



The “quiet revolution” in the aquaculture value chain in Bangladesh

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ABSTRACT

The study has produced a single, powerful finding: the fish value chain in Bangladesh is growing and transforming very rapidly, in all segments. (1) The quiet revolution in the fish value chain is a domestic market revolution: 94% of aquaculture production is destined for domestic consumption. (2) The farmed fish market grew by a factor of 25 times in three decades to nearly 2 million tons today. At most 10% of farmed fish are home-consumed, the rest are marketed. 42% of marketed farmed fish is consumed in urban areas and that share is growing fast. (3) There has been a tripling of volumes and actors in all the segments of the value chain over the past decade. (4) There has been rapid capital deepening in the form of investments by hundreds of thousands of actors in the fish value chain; apparent in a great jump in feed use, investment in equipment and pond construction, and investments in mills, hatcheries and vehicles. These investments have been made by, and provided opportunities for, a multitude of smallholder farmers and small and medium enterprises throughout the chain. (5) There has been diversification and specialization beyond carps into production of commercial species such as tilapia and pangasius catfish, which have raised yields and helped to move the fisheries sector along the “product cycle.” (6) So far the quiet revolution is driven by increase in demand, improvement in infrastructure, and investments by small-scale actors apart from large feed mills. Very little change is due to imposition of standards and contracts, or NGO or government action (except initial government support at the earliest stages in the 1980s). The most important policy has been infrastructure investment, good business environment, and *laissez faire* policy in terms of crop choice of farmers.

Statement of relevance: This study focuses on the transformation of aquaculture in Bangladesh, a dynamic sector that has been driven by investments of hundreds of thousands of mainly small actors in the fish value chain. Investments that have bolstered the diversification beyond the production of carps, into production of new commercial species, raising yields and then reducing the price of consumed fish over time.

1. Introduction

There are two strands in the socioeconomic literature on aquaculture. The first, which we call “micro socioeconomics”, is work centered on the role of farm households as fish producers, and the impacts of aquaculture on rural communities where aquaculture takes place. This strand can be divided into three themes: (1) farm technology diffusion and efficiency (e.g. Dey et al., 2005; Rauniyar, 1998); (2) farm interactions with the environment (e.g. Islam, 2014; Primavera, 2006); (3) livelihoods. The latter can be divided further into studies linking aquaculture to poverty reduction and studies of impacts of aquaculture on communities. The ‘poverty’ literature has focused on the role of small-scale and subsistence forms of aquaculture for household food security and incomes (e.g. Bondad-Reantaso and Subasinghe, 2013).

The ‘community’ literature adopts a more critical approach to the distribution of benefits and losses from aquaculture among farm and non-farm households (e.g. Paprocki and Cons, 2014; Toufique and Gregory, 2008).

In focusing on the farm and its immediate environs, studies in the first strand tend to take the aquaculture value chains as given, paying little attention to chain transformation (change in structure and conduct) over time. The first strand is often based on surveys with small or unrepresentative samples, or on community case studies, and is ‘micro’ in scope, largely neglecting the ‘meso’ structural context in which farms and farm households are embedded.

The second strand, which we call “value chains,” has been dominated by work on international fish and seafood value chains, particularly those to export markets in developed countries (e.g. Goss et al.,

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2000), rather than domestic market value chains linking rural to urban areas. A corollary of this focus is a near exclusive attention to value chains supplying the few species (principally shrimp and salmon) demanded by developed country markets (Belton and Bush, 2014).

The second strand also tends to focus on value chain governance and institutions (e.g. contracts, standards, and certification schemes). For example, it includes studies on the role of third party standards and certification in governing value chains serving developed country export markets (Hatanaka et al., 2005). This has highlighted challenges of compliance with such standards for small farmers (e.g. Marschke and Wilkings, 2014).

By contrast the second strand pays little attention to technological change among actors within chain segments. Moreover, even though the strand takes in a view not just of the aquaculture farm but also of midstream and downstream segments of the value chains, it tends to do so with small, non-representative sample surveys or case studies or key informant work (e.g. Macfadyen et al., 2012; Veliu et al., 2009). As a result, there has been little detailed quantitative work on the dynamics of transformation of the structure (such as concentration over or within segments) and conduct (such as technologies used by the actors) of value chains overall and per segment.

The above synopsis of the literature leads to our making two critiques which we focus on the Asian context.

On the one hand, contrary to the export focus of the existing aquaculture value chain literature, the great majority of fish farmed in Asia is sold and consumed in Asian domestic markets. For example, in Bangladesh, 94% of aquaculture production is destined for domestic consumption (calculated from FAO, 2016). Furthermore, 42% of this fish is consumed in urban areas,¹ with urban dwellers having an average consumption per capita of 21.8 kg per capita, 31% greater than that of rural consumers (Toufique and Belton, 2014). Rapid increases in urban consumption of farmed fish are consistent with changes taking place in food systems throughout Asia, as consumption has diversified from basic staples into higher value non-staple foods with rising real incomes. These developments are particularly significant for Bangladesh, where fish is the most important food after rice in terms of share of the food budget in value terms (Reardon et al., 2014).

On the other hand, both the ‘micro socioeconomics’ and ‘value chain’ literatures tend to have a static perspective. This approach is at odds with several trends.

First, aquaculture is growing fast in Asia. Over 1984 to 2014, Bangladesh's farmed fish jumped from 124,000 tons to 1.96 million ton, increasing by 1580%. As a result, aquaculture now accounts for 55% Bangladesh's fish supply, up from just 16% three decades ago (DOF, 1994, 1997, 2006, 2015).

Second, there has been a rapid shift from home-consumption (from one's own pond) to purchasing farmed fish from the market: consumers of farmed fish got 92% of it via purchase from the market in 2010, versus only 79% in 2000 (data extracted from BBS, 2011). Let us surmise that the share of purchases in farmed fish consumption grew by 10 percentage points in total consumption each decade, extrapolating from that change in the 2000s. That would mean that the purchase share was about 60% in the 1980s. Applying that assumption to the volume of farmed fish output in 1984 means there were roughly 75,000 tons in 1984. Applying the 92% to the output volume of 2 million tons in 2014 means there were roughly 1.84 million tons in 2010. That means the farmed fish market grew by a factor of 25 times in three decades. Note from above that in 2014 there were 1.96 million tons of farmed fish in 2014. Hence 1.84/1.96 of the farmed fish output is marketed, or 94% is marketed, and only 6% is home consumed. (Note that our fish farm survey results presented in this paper show a sales share in total aquaculture output of 92%, so the macro and micro data track closely).

This implies that ‘commercial aquaculture’ (which we define simply as fish farming output that is sold, with no specification of the size of the farm) has moved to be far more important than subsistence fish farming. Yet subsistence aquaculture is the traditional focus of much of the literature on aquaculture in Asia.

Third, there has been rapid diversification of farmed fish composition. This involved a shift from traditional carps to introduced species (tilapia and pangasius) that lend themselves better than carp to intensification through higher stocking densities combined with use of manufactured feeds. This is an example of what economics terms the ‘product cycle’, where in the evolution of a sector one observes a shift from traditional niche products to commoditized bulk products for a larger market, and finally to differentiated products either as varieties of the commoditized products or new niche products introduced. Typically there is also technological change accompanying the increase in scale and, finally, in the creation or adaption for introduction of differentiated products. The product cycle in aquaculture has not been studied in Asia as an evolution in the market, although there has been extensive study of the technical issues in the farming of tilapia and pangasius.

Fourth, far less studied is a rapid transformation of the structure of domestic aquaculture value chains in Asia, shown by our survey results for Bangladesh. As the sector expanded, rapid commercialization and diversification of species occurred, and there was a proliferation of value chain actors, and in some cases concentration among them. This has been occurring both upstream from the farm, in feed milling and hatcheries, and downstream from the farm, in transport and wholesale.

The great majority of these changes have been driven by small and medium enterprises. These changes can be categorized as ‘immanent development’ (Belton and Little, 2011), that is, development unplanned and undirected by government or NGOs, arising mainly from private household, firm, and community choices, driven by changes in demand, technology, communications, and infrastructure, and abetted by propitious policies. This can be contrasted with ‘interventionist development’ (NGO projects, centralized planning by governments). The ‘Quiet Revolution’ in agrifood systems in Asia, observed by Reardon et al. (2012) in rice and potatoes in Bangladesh, India, and China, is symptomatic of these broad processes of immanent development led by small farms and small off-farm enterprises. We argue that aquaculture in Bangladesh has experienced as similar quiet revolution.

Despite the rapid growth and restructuring of the upstream segments of inputs and services to aquaculture, and the downstream segments moving farmed fish to wholesale markets and retailers and consumers, these off-farm components have been little studied in Bangladesh – and certainly not yet using representative sample surveys of the actors in the these chains. This omission is important because these structural changes in the supply chain have facilitated on-farm growth and technology change and commercialization.

In this paper we address the above four trends as a confluence, with an emphasis on the latter one, structure and conduct change in the aquaculture value chain in Bangladesh, with a focus on fish. We address two questions and thus important gaps in knowledge about value chain transformation. First, how is the domestic fish value chain restructuring? Second, how is the conduct of the segments changing in terms of product composition and technology? It is beyond the scope of this paper to explore impacts on farmers or consumers of these value chain changes; that is an agenda for further research.

The paper proceeds as follows. First, we describe the survey method. Second, we outline the characteristics of the main geographical ‘zones’ or clusters included in the study, where high concentrations of farms and other off-farm value chain actors occur. Third, we address the structure and conduct changes in the various segments of the aquaculture value chains in these zones serving rural and urban markets. Fourth, we conclude with policy implications.

¹ Compare that with their being 34% of Bangladeshi population in urban areas in 2015 <http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS>.

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