



## OWC 2020 Paper Submission - Science Forum

*Topic 5 - Political and economical frameworks as drivers for a vibrant development of the organic sector*

OWC2020-SCI-1040

### OPPORTUNITIES AND BARRIERS TO THE DEVELOPMENT OF ORGANIC AQUACULTURE

Daniela Vairo\*<sup>1</sup>, Danilo Gambelli<sup>1</sup>, Francesco Solfanelli<sup>1</sup>, Raffaele Zanolli<sup>1</sup>

<sup>1</sup>D3A - Dipartimento di Scienze Agrarie, Alimentari ed Ambientali, Università Politecnica delle Marche, Ancona, Italy

**Preferred Presentation Method:** Oral or poster presentation

**Full Paper Publication:** No

**Abstract:** This study considers the context of organic aquaculture worldwide from an economic perspective. We present an analysis of the current situation of aquaculture production and the main results from a systematic review of the literature concerning economic issues in organic aquaculture.

*Results show that profitability in organic aquaculture is not assured for all aquaculture species, and the feed and fixed costs should be balanced by adequate price premiums. Socio-economic aspects of organic aquaculture are mostly relevant in developing countries. Even if consumers show a positive attitude towards organic seafood, consumers knowledge of organic aquaculture standards is still limited.*

*Dedicated research, competitiveness of organic fish farming and marketing activities (in order to develop consumer knowledge) need to be improved to ensure the future development of organic aquaculture, and efforts should be made to simplify the regulatory framework.*

**Introduction:** The total world production from aquaculture shows in 2016 an increase of 8.2% with respect to 2015. Total food production from organic aquaculture worldwide in 2016 was more than 415 thousand metric tonnes. Production from organic aquaculture has grown rapidly over the last few years but remains at relatively low volumes at the world level. Despite the relevant growth rates, the share of organic aquaculture with respect to total aquaculture remains at around 0.5%. Distribution of organic aquaculture across the world in 2016 showed a highly differentiated situation both in terms of volumes and growth rates (Willer and Lernoud 2018). Figure 1 shows organic aquaculture production for the main producers in the world for the period 2015-16 (Vietnam 2016 only). In Figure 2, we provided an estimate of the worldwide organic aquaculture volume per species in 2016 (Gambelli et al. 2019a).

Given the contrasting data on the growth of the sector, its outlook remains neutral. This study aimed to investigate the opportunities and barriers related to organic aquaculture by a systematic review of the scientific literature on market and economics.

**Material and methods:** Key economic aspects concerning organic aquaculture are investigated through a qualitative systematic review based on studies available from the main scientific databases (i.e., Scopus, Web of Science), and on selected high-quality grey literature in the field of the economic dimension of organic aquaculture. No time limit was

imposed (post-1990), and only the literature in the English language was included. The literature search was concluded on 19 March 2018, and all countries and species were included. The study selection was based on the 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses' PRISMA framework procedure for systematic reviews (see Moher et al. 2014, among others). Based on the search outcomes (for a more detailed analysis of the procedure, please see Gambelli et al. 2019b), the selection procedure was carried out independently by two reviewers. The final selection included 50 studies.

**Results:** The main outcomes of the review are shown in Table 1 (for more details, please see Gambelli et al. 2019b). As most of the studies concern either developed (mainly European) or developing (mainly Asian) countries, we have focussed the results of this review on these two categories.

**Table 1: Main outcomes of the review for the organic aquaculture sector, by theme and country classification**

Theme	Countries	Opportunities	Barriers
Socio-economic development of organic aquaculture	Developed	Positive expectations for sector growth and development; high annual growth rates	Market size still very limited; fragmentation of standards
	Developing	Growing international demand; positive effects from integration with rural contexts and livelihood conditions	Fragmentation of standards; demand still mainly dependent on export
Economic performance of organic aquaculture	Developed	Profitability for trout and salmon (to a lesser extent)	High costs for purchased inputs and low economies of scale; low profitability for carp; price premiums not always sufficient to ensure profitability
	Developing	Good relative profitability for shrimps and prawns	Certification costs; managerial difficulties for meeting western standards
Consumer attitude for products from organic aquaculture	Developed	Positive willingness to pay and price premiums for organic fish and seafood	Organic aquaculture confused with caught/ eco-labelled fish; organic not the main driver of consumer preferences
	Developing	Positive willingness to pay and price premiums for organic fish and seafood	Local origin is relevant for western consumers

The main driver for the uptake of organic aquaculture in western countries is economic profitability over conventional aquaculture. Compared to conventional aquaculture, the profitability is conditioned by the lower yields and higher costs, which are generally due to high feed costs and limited farm sizes, as well as the higher prices for organic fish. Profitability in organic aquaculture is not guaranteed for all aquaculture species, and the feed and fixed costs can be an issue if they are not balanced by adequate price premiums. Other costs, (e.g., general costs, energy, maintenance, financial costs) and labour costs have relevant but differentiated importance according to the type of species.

Price premiums mainly depend on consumer preferences, availability of substitutes, and consumer knowledge, and the ability of consumers to distinguish between organically and non-organically farmed fish. Consumers show a generally positive attitude towards organic seafood, although other aspects such as local origin might represent more relevant attributes. Consumer knowledge of organic aquaculture standards is also limited.

Socio-economic aspects of organic aquaculture are particularly relevant in developing countries, where this farming practice can contribute to improved livelihood and can integrate effectively with local farming practices. From the supply side, social aspects like social acceptability and compatibility with tradition are taken into consideration, in particular in the decision to adopt organic practices for aquaculture. Demand for organic aquaculture products is mainly driven by exports, which are mainly oriented to western countries. In this context, the regulatory framework for organic aquaculture represents a critical issue as it is particularly complex, with over 80 national and private standards. This represents a barrier for producers from developing countries who face difficulties in marketing their products in western countries.

**Discussion:** The data available on the economics of organic farming in Europe show an ambiguous situation, where real profitability relative to conventional aquaculture is dependent on the fish species and the country. Profits are not always guaranteed, and conversion to organic might be an opportunity only for already established farms. From an economic perspective, the minimal size of the sector implies obstacles for operators, such as diseconomies of scale, limited availability and high prices for purchased inputs, major limitations for processing, and high costs of distribution. The growth of organic aquaculture in the next few years appears to be conditioned by three key issues: enhanced research, particularly into the aquafeed field; improved competitiveness of organic fish farming; improved marketing activities (e.g., promotion, packaging, wider product range, availability), development of consumer knowledge and differentiation of organic seafood. Besides these aspects, the simplification of the regulatory framework at the global level is essential to reduce the obstacles for the uptake of organic practices and for reducing barriers in international trade in organic seafood.

**References:** Gambelli D, Naspetti S, Zander K, Zanoli R (2019a): Organic Aquaculture: Economic, Market and Consumer Aspects, chapter 3, in Lembo G., Mente E. (editors) Organic Aquaculture. Impacts and Future Developments.

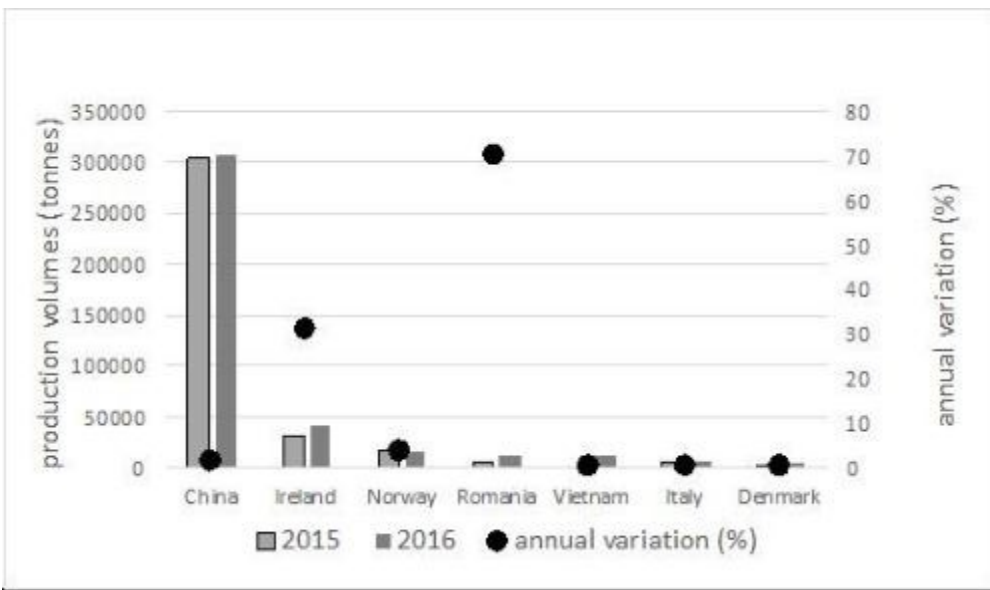
Gambelli D, Vairo D, Solfanelli F, Zanoli R (2019b): Economic performance of organic aquaculture: A systematic review. Marine Policy. Available online <https://doi.org/10.1016/j.marpol.2019.103542>

Willer H, Lernoud J (2018): The World of Organic Agriculture 2018: Statistics and Emerging Trends, Research Institute of Organic Agriculture (FiBL), Frick, and IFOAM-Organics International, Bonn.

Moher D et al. (2014): Grupo P. Moher, Ítems de referencia para publicar Revisiones Sistemáticas y Metaanálisis: La Declaración PRISMA. [Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement], Rev. Española Nutr. Humana y Dietética. 18, 172–181.

### Image 1:

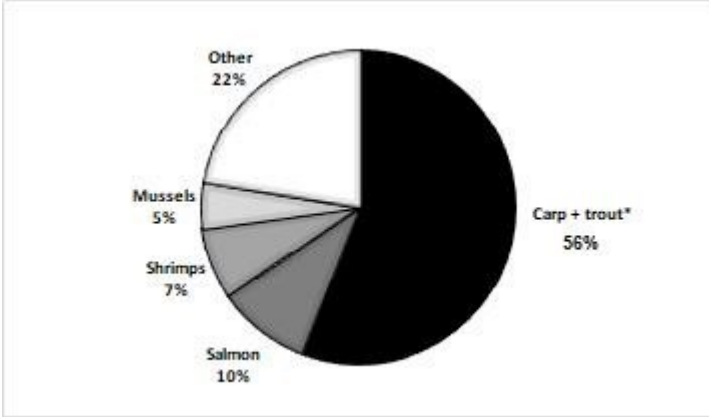
Figure 1: Organic aquaculture production, as the main producers\* and the annual variation.



Source: Calculated from FiBL data; \*95% of total organic world production; Vietnam: 2015 not available.

**Image 2:**

Figure 2 Estimated organic aquaculture production by species in 2016.



Source: Calculated from Lernaud and Willer (2018) and Xie et al. (2013)

**Disclosure of Interest:** None Declared

**Keywords:** consumer attitude, economic performance, organic aquaculture, systematic review