

## TOPIC AREA

### MARKETING, ECONOMIC RISK ASSESSMENT, AND TRADE



#### ENHANCING THE FUNCTIONALITY AND APPLICABILITY OF FISH MARKET INFORMATION SYSTEM (FMIS) TO MARINE ARTISANAL FISHERIES IN GHANA

Marketing, Economic Risk Assessment, and Trade/Activity/16MER01PU

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#### ABSTRACT

This investigation expanded the functionality of the Fish Market Information System (FMIS) funded during the AquaFish Innovation Lab 2013-2015 funding cycle that developed a pilot cell-phone based FMIS with a focus on farmed tilapia and catfish in Ghana. The enhancement included prices of marine species at selected landing sites, and access of the system to consumers. The species included are: (1) Red fish (*Dentex angolensis*) locally referred to as “Wiriwiri.” (2) *Caranx* species (locally called “kpanla”), (3) Mackerel (*Scomber sp*), wrongly but locally referred to as salmon), (4) Tuna (*Tunus tunus*), and (5) *Sardinella* species (also called Herring) – the two common species are *Sardinella aurita* and *sardinella eba*. By providing fishermen easy access to price information, and fish mongers with information on where to buy fish further empowers these value chain agents to operate efficiently. Also, allowing consumers of fish access to market prices further closes the gap between what farmers / fishermen are making and what consumers are paying. The enhanced FMIS thus created an enabling environment where stakeholders in the fish value chain are better informed. The improved system helps fish farmers/fishers, fish processors and traders to more efficiently support urban markets with seafood products. In addition, the improved FMIS has applicability to the marine artisanal fisheries subsector from fish trade.

The enhanced FMIS delivers information in 5 languages – English, Twi, Ga, Ewe and Fante. For SMS/access code, SMS/text to the FMIS by dialing \*399\*23# on a local Ghana phone number. The FMIS has an online database that can be accessed with registration at <https://mis.mergdata.com>. Once registered, access to the fish information is at <https://core.mergdata.com>.

Two training workshops were organized for artisanal fishermen and fish mongers on the use of the technology. The first workshop was held in Elmina in the Central region on May 16, 2017 in the Conference Hall of the District Assembly, Komenda-Edina-Eguafo Abrem (KEEA), off the main Cape Coast-Takoradi road. There were a total of 55 participants, which included 38 males and 17 females. Participants included fishermen, canoe operators, community leaders, fish mongers, municipal officials, and scientists from the University of Cape Coast. The second workshop was held at Bortianor in the Greater Accra region on May 23, 2017. This was also a one day workshop, and there were a total of 48 participants, which included 28 males and 20 females.

## INTRODUCTION

An analysis of tilapia value chain in Ghana under a previous AquaFish CRSP project revealed challenges in the flow of information along the value chain, especially information relating to tilapia supply, demand and prices. For small-scale fish producers and artisanal fishermen, readily available market information on prices and demand for fish at different fish markets will help inform production and harvesting decisions. Minimizing the information gaps along the fish value chain will greatly improve efficiencies in fish marketing and the value chain as a whole. There was a need therefore to develop a marketing information system for tilapia in Ghana. Consequently, the AquaFish Innovation Lab funded an investigation during the 2013-2015 funding cycle that developed a cell-phone based Fish Market Information System (FMIS) with a focus on tilapia and catfish in Ghana. Tilapia and catfish are the dominant farmed fish species that are also caught in inland waters. The FMIS is web-based and provides market information on the two species on-line as well as via voice and SMS/text messaging to users. It has a database of farm-gate and market prices of the two species in selected locations in Ghana assembled by fisheries officers and selected agents.

There are two types of subscribers to the system – registered users and ad-hoc users. The system can send out (push) farm-gate and market price information to only the registered users. However, to request (pull) information on tilapia prices from the system, both registered users and ad-hoc users can access the system by dialing or SMS/text messaging to a 10-digit phone number or a 4-digit short code. The voice feature of the system when a user requests for information includes messages in English and three native languages – Twi, Ga and Ewe.

This investigation expanded the functionality of the current FMIS with more value chain services to include prices of marine species at selected landing sites, add another local language (Fante) and access of the system to consumers. The artisanal fishery plays an important role to coastal communities by providing employment, revenue, and a resource for food. It contributes to the national economy in terms of food security, employment, poverty reduction, GDP and foreign exchange earnings. However, the artisanal fisheries are confronted with challenges, which include high post-harvest losses and handling costs as well as low economic returns and low value addition (Aheto et al., 2012; Mills et al., 2012; Mensah & Antwi, 2002). Artisanal fishers depend on inland and marine resources and their contribution to the national food system required appropriate investments in developing the seafood value chain to reduce the waste, enhance efficiency, and strengthen value addition. Therefore, the applicability of the existing FMIS was broadened to include the marine artisanal fisheries subsector, which goes a long way to improving the welfare of artisanal fishermen through a reduction in transaction costs and improvement in the benefits from fish trade.

Allowing consumers of fish access to market prices via the FMIS further closes the gap between what farmers and fishermen are making and what consumers are paying. The FMIS thus creates an enabling environment where stakeholders in the fish value chain are better informed. The improved system helps fish farmers/fishers, fish processors and traders to more efficiently support urban markets with seafood products.

## OBJECTIVES

1. Broaden the applicability of existing FMIS to include the marine artisanal fisheries subsector.
2. Expand the functionality of the FMIS by customizing market price collection procedures to enable accurate and real time data collection.
3. Train marine artisanal fishermen on the use of the FMIS.

## METHOD

### Objectives:

1. Broaden the applicability of existing FMIS to include the marine artisanal fisheries subsector.
2. Expand the functionality of the FMIS by customizing market price collection procedure to enable accurate and real time data collection.

Farmerline provided additional programming that broadened the applicability which allows marine artisanal fishermen to obtain market prices for 5 major marine species landed and found in major markets via voice and SMS/text messaging. The species are: (1) Red fish (*Dentex angolensis*) locally referred to as “Wiriwiri.” (2) *Caranx* species (locally called “kpanla”), (3) Mackerel (*Scomber sp*) (wrongly but locally referred to as salmon), (4) Tuna (*Tunus tunus*), and (5) *Sardinella* species (also called Herring) – the two common species are *Sardinella aurita* and *sardinella eba*.

Artisanal fishermen are able registered with the system and requested market information through a short code. Fisheries officers and agents were recruited to visit selected landing sites along the coastal regions of Ghana as well as major retail markets to obtain prices. Discussions were held with the Ministry of Fisheries and Aquaculture Development (MFAD) on providing assistance through the fisheries officers. FarmerLine’s field officers assisted with the collection of market prices. A weighted average weekly price were calculated and made available to users.

The improved FMIS enhanced the quality and timeliness of data collected through customization of the MERGDATA platform. The data collection process was complemented with crowd-sourced information from consumers selected randomly to provide vital feedback on the validity of the prices being received. New partnerships were developed with the marine sector, which expanded the scope of engagement with information assembled in the FMIS database. The enhanced FMIS provides more accurate and timely market information. The languages of delivery are English, Twi, Ga, Ewe and Fante. The messages are sent periodically by 8 agents in Weija, Apam and Elmina from landing beaches in the Central region using the USSD code assigned to the FMIS, \*399\*23\*1#.

### Objective:

3. Train marine artisanal fishermen on the use of the FMIS.

Two training workshops were organized for artisanal fishermen and fish mongers on the use of the technology to access information to facilitate their business transactions relating to fish availability, sales and sales points, and prevailing prices. The workshops took place in Elmina in the Central region, and Bortianor in the Greater Accra region, both vibrant and historic fishing towns along the coast. The training activities were conducted in collaboration with the MFAD, chief fishermen, and elders in the selected fishing communities. Regional and District fisheries officers participated in the training of the artisanal fishermen.

## RESULTS

### Objectives

1. Broaden the applicability of existing FMIS to include the marine artisanal fisheries subsector.
2. Expand the functionality of the FMIS by customizing market price collection procedure to enable accurate and real time data collection.

A summary of results from Farmerline is presented in Figure 1. FarmerLine delivered the first fish market information using the FMIS to 23 fishermen and fish traders who had registered to receive the weekly prices. The traders were all women. Three hundred and sixty-seven (367) fish price messages were sent; 308 via SMS and 59 via voice calls. All subscribers successfully received the messages.

Forty-two (42) out of the 59 calls were answered and listened to in full by the farmers, thus the message completion rate was 100%.

Farmerline successfully expanded the FMIS platform for some marine fish species as a way of enhancing efficiency of market information through mobile messaging. This system has provided a direct relationship between the fish product and fishermen, and bridged the information gap for tilapia, catfish from the previous AquaFish FMIS and marine species (Redfish – *Dentex Angolases*, Herrings, *Sardinella spp*, Tuna, *Carans spp* and Mackerel fish) for fish farmers and fishermen.

At the completion of the project, 12 fishermen of the total who had registered and were receiving messages were picked at random, and their views sampled on various aspects of the prices they received. Approximately 92% were happy with the clarity of the messages on prices.

The FMIS has a database of fish quantities, prices and other market information and a platform for sharing market information. For online access to the database of fish prices, registration is required. Visit: <https://mis.mergdata.com>. Once registered, access to the fish information is at <https://core.mergdata.com>. For SMS/access code SMS or text to the FMIS by dialing \*399\*23# on a local Ghana phone number.

**Objective:**

3. Train marine artisanal fishermen on the use of the FMIS.

The workshop in Elmina in the Central region was held on May 16, 2017 in the Conference Hall of the District Assembly, Komenda-Edina-Eguafo Abrem (KEEA), off the main Cape Coast-Takoradi road. There were a total of 55 participants, which included 38 males and 17 females. Participants included fishermen, canoe operators, community leaders, fish mongers, municipal officials, and scientists from the University of Cape Coast (UCC). The scientists, professors, and students from UCC, and the Regional Fisheries Officer who attended the workshop found the initiative exciting and very relevant to the fishermen they worked closely with. In Ghana, women are not allowed to go fishing but most often, they exclusively handle the fish after landing by the male fishermen.

The meeting began with an outline of what USAID AquaFish Innovation Lab has accomplished over the years in Ghana with fish farming and the purpose of the FMIS technology. Mr. Amos Wussah from FarmerLine went through in detail the functionality of the FMIS and the importance to participants. Participants received various short codes from FarmerLine to access the database to find out fish type, location, prices, language in which they want to communicate, and check for relevant market information using their own cell phones, which everyone had. There were very lively discussions on the FMIS and some of the issues that arose included:

1. Participants provided indigenous names for 5 common marine species but the names appeared to vary by locations along the coast. Other common species were suggested to be added to the list to populate the FMIS platform.
2. Suggestions were also made to extend the FMIS training to nearby coastal fishing communities such as Komenda, which was said to host many more artisanal fishers because it is a conglomerate of 4 fishing communities.
3. Participants were excited about the FMIS and grateful for the initiative by AquaFish Innovation Lab and asked for a continuous refresher training from time to time.

The second workshop was held at Bortianor in the Greater Accra region on May 23, 2017. This was also a one-day workshop. There was a total of 48 participants, which included 28 males and 20 females. Similar issues encountered in the Elmina workshop were also brought up during the

Bortianor workshop. The participants provided the indigenous names to the common marine species and would like to see other common fish species added to the database.

#### **CONCLUSIONS**

Overall, the FMIS has been a success for a pilot program. Some of the challenges encountered are the absence of clear standards for fish products and pricing, buy-in from all stakeholders, which is important for long term sustainability of the FMIS on a pay-per-use basis, and publicity of the tool. There are diverse clientele and information needs of different stakeholders (e.g., input suppliers, fish farmers, fish traders, policy makers, consumers, etc), which suggests further scalability – expansion to attract more users moving forward. Long-term sustainability of the FMIS requires a pay-per-use system and arrangements on revenue sharing with mobile phone service providers. FarmerLine has added FMIS as an integral part of their portfolio of services to increase the benefits to users.

#### **LITERATURE CITED**

- Aheto, D.W., Asare, N.K., Quaynor, B., Tenkorang, E.Y., Asare, C., & Okyere, I. (2012). Profitability of Small-Scale Fisheries in Elmina, Ghana. *Sustainability*, 4: 2785-2794.
- Mensah, J.V., & Antwi, B.K. (2002). Problems of Artisanal Marine Fishermen in Ghana: The Way Ahead. *Singapore Journal of Tropical Geography*, 23(2); 217-235.
- Mills, D.J., Mutimukuru-Maravanyika, T., Ameyaw, G., & Asare, C. (2012). Ghana Coastal Fisheries Governance Dialogue: Presentations, discussions and outcomes from a stakeholder forum on issues for reforming governance of Ghana's coastal fisheries. WorldFish Center, USAID Hen Mpoano Initiative, Ghana. 57pp. Available at: [http://www.worldfishcenter.org/resource\\_centre/WF\\_3450.pdf](http://www.worldfishcenter.org/resource_centre/WF_3450.pdf)

TABLES AND FIGURES



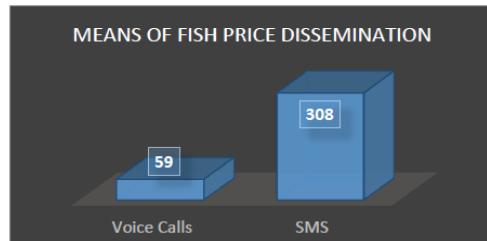
**FISH MARKET INFORMATION SYSTEMS**

USAID Aquafish Ghana Innovation Lab, KNUST

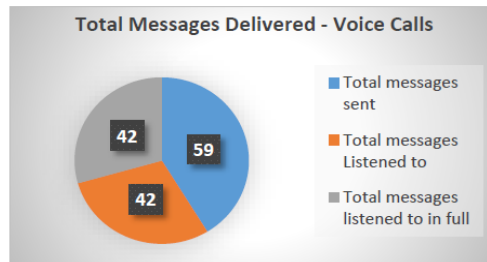
Farmerline has developed and implemented an extraordinarily successful Market Information System platform for some fresh water and Marine fishes in improving the profits of farmers by enhancing the efficiency of input use and increasing the size of the average fish by delivering concrete suggestions and market information through mobile messaging.

By providing a direct relationship between product and farmers, the Aquafish MIS project has closed the information gap for farmers of tilapia, catfish and marine fishes.

Content delivery started on May 02, 2016 to twenty-three (23) farmers and women who trade in fish, and has registered to receive the weekly prices. A total of **367 fish price messages delivered in SMS (308) and Voice Calls (59)**. All the 308 SMS were received by the subscribers.



Out of the 59 fish prices that were sent through voice calls, a total of forty-two (42) calls were picked up (answered) and listened to by the farmers. **The call pick-up rate on the first ring averaged 71.2%.** The farmers who picked up the calls listened to the messages in full (42), thus, **the message completion rate was 100.00%.**



www.farmerline.co

**Project Duration:**

2nd February, 2017 – 30th May, 2017

**Implementing Partners:**

USAID Aquafish Ghana Innovation Lab

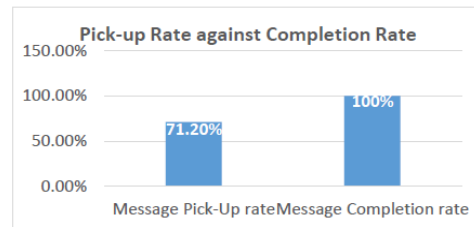
**Targeted Fish Species (7):**

Fresh water: Tilapia & Catfish

Marine: Red fish - Dentex Angolases, Herrings (Amane) - Sadinalla species, Tuna, Carans (Kpala) & Mackerel (Salmon)

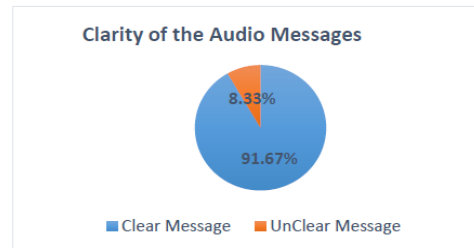
**Languages for Content Delivery:**

Twi, English, Ga, Ewe, Fante



Eight (8) agents from Weija, Apam and Elimna periodically send fish prices from the landing beaches using the USSD code assigned to the FMIS, \*399\* 23\*1#.

At the end of the project, twelve (12) farmers (52% of the farmers who registered and are receiving fish prices were picked at random to sample their view on various aspect of the prices they received. According to the responses, **91.67% were happy with the clarity of the messages with prices.**



MIS to USAID AQUAFISH INNOVATION LAB FACTSHEET

Figure 1. Farmerline summary of results.