

Understanding sustainable consumption of seafood in São Vicente Island, São Paulo, Brazil

Compreendendo o consumo sustentável de pescado na Ilha de São Vicente, São Paulo, Brasil

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ABSTRACT

There is a growing consumption trend towards sustainability. A feedback between sustainability of consumption and biodiversity maintenance seems a positive trend toward sustainability. The results showed that an index of perception of consumers could serve to evaluate the status of the perception about fish resources. This index could be useful for comparing different areas or communities. It could be useful for mapping areas where educational programs could be enforced and detecting population strata where educational attention should be important.

Keywords: environmental perception, seafood consumers, fisheries resources, sustainable consumption.

RESUMO

Há um crescimento no consumo com tendências sustentáveis. Um feedback entre a sustentabilidade do consumo e a manutenção da biodiversidade parece uma tendência positiva em direção à sustentabilidade. Os resultados mostraram que um índice de percepção dos consumidores pode servir para avaliar o estado da percepção sobre os recursos pesqueiros. Este índice pode ser útil para comparar diferentes áreas ou comunidades. Pode ser útil para mapear áreas onde programas educacionais podem ser

aplicados e detectar estratos populacionais onde a atenção educacional deve ser importante.

Palavras-chave: percepção ambiental, consumidores de pescado, recursos pesqueiros, consumo sustentável.

1 INTRODUCTION

Everyone receives information through their senses and interprets it differently (Fernandes et al. 2004; Denny 2006). According to Del Rio (1999), a stimulus of the senses initiates a process of knowledge, triggers interpretations and leads an individual to sketch reactions. This process can generate motivation and interest to make a decision, action or behavior or form an opinion (Zube 1999; Brandalise et al. 2009). Authors affirm that knowledge about environmental issues, which is associated with the perception of individuals concerning the implications of their actions, can lead to changes in attitudes and influence purchase decisions (Fernandes et al. 2004; Brandalise et al. 2009; Rodrigues et al. 2012; Uchida et al., 2013; Aswani, Lemahieu and Sauer 2018).

In the 1970s, the United Nations Educational, Scientific and Cultural Organization (UNESCO) highlighted the importance of environmental perception studies for more efficient natural resource management, emphasizing that the study of complex human interrelationships with the biosphere needs to take into account how the surrounding environment is perceived since decisions and actions are based on objective and subjective factors (Whyte, 1977; Fernandes et al., 2004).

The bibliographic research revealed the existence of other indices, such as about tourist perceptions on environmental impacts (Hillery et al. 2001), or on environmental risk perceptions (Xue et al., 2014), and the Environmentally Sensitive Shopper (ESS) index (Panzone, Wossink and Southerton, 2013), that measure the environmental sustainability of food consumption at the household level. Despite of that, in the literature we did not find in an index specific about the perceptions of fish consumers. According to Sparks and Shepherd (1994), food choice directly affects each individual and is linked to numerous dimensions, such as physiological, psychological, social, political, cultural and ethical dimensions.

Authors such as Lauck et al. (1998), Pauly et al. (2002) and Clover (2004) observed the context of overfishing when the fishing activity became excessive and unsustainable and did not consider the recovery capacity of the species. According to

Lauck et al. (1998), overexploitation has been shown to be a serious problem. Coupled with environmental factors such as marine ecosystem pollution and climate change, overexploitation impacts fish stocks and leads to biodiversity loss (Sumaila et al., 2011, Pauly et al., 2002; Freire and Pauly, 2010). Moreover, there are traditional communities that depend upon artisanal fisheries, some of which have been in the process of substituting fishing for other activities (Begossi et al., 2010; Begossi, 2013; Vieira et al., 2016; Brasil-MMA, 2017).

Fish consumption is increasing worldwide. According to the Food and Agriculture Organization of the United Nations - FAO (FAO, 2012), production increased from 148 million tons in 2010 to 154 million tons in 2011. Between 1961 and 2009, world fish production increased at an annual average rate of 3.2% (FAO, 2012; FAO, 2014).

In 1982, the United Nations Convention on the Law of the Sea initiated a strong stand for sustainable fisheries management. A broader set of principles, standards, institutions and regulations was established. Fish certification and eco-labeling schemes were developed to meet the new demands. These schemes emerged as an important management tool because they provide more information to the final consumer about the socioenvironmental impacts (Lauck et al., 1998; Wessells et al., 2001; Potts and Haward, 2007; UNEP, 2009; Kirby, Visser and Hanich, 2014; Roheim, Asche and Santos, 2011; Brasil – MMA, 2018).

Consumption can be defined as a set of sociocultural processes where the product is appropriate and used by an individual (Canclini, 2006). With the signing of Agenda 21 during Rio 92 in the 1990s, sustainable consumption emerged as one of the ways to achieve sustainable development (Brasil-MMA, 2018). The "conscious consumer" concept used reflects purchase behaviors, values and lifestyle choices that consciously seek to minimize the negative impact of man's impacts on nature. The sustainable consumption of fish is the consumption of only species that are not in a vulnerable conservation state (Kollmuss and Agyeman, 2002; Lee, 2014; Brasil-MMA, 2018).

Richter, Thøgersen and Klöckner (2017) suggested that consumers need to understand what a sustainable seafood consumption means, in the first place. Following that, consumers could prioritize sustainability over other factors as price, or even seafood taste. According Jonell et al. (2016) eco-certification became a popular market-based tool to reduce negative environmental impacts from fisheries and aquaculture. The authors observed that literature analyzing consumers' perceptions of, and willingness to pay for

eco-labeled seafood is growing, as well as the number of certification schemes for seafood.

Consumer perceptions of sustainable products have a strong socioenvironmental appeal that could add value to fish and therefore increase the demand for production from small-scale communities. In some countries, recommendation criteria and rating systems, certifications and training support to small fishing communities have encouraged restaurants and retail chains to buy sustainable fish and link their brand to socioenvironmental issues (Pérez-Ramírez and Lluch-Cota, 2010).

Therefore, Panzone, Wossink and Southerton (2013) stressed that further research is needed to aid in setting priorities for public decision making, for the environmental impacts of food consumption, including how this impact could be reduced. In Reisch, Eberle and Lorek (2013) vision, it is necessary understanding the entire food system and all its interactions and dependencies, to create effective policies, in order to enhance sustainable food consumption. In the authors point of view, good policy requires policy-minded researchers and research-minded policy makers.

Some studies have pointed out the factors that may influence "conscious consumption", such as demographic (age, gender, income, level of education, etc.), external (economic, social and cultural) and internal (knowledge of environmental issues, values, responsibilities and priorities, individual motivations, altruism and ecological awareness) considerations (Brandalise et al., 2009; Laroche, Bergeron and Barbaro-Foleo, 2001; Nitalla, 2014; González et al., 2015; Mainieri et al., 1997; Teisl et al., 2008; Xu et al., 2012; Lee, 2014; Grunert, Hieke and Wills, 2014; Straughan and Roberts, 1999; Hanss et al., 2016).

The main goal of this study is to propose an index to determine the degree of environmental perception (DEP) of seafood consumers from Santos and São Vicente on the São Paulo coast.

2 MATERIALS AND METHODS

This study was based on bibliographic research and a field survey. The research was implemented as a personal interview. The cities chosen for this study represent a geographical and cultural area in the metropolitan region of Baixada Santista. They are located on the island of São Vicente, in São Paulo state.

Santos city has a population of 419,400 inhabitants, with a gross domestic product (GDP) of US\$ 13,299.83 per capita in 2016. The prominent economic activities include

port, tourism, services, business tourism and ecotourism. Santos has a history of pioneering environmental issues of concern (Santos, 2018). The local fish market is supplied by a fleet of industrial vessels that fish far from the coast and land their fish at the Santos Fishing Warehouse (next to the fish market in the Ponta da Praia neighborhood) (Figure 1). São Vicente city has a population of 347,733 inhabitants, with a gross domestic product (GDP) of US\$ 3709.26 per capita in 2016. The prominent economic activities include trade, service and tourism (IPT, 2017).

Fig 1. Map of points where the interviews were conducted in São Vicente and Santos.



Font: Google Maps, jan.2019.

The empirical research consisted of 150 fish consumers present in a fish market, at three street fairs, at a fishmonger and in a supermarket in the municipalities of Santos and São Vicente (Figure 1). The research sample was randomly stratified once the questionnaire was administered with those who were present on the day of the visit to the locations and who consented to participate in the research.

The chosen method for data collection was a personal interview that used a questionnaire that was divided into three sections: A, socioeconomic profile; B, fish consumption profile; and C, environmental perception. Each section was composed of five questions for a quick approach. The section C questions were about the closed season, the species threatened with extinction, the danger of pollutant contamination and interest in certified or eco-labeled fish. The Ethical clearance to conduct the research was obtained the Ethics Committee (CAEE No. 85011718.8.0000.5513) at Santa Cecília University.

The responses from this section were transformed into a degree of environmental perception (DEP) that was scaled from 0 to 5, where 0 was assigned to the respondents that had no positive responses, and 5 was assigned to the respondents who answered all the questions positively. The interviews were face-to-face and followed a set of predefined questions. The researcher approached the consumers from May to June 2018. The samples were randomly stratified among the consumers, and the interviewees were previously consulted; the criterion was their willingness to participate in the survey.

The perception degree was divided to understand the behavior of the population. The respondents with a DEP between 1 and 2 were classified as lacking environmental perception, those with a DEP of 3 were classified as having a mean perception, and those with a DEP 4 and 5 were classified as having excellent environmental perception.

Five independent variables were chosen, including 'gender', 'age', 'educational level', 'activity' and 'place of purchase', to verify whether there was a correlation with the degree of environmental perception, and the statistical treatments were performed by comparing these variables with the DEP index. For the comparisons between the variables with the DEP, a Shapiro-Wilk test was used for verification, and it was verified that the data were normal and parametric. T and F tests were chosen for the 'gender', 'age', 'educational level' and 'activity' variables, and the Kruskal-Wallis test was used to compare the DEP with the 'place of purchase; the tests were performed using the PAST v.3 software (Hammer et al., 2001), and all of the tests were performed with a significance level of 0.5%.

3 RESULTS AND DISCUSSION

The literature research revealed that consumer behavior can be an effective bottom-up for sustainable resource use (Richter, Thøgersen and Klöckner, 2017). According Panzone, Wossink and Southerton (2013) the possibility to measure sustainable consumption could trigger more coherent set of policies to reduce consumption, and it can empower the policymakers to define and monitor policy objectives. The literature presents studies that investigate which factors predict sustainable food consumption.

Richter, Thøgersen and Klöckner (2017) discussed sustainable behaviors that influence seafood consumers and tested some predictives related to the use of sustainable seafood labels and sustainable seafood guides. Panzone, Wossink and Southerton (2013) studies pointed a design and a methodology for an Environmentally Sensitive Shopper

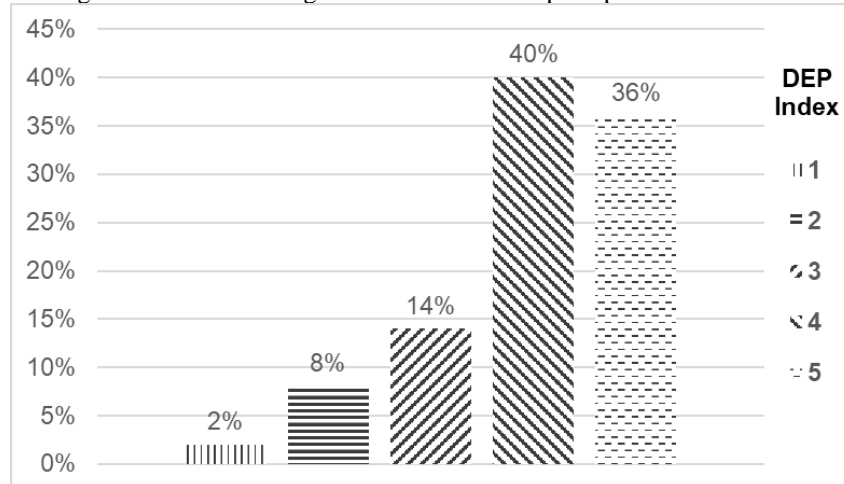
(ESS) index, that could measure the environmental sustainability of food consumption. In the studies by Hanss et al. (2016) attitudes and norms were positively associated with intentions to purchase sustainable products.

The field research presented in this paper helped to measure the degree of environmental perception (DEP) of fish consumers in the chosen region. The respondents who had a DEP between 1 and 2 were classified as lacking excellence in environmental perception, those who had a DEP of 3 were classified as having average perception, and those with a DEP of 4 and 5 were classified as having excellent environmental perception.

Section A of the survey revealed the profile of the consumers, and section B provided information on the patterns of fish consumption. Among the 150 respondents representing the population profile of the region, 77 were female and 73 were male. The population sampled in this study showed a high number of older citizens; among the 150 respondents, 46 participants were over 61 years old (30.7%). The population sampled had a high level of education, since 41.33% of the population surveyed had completed high school and 28.67% had completed a higher education level.

Among the respondents, 82% consumed fish frequently, and 40% ate some seafood at least once a week. The survey revealed that 80% of the respondents did not know the origin of the fish they buy, showing the low concern of fishers with the origin of the product. This behavior shows some confidence and optimism about food security. Figure 2 shows that consumers demonstrate concern about the resource to be consumed.

Fig 2. Percentual of Degree of environmental perception – DEP Index.



The statistical analysis was first conducted to examine whether there were differences between the variables and the DEP. Using t and F tests, the analyses revealed no significant main effect of age, $F(0,878)$ and $t(0,053)$; educational level, $F(0,391)$ and $t(0,071)$; activity, $F(0,109)$ and $t(0,099)$; or purchase location, $p(0,910)$ among the five variables. Only gender revealed a significant main effect ($F(0,024)$ and $t(0,050)$).

3.1. GENDER

A greater percentage of women presented excellent environmental perception, as approximately 83% of the women compared to approximately 70% of the men had a DEP of 4 or 5. When t and F tests were performed to verify whether this variable was significant, the results showed a significant difference. This result indicates that this variable can interfere with environmental perception, confirming other studies, where females consumers are the most oriented toward sustainability. (Mainieri et al., 1997; Laroche, Bergeron e Barbaro-Foleo, 2001; González et al., 2015; Richter, Thøgersen and Klöckner, 2017).

3.2. AGE

The results showed that older people had a higher DEP, while younger people have an average DEP. To verify the significance of the results, t and F tests were. To carry out the tests, the respondents were grouped into two sections to evaluate the degree of environmental perception among generations: those between 18 and 40 years old were classified as young, and those older than 41 were classified as mature. The statistical test revealed that there was no statistical significance.

This behavior was also observed by González et al. (2015) in their studies with Mexican consumers, where the less conscious consumers had the highest proportion of young respondents. In Teisl et al. (2008), the older respondents reported giving greater credibility to ecological certifications since they showed more concern about the environment.

This result led to the inference that this more mature population may be more aware because they had lived in a less urban society in the past, when consumers had the opportunity to have more contact with fresh fish. This population, for the most part, still maintains its buying habits, preferring fresh fish and buying from the same traders for many years.

3.3 EDUCATIONAL LEVEL

For a better visualization of the results, the respondents were grouped by their level of education. Respondents who had incomplete elementary school experience to complete high school experience were grouped as 'high school', and the respondents who had incomplete higher education experience through full graduation were grouped as 'higher'.

There was a small difference in the DEP between the respondents with an educational level up to high school and those who were attending or already had a complete upper level education. It was observed that 78.8% of the respondents had excellent DEP scores (indexes of 4 and 5), while 73.8% of the respondents with a high level of education had excellent DEP scores (indexes 4 and 5). To confirm whether there was significance in the results, t and F tests were performed and there was no statistically significant difference.

This result is different from the results of previous studies (Teisl et al., 2008; Xu et al., 2012; González et al., 2015). In the studies of Teisl et al. (2008), educational level was the most significant socioeconomic variable, with research showing that the most educated individuals gave more importance to information on environmental issues and were more likely to trust eco-labels. However, the results confirm Lee's (2014) studies with Japanese consumers, where educational level had no significant effect on environmental concern and sustainable consumption, as in the studies of Straughan and Roberts (1999) and Mainieri et al. (1997).

3.4 PROFESSIONAL SITUATION OR ACTIVITY

To compare the DEP to the activity variable, the population was divided into active and inactive groups. Of the 150 respondents, 63 stated that they were not professionally active, 41 respondents were retired, 18 were home respondents and 4 were unemployed. The number of professionals totaled 87 respondents. This result confirms the profile of the population of Santos, which has a high level of aging and has many retirees in its population (IPT, 2017). To verify whether there was significance in the results, t and F tests were performed. The results showed that there was no significant difference in the DEP scores between the active and inactive groups. Therefore, this variable does not directly influence the environmental perception of consumers.

3.5 PLACE OF PURCHASE

Regarding the preference for the place of purchase, among the 150 respondents, a total of 49 respondents preferred to buy fish in the fish market (32.67%), and 37 respondents preferred to buy fish in the supermarket, corresponding to 24.67% of the locations. Comparing the DEP scores of these consumers, of the 49 respondents who preferred to go to the fish market, 40 (71.4%) individuals had DEP scores of 4 or 5, and of the 37 respondents who preferred the supermarket, 29 (78.3%) individuals had DEP scores of 4 or 5. The results of the present study confirm the studies of Straughan and Roberts (1999) and Xu et al. (2012), who pointed out that consumers living in urban areas showed more favorable attitudes towards environmental issues since the municipalities chosen in the study had a high degree of urbanization (IPT, 2017).

3.6 OTHER FINDINGS

This research has shown that consumers are beginning to be interested in certified products, revealing the intention to pay slightly more for products that are environmentally friendly. Of the 150 respondents, 137 (91.3%) said they would be more interested in buying fish with a certificate or eco-label, and 104 (69.33%) said they would pay more for certified fish.

In the studies by Jonell et al. (2016) with consumers in Stockholm, Sweden, two variables significantly influenced the purchase of eco-labeled fish, including the recognition and understanding of eco-labels and concern for the negative environmental impacts associated with fish production. According to the authors, improving consumer familiarity with eco-labels could stimulate the consumption of sustainable fish.

Although there is still a portion of the population that views ecolabels and eco-certificates with some mistrust, these tools can become increasingly known and used. Cai, Xie and Aguilar (2017) reported on the impact of consumers' perceived credibility regarding eco-labels on buying preference. Consumer confidence in certification and eco-labeling systems significantly affects their preferences for sustainable products.

This research also showed that the concern of consumers with the origin of fish is low, and only 21% of the respondents said they knew the origin of their fish. However, this is a very important issue to monitor, and producers should be pressured to achieve more sustainable and quality fisheries.

4 CONCLUSIONS

This study contributes to the understanding of sustainable consumption in urban markets by proposing an index to study the environmental perceptions of fish consumers. This index model can be a first step to measure the environmental sustainability of seafood consumption in Brazil and could be applied to other regions. The main results demonstrate consumer concern about natural resources and also the 'gender' significant influence on environmental perception of seafood consumption.

This field research was pioneer in this area, as the discussion about sustainable seafood consumption is relatively incipient at the Baixada Santista, coast of Santos, Brazil. There have been initiatives to create and to disseminate sustainable seafood guides in the past, but there were no preliminary studies about the fish consumption profile in this region of Brazil. The DEP index also contributes to the understanding of the perceptions associated with food security. It could be helpful for environmental policy makers to promote biodiversity conservation programs associated with this field, as some authors (cited previously) agreed. The results have shown the importance of environmental education and actions that involve the concepts of sustainable consumption and sustainability in fisheries.

This index can be improved and expanded, in order that in future, it may be used in studies about sustainability of food shopping under different circumstances. We believe it could be useful for promoting environmental educational programs in different areas and points in time where the consumer is high and the DEP or the environmental awareness is low.

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