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THE SUSTAINABILITY OF FISH CONSUMPTION IN ROMANIA: CUSTOMER BEHAVIOUR PRIOR AND AFTER THE COUNTRY'S ADHERENCE TO THE EU

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Abstract

Using two sets of bivariate analyses in SPSS, we have tried to find out how sustainable the fish consumption in Romania is. We have used numerical variables, computed based on primary data obtained from Eurostat and the National Institute of Statistics. Two different timespans have been considered: the one prior to the country's adherence to the European Union and the one after. Using the two timespans let us compare the pre- and post-adherence situations, in order to see if the subsidies offered by the EU have had any effect on the sustainability of the environment.

The variables used have been of economic nature (index of real earnings), respectively related to the sustainable consumption of fish, all computed for one calendar year (total fish consumption, captures from inland waters, and aquaculture production). The results indicate significant correlations between total consumption and captures ($r = .947$ for the first and $r = .990$ for the second timespan), and between real earnings and consumption, respectively captures (only for the first timespan), but not significant correlations for the links between aquaculture and the rest of the variables. This shows a high pressure placed on the natural environment, which could eventually be reduced by improving aquaculture production.

Keywords: sustainable consumption, customers, sustainability, aquaculture, captures from inland waters, index of real earnings

JEL Classification: E21, F15, F40, Q25, Q52, Q53, Q57

Introduction

Changes in marine ecosystems call for a more sustainable future, requiring a correlation of the seafood consumption with the fishing activity. Science and practice have tried for some decades now to make consumers aware of environmental norms and efficient behavior (Dinu, 2012, Spaargaren, 2011). In this article we wanted to investigate how sustainable fish consumption in Romania was prior and after the country's adherence to the European Union. To prepare the results and their interpretation, we started with literature review, in

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which we have tried to present some important aspects related to sustainable consumption, so that we could set the conceptual framework of the research. A subchapter of the review was dedicated to the relationship between sustainable consumption and economic systems, and it was meant to show that the lack of market equilibrium and the customers' lack of awareness of a decreasing marginal utility can have negative effects both on the economic and ecologic stability. The literature review ends with a presentation of the sustainable consumption in aquatic environments and with an introduction of several key concepts relating to aquaculture, an important component of sustainability in fishing.

The second part of the paper is dedicated to the research methodology, in which we have presented information about data sources and the way in which these have been processed in order to fit the purpose of research, about the software used to save and analyze data, and about the types of statistical computations carried out. The methodology also presents, on a wider basis, the research aims, the research objectives, and the research questions. The study ends with a presentation and an interpretation of the results, as well as with a series of conclusions meant to test the hypotheses launched in the research.

1. Literature Review

Evans (2011) argues that the issue of sustainable consumption has become a hot topic since the 1992 Earth Summit, which focused on the impact consumption patterns of industrialized societies have had on the environment. Led by several factors such as urbanization, growth in income and spending power, and growth of population, increased per capita consumption placed pressure on ecosystems, threatening their structures (Rosegrant et al., 2001; Safarzynska, 2013).

Scientific research has been a keen follower of the topic. An important segment of the academic literature has chosen to define sustainable consumption while presenting what non-sustained consumption meant (Bansal et al., 2007). Yang (2011) outlines non-sustained consumption as a type of consumption that permanently bares the risk of random shocks for the environment. Diamond (1982) went so far as to state that not only the environment, but the entire economic system was threatened by overabundance in consuming goods.

The rich empirical evidence on non-sustainability can be explained through the sustainability/non-sustainability dyad. According to it, while it is widely acknowledged that durable consumption has an important role, it seems that non-sustainability is the normal order of things: in many cases, with the price of satisfying consumption, little attention is granted to ecosystems. At the call of several organizations that have identified non-sustainability as a cause of environmental decadence (UNDP, 1998), sustainability concerns were transformed into political ideologies. After decades in which the public discourse was ruled by the myths of growth, politics and businesses have become aware of the importance and necessity of sustenance (Nielsen, 2011). The limits of economic growth have been demonstrated especially after the recent financial crisis, setting the grounds for sustainability to win share of interest. Politics have materialized sustainability concerns in programs aiming at improving production and resource collecting techniques so as to raise economic efficiency and also make the environment cleaner and wealthier. Nonetheless, it has to be noticed that even in turmoil times, economic growth continues to be regarded as the main factor of progress. Therefore, political initiatives do not always result in maintainable consumption and production designs. Consumers and producers continue to conduct their actions so as to maximize economic benefits, their decisions often having

negative effects on the ecosystem (Jackson, 2005). What is more, sustainability being such a delicate issue, governments often hang back when it comes to assuming responsibility (Lafferty, Meadowcroft, 2000). The scapegoats often blamed for unsustainability are consumers themselves, although sustainability means the optimal combination between consumption and production, the latter one missing from the equation. Governmental bodies and researchers alike claim that people consume too much and, therefore, place pressure on ecosystems (Arrow et al., 2004; OECD, 2001).

Impelling people to change behavior can be achieved by clearly presenting them what sustainable consumption is about. In this direction, another school of thought, focusing on the positive, sustainable part of the dyad, claims its rights. Observational proof on sustainable consumption defines the concept as a type of consumption that can satisfy the needs of current and coming generations of consumers without altering ecosystems (Phipps et al., 2013). In fact, one of the main characteristics of sustainable consumption is its drive towards protecting the effectiveness of natural environments (Bandura, 1986).

Following the increasing advent of social responsibility on the agendas of public and private organizations, the International Standardization Organization has created ISO 26000, a social responsibility dedicated guidance (Castka, Balzarova, 2008; Schwartz, Tilling, 2009). This global initiative tries to integrate more responsibility in the production strategies and operations, as well as in consumption (Castka, Balzarova, 2007). ISO 26000 encourages producers to supply their customers with quality-rich products, both from a technological point of view, as well as in what concerns the environment. Nevertheless, Hemphill (2013) considers that the implementation of ISO 26000 is hindered by its own too large horizons: without sector or industry dedicated measures, each and every producer can understand the standard in different ways. To bear in mind for the fishing industry is that ISO 26000 makes clear references to the protection of animals, the elimination of the negative impact of captures upon the environment, the correlation of supply with demand and the provision of full and true information for consumers.

1.1 Importance for economic system

While it is closely related to the environment, sustainable consumption would not exist without also being interrelated to economics. Therefore, it has become of a particular interest for many scientists to investigate the associations between sustainability and economy. The main claim of this course of research is that economic growth has to be scaled to a proper size where environmental goals are not affected. Researchers argue that consumers must become more aware of the saturation level (Cohen, 2001). Acknowledging that consumption is limited by the law of descending utilities can have a major impact upon the wider economy, which makes sustainable consumption an issue not only of consumers, but of producers as well. As an important part of consumption is met by economic goods, the production of the latter ones also becomes part of the sustainable consumption debate. Hence, the quest in sustainable consumption is to either consume or produce in such a way as not to harm the surroundings. Accordingly, sustainability can be presented as the degree in which a system can combine ecological goals with economic growth (Prelicean, Boscoianu, 2012). Moreover, Manoochchri (2002) identifies market mechanisms as the main building blocks of sustainability.

Because sustainable consumption is directly influenced by consumers, supply will have to adapt, with request and bid having to meet on the market. However, in the lack of market equilibrium, consumption and production alike bare the risks of becoming threats to

sustainability (Dragulănescu, 2007). With greedy producers and rapacious consumers, politics are often left the only chance to intervene and regulate markets. The "Our Common Future" report in 1987 showed that sustainability is a matter of needs and limitations, which time and again are pulled in through political programs, as neither customers, nor producers are ready to restrict themselves. On the one hand side, people ought to reduce their consumption to a level at which their needs are satisfied. Then, and not less important, producers should adapt their offerings to the level of the demand. However, failure in doing so leads to overconsumption and overproducing, which once appeared will continue to trigger one another.

1.2 Aquatic environments

In what concerns Aquatic environments, scientific literature recognizes the importance of complex marine and riverine ecosystems for the sustainable development of the fishing industry (Akpulu, Bitew, 2011; Douvère, 2008). Proper water use management is seen as a critical step in helping ecosystems develop, with recent enterprises concentrating on the need to conserve delicate areas (Douvère, 2008). Sustainability concerns directed towards watery ecosystems involve both overconsumption and overexploitation. Overconsumption of fish impacts the marine environments as natural fish stocks risk being depleted in the hunt to ensure the supply needed to match the inflated market demand (Ellis, 2003). The increased commercialization of fish products has led to an industrialization of fishing with severe effects on the natural surroundings. Human exploitation of natural waters has been demonstrated to alter the structures of ecosystems. Myers and Worm (2003), for example, identify species of fish that have been reduced to less than ten per cent of the quantity which used to exist in pre-industrialized ages. Overfishing is regarded as one of the highest threats to the functioning of marine ecosystems, next to climate-driven effects (Dudgeon et al., 2006; Grădinaru, 2002). Eliminating fish from rivers and seas can have negative impacts on the ecosystems (Sinclair, Valdimarsson, 2003). Because it does not let fish stocks reap optimally, overfishing is considered a not advisable situation (Silberschneider et al., 2009). While sustainability is widely seen as the most appropriate solution for stopping the environmental degradation (Pasqual, Souto, 2003), innovations in production systems can't guarantee sustainability if unmatched by modifications in consumption behavior. Sustainability, hence, becomes a question of correlating supply and demand for fish food. Fish captures need to be matched by sustainable consumption patterns. One of the main concerns in the current global economy is the overexploitation of resources, which shows that production and consumption volumes are yet unmatched properly (Lehtoranta et al., 2011). Based on own calculations from FAO data, we identify that Romania has wasted 9580 tonnes of fish food between 2002 and 2008. Table 1 shows the amount of waste per years, computed by subtracting the annual total consumption of fish-food products (in tonnes) from the amount of fish in the domestic supply that was used purely for food purposes. Such wastes, it has been demonstrated, alter the structures of ecosystems: to many a fish captured in natural waters leads to a reduction of the living matter and of potential yields (Howes, 1998; Oguz et al., 2012; Planque et al., 2010). Stocks are reduced to a level wherefrom sustainability is threatened (Ludicello et al., 1999). The numbers presented in Table 1 and the graphic representation in Figure 1 indicate that fish consumption in Romania was not sustainable yet until 2008. This unsustainability placed pressure on Romania's trade balance. While fish captured in inland waters and fish grown in aquaculture were not enough to satisfy the customers' demands, Romania was forced to import fish from overseas. Figures provided by FAO between 2002 and 2009 show that

Romania has constantly had a negative trade balance in what concerned the quantity of fish during that timespan. However, not only the trade balance was in danger.

Table nr. 1: Fish food waste in Romania between 2002 and 2008 (in tonnes)

Year	Waste (in tonnes)
2002	1074
2003	1674
2004	1117
2005	4246
2006	159
2007	410
2008	900
Total	9580

Source: Own computations based on raw data from FAO.

Motivated by overconsumption, fisheries tended to overexploit natural waters. Prior to Romania's EU integration many aquacultures have failed in doing business profitability, which would have translated through taking the burden off the natural environment. Figures show that aquaculture production has decreased in the years leading towards 2007, while the captures from inland waters tended to grow. As overfishing was motivated by unsustainable consumption, the European Union was forced to intervene in order to protect stocks in natural waters. The EU opened the non refundable grant *Axis 2, Measure 2.1. – Productive Investments in Aquaculture* in order to stimulate aquaculture and promote better fishing practices, so as to reduce overfishing and to guarantee more sustainability.

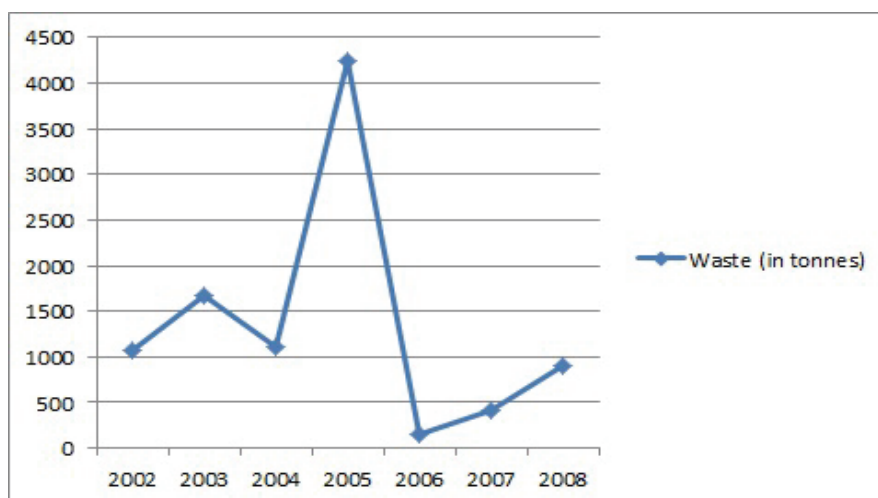


Figure nr. 1: Romania's waste of fish food between 2002 and 2008 (in tonnes)

Source: Own computations and representation based on raw statistics from FAO 2013.

Aquaculture can be simply presented as farming fish and other submarine organisms such as crustaceans, molluscs, or aquatic plants (De Silva, Anderson, 1995, p. 5; Edwards, 2000). According to De Silva and Anderson (1995), aquaculture can take various forms:

- Artificially growing fish and releasing them in natural waters from where they will be captured;
- Capturing fish from natural waters and growing them artificially up to the moment when they are going to be sold to the market;
- Raising and feeding fish from its youth.

Romania, as well as other developing countries, still faces problems in improving its aquaculture industry. Amongst the most important difficulties are the slowness in adopting modern technology and the limited national research and education capacities (Edwards, 1998; Istudor et al., 2010). The economic difficulties faced by Romania delayed the country's potential to improve its aquaculture base. First, macroeconomic data show that Romania lags compared to most of its European Union counterparts. For example, GDP per capita in 2010's Romania was only 22 per cent of the EU-27 average (Eurostat, Key figures on Europe, 2011, p. 19), which indicates that both consumption and investment power are reduced. Second, national agricultural trends are on a downward slope: the added value generated by the local agriculture between 2008 and 2009 decreased twice as fast the EU's (Ignat, 2011). In such a situation, the aquaculture can't satisfy the local demand for fish, even if it did complement with the local fish captures. As can be seen in Figure 2, the annual total consumption of fish lies far above what aquaculture can produce.

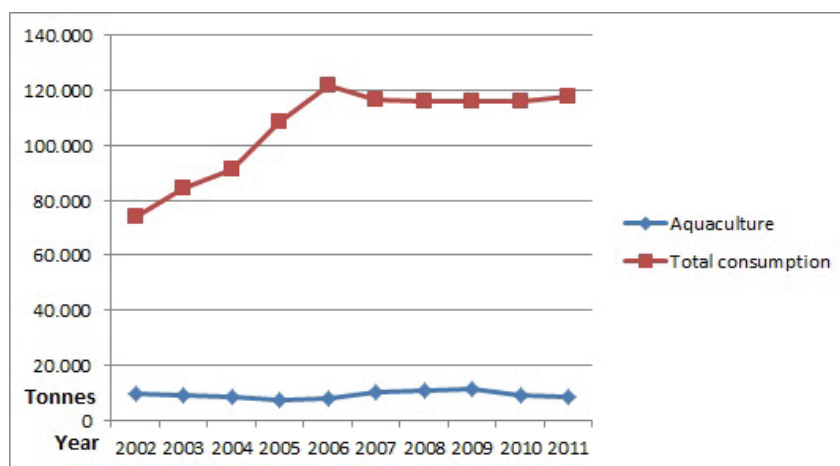


Figure nr. 2: Comparison between the total consumption of fish and the production of aquaculture (in tonnes), 2002-2011

Source: FAO Stat, 2013. Own representation

2. Methodology

The purpose of our study was to investigate how sustainable fish consumption patterns were in Romania prior to and after the country's integration in the European Union. We have therefore chosen two courses of action. First, we wanted to find out how economic changes influenced sustainable consumption. The rationale behind this research aim was

our supposition that, when earnings of individual consumers changed, also did their fish consumption patterns. We have set out to answer this question as Romania's integration to the European Union occurred at a moment placed right after the country's economic boom and prior to the global financial crisis. We found it interesting to see whether the shift from one economic end to another has had any impact on how people consumed fish, especially as Rosegrant et al. (2001) note that times of economic change usually have a major influence on consumption patterns and their sustainability. We were also interested in following whether the free access to the pan-continental market impacted sustainable consumption? With the local market opening for foreign goods, we set to find out if this has had any influence on sustainability and on the wellbeing of ecosystems.

Second, we wanted to investigate how the stimulation of aquaculture has influenced both fish consumption and sustainability. Therefore, our research questions were the following:

RQ1: How did economic changes influence sustainable consumption?

RQ2: How did aquaculture influence sustainable consumption?

For the purpose of our paper, we have defined sustainable consumption as a consumption pattern stable over time, backed by a decrease of captures from natural fishing areas and an increase of the aquaculture productivity.

The study took the form of a correlational research, concerned with establishing the interdependences between several macroeconomic and sustainable consumption variables. Raw data was gathered from Eurostat and from the Romanian National Institute of Statistics, using materials provided on the websites of the organizations, as well as the *Romanian Statistical Yearbook 2011*. Two types of numeric variables were gathered: macroeconomic and sustainability variables. The macroeconomic variable, "Index of real earnings", was collected from the National Institute of Statistics. The National Institute of Statistics defines the Index as "a ratio between values of the same variables recorded in various time or territorial units" (*Romanian Statistical Yearbook*, 2011, p. IX). Hence, the Index of real earnings lets know how real earnings of people have changed over time. For our study, the index was used as a measure of the consumers' economic wellbeing, the latter one being further used in order to test the impacts of economic changes on sustainability. In what concerns the sustainability variables, three fish consumption-related variables were used, all of them collected from Eurostat: Total fish consumption (in tonnes, per year), Captures from inland waters (in tonnes, per year), and Aquaculture (production in tonnes, per year).

Collected data was stored and computed in Microsoft Excel. In several cases, computations have been done in order to find out the approximate value/year. For example, the fish consumption figures provided by Eurostat were given as per capita consumption in kilograms a year. So as to find the total yearly fish consumption in tonnes, we identified the total population of Romania for that particular year (provided by the National Institute of Statistics) and multiplied it with the per capita consumption, and then divided by 1000. Secondly, as in some cases figures were lacking for Captures in inland waters, and Aquaculture, we had to make computations around the data reported by Eurostat for Total fish production in order to find the former two variables. We therefore used the following two formulae:

Aquaculture = Total Fish Production – Captures in inland waters

Captures in inland waters = Total Fish Production - Aquaculture

Two timespans have been chosen for analysis. The first one, 2004-2006 ($n=3$), corresponded to Romania's pre-integration period, while the second one, 2007-2010 ($n=4$), corresponded to the period after Romania has been accepted in the European Union.

The IBM SPSS Statistics v19 software was used to carry out the correlations. Bivariate analyses have been conducted in SPSS in order to identify the influences that macroeconomic developments and aquaculture have had on sustainable consumption before and after Romania's entering into the EU. The aims of the bivariate correlations were to find out the interdependencies between variables. Overall, six correlations have been made. First, we tried to find out how economic growth influenced the three sustainability variables, with a particular focus on total consumption and captures from inland waters. Then, we were also interested to see how aquaculture influenced total fish consumption and the captures from inland waters. Last but not least, we have investigated the relationship between captures from inland waters and total fish consumption.

The six correlations were carried out for the 2004-2006 period, and then repeated for the 2007-2010 period. This resulted in two separate sets of data, which were thereafter compared in order to see whether differences in sustainable consumption can be identified for the period before Romania's EU integration and the one after. 2004 was used as the reference year for the index of real earnings: changes in real earnings for 2007, 2008, 2009 and 2010 were reported to the basics of 2004 (100).

We used Pearson's r to find out whether there was any correlation between the four variables used in the study. If this first condition was true, the r then offered further information about the direction and the significance of the relationship.

3. Results

Note that we have carried out two identical correlational computations, but for two different timespans: 2004-2006 ($n=3$) and 2007-2010 ($n=4$). The correlations were run using the bivariate analysis function in SPSS. A two-tailed test of significance was used, with the confidence interval set at a 95 per cent confidence level (sig 2-tailed level of significance at .05). For analyzing and showing the data in this paper, we have used the following abbreviations: Ind = Index of real earnings; Tfc = Total fish consumption; Ciw = Captures from inland waters; Aqua = Aquaculture production.

The values of the Pearson's r 's for the 2004-2006 timespan are displayed in Table 2.

Table nr. 2: Pearson's r 's values of the bivariate correlations between Ind, Tfc, Ciw, and Aqua for the 2004-2006 timespan

	Ind	Tfc (tonnes)	Ciw (tonnes)	Aqua
Ind		1.000	.941	.346
Tfc (tonnes)	1.000		.947	.364
Ciw (tonnes)	.941	.947		.644
Aqua	.346	.364	.644	

The critical value for the Pearson r in this case where $n = 3$ lies at .878. The bolded numbers in Table 2 are the ones equal or higher than .878, and therefore, significant. There are three significant correlations, of which one, between the Index of real earnings and the

Total fish consumption, yields an index of association of + 1.00, which means that it is perfectly positive. The other two significant correlations occur amongst the Index of real earnings and the Captures from inland waters ($r = .941$) and amongst the Total fish consumption and the Captures from inland waters ($r = .947$). It is interesting to see that Aquaculture is the one and only variable that couldn't produce significant correlations, all of its associations being beneath the critical r border at .878.

The results of the second series of correlations, for the 2007-2010 timespan, are displayed in Table 3.

Table 3: Pearson's r 's results of the bivariate correlations between Ind, Tfc, Ciw, and Aqua for the 2007-2010 timespan

	Ind	Tfc (tonnes)	Ciw (tonnes)	Aqua
Ind		-528	-413	.565
Tfc (tonnes)	-528		.990*	.270
Ciw (tonnes)	-413	.990*		.343
Aqua	.565	.270	.343	

Note: (*) Confidence level at 0.01

The critical value for the Pearson r for the second set of correlations, where $n = 4$, lies at .811. Therefore, out of the three valid correlations in the previous analysis, only one, between the Total fish consumption and the Captures from inland waters kept its significance, and even this one at a 0.01 level of at least .917. None of the other five correlations is significant, which includes neither of the other two that were significant in the first set, which both included the Index of real earnings. The Aquaculture variable still couldn't establish significant correlations.

4. Discussions

The results for the 2004-2006 interval indicate that during those years fish consumption was strongly influenced by the growth in earnings: Romanian consumers demanded more fish products as a consequence of their improved economic condition. While the market for fish food developed between 2004 and 2006, it has to be said that the same happened with the desires of customers, who demanded more fish from natural waters, as a consequence of the perception that this latter type of fish was of a greater quality than aquaculture fish. Evidence shows that the increase in real earnings is strongly correlated with the captures from inland waters ($r = .941$). This lets us conclude that, as Romanian customers had more disposable incomes, they demanded more fish from natural waters. As a consequence of this type of demand, captures from inland waters increased between 2004 and 2006, as Figure 3 displays.

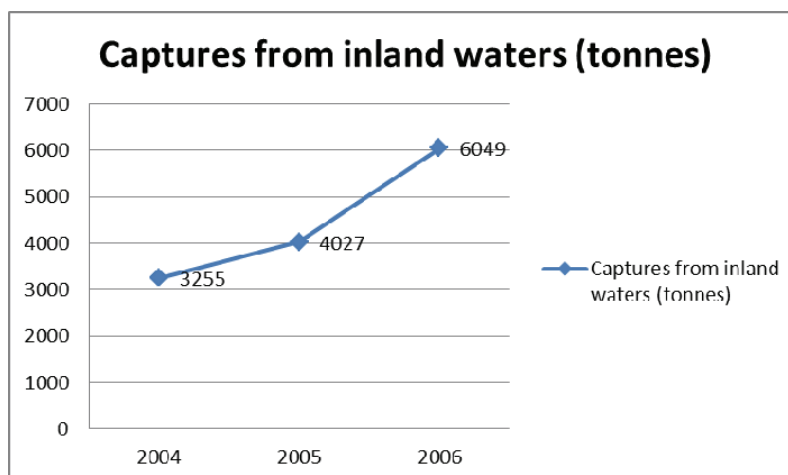


Figure nr. 3: Captures from inland waters between 2004 and 2006 (in tonnes)

Source: Own display based on Eurostat data

Meanwhile, results show that the correlation of the aquaculture production with all the other indicators is insignificant, which leads us to the following observations:

- Aquaculture production before 2007 was not strongly stimulated by internal market demand, but rather by other factors;
- Improved earnings of customers did not have much effect on the aquaculture production between 2004 and 2006, with the demand for this sort of fish even falling during that period;
- As the correlation between aquaculture and total fish consumption is not significant (.364), it can be said that Romanian consumers satisfied their needs for fish food from other sources, like natural waters productions or imports, aquaculture being mostly used for non-alimentary sources.

Hence, while the national economy improved and their earnings increased, Romanian consumers opted for more fish from natural waters, which led to a steady decline in demand for aquaculture products between 2003 and 2005, as can be seen in Figure 4. It is true the same downward slope is visible for the captures in inland waters. However, sustained by a higher demand due to increased earnings, the demand for fish from natural waters recovered faster. The circles in Figure 4 indicate that, while production of aquaculture fish was still falling, the capture of fish from inland waters recovered momentum. The SPSS analysis indicates that the faster growth of the captures from inland waters (50% growth year over, from 2005 to 2006) compared to the aquaculture production (25% growth year over, from 2005 to 2006) was motivated through the higher demand for fishes from natural waters, made possible by the increased earnings of customers and by the already mentioned perception of higher quality of natural water fish.

It can be said that the economic developments in Romania between 2003 and 2007 led to the intensification of unsustainability in fish consumption, with the customers demanding more fish from natural waters. Such a demand has put pressure on the local marine and riverine ecosystems. Therefore, the EU continued to subsidize aquaculture after 2007 as well, after in the years before it has contributed with SAPARD funds. The aim was and still is to improve aquaculture so as to possibly replace the fish from natural waters in the

market demand and protect the natural fish stock. For the 2007-2010 interval, the results show that, after 2007, there isn't any more a significant correlation between the economical, expressed by the index of real earnings, and the fish consumption, respectively the captures from inland waters.

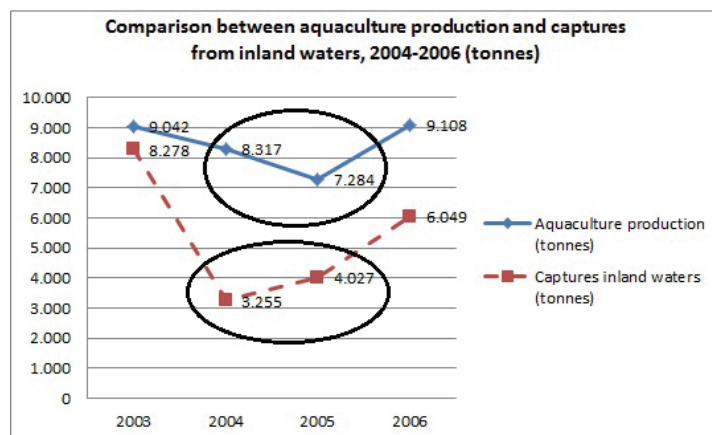


Figure nr. 4: Comparison between aquaculture production and captures from inland waters, 2004-2006 (tonnes)

Source: Own display based on Eurostat data

Although highly increased as compared to 2004, the fish consumption was motivated by other factors than economical ones. At the same time, the captures from inland waters have been reduced, after the country's adherence to the EU, to nearly half the level of 2004. So, if for 2004-2006, a perfect positive correlation existed between the index of real earnings and the fish consumption (the consumption was directly proportional with the evolution of wage earnings, moving the same way as the latter ones moved), after 2007, the relationship between the two variables is not significant anymore. Such a situation can signify that the Romanian consumers have got acquainted with the consumption of fish, as well as the transformation of fish in a consumption good accesible to the wider public. As can be seen in Figure 5, the annual consumption of fish per head has followed the direction of the index of real earnings, which confirms one of the hypotheses of our research. To note would be the different dynamics: slowly growths of the real earnings motivated significant growths of the fish consumption. The dynamics show that 2002-2007 has been a period in which the Romanian consumers have rediscovered fish in their nutrition after a post-revolutionary decline influenced by the economic difficulties of the first post-decembrist decade. Once with the economic recovery and the expansion years in the first half of the new millenium, which led to an increase of the household earnings, the customers consumed more fish. Hence, in 2010, Romanians consumed, on average, 58 per cent more fish as in 2002. Only in 2006, sixteen years after the Revolution, consumers have managed to reestablish the fish consumption at the level it was in 1990: 5,6 kg/head in 2006 and 5,5 kg/head in 1990. However, according to FAO data, the level of 1989 (6,8 kg/head) is still far away even from the level of 2012 (5,3 kg/head). The farther still is the level of 1982-1989, when Romanians consumed, on average, over 9 kg of fish per year (FAOstat, 2013).

The strong growth of fish consumption between 2002 and 2007 has allowed consumption to stabilize around five kilos and a half per head a year, even after the breakout of the

global financial crisis. Eventhough after Romania's adherence to the EU, the fish consumption has not been influenced any more by wage earnings, once consumer preferences have been formed, Romanians have not given off fish any more. This positive trend has also been influenced by the fact that, according to the National Institute of Statistics, although earnings have decreased after 2008, their level was still higher as the one of the reference year 2004.

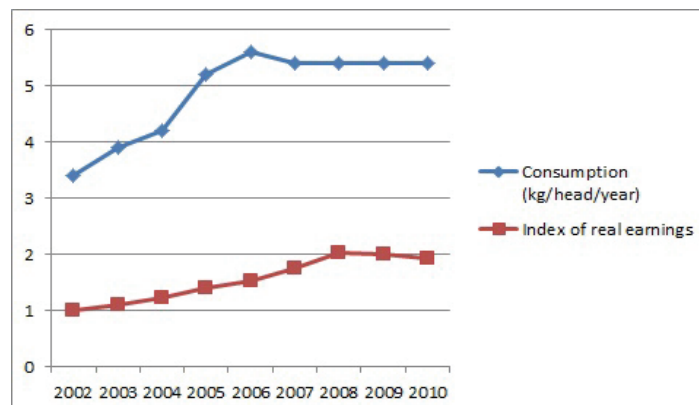


Figure nr. 5: The evolutions of fish consumption and of the index of real earnings

Source: Own display based on Eurostat and INS data

This stabilization, though advantageous for the industry, can prove dangerous for the quality of natural waters, as aquaculture production couldn't be stimulated. Research results show us that there isn't any significant correlation between aquaculture production and the consumption of fish, neither for the 2004-2006 timespan, nor for 2007-2010. Some observations can be made. Once, that Romanian aquaculture is rather used for purposes other than growig fish for human nutrition. As De Silva and Anderson (1995) showed, aquaculture does not only mean the artificial nurturance of fish for accomplishing alimentary goals, but also its nurturance in order to be later on freed in natural waters or to be used as a resource in other industries, such as pharmaceuticals. Then, while aquaculture can't be correlated with consumption in order to fulfill some part of the latter one, the task of satisfying market demands rests on the shoulders of imports and on the ones of the captures from inland waters. Hence, eventhough they were reduced to nearly half the level of 2007, the captures from inland waters, continue to be strongly related to consumption, significant correlations existing amongst the two both for the 2004-2006 timespan ($r = .947$), as well as for 2007-2010 ($r = .990$).

Conclusions

Here and there, Romanian fish consumption continues to be unsustainable. Eventhough some positive signals exist, there are still problems. Aquacultures have failed to accomplish their tasks properly, both prior and after Romania's adherence to the European Union. The aftermaths of accessing nearly 52 million Euros from the Prioritary Axis 2, Measure 2.1., can't be seen yet. As long as the embracement of modern production technologies and schooling of aquafarmers will continue to be delayed, the aquaculture won't be able to contribute to the improvement of the sustainable consumption, with the bid for satisfying

market demand continuing to be fulfilled by fish from natural waters, which, if a good aquaculture infrastructure existed, could be protected.

Fish consumption sustainability will only be obtained when the correlation between the captures from inland waters and consumption will become insignificant. This would mean that, however demand would change, the captures from inland waters won't fluctuate, remaining at a constant level, on the long term. A first step that could be done for encouraging sustainable consumption would require the organizations to assume the responsibility of presenting to customers that aquaculture could be one of the solutions of protecting the environment. Producers, vendors and distributors can cooperate to present themselves in front of the customers with honest retailing practices, either for fish from natural waters or from aquaculture. Without, first of all, the organizations assuming the role of sustaining a fish consumption based on solutions with low environmental risks, the behavior of consumers would hardly let itself changed.

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