-term business relationships. The division of the buyer group is not based on geographical boundaries; it belongs to partnerships between sellers and buyers. The partner selection process was based on criteria, namely, the attitude and availability of wholesalers and retailers toward collectors and the ability to respond and prioritise shown by the collectors to their buyer group. Besides, the fair treatment in selling the products and the willingness to lend money without interest to the farmers and buyers' group have created stable status of the collectors in the chain and the dependence of other actors on collectors. The determinants of the relationship are based on trust, reputation and the bond of emotion and finance between actors. This relationship is considered an informal relationship, and tacit agreement is binding between them, which can be more substantial than a contract between them.

## **Acknowledgements**

This work was partially supported by Hue University under the Core Research Program, Grant No. NCM.DHH.2019.02.

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