

Fish Farmer Transaction Costs and Profitability Along Aquaculture Marketing Channels in Cameroon

Mkong, C.J.¹, Nkendah, R.¹, Mvodo, E.S.M.¹, Shu, G.¹ & Molua, E.L.^{1,2}

¹Department of Agricultural Economics and Agribusiness, University of Buea, P.O. BOX 563, Buea, Cameroon

²Centre for Independent Development Research (CIDR), Buea, Cameroon

Corresponding author: mkongcynthiahjeh@gmail.com

Abstract

A fundamental concern of aquaculture development in Cameroon is the efficient marketing of farmed-fish products. Using cross-sectional data from a farm household survey, we employed a multinomial logit model and gross margin analysis to assess how transaction costs affect fish farmers' choices of marketing channel, and its implications for their livelihoods. Farmers' bargaining power, access to extension services and group membership are important drivers of their marketing channel choices. The results equally show that although selling at the farm gate is the most common fish market outlet, the urban market outlet is the most efficient. This study reinforces the importance of institutional economics in understanding how fish markets operate, given that channel choice is principally determined by institutional factors such as group membership, access to extension service and transaction costs. Empowering fish farmers by improving rural infrastructure, enhancing the extension services, and strengthening the capacity of farmer groups would not only support sustainable economic growth and food security, but would also increase the effectiveness of initiatives aimed at eradicating poverty and ensuring food security.

Key words: Cameroon, income, farmed-fish, livelihood

Résumé

Une préoccupation fondamentale du développement de l'aquaculture au Cameroun est la commercialisation efficace des produits de la pêche d'élevage. À l'aide de données transversales provenant d'une enquête auprès des ménages agricoles, nous utilisons un modèle logit multinomial et une analyse de la marge brute pour évaluer l'impact des coûts de transaction sur les choix de canaux de commercialisation des pisciculteurs, ainsi que leurs implications sur leurs moyens de subsistance. Nous constatons que le pouvoir de négociation des agriculteurs, l'accès aux services de vulgarisation et l'appartenance à des groupes sont des facteurs importants dans leurs choix de canaux de commercialisation. Nos résultats montrent également que si la vente au bord de la ferme constitue le débouché le plus courant sur les marchés de poissons, le débouché sur les marchés urbains est le plus efficace. Cette étude renforce l'importance de l'économie institutionnelle pour comprendre le fonctionnement des marchés aux poissons, étant donné que le choix du canal est principalement déterminé par des facteurs institutionnels tels que l'appartenance à un groupe, l'accès aux services de vulgarisation et les coûts de transaction. Autonomiser les pisciculteurs en améliorant les infrastructures rurales, en renforçant les services de vulgarisation et en renforçant les capacités des groupes d'agriculteurs soutiendrait non seulement une croissance économique durable et la sécurité alimentaire, mais augmenterait également l'efficacité des initiatives visant à éradiquer la pauvreté et à assurer la sécurité alimentaire.

Mots-clés: Cameroun, moyens de subsistance, pisciculture, revenu

Introduction

Fish farming in Cameroon and in most parts of sub-Saharan Africa is presumed to mobilize significant amounts of resources, provide employment and help to underpin the livelihoods of thousands of rural people (Be'Ne' *et al.*, 2003; Bomdzele *et al.*, 2020). A fundamental concern about its development, however, is the efficient marketing of farmed-fish products. While access to efficient fish markets is essential in reducing hunger and economic hardship for small-scale fish farmers (who make the majority of fish farmers in Cameroon), the majority of them continue to experience numerous constraints in accessing profitable markets. The most significant of these constraints are their remote locations, high transportation costs, inadequate institutional support and assistance, and the lack of organization and coordination that could offer them the requisite bargaining power (Lazard *et al.*, 2014; Maïworé *et al.*, 2021). As a result, farmed fish markets have remained traditional and less competitive - marked by large inconsistencies in fish supply, and the lack of an organized distribution and marketing system (Brummett *et al.*, 2010). In the absence of efficient distribution and marketing networks, much of the cost of marketing is borne by the farmer which negatively affects his profit and income. Understanding how these costs influence a fish farmer's choice of market and the resultant earnings is a good starting point for improving their livelihoods and is therefore considered crucial for policy development in Cameroon.

This research contributes to current efforts in the development of Cameroon's aquaculture markets by assessing how transaction costs incurred by fish farmers affect the choice of marketing channel, and its implications for their livelihoods. Specifically, the study aimed to; 1) characterize farmed-fish marketing channels in Cameroon, 2) examine the effect of transaction cost on fish farmer's choice of marketing channel and 3) compare profit along different farmed-fish marketing channels.

Methodology

Using cross-sectional data from a farm household survey in Cameroon's three main fish farming regions (the West, Centre and Littoral), the study employs a multinomial logit model (MNL) and gross margin analyses to assess how transaction costs affect fish farmers' choices of marketing channel, and its implications for their livelihoods. Overall, the research draws on the Transaction Cost Theory by Williamson (Williamson, 1987), and the Random Utility Theory by Mcfadden (Mcfadden, 1986). It makes use of two key outcomes; choice of marketing channel and profit.

The MNL model for the study is specified as:

$$P_i = TC_i \beta_k + Z_i \theta_k + e_{ik} \quad (1)$$

Where P_i is a vector of the marketing choices ($i = 1$ for sales at farm gate, $i = 2$ for sales to neighboring food services provider, $i = 3$ for sales to urban market) of j^{th} farmer, TC_i is a vector of transaction cost characteristics, Z_i is the vector for socio-economic characteristics of farmers, β_k and θ_k are parameters to be estimated, and e_{ik} is the error term. Transaction cost variables used in this study are transport cost, access to market information, bargaining power, transport ownership and distance to the market. Institutional variables are membership with farming or marketing organizations, access to credit, access to training and access to extension service. Socioeconomic variables

are age, sex, level of education and years of experience.

Results and Discussion

Characterization of Farmed-fish Marketing Channels. In most cases, fish changes hands immediately or shortly after harvest and moves via different market participants at different phases until it reaches the ultimate consumer. Figure 1 shows the three farmed-fish marketing channels analyzed in this study.

In the first channel, farmers sell fish at farm gate, mostly to local retailers. Farmers who chose this channel know at least one retailer in their community. Most retailing actors sell fresh fish onward to final consumers in surrounding communities in the open market. The main disadvantage for farmers is that they rely on their buyers for marketing information and have limited bargaining power. Most retailers transport fish by road using vehicles or motorcycles or by human carriage. Due to bad state of rural roads and inadequate rural infrastructure, transporting fish from ponds is challenging for most buyers and this reduces on the farm gate price.

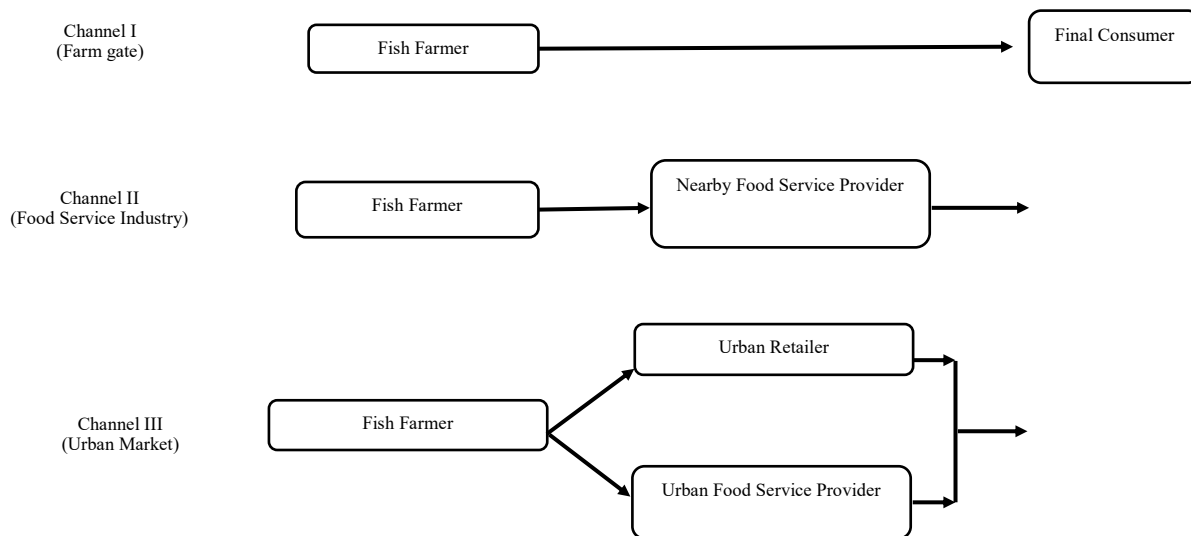


Figure 1. Farmed-fish Marketing Channels under Study

As a result, some farmers in the study area tend to deliver their fish to the second marketing channel: to food services provider (mostly restaurants and hotels) in the same or neighboring communities. Farmers who sell through this channel sell greater volumes of fish as the buyers here are characterized by frequent and constant demand. Fish is delivered upon request from restaurant/hotel managers, usually on a weekly basis in plastic buckets by motorbikes or cars. This channel option is common in the Centre region since the “ndomba” (a traditional spicy fish papillote) is a choice dish in most restaurants and hotels this region.

The third marketing channel examined in the study area is sales in urban markets (to retailers or food services providers). This option is more common in the West region where most farmers deliver fish consignments to buyers in distant urban towns like Yaoundé, Douala and Mbalmayo. To succeed in this marketing channel, farmers generally must rely on their urban networks. Smallholder farmers face high transaction costs when selling a small volume of fish, so they end up selling their produce at a loss.

Overall, the Nile tilapia, catfish and common carp are the most farmed fish species in the study area, with catfish and Nile Tilapia topping the list. Other species that are typical to the Centre and littoral regions are the “kanga” and “*poisson vipère*”. Fish is mostly sold fresh, with sales at farm gate being predominant market channel choice.

Most farmers depend on a specific marketing channel due to ties and established relationships. Currently, no farmed-fish is exported from Cameroon and strong consumer preferences for fresh fish limit processing to only about 3%.

Average price/kg of farmed-fish varies across the three regions. In the west region, it is 1600 FCFA (USD 2.5), in Littoral, it is 2000 (USD 3.1) and in the Centre it is 2200 FCFA (USD 3.4). Peak sales periods in all three fall between November and December regions, during holidays and festive periods. Payments are mostly done in cash immediately after sales for all channels across all regions. Unsold fish is mostly frozen, sold at reduced prices to neighbors or smoked for home consumption. Sales promotion and advertising is hardly done and where this happens, only social media platforms are used. Across three regions, grading is only done by specie categorization.

Determinants of Marketing Channel Choice. Table 1 presents the empirical results of the multinomial logistic analysis of farmers' marketing channel choice through the three farmed fish marketing channels. To run the model, we chose the farm gate as the base category to compare it with the two other marketing channels. The result indicated that bargaining power, access to extension service and group membership are among the significant variables affecting channel choice. We further show that farmers who have access to extension service are less likely to sell through the food service and urban market. It is possible that the information obtained from these agents promoted sales at the farm gate as the best channel option.

Table 1. Factors influencing marketing channel choice

Marketing Channel Choice	Coef.	Std. Err.	Z	P>z	[95% Conf. Interval]
0 (base outcome)					
1					
Transport cost	-.0011436	.0009034	-1.27	0.206	-0.00291 0.000627
Access to market information	3.569852 2.189325		1.63	0.103	-0.72115 7.860849
Bargaining power	6.095749**	2.61585	2.33	0.020	0.968778 11.22272
Transport ownership	3.43877 2.195579		1.57	0.117	-0.86449 7.742026
Access to extension services	-5.117614***	1.923576	-2.66	0.008	-8.88775 -1.34748
Group membership	-3.506428	2.508386	-1.4	0.162	-8.42277 1.409918
Distance to market	-.1782342	.1329715	-1.34	0.180	-0.43885 0.082385
_cons	-.4421871	.9970429	-0.44	0.657	-2.39636 1.511981
2					
Transport Cost	-.0005962	.0008009	-0.74	0.457	-0.00217 0.000974
Access to market information	2.449542 1.776571		1.38	0.168	-1.03247 5.931558
Bargaining power	6.189022**	2.588026	2.39	0.017	1.116584 11.26146
Transport ownership	2.746703 2.009588		1.37	0.172	-1.19202 6.685424
Access to extension services	-4.845694**	1.959906	-2.47	0.013	-8.68704 -1.00435
Group membership	-5.540947**	2.659388	-2.08	0.037	-10.7533 -0.32864
Distance to market	-.0077926	.0376574	-0.21	0.836	-0.0816 0.066015
_cons	.0887456. 8876366		0.1	0.920	-1.65099 1.828481

***, **, * = significant at 1%, 5% and 10% level respectively, base outcome = sales at farm gate, Prob > chi2 = 0.0307, Pseudo R²=0.363

When compared to the farm gate outlet, farmers with bargaining power have an increased probability of selling through the food service and urban market outlets. Despite being price takers and often required to travel, farmers who sold their produce to food service providers were presumably attracted by market reliability. Conversely, farmers who choose the urban market outlet are most likely attracted by the comparatively higher producer prices in urban centers.

Another important observation from the results is that producers who are affiliated to fish producer and/or marketing groups are less likely to sell to urban market outlets. Although considered new institutions in many rural areas of developing and transition countries, the importance of farmer associations and cooperatives for farmers' development has been stressed by most institutional economics scholars. It could be inferred that groups provide a ready market which reduces the necessity to sell to urban centers- a task often associated with high transaction costs. For this reason, the farmers opt to sell to marketing group at farm gate to incur zero or minimal transaction costs because of economies of scale.

Profit Along Farmed Fish Marketing Channels. Table 2 shows that farmers who sell fish at farm gate earn the highest gross margin of 14,436,905 FCFA (USD 23,099.048). These high gross margins could be attributed to the fact that farmers who sell at the farm gate do not incur transport costs to the market. Annual total variable cost of 4,767,149 FCFA (USD 7,627.44) is equally the highest when compared to the other channels.

Table 2. Profit along armed fish marketing channels

	Marketing Channel Choice		
	Farm Gate	Food services industry	Urban Market
Output (kg)	9403.81	2637.5	7225.94
Total Variable Cost (FCFA)	4767149	1273348	2511309
Sales Price/ Kg (FCFA)	2050	2100	1900
Total Revenue (FCFA)	19204056	5538750	13632938
Gross Margin (FCFA)	14436907	4265402.10	11121626
Benefit Cost Ratio (BCR)	3.03	3.35	4.43

Source: Authors' calculations.

Judging from the computed values in Table 3, selling to the urban market has the highest efficiency (4.43) while selling at farm gate has the lowest efficiency (3.03). This means that urban market channel is more effective than the two other options. Although attributed with the lowest sales price/kg, the higher efficiency observed along this channel may be because relatively greater volumes of farmed-fish are traded, allowing for the benefits of economies of scale along this channel.

Conclusion and Policy Implications

Three key conclusions from this study are pertinent to policy. First, that farmers' bargaining power, access to extension services and group membership are important drivers of their marketing channel choices. This suggest that efforts are needed to increase fish farmers' bargaining power. In this regard, we recommend strengthening the capacity of farmers' groups/associations. This can act as platforms for information exchange and trust building between farmers and buyers, especially in areas where infrastructure is weak.

Working collectively allows farmers in production and marketing groupings to benefit from economies of scale and can reduce transaction costs faced by small-scale fish farmers. The study also reinforces the importance of institutional economics in understanding how agricultural product markets operate in developing countries, given that channel choice is principally determined by institutional factors such as group membership, access to extension service and transaction costs.

This research establishes, secondly, that although selling at the farm gate is the most common fish market outlet, the urban market outlet is the most efficient. This study challenges the conventional view that low return on production is as a result of low prices for agricultural produce brought on by an excess of supply at the farm gate. Instead, it argues that low return on production is caused by farmers' failure, fear, or inability to move outside the farm gate into other markets. Overall, empowering fish farmers by improving rural infrastructure, enhancing the extension services, and strengthening the capacity of farmer groups would not only support sustainable economic growth and food security, but would also increase the effectiveness of initiatives aimed at eradicating poverty and ensuring food security.

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