



## Assessing stakeholder's experience and sensitivity on key issues for the economic growth of organic aquaculture production

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### ABSTRACT

Participatory management is widely recognised as a working method of paramount importance, based on the principles of knowledge sharing, accountability and legitimacy. Hence, it is broadly considered suitable for addressing issues related to the sustainable development of the seafood industry, and specifically, of the aquaculture system. A survey focused on the current EU regulatory framework was carried out to elicit stakeholders' preferences, knowledge and experience on key issues for the development of organic aquaculture, supported by science-based regulations. The survey was completed by 65 stakeholders belonging to several categories, and it was supported by the implementation of the Analytic Hierarchy Process method. Stakeholders' preferences were elicited on organic production methods and control systems, the quality of the environment and organic products, fish health and welfare. The views expressed by the participants revealed both competence and awareness, despite the complexity of the subject. Several ideas and useful suggestions emerged regarding unresolved technical issues. In addition, the need for a targeted communication strategy on the quality of organic aquaculture products and the necessity of fostering European/national programs to support the production and marketing of organic aquaculture products were highlighted.

### 1. Introduction

Organic agriculture is one of the most dynamic food production sectors in Europe. According to Eurostat data, in 2015 the EU-28 had a total area of 11.1 million hectares organically cultivated, up from 5.0 million in 2002. There are almost 185,000 organic farms across Europe, and around 306,500 organic operators (producers, processors and importers) were registered in the EU-28 in 2015 [1]. However, organic production still represents a relatively young market segment, and the whole organic area, although constantly growing, represents only 6.2% of the total utilised agricultural area in Europe. According to the International Federation of Organic Agriculture Movements (IFOAM), organic agriculture is based on four principles: health, ecology, fairness and care. A succinct definition of organic agriculture is provided by IFOAM [2] as follows: “a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved.”

Organic aquaculture is a fairly young sector, and the data collection system for organic production is subject to fragmentation and uncertainty. A praiseworthy attempt to shed light on the consistency of the organic aquaculture industry in Europe and its economic performance is provided by the European Market Observatory for Fisheries and Aquaculture Products (EUMOFA) in EU Organic Aquaculture [3]. According to this report, the total EU organic production was a little more than 50,000 t in 2015, equivalent to about 3.9% of the total European aquaculture production. The main species produced under organic standards, in order of importance, were i) salmon, ii) mussel, iii) carp, iv) trout, v) sea bass and sea bream.

European organic aquaculture started in the early 1990s in Austria with the first extensive carp farming experiences, and then a further boost came with the first organic salmon project in Ireland. Lacking specific rules for organic aquaculture, the objective at that time was to develop a standard for organic farmed salmon, based on IFOAM organic farming principles and the first European Organic Regulation (EEC) No 2092/1991. The Soil Association picked up the challenge and published the first organic standard for salmon in 1998, followed by Naturland, which designed the first organic shrimp standard at the end of the

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1990s [4]. Then, in 2000 IFOAM published its first draft of basic standards for organic aquaculture, which were fully accepted five years later at the IFOAM General Assembly in Adelaide, Australia. This event received strong interest from consumers worldwide as well as from retailers and certifying bodies, stimulating the growth of organic seafood production. An aquaculture standard is now included in the IFOAM Norms for Organic Production and Processing [5].

In addition, the European Commission launched a European Action Plan on Organic Food and Agriculture [6] with the intention to assess the current situation and lay a foundation for policy development, thereby providing an overall strategic vision for the contribution of organic farming to the Common Agricultural Policy. The Commission's Directorate General for Maritime Affairs and Fisheries (DG Mare) organised a conference in December 2005 to kick off the discussion with the organic aquaculture sector, followed by a series of meetings with organic aquaculture experts. Meanwhile, organic aquaculture was included, for the first time, into Council Regulation EC n° 834/2007 [7], which provided the overall principles guiding the sustainable development of organic production. Subsequently, a Commission Regulation addressing the rules for implementing organic farming (Commission Regulation EC n° 889/2008) was adopted, but without the section on aquaculture. Finally, after a thorough process spanning several years to streamline a number of different organic standards and national certification schemes in Europe, Reg. EC n° 889/2008 was amended by the Reg. EC n° 710/2009 [8] to introduce detailed rules for organic aquaculture animal and seaweed production. A common European regulation that created basic standards was highly welcomed, but it also highlighted many problematic issues, such as fish welfare, feed and environmental concerns, which still require appropriate solutions. Indeed, Reg. 889/2008 [9] has since undergone several amendments on different aspects of the organic farming regulation.

Thus, an Expert Group for Technical Advice on Organic Production (EGTOP) was established by the Commission Decision 2009/427/EC of 3 June 2009. The mandate of the group is to provide the Commission with technical advice on the authorisation of products, substances and techniques for use in organic farming and processing, to develop or improve organic production rules and, more generally, to provide advice for any other matter relating to organic production. The EGTOP group has delivered three reports on organic aquaculture issues to date [10–12].

To further advance the development of the EU Regulations on organic aquaculture, the EU FP7 project “European Organic Aquaculture - Science-based recommendations for further development of the EU regulatory framework and to underpin future growth in the sector” was launched in 2014 ([www.oraqua.eu](http://www.oraqua.eu)). The overall vision of the project was the economic growth of the organic aquaculture sector in Europe, supported by science-based regulations in line with the organic principles and consumer confidence.

Aim of this paper is to analyse data collected through the participatory management process accomplished during the OrAqua project in order to assess multi-stakeholders' knowledge, experience and perception of key issues regarding organic aquaculture development. To this end preference modelling methods were applied to draw conclusions.

Participatory management is widely recognised as a working method of paramount importance, based on the principles of knowledge sharing, accountability and legitimacy, for addressing the sustainable development of the seafood industry and, specifically, of the aquaculture system. In addition, cooperation among industry, citizenship and science can ensure more coherent information, enhance credibility as well as contribute to the progressive, sustainable development of a seafood production system. Indeed, the use of survey-based methods for eliciting public and stakeholder preferences has been applied to a wide range of marine multi-objective problems [13,14].

As in “real world” situations, alternative solutions are reached through compromise, resulting from trade-offs between various (sometimes) conflicting objectives of the stakeholders and decision-

makers, utilising negotiations to reach consensus. This involves seeking “optimal solutions” to multiple alternatives, such as prioritising between fish health/welfare and farm economics/competitiveness. Conflicting approaches to the wide range of multidisciplinary and complex organic farming issues may challenge stakeholders with different backgrounds, knowledge and possibly even conflicting objectives and preferences on specific farming issues (feed, welfare, environment, economic, etc.) connected to the EU regulation. These “optimal solutions” can be effectively pursued using preference modelling methods, namely, the Multi Criteria Decision Analysis (MCDA) [15], which is a family of techniques meant to facilitate informed decisions among alternative approaches. Although applications MCDA techniques have been reported in many peer-reviewed publications [16–21] related to fisheries management, aquaculture and marine conservation, there are still challenges and emerging issues with the application of participatory MCDA that must be addressed. One of these issues is the way uncertainties around the integration of different stakeholder value judgments are included in the process [21–25]. It is also fundamental to evaluate trade-offs and the weights of the different objectives that stakeholders must decide upon. Different MCDA methods have been used to establish the weights of importance among objectives. The Analytic Hierarchy Process (AHP) is one of the most widely applied methods for prioritising alternatives [26–28], which develops a set of pairwise comparison matrices, expressing the intensity of preference over a broad range of scores.

In this paper the stakeholders' position was analysed using the AHP method and uncertainty was addressed using the Monte Carlo approach.

## 2. Materials and methods

### 2.1. Survey

During the OrAqua stakeholder meeting held in Rotterdam on October 2015, back to back to the European Aquaculture Society (EAS) Conference, a survey focused on the current EU regulatory framework was carried out to elicit stakeholders' preferences, knowledge and experience on key issues related to organic aquaculture development, supported by science-based regulations. The 65 participants to the survey were selected by the OrAqua stakeholders platform in order to have a balanced representation of the following categories: consumers, retailers, researchers and organic farmers, as well as experts from the organic certification bodies, aquaculture associations, environmental NGOs, feed industry and public institutions.

A broad discussion of the concept, objectives, problems and technical issues of the survey took place before the administration of a specific questionnaire. The participants were encouraged to participate in a plenary discussion about the survey objective and methods. They were then invited to answer the questionnaire anonymously. The closed questions concerned the following 18 thematic areas: (1) Institutional framework; (2) Consumer perception; (3) Environmental interaction; (4) Fish health and welfare; (5) Control provisions; (6) Production rules; (7) Legislative framework; (8) Production systems; (9) Product qualities; (10) Product ecological qualities; (11) Energy use; (12) Recycling; (13) Environmental impact; (14) Quality of water; (15) Quality of feed; (16) Quality of the rearing environment; (17) Physiological condition; and (18) Husbandry practices. The stakeholders also had the additional possibility to submit free contributions. A glossary of the terminology used in the survey was distributed to all the participants in advance to ensure a homogeneous interpretation/understanding of the questions.

Ethics approval was not required for this study. However, the survey was carried out in compliance with the “Ethics Review procedure for researchers as a part of the 7th EU Framework Programme (FP7)” of the European Commission, and oral informed consent was obtained from the participants.

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