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The Price of Fish Quality Attributes in the Province of Iloilo, Philippines: Estimates from Hedonic Pricing for Milkfish

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Abstract

Milkfish is the most important fish species being farmed in the Philippines today with the province of Iloilo as a major producer. While demand for fish and other fishery products is increasing, provincial production is dwindling. This study attempts to investigate different milkfish attributes and how consumers value each of these attributes. The research was conducted in the province of Iloilo using primary data gathered by personal interview of 378 purchase-decision makers. Respondents were identified by two-stage random sampling. Hedonic price for each quality attribute was estimated using regression with robust standard errors. Quality attributes considered are: skin and outer slime characteristics, colour of gills, eyes and peritoneum, size, organic and place of origin labels, product form, provision of value-added services and market outlet. It was shown that consumers accord variability in prices to each product attribute. Consumers place a higher premium on colour of the eyes, provision of value-added services, product processing and place where the product is sold. Knowledge of specific features being sought by consumers is vital in ensuring that these product specifications are met. Collaboration of supply chain participants is essential to meet these desired market specifications.

Keywords: Hedonic price, fish quality, quality attribute.

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Introduction

Milkfish is the most important fish species being farmed in the Philippines today (Yap *et al*., 2007). Cultured all over the country, it is cultivated in freshwater, brackish water and marine environments. About 98 % of milkfish production in the Philippines comes from aquaculture while the remaining 2 % comes from marine fisheries according to the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD, 2012). Top milkfish-producing regions are Regions 6 (Western Visayas), 3 (Central Luzon), 1 (Ilocos Region), and 4A (CALABARZON) while top producing provinces are Capiz (11 %), Iloilo (9 %), Bulacan (11 %), Negros Occidental (10 %), and Pangasinan (39 %) PCAARRD (2012). The province of Iloilo is under the Western Visayas Region. The province of Iloilo is a major milkfish producer producing 9 % of the country's milkfish production (BFAR, 2014).

Technology being adopted in the production of milkfish in the province varies in terms of intensification level (extensive to intensive farms) and in terms of culture system (aquaculture or mariculture) (PCAARRD, 2012). Not only is Iloilo a major producer of milkfish, it is a major consumer as well. Based on the Philippine Bureau of Agricultural Statistics (PSA, 2014), the primary sources of protein in the province are pork, milkfish and chicken. *Ilonggos* consume more milkfish on a per capita basis compared to the national per capita consumption. Moreover, provincial per capita consumption of milkfish is approximately twice the national average (Table 1).

Table 1. Comparative animal protein consumption, kg.person^{-1}, Philippines, Western Visayas and Iloilo, 2014

Location	Pork	Beef	Chicken	Milkfish	Round scad
Philippines	9.466	0.926	8.077	3.663	5.738
Western Visayas	7.54	1.232	6.453	6.316	5.322
Iloilo	7.275	1.019	6.806	6.884	4.586

Source: PSA (2014)

While demand for fish and other fishery products is rising due to (1) increasing population, (2) growing preference towards healthy food and (3) increasing human concerns about terrestrial animal welfare, the provincial production of milkfish is slowly dwindling. This is contrary to existing industry trends. Fig. 1 shows the production trend from 1996 to 2014 of the top milkfish-producing provinces in the country. Among the possible reasons for the declining production in Iloilo are decrease in the level of intensification from intensive to extensive, decrease in stocking density, exit of some of the farmers in milkfish production, shifting of cultured species, and possible conversion of milkfish farms to alternative uses.

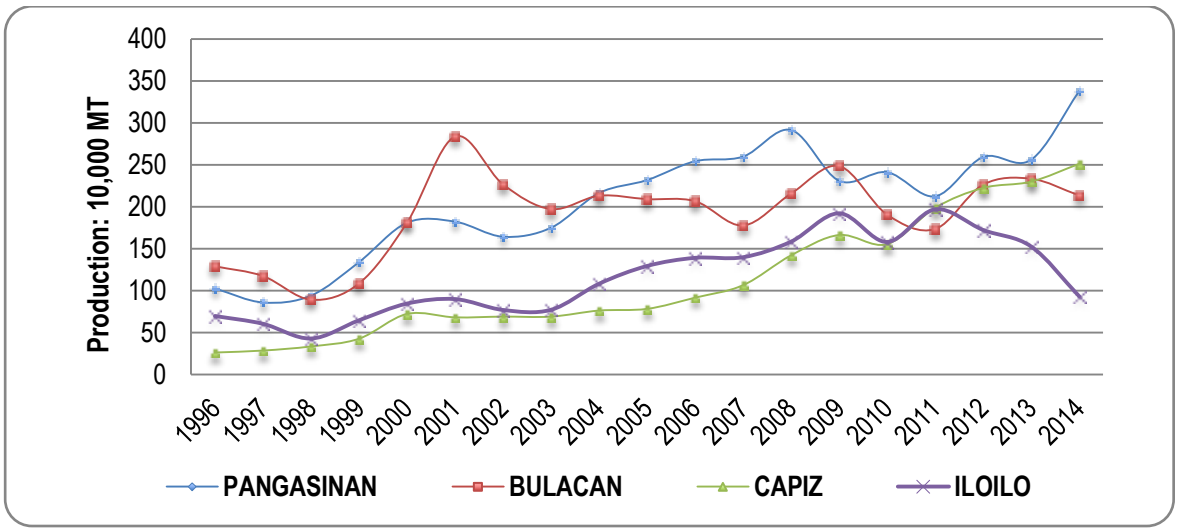

Fig. 1. Milkfish production of top producing provinces in the Philippines, 1996-2014

Milkfish production in the province of Iloilo has lost its competitiveness vis-à-vis traditional sources like Pangasinan, Bulacan, Capiz and Negros Occidental in Western Visayas. It can only be surmised that farmers are moving out of milkfish production due to declining financial sustainability arising from low profitability and level of competitiveness. Published studies are suggestive of the direct link between satisfying customer needs and profitability. Examples are the works of Narver et al, (1990), Hemsworth (2016), Kahan (2013), and Siguaw et al. (1998). From their works, one can deduce that competitiveness can be enhanced by redirecting the overall industry direction to one that is responsive to the needs of the target market. A market-oriented industry direction espouses that focus is on consumer needs and satisfying these needs are the paths to sales and profits (Kotler and Armstrong, 2013). The literature is rich in both theoretical and empirical studies on consumer demand covering various commodities and applied in many countries. However, limited studies have been conducted to understand milkfish consumer demand, more so in the province of Iloilo. Studies attempting to look into the different product attributes and how much consumers are willing to pay for these attributes are still wanting. Toward increasing the level of competitiveness through market-oriented overall industry direction, the study attempted to answer the question, "What are the different product features being sought for by milkfish consumers and how much are they willing to pay for each product attribute being sought?" Variation in milkfish characteristics results in variability in product prices; hence this justifies the use of the hedonic method for non-market valuation. Hedonic pricing techniques have been extensively used to estimate the importance of quality attributes to consumers in many differentiated products. Taylor (2003) reported its use in housing, labour markets, childcare services, agricultural products, computers and cultural commodities. Recent analyses of fish markets have begun focusing on quality attributes (McConnell and Strand, 2000) thus opening opportunities in learning about the costs and prices of fish characteristics.Knowledge concerning specific product attributes wanted by consumers and prices they accord to each of the desired product attribute is vital in order for industry participants to reconfigure their respective roles in the milkfish value delivery network.

Based on the demand study for milkfish in the province of Iloilo, industry rationalisation seems to be a good opportunity for the fishing industry in the Philippines. For the academics, it will enrich application of hedonic pricing techniques in areas where it is not traditionally used, such as fisheries. In the process, product attributes of differentiated goods or products are appropriately valued.

Methodology

Data and Data Sources

The research was conducted in the province of Iloilo, Philippines. Iloilo is in the central part of Philippine archipelago and stands as a gateway to Southern Philippines (Fig. 2). The capital city of the province is Iloilo City. The largest province in Panay Island of the Western Visayas Region, Iloilo is divided into 42 municipalities and one component city. There are 1,721 barangays in the province.

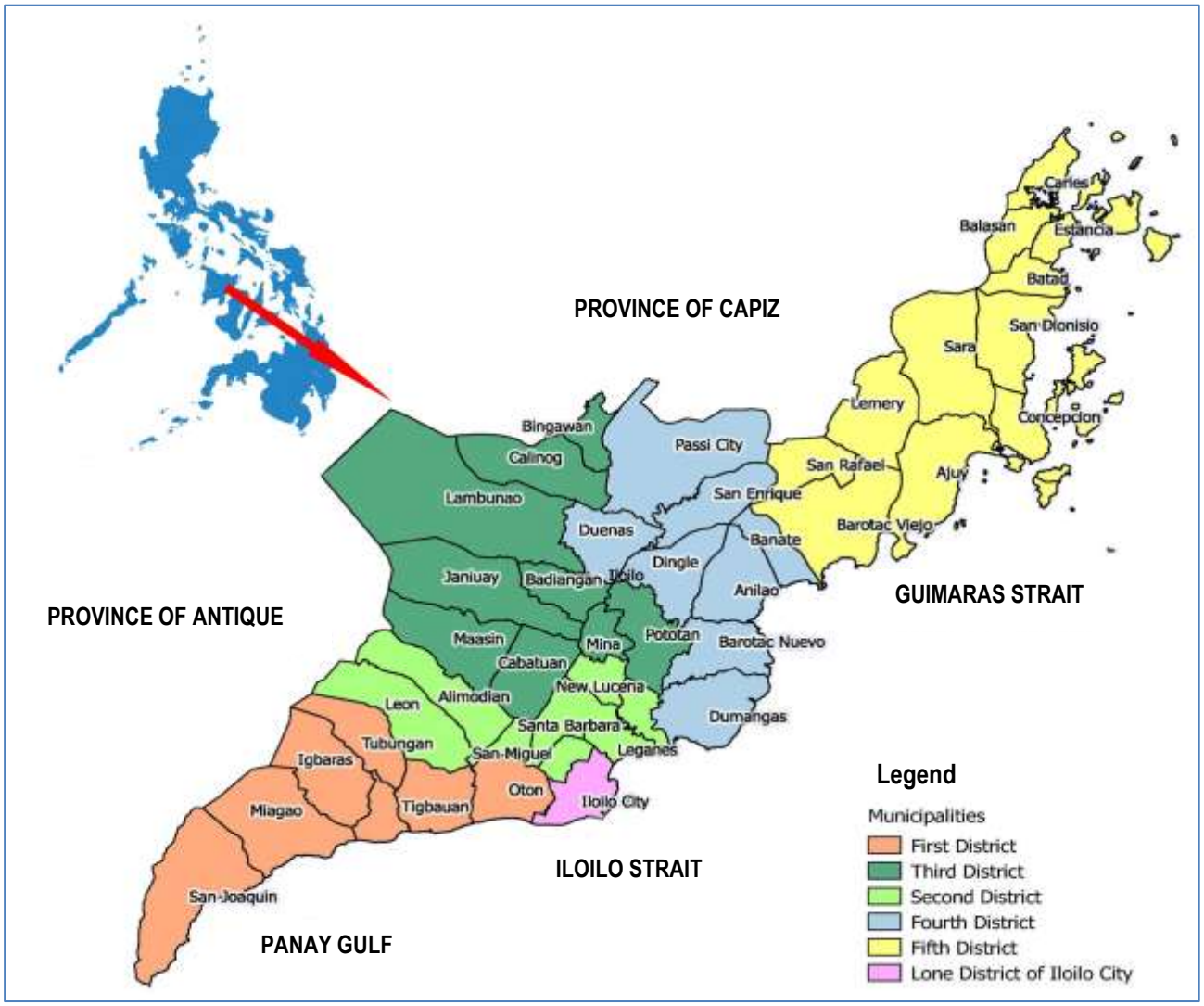

Fig. 2. Map of the Province of Iloilo
Source: Public Information and Community Affairs Office, Province of Iloilo (2015)

Table 2. Data requirements for the analysis of various product features sought by consumers and their willingness to pay for each of the product attributes.

Variable	Variable description
Dependent Variable	
Price	Pesos per kilogram of milkfish
Independent Variables	
Characteristics of the Skin	
S_b (base category)	0 if bright and shining; iridescent or opalescent
S_w	1 if waxy, slight loss of bloom; 0 otherwise
Outer Slime	
M_t (base category)	0 if outer slime transparent; water white
M_m	1 if outer slime milky; 0 otherwise
Colour of the Eyes	
E_b (base category)	0 if black pupil translucent and water white
E_o	1 if eyes slightly opaque pupil; slightly opalescent cornea; 0 otherwise
E_g	1 if grey pupil and opaque cornea; 0 if otherwise
Colour of the Gills	
G_r (base category)	0 if bright red or dark red; mucus translucent
G_p	1 if red or pink; mucus slightly opaque; 0 otherwise
Colour of the peritoneum	
Pg (base category)	0 if glossy; brilliant; difficult to tear from flesh; 0 otherwise
Ps	1 if slightly dull; difficult to tear from flesh; 0 otherwise
Size	
SZ_s (base category)	0 if size small;
SZ_m	1 if size medium; 0 otherwise
SZ_l	1 if size large; 0 otherwise
Outlet	
O_m (base category)	0 if outlet is from mall-based supermarket
O_{tc}	1 if outlet is from trade centre; 0 if otherwise
O_{mm}	1 if municipal markets; 0 if otherwise
O_{ps}	1 if source is peddled on street; 0 if otherwise
O_{fp}	1 if outlet is from Iloilo fish port complex; 0 otherwise
Form	
F_w (base category)	0 if product form is whole
F_s	1 if product form is sliced; 0 if otherwise
F_p	1 if product form is processed; 0 if otherwise
Label - Market	
I_l	1 if labelled/market as produced in Iloilo; 0 otherwise (base category)
Label - Value-Added Services	
V_s	1 if value-added services available; 0 otherwise (base category)
Label - Organic	
O_l	1 if labelled/marketed as organic; 0 otherwise (base category)

Data used in the study are primary data collected using a structured interview schedule conducted by trained enumerators. The interview schedule was translated into the local dialect to ensure that respondents understood the questions fully. Data requirement in the determination of hedonic prices for milkfish attributes is shown in Table 2.

Sample size was obtained using the following formula:

$$\text{Sample size } n = \frac{NZ^2s^2}{Nd^2+Z^2s^2}$$

where N = total number of sampling units in a population, $s = \delta^2$, Z = normal variable and d = maximum error deemed acceptable.

Sampling of respondents was by multi-stage stratified random sampling. In the first stage of stratification, the basis was by degree of urbanisation while in the second stage it was by *District*. Here, areas covered in the study were classified as either rural or urban. As such, 50 % of the respondents came from the rural area and 50 % from the urban area. Under the rural area, five municipalities were randomly selected representing each of Iloilo's five congressional districts. On the other hand, each of Iloilo City's seven districts was selected to represent the urban area respondents. Sampling frame was developed from the list of households obtained from the identified municipalities. Total number of respondents was 378. Distribution of sample size per municipality including a description of the chosen municipality as shown in Table 3. Sample size allocation per area covered was determined by proportional allocation.

Table 3. Profile of sample municipalities and sample size per municipality

Item	Iloilo City	Miagao	Leganes	Mina	Barotac Nuevo	Concepcion
Land area (sq.km)	78.34	56.8	32.2	3.4	94.49	86.12
Congressional district	Single District	1	2	3	4	5
Income class	1st	1st	4th	5th	2nd	3rd
Distance from the centre (km)	0	40	11	38	27.5	105.6
Population	424,619	64,545	29,438	21,785	51,867	39,617
Milkfish production status	deficit	deficit	surplus	deficit	surplus	deficit
No. of respondents	189	59	27	20	47	36
Percentage of total respondents	50.00	15.61	4.67	5.29	12.43	9.52
Total no. of respondents	378					

Source: Province of Iloilo (2016)

Two regression diagnostics were conducted to prepare the data. One was determination of the existence of unusual and influential data and the other was to check how the data meets the assumptions of Ordinary Least Squares (OLS). In checking for the presence of usual and influential data, three procedures were resorted to. These are: (1) leverage statistic, h; (2) Cook's distance, D; and (3) dfFit. Identification of these outliers may affect validity of regression results and must be considered in interpreting the results. The following OLS assumptions were checked: (1) normality; (2) linearity; (3) homogeneity; (4) independence; (5) errors in the variables. Hedonic price for each of the product quality attribute was estimated using regression with robust standard errors.

The hedonic price model specification

The hedonic pricing method measures how important quality characteristics are to consumers. Following Ladd and Suvannont (1976), let X_{oj} be the *j*th product characteristic provided by the consumption of all products, and X_{ij} be the amount of the *j*th characteristic provided by one unit of product *i*. Further, let q_i represent the quantity of product *i* consumed.

Total consumption of each characteristic is a function of the q_is and the X_{ij}s:

$$X_{oj} = f(q_1, q_2 \ldots\ldots q_n, X_{ij} \ldots. X_{nj}) \quad \text{for j=1,…, m}$$

As stated, consumer's utility function is expressed as a function of the characteristics of the goods, hence,

$$U = U(q_1, q_2 \ldots. q_n, X_{11}, X_{12}, \ldots X_{21} \ldots. X_{nm})$$

Note that the model remains consistent with the demand theory assumption that consumers maximise utility subject to budget constraints (Unnevehr, Duff and Juliano 1992). Consumer goods characteristics can be modeled for a particular product *F* as:

$$P_F = \sum_{j=1}^{m} X_{Fj} P_{Fj}$$

where P_F = retail price of commodity, X_{Fj}= quantity of milkfish characteristic j, and P_{Fj} = implicit price of characteristic *j*.

Regression equation for the hedonic price model is of the following form:

$$y = \propto_0 + \gamma_1 S_w + \gamma_2 M_m + \gamma_3 E_o + \gamma_4 E_g + \gamma_5 G_p + \gamma_6 P_s + \gamma_7 SZ_M + \gamma_8 SZ_L + \gamma_9 O_{TC} + \gamma_{10} O_{MM} + \gamma_{11} O_{PS} + \gamma_{12} O_{FP} + \gamma_{13} F_s + \gamma_{14} F_p + \gamma_{15} I_L + \gamma_{16} V_S + \gamma_{17} OR_L + \mu_i$$

where *y* is the price of fish in PhP per kilogram, α is the estimated intercept term, β is a *k*x1 vector parameter and μ is a *T*x1 vector of disturbances. *S, M, E, G, P, SZ, O, F, I, V* and *OR* are dummy variables defined as skin characteristics, outer slime characteristics, colour of the eyes, gill colour, characteristics of the peritoneum, size, location where the product is marketed, product form, place of origin label , value-added services, and organic label, respectively.

The dependent variable *y* is the price of milkfish expressed in terms of price per kilogram. This is a function that relates selling price to product characteristics. Price also represents the observed price of a market that is assumed to be in a state of equilibrium. Variability in product prices is assumed to change with variations in product characteristics. Product characteristics were based on fish quality assessment parameters mentioned in FAO (1995).

The constant term in the regression model show the joint effects of the variables not included in the model. The coefficients represent the direct effect of the characteristics on the price of fish. The categorical variables indicate the qualitative physical condition, place of purchase, labels that would inform consumers about product source, value-added services, and production technology adopted. They are interpreted as the premium or the discount in price vis-à-vis the default case of the attribute. It is expected that as quality deteriorates, there is a decrease in price for that specific quality attribute, thus γ_1-γ_6<0. Best quality indicators with zero value are earlier presented in Table 2.

Size of milkfish is expected to increase its price as bigger size milkfish command higher prices than their relatively smaller counterparts, γ_7-γ_8>0. Milkfish bought at the malls are expected to be more expensive than those from other outlets. Since the value-added tax is being passed on to consumers the cost of selling is more expensive in malls. Thus, γ_9-γ_{12}<0. Any form of modification on the whole milkfish entails cost, thus it is expected that γ_{12}-γ_{14}>0. Labels that would inform consumers about the milkfish being produced in Iloilo are expected to increase price thus, γ_{15}>0. Presence of value-added services are expected to increase price, hence γ_{16}>0. Also, labeling milkfish as organic is expected to increase its price thus γ_{17}>0. In addition to providing better customer value in terms of health benefits, organic production technology is relatively more costly than conventional.

Results

The conduct of hedonic pricing study requires a detailed account of the demographic profile of the respondents. This is because the characteristics of the respondents may influence their consumption behaviour. The profile of the respondents is considered in terms of gender, age, educational attainment, income, congressional district where the household is located, the household life cycle, the income class of the municipality where the household is located and the household size. Summary statistics for each of these demographic profiles, categorised either as rural or urban household, is shown in Table 4.

Table 4. Socio-demographic profile of the 378 milkfish purchase decision-makers, Province of Iloilo, Philippines, 2016

Item		Rural		Urban		Total	%
		No.	%	No.	%		
Sex	Female	130	68.78	91	48.15	221	58.47
	Male	59	31.22	98	51.85	157	41.53
	Total	189	100.00	189	100.00	378	100.00
Age	Twenties and below	26	13.76	9	4.76	35	9.26
	Thirties	45	23.81	47	24.87	92	24.34
	Forties	40	21.16	57	30.16	97	25.66
	Fifties	34	17.99	39	20.63	73	19.31
	Sixties up	44	23.28	37	19.58	81	21.43
	Total	189	100.00	189	100.00	378	100.00
	Average		46.56[a]		47.44[a]		47.00[a]
	Standard Deviation		15.034[a]		13.097[a]		14.09[a]
Educational Attainment	No education	2	1.06	0	-	2	0.53
	Elementary	30	15.87	8	4.23	38	10.05
	High school	58	30.69	51	26.98	109	28.84
	College	87	46.03	118	62.43	205	54.23
	Post-graduate	10	5.29	10	5.29	20	5.29
	Vocational	2	1.06	2	1.06	4	1.06
	Total	189	100.00	189	100.00	378	100.00
Income Class	Low income	143	75.66	89	47.09	232	61.38
	Lower middle income	36	19.05	76	40.21	112	29.63
	Upper middle income	7	3.70	17	8.99	24	6.35
	Lower high income	3	1.59	7	3.70	10	2.65
	Total	189	100.00	189	100.00	378	100.00
	Average		4,8901.67[b]		109,217.32[b]		79,059.5[b]
	Standard Deviation		10,5876.64[b]		13,8892[b]		126,972.39[b]
Congressional District	1st District	59	31.22	0	-	59	15.61
	2nd District	27	14.29	0	-	27	7.14
	3rd District	20	10.58	0	-	20	5.29
	4th District	48	25.4	0	-	48	12.7
	5th District	35	18.52	0	-	35	9.26
	Lone District of Iloilo City	0	-	189	100	189	50
	Total	189	100.00	189	100.00	378	100.00
Household Life Cycle							
	Young singles	22	11.64	23	12.17	45	11.9
	Newlyweds	9	4.76	3	1.59	12	3.17
	Young couples without children	10	5.29	4	2.12	14	3.7
	Married couples with children	39	20.63	36	19.05	75	19.84
	Married couples with small children	0	-	1	0.53	1	0.26

Item		Rural		Urban		Total	%
		No.	%	No.	%		
	Household with teenagers	63	33.33	84	44.44	147	38.89
	Mature couples	46	24.34	39	20.63	85	22.49
	Total	189	100.00	190	100.00	379	100.00
Municipal Income Class							
	1st Class	59	31.22	189	100	248	65.61
	2nd Class	48	25.4	0	-	48	12.7
	3rd Class	35	18.52	0	-	35	9.26
	4th Class	27	14.29	0	-	27	7.14
	5th Class	20	10.58	0	-	20	5.29
	Total	189	100.00	189	100.00	378	100.00
Household Size		189	100	189	100	378	100
	Average		4.788[c]		5.116[c]		4.9523[c]
	Standard Deviation		2.064[c]		2.57[c]		2.34[c]

[a] Age in number of years; [b] Annual household income in PhP per year; [c] Household size (number of family members)

Gender of the Household Purchase Decision-Maker

The majority of the respondents, representing 58.47 % of the household purchase decision-makers of milkfish in the province of Iloilo, are female. Only 41.53 % of the total respondents were male. When categorised according to household geographic location, rural households are dominated by female purchase decision-makers at 68.78 % of the total number of respondents vis-à-vis 31.22 % for male. In contrast, it is the male that dominates the purchase decision-making for urban consumers at 51.85 %. This shows that decision to buy varies with location: the females decide in the rural areas whereas it is the males who dominantly decide among urban households. For the entire province of Iloilo, however, the decision to buy is dominated by the females. This can be explained by dominance of full-time homemakers in the rural areas whereas in the urban areas, increase in the participation by women in the labour force reduces their role in purchase decision-making.

Age of Purchase Decision-Maker

Half of the total number of respondents were in their 30s and 40s (50 %). Respondents belonging to the *60*s and older category comprise 21.43 % of those who were interviewed. Moreover, 19.31 % of the respondents are in their *50s* and the remaining 9.26 % were reported to belong in the *20s and below* category. When grouped according to geographic location, the modal age group for purchase decision-makers from rural households is *30s* and *60s*, i.e. older. The modal age group, however, for purchase decision-makers from the urban area is *40s*. The average age of respondents was 46.57 years old.

Educational Attainment of Purchase Decision-Maker

When asked for their educational attainment, more than half of the respondents were reported to have finished college (54.23 %). Moreover, 28.84 % were reported to have finished high school. Only 10.05 %, 5.29 %, 1.06 % and 0.53 % of them had elementary, postgraduate, vocational education and no education, respectively. In both rural and urban households, more than three-fourths of their respondents were categorised as high school and college graduates. The number of respondents who had finished college, however, was higher in urban areas (62.43 %) compared to respondents from rural areas (46.03 %).

Income of Purchase Decision-Maker

From Villejo, et al. (2014), income distribution of households in the Philippines was classified into five major classes: the low income class (below PhP 142,974), lower middle income class (PhP 142,974-330,343), the upper middle income class (PhP 330,343-594,317), the lower high income class (PhP 594,317-1,718,354) and the upper high income class (above PhP 1,718,354). As shown in Table 4, most of the respondents are classified as low income (61.38 %) with the remaining classified as lower middle income (29.63 %), upper middle income (6.35 %) and lower high income (2.65 %). No respondent was reported to belong to the upper high income class. Average income is higher among urban households (mean = PhP 109,217.32, std. dev. = PhP 138,892.00) vis-à-vis rural households (mean = PhP 48,901.67, std. dev. = PhP 105, 876.64). The magnitude of the low income class is higher in the rural areas (75.66 %) compared to the urban areas (47.09 %).

District

Of the total number of 378 respondents, 50 % are from the sole district of Iloilo City. The rest of the districts, with their corresponding shares of the total number of respondents, are as follows: 1st District (15.61 %), 2nd District (7.14 %), 3rd District (5.29 %), 4th District (12.70 %) and 5th District (9.26 %). The districts having the most number of allocated respondents representing the rural area are the 1st District with 31.22 % and 4th District with 25.40 %.

Household Life Cycle

The household life cycle was based on seven categories: young singles, newlyweds, young couples without children, married couples with small children, married couples without children, households with teenagers and households with mature couples. The household life cycle stage of most respondents is household with teenagers (38.89 %). The remaining household lifecycle stage classifications and their share of the total number of respondents are as follows: mature couples (22.49 %), married couples with small children (19.84 %), young singles (11.90 %), young couples without children (3.70 %), newlyweds (3.17 %), and married couples without children (0.26 %). For both rural and urban households, the category comprising of households with teenagers has the biggest share in the total number of respondents with 33.33 % and 44.44 %, respectively.

Municipal Income Class

The majority (65.61 %) of the respondents came from first class municipalities. Only 12.70 % of the respondents came from 2nd class municipalities. The share of the remaining municipal classes in the overall number of respondents is as follows: 3rd class municipalities (9.26 %), 4th class municipalities (7.14 %) and 5th class municipalities (5.29 %). For municipal classes in the rural areas, more than half came from first (31.22 %) and second (25.40 %) class municipalities. All respondents interviewed under the urban area were classified as first class.

Household Size

The average household size of the respondents was 4.95 or households with 5 members. (Table 4). For the rural area, household size was 4.78. Average household size for the urban area was 5.11. Estimate of the rural household size ranges from 1-13 while that of the urban area ranges from 1-15.

Table 5. Result of the OLS regression showing the quality attributes that affect the hedonic price of milkfish, 378 consumers, Province of Iloilo, Philippines, January 2016

Quality Attribute	Coefficient		Robust Std. Error	t-value	p>|t|
Skin waxy (base = skin bright, shining	10.18		8.49	1.20	0.23
Outer slime milky (base = outer slime transparent)	1.35		8.48	0.16	0.87
Slightly opaque pupil (base = black pupil)	-21.94	***	6.90	-3.18	0.00
Grey pupil (base = black pupil)	-36.21	***	9.13	-3.97	0.00
Gill pink (base = gill bright red)	9.32	**	4.37	2.13	0.03
Peritoneum slightly dull (base = peritoneum glossy)	2.25		6.66	0.34	0.74
Medium size (base = small)	1.20		5.56	0.22	0.83
Large size (base = small)	8.83		6.23	1.42	0.16
Outlet - Trade centre (base = mall-based supermarket)	-10.30	***	3.85	-2.68	0.01
Outlet - Municipal market (base = mall-based supermarket)	-11.03	***	3.32	-3.32	0.00
Peddled on streets (base = mall-based supermarket)	-13.27	***	3.93	-3.38	0.00
Fishport (base = mall-based supermarket)	-46.17	***	2.86	-16.14	0.00
Form - sliced (base = whole)	2.08		3.29	0.63	0.53
Form - Processed (base = whole)	33.16	***	7.88	4.21	0.00
Labelled ‘Produced in Iloilo’ (base = no label)	-0.73		2.30	-0.32	0.75
Provision of value-added services (base = no label)	5.28	**	2.46	2.15	0.03
Labelled as organic (base = no label)	1.12		3.38	0.33	0.74
_cons	145.34	***	6.36	22.85	0.00

F (17,360)=106.85 R^2 = 0.23 Root MSE= 20.64

Result of the Hedonic Price Analysis

Table 5 shows the regression results for the previously defined hedonic pricing model. From Table 5, it can be seen that the price of milkfish is negatively related to the colour of the eyes. *Ceteris paribus*, the discount for a milkfish possessing opaque eyes is PhP -21.94 (p=0.0020). As the eye colour further deteriorates to grey, discount vis-à-vis the base case increases to PhP 36.21 (p=0.000). Deviating from the *a priori* expectation that as gill colour digresses away from deep red associated with the gill colour of newly caught fish this would result in a price discount, the result of the study showed otherwise. A price premium of Php 9.32.kg^{-1} (p=0.034) in pink coloured gills was noted.

Contrary to *a priori* expectation that milkfish price increases with size, price of milkfish did not vary in proportion to its size. As size increases from small to medium, a price premium equivalent to PhP 1.20.kg^{-1} was noted to be insignificant (p=0.830). Moreover, as milkfish size increases to large, a premium equivalent to PhP 8.83.kg is gained (p=0.1570). Note, however, that there is a considerable increase in the level of confidence with increase in size. The provision of value added-services gives a premium of PhP 5.28 (p=0.032). Of those respondents who availed of the value-added services (n=188), the following are the nature of service(s) availed of: deboning (22.87 %), cleaning (42.02 %) and cleaning and slicing (35.11 %). Cleaning involves washing, descaling and removing of gut and other internal organs.

Hedonic price differences for the five places to purchase milkfish are all significant and negative relative to the base place of purchase which is the mall-based supermarkets. Magnitude of difference vis-à-vis the base case (mall-based supermarkets) is highest for milkfish bought in Iloilo Fishing Port at PhP -46.17 (p=0.000). With respect to product form, no statistically significant difference exists between milkfish sold whole and milkfish cut into pieces. However, processing carries a hedonic price premium of PhP 33.16 (p=0.000).

Discussion

This study investigated the different milkfish attributes and how much importance consumers accord to each of these attributes. Determination of hedonic prices associated with each of these attributes will be essential for the milkfish value chain participants in designing a value offering consistent with the needs and wants of the market. With respect to the colour of the eyes, it can be seen that the price of milkfish is negatively related to the colour of its eyes. This implies that hedonic price decreases as the colour of the eye deviates from the base category which is fresh milkfish. A fresh milkfish is characterised as exhibiting white and watery eyes. Further deterioration away from the white and watery eyes reduces the hedonic price of the attribute sending a strong signal that the eye colour is a major determinant for milkfish price. The order is also noted to be correct such that the price discount increases as the eye colour deviates farther from the watery white eyes.

Contrary to *a priori* expectation that price will reduce as gill colour deteriorates away from the base of deep red, the result showed otherwise. One can only deduce that respondents may have confused the colour associated with a particular level of freshness. A newly caught fish/ fresh fish possesses a deep red gill with watery mucus in contrast to pink coloured gills with cloudy mucus, the next in spectrum in terms of freshness. Hedonic price associated with size of milkfish does not vary with respect to size. An improvement in p-value as milkfish size varies from small to medium ($p=0.830$) vis-a-vis small to large ($p=0.157$) may be an indication that there might perhaps be a price premium accorded to bigger size milkfish. Due to observation errors and limitations imposed by the sample size, variability in price premium across size may not have been properly captured. Bigger size milkfish are conventionally used as key ingredients in the relatively more expensive preparations like stuffed, stewed and grilled milkfish.

It is apparent from the result that value-added services form part of the core customer value – the very reason why customers buy the product. This is attributed to non-significant difference between hedonic prices of milkfish bought as whole and those provided with value-adding services such as cleaning and slicing. This provides insights into the necessity of incorporating value-added services in order to deliver the desired customer expectations.

Hedonic price differences for the five places to purchase milkfish are all significant and negative relative to the base place of purchase which is the mall-based supermarkets. The price differences relative to the mall-based supermarkets is attributed to higher marketing costs for malls and the inclusion of value-added taxes which are passed on to consumers. In addition, the price premium accorded to mall-based milkfish outlets has also something to do with convenience. Value-offering of these current-day malls transcends traditional shopping and they have evolved to the overall mall experience as providers of entertainment and services. The lowest hedonic price for milkfish bought from the Iloilo Fishing Port Complex was expected because milkfish produced in farms all over the province and nearby provinces are traded here prior to being sold again within the province, nearby provinces or shipped to Luzon. Statistically insignificant difference existing between milkfish sold as whole and milkfish cut into pieces justifies the provision of value-added services as part of the core product. A statistically significant hedonic price associated with processing on the other hand warrants the potential to explore processing as a mechanism to increase revenue.

Conclusion

The need to increase the level of competitiveness of Iloilo milkfish producers vis-à-vis other milkfish producing provinces in the Philippines has paved the way to probe into the various milkfish quality attributes and the price accorded to each attribute. Published studies are suggestive of the direct link between satisfying customer needs and profitability. The present study was designed to analyse the various factors being sought by consumers and prices they accord to each of the product attributes.

Hedonic price for each quality attribute was estimated using regression with robust standard errors. Overall, quality indicators, i.e. the colour of the eyes, colour of the gills and size, are significant in affecting price. It is the place where milkfish was bought, however, that explains much of the variability in milkfish prices. Extension of product form such as addition of value-added services and processing increases the revenues derived from price premium associated with these mentioned attributes. Finally, it was noted that price is invariant to place-of-origin labels and labelling of the product as organic. The research findings have a number of implications. To producers and the participants in the distribution channels, post-harvest handling to preserve the physical condition of fresh fish until it reaches the consumers should be given proper attention. Appropriate post-harvest handling technologies and retailing must be adopted to guarantee that the produce meets customer specifications. Expansion of existing markets like mall-based supermarkets is recommended in order to reap the value from customers in return.

The role of government becomes essential in ensuring that the desired customer specifications are met. Government can enter through provision of market infrastructure and facilities. An example of critical soft marketing infrastructure is the strengthening of government-initiated marketing support services like market intermediation. Through market-intermediation, successful markets are generated by linking suppliers to consumers. Intermediation is essential especially in mall-based supermarkets and other institutional markets where entry barriers are high.The study is limited by the method of characterising quality specifications. The use of trained fish quality evaluators can be resorted to as an alternative in determining hedonic prices. Quantification used in the study was based mainly on personal perception of individual respondents. Quality recalling may have resulted in the bias. In addition, a common standard in assessing quality parameters may also have contributed to any biases.

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