The Traceability and Safety of Fishery Products

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A R T I C L E I N F O	**A B S T R A C T**

The paper follows two main objectives: to understand consumers' perception of safety trasability and quality of fishery products and to identify communication levers in order to improve the perceived image of fishery products. The present research is focused on the fishery products, regardless of their presentation – fresh, frozen or processed. This paper conducted a questionnaire survey of Romanian consumers' perception toward fishery products. The empirical study with brands indicated that consumers are different awareness to domestic and foreign safety fish products. National fishery products got more attention from the consumers.

1. Introduction

The safety and quality of fishery products has been of particular concern in recent years. Fish food quality has always been very hard to quantify. The two main parts of overall quality are safety and freshness. A food is considered unsafe when a person eats a product and has an unpleasant physical side effect. A safe food should cause no unwanted physical side effects. Freshness is an individual opinion; it is how the consumer feels about the product based upon their senses. While there are basic sensory guidelines to follow when choosing fishery products, it usually comes down to how the consumer feels about the product's general appearance and/or odor. Consumers normally examine color, flavor, odor and texture when evaluating fishery products (Brockman, 2006). This research will help fishery providers ensure their product will be both safe and fresh for the consumer.

The quality of fishery products has always been hard to define, and is typically based on the general perception of the consumer evaluating the product.

Expiration dates serve as a guide, but the sensory appeal of a fishery product is generally the deciding factor as to whether a product is deemed acceptable or not by the end consumer.

Fisheries and aquaculture can help meet the development goals:
- fish contributes >50% of protein intake for 400 million people from the poorest African and South Asian countries
- employs 135 million worldwide, a quarter of whom work in aquaculture
- for the World's 40 least developed countries, fish is the third largest traded commodity

The fishery products represent a kind of important producer goods as it plays a significant part in agricultural production market. With the development of aquaculture, there are rapidly growing demands for fishery products from consumer, so fishery products farms will face increasing fierce competition in the market. (Armstrong et all, 2000) In the modern market economy, consumers are the main body of fishery products market, their attitude, perception and preference toward a brand will largely influence the sales volume of this kind of products, and even the survival and development of the fishery farm.

This paper purpose is to investigate and analyze consumers' fishery products awareness, purchasing behaviour, based on an empirical survey. The present challenges for fishery products supply are:
- Provenience from 150 countries
- 80% from foreign sources
- Fishery products safety problems common
- Fishery products economic fraud is common
- Resources to address the problem have been limited
- Consumer perception not always factual
- The consumer demand for fishery products continues to grow.
- Domestic demand for safe aquaculture products will continue to exceed domestic supply from wild stocks.
- The contribution of aquaculture to supply fish, crustaceans, mollusks and other aquatic resources will continue to grow.
- Increasing fishery products consumption and demand are exceeding capacity for inspection.

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- Economic fraud in the nation's fishery products supply is increasing.
- Consumer confidence in fishery products safety is declining.
- The human health benefits of fishery products consumption are becoming increasingly apparent.
- Resources are inadequate to ensure safety and quality of fishery products.
- Situation will probably worsen with increased aquaculture production.
- Adequate inspections of imported fishery products are not practical given the amount of resources available
- Develop new and automated technologies for more rapid, timely, and cost-efficient analyses of contaminants and antibiotic residues
- Economic fraud from species substitution and mislabeling is decreasing consumer confidence.
- Consumer confidence in the sustainability of the nation's fishery products supply is decreasing.
- Augment research directed at evaluating benefits versus risks of fishery products consumption, including contemporary assessments of mercury, selenium, banned chemical contaminants, emerging chemicals of concern, and omega-3 fatty acids

2. Methods
Conceptual framework

The market share of any product is highly determined by the purchasing behavior of the consumers. Following study is conducted by the researcher to find out the behavior of the consumers, to analyze the preference of consumers, consumer awareness. Descriptive research design was adopted and the data is collected through primary and secondary sources. The method adopted for conducting survey is questionnaire; Simple random sampling technique was adopted for selecting the consumers.

Perception is a mental process, whereby an individual selects data or information from the environment, organizes it and then draws significance or meaning from it. Product class knowledge is a measure of consumers perceptions of how much they know about a specific class of products. Attitudes cannot be seen; they can only be inferred from the manner in which an individual behaves. Nevertheless it is crucial that attitudes are measured. This is because an individual with a positive attitude towards a product/service offering is more likely to make a purchase. Attitudes can be measured by observation, qualitative studies and quantitative techniques.

Observation: As has been mentioned above, attitudes can be inferred from the manner in which an individual behaves. By making observations of behavior, a marketer can infer a consumer's attitudes. For example, if a person patronizes Colgate toothpaste and buys it, it can be inferred that he likes that brand.

Observation as a process of measuring attitudes, has both pros and cons. Advantages are that on the basis of past experiences, market researchers can make quick inferences. Disadvantages are that the process is expensive in terms of time and money; further findings may not always be reliable and valid. Thus, the method is used to complement other tools and techniques in research, and is generally not used as the sole method of research.

Qualitative studies: Attitudes can also be measured through qualitative tools and techniques that help identify consumer opinions and beliefs as well as their feelings, by getting them involved in open discussions. Such techniques could take the forms of focus groups, depth interviews, and psychological tests.

Quantitative techniques, Rating scales or Attitude scales: Commonly used methods for measuring attitudes is via attitude scales. Consumer survey questionnaires based on rating scales are used to measure attitudes quantitatively. The most commonly used attitude scale is the Likert scale, which measures consumer reactions on a five point or on a seven point scale based on degrees of agreement and disagreement, or liking and disliking. Another scale that is commonly used is the one that uses a bipolar scale comprising opposite adjectives at each extreme; this is known as a Semantic differential scale. While collecting responses may be time consuming, rating scales provide a means for quantitative analysis, and thereby lead to reliable and valid findings. However, care should be taken to chose a sample representative of the sample.

Questionnaire

Research methodology is the process of solving the problem systematically by research. The objective of the study is to solve the problem by using available data. Descriptive research can be either quantitative or qualitative. It can involve collections of quantitative information that can be tabulated along a continuum in numerical form, such as scores on a test or the number of times a person chooses to use a-certain feature of a multimedia program, or it can describe categories of information such as gender or patterns of interaction when using technology in a group situation. Descriptive research involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data collection. It often uses visual aids such as graphs and charts to aid the reader in understanding the data distribution. Because the human mind cannot extract the full import of a large mass of raw data, descriptive statistics are very important in reducing the data to manageable form. When in-depth, narrative descriptions of small numbers of cases are involved, the research uses description as a tool to organize data into patterns that emerge during analysis. Those patterns aid the mind in comprehending a qualitative study and its implications.

Sample is the fraction of the population; sampling is a technique or a method of selection of samples. The researcher in carrying out this research adopted the most appropriate sampling technique for research that is the simple random technique.

Simple random sampling method, it is assumed that each and every unit in the population has equal chance of occurrence or equal probability of occurrence. In other words the sampling units are selected randomly. An unbiased random selection of individuals is important so that in the long run, the sample represents the population. However, this does not guarantee that a particular sample is a perfect representation of the population. Simple random sampling merely allows one to draw externally valid conclusions about the entire population based on the sample. Conceptually, simple random sampling is the simplest of the probability sampling techniques. It requires a complete sampling frame, which may not be available or feasible to construct for large populations. Even if a complete frame is available, more efficient approaches may be possible if other useful information is available about the units in the population. The researchers have taken 200 samples randomly from the total population. Primary sources of data collected through questionnaire, magazines, journals and website are referred as a secondary source. Personal interview is the method of contact used with the respondents. Personal interviewing method is used because sample size is relatively small and interviewer can ask more questions. For collecting primary data, method used is questionnaire. It is the most popular method used when the population and sample size are large. A questionnaire includes a number of questions, printed in proper sequence, for presenting to respondents for their answers. Each question is contributing to research objectives. Questionnaire was designed with most of closed ended questions and only few open ended question. It was designed to cater to all areas and aspects of the study.

The data has been collected with the help of questionnaire. And it has been analyzed and interpreted with the help of tables along with relevant descriptions. Appropriate treatment has been done to the raw data and logical conclusions are drawn based on the findings. A questionnaire about fishery products consumers' perception was designed based on conceptual framework. The questionnaire have following sections:
- consumer demographic (gender, age, education level, labour number and annual income of household);
- farmers' purchase behaviour of fishery ecological products (purchase experience, money source, information source);
- fishery products perception (familiarity, perceptive price, value).

Survey

The questionnaire survey was conducted with consumers from Braila, Galati, Tulcea, Constanta, Vrancea and Buzau, all being counties of South East Romania's development region, were chosen as the respondents. 200 questionnaires were distributed in above 6 counties and returned 134. After eliminating the validity of the returned questionnaire, 26 questionnaires that incomplete and with logical mistakes were deleted, 106 valid questionnaires were obtained; the effective response rate was 53%. From 106 respondents 82 expressed the intention to buy fish products.

Statistical methods

All the data obtained from the responses at the questionnaires were transformed into statistics variables and then processed. Descriptive Statistics method was mainly adopted to calculate the mean with standard deviation of each variable, and to examine the different levels of consumers' awareness. The index values of product familiarity were the ratio between each product's familiarity value and the average value. The same calculation method was adopted in perceptive price and perceptive value.

3. Discussion
Consumer characters

The questionnaire survey gained a total of 106 valid samples and 82 with intention to buy fish products. Table 1 shows the demographic characters of respondents.

Table 1. Demographic description of fishery products consumers

Demographic variables	Categories	Subjects no.	Percent %
Gender	Male	31	37.80
	Female	51	62.20
Age	18-30	24	29.27
	31-40	29	35.37
	41-50	19	23.17
	51-60	6	7.32
	Above	4	4.88
Educational level	<primary school	1	1.22
	primary school	5	6.10
	junior school	18	21.95
	senior school	20	24.39
	≥college	38	46.34
Labor number of household	<3	41	50.00
	3	19	23.17
	4	21	24.39
	5	2	2.44
	>5	0	0.00

Samples are mostly female (62.20%). They are more inclined to interest in fishery products. Women show a higher sensitivity in health and a greater propensity than men to follow the recommendations for nutrition. This does however not always reflected by a high consumption of fish higher in women than in men in Western Europe.

Age is often presented as an important determinant of demand for food in general and more specifically the consumption of fish. However, the demographic determinants such as age will also be correlated with other determinants such as interest and knowledge of nutrition topics (including aspects so beneficial to health) or health status of person. The interest in issues related to health and nutrition, for example increases with age. The most common age group was 31-40; educational level college (46.34%). Less than 3 persons had accounts for 50% in the labour number of household.

The education level is correlated positively to the image of fish as food easy to prepare. The higher the education level increases, the consumer sees the fish as a food easy to prepare. Place of residence (and more specifically its coastal or continental character) is an important factor in explaining the consumption of different seafood and is linked to historical and current availability of fresh fish.

Purchase behaviour

Consumer behavior is stated as the behavior that consumer display in searching for, purchasing, using, evaluating, and disposing of products, services and ideas that they expect will satisfy their needs. The study of consumer behavior is concerned not only with what consumers buy, but also with why they buy it, when and how they buy it, and how often they buy it. It is concerned with learning the specific meanings that products hold for consumers. Consumer research takes places at every phase of consumption process, before the purchase, during the purchase and after the purchase. According to Philip Kotler defined consumer behavior as "all psychological, social and physical behavior of potential customers as they become aware of evaluate, purchase, consume and tell other about products and services". The scope of consumer behavior includes not only the actual buyer and his act of buying but also various roles played by different individuals and the influence they exert on the final purchase decision .Individual consumer behavior is influenced by economic, social, cultural, psychological, and personal factors. A decision is the selection of an action from two or more alternative choices. Consumer decision to purchase the goods from the available alternative choice is known as "consumer purchase decision". The various options of the consumer may be classified into five main types of decisions. They are what to buy, how much to buy, where to buy, when to buy, how to buy. The participants in the buying decisions may be classified as the initiator, influencer, decider, buyer and users. The marketing people should initiate the participants in the purchase decision to make the purchases of the product at different marketing strategies. There are number of reasons why the study of consumer behavior developed as separate discipline. Marketers had long noted that consumer did not always act or react, as marketing theory would suggest.

Consumer behavior has been always of great interest to marketers. The knowledge of consumer behavior helps the marketer to understand how consumers think, feel and select from alternatives like products, brands and the like and how the consumers are influenced by their environment, the reference groups, family, and salespersons and so on. A consumer's buying behavior is influenced by cultural, social, personal and psychological factors. Most of these factors are uncontrollable and beyond the hands of marketers but they have to be considered while trying to understand the complex behavior of the consumers. In this study, the researcher emphasizes the importance of lifestyle and its impact on the buyer behavior.

There are two factors mainly influencing the consumers for decision making: Risk aversion and innovativeness. Risk aversion is a measure of how much consumers need to be certain and sure of what they are purchasing. Highly risk adverse consumers need to be very certain about what they are buying. Whereas less risk adverse consumers can tolerate some risk and uncertainty in their purchases. The second variable, innovativeness, is a global measure which captures the degree to which consumers are willing to take chances and experiment with new ways of doing things. The shopping motivation literature is abound with various measures of individual characteristics (e.g., innovative, venturesome, cosmopolitan, variety seeking), therefore, innovativeness and risk aversion were included in this study to capture several of these traits (Nagle, 1998).

Purchase intention is widely believed that directly interrelated with purchase behaviour, it is the main index to forecast whether consumer will purchase (Zheng et all., 2010), so the organic fish products intention could imply the familiarity of whether consumer will choose a fish product in the future. Among the respondents, 82 described that they considering purchase a fish.

Price, risks of contamination (microbiological and chemical), sustainability aspects such as environmental risks (damage of the ecosystem, animal cruelty etc.) and risks of depleting fish stocks are the main barriers to eating fish in general for the consumers.

Barriers vary a lot depending on the levels of processing (for example, price is no longer the main barrier for eating frozen fish products). In general, consumers would eat more fishery and aquaculture products if: there was a quality label, prices were more affordable and they had a better knowledge of the quality of these products. Guarantee of the European origin of fish encourages consumers to eat fish in general, all the more so in Southern European countries. Consumers have a positive overall image of fishery and aquaculture products. In general, they think they are good for health, and that they are fresh products.

With Hazard Analysis and Critical Control Point (HACCP) based regulations that require companies to monitor their processing operations (both in the US and the EU), the likelihood of consumers purchasing

seafood of questionable quality should, in theory, decrease. But with imports increasing, economically viable methods for rapidly determining safety and quality need to be developed to protect consumers and providers, and ensure that proper processing standards are followed. For most fishery products, critical control points are hard to define and monitor. The different quality measurements are usually defined by examining microbial count, sensory panel scores, and chemical indicators. Although these methods all show some overlap, there are differences between the quality levels that each one indicates.

Fresh fish received the most positive overall image score and the most positive image with regard to health (Table 2).

Table 2. Image scores for fish production method in South East

	Health	Quality/Price	Fresh	Environment
Wild	1,26	2,51	1,68	1,86
Farmed	1,63	2,34	1,59	1,85

Thus, the image of fresh fish is very similar to the image of fish in general. However, this kind of product obtains a poorer image in terms of quality/price ratio (mostly due to its price, since its quality is considered as good). With regard to health benefits, frozen fish has a less positive image than fresh fish, but its quality/price ratio is considered to be good and its availability to be higher. Preserved fish has a poorer image in terms of quality, but its quality/price ratio is more positive. This product is also considered by all respondents to be the most available.

When buying fish, a quality and/or food safety label is the most important expectation of consumers in terms of information on fishery and aquaculture products. Nutritional information as well as information on the geographic origin of production is among the most important pieces of information consumers are looking for. However, fishing zones as defined by FAO is ranked last by consumers (Fishman, 2004). Consumers are also interested in information relating to the production method and its environmental characteristics.

Most safety concerns in food products are from microbial and chemical contamination. Both of these hazards have to be measured and controlled in order to increase the safety of the food supply. Hazard Analysis and Critical Control Point (HACCP) processing limits these concerns. Processors using HACCP must identify possible hazards and make detailed plans on how to detect and deal with these hazards. A primary goal of HAACP involves keeping a record of control points and making sure that these points are kept within the desired range.

Since 1995, the EU had implemented the HACCP principles by stating that a hazard analysis must be performed, but there were no laws regarding writing down the steps used in each hazard analysis. The US, which had used HACCP-based guidelines since the 1970s to regulate canned foods, followed suit in 1995 by also establishing HACCP guidelines regarding the processing of fishery products. To continue doing business after December 1997, U.S. seafood processors and importers had to have a written HACCP plan on file and an employee certified through FDA approved HACCP training (FoodQualityNews.com, 2006). As of January 2006, the EU issued a new directive stating that "Food safety is a result of several factors: legislation should lay down minimum hygiene requirements; official controls should be in place to check food business operators' compliance and food business operators should establish and operate food safety procedures based on the HACCP principles" ((EC) No 852/2004). In addition, the new EU guidelines emphasize that it is the "primary responsibility of food business operators to produce food safely" (McFadden, 2003). From 1988 to the present day, HACCP principles have been promoted and incorporated into food safety legislation in many countries around the world. The purpose of these regulations is to ensure safe processing and importing of food products, including fish and fishery products. This program arose because of growing public concern about seafood-borne illnesses and seafood safety as well as from industry requests for a practical, cost-effective solution. Microbial contamination is of major concern in almost all food products but is especially important in low shelf-life foods such as meat.

The most popular sources of information used by Europeans are labels and sellers in retail and in supermarkets. These two types of information it was directly gathered by consumers at the time of purchase. The media (Internet, television, advertising followed by written media) also plays an important role in the information of consumers (Xiong, 2010). Non commercial sources of information like scientific reports, consumer associations, institutional campaigns and information are less popular. However, this remark should be qualified by the fact that the question asked within the survey implied an active investigation by consumers.

For the retail sector, farmed fish offers major advantages. On a general level, retailers perceive farmed fish as a product much easier to market than wild fish. Regularity in terms of supply, taste, quality and freshness are the main arguments put forward. One disadvantage of farmed fish for the retailers has to do with the somewhat negative image that can be associated with the aquaculture sector. Still, in most cases, the aquaculture product does not possess any specific image in the mind of the consumer. There is henceforth no distinct link in the mind of the consumer between the aquaculture sector and its image on the one hand and the aquaculture product on the other hand. This is reflected in the behaviour of the consumer, who does not differentiate between farmed and wild products when purchasing fish.

Freshness is more of a nebulous concept. Ultimately the quality of a product is going to be determined by the consumer buying it. Therefore any quality measurement should correlate to sensory changes in the product. Two of the main senses that customers use are sight and smell. Most quality measurements performed in industry use trained personnel to get a sensory score for a product. These personnel are trained as to what to look for and smell for as product quality deteriorates.

The absence of image of the aquaculture sector is still seen as a risk by some managers of the retail sector. Indeed, the image can then still be developed and hence be hijacked. To fill this gap in terms of image should therefore be considered as a strategic priority for the aquaculture sector. The consumer places a high level of trust in the retailer. He/she has the tendency to transfer the responsibility of some of his/her consumption decisions to the retailers, what leaves these later as unmistakable partners in any communication action.

Fish is generally considered as a healthy product by consumers. Any type of communication on fishery and aquaculture products should capitalize on this image of "healthy" product, and put "health" at the centre of the message conveyed. Communication on fishery and aquaculture products should mention the efforts made to guarantee their healthiness to the consumers (quality and food safety labels, standards of production used). The other side of the coin is that fish products in general are considered to be expensive. Proposing special offers may thus be a relevant manner to appeal to new consumers.

Consumers have a confused and slightly negative image of the aquaculture sector. The image of aquaculture products derives from the image of the sector, although consumers generally do not distinguish wild fish products from farmed fish products. They generally consider that the products they buy are wild fish products. Thus, the issue at stake is to understand whether to promote farmed products as such or to promote them as "fish products" (Zeng, 2009).

If a specific promotion of farmed products were to be preferred, it should base itself on the positive but often unknown attributes of these types of products: o an affordable price, freshness and guaranteed nutritional characteristics, optimum traceability along the production process. Beyond the product in itself, filling in this information gap will benefit the image of the sector as a whole. Indeed, improving the image of aquaculture products should be a priority of the aquaculture sector, as it will contribute to improving market acceptance of this type of product, on the long term.

Consumers place environment amongst their first preoccupations and declare to be ready to pay the price requested for a guarantee of quality.

4. Conclusion

The research results show fish consumers have different perception of fishery products. The information channels of brand are mainly from friends, relatives and neighbours, so word of mouth spreading is very important for a brand. The higher perceptive price of foreign fishery brands may reduce consumers' perceptive value and purchase intention to them.

The research results show safety of fish products has different perception in case of organic fishery products. The information channels of brand are mainly from friends, relatives and neighbours, so word of mouth spreading is very important for a brand.

A problem very "acute" refers to the transportation of fish catches in the inland market is not local. Recommend, in this respect, improved conservation of fish products on board. The quality of their products before selling, improving distribution channels and promotion of products from inland fishing are goals to be achieved for a local fish market development and reducing imports of similar products.

Regarding Aquaculture fish production, it is real potential for benefiting the Romanian consumer survey conducted in humanitarian resulting in increased domestic demand for these products. Aquaculture allows local growth, high value species (sturgeon, turbot) and is a real potential for rural tourism and ecotourism. Also, water quality, available in mountainous areas, infrastructure and trained personnel can ensure long-term, high demand satisfaction and business development to lead to Romanian producers.

In conclusion, although this paper is an empirical study based on 106 valid samples, it provides a chance to understand consumers' awareness to different fishery products brands in Romania. A further quantitative research with wider samples will be necessary in the future.

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