



Characterization of the aquafeed sub-sector in Kyrgyz Republic: A value chain analysis

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Abstract

This is the first post-USSR country case study which assesses the value chain performance of the aquafeed sub-sector including mapping the aquafeed value chain, performance of different actors in terms of value addition and profitability and their possible constraints, and feed regulations, institutions and policies of aquafeed sub-sector in Kyrgyz Republic. Qualitative and quantitative data were collected, for each link in the value chain from different regions of the country. Qualitative and quantitative data analysis result shows that the Kyrgyz aquafeed sub-sector is still in its infancy since there is very little domestic aquafeed production. Its value chain is very simple, including only few actors comprising feed input suppliers, aquafeed producers, aquafeed traders and fish farmers, and all of them are doing their business profitably by performing some of the value addition activities including buying and selling, transportation, small-scale packaging, grinding, storage, etc. Most trout farmers (80–85%) use commercially manufactured pellet feeds typically imported from Europe and Russian Federation. In contrast, most carp farmers (90–95%) use farm-made feed, prepared from domestically produced feed ingredients, the exceptions being fishmeal, vitamins and premixes, which are imported from Kazakhstan and Russian Federation. The feed mills in Kyrgyz Republic produce conventionally pressed, pellet feeds, mostly for their own farm, with the remainder sold to neighboring farms. Feeds are sold directly to farmers with payment either in cash or on credit, or sold through intermediaries such as wholesalers and retailers. Feed ingredient costs represents 80–90% of the total operating costs of the feed mill, and feed costs represents 65–75% of the total operating cost of the fish farms. The strengths, weaknesses, opportunities and threats and other major factors impacting on the performance of the aquafeed value chain are also identified. The study recommends a number of supply and demand side entry points for interventions, and investments to sustainably develop the aquafeed sector in Kyrgyz Republic.

Introduction

Aquaculture in Central Asia remains a largely underdeveloped sector, despite significant investments made during the Union of Soviet Socialist Republics (USSR) era. The subsequent fall of USSR (1989–1991) and the development of the Commonwealth of Independent States (CIS), resulted in a precipitous drop in production. Since independence from USSR in the early 1990s, aquaculture production across the central Asian region declined markedly, and by 2004 production from the five former USSR republics (Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan) in central Asia accounted for just 3,343 t which is only 7.50% of aquaculture production in 1991 (44,609t) (FAO, 2018). However, since 2005 aquaculture production is recovering from 3,995 t to 42,343t in 2016. The Kyrgyz Republic, the focus of this article, is a landlocked mountainous country, with a population of around 5.9 million. In the Kyrgyz Republic, 32.1% of the population live under the national poverty line and two third of them live in rural areas (ADB, 2017). Agriculture, primarily livestock raising, is a significant part of the economy. Out of the total agricultural output, crop production accounts for 51%, livestock including milk and meat at 47% while the agriculture services, forestry, and fisheries contributes less than 2% (ADB, 2018). Historically, the aquaculture sector has been based on polyculture of carps in ponds and cage culture of trout. The main culture species comprise the silver carp (*Hypophthalmichthys molitrix*), common carp (*Cyprinus carpio*), crucian carp (*Carassius carassius*), grass carp (*Ctenopharyngodon idella*), rainbow trout (*Oncorhynchus mykiss*) and sturgeons (Siberian sturgeon, *Acipenser baerii* and Russian sturgeon, *Acipenser gueldenstaedtii*) (FAO, 2014; Kustareva and Naseka, 2015).

Although the Government of the Kyrgyz Republic recognizes the importance of the aquaculture and fisheries sector, since independence from USSR in 1990, fish production has declined sharply until 2006.¹ In 2006, the fish production in Kyrgyz Republic was estimated at 57t, compared with 1,447t in 1989 (FAO, 2018). This drastic fall in fish production has had a negative impact on poverty alleviation, and on fish consumption, food and nutritional security in Kyrgyz Republic (Ilibezova et al., 2013). The main factors responsible for the decline in aquaculture production were the absence of good quality seed and feed, high prices of feed particularly compound feed, high customs tariff and other trade barriers to feed ingredient and equipment import, absence of subsidies, and of appropriate policy and legal and institutional frameworks (Sarieva et al., 2008; Thorpe et al., 2009; Thorpe and Van Anrooy, 2010; FAO, 2014; GCP/KYR/012/FIN, 2015). Since 2007, fish production has slowly increased, however production remains very low, and is traditional based on extensive and low input culture systems.

To increase the fish production in Kyrgyz Republic, a holistic approach is needed, including technical improvements to feed quality and improving manufacturing, and to produce less-expensive feeds that are balanced in terms of protein, lipid, carbohydrate, vitamin, etc., improving feed management on the farms, unlocking the value chain and improving supply chain management, and optimizing regulatory and governance (including appropriate policy and legal and institutional frameworks) (Sarieva et al., 2008; Ilibezova et al., 2013). Aquafeed research in other countries show that adoption of nutritionally complete commercial aquafeed increased fish production and farmers' income (Ahmed, 2007), and thus the same positive outcomes can be expected for Kyrgyz Republic. Commercial aquafeed production in Kyrgyz Republic is not well developed. Carp feeds are generally farm-made and trout feeds are mostly imported (Sarieva et al., 2008). The locally produced feed ingredients comprise grains (barley, maize, oat and wheat) and other plant-based materials (e.g. clover). In contrast, animal protein sources, fishmeal, meat & bone meal and bone meal, are imported. Plant ingredient sources such as soybean and sunflower oilcakes are also available, while the soybean oilcake being imported (National Statistical Committee of Kyrgyz Republic, 2016). However, despite the importance of the aquafeed sub-sector for enhancing aquaculture in Kyrgyz Republic, the value chain of aquafeed sub sector has not yet been mapped and the key players have not been

identified and characterized, therefore, the status and performance of this sector are not well documented or understood.

Under these backdrops, the present study aims to characterize the value chain of the aquafeed sub-sector in Kyrgyz Republic, particularly by identifying the issues and constraints for increase in fish production. Specifically the study aims to: (1) map the aquafeed value chain to identify the main actors, and the flow of product and information through the chain; (2) understand the financial performance in terms of profitability of the different actors in the chain; (3) document the status and gaps of regulation, institutions and policies, for a vibrant aquafeed sub-sector; and (4) identify the major strengths, weaknesses, opportunities and threats (SWOT) impacting the different actors in the chain, and provide suggestions for strategies to enhance the strengths and opportunities, and address the weaknesses and threats.

To meet these study objectives, the assessment methodology was a value chain analysis framework, in which the primary information was collected through field survey using structured and semi-structured questionnaires for the different actors in the aquafeed chain in Kyrgyz Republic. Value Chain Analysis (VCA) is a “multi-dimensional assessment of the performance of value chains, including the analysis of product flows, information flows and the management and control of the value chain” (Taylor, 2005). The VCA framework is a useful tool for assessing performance, and it is increasingly used to analysis performance of the fisheries and aquaculture sectors (Veliu et al., 2009; Christensen et al., 2011; Macfadyen et al., 2012; Thyresson et al., 2013; Nasr-Allah et al., 2014; Islam, 2016; Bush et al., 2019), very few studies uses it for aquafeed (El-Sayed et al., 2015; Mamun-Ur-Rashid et al., 2013) and no such studies have done in former USSR countries to the best of our knowledge.

The reminder of the article is organized as follows: Section 2, presents the methodology of the study including theoretical motivation, data, study areas and analytical methods; Section 3, elaborate the results and discussion; and finally Section 4, presents conclusion and recommendations.

Section snippets

Value chain analysis (VCA)

The present study uses a VCA framework as an assessment method for analyzing the performance of the aquafeed value chain in the Kyrgyz Republic. A value chain consists of related actors who perform various activities to add value to a product in each link of the chain, from its primary production to its ultimate consumers (Kaplinsky and Morris, 2001). Value may be added to the product via activities such as production, processing, transporting, buying, and selling. The VCA incorporates...

Value chain mapping and marketing channels

One of the first tasks to complete in the VCA, is creating a map of the chain to trace the relationships between different actors such as fish producers, feed and feed ingredients traders, feed manufacturers and importers, and the flow of inputs, services, and information through the chain (Fig. 2). In Kyrgyz Republic there is very little domestic aquafeed production, and thus the value chain is short and simple. This situation contrasts with the complex aquafeed value chains in some other...

Conclusion and recommendations

This study demonstrated that the nascent Kyrgyz aquafeed value chain is relatively simple, including only four main stakeholder groups: feed ingredient traders, aquafeed producers, aquafeed and feed ingredient traders, and fish farmers. Although this sub-sector is not labor-intensive, it has the potential to generate considerable levels of value-addition, resulting in profitable businesses at each stage of the value chain, and provision of employment opportunity for many people, including...

Declaration of Competing Interest

The authors declare that they have no conflict of interest....

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...Consequently, a number of funding/ sales mechanisms have been developed, including cash on delivery, cash before delivery, providing credit for up to 90 days, and joint ventures with the farmers. The problem of feed affordability among small farmers and feed manufacturers has also been reported in Bangladesh (Ahmed, 2015), Kyrgyz Republic (Islam and Hasan, 2020) and Vietnam (Hasan et al., 2019). It is clear from the above discussion that many Egyptian small-scale aquafeed producers are unable to invest in new production technologies....

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