Highlights

We performed consumer segmentation and quantified the effect of factors influencing intention to buy organic fish.

Food-related lifestyle instrument and the theory of planned behaviour were utilized.

Four consumer segments were identified.

Past experience, availability and perceived barriers are the most important factors driving intention to buy organic fish.

Accepted refereed manuscript of: Budhathoki M, Zølner A, Nielsen T, Rasmussen MA & Reinbach HC (2022) Intention to buy organic fish among Danish consumers: Application of the segmentation approach and the theory of planned behaviour. *Aquaculture*, 549, p. 737798. https://doi.org/10.1016/j.aquaculture.2021.737798

Intention to buy Organic Fish among Danish Consumers: Application of the Segmentation Approach and the Theory of Planned Behaviour

Mausam Budhathoki,[a+b] * Anette Zølner,[a] Thorkild Nielsen,[c] Morten Arendt Rasmussen,[a+d] Helene Christine Reinbach[a]

[a]Department of Food Science, University of Copenhagen, Rolighedsvej 26,1958 Frederiksberg C, Denmark
[b]Institute of Aquaculture, University of Stirling, Stirling, FK9 4LA, UK

[c]Department of Food and Resource Economics, University of Copenhagen, Rolighedsvej 25, 1958 Frederiksberg C, Denmark

[d]COPSAC, Copenhagen Prospective Studies on Asthma in Childhood, Herlev and Gentofte
Hospital, University of Copenhagen, Copenhagen, Denmark

* Correspondence Authors:

Mausam Budhathoki Email: mausam.budhathoki@stir.ac.uk

Abstract

More than half of Danes buy organic food products every week; however, this has not been reflected in the retail sale of organic fish and shellfish. Therefore, this paper aims to perform consumer segmentation through the food-related lifestyle (FRL) instrument and determine the factors influencing intention to buy organic fish among Danish consumers applying the theory of planned behaviour (TPB). Survey data were collected using a validated questionnaire from 237 Danish convenient consumers. The structural equation model (SEM) was used to analyze the relationships between the TPB constructs. Consumer segmentation was based on the FRL instrument (incl. the shopping scripts, higher-order product attributes, and meal preparation scripts) as a basis for consumer segmentation. Factor analysis with hierarchical clustering yielded four consumer segments: the "Careless" (31.6% of the respondents), the "Rational" (17.3%), the "Cooks" (31.6%), and the "Eco-moderate" (19.4%). Consumers from the Careless segment had the highest percentage of respondents buying organic fish (39.1%), followed by those from the Cooks (33.1%). However, consumers from the Cooks segment purchase organic fish regularly, followed by the Careless segment (27.3% and 11.5%, respectively). The results from SEM indicated that past experience, perceived barriers such as difficulty to judge the quality, and availability of organic fish were significant predictors of the intention to buy organic fish. However, attitudes, subjective

norms, and perceived price were not significant predictors of the intention to buy organic fish. The intention to buy organic fish showed a strong positive correlation with the reported consumption frequency of organic fish. Hence, focusing on perceived barriers, past experience with buying organic, and promoting availability among consumers is likely to trigger a behavioural intention of buying organic fish, thereby potentially increasing the purchasing frequency of organic fish.

Keywords: Organic Fish; Food-related Lifestyle; Theory of Planned Behaviour; Consumers

1. Introduction

The global consumption of fish and fish products has increased significantly over the past 40 years. In 2015, the estimated annual consumption of fish and fish products worldwide per capita was 20.5 kilograms, which in comparison was approximately 10 kilograms in 1961. Europe has the highest annual consumption of fish and fish products per capita estimated to be almost 4.0 kilograms more than in the rest of the world (Food and Agriculture Organization, 2020). Several factors are contributing to the increased consumption of fish, such as technological innovation, increased numbers of distribution channels and improved availability with a consistent supply to a larger consumer base (Asche, 2008, Tveterås et al., 2011, Kobayashi et al., 2015). Additionally, fish are considered to be a healthy source of protein, supporting human health and protecting against lifestyle-related diseases (Hosomi, Yoshida and Fukunaga, 2012). In 2017, fish accounted for approximately 17 per cent of animal protein consumed globally and supplied 3.3 billion people with protein, covering almost 20 per cent of their average protein intake derived from animals (Food and Agriculture Organization, 2020).

Following the rise in demand and market development worldwide, aquatic cultivation (farmed fish) took over a large share of the supply and grew 5.3 per cent between 2001-2018, where it produced approx. 82.1 million tons of fish (Food and Agriculture Organization, 2020). Further, the increased consumption has only been possible due to the rapid expansion of aquaculture production as production in wild capture fisheries has been stagnant since the late 1980s (Garlock et al., 2020). However, a rapid increase in aquaculture production and its industrialization has in many cases resulted in environmental damage through intoxication from feed and antiseptic agents, causing additional concern for human health (Cole et al., 2009). Further, the aquaculture industry has become increasingly vulnerable to pathogens, parasites, and pests (PPP), pollution, harmful algal blooms, and climate change (Naylor et al., 2021). Therefore, consumers in many markets are sceptic about aquaculture products. Previous studies have shown that consumers have shifted their preferences towards wild fish (Davidson et al., 2013; Roheim et al., 2013; Uchida et al., 2014; Claret et al., 2014; Risius et al., 2017). Bronnmann and Asche (2017) however found that an ecolabel can make farmed fish equally preferred to sustainably caught wild fish. The use of ecolabel especially organic labels offers improved fish welfare, as well as environmentally and socially responsible production systems, for example, prohibiting GMOs, limiting antibiotic use, and regulating feed sources and stocking densities (EC 2009[Regulation No 710/2009]). Therefore, farmed fish products with organic ecolabels attract more than twice the value of other eco-labels such as Aquaculture Stewardship Council (ASC) ecolabels (Ankamah-Yeboah et al., 2019).

In Denmark, organic aquaculture production has gained notable growth during the last decade (Ankamah-Yeboah, Nielsen and Nielsen, 2017), however, retail sales of organic fish and shellfish in

2016 only constitute 1 per cent, while organic meat and dairy products had the market share of about 4 per cent and that of organic vegetables and fruits was about 26 per cent (Statistic Denmark, 2016). A recent study found that ecolabeling has a significant effect on consumer demand for salmon retail sales in Denmark, but still, a majority of consumers were more likely to choose non-labelled products (Ankamah-Yeboah et al., 2020). Studies investigating the consumer perceptions of, and motivation to buy, organic fish remains scarce and identifying the determinants of purchase intention remains a challenge. However, previous research has indicated that determining factors of sustainable seafood consumption includes attitudes (Altintzoglou et al., 2010; Honkanen and Young, 2015), social norms (Honkanen and Young, 2015), knowledge (Almeida et al., 2015; Perez-Ramirez et al., 2015; Feucht and Zander, 2015), geographical origin (Risius, Janssen and Hamm, 2017), price (Risius, Janssen and Hamm, 2017), private labels (Hukom et al., 2019) and moral obligation (Honkanen and Young, 2015). Moreover, a study on seafood consumption by Leek, Maddock and Foxall (2000) suggested that perceived difficulty of buying, preparing, and cooking fish, along with unpleasant properties such as small bones and unpleasant smell, might affect consumers inclination for buying fish in general. Similarly, Torrissen and Onozaka (2017) highlight that consumers' desire to save time and effort when cooking serves as a barrier for choosing fish, which is viewed as an inconvenient food, particularly in markets such as Norway, Denmark, Belgium, Iceland, Italy, and Spain, even though consumers in those markets desire to increase fish consumption.

The theory of planned behaviour (TPB) that evaluates social-psychological behaviour theory is well accepted and supported by empirical evidence in numerous studies worldwide (Al-Lozi and Papazafeiropoulou, 2012) and has previously been validated to predict intentions to purchase organic food (Arvola et al., 2008) as well as to explore consumer behaviour towards fish consumption in Europe (Olsen, 2001; Honkanen et al., 2005; Verbeke and Vackier, 2005; Fotea et al., 2012; Tomic, Matulic and Jelic, 2016; Pétursdóttir, 2017). The TPB predicts intention and behaviour through the three fundamental aspects of human behaviour: attitudes, subjective norms, and perceived behavioural control (Ajzen,1991). A recent meta-analysis by Scalco et al. (2017) covering 23 independent studies, suggested that the TPB is an adequate theoretical framework to predict the intention to purchase and consume organic food products. Similarly, the behavioural intention of seafood consumption can also be predicted through the TPB (Bredahl & Grunert, 1997; Verbeke & Vackier, 2005). Moreover, the original model proposed by Ajzen has been extended to better predict and explain the behavioural intention of fish consumption. Researchers have tried to increase the proportion of explained variance of the intention of fish consumption by including additional variables: habits (Verbeke & Vackier, 2005; Honkanen et al., 2005), past experience (Higuchi et al., 2017); health (Tomic et al., 2015; Higuchi et al., 2017); trust (Richter et al., 2017); involvement (Olsen, 2001), availability (Tomic et al., 2015); perceived risk, knowledge, price and cost (Siddique, 2012). However, the attitude-behaviour relationship might not be straightforward when it comes to the perception of sustainable labels. Grunert et al. (2014) found that concern for sustainability issues does not necessarily translate into behaviour, even when the information is understandable and available, as consumers constantly make many trade-offs when buying food – for instance, with price and nutritional information.

The Food-Related Lifestyle (FRL) instrument is a cross-culturally validated lifestyle instrument that has been a widely used segmentation method to understand the complexities of consumer food choices (Pérez-Cueto et al., 2010; Nie and Zepeda, 2011; Buitrago-Vera et at.,2016; Torrissen and Onozaka, 2017; Kumar and Smith, 2017). Brunsø, Grunert and Bredhal (1995) identified six segments utilizing the FRL instrument regarding Danish consumers. These segments were identified

as 1. Uninvolved, 2. Careless, 3. Rational, 4. Conservative, 5. Adventurous, and 6. Eco-moderate, where adventurous were the largest segment consisting 27% of the respondents.

To our knowledge, no research has been conducted in any northern European countries on the determinants of purchase behaviour of organic fish using the Theory of Planned Behavior (TPB). Existing data have only investigated the determinants of conventional seafood and fish consumption using the TPB. The main aim of this study was to determine the factors influencing purchase intention of organic fish by applying the TPB. Also, consumer segmentation was conducted through the FRL to profile Danish FRL segments and investigate their relationship with eating and purchasing habits of fish and organic fish purchasing behaviour.

2. **Conceptual framework**

According to the TPB framework, attitudes are referring to the positive or negative evaluation of the behaviour. In detail, the more positive the attitude towards a behaviour, the stronger will be the intention for such behaviour (Armitage and Conner, 2001). Attitude was previously reported as the most influencing factor for intention to consume organic food (Scalco et al., 2017). However, a cross European comparison study including Denmark, found that attitude was the second most important factor influencing the purchase intention of organic products (Ruiz de Maya, López & Munuera, 2011) following subjective norms that exerted the highest influence. The more positive the attitude, the more likely it will be to have high intentions to purchase organic products (Ruiz de Maya, López & Munuera, 2011) as well as sustainable seafood consumption (Birch, 2015). The noted positive attitude among European consumers regarding organic food includes better taste, healthiness, and better sustainable footprint when compared to conventional food (Arvola et al., 2008). Interestingly, an Italian study, found that despite perceiving organic products as expensive, all most all consumers judged them positively (Zanoli & Naspetti, 2002).

Subjective norms cover both social pressure from significant others about the behaviour in question, but also the interplay between social and personal norms, meaning one's expectations of right or wrong behaviour (Ajzen, 1991). Zagata (2012) found that the social influences enhance the consumer intention to purchase organic food and the most relevant sources are families – like a partner or other members of the family. Similarly, Scalco et al. (2017) found that subjective norms significantly shape intention to buy organic food products. However, previous studies have found that subjective norms to be the weakest predictors of intention and behaviour (Armitage & Conner, 2001; Yadav and Pathak, 2016).

Perceived behavioural control influences actual behaviour only if the behaviour is not completely under the person's volitional control (Ajzen, 1991). Previous studies have reported limited knowledge regarding preparation, difficulties in judging the quality, lack of familiarity and inability to identify seafood varieties a barrier to the purchase of seafood (Mayer, 2014; Birch and Lawley, 2014). However, studies have found varying results on the strength of perceived behavioural control to predict buying intention related to organic food (Scalco et al., 2017).

Past experience with organic food products affects consumer decisions, making it easier for them to point out which values can be achieved through organic products (Raffaele & Naspetti, 2002). Moreover, past experience especially knowledge, eating habits of fish and familiarity with preparing determines the behavioural intention of fish consumption (Verbeke and Vackier, 2005).

Moreover, behaviours of which people have no volitional control, in this case, availability as it is depending on the supply chain (Azjen, 2002), will directly influence intention to buy organic fish independently from the other factors of the TPB. Studies have shown varying results on price influencing the intention to buy organic food products. Smith et al. (2009) found no significant effect of price on the intention to buy organic food products, whereas Aertsens et al. (2011) and D'Souza et al. (2006) found that high price of organic food products negatively affects purchase behaviour.
According to the TPB, intentions were reported to be the most significant predictors of actual behaviour. Ajzen (1991) found that when behaviours pose no serious problems of control, they can be accurately predicted with considerable accuracy through intentions. Finally, studies have shown that socio-demographic characteristics significantly impact fish consumption as well as organic food purchase. In particular, age (Birch and Lawley, 2012), gender (Verbeke and Vackier, 2005), education (Pieniak et al., 2007), and income (Skuland, 2015) significantly influences fish consumption. Similarly, age (Magnusson et al., 2001), gender (Pearson, Henryks and Jones, 2011), and household size (Hill and Lynchehaun, 2002) influence organic food purchase. The attempt to further classify the organic buyer according to income and education has given mixed or inconclusive results (Hughner et al., 2007).

According to a study by Higuchi et al. (2017) attitudes, subjective norms, and past experience were significant predictors of intention to consume fish. Among these determinants, the past experience was the weakest predictor of intentions. Based on the findings, a proposed TPB model for buying intentions of organic fish was developed for this study (see Figure 1).

Figure 1. Proposed TPB model for predicting buying intentions of organic fish.

3. Methods and Materials

3.1 Questionnaire and measurement scale

The questionnaire was developed in English and administered in both English and Danish languages. The Danish version of the questionnaire was translated by two independent translators and evaluated with 12 native Danish speakers interested in organic fish. The questionnaire consisted of four sections, each comprising several items (53 variables in total) and were closed-ended questions (see Annexure A).

The FRL instrument was adjusted by reducing the original five domains to three domains. The selected domains include *Shopping scripts, Higher-order product attributes,* and *Meal preparation* whereas *Usage situations* and *Desired consequences* were excluded. Within these selected domains, 10 dimensions with 12 items in total that are relevant to fish consumption were selected; *Shopping scripts: the* importance of product information (1 item), price criterion (1), the joy of shopping (1); *Higher order product attributes:* health (3), price-quality relation (1), novelty (1), organic products (1); *Meal preparation:* involvement with cooking (1), looking after new ways (1), and convenience (1). The selection of the FRL instruments' domains, dimensions, and items was inspired by previous studies on seafood consumption (Torrissen and Onozaka, 2017; Onozaka et al., 2014) with adjustments that are relevant to the purpose of this study. For instance, apart from seven FRL dimensions (freshness, health, taste, cooking methods, convenience, importance of product information and the price-quality relationship) utilized by Torrissen and Onozaka, three additional dimensions (novelty, organic products, and shopping) were included in this study.

The TPB proposed model (Figure 1) measures attitudes with seven items, subjective norms with five items, perceived barriers with four items, past experience with three items, availability with one item, perceived price with one item, and intention with three items. All items were directly taken from Verbeke and Vackier (2005) except one item in attitude that was self-constructed; "*Organic fish has better sustainable footprint*". Behaviour (organic fish purchase) was based on the self-reported purchase of organic fish with the frequency of purchase measured by the following five items: "*How often do you purchase organic fish?";* once a week or more, once every 14 days, once a month, once every 2 or 3 months, and once a year.

Finally, both the FRL item and the TPB items were assessed using five-point Likert scales ranging from 'strongly disagree' to 'strongly agree', with 'neither or nor' as the neutral point. Subjective norms were provided with additional don't know/unsure options at the end of the five-point Likert Scale to minimize ambiguity in the meaning of the scale points (Baka, Figgou and Triga, 2012; Krosnick, 2018).

3.2 Sample and design

Participants between the ages range 18-70 years were included. Data were collected from 23rd November 2018 to 6th December 2018 by web questionnaire distributed through social media including seven days of Facebook ads and visits to various shopping malls and libraries around Copenhagen. The respondents at shopping malls and libraries were provided with a free package of cookies and fruits as an incentive to fill out the questionnaire. The questionnaire was administered through the self-creation by hyperlink generated by Survey-Xact. Respondents were made aware of the time needed (approximately 5–8 minutes) to complete the questionnaire beforehand. In the opening instructions of the survey, a detailed description of the production methods (wild-caught, conventionally farmed fish and organic farmed fish) was provided to make sure that respondents understood how organic fish production differs from the other production methods (See Annexure A).

3.3 Data analysis

During statistical analysis, the data from Survey-Xact was transferred to a file compatible with IBM SPSS Statistics 25 (IBM Crop, 2018) for statistical analysis. All reverse-scaled statements of the questionnaire were recorded in the same direction. The don't know/unsure option for measuring subjective norms was converted to a missing value (Mirzaei et al., 2021).

Descriptive statistics for items measuring the FRL instrument was conducted, and data were presented as the median and the interquartile range (IQR). Factor analysis was performed to reduce 12 items of the FRL instrument into a few factor variables following the correlations between the FRL dimensions. For performing factor analysis, principal component analysis was selected with eigenvalues greater than 1. Varimax rotation was applied to improve the interpretation of factors. The Kaiser, Meyer and Olkin (KMO) and Bartlett's test of sphericity were selected for assessing the suitability of the data for factor analysis. Moreover, to estimate the number of segments, cluster analysis using hierarchical procedures was performed with squared Euclidean distance to measure the similarity between objects. Ward's method was selected to aggerate objects to yield the segments. Analysis of variance (ANOVA) was used for factor loadings of the segments to determine whether significant differences exist between the consumer segments. A comparison of socio-demographic characteristics, eating and purchasing habits between the segments was performed employing the Chi-Square test, Fisher's Exact and Kruskal-Wallis test.

The exploratory factor analysis was performed for the TPB items. Cronbach's alpha was used for evaluating factor analysis construct homogeneity (Reynaldo and Santos, 1999) and variance inflation factor (VIF) for evaluating multicollinearity of the proposed TPB model constructs. The relationships between the TPB constructs were assessed by using Structural Equation Model (SEM) with IBM SPSS AMOS 26 (Arbuckle, 2017). SEM is a well-known and validated modelling framework to explain very complex relationships (Lei, 2009) and has been used in several previous studies (e.g., Tarkiainen and Sundqvist, 2005; Zagata, 2012; Yadav and Pathak, 2016).

Analysis of the proposed TPB model (Figure 1) and the original TPB model (direct path from attitude, subjective norms, and perceived behavioural control towards intention) were conducted to test if the proposed TPB model fits the data more accurately than the original version of the TPB model. The model fit was reported by chi-square, GFI (Goodness-of-fitness), TLI (Tucker Lewis Index), CFI (Comparative fit index), and RMSEA (Root mean square error of approximation). Finally, the association between the sociodemographic characteristics of respondents and reported purchase frequency was estimated employing the Chi-square and Kruskal-Wallis tests. In all statistical tests, p values of less than 0.05 were considered statistically significant.

4. Results

4.1 Descriptive analysis of the FRL instrument

The FRL items are presented in Table 1. Consumers generally agreed with the importance of product information, price, the joy of shopping (median score = 'agree'), although differences between the upper and lower quartiles were observed (IQR ranged from 'strongly agree' to 'agree' for price criterion and joy of shopping and IQR ranged from 'agree' to 'disagree' for product information). Moreover, consumers also had higher median scores ("agree") in items measuring health, price-quality relation, novelty, organic products, cooking, and convenience. However, consumers equally valued food items for their nutritional value as well as for their taste (median score = 'neither agree nor disagree' and IQR ranged from "agree" to "disagree"). Finally, consumers were somewhere between agreeing and disagreeing on avoiding complicated recipes (median score = 'neither agree nor disagree' and IQR ranged from "agree" to "disagree").

Table 1. Descriptive statistics for items measuring the food-related lifestyle, N = 237.

4.2 Factor analysis

Factor analysis was used to explore the variability as well as interrelationships among the FRL items. Using Principal Components Analysis, four factors emerged and together accounted for 57.60% of the variance in items. With Varimax rotation, items for the constructs of freshness and organic, cooks and novelty, nutrition and health, and price/quality ratio represented distinct dimensions (Table 2). The Kaiser-Meyer-Olkin measure of sampling adequacy yielded a value of 0.65 whereas Bartlett's Test of Sphericity yielded a p-value of < 0.001.

Table 2. Factor analysis: Matrix of Varimax rotated component loadings by principal component analysis.

4.3 Factor loadings of the segments

Factor loadings of the segments were presented in Table 3. Four consumer segments were generated from three FRL domains employing cluster analysis. To retain the four segments, different starting values and different starting numbers of segments were employed. Further, a distance measure between the data points was used for estimation, which also yielded a stable solution of four segments. However, it should be noted that the clusters are not directly comparable given the differences in the survey instruments used, three of the four resulting segments corresponded roughly to "Careless", "Rational", and "Eco-moderator". The third segment we called "Cooks". Profiling of the segments was as follows:

Segment 1: Careless – 31.6% of the sample (n = 75). These consumers were less interested in nutrition and health than other segments. They were only slightly interested in price versus quality aspects and looked for changes in the price of food items. However, these consumers valued neither freshness nor the organic of the food. Furthermore, they lacked interest in cooking and the novelty aspect of food.

Segment 2: Rational – 17.3% of the sample (n = 41). These consumers were characterized by a strong value on price and quality of food. They also valued the freshness of the food and bought organic if they had the opportunity. They were involved with the nutrition and health aspect of food. They were considerably less interested in cooking and the novelty aspect of food.

Segment 3: Cooks – 31.6% of the sample (n = 75). Consumers in this segment were characterized by their interest in cooking and novelty.

Segment 4: Eco-moderator – 19.4% of the sample (n = 46). This segment was characterized by their interests in 'freshness and organic' and 'nutrition and health' and lack of interest in cooking, novelty, and price and quality aspect of food.

Table 3. Factor loading of the segments, N=237.

4.4 Socio-demographic characteristics of the respondents and segments

Socio-demographic characteristics of the respondents and segments are presented in Table 4. Sociodemographic characteristics of the segments (except for gender) did not differ significantly between the four segments. Further, the results indicated that although the sample was heterogeneous according to the socio-demographic characteristics, it was somewhat biased in terms of respondents aged 21-30 years old (predominantly females) with the number of household size equals two members and predominantly full-time employment those residing in the Greater Copenhagen region.

Table 4. Socio-demographic characteristics %(n) of the four segments and the total sample.

4.5 Eating and purchasing habits

The eating and purchasing habits of the respondents are presented in Table 5. The results indicated that most of the respondents (48.9%) consumed fish one to two times per week; however, 39.7% of the respondents consumed fish less than once per week. 37.6% of the respondents did not know or were unsure about their preference of production methods whereas 15.6% had no preference when selecting the production method. Wild-caught fish was the most preferred production method (24.9%), followed by organic fish (12.7%) and conventional fish (9.3%). More than half of the

respondents had bought organic fish (56.1%) and among them, only 15.8% of the respondents purchased organic fish once a week or more. The usual place to buy organic fish among the respondents was supermarket/discount stores (37.6%) followed by fish stores/speciality shops (20.3%).
The results also indicated that the respondents preferred fresh fish mostly as a warm dish, especially for dinner.

Although fresh fish was the most common type of fish consumed among segments, there was a statistically significant difference between the segments in buying/consuming fresh fish. Buying/consuming fresh fish was more common among the "*Careless"* segment (84.0%) followed by the "*Rational"* (70.7%), the "*Cooks*" (70.7%) and *"Eco-moderator"* (60.9%). Moreover, the respondents who belong to the *"Careless" segment* had the highest percentage of respondents who had bought organic fish at some point (39.1%) followed by the *"Cooks"* (33.1%). However, 27.3% of the respondents who belong to the *"Cooks" segment* purchased organic fish regularly (once a week or more) followed by the segment *"Careless"* (11.5%). Respondents from the segment *"Cook"* bought their organic fish at various places such as fish stores/speciality shops and straight from the fisherman.

Table 5. Eating and purchasing habits %(n).

4.6 Factor analysis, reliability, and multicollinearity tests

Initial factor analysis yield six factors (attitudes, subjective norms: external social and personal, perceived barriers, past experience and intention) that explained 77.18% of the variance in the data. The value of the Kaiser-Meyer-Olkin measure of sampling adequacy equals 0.79 whereas Bartlett's Test of Sphericity yielded a p-value of < 0.001; thus, implying the appropriateness of the factor analysis (Malhotra, 2006). Thus, exploratory factor analysis was done on the items of the proposed TPB model (Table 6). Factor loadings of all items greater than the standard level (0.7) were included for further analysis. Attitudes towards organic fish (trustworthy and sustainable footprint), subjective norms (advertisement), perceived barrier (difficult to prepare) and intention (willingness) were excluded (standard level <0.7). Cronbach's alpha was used for evaluating homogeneity of factor analysis construct, which were at the acceptable cut-off level of 0.70 (Reynaldo and Santos, 1999). The value of variance inflation factor (VIF) of proposed TPB model constructs were less than 3.3, indicating no issue of multicollinearity among the constructs (Bowerman and O'connel, 1990).

Table 6. Factor analysis, composite reliability, and multicollinearity tests of the proposed TPB model.

4.7 Assessment of the proposed TPB model of organic fish purchase

The proposed TPB model (chi-square = 247.0, df of 155, $p < 0.001$ and GFI of 0.85, TLI of 0.91, CFI of 0.93 and RMSEA of 0.067) explained about 75.4% of the total variance in the intention to buy organic fish, and about 51.7% of the total variance in behaviour (purchase of organic fish) (see Figure 2). The fit indices with the original TPB model (direct path from attitude, subjective norms, and perceived behavioural control towards intention) were poorer compared to the proposed TPB model (chi-square = 408.96, df of 180, $p<0.001$ and GFI of 0.78, TLI of 0.79, CFI of 0.82 and RMSEA of 0.09). Therefore, the proposed TPB model (direct path from attitude, subjective norms, perceived

barriers, past experience, perceived price, and availability towards intention) was retained in this study.

Figure 2. Structural relations between the proposed TPB model constructs.

The results indicated that past experience had a high impact on the intention to buy organic fish. Past experience towards organic fish directly and positively affected the intention to buy organic fish (β_{PEI} =0.86, p<0.001). Perceived barriers towards organic fish directly and negatively moderately affected the intention to buy organic fish (β_{PB-I}=-0.24, p=0.02). As expected, the availability of organic fish was found to be a significant predictor of intention (β_{PA-I}=0.34, p<0.001). In contrast, other predictors of intention to buy organic fish, attitudes (β_{A-I}=-0.06, p=0.63), subjective norms (β_{SN-I}=-0.01, p=0.86) and perceived price (β_{P-I}=0.02, p=0.78), were not found to be a significant predictor of intention. Intention (β_{I-B}=0.47, p<0.001) was found to be positively and significantly associated with behaviour.

Finally, the association between the socio-demographic characteristics of respondents and reported purchase frequency is shown in Table 7. The results indicated that socio-demographic characteristics (household size with the number of children under five years, employment status, and segments) had a statistically significant linkage with the reported purchase frequency of organic fish. The high percentage of reported purchase frequency of organic fish were among the respondents with no children under aged five years (73.7%), had a full-time job (39.5%), and those belonging to the segment '*Cooks*' (36.8%).

Table 7. Association between the socio-demographic characteristics of respondents and reported purchase frequency, N=133.

5. Discussion

This study was conducted to explore if the attitude, subjective norms, past experience, and availability could predict the intention to buy organic fish of Danish consumers. The FRL instrument identified four consumer segments: 1. the 'Careless', 2. the 'Rational', 3. the 'Cooks' and 4. the 'Eco-moderator'. Moreover, the proposed TPB model indicated that past experience, perceived barriers such as difficulty to judge the quality, and availability were significant predictors of intention to buy organic fish.

The result from the present study indicated that wild-caught fish seems to be the "golden standard" among Danish consumers as 24.9 % of the respondents preferred wild-caught fish over conventional fish 9.3% and organic fish 12.7%. Similarly, a previous study by Claret et al. (2014) found that wild fish were thought to be fresher, healthier, more natural and overall of better quality when compared to farmed fish by Spanish consumers. Risius, Janssen and Hamm (2017) found that most of the consumers prefer wild-caught fish over farmed fish (36% versus 9%), even though most of them (39%) stated to be indifferent towards the production method. A Belgian study found that wild fish was preferred under the informed condition, but interestingly not under the blinded sensory testing (Claret et al., 2016). This study also found that participants shared the attitude of organic fish having a better sustainable footprint, but when to hold up against the finding related to production preferences, the majority still preferred wild-caught fish. A study by Hartmann et al. (2017) investigating psychological empowerment in climate protective consumer behaviour, found that consumers lack the motivation to do pro-environmental behaviour, including the purchase of

sustainable products and consumption if it requires personal sacrifice and yields no substantial benefits. Therefore, emphasizing consumers' potential for influencing and contributing to climate protection, through specific examples could be beneficial to support sustainable consumer behaviour in future research. A similar approach could be considered for organic fish, where the environmental benefits could be used for marketing strategies.
The results from the analysis of SEM indicated that the paths from attitudes, subjective norms and perceived price towards the intention to buy organic fish were not significant, which might suggest that *'if people feel uncertain about organic food or feel that organic food is difficult to get there is some likelihood that they will give up on organic, despite favourable attitudes and norms*' (Thøgersen, 2009). A survey covering eight European countries, including Denmark, confirmed that uncertainty has a direct negative impact on the intention to buy organic food. This phenomenon might be reflected in the results of the present study. Similarly, a recent study by Ghifarini, Sumarwan and Najib, (2018) found that attitude towards behaviour and perceived behavioural control did not influence the intention to consume shrimp, while subjective norms influenced the intention to consume shrimp. However, attitude and subjective norms were previously reported to be the most influencing explanatory factors towards intention to buy seafood (Higuchi et al., 2017) and sustainable seafood consumption (Richter, Thøgersen and Klockner, 2017; Vermeir and Verbeke, 2005).

Perceived price was not a significant predictor of intention to buy organic fish. This might be because Danish consumers were willing to pay a premium price for organic fish (Nielsen, 2017; Ankamah-Yeboah et al. 2016). In general, fish are viewed as more expensive yet less filling when considering the selection of a broad variety of products, generally higher priced when compared to meat alternatives (Torrissen and Onozaka, 2017). Risius, Janssen, Hamm (2017) revealed that German consumers were more likely to choose products in the mid-range price scale rather than the cheapest product. This may suggest that although fish are perceived as more expensive, lower prices of fish products are susceptible to consumers' rejection.

Past experience with organic fish had a significant effect on the intention to buy organic fish. This finding is consistent with the findings from Higuchi et al. (2017) and Verbeke and Vackier (2005) on seafood consumption. In general, this may signify that the knowledge of organic fish, experience with buying organic fish, and items of habit are particularly important for a strong intention to buy organic fish. The result from this study also indicated that perceived barriers towards organic fish are a significant and negative predictor of intention to buy organic fish. Thus, although being the weakest predictor, perceived barriers such as difficulty to judge the quality are important for not intending to buy organic fish.

Moreover, the availability of organic fish also has a significant effect on the intention to buy organic fish. A review article by Hemmerling et al. (2015) found that limited availability discourages consumers from purchasing organic food and in response consumers would increase intentions with increased availability. Vermeir and Verbeke (2008) found that enhancing availability was a significant predictor of intention to buy sustainable food products. In the case of organic fish, yet relatively few species such as salmon, trout, and carp are produced following the organic principles, which always require enclosed areas for the farming process. If participants prefer other species of fish, they would not be able to get these with the organic principles applied. This may further affect intentions if product attributes do not match consumer preferences and consumer needs.

Intention to buy organic fish was a significant predictor of purchase behaviour. The results are in line with a previous study by Higuchi et al. (2017). Finally, the results also indicated that household size

with the number of children under five years, employment status and consumer segments were the only socio-demographic characteristics that have a statistically significant linkage with the behaviour. However, a study on determinants of consumption for organic aquaculture by Polymeros et al. (2014) found that the family's disposable income, educational level and the householder's age were associated with purchasing behaviour towards organic aquaculture products. Moreover, consumers' educational level was also reported to be correlated with the interest in purchasing organic seafood in a previous study by O'Dierno et al. (2006).

The main strength of the study is being the first of its kind within the area of organic fish, applying the FRL instrument and the TPB. It may serve as inspiration for future consumer research as an alternative approach to understanding the determinants of buying organic fish. Nevertheless, the current study has some limitations. Firstly, the convenience sampling technique employed might have resulted in selection bias. The sample was biased in terms of younger female adults with full-time employment residing in the Greater Copenhagen region, however, understanding young consumers is of importance for the organic food marketers as they represent a relevant target group for targeting purchase behavioural change. Secondly, only 133 respondents had previously bought organic fish therefore, the sample size for the SEM analysis was just above the minimum requirement to test multiple hypotheses in a model of interacting variables (Byrne, 2013). Due to limited research on organic fish in the context presented in this study, comparison and contrast of the results were conducted through studies on sustainable fish, organic food products, and seafood in general. Finally, this study measured purchase behaviour of organic fish using self-report measures that may have resulted in over-or under-reporting of the purchase frequency. This may cause an error in the true effect of association (Althubaiti, 2016); however, Armitage and Conner (2001) noted a better prediction of TPB constructs when behaviour measures were self-reported than observed (R^2s = .31 and .21, $p<0.01$).

6. Conclusion

In conclusion, this study presents a market segmentation of Danish consumers differentiated by consumer' food-related lifestyles that comprised four segments: the "Careless", the "Rational", the "Cooks" and the "Eco-moderator". Consumers' eating and purchasing habits were analyzed using the TPB to better understand organic fish purchase behaviour. The results from this study suggest that it is possible to predict Danish consumers' reported purchase of organic fish with their intentions to buy organic fish, which can further be predicted from past experience, perceived barriers such as difficulty to judge the quality, and availability of organic fish. Finally, socio-demographic characteristics considered, household size with the number of children under five years, employment status and consumer segments were significantly associated with the purchase behaviour of organic fish. Consumers with no children under aged five years, that had a full-time job, and those belonging to the segment '*Cooks*' were associated with the purchase frequency of organic fish. Future research may further explore the perceptions of organic, wild-caught and/or conventionally farmed fish to better understand and predict the complex fish choice behaviour. For instance, by focusing on the different key factors (e.g., intrinsic product characteristics perception, biological and physiology factors, situational factors, psychological factors, social-cultural factors, and extrinsic product characteristics expectations) and their interactions as previously suggested by Mojet (2001 in Koster, 2009).

References

1. Aertsens, J., Mondelaers, K., Verbeke, W., Buysse, J., Van Huylenbroeck, G., 2011. The influence of subjective and objective knowledge on attitude, motivations and consumption of organic food. British food journal. 113(11), 1353-1378. https://doi.org/10.1108/00070701111179988
2. Aghamolaei, T., Tavafian, S. S., Madani, A., 2012. Fish consumption in a sample of people in Bandar Abbas, Iran: application of the theory of planned behavior. Archives of Iranian Medicine. 15(9), 545 – 548. https://doi.org/012159/AIM.006
3. Ajzen, I., 1991. The theory of planned behavior. Organizational behavior and human decision processes. 50(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T
4. Ajzen, I., 2002. Perceived behavioral control, self‐efficacy, locus of control, and the theory of planned behavior 1. Journal of applied social psychology. 32(4), 665-683. https://doi.org/10.1111/j.1559-1816.2002.tb00236.x
5. Al-Lozi, E., Papazafeiropoulou, A., 2012. Intention-based models: The theory of planned behavior within the context of IS. In: Dwivedi, Y., Wadem M., Schneberger, S. (Eds.), Information systems theory. Integrated Series in Information Systems. Vol 29, Springer, New York, pp. 219-239. https://doi.org/10.1007/978-1-4419-9707-4_12
6. Almeida, C., Altintzoglou, T., Cabral, H., Vaz, S., 2015. Does seafood knowledge relate to more sustainable consumption? British Food Journal. 117(2), 894-914. https://doi.org/10.1108/BFJ-04-2014-0156
7. Althubaiti, A., 2016. Information bias in health research: definition, pitfalls, and adjustment methods. Journal of multidisciplinary healthcare. 9, 211. https://doi.org/10.2147/JMDH.S104807
8. Altintzoglou, T., Hansen, K. B., Valsdottir, T., Odland, J. Ø., Martinsdóttir, E., Brunsø, K., Luten, J., 2010. Translating barriers into potential improvements: The case of new healthy seafood product development. Journal of Consumer Marketing. 27(3), 224-235. https://doi.org/10.1108/07363761011038293
9. Ankamah-Yeboah, I., Asche, F., Bronnmann, J., Nielsen, M., Nielsen, R., 2020. Consumer preference heterogeneity and preference segmentation: The case of ecolabeled salmon in Danish retail sales. Marine Resource Economics. 35(2), 159-176. https://doi.org/10.1086/708508
10. Ankamah-Yeboah, I., Jacobsen, J. B., Olsen, S. B., Nielsen, M., Nielsen, R., 2019. The impact of animal welfare and environmental information on the choice of organic fish: An empirical investigation of German trout consumers. Marine Resource Economics. 34(3), 247-266. http://dx.doi.org/10.1086/705235
11. Ankamah-Yeboah, I., Nielsen, M., Nielsen, R., 2016. Price premium of organic salmon in Danish retail sale. Ecological Economics. 122, 54-60. https://doi.org/10.1016/j.ecolecon.2015.11.028
12. Ankamah-Yeboah, I., Nielsen, M., Nielsen, R., 2017. Price formation of the salmon aquaculture futures market. Aquaculture Economics & Management. 21(3), 376-399. https://doi.org/10.1080/13657305.2016.1189014
13. Arbuckle, J. L., 2017. Amos (Version 25.0) [Computer Program]. IBM SPSS. Chicago.
14. Armitage, C. J., Conner, M., 2001. Efficacy of the theory of planned behaviour: A meta‐analytic review. British journal of social psychology. 40(4), 471-499. https://doi.org/10.1348/014466601164939

15. Arvola, A., Vassallo, M., Dean, M., Lampila, P., Saba, A., Lähteenmäki, L., Shepherd, R., 2008. Predicting intentions to purchase organic food: The role of affective and moral attitudes in the Theory of Planned Behaviour. Appetite. 50(2-3), 443-454. https://doi.org/10.1016/j.appet.2007.09.010
16. Asche, F., 2008. Farming the sea. Marine Resource Economics. 23 (4), pp. 527–547.
17. Baka, A., Figgou, L., Triga, V., 2012. 'Neither agree, nor disagree': a critical analysis of the middle answer category in Voting Advice Applications. *International Journal of Electronic Governance*, *5*(3-4), 244-263. https://doi.org/10.1504/IJEG.2012.051306
18. Birch, D., 2015. Fishing for answers? Using the theory of planned behaviour to understand consumption of sustainable seafood in the UK. In: British Academy of Management, 8--10 September 2015, Portsmouth, England.
19. Birch, D., Lawley, M., 2014. The role of habit, childhood consumption, familiarity, and attitudes across seafood consumption segments in Australia. Journal of food products marketing. 20(1), 98-113. https://doi.org/10.1080/10454446.2012.732548
20. Bowerman, B. L., O'Connell, R. T., 1990. Linear statistical models: An applied approach. PWS-Kent Pub. Co: Boston.
21. Bredahl, L., Grunert, K. G., 1997. Food-related lifestyle trends in Germany 1993-1996. Århus: Institut for Markedsøkonomi/MAPP Centret, Handelshøjskolen i Århus.
22. Bronnmann, J., Asche, F., 2017. Sustainable seafood from aquaculture and wild fisheries: Insights from a discrete choice experiment in Germany. Ecological Economics. 142, 113-119. https://doi.org/10.1016/j.ecolecon.2017.06.005
23. Brunsø, K., Grunert, K. G., Bredahl, L., 1995. The comparison of food-related lifestyles across countries. Appetite. 24(3), 286-287. https://doi.org/10.1016/S0195-6663(95)99871-3
24. Buitrago Vera, J. M., Escribá Pérez, C., Baviera Puig, M. A., Montero-Vicente, L., 2016. Consumer segmentation based on food-related lifestyles and analysis of rabbit meat consumption. World Rabbit Science. 24(3), 169-182. https://doi.org/10.4995/wrs.2016.4229
25. Byrne, B. M., 2016. Structural equation modeling with AMOS: Basic concepts, applications, and programming. 3rd Edition. Routledge: New York. https://doi.org/10.4324/9781315757421
26. Claret, A., Guerrero, A., Gartzia, I., Garcia-Quiroga, M., Ginés, R., 2016. Does information affect consumer liking of farmed and wild fish? Aquaculture. 454, 157-162. https://doi.org/10.1016/j.aquaculture.2015.12.024
27. Claret, A., Guerrero, L., Ginés, R., Grau, A., Hernández, M.D., Aguirre, E., Peleteiro, J.B., Fernández-Pato, C. and Rodríguez-Rodríguez, C., 2014. Consumer beliefs regarding farmed versus wild fish. Appetite. 79, 25-31. https://doi.org/10.1016/j.appet.2014.03.031
28. Cole, D.W., Cole, R., Gaydos, S.J., Gray, J., Hyland, G., Jacques, M.L., et al., 2009. Aquaculture: Environmental, toxicological, and health issues. Int J Hyg Environ Health. 212(4), 369-77. https://doi.org/10.1016/j.ijheh.2008.08.003
29. Davidson, J., Good, C., Barrows, F. T., Welsh, C., Kenney, P. B., Summerfelt, S. T., 2013. Comparing the effects of feeding a grain-or a fish meal-based diet on water quality, waste production, and rainbow trout Oncorhynchus mykiss performance within low exchange water recirculating aquaculture systems. Aquacultural engineering. 52, 45-57. https://doi.org/10.1016/j.aquaeng.2012.08.001
30. De Maya, S. R., López-López, I., Munuera, J. L., 2011. Organic food consumption in Europe: International segmentation based on value system differences. Ecological Economics. 70(10), 1767-1775. https://doi.org/10.1016/j.ecolecon.2011.04.019

31. D'Souza, C., Taghian, M., Lamb, P., 2006. An empirical study on the influence of environmental labels on consumers. Corporate Communications: An International Journal. 11(2), 162-173. https://doi.org/10.1108/13563280610661697
32. EC (European Commission), 2009. Regulation No 710/2009 of 5 August amending Regulation (EC) No 889/2008 laying down detailed rules for the implementation of Council (EC) No 834/2007, as regards laying down detailed rules on organic aquaculture animal and seaweed production. Official Journal of the European Union 52, 15–34.
33. Feucht, Y., Zander, K., 2015. Of earth ponds, flow-through and closed recirculation systems—German consumers' understanding of sustainable aquaculture and its communication. Aquaculture. 438, 151-158. https://doi.org/10.1016/j.aquaculture.2015.01.005
34. Food and Agriculture Organization, 2020. The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. https://doi.org/10.4060/ca9229en
35. Garlock, T., Asche, F., Anderson, J., Bjørndal, T., Kumar, G., Lorenzen, K., et al., 2020. A global blue revolution: Aquaculture growth across regions, species, and countries. Reviews in Fisheries Science & Aquaculture. 28(1), 107-116. https://doi.org/10.1080/23308249.2019.1678111
36. Ghifarini, A. F., Sumarwan, U., Najib, M., 2018. Application of theory of planned behavior in shrimp consumer behavior analysis. Independent Journal of Management & Production. 9(3), 984-1001. https://doi.org/10.14807/ijmp.v9i3.705
37. Grunert, K. G., Hieke, S., Wills, J., 2014. Sustainability labels on food products: Consumer motivation, understanding and use. Food policy. 44, 177-189. https://doi.org/10.1016/j.foodpol.2013.12.001
38. Hartmann, P., Apaolaza, V., D'Souza, C., 2018. The role of psychological empowerment in climate-protective consumer behaviour: An extension of the value-belief-norm framework. European Journal of Marketing. 52(1/2), 392-417. https://doi.org/10.1108/EJM01-2017-0080
39. Hemmerling, S., Hamm, U., Spiller, A., 2015. Consumption behaviour regarding organic food from a marketing perspective—a literature review. Organic Agriculture. 5(4), 277-313. https://doi.org/10.1007/s13165-015-0109-3
40. Higuchi, A., Davalos, J., Hernani-Merino, M., 2017. Theory of planned behavior applied to fish consumption in modern Metropolitan Lima. Food Science and Technology. 37(2), 202208. https://doi.org/10.1590/1678-457X.17516
41. Hill, H., Lynchehaun, F., 2002. Organic milk: attitudes and consumption patterns. British Food Journal. 104(7), 526-542. https://doi.org/10.1108/00070700210434570
42. Honkanen, P., Olsen, S. O., Verplanken, B., 2005. Intention to consume seafood—the importance of habit. Appetite. 45(2), 161-168. https://doi.org/10.1016/j.appet.2005.04.005
43. Honkanen, P., Young, J.A., 2015. What determines British consumers' motivation to buy sustainable seafood? British Food Journal. 117(4), 1289-1302. https://doi.org/10.1108/BFJ06-2014-0199
44. Hosomi, R., Yoshida, M., Fukunaga, K., 2012. Seafood consumption and components for health. Global Journal of Health Science. 4(3), 72-86. https://doi.org/10.5539/gjhs.v4n3p72
45. Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., Stanton, J., 2007. Who are organic food consumers? A compilation and review of why people purchase organic food. Journal of Consumer Behaviour: An International Research Review. 6(2‐3), 94110. https://doi.org/10.1002/cb.210

46. IBM Corp, 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, IBM Corp. New York.
47. Kobayashi, M., Msangi, S., Batka, M., Vannuccini, S., Dey, M. M., Anderson, J. L., 2015. Fish to 2030: The role and opportunity for aquaculture. Aquaculture Economics & Management. 19 (3), 282–300. https://doi.org/10.1080/13657305.2015.994240
48. Koster, E.P., 2009. Diversity in the determinants of food choice: A psychological perspective. Food Qual Prefer. 20(2), 70–82. https://doi.org/10.1016/j.foodqual.2007.11.002
49. Krosnick, J. A., Presser, S., 2009. Question and Questionnaire Design. In: Wright, J. D. and Marsden, PV. (Eds.), Handbook of Survey Research (Second Edition). Elsevier, San Diego, CA.
50. Kumar, A., Smith, S., 2018. Understanding local food consumers: Theory of planned behavior and segmentation approach. Journal of Food Products Marketing. 24(2), 196-215. https://doi.org/10.1080/10454446.2017.1266553
51. Leek, S., Maddock, S., Foxall, G., 2000. Situational determinants of fish consumption. British Food Journal.102(1), 18-39. https://doi.org/10.1108/00070700010310614
52. Lei, P. W., 2009. Evaluating estimation methods for ordinal data in structural equation modeling. Quality and Quantity. 43, 495. https://doi.org/10.1007/s11135-007-9133-z
53. Magnusson, M. K., Arvola, A., Hursti, U. K. K., Åberg, L., Sjödén, P. O., 2001. Attitudes towards organic foods among Swedish consumers. British food journal. 103(3), 209-227. https://doi.org/10.1108/00070700110386755
54. Malhotra, N.K., 2006. Marketing research: An applied orientation, fourth ed. Pearson, Singapore.
55. Mirzaei, A., Carter, S. R., Patanwala, A. E., Schneider, C. R., 2021. Missing data in surveys: Key concepts, approaches, and applications. Research in Social and Administrative Pharmacy. https://doi.org/10.1016/j.sapharm.2021.03.009
56. Naylor, R. L., Hardy, R. W., Buschmann, A. H., Bush, S. R., Cao, L., Klinger, D. H., et al., 2021. A 20-year retrospective review of global aquaculture. Nature. 591(7851), 551-563. https://doi.org/10.1038/s41586-021-03308-6
57. Nie, C., Zepeda, L., 2011. Lifestyle segmentation of US food shoppers to examine organic and local food consumption. Appetite. 57(1), 28-37. https://doi.org/10.1016/j.appet.2011.03.012
58. O'Dierno, L., Govindasamy, R., Puduri, V., Myers, J., Islam, S., 2006. Consumer Perceptions and Preferences for Organic Aquatic Products: Results from the Telephone Survey. IDEAS Working Paper Series from RePEc. https://doi.org/10.22004/ag.econ.36743
59. Olsen, S., 2001. Consumer involvement in seafood as family meals in Norway: an application of the expectancy-value approach. Appetite. 36(2), 173-186. https://doi.org/10.1006/appe.2001.0393
60. Onozaka, Y., Hansen, H., & Sørvig, A., 2014. Consumer product perceptions and salmon consumption frequency: the role of heterogeneity based on food lifestyle segments. Marine Resource Economics, 29(4), 351-374. http://dx.doi.org/10.1086/678927
61. Pearson, D., Henryks, J., Jones, H., 2011. Organic food: What we know (and do not know) about consumers. Renewable Agriculture and Food Systems. 26(2), 171-177. https://www.jstor.org/stable/44490636

62. Pérez-Cueto, F. J., Verbeke, W., de Barcellos, M. D., Kehagia, O., Chryssochoidis, G., Scholderer, J., Grunert, K. G., 2010. Food-related lifestyles and their association to obesity in five European countries. Appetite. 54(1), 156-162. https://doi.org/10.1016/j.appet.2009.10.001
63. Pérez-Ramírez, M., Almendarez-Hernández, M. A., Avilés-Polanco, G., Beltrán-Morales, L. F., 2015. Consumer acceptance of eco-labeled fish: A Mexican case study. Sustainability. 7(4), 4625-4642. https://doi.org/10.3390/su7044625
64. Pieniak, Z., Verbeke, W., Scholderer, J., Brunsø, K., Olsen, S. O., 2007. European consumers' use of and trust in information sources about fish. Food Quality and Preference. 18(8), 1050-1063. https://doi.org/10.1016/j.foodqual.2007.05.001
65. Polymeros, K., Kaimakoudi, E., Mitsoura, A., Nikouli, E., Mente, E., 2014. The determinants of consumption for organic aquaculture products—Evidence from Greece. Aquaculture Economics & Management. 18(1), 45-59. https://doi.org/10.1080/13657305.2014.855954
66. Reynaldo, J., Santos, A., 1999. Cronbach's alpha: A tool for assessing the reliability of scales. J. Ext. 37(2). http://www.joe.org/joe/1999april/tt3.php (Accessed 13/12/2018).
67. Richter, I., Thøgersen, J., Klöckner, C. A., 2017. Sustainable seafood consumption in action:
Relevant behaviors and their predictors. Sustainability. 9(12), 2313. https://doi.org/10.3390/su9122313
68. Risius, A., Janssen, M., Hamm, U., 2017. Consumer preferences for sustainable aquaculture products: Evidence from in-depth interviews, think aloud protocols and choice experiments. Appetite. 113, 246-254. https://doi.org/10.1016/j.appet.2017.02.021
69. Roheim, C. A., Sudhakaran, P. O., Durham, C. A., 2012. Certification of shrimp and salmon for best aquaculture practices: Assessing consumer preferences in Rhode Island. Aquaculture Economics & Management. 16(3), 266-286. https://doi.org/10.1080/13657305.2012.713075
70. Scalco, A., Noventa, S., Sartori, R., Ceschi, A., 2017. Predicting organic food consumption: A meta-analytic structural equation model based on the theory of planned behavior. Appetite. 112, 235-248. https://doi.org/10.1016/j.appet.2017.02.007
71. Siddique, M. A. M., 2012. Explaining the role of perceived risk, knowledge, price, and cost in dry fish consumption within the theory of planned behavior. Journal of global marketing. 25(4), 181-201. https://doi.org/10.1080/08911762.2012.743203
72. Skuland, S. E. (2015). Healthy eating and barriers related to social class. The case of vegetable and fish consumption in Norway. Appetite. 92, 217-226. https://doi.org/10.1016/j.appet.2015.05.008
73. Smith, T. A., Huang, C. L., Lin, B. H., 2009. Does price or income affect organic choice? Analysis of US fresh produce users. Journal of agricultural and applied economics. 41(3), 731-744.
74. Statistics Denmark, 2016. Detail sales of organic food products in volume and value. Danmarks Statistik. http://www.statistikbanken.dk/OEKO3 (Assessed on 25/05/2018)
75. Tarkiainen, A., Sundqvist, S., 2005. Subjective norms, attitudes and intentions of Finnish consumers in buying organic food. British Food Journal. 107(11), 808-822. https://doi.org/10.1108/00070700510629760

76. Thøgersen, J., 2006. Predicting consumer choices of organic food: results from the CONDOR Project. Joint Organic Congress, Odense, Denmark, May 30-31. Microsoft Word - Predicting consumer choices-CONDOR.doc (orgprints.org) (Accessed 17/12/2018).
77. Tomić, M., Matulić, D., Jelić, M., 2016. What determines fresh fish consumption in Croatia? Appetite. 106, 13-22. https://doi.org/10.1016/j.appet.2015.12.019
78. Torrissen, J. K., Onozaka, Y., 2017. Comparing fish to meat: Perceived qualities by food lifestyle segments. Aquaculture Economics & Management. 21(1), 44-70. https://doi.org/10.1080/13657305.2017.1265022
79. Torrissen, J.K., Onozaka, Y., 2017. Comparing fish to meat: Perceived qualities by food lifestyle segments. Aquaculture Economics and Management. 21(1), 44-70. https://doi.org/10.1080/13657305.2017.1265022
80. Tveterås, S., Asche, F., Bellemare, M.F., Smith, M. D., Guttormsen, A.G., Lem, A. Lien, K.,
Vannuccini, S., Montoya, A. R. H., 2011. Fish is food-the FAO's fish price index. PLoS One. 7 (5), e36731. https://doi.org/10.1371/journal.pone.0036731
81. Uchida, H., Onozaka, Y., Morita, T., Managi, S., 2014. Demand for ecolabeled seafood in the Japanese market: A conjoint analysis of the impact of information and interaction with other labels. Food Policy. 44, 68-76. https://doi.org/10.1016/j.foodpol.2013.10.002
82. Verbeke, W., Vackier, I., 2005. Individual determinants of fish consumption: application of the theory of planned behaviour. Appetite. 44(1), 67-82. https://doi.org/10.1016/j.appet.2004.08.006
83. Vermeir, I., Verbeke, W., 2008. Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values. Ecological economics. 64(3), 542-553. https://doi.org/10.1016/j.ecolecon.2007.03.007
84. Yadav, R., Pathak, G. S., 2016. Young consumers' intention towards buying green products in a developing nation: Extending the theory of planned behavior. Journal of Cleaner Production. 135, 732-739. https://doi.org/10.1016/j.jclepro.2016.06.120
85. Zagata, L., 2012. Consumers' beliefs and behavioural intentions towards organic food. Evidence from the Czech Republic. Appetite. 59(1), 81-89. https://doi.org/10.1016/j.appet.2012.03.023
86. Zanoli, R., Naspetti, S., 2002. Consumer motivations in the purchase of organic food: A means- end approach. British food journal. 104(8), 643-653. https://doi.org/10.1108/00070700210425930

Figure

Figure 1. Proposed TPB model for predicting buying intentions of organic fish.

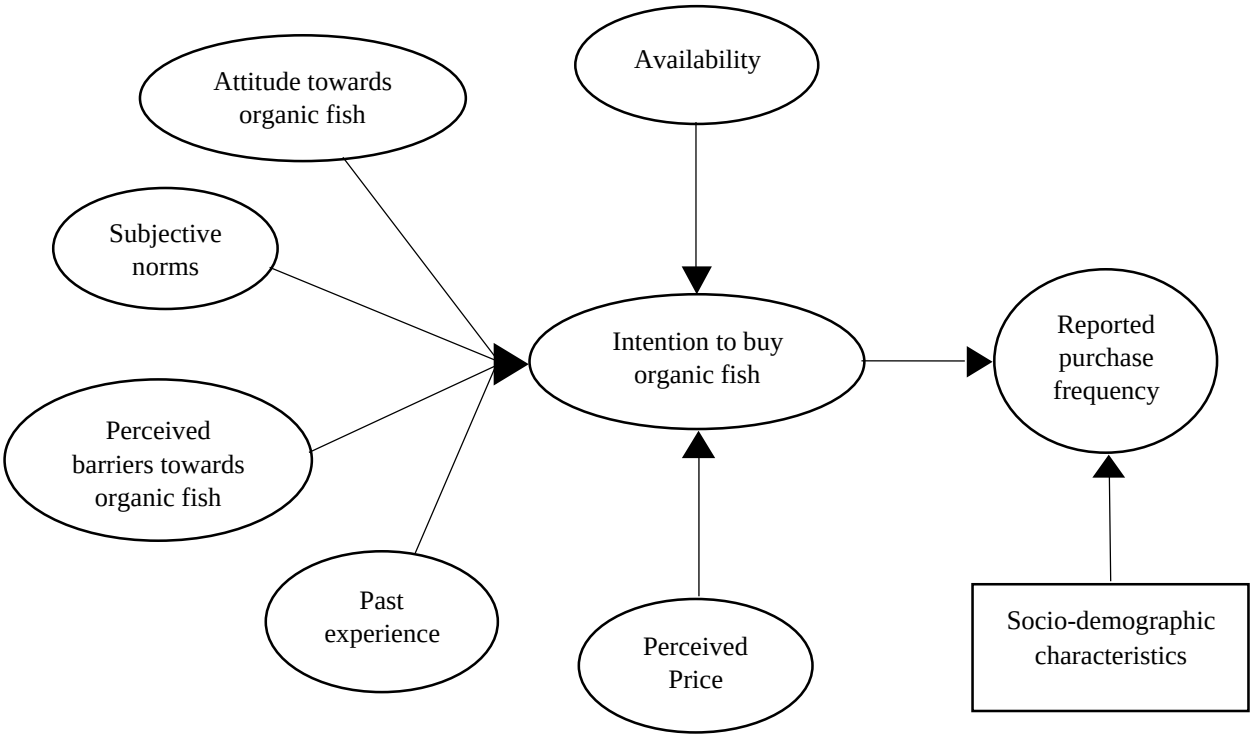
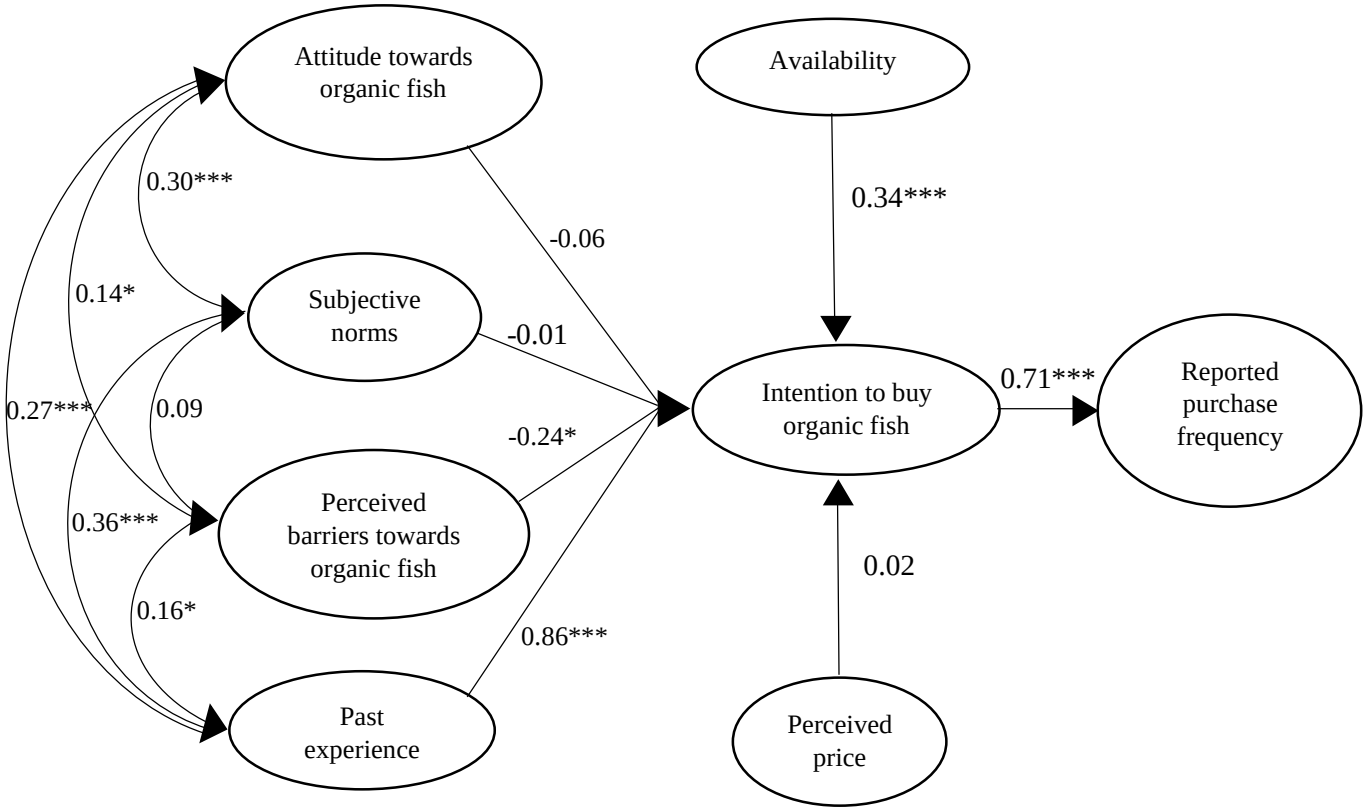


Figure 2. Structural relations between the proposed TPB model constructs.



*In Figure 2, N=133, ***p<0.001, *p<0.05, the chi-square of 246.98, df of 115, p<0.001 and GFI of 0.851, TLI of 0.908, CFI of 0.925 and RMSEA of 0.067. Intention to buy organic fish R-squared = 75.4% and reported purchase frequency R-square = 51.7%. (GFI: Goodness-of-fitness, TLI: Tucker Lewis Index, CFI: Comparative fit index, RMSEA: Root mean square error of approximation).*

Table1. Descriptive statistics for items measuring the food-related lifestyle, N = 237.

Domains	Items	Median	IQR
Shopping scripts	'I compare labels to select the most nutritious food'	4	2
	'I am on the lookout for changes in the price of food items that I buy regularly'	4	1
	'I like shopping for food for my household'	4	1.25
Higher-order product attributes	'I prefer to buy natural products such as products without preservatives'	4	1
	'I always buy organically grown food products if I have the opportunities'	4	1
	'I believe it is more important to choose food items for their nutritional value than for their taste'	3	2
	'I always try to get best quality for the best price'	4	1
	'I try to plan the amounts and types of food that I/my family consumes'	4	1
	'I like to try new foods that I have never tasted before'	4	1
Meal preparation scripts	'I prefer fresh products to tinned or frozen products'	4	1
	'I look for ways to prepare unusual meals'	4	1
	'I deliberately avoid complicated recipes'	3	2

Note: IQR = Inter Quartile Range, items scored in 5 – point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5).

Table 2. Factor analysis: Matrix of Varimax rotated component loadings by principal component analysis.

Variables	Factors			
	Freshness and organic	Cooks and novelty	Nutrition and Health	Price and quality
'I compare labels to select the most nutritious food'			.660	
'I am on the lookout for changes in the price of food items that I buy regularly'				.794
'I always try to get best quality for the best price'				.865
'I prefer fresh products to tinned or frozen products'	.655			
'I prefer to buy natural products such as products without preservatives'	.785			
'I always buy organically grown food products if I have the opportunities'	.758			
'I like shopping for food for my household'				
'I try to plan the amounts and types of food that I/my family consumes'			.504	
'I like to try new foods that I have never tasted before'		.693		
'I believe it is more important to choose food items for their nutritional value than for their taste'			.763	
'I look for ways to prepare unusual meals'		.759		
'I deliberately avoid complicated recipes' (reversed)		.668		

Note: Coefficient values below 0.5 were suppressed.

Table 3. Factor loading of the segments, N=237.

Factor	**'Careless'**	**'Rational'**	**'Cooks'**	**'Eco-moderate'**
Freshness and organic	-0.74[a]	0.75[c]	-0.12[b]	0.75[d]
Cooks and novelty	-0.61[a]	0.49[d]	0.16[b]	-0.30[c]
Nutrition and health	0.28[b]	0.61[d]	-0.92[a]	0.49[c]
Price and quality	0.10[c]	1.05[d]	-0.29	-0.62[a]
Total	75	41	75	46
%	31.6	17.3	31.6	19.4

Note: The values marked by letters were significantly different at $P<0.05$ from other values in the same row, according to the one-way ANOVA test. [%]Percentage of the respondents in each segment.

Table 4. Socio-demographic characteristics %(n) of the four segments and the total sample.

Variables	Categories	Careless	Rational	Cooks	Eco-moderate	Total	P value
Age	20 or younger	2.7(2)	4.9(2)	1.3(1)	4.3(2)	3.0(7)	0.091[b]
	21-30	48.0(36)	58.5(24)	38.7(29)	32.6(15)	43.9(104)	
	31-40	21.3(16)	14.6(6)	26.7(20)	30.4(14)	23.6(56)	
	41-50	9.3(7)	14.6(6)	14.7(11)	17.4(8)	13.5(32)	
	51 or older	18.7(14)	7.3(3)	18.7(14)	15.2(7)	16.0(38)	
Gender	Male	24.0(18)	41.5(17)	34.7(26)	50.0(23)	35.3(84)	0.026[*a]
	Female	76.0(57)	58.5(24)	65.3(49)	50.0(23)	64.6(153)	
Household size	Number of adults						0.186[b]
	1	16.0(12)	24.4(10)	16.0(12)	19.4(9)	18.1(43)	
	2	53.3(40)	48.8(20)	37.3(28)	41.3(19)	45.1(107)	
	3 or more	30.7(23)	26.8(11)	46.7(35)	39.1(18)	36.7(87)	
	Number of children under 5 years						0.565[b]
	0	82.7(62)	73.2(30)	80.0(60)	84.8(39)	80.6(191)	
	1	13.3(10)	22.0(9)	17.3(13)	10.9(5)	15.6(37)	
	2	4.0(3)	4.9(2)	2.7(2)	4.3(2)	3.8(9)	
	Number of children between 6-17						0.393[b]
	0	90.7(68)	35(85.4)	80.0(60)	87.0(40)	85.7(203)	
	1	5.3(4)	9.8(4)	18.7(14)	6.5(3)	10.5(25)	
	2 or more	4.0(3)	4.9(2)	1.3(1)	6.5(3)	3.8(9)	
Education	School	2.7(2)	2.4(1)	4.0(3)	6.5(3)	3.8(9)	0.651[b]
	High School	22.7(17)	31.7(13)	22.7(17)	28.3(13)	25.3(60)	
	Bachelor	41.3(31)	19.5(8)	37.3(28)	34.8(16)	35.0(83)	
	Masters and above	28.0(21)	39.0(16)	29.3(22)	28.3(13)	30.4(72)	
	Other	5.3(4)	7.3(3)	6.7(5)	2.2(1)	5.5(13)	
Income	DKK 100,000-249,999	28.0(21)	24.4(10)	17.3(13)	21.7(10)	22.8(54)	0.994[b]
	DKK 250,000-499,999	26.7(20)	34.1(14)	41.3(31)	15(32.6)	33.8(80)	
	DKK 500,000-649,999	25.3(19)	19.5(8)	26.7(20)	26.1(12)	24.9(59)	
	DKK 650,000 and more	10.7(8)	17.1(7)	10.7(8)	15.2(7)	12.7(30)	
	Other	9.3(7)	4.9(2)	4.0(3)	4.3(2)	5.9(14)	
Employment status	Student	16.0(12)	14.6(6)	10.7(8)	13.0(6)	13.5(32)	0.608[b]
	Student with a job	32.0(24)	24.4(10)	18.7(14)	19.6(9)	24.1(57)	
	Part time job	4.0(3)	4.9(2)	12.0(9)	8.7(4)	7.6(18)	
	Full time job	30.7(23)	39.0(16)	45.3(34)	39.1(18)	38.4(91)	
	Self-employed	5.3(4)	4.9(2)	4.0(3)	8.7(4)	5.5(13)	
	Unemployed	12.0(9)	12.2(5)	9.3(7)	10.9(5)	11.0(26)	
Region of residence	Greater Copenhagen	74.7(56)	65.9(27)	73.3(55)	65.2(30)	70.9(168)	0.686[a]
	Sealand	12.0(9)	22.0(9)	17.3(13)	23.9(11)	17.7(42)	
	Other	13.3(10)	12.2(5)	9.3(7)	10.9(5)	11.4(27)	

Note: *p<0.05, [a]Chi-Square Test, [b]Kruskal-Wallis test.

Table 5. Eating and purchasing habits %(n).

Variables	Careless	Rational	Cooks	Eco-moderate	Total	p-value
Frequency of fish consumption						0.058[c]
Never	-	9.8(4)	4.0(3)	-	3.0(7)	
Less than once per week	33.3(25)	46.3(19)	41.3(31)	41.3(19)	39.7(94)	
1-2 times per week	58.7(44)	41.5(17)	42.7(32)	50.0(23)	48.9(116)	
3-4 times per week	6.7(5)	2.4(1)	10.7(8)	4.3(2)	6.8(16)	
More than 4 times per week	1.3(1)	-	1.3(1)	4.3(2)	1.7(4)	
Usual place of purchase of fish[S]						
Supermarket/discount stores	73.3(55)	75.6(31)	82.7(62)	84.8(39)	78.9(187)	0.353[a]
Online (box schemes, etc.)	13.3(10)	7.3(3)	6.7(5)	6.5(3)	8.9(21)	0.499[b]
Fish stores/speciality shops	40.0(30)	19.5(8)	34.7(26)	32.6(15)	33.3(79)	0.165[a]
Straight from fisherman	6.7(5)	9.8(4)	5.3(4)	-	5.5(13)	0.184[a]
Other	-	14.6(6)	5.3(4)	2.2(1)	4.6(11)	0.003[**b]
Production method of fish						0.075[a]
Wild-caught fish	32.0(24)	19.5(8)	18.7(14)	28.3(13)	24.9(59)	
Conventional fish	8.0(6)	9.8(4)	6.7(5)	15.2(7)	9.3(22)	
Organic fish	14.7(11)	4.9(2)	17.3(13)	8.7(4)	12.7(30)	
Don't know/unsure	40.0(30)	39.0(16)	38.7(29)	30.4(14)	37.6(89)	
No preference	5.3(4)	26.8(11)	18.7(14)	17.4(8)	15.6(37)	
Types of fish [S]						
Fresh fish	84.0(63)	70.7(29)	70.7(53)	60.9(28)	73.0(173)	0.039*[a]
Canned fish	41.3(31)	34.1(14)	28.0(21)	41.3(19)	35.9(85)	0.304[a]
Smoked fish	41.3(31)	36.6(15)	28.0(21)	43.5(20)	36.7(87)	0.257[a]
Frozen fish	36.0(27)	41.5(17)	41.3(31)	50.0(23)	41.4(98)	0.512[a]
Salted fish	6.7(5)	7.3(3)	4.0(3)	6.5(3)	5.9(14)	0.847[b]
Other	6.7(5)	12.2(5)	6.7(5)	2.2(1)	6.8(16)	0.337[b]
Meal context and preference[S]						
Breakfast and cold dish	5.3(4)	4.9(2)	5.3(4)	-	4.2(10)	0.475[b]
Breakfast and warm dish	4.0(3)	2.4(1)	5.3(4)	-	3.4(8)	0.486[b]
Lunch and cold dish	74.7(56)	34.1(14)	44.0(33)	69.6(32)	57.0(135)	<0.001[***a]
Lunch and warm dish	20.0(15)	22.0(9)	38.7(29)	19.6(9)	26.1(62)	0.030[*a]
Dinner and cold dish	24.0(18)	22.0(9)	18.7(14)	19.6(9)	21.1(50)	0.866[a]
Dinner and warm dish	89.3(67)	73.2(30)	82.7(62)	84.8(39)	83.5(198)	0.162[a]
Other	1.3(1)	7.3(3)	2.7(2)	-	2.5(6)	0.146[b]
Have you ever bought organic fish?						0.007[**a]
Yes	39.1(52)	13.5(18)	33.1(44)	14.3(19)	56.1(133)	
No	22.1(23)	22.1(23)	41.3(31)	29.8(27)	43.9(104)	
Purchase frequency of organic fish						0.012[*c]
Once a week or more	11.5(6)	11.1(2)	27.3(12)	5.3(1)	15.8(21)	
Once every 14 days	17.3(9)	5.6(1)	18.2(8)	21.1(4)	16.5(22)	
Once a month	17.3(9)	33.3(6)	31.8(14)	47.4(9)	28.6(38)	
Once every 2 or 3 months	34.6(18)	27.8(5)	15.9(7)	21.1(4)	25.6(34)	
Once a year	19.2(10)	22.2(4)	6.8(3)	5.3(1)	13.5(18)	
Usual place to buy organic fish [S]						
Supermarket/discount stores	45.3(34)	36.6(15)	37.3(28)	26.1(12)	37.6(89)	0.209[a]
Online (box schemes, etc.)	9.3(7)	2.4(1)	4.0(3)	6.5(3)	5.9(14)	0.457[b]
Fish stores/speciality shops	25.3(19)	4.9(2)	26.7(20)	15.2(7)	20.3(48)	0.012[*b]
Straight from fisherman	-	2.4(1)	8.0(6)	-	3.0(7)	0.012[*b]
Other	2.7(2)	2.4(1)	-	-	1.3(3)	0.341[b]

Note: *p<0.05, **p<0.01, ***p<0.001, [a]Chi-square test, [b] Fisher's Exact test, [c]Kruskal-Wallis test, [S]Selected.

Table 6. Factor analysis, composite reliability, and multicollinearity tests of the proposed TPB model.

Construct	Items[b]	Median	IQR	Factor loading[c]	% explained variance	Cronbach alpha	VIF
Attitudes towards organic fish	'Eating organic fish is healthy'	4	0	0.83	65.2	0.86	1.46
	'Eating organic fish is safe'	4	1	0.80			
	'Eating organic fish is nutritious'	4	2	0.82			
	'Organic fish has a great taste'	4	1	0.77			
	'I am satisfied when organic fish is on the menu'	4	2	0.79			
Subjective norms	'My Family thinks that I should eat/buy organic fish'	3	2	0.86	47.4	0.76	1.17
	'My partner thinks that I should eat/buy organic fish'	3	2	0.88			
	'To give myself/my family a healthy meal, I buy organic fish'	4	1	0.95	87.6		
	'To give myself/my family a nutritious meal, I buy organic fish'	4	1	0.95			
Past experience	'I have knowledge about organic fish'	3	2	0.82	67.8	0.75	1.33
	'I have experience in buying organic fish'	4	1	0.85			
	'Eating organic fish is a part of my eating habits'	3	2	0.79			
Perceived barriers towards organic fish	'I find it difficult to judge the quality of organic fish' (reverse)	3	1	0.78	63.4	0.70	1.07
	'When I buy organic fish, I never know whether I will make a good choice' (reverse)	3	1	0.77			
	'I find it difficult to trust the organic certification labels' (reverse)	4	1	0.83			
Intention	'The chance that I eat organic fish in the next two weeks is high'	3	2	0.93	70.1	0.78	1.37
	'I am planning to eat organic fish in the next two weeks'	3	2	0.90			
Availability	'Organic fish is easily available to me'	3	1	1.00 (fixed)	-	-	
Perceived price	'Organic fish are expensive' (reverse)	4	1	1.00 (fixed)	-	-	
Behavior[a]	Frequency of purchase	3	2	1.00 (fixed)	-	-	

Note: [a]The purchase frequency is measured by the following item: "How often do you purchase organic fish?": 1=once a week or more, 2= Once every 14 days, 3=once a month, 4= once every 2 or 3 months, and 5= once a year. [b]Items scored in 5 – point Likert scale ranging from strongly disagree (1) to strongly agree (5). [c]Variables with loading less than 0.7 were not assigned: attitude; trustworthy (loading: 0.33) and sustainable footprints (0.67), subjective norms; advertisement (0.66), perceived barriers; difficult to prepare (0.57), and intention; willing to buy organic fish (0.64), IQR: Interquartile range, VIF: Variance inflation factor.

Table 7. Association between the socio-demographic characteristics of respondents and reported purchase frequency, N=133.

Socio-demographic characteristics		**Purchase frequency (%)**			**p-value**
		Low (n = 52)	**Medium (n = 38)**	**High (n = 43)**	
Age	20 or younger	1.9	4.7	5.3	0.07[b]
	21-30	55.8	30.2	36.8	
	31-40	21.2	20.9	28.9	
	41-50	11.5	23.3	10.5	
	51 or older	9.6	20.9	18.4	
Gender	Male	26.9	34.9	36.8	0.55[a]
	Female	73.1	65.1	63.2	
Household size	Number of adults				0.12[b]
	1	17.3	14.0	5.3	
	2	48.1	46.5	42.1	
	3 or more	34.6	39.5	52.6	
	Number of children under 5 years				<0.01**[b]
	0	88.5	60.5	73.7	
	1	9.6	27.9	26.3	
	2	1.9	11.6	0	
	Number of children between 6-17				0.64[b]
	0	88.5	81.4	84.2	
	1	7.7	14.0	15.8	
	2 or more	3.8	4.7	0	
Education	School	1.9	2.3	2.6	0.84[b]
	High School	17.3	20.9	28.9	
	Bachelor	42.3	37.2	26.3	
	Masters and above	30.8	32.6	39.5	
	Other	7.7	7.0	2.6	
Income	DKK 100,000-249,999	23.1	18.6	21.1	0.16[b]
	DKK 250,000-499,999	42.3	27.9	31.6	
	DKK 500,000-649,999	23.1	23.3	34.2	
	DKK 650,000 and more	7.7	25.6	10.5	
	Other	3.8	4.7	2.6	
Employment status	Student	19.2	7.0	15.8	<0.01**[b]
	Student with a job	38.5	16.3	13.2	
	Part time job	5.8	7.0	13.2	
	Full time job	30.8	51.2	39.5	
	Self-employed	1.9	4.7	10.5	
	Unemployed	3.8	14.0	7.9	
Residence	Greater Copenhagen	75.0	67.4	65.8	0.74[a]
	Zealand	13.5	23.3	21.1	
	Other	11.5	9.3	13.2	
Segments	Careless	53.8	17.3	28.8	0.012*[a]
	Rational	50.0	33.3	16.7	
	Cooks	22.7	31.8	45.5	
	Eco-moderate	26.3	47.4	26.3	

Note: *p<0.05, **p<0.01, [a]Chi-square test, [b]Kruskal-Wallis test, reported purchase frequency high = ‘once a week or more’ and ‘once every 14 days’, medium = ‘once a month’ and low = ‘once every 2 or 3 months’ and ‘once a year’.

Declaration of interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☐ The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Author Statement

Mausam Budhathoki: Conceptualization, Methodology, Formal analysis, Writing- Original draft preparation

Anette Zølner: Methodology, Data curation, Writing – Original draft preparation

Helene Christine Reinbach: Conceptualization, Writing – Review and Editing, Supervision

Morten Arendt Rasmussen: Software, Validation

Thorkild Nielsen: Conceptualization, Resources, Supervision

Supplementary Material

Click here to access/download

Supplementary Material

Annexure A.docx