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THE DEVELOPMENT OF THE ORGANIC AQUACULTURE. CASE STUDY: ROMANIA

Case study

Keywords
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Abstract

Aquaculture contribute ever more to the production of aquatic food worldwide, even if the sustainable limits for majority of wild fish stocks, are now almost reached or even exceeded. In the EU, aquaculture is an important economic activity in many coastal and continental regions. Aquaculture plays an important role in terms of access to food resources and it is necessary to use its potential to contribute to sustainable development, food security, economic growth and employment. In this regard, starting from EU aquaculture objectives, the paper intend to make an analysis of the national situation of aquaculture and its current potential. The paper presented the progress of Romanian investments in aquaculture, identifying needs and opportunities for the Romanian aquaculture development. Taking into consideration the natural resources available and the growth of global request of organic product, the development of ecologic aquaculture might represent o niche market for local producers.

Short literature review

The prerequisites and the development of ecological aquaculture are presented in FAO Reports, published by El-Hage Scialabba and Hattam (2002), concerning organic aquaculture, in which a short- and medium-term analysis on aquaculture industry is performed. Franz (2002) characterised ecological aquaculture and performed an analysis of USA, EU, Japan and other states' organic markets, by presenting the aquatic species appropriate to green growth, describing the retail trade prices of fishery products in analysed markets, and concluding that developed countries present a high absorption potential of these products. Szeremeta et al. (2010) stated the community regulations concerning ecological aquaculture in a material conducted under aegis of the IFOAM EU Group. Prein et al (2012) described the opportunities of organic aquaculture by exploiting niche markets. Dinu et al (2014) conducted a study concerning the reasons for consuming organic product in Romania, concluding that these products are considered healthy and beneficial by local consumers. Stanciu (2014) analyzed the economic impact of organic agricultural production on the national economy, concluding that this could be an opportunity for local farmers.

Material and methods.

The information on Community and local fishery industry were provided by national databases (The National Institute for Statistics INS, The Ministry of Agriculture and Rural Development MADR, National Agency for Fisheries and Aquaculture ANPA), Community databases (Eurostat, Amadeus, European Commission EC) or international databases (FAOStat, FishStat, IFOAM). The data have been statistically processed, chart represented and analyzed. The interpretation of results had been fulfilled by referring to specialized literature.

An history concerning the organic aquaculture

Animal growth in organic aquaculture systems, performed in high safety conditions aims to obtain some quality food product with a minimum impact on the aquatic environment. In comparison with organic agriculture, practiced by a relatively long time at the level of agricultural exploitations, the aquaculture is a relatively new field of organic production. The start was the ecological growth of Common carp (*Cyprinus carpio)* in Austria (1994) an followed by Atlantic salmon (*Salmo salar*) in Irland (1995), a Shrimp (*Penaeidae*) in Ecuador (1999) or more recently, the Atlantic cod (*Gadus morhua*) in United Kingdom (2005) or Pangasius (*Pangasianodon hypophthalmus*) in Vietnam (2006) (accordind to Prein et al, 2010). An evolution of production and the occurrence of regulations related to organic aquaculture are presented in Table no.1. The last period registered the increase for organic seafood demand, especially in the developed countries from Europe, North America and Japan, but also for medium revenues consumers from emerging economies. The demand is covered by internal production (for example, common carp *Cyprinus carpio*, brook trout *Salvelinus fontinalis* or rainbow trout *Oncorhynchus mykiss* in Austria and Germany), regional production (salmon, cod and seafood in NW Europe, and seabream, perch, tilapia in mediteranean countries) or imports. A significant part of certified aquaculture are products processed and traded on internal markets of developing countries. In 2009, 240 organic aquaculture farms (including for seaweed production) were certified worlwide, located in 29 countries. Over 50% of cerified units operated in Europe. In China, 72 farms were ecological certified according to Chinese national standards. The total poduction resulted from organic aquaculture reached in 2009 53.500 tonnes, representing over 0.1% of the global aquaculture production. The main aquaculture species produced worldwide and by countries are presented in Table no. 2.

Communnity context

The European Union gives special attention to aquaculture, especially to the development of sustainable activities with reduced impact on environment. The development of organic aquaculture activities requires prior evaluation of risks, adapting the activity area and mitigating the potential negative effects on the environment, by applying prevention methods. Nutrients, water, chosen location for farm are the most important aspects related to ecological sustainability of aquaculture farms. Starting with July 1st 2010, the new community regulations on organic aquaculture for fish, shellfish and seaweed entered into force. Hence, the CE 710/2009 Regulation stated the necessary conditions for aquatic production environment and the activity impact on other species. The Community norms comprise recommendations concerning ecological aquaculture activity area (including the lack of contamination risks with unauthorized substances/pollutants which might compromise the ecological feature of products); separation of ecological units of production of conventional production (related to natural contexts, different water distribution systems, distances, tide, upstream and downstream location of the production unit). The member state authorities may state places/areas which are appropriate for ecological aquaculture and may set the minimum distances of separation between ecological production units and the

conventional ones, information which must be provided to operators, other member states and European Commission. In the case of new farms with a capacity over 20 tonnes of aquaculture products per year for which an ecological certification is requested, an environment evaluation is necessary, tailored for production unit, for setting the existent conditions and potential effects on the environment. The evaluated operator shall make available for the control body/authority, the environment evaluation. Pursuing the environment evaluation shall be made according to Annex IV of Directive 85/337/CEE of the Council. In the case in which the unit had been already subject to prior evaluation, this shall be used. The operator must present a sustainable management plan of the resources, tailored for the aquaculture production unit subject to certification. The plan, which must be updated on every year, details the effects of the activities on the environment, the monitoring conducted and the measures necessary for reduction of negative effects, the nutrients quantity discharge into the environment per production cycle/year. The plan also registers the data on technical equipment control and repairing. The ecological operators shall preferably use renewable energy, shall recycle materials and elaborate, as part of sustainable management plan, a calendar for reducing the quantity of waste emissions, applicable from the beginning of the activity. As much as possible, the use of waste heat shall be limited to the energy resulted from renewable sources. Special provisions shall be stated for production of bivalve molluscs and seaweed. The community ecological regulations provide strict criteria on aquaculture animal origin (local species which may be grown without significant effects on natural fauna, respecting biodiversity, the absence of artificial hormones induced eggs); reproduction, grow and food conditions (ecologic fish population shall be fed with organic food, food flows might be completed with drrivatives resulted from fish activities, sustainable managed); livestock density depending of species/groups of species. For example, the maximum density of population for salmonids of 1,510 kg/m^3, with special provisions for salmon/trout - 10 kg/m^3, in net pens in sea water, 20 kg/m^3 in freshwater, perch and sea bream maximum density - 15 kg/m^3 in sea and de 4 kg/m^3 in ponds and lagoons, turbot – 25 kg/m^3 are allowed). For carp and other cyprinids, the maximum allowed production is 1,500 kg fish per hectare per year.

The production of the community organic aquaculture is at the beginning, the industry being confronted with insufficient organic breeding, organic means of treatment against pests and feed sources. In order to compensate these shortcomings, EU rules have allowed the introduction of breeding or very young non-organic specimens in farms, the maximum allowed percentage being of 80 % until December 31st 2011, 50 % until December 31st 2013, respectively 0 % until December 31st 2015.

Farming practices, management systems and tanks used for organic aquaculture must comply with good practices on quality of life and welfare. In ecological production, recirculating closed systems shall not be used. Exceptionally, their use is accepted for artificial reproduction, incubation, nurseries or in order to obtain ecological food. The efficient use of nutrients necessary for food is essential for environmental sustainability. Food for organic aquaculture production units must meet the nutritional needs of animals, complying with community health requirements and organic character. The food used to feed organic carnivorous fish and crustaceans must come from sustainable fisheries exploitation or organic aquaculture sources. An important element is the reduction of food losses through an optimized feeding system and an appropriate selection of food. The source of food used is an issue which might contribute to environmental sustainability. The fact that organic aquaculture is at the beginning and the sustainable exploitation of fish resources led to food shortage within member states. In some cases, the authorization of conditional use of protein food derived from sources in their first year of conversion, controlled use of non-organic food materials, food additives and some auxiliary substances is allowed. According to FiBl Report (2014), in Europe the number of certified organic aquaculture farms was of 123 units, representing over 50% of a total of 225 establishments registered worldwide.

European aquaculture production farms accounted for nearly half of world production, estimated at about 50,000 tonnes in 2008. Statistical information on organic fish production in major producing countries in Europe in 2012 is provided by the journal European Aquaculture Society (2013). As shown in Figure 1, the largest EU producers are Norway, Ireland, Great Britain, Greece, France and Germany, which grow mainly organic salmon sold at a higher price by about 50% in comparison with the salmon coming from conventional hatcheries. The increase in demand was very strong in France, where organic seafood market increased by 220% during the period 2007-2008, respectively in Germany, where the existence in supermarkets of specialized sections in organic products has favored the increase. The evolution of consumer interest in the market for the products obtained under ecological conditions is manifested in a higher conversion of conventional aquaculture units to organic systems. Quantitatively, in 2014 organic aquaculture production in the European Union reached an overall value of 175,000 tonnes, up by 335% over the previous year. The main European producers of organic aquatic products in the year

2014 were Ireland, Slovenia and Romania, Member States where it is concentrated over 80% of the profile production. The most important aquatic species grown in organic system are shown in Table no. 3. European production is focused mainly on carp and cyprinids in freshwater aquaculture or sea bass and mussels in the sea. Although the industry is at the beginning, EU funds concerning research in the field of organic fish activities will be used to acquire the experience and knowledge, especially on preserving water quality (through the development of recirculation systems), use of organic ingredients for animal nutrition and optimum density of livestock of certain fish species.

Ecological aquaculture production in Romania

Romania's EU integration has provided a market opportunity with a potential of 500 million consumers, the possibility of financing projects of community interest and restrictions imposed by EU rules. National organic production is governed by a set of rules of national legislation harmonized with EU legislation. Government Emergency Order no. 34/2000, supplemented by subsequent regulations, states that for food produced in an environmentally friendly production system the term "organic" is used, similar with "biological", "organic" or combinations thereof "organic - biological", "bio - organic "and partly by the term" natural ". According to Man et al. (2004), if the final food product comes from conventional aquaculture, but at its industrial process no food additives are used, the product shall be named natural, and if it comes from ecological aquaculture and its industrial process is also ecologic, then it shall be named ecological product. The ecological production requires manufacturing standards and management practices specific to certified organic farms. Hence, the organic production rules require farms a conversion period for the certification of production, which should only be used in organic production. Where there has been a continuous use only traditional farming practices, the conversion period may be reduced. The conversion period for aquaculture production units recommended for Romania are:

- 24 months for installations which cannot be drained, cleaned and disinfected;
- 12 months for installations which had been drained or which were subject to a sanitary void;
- 6 months for installations which had been drained, cleaned and disinfected;
- 3 months for installations with open circuit water, including those for bivalve mollusks grow.

The certifying authority may decide to include retroactive conversion during a period prior to certification if there are no supporting documents relating to treatments with products not authorized. The certification process is based on the organic standards, product buyers having the certainty of organic production. Internationally, various organic certification systems are applied, and choosing the appropriate solution depends on the market. Thus, if the exportation is aimed on a third party market, the certification shall be adapted and recognized by that market. National certification rules are correlated with international/Relevant Community: Codex Alimentarius Guidelines for the Production, Processing, Labelling and Marketing of Organically Produced Foods: Organic aquaculture. Para. 57 and Appendix III (Codex Alimentarius 1999); IFOAM Norms: Basic Standard for Organic Production (2014), Norms concerning the production of ecological aquaculture of certification private organizations); Community regulations (EC 834/2007, EC 889/2008, EC 710/2009), completed by general norms on organic agricultural and food production.

Currently, Romania has 13 certification agencies approved by MADR that can help producers and processors in the certification of agricultural primary production and processing environment. The certification process complies with EU regulations, a sequence of steps being respected, shown in Figure no. 2. Certification begins with choosing a certification and inspection body for organic production in the list presented on the ministry's website, the operator concludes an agreement for inspection and certification. Fisheries manufacturer making an organic production shall record their activity in MADR through the County Directorates for Agriculture and Bucharest County Directorates for Agriculture, with completion of the registration document production units for organic aquaculture (Annex no. 2 MADR).

Registration form shall be joined by the agreement between the operator and the inspection and certification body referred to in the registration document; affidavit for registration as an operator in the organic farming system in order for operators to access measures under PNRD or POP; affidavit for holding documents required for enrollment in organic farming, completed in the form prescribed in Annex 9, MADR.

Subsequent to verifications carried out by certification and inspection bodies, the operator who has met the organic production rules shall obtain a certificate of organic production and may label products with the words,, green "and eco-friendly production with the national mark. The label of organic products requires references to organic production (Ecorom Organic Agriculture - Control System RO), logos, names and code inspection and certification body which carried out the inspection and issued the certificate of organic product. The logo,, ae "specific for Romanian organic products, together with the Community logo are used to supplement labeling in order for a product obtained in accordance with ecological production methods to be identified by consumers

(Figure 3). National logo for organic production is owned by MADR and ensures that the product labeled organic comes from ecological agriculture, being certified by an inspection and certification approved body.
Rules for using the logo ,,ae " are included in Annex 1 to the Joint Order amending the Annex of Ministry of Agriculture, Forests and Rural Development no. 317/2006 and of the National Authority for Consumer Protection no. 190/2006 approving specific rules on organic food labeling. The right to use the logo,, ae "on product labels and packaging of organic products is owned only by producers, processors and importers registered with MADR as organic producers. In order to obtain the right to use the logo ,,ae" certification and logo ,,ae "communication, applicants will complete the request form. Consumers who buy products with the national and Community logo can be confident that at least 95% of the product's ingredients have been obtained in accordance with the organic production methods and that the product complies with the organic production rules. The certified product will bear the name of the manufacturer, processor or sales person name / code inspection and certification body. Every year until 15 December organic aquaculture operators are required to register the work at the Ministry of Agriculture and Rural Development, County Departments of Agriculture or Bucharest County Departments of Agriculture.
If the operator voluntarily withdraws from the organic farming system, he shall notify the authority that registered him by submitting Annex 14 - MADR. The operator shall retain for a period of five years after the notification of withdrawal from ecological aquaculture system, accountant records and all documents issued during its activity.
Organic fish production in Romania is at the beginning. Although in 2007-2013, POP granted special funds for organic production, Complex Grup S.R.L. (Ltd) owns in Buceag, Constanța, the sole ecologic certified farm from our country. The transition to organic production was achieved through the accumulation of the following projects "Sustainable aquaculture in NATURA 2000 site, Buceag fish farm - ROSPA0053", 01.01.2008-31.12.2008, 1,208,950 lei; "Sustainable aquaculture in NATURA 2000 site, Buceag fish farm - ROSPA0053" 01.01.2009-31.12.2009, 1,208,950 lei; „Transition to ecological aquaculture of Buceag I Fish Facility" 01.01-31.12.2010, 3,626,850 lei; „Aquatic environment protection and mitigation, natural resources, genetic dversity and management of landscape in Buceag I Fish Facility, concerning sustainable aquaculture", 01.01.2010-31.12.2011, 2,460,540 lei; „Fish products promotion" 01.01-29.11.2011, 3,297,605,47 lei, „Promoting campaign – Fish health", 01.01-30.11.2011, 3,293,818.77 lei.
The production of 4,00 tonnes of organic carp is made on a 1,200 water surface. The farm comprises 24 pools with areas ranging from 5.000 to 10.000 sqm, stocked with seed from Germany, activity partially subsidized by state with 3,000 lei/year*hectare. The product destination is the internal market, trade price for organic carp being of 10 lei/kg.
After concluding the grant, the company registered sale reduction, increase of costs and losses (figure no. 4). The number of employees remained relatively constant, being imposed by funding agreement.

Conclusions

Organic production might be a sustainable solution for Romanian agriculture. Underdevelopment, excessive fragmentation, low productivity, lack of funding led to a low competiveness of local industry compared to intensive production systems or Community competitors, switching to organic production is an opportunity and a necessity for the survival of small producers. The increased demand for organic products in foreign markets, quality of local organic products and natural agricultural offers the opportunity to develop the organic production in Romania. Supporting organic aquaculture by providing financial support compulsory for starting up production and protect local industry from foreign competition might ensure business continuity with organic products on medium and long term. In Romania only one certified ecological profile company exists and its activity shows the need for strong financial support from officials, the industry being unprofitable in the current context.

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Appendices

Table No. 1
History of organic aquaculture

Year	Species/Issue	Country	Certifying Organization
1994	Common carp (*Cyprinus carpio*)	Austria, Germany	
1995	Atlantic salmon (*Salmo salar*)	Ireland	Naturland
1997	Organic aquaculture standard	Australia	National Association for Sustainable Agriculture, Australia
1998	Atlantic salmon	United Kingdom	Soil Association
1999	Shrimp (*Penaeidae*)	Ecuador	Naturland and Deutsche Gesellschaft für Technische Zusammenarbeit
1999	Blue mussel (*Mytilus edulis*)	Ireland	
2000	Organic aquaculture standard	United Kingdom	
2000	Organic aquaculture standard	France	Agriculture Biologique
2000	Giant tiger prawn (*Penaeus monodon*) small-scale farmer groups	Viet Nam	Naturland and Swiss Import Promotion Programme
2001	Basic organic aquaculture standards	Global	International Federation of Organic Aquaculture Movements
2001	Organic aquaculture standard	Australia	
2002	2002 Tilapia (not species specific)	Israel	Naturland
2003	Aquaculture Group formed	Global	IFOAM
2004	Organic aquaculture standard	Denmark	Økologisk
2005	Organic aquaculture standard	China	
2005	Gilthead seabream (*Sparus aurata*)	France	
2005	Microalgae	Taiwan POC	
2005	Atlantic cod (*Gadus morhua*)	United Kingdom	
2005	Ban on labelling of organic seafood	California, USA	State
2006	"Pangasius" (*striped catfish, Pangasianodon hypophthalmus*)	Viet Nam	Naturland and Deutsche Gesellschaft für Technische Zusammenarbeit
2009	Organic aquaculture legislation	EU	Commission of the European Communities

Source taken from Prein et al, 2010

Table No.2
Species farmed organically and main producers

Marine	Contry	Freshwater	Country
Atlantic Salmon	Ireland, UK, Chile	Trout	Austria, France, Germany, Switzerland, China, Denmark
Black Tiger Shrimp	Indonesia, Vietnam, Malaysia	Carp	Austria, UK, Switzerland , Germany, Hungary
White shrimp	Ecuador, Peru, Columbia	Crucian Carp	China
Vannamei shrimp	Ecuador, Costa Rica, Thailand	Catfish (*Pangasius bocourti*)	Vietnam
Seabass	France	Giant Catfish (*Pangasius gigas)*	Vietnam
Seabream	France	Tillapia	Israel
Turbot (Psetta maxima)	Spain, Portugal	Arctic charr	Iceland
Milkfish	Indonesia, Taiwan Philippines	Eel	Europe, Japan, China, Taiwan, Australia, Morocco
Shellfish (Mussels, Scallops, Oysters)	Ireland, USA, New Zealand, Ireland, France	Gaint Freshwater Prawn (Macrobachium resenbergii)	Myanmar
Micro Algae	USA, Taiwan, India	Tench	Austria, Germany
Seaweed	China		

Source Author, using data from Infofish (2011), IFOAM EU (2010), EC (2013)

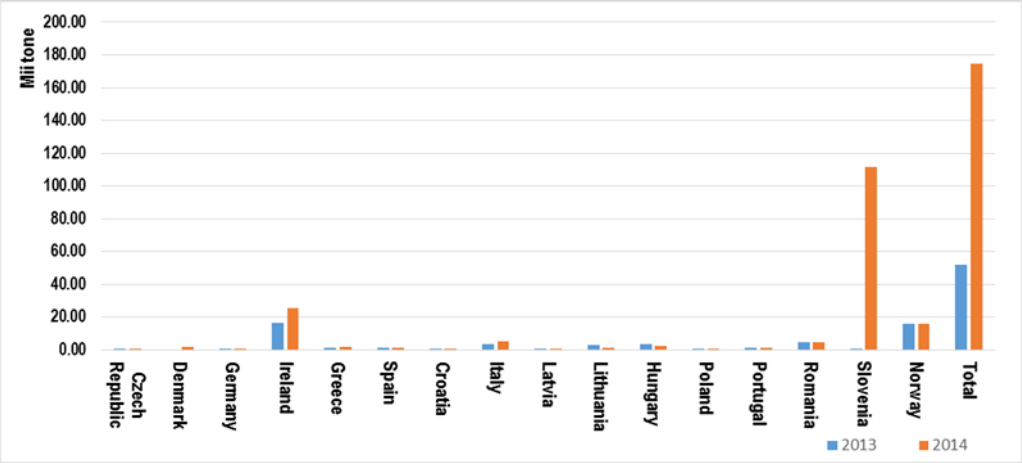

Figure No. 1. EU Organic aquaculture production
Source Author, using the Eurostat data, 2015

Table No.3
Species farmed organically in Europe

No.	Fish Species	Quantity (tonnes)		Main producers (tonnes)	
		2013	2014	2013	2014
1.	Carp and other cyprinid	7,689.4	2,885.03	Lithuania 2,657.76 Romania 1,675,85 Slovenia 3350,00	Lithuania 1,088.04 Romania 1,796.99
2.	Sturgeons, incl. paddlefishes	-	378.85	-	Spain 378.85
3.	Oysters	6.00	-	Croatia 5.00 Italy 1.00	-
4.	Mussels	94.39	6.221	Slovenia 90.000 Italy 2.510 Denmark 1.870	Italy 4.820 Denmark 1.152
5	Algae	-	129.25	-	Spain 129.25
6.	Seabass *(Dicentrarchus labrax)*	693.00	459.00	Croatia 260.00 Spain 216.02	Croatia 308.00 Spain 151.01
7	Salmon (*Salmo salariu*)	45.28	-	Romania 45.28	-
8	Sparus aurata	-	0.15	-	Croatia 0.15
9	Trout (*Salmo spp.)*	436.00	-	Italy 390.00 Spain 33.13 Portugal 13.00	-

Source: Author, using EuroStat data, 2015

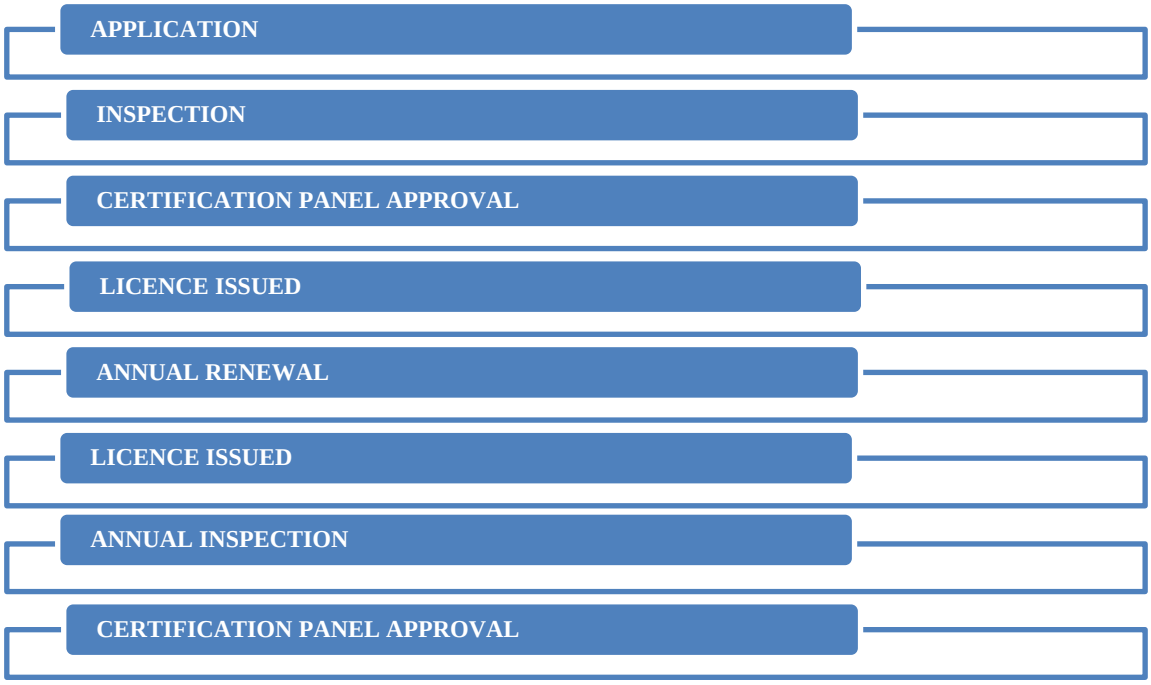

Figure No. 2. Steps to organic certification
Source IOFGA, 2015

a) b)

Figure No. 3. National ecological agriculture (a) and EU organic logo (b)
(Source MADR, 2015)

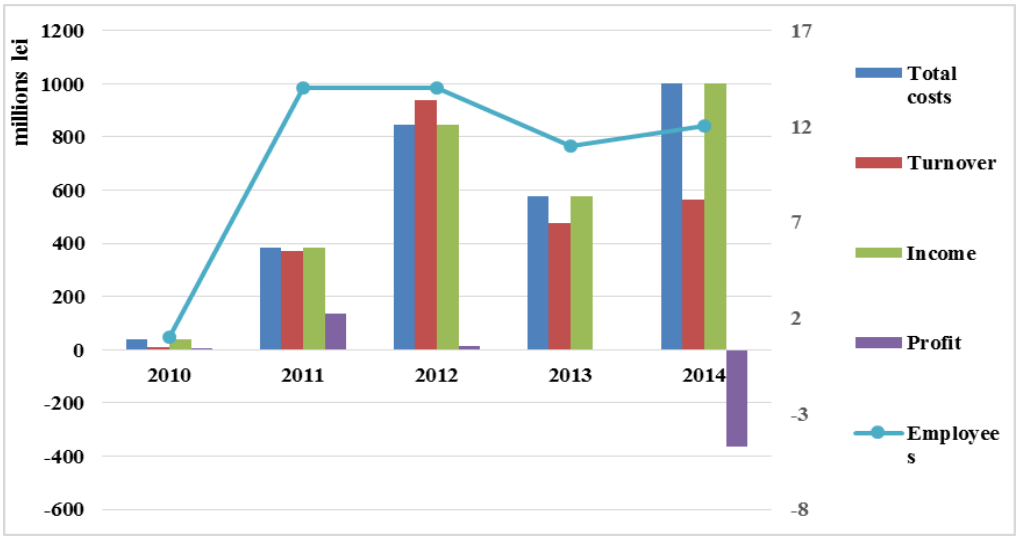

Figure No.4. Profit and loss account for The Romanian organic aquaculture sector
Source Author, using data from The Romanian Ministry of Finance, 2015