

Purchase Behavior of Consumers for Seafood Products

N. Al-Mazrooei¹, G.V. Chomo²,
and A. Omezzine^{3*}

¹Quality Control Center, Ministry of Agriculture and Fisheries,
P.O. Box, 467, Muscat, Sultanate of Oman

²Escwa, Beirut, Lebanon

³Ministry of Agriculture and Fisheries. P.O. Box 467, PC 113,
Muscat, Sultanate of Oman

السلوك الشرائي لمستهلكي المنتجات البحرية

نشوى المزروعى وفكتوريا تشومو وعبدالله أم الزين

خلاصة: يلعب مستهلكو المنتجات البحرية دوراً رئيسياً في قرارات الصيادين و التجار حيث أنهم يتجاوبون مع خصوصيات المنتج المتعلقة بالصف و الشكل ومكان الشراء و الجودة. يهدف هذا البحث إلى دراسة سلوك المستهلك العماني وإختياراته للمنتج من حيث الشكل ومنفذ تسويقه عند شرائه للأسماك. تشير النتائج بأن الأسواق بمواقع الإنزال على الشواطئ تمثل المنفذ الرئيسي المفضل لسكان المناطق الساحلية بينما تمثل أسواق المفرق وشركة الأسماك العمانية المنفذ الأكثر إستعمالاً لسكان المناطق الداخلية. وتبين النتائج أيضاً أن المستهلكين بالمناطق الريفية و الحضرية يفضلون شراء الأسماك كاملة بدون تقطيع بينما يفضل المستهلكون ذوي الدخل المرتفع شراء الأسماك الجاهزة و المقطعة على أشكال متعددة. توصي الدراسة بتركيز جهود تنمية الأسواق السمكية على تطوير الأسواق بمواقع الإنزال وأسواق البيع بالمفرق بالمناطق الداخلية وتحسين البنية الأساسية بها. كما توصي بتطوير منافذ بيع الأسماك المجهزة مثل السوبر ماركت و المحلات المتخصصة لتلبية طلب المستهلكين ذوي الدخل المرتفع.

ABSTRACT: Fish consumption is a key component in production and marketing decisions. Fish consumers play a key role because fishermen and distributors recognize their purchase choices as a determinant to their operation. Consumers make buying decisions according to market conditions and to various attributes of the product, namely the specie, the form, the place of purchase, the size and the quality. This study is aimed at providing information on Oman consumers' attitudes and preferences for fish purchase form and market outlets using an information-processing model. It identifies factors for predicting changes in market demand for fish products and services as a result of changes in consumers attributes. Results indicate that on-shore fish markets are the most preferred outlets for the coastal population while retailers and Oman National Fisheries Company are the commonly used outlets. Results also show that whole fish is the most preferred form of purchase for both rural and urban medium to low-income consumers while a large proportion of high-income consumers in urban regions prefer mainly sliced fish. Market development efforts should focus on the organization of on-shore fish markets in coastal regions, and retailers and Oman Fisheries Company's outlets in the inland areas. Forms other than whole fish may be promoted for sale in supermarkets and specialized shops for the urban high-income consumers group..

Keywords: fish products, consumers behavior, Sultanate of Oman

Although fish products have always been an important dietary food item, fish consumption in countries such as Oman has increased remarkably. Consumption in this country has reached an annual average of more than 60,000 metric tons (t) during the last five years with a peak of about 28 kilogram (kg) per capita in 1999 (MAF, 1999). There are over 300 fish species in Oman but only less than 120 among them are commercially exploited. Local markets are

the most important outlets for all these species although seafood exports have increased during the last ten years (Omezzine, 1998). Due to the importance of the local market, consumers' buying behavior is a significant determinant of production and marketing decisions made by the private and public sectors (Houston *et al.*, 1996). Survey data (Houston *et al.*, 1996) show that Omani consumers react to many different attributes of fish products. They make

*Corresponding author.

decisions on the species, the form, place of purchase, and quality based on product prices, disposable income and other consumption factors. Moreover, consumers' preferences are affected by their demographic, socio-economic and attitudinal characteristics. Successful fish traders respond to consumers' preferences. Fishermen, investors, and distributors recognize the key role of consumers, their buying behavior, and their preferences in the development of market outlets, and the supply of products in the desired form and quality.

Previous studies of seafood demand and marketing have focused heavily on consumer attitudinal factors and their impacts on choices between species, form, and quality (Hanson *et al.*, 1995; Houston *et al.*, 1996; Gempesaw *et al.*, 1995; Herrmann *et al.*, 1994). Most studies include traditional determinants of demand, namely product prices, consumers' tastes, habits, income, and preferences. However, consumer behavior and choice attitude have significant bearing on market development. Consumers are generally believed to formulate their attitudes from available information and experience. These attitudes are of interest because they influence the choice of a given product, quantity, and quality. The operative mode of this framework is consistent with the "attitude-before-behavior" paradigm used to depict the effects of advertising in situations that exhibit high consumer involvement (Ray, 1974). Attitudes may be affected by both endogenous and exogenous factors. The information-processing model recognizes the importance of consumer perceptions and attitudes as they relate to behavioral intention in the decision-making process within a simultaneous framework (Huang, 1993).

Many approaches have been developed in the field of consumers' attitudes and purchase choice. These were aimed primarily at identifying how behavioral factors might affect market dimensions and development. They differed from traditional demand analysis that focus on explaining the relationships between quantity demanded and its determinants such as consumer income, taste, and prices and aimed primarily at determining consumer response to income and price changes.

Houston *et al.* (1996) conducted a study of fish consumers' preferences in Oman with respect to species choice and product nature. They addressed the role of consumers' attitudes with respect to four common fish species (kingfish, shrimp, cuttlefish, and tuna) and the product nature (fresh, frozen, canned, and sliced). Their results provided valuable information to assist market and product development. Houston *et al.* (1996) contended that freshness is the primary concern of Omani consumers, with little regard for "quality or product differentiation". They contended that the market could be expanded if consumers accepted

frozen and processed fish products. Extending the market is beneficial to consumers by increasing fish availability in the diet, to fishermen by increasing the value of their catch, and to fish processors and traders by raising their revenues from a higher volume and better quality of fish products. However, it is essential to determine exactly how the market can be extended by analyzing all details of consumer preferences for fish products.

The present study focuses specifically on product form and market outlet as they influence consumer attitudes and preferences for fish products in Oman. This study recognizes the importance of thorough market analysis to assist in market development and improvement of revenues from the fish resources. The specific objective of the study is to generate information regarding the primary factors affecting consumers' choices between different purchase forms of fish (whole, fillet, and sliced) and, between the various market outlets available to consumers in Oman on-shore market, Oman National Fisheries Company (ONFC), supermarkets, specialized fish shops, and retailing outlets near the on-shore fish market. Furthermore the study separates out consumer characteristics such as income, market preference, education, urban versus rural, etc., to clarify preferences for product differentiation and market outlet. It is anticipated this study will identify factors for predicting changes in market demand for fish products and services in line with income growth, rural to urban population drift, and continued improvements in education. Results are expected to contribute to product and market development and differentiation.

Overview of Fish Consumption and Market Setting in Oman

Fresh and frozen fish are the most commonly forms sold in both the domestic and export markets. The local market is very important, as average per capita consumption of fish has been increasing and reached around 28.5 kg in year1999 (MAF, 1999). Previous studies (Omezzine, 1998; MAF, 1999) indicate that the marketing system for fish in Oman is dominated by on-shore fresh fish direct sale from fishermen to consumers in the coastal regions and dispersed retail sale outlets in the inland regions. A few other sale outlets have evolved during the last few years as a result of changes in life-styles and social conditions of consumers together with the increasing demand from high income expatriates working in the country. The development of these new outlets has been viewed to be slow as demand for them has been judged still below promoters' expectations. Officials believe that the domestic market is still underdeveloped and offers slower growth than the potential

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might indicate (MAF, 2002). Consumer behavior and consumption habits are the most important factors affecting the development of these markets. Field observations and prior studies of Omani dietary habits stated that consumers prefer fresh vegetables, fresh fruit, fresh meat, and fresh fish. Moreover, consumers seem to prefer large fish rather than small. Consumers treat favorably large fish as determined by name, appeal, recognition and appearance. Frozen fish have a very thin market in Oman (Ingvarsson, 1988). Whole fish is a common form of sale except for very large species. Other forms of fish sale have evolved with new sale outlets during the last few years. However, the market for these new forms such as sliced fish, fillets, smoked and dried remains very limited.

Research Methodology

MODEL SPECIFICATION: The logistic regression procedure is the most frequently used method to study consumer perceptions and attitudinal behavior (Gempesaw *et al.*, 1995). It allows the analyst to measure the effects of relative price perceptions and socio-economic and demographic characteristics on household choices of forms of products and market outlets. According to Demarris (1995) a logistic regression is a logical choice for modeling consumer choice behavior because the error term is not normally distributed due to the nature of the data used. When data are generated from a survey using questions based on the Likert five-point scale, responses are clumped and truncated at either side of the distribution. That is, more positive or negative responses are expected rather than responses being normally distributed. The error term has a logistic distribution and, therefore, the appropriate analytical technique is the logistical regression.

A choice model is specified with a dichotomous dependent variable representing the consumer's final choice to be explained by a set of variables such as demographic factors, socio-economic factors, perception, experience, and preferences. The Logit model transforms the problem of predicting probabilities within a (0,1) interval to the problem of predicting the odds of an event occurring within the range of the entire real line. This model takes the following form:

$$\text{Choice} = f(\text{explanatory variables})$$

The analytical form of the Logit model is based on the cumulative logistic probability function where the probability (P_i) that a consumer will make a certain choice (i) given his attributes (x_i) is specified as follows (Pindyck and Rubinfeld, 1981):

$$P_i = F(z_i) = F(\alpha + \beta x_i) = \frac{1}{1 + e^{-z_i}} = \frac{1}{1 + e^{-(\alpha + \beta x_i)}} \quad (1)$$

P_i is the probability that an individual will make a certain choice, given knowledge of x_i .

In the fish purchase choice, P_i would represent the probability that a consumer will choose a certain form or an outlet given an income (education level, etc.) equal to x_i .

F is the cumulative probability function and z_i is a theoretical index, which is determined by an explanatory variable x_i ; α and β are constants. The model to be estimated is derived from Equation (1) Pindyck and Rubinfeld, 1981).

$$\log \left(\frac{P_i}{1 - P_i} \right) = z_i = \alpha + \beta x_i \quad (2)$$

The dependent variable in Equation (2) is the natural logarithm of the odds (the ratio of expressing the probability) that a particular choice will be made (Pindyck and Rubinfeld, 1981; Judge *et al.*, 1982). The estimated coefficients α and β reflect the effect of a change in an independent variable x_i on $\log(P_i/(1 - P_i))$.

The slope of the cumulative logistic distribution is greatest at $P = 1/2$. This implies that changes in the independent variables x_i will have their greatest impact on the problem of choosing a given option at the midpoint of the distribution. In the case of purchase choice, the model presumes that an increase in income for example will increase the probability of choosing a certain form of outlet. However, it may have no significant effect on low-income individuals who are unlikely to alter their choice under any conditions. Likewise, it may have very slight impact on high-income individuals who are very likely to have made their choice before the increase in income.

$$P_i \text{ is approximated through } \hat{P}_i = \frac{r_i}{n_i}$$

where r_i is the number of times an alternative is chosen by consumers with the same x_i ; n_i is the number of consumers choosing the same x_i and choosing the same alternative.

$$\text{then } \log \frac{(P_i)}{1 - P_i} = \log \left(\frac{\hat{P}}{1 - \hat{P}_i} \right)$$

$$\begin{aligned} \text{then } \log \left(\frac{\hat{P}}{1-\hat{P}_i} \right) &= \log \frac{z_i/n_i}{1-z_i/n_i} = \log \frac{r_i}{n_i - z_i} \\ &= \alpha^* + \beta^* X_i + \epsilon_i . \end{aligned}$$

$\epsilon =$ error term

The logit model will be estimated as :

$$\log \frac{\hat{P}}{1-\hat{P}} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \epsilon_i .$$

The parameters do not indicate the increase of the probability of the event occurring, given a one unit increase in the corresponding independent variable. The amount of change in probability depends on the original probability and thus, on the initial values of all the dependent variables and their coefficients. Specifically,

$$\frac{dP_i}{dx_i} = \frac{\beta_i e^{-z_i}}{(1 + e^{-z_i})^2} \quad (3)$$

The interpretation of the estimated parameters must be done with care since the left-hand side of the equation is the logarithm of the odds of choice and not the actual probability (Pindyck and Rubinfeld, 1981). The change in the logarithm of the odds of choice can be determined as follows:

$$\Delta \log \left[\frac{P_i}{1-P_i} \right] = \beta \Delta X_i \quad (4)$$

For example, to interpret the effect of a change in X_i on the probability of choosing a given form of fish we use Equation (2) as follows:

$$\Delta \log \frac{P_i}{1-P_i} = \beta_i \Delta X_i$$

$$\Delta \log \left(\frac{P_i}{1-P_i} \right) = \left(\frac{1}{P_i} - \frac{1}{1-P_i} \right) \Delta P_i = \frac{1}{P_i(1-P_i)} \Delta P_i$$

If ΔX_i is 1 \rightarrow

$$\Delta P_i = \beta_i \left[P_i (1-P_i) \right]$$

then a one-unit change in X_i will result in $\Delta P_i = \beta_i \left[P_i (1-P_i) \right]$ change in the probability that a choice will be made given a value of X_i .

DATA AND SURVEY PROCEDURE: Data for this paper was gathered from a cross-sectional survey (Bulmer, and Warwick, 1983) executed in the Sultanate of Oman. Some 124 households were selected and interviewed using a pre-tested questionnaire according to the principles described in Nachmias and Nachmias, (1996). The survey instrument contained ordered responses that follow the Likert five-point scale (Simon and Burstein, 1985), as well as close-ended questions consisting of “yes” or “no” stated items. All statistical treatments employed SAS® software (Statistical Analysis System; SAS/STAT, 1993).

The reliability of the questionnaire was tested through a pilot study. The same instrument was used on the same subjects twice. The questionnaire was then revised to incorporate suggestions and clarify ambiguous questions or deal with omitted items that may have bearings on consumers’ attitudes and attributes. The final questionnaire was then conducted on 124 households. A convenience sampling procedure was used to assign consumers from urban coastal and rural inland regions of Oman. It was not possible to reach a larger group of potential respondents because of the unavailability of respondents and budget constraints to cover a larger geographic area. Questions were addressed to the person responsible for the purchase of seafood for household consumption.

While the sample was randomly selected, demographic characteristics of the country were represented to a large extent. However, because of difficult access to households the resulting sample was slightly skewed towards higher education level and urban consumers respondents. This, in our opinion, will not affect seriously the conclusions of the study as fish market development may potentially target the educated and urban strata of the population.

Meanwhile, the sample was also skewed towards male respondents. In many countries of the world women are primarily responsible for food purchase. This is not the case for Oman. Although no official records exist on this issue it is well known that men are responsible for food purchase, and even more so for fish. Women are present in outlets where prices are fixed such as supermarkets, but are seldom found in food outlets where prices are negotiated or auctioned. This is the case of fish markets. It is a matter of culture that women cannot stand in a crowd to negotiate prices or participate in an auction with men.

MODEL ESTIMATION: To analyze the survey data, two models were specified. The first deals with decision

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TABLE 1

Dependent variable names, definitions, and coding values.

Form of purchase	Whole fish	1 = Whole fish,	0 = Otherwise
	Filletts	1 = Filletts	0 = Otherwise
	Slices	1 = Slices	0 = Otherwise
Place of Purchase	On-shore market	1 = On-shore markets	0 = Otherwise
	Fisheries Company	1 = Company	0 = Otherwise
	Supermarket	1 = Supermarket	0 = Otherwise
	Fish shop	1 = Shop	0 = Otherwise
	Retailer	1 = Retailer	0 = Otherwise
		Frozen fish sold by retail outlet of Fisheries Co. Chilled or frozen or iced fisheries sold Specialized shop selling chilled or frozen fish Small fish dealers in markets or truckers, jobbers selling fish to consumers	

TABLE 2

Independent variables, names, and coding.

hhsze	household size measured in numerical values;
edu	education of respondents measured by number of years of education;
age	the respondent's age measured in years;
ncom	the respondent's income measured in RO. as reported by respondent and grouped as follows: in RO. = 1,200 if 0 < income < 2,400; = 4,200 if 2,400 < income < 6,000; = 8,000 if 6,001 < income < 10,000; = 15,000 if 10,001 < income. This variable is introduced as a dummy and was given values from 1 to 4 for the different categories of income, respectively.
urbru	whether respondent is urban or rural. It is equal to 1 if rural and 0 if urban;
Incmri	income increase in the future (expectation). Equals 1 if an increase of income would increase purchase of fish, and 0 otherwise;
prceexp	price expectation. Equals 1 if a future price decrease would increase purchase of fish and 0 otherwise;
price	the price of fish. Equals 1 if very important or important in decision of fish purchase and substitution and 0 otherwise;
odor	fish odor measured in the Likert five-point scale with 5 = very good, 4 = good, 3= medium, 2 = satisfactory, 1 = unsatisfactory;
textr	fish texture measured in the Likert five-point scale with 5 = very good, 4 = good, 3= medium, 2 = satisfactory, 1 = unsatisfactory;
moistnss	fish moistness measured in the Likert five-point scale with 5 = very good, 4 = good, 3= medium, 2 = satisfactory, 1 = unsatisfactory;
flavor	fish flavor measured in the Likert five-point scale with 5 = very good, 4 = good, 3= medium, 2 = satisfactory, 1 = unsatisfactory;
overall	fish overall attractiveness measured in the Likert five-point scale with 5 = very good, 4 = good, 3 = medium, 2 = satisfactory, 1 = unsatisfactory;
availbl	availability of fish in place of residency measured in the Likert five-point scale with 5 = very good, 4 = good, 3 = medium, 2 = satisfactory, 1 = unsatisfactory;
spouse	spouse contribution to fish purchase measured in the Likert five-point scale with 5= always,...., 1= never

choice on form of purchase and the second with market outlet. In both models the choice variables were converted into binary variables with 0 and 1 values. Selected purchase forms considered in the choice include whole fish, fillet, and sliced. Specific market outlets included in the choice are on-shore market, Oman National Fisheries Company (ONFC), supermarket, fish shop, and retailer. In the purchase form model, the purchase decision of a particular form takes the value of 1 if the respondent's answer is "yes", and 0 "otherwise". In the place of purchase model the decision on a particular outlet takes the value of 1 if the respondent's

answer is "yes", and 0 "otherwise". Both choice models included a set of explanatory variables as indicated below:

$$\text{Choice} = \alpha_0 + \text{hhze } \alpha_1 + \text{edu } \alpha_2 + \text{urbu } \alpha_3 + \text{age } \alpha_4 + \text{income } \alpha_5 + \text{incmri } \alpha_6 + \text{Prceex } \alpha_7 + \text{price } \alpha_8 + \text{odor } \alpha_9 + \text{textr } \alpha_{10} + \text{moistnss } \alpha_{11} + \text{flavor } \alpha_{12} + \text{overall } \alpha_{13} + \text{availbl } \alpha_{14} + \text{spouse } \alpha_{15} + \text{markt } \alpha_{16} + \text{fishcom } \alpha_{17} + \text{sprmnt } \alpha_{18} + \text{shop } \alpha_{19} + \text{retail } \alpha_{20} + e.$$

Tables 1 and 2 represent the dependent and independent variable names, definitions, and their coding, respectively.

Results and Discussion

TABLE 3

Descriptive statistical analysis of consumers' preferred forms and place of purchase was performed first to determine the importance of each form and market outlet in the consumers' choices.

The Logit model was then estimated using the maximum-likelihood estimation procedure (SAS, 1988). The results are presented for both choice variables in Tables 3 and 4. All measures of model goodness-of-fit indicate that the estimated models for both choice decisions fit the data with high percentages of correct predictions ranging from 69% to 94% for the purchase choice model, and 80% to 96% for the market outlet model.

THE PURCHASE FORM CHOICE MODEL: Results of descriptive statistics analysis on consumers fish preferred indicate that whole fish is the most frequently purchased form. About 92% of the respondents answered "yes" when they were asked if whole fish was their preferred form of purchase, while only 60% of respondents said "yes" for sliced fish. Fillet is the least preferred with about 21% of "yes" responses.

Table 3 shows the estimated coefficients and the asymptotic t-ratios for the purchase form decision model. Results suggest that the logarithm of the odds that an individual consumer will choose whole fish as a form of purchase is higher if the respondent buys from an on-shore market and ranks the perceived flavor of that particular fish specie "very good" to "good". Consumers who buy from the on-shore market are more likely to buy whole fish. However, the probability that consumers prefer whole fish decreases with income and overall actual attractiveness of a particular form. Actual attractiveness is dependent on what the product in a particular form looks like and how it is packed, handled and presented to the buyer. There is no doubt that those who place importance on attractiveness are more likely to choose fillets and sliced fish rather than whole fish from the on-shore markets. Consumers with lower income are also more likely to buy whole fish. This negative relationship between purchase form and income is consistent with observed buying attitudes. On the other side, observed attitudes show that often high-income consumers prefer to buy their fish supplies from higher service market outlets where fish slices and fillets are available. This inference is confirmed in the place of purchase choice model where high-income consumers prefer supermarkets and fish shops that provide them the form and attributes they desire. The negative relationship between the likelihood of whole fish purchase choice and overall attractiveness of fish

Omani consumer behavior survey, parameters of choice models for normally purchased form.

Independent Variable	Whole fish	Fillet	Slice
Constant	0.098 (0.018)	-3.100 (-1.177)	2.220 (1.057)
Household size	-0.144 (-0.942)	0.132 (1.235)	-0.086 (-0.864)
Education	0.133 (1.242)	0.078 (1.167)	-0.122** (-2.320)
Rural/Urban	0.481 (0.365)	-0.172 (-0.267)	0.138 (0.263)
Age	-0.035 (-0.631)	-0.042 (-1.238)	0.003 (0.101)
Income	-0.255E ⁰³ * (-1.862)	0.141E ⁰³ ** (2.030)	0.120E ⁰³ ** (2.007)
Income increase	0.364 (0.326)	-0.807 (-1.141)	-0.042 (-0.083)
Price expectation	-0.100 (-0.079)	0.283 (0.394)	1.079* (1.795)
Market	2.903* (1.675)	0.150 (0.177)	-0.373 (-0.471)
Fisheries Co.	0.505 (0.316)	-0.385 (-0.440)	-0.693 (-1.082)
Supermarket	0.096 (0.073)	0.307 (0.371)	-0.961 (-1.474)
Fish shop	-0.271 (-0.227)	0.844 (1.384)	0.278 (0.518)
Retailer	0.684 (0.367)	1.009 (1.121)	-0.562 (-0.710)
Odor	0.843 (0.924)	-0.002 (-0.003)	-0.814* (-1.795)
Texture	-0.256 (-0.165)	-0.128 (-0.186)	0.134 (0.255)
Moistness	-0.499 (-0.417)	-0.549 (-1.031)	-0.095 (-0.229)
Flavor	2.281* (1.826)	0.979 (-0.231)	-0.281 (-1.626)
Overall	-1.791* (-1.774)	0.979* (1.856)	-0.281 (-0.667)
Spouse decision	0.174 (0.579)	-0.309* (-1.810)	-0.024 (-0.169)
Cragg-Uhler R ²	0.392	0.242	0.191
Number of observations	124	124	124
Observations at zero (Answers No)	10	97	49
Likelihood ratio	22.817	21.187	18.829
% of correct predictions	94.4	84.7	69.3

Number in parentheses are asymptotic t-values.

*indicates significance at P=0.10.

**P= 0.05 level.

TABLE 4

Omani consumer behavior survey, parameters of choice model for place of purchase.

Independent Variable	On-Shore Market	Fisheries Co.	Supermarket	Fish Shop	Retailer
Constant	4.505 (1.019)	-2.461 (-0.735)	2.449 (0.789)	1.323 (0.584)	-0.176 (-0.028)
Household size	-0.069 (-0.399)	-0.446** (-2.262)	-0.229 (-1.286)	-0.214 (-1.573)	-0.290 (-1.125)
Education	0.167** (2.026)	-0.098 (-1.067)	-0.166* (-1.805)	0.033 (0.556)	0.420** (2.087)
Rural/Urban	0.312 (0.269)	1.734* (1.949)	-3.029** (-2.337)	0.060 (0.106)	3.445** (2.206)
Age	0.036 (0.782)	0.029 (0.720)	-0.001 (0.034)	0.023 (0.741)	0.046 (0.0694)
Income	-0.198E ⁰³ * (-1.682)	+0.115E ⁰³ * (1.147)	+0.354E ⁰⁴ * (0.384)	-0.435E ⁰⁴ * (0.658)	-0.355E ⁰³ * (-1.841)
Income increase	0.824 (0.765)	1.030 (1.379)	-1.656 (-1.496)	-0.324 (-0.518)	-0.444 (-0.346)
Price expectation	0.712 (0.811)	0.366 (0.523)	0.778 (1.007)	-0.063 (-0.116)	2.010* (1.844)
Market		-0.211 (-0.189)	-0.463 (-0.295)	-1.969** (-2.139)	-8.962*** (-3.735)
Fisheries Co.	-0.186 (-0.154)		-0.441 (-0.351)	-0.121 (-0.165)	0.776 (0.493)
Supermarket	0.374 (0.270)	-0.521 (-0.387)		-0.857 (-0.945)	1.046 (0.462)
Fish shop	-2.456** (-2.452)	0.209 (0.272)	-1.229 (-1.196)		-6.003** (-2.558)
Retailer	-6.358*** (-4.731)	-2.969* (-1.776)	1.565 (0.947)	-2.931** (-2.605)	
Odor	0.932 (1.067)	-1.530* (-1.858)	0.646 (0.838)	0.185 (0.369)	-0.516 (-0.419)
Texture	-2.160* (-1.989)	2.854** (2.203)	-0.256 (-0.325)	-1.329** (-2.586)	-3.229*** (-3.070)
Moistness	0.271 (0.355)	1.312* (-1.912)	1.323 (1.606)	0.670 (1.441)	0.698 (0.606)
Flavor	0.790 (0.904)	0.113 (0.142)	-1.951** (-2.080)	0.455 (0.801)	3.047** (2.047)
Overall	-0.470 (-0.579)	1.327* (1.844)	0.914 (1.092)	0.360 (0.691)	-1.860 (-1.479)
Spouse decision	-0.564* (-1.847)	0.066 (0.306)	0.237 (0.890)	-0.065 (-0.419)	-0.254 (-0.734)
Cragg-Uhler R ²	0.718	0.345	0.375	0.238	0.807
Number of observations	124	124	124	124	124
Observations at zero (Answers No)	30	108	109	94	95
Likelihood ratio	81.269	25.491	27.035	21.495	94.875
% of correct predictions	88.7	88.7	91.9	79.8	96.0

Number in parentheses are asymptotic t-values. *indicates significance at P=0.10. **P= 0.05 level. *** P= 0.01 level.

products indicates that the higher the consumer perception of overall attractiveness, the lower is their purchase of whole fish. This may mean that whole fish as a form of purchase does not exemplify much attractiveness and that consumers preferring whole fish are looking for other characteristics such as freshness or low per unit price, rather than attractiveness. The variables that have a significant effect on consumer's choice of fillet as a form of purchase were income, overall attractiveness, and spouse. Results suggest that high-income consumers are more likely to prefer fillets than lower income consumers. This is very consistent with the previous interpretation of the negative relation between the market outlet as a choice of place of purchase and income. The higher the income the more consumers prefer to buy from fish shops and supermarkets where fish are sold in different forms including fillet and slice. Consumers who place more importance on overall attractiveness are more likely to buy fillet. The logarithm of the odds that a consumer will choose fillet is higher if the consumer thinks that overall attractiveness is important in making his choice of form of purchase. The probability that consumers consider fish fillet in his form-evoked set will decrease if spouse contribution in purchase decision is important. Respondents whose spouses contribute very often to the fish purchase decisions are less likely to buy fillet. However, since less than 25% of spouses are responsible for fish purchase in Oman, this result implies that the market for fish in the form of fillets may be promoted.

The factors for the odds of choosing sliced fish include education, income, price expectation, and odor. The logarithm of the odds that an individual consumer will choose slice as a form of purchase increases for higher consumer income, and more important the price is in substituting fish for other products. Consumers with a higher level of education and those who rate natural fresh fish odor as very important in their purchase decision are less likely to buy fish in slices. The negative relationship between price and slice form of purchase is consistent with the Law of Demand. The lower the price of sliced fish, the greater is the probability of consumers buying fish in the form of slices. Likewise, the positive relationship between income and slices is consistent with income elasticity of normal goods. The probability of buying fish in slices increases for higher consumer incomes. High-income consumers do not buy whole fish, preferring higher per unit price slices because they are consistent with their attitudinal attributes.

THE MARKET OUTLET CHOICE MODEL: Descriptive statistical analysis of survey data on market outlet choice revealed that the on-shore market is by far the most preferred outlet. About 76% of the respondents

indicated that the on-shore fish market is their exclusive source of supply. These markets provide a variety of fish products in the most preferred forms and quality to Omanis and foreign nationals residing in Oman. Fish is not sold per weight but by unit, case, or string of many pieces together. Sales take place in an open area on the seashore where fish is displayed on the ground as landed.

All other outlets are deemed less important in the consumers' market choice. About 24% of respondents prefer fish shops and retailers while only 13% have a preference to ONFC and supermarkets.

Results of estimated parameters and asymptotic t-values of the market outlet choice model are presented in Table 4.

Education, income, fish shop, retailer, texture, and spouse variables significantly affect on-shore fish market choice. The model estimates indicate that consumers with higher education levels are more likely to choose on-shore market for buying fish. Fish shops and retail outlets are marked substitutes for on-shore markets. Moreover, the more important the fish texture to consumers' choice the less they buy from the on-shore market. Likewise, the more the spouse contribution is important in the purchase decision, the less they buy from the on-shore market. Finally, income is found to have negative impact on the probability of buying from on-shore markets. High-income people are less likely to use on-shore markets because on-shore markets are inconvenient and don't offer the form and services they desire. Although other market outlets appear more popular, some variables are found to have a significant effect on consumers' choice of ONFC, retailers, fish shops and supermarkets. Results indicate that the probability of choosing ONFC as a place of purchase decreases for large sized households, when odor and moistness are important criteria in the purchase decisions, and finally when retail outlets are important in consumers' evoked set. In contrast, the probability of ONFC purchase increases for rural consumers, and with favorable views of texture, and availability. The level of education, consumers' origin, and flavor significantly affects the choice of supermarket. The probability of using supermarkets as the preferred place of purchase increases in urban areas with lower level of education and when flavor is an important factor in fish purchase.

Results indicate that rural consumers are less likely to use supermarkets as their preferred place of fish supply. Results also indicate that the logarithm of the odds that a particular consumer will choose a fish shop is lower if this same consumer specified the on-shore market or retailer in his choice evoked set and if texture is very important in his decision of purchase. On-shore fish markets and retailers are the most competitive outlets to the fish shop.

*Corresponding author.

PURCHASE BEHAVIOR OF CONSUMERS FOR SEAFOOD PRODUCTS

The choice of retailer is significantly affected by the level of education, the origin of consumers, income, future price, texture, flavor and other market outlets, namely the on-shore market and the fish shop. Results show that the probability that an individual consumer will have "retailer" in his evoked set of fish market outlets is higher with a higher level of education, if he lives in a rural area, belongs to the medium to low income group and considers price very important in substitution of fish for other products, and texture is less important in making his purchase decision. Rural consumers are more likely to choose retailers than are urban dwellers. This is consistent with their geographical location with respect to on-shore markets. Rural inland consumers are far from the seacoast. On the other hand, consumers who consider price as important in their spending decision on food and other products are more likely to choose retailers as their preferred outlets. The on-shore markets and the fish shops are found to be very competitive for retailers

Conclusions

This study has focused on consumers' attitudinal behavior with respect to fish product form and market outlet. It has generated information regarding the potential factors affecting consumers' choices between different purchase forms and between the various market outlets. Results indicate that on-shore fish markets are the most popular outlets of fish purchase in the coastal regions. They provide a variety of fish products in the most preferred form and quality. Retailers and fish shops are primarily important in the rural inland areas. Whole fish is the most preferred form of purchase for both rural and a large proportion of urban consumers. Sliced fish is highly preferred by higher income households in urban regions. These preferences are the result of the effects of consumer demographic, socio-economic, and attitudinal characteristics as well as product attributes.

Income is a significant determinant of the probability that consumers buy whole fish at on-shore markets. This suggests that higher income consumers do not use the on-shore markets because they prefer to buy their fish in other forms. On the other hand, price seems to have no significant impact on fish purchases from on-shore markets. This suggests a highly inelastic demand for fish in the on-shore fish markets at the current market prices. However, price is an important factor in the substitution of fish for other products. It has a significant effect on consumers' decisions only when buying fish in slices or fillet

Consumers' perceptions of product characteristics are very important in the purchase decision of form and place. Results indicate that the higher the consumers' perception of overall acceptability, odor, flavor, and

moistness, the lower the probability of choosing whole fish and on-shore fish markets. This indicates that consumers preferring whole fish and on-shore markets do not consider these product attributes as important, but may have higher perception of other attributes provided in fish products sold directly by fishermen on landing sites. High-income consumers are found to prefer fresh fish in processed slice and fillet forms. They place high importance on attractiveness that is not available in other forms of fish. For this reason they are more likely to buy in other outlets than on-shore markets. Yet, high income people prefer to shop in one-stop outlets to buy all food items or in specialty shops where they think they are served better. Moreover, their diet and cooking habits may differ from lower income households for that they are significantly attracted by forms other than whole fish.

The consumers' education is another significant factor to affect choices of place and form of purchase. Results indicate evidence of positive relationship between the level of education and the preference for whole fish and on-shore market. A significant proportion of the highly educated consumers are found to have preferences for whole fish from on-shore markets. Yet, this preference does not imply that the educated group will sacrifice the other good attributes of freshness, flavor, attractiveness and natural odor. The product form and market place they prefer are not provided in other market outlets. Moreover, another explanation for this inconsistent relationship between the level of education and preference for whole fish and on-shore markets is the lack of evidence of a correlation between high income and education in a yet young population. Strict education level is not an indicator of income.

These results have considerable implications on production and marketing decisions as well as consumption planning and forecasting in light of economic development in the country and continued growth in income, education, and urbanization. It is expected that economic growth and continued improvement in income and education will prove significant in developing new product forms and purchase places at supermarkets and specialty shops.

Market development efforts in Oman should consequently focus on the organization of on-shore fish markets in coastal regions and retailing outlets in the inland areas. The promotion of fish selling in supermarkets and specialized shops for other forms of fish would necessarily target urban high-income areas

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Received July 2002.

Accepted January 2003.