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Consumers' Preference and Willingness to Pay for Aromatic Rice in Nueva Ecija, Philippines

Maria Excelsis M. Orden*, Janet N. Padilla and Charlito R. Juico

Research Office, Research, Extension, and Training, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines.

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The consumers' preference and willingness to pay for aromatic rice were evaluated among 70 rice consumers from the Central Luzon State University (CLSU), Science City of Munoz, Nueva Ecija, Philippines. The University is the producer of aromatic rice in Nueva Ecija hence the choice of the consumers from it. Consumers have high preference for aromatic rice and its characteristics such as fragrance/aroma and taste along with other cooking quality, tenderness, color, cohesiveness, smoothness, glossy, off odor, grain size, and being nutritious. Their willingness to pay for these characteristics was analyzed using the Hedonic Price Model. The model examined the attributes of aromatic rice and the price consumers attached to these attributes. Moreover, the study also determined how much the consumers are willing to pay for a kilo of aromatic rice and this was compared with the existing price. The price of aromatic rice in CLSU is Php40/kg. Not all of the consumers are willing to pay higher price for aromatic rice. In fact, the average price the respondents are willing to pay for aromatic rice is only Php 39.19. Only10% of the consumers are willing to pay more than the prevailing price of Php 40/kg, with Php80/kg as the highest. Results of the hedonic price model shows Y = 0.925 + 0.1879 Aroma + 0.0849 Color + 0.1479 Grain size + 0.0734 Glossy + 0.0382 Cooking quality, where Y is the price of aromatic rice. Aroma, grain size and cooking quality were the most significant factors that explain the price. Consumers paid the highest premium of Php15.04 for aroma. Whereas, grain size and cooking quality also received higher premiums while color and glossiness received lower premiums.

Keywords: aromatic rice, hedonic, price premium, consumers, Philippines

Introduction

Rice is one of the important and staple food crops in the world (Shamimagrimet, 2013, Diako *et al.*, 2015). Aside being an essential food, rice is also an important factor in enriching culture, lifestyles and ecosystem functions. Rice is a symbol of cultural identity, global unity and life.

One variety of rice grown in the Philippines is aromatic rice. In Nueva Ecija province, R and D of aromatic rice is being undertaken at the Central

*Coressponding Author: Maria Excelsis; **Email**: ma_excelsis@yahoo.com

Luzon State University, Science City of Munoz since 1996. To evaluate its performance, different varieties of aromatic rice are planted in two cropping seasons in the university's production area. Part of the harvests are milled and sold as rice to interested clienteles while others (after screening) are sold as seeds to farmers to be planted in their own fields.

Aromatic rice varieties are known for their aroma, good grain and cooking quality. It has a distinguishing scent when cooked. These are considered important characteristic of quality rice. Aromatic rice commands higher price in the market than the non-aromatic rice. Through the years, aromatic rice has started to create its own niche market. In the university alone, demand for this type of rice has been increasing. Basmati 370, Jasmine, Vertin, and other varieties of aromatic rice are produced and sold by the Research Office.

Despite years of selling these type of rice, information about the consumers' attitude and preference for aromatic rice is still unknown. These are important sets of information that need to be evaluated as basis for future and more comprehensive R and D plans for aromatic rice.

In view thereof, this research was undertaken to determine the consumers' attitude and preferences for aromatic rice. The basic questions answered were as follows: 1) What are consumers' quality preferences for aromatic rice; and 2) how much do they attach to these attributes. Hedonic price analysis was done to determine how much do buyers attach to the different preferred characteristics of aromatic rice.

Materials and methods

Location of the study and data collection procedure

The Central Luzon State University is the main producer of aromatic rice in Nueva Ecija. Every season, about 7 ha of aromatic rice is produced for seeds and for commercial rice production every year with total rice production of about 23 tons (Orden *et al.*, 2015). Majority of the produce is sold within the campus with the University's faculty and staff as the main consumers. It is in this context that the study was conducted in CLSU, Science City of Munoz, Nueva Ecija, Philippines.

There were 300 questionnaires distributed in various offices of the University in 2014. From which, 101 complete questionnaires were sent back. Each questionnaire was processed. Results showed that only 70% have preference and were willing to buy aromatic rice. This paper presents the analysis of data from the 70 consumers.

Theoretical framework

Consumer goods characteristics model developed by Ladd and Suvannunt (1976) were applied to study consumers' demand for rice by Abansi *et al.* (1991), Kaosa-ard and Juliano, and Tuquero. The same model was used by Umapathi *et al.* (1994) in cotton, Beach and Carlson (1993) in herbicides, and Lenz *et al.* (1994) in milk. In addition, Orden *et al*. (2015) applied the same model to analyze traders' preference for goat quality characteristics in a few livestock markets in Pangasinan, Philippines. For this study on aromatic rice, the consumers' demand for aromatic rice quality was estimated following the same good characteristics model. This model describes the price of goods as a linear summation of the implicit value of the good's attributes. It is based on Lancaster's model of consumption theory, which considers the properties of the goods, and not the goods itself, as the direct object of utility. Also, it remains consistent with the demand theory of consumer maximizing behavior subject to budget constraint.

The hedonic price model, the price-quantity relationship, was used in this study to estimate consumer preferences for aromatic rice grain quality. If consumers derive utility or satisfaction from the characteristics of goods, then it is possible to show that:

$$P_R = \sum_{i=1}^{n} X_{ri} P_{ri}$$

where P_R, is the price of aromatic rice, X_{ri} is the quantity of aromatic rice characteristic i, and P_{ri} is the implicit price of aromatic rice characteristic i.

The model describes the quantity of physical characteristics of aromatic rice, $X_{ri,}$ as determinant of its own price P_R. The characteristics included in the model should observable and economically relevant to the consumers (Orden *et al.*, 2005). The first partial derivative of price P_R with respect to the rice's characteristics, $\delta P_R/\delta X_{ri}=b_{ri}$, reveals the consumers' implicit bid for the fundamental attribute, X_{ri}. There is a corresponding marginal bid of consumers for every change in the fundamental physical characteristics of aromatic rice. This explains consumers' relative preferences and the corresponding price responsiveness with the identified attributes.

Data Analysis

Hedonic price analysis was done to determine how much do buyers attach to the different preferred characteristics of aromatic rice. The double logform of hedonic price function was used to estimate the relationship between price and the selected characteristics. The double log form is

$[aP_1X_1^{b1}P_2X_2^{b2} \ldots X_6^{b6}]e$

$eP^R = e$

$[aP_1X_1^{b1}P_2X_2^{b2} \ldots X_6^{b6}]e$

$\ln eP^R = \ln[e]$

$\ln(P_R) = \ln[aP_1X_1^{b1}P_2X_2^{b2} \ldots P_6X_6^{b6}e]$

Where P_R is the price of aromatic rice in pesos per kilo; X_i is the choice characteristics for aromatic rice, P_i is the implicit price of aromatic rice characteristic i; b_i is the regression coefficients; and e is the error term. STATA software was used in the estimation. In this study, the following are the characteristics of aromatic rice considered.

X_1 = aroma / fragrance
X_2 = color
X_3 = grain size
X_4 = gloss
X_5 = cooking quality

To estimate the functions, the ordinary least-squares regression (OLS) was used. The OLS estimators are linear, unbiased and efficient. It also provides the best linear unbiased estimates under certain assumptions. The expected value of the estimated parameter approximates the true value of the parameter. The OLS estimators are best in the sense that their variance is the minimum in the class of linear unbiased estimators. In this sense, the OLS estimators are the most efficient in this class.

Results and Discussion

Socio-demographic characteristics of rice consumers

The average age of the consumers is 46.45 years with range of 20 to 62 years (Table 1). There were more male (61%) than female (39%) respondents, and 76% of them were married. Obviously, respondents from CLSU are relatively educated, but there were also those who are elementary and vocational graduates. These comprise some of the non-academic staff of the University. The mean family size is 4.78, with a range of 1 to 10 members. The

average monthly income of all the consumer-respondents is Php 27,734.16 with a range of Php6,000.00 to Php74,716.00.

Table 1. Socio-demographic characteristics of aromatic rice consumers, 2014

Particular	No. of reporting (n=70)	%
Age		
Mean	46.45	
Range	20-62	
Sex		
Male	43	61
Female	27	39
Civil Status		
Single	15	21
Married	53	76
Widow/er	1	1
Separated	1	1
Educational attainment		
HS graduate		
Vocational graduate	3	4
College undergraduate	8	11
College graduate	28	40
MS Graduate	7	10
PhD Graduate	19	27
Post Studies Graduate	1	1
Family size		
Mean	4.78	
Range	1-10	
Monthly Income (Php)		
Mean	27,734.16	
Range	6,000-74,716	

Knowledge on aromatic rice

All of the respondents have heard about aromatic rice. About 81% tried aromatic rice after hearing it while only 50% continued to buy and eat aromatic rice. The consumers have knowledger of the following varieties of aromatic rice, namely; Basmati, Jasmin, Pandan, Vertin, and Kasturi. These are the varieties that are mostly produced and sold in CLSU. Among the characteristics that they associate to aromatic rice are its fragrance, delicious, soft, glossy, among others. Moreover, they also associate a high price for aromatic rice.

Choice characteristics for aromatic rice

Consumers were asked of their preference and ranking of the different characteristics of aromatic rice. Their preferences were aroma, cooking quality, grain size, color, glossiness, taste/eating quality, nutrition/healthy, unpolished, texture, cohesiveness and swelling/puffiness (Table 2). Aroma was ranked first, described by respondents as with good smell like "pandan". Ranked second is its cooking quality, i.e., aromatic rice is easy to cook, soft, not so sticky but tensile "makunat", and does not spoil easily. Grain size was ranked third, while its white color was ranked 4th. Seven other characteristics were mentioned which were ranked from 5th to 10.5.

Table 2. Choice characteristics of aromatic rice by consumers rank of preference in Nueva Ecija

Characteristics	Ranked
Fragrance/Aroma	1
Cooking quality	2
Grain size	3
Color	4
Glossy	5
Taste/Eating quality	6
Nutrition/Healthy	7
Unpolished	8
Texture	9
Cohesiveness	10.5
Swelling/Puffiness	10.5

Willingness to pay for aromatic rice

Respondents expressed their willingness to pay for aromatic rice (Table 3). The prevailing price of aromatic rice in the Research Office during the interview in 2014 was Php40.00 per kilo. Result showed that not all of the consumers were willing to pay higher price for aromatic rice. About 78% were only willing to pay from Php30-40 per kg. There were only 22% of the consumers willing to pay above the prevailing price, but the highest price consumer was willing to pay was Php80.00 per kg. The average price consumers were willing to pay was Php39.19 per kg.

Table 3. Consumers' willingness to pay for aromatic rice

Willingness (Php/kg)	No. Reporting (n=70)	%
30-35	29	41
36-40	26	37
41-45	10	14
46-50	3	4
56-60	1	1
66-70	1	1
76-80	1	1

Hedonic price relationship

Eleven characteristics were selected and analyzed using multiple regression to assess the price of aromatic rice. However, multi-collinearity among regressors was detected, thus the variables were reduced to 5 characteristics.

The estimated hedonic price model for aromatic rice is shown in Table 4. Three of the five characteristics were found significant to explain variation in consumers' willingness to pay for aromatic rice such as aroma, grain size characteristics ($p<.01$) and cooking quality ($p<.05$). Other characteristics such as color and glossy were not significant. The computed R-square was 0.9285. The consumers also attached premium price on the different characteristics of aromatic rice. The main characteristic with the highest price premium was aroma at Php15.04. The price premium for other characteristics was Php8.18 for cooking quality, Php 5.91 for grain size, Php 5.72 for color, and Php2.38

for glossiness. Consumers were only willing to pay much lower price for the other characteristics. Hedonic price analysis was also done for rice in Medan, Indonesia which showed that only variety, milling degree, alkali spreading value, and stickiness significantly affected its price (Damardjati and Oka, 1989).

Table 4. Estimated hedonic price model for aromatic rice

	Coefficients	**Standard error**	***t-value***	***P-value***	***Peso equivalent***
Constant	.9258285	.0598943	15.46	0.000	NA
Fragrance/Aroma	.1879393	.0343721	5.47	0.002**	15.04
Color	.0848807	.0356543	2.38	0.055	5.72
Grain size	.1497019	.0260528	5.75	0.001**	5.91
Glossy	.0734553	.0554085	1.33	0.233	2.38
Cooking quality	.0382094	.0119851	3.19	0.019*	8.18

**Significant at 1% level, * Significant at 5 % level. F = 15.58; R-squared, 0.9285.

Discussion

The average price CLSU consumers were willing to pay for aromatic rice was Php39.19, lower than its selling price. The consumers were relatively conservative in terms of paying higher price for a better quality rice. Nonetheless, they were willing to pay higher than what they pay for non-aromatic rice whose price ranges from Php30-34 per kg in the local market in 2014.

Five characteristics were considered in the estimation of the hedonic price model for aromatic rice. These 5 variables had an R-square value of 0.9285 which means that approximately 93 percent of the variation in the consumers' willingness to pay for aromatic rice can be explained by the model. Hedonic price model was also used by Sodjinou *et al*. (2015) to analyze consumers preference for physical traits of chickens, ducks and guinea fowl in the Republic of Benin.

Aroma had the ultimate positive influence on aromatic rice as showed by the highest positive coefficient. Consumers' willingness to pay for this characteristic was estimated at Php15.04, the highest among the different characteristics mentioned. Aroma was ranked first among the different characteristics which indicates its importance as a choice factor. The presence of aroma makes it special and differentiated than ordinary rice. Moreover, cooking quality was one of the factors contributing to the price of aromatic rice. Consumers were willing to pay higher price for a better cooking quality

aromatic rice by as much as Php8.18. Likewise, grain size was a positive factor of the price of aromatic rice. Grain size varied according to the preference of consumers, either medium or long grain or whole grain. The attached price premium based on hedonic price model was Php5.91. Other characteristics were attached with lower prices which indicate their lower preference for these characteristics. More studies were conducted that indicate that there are some variations in the consumers' preference for rice. Some of which are Diako *et al.* (2010) and Asante *et al.* (2013) in Ghana, Suwannaporn and Linnemann (2008) in Thailand, Damardjati and Oka (1989) in Indonesia, Galawat and Yabe (2010) in Brunei, Azabagaoglu and Gaytancioglu (2009) in Turkey, Hori *et al.* (1992) in East and Southeast Asia, and Abansi *et al.* (1987) in the Philippines.

Results of the study are very important because it provides information what consumers consider in buying and paying for aromatic rice. Thus research efforts in developing local varieties of aromatic rice should consider these choice characteristics that are relevant to the consumers (Orden *et al.,* 2005). Sodjinou *et al.* (2015) had the same recommendation for improving poultry in the Republic of Benin based on the results of the hedonic price model they estimated. Moreover, programs to further improve the quality of rice were also the recommendations in the study of Abansi *et al.* (1987), Suwannaporn and Linnemann (2008), and Damardjati and Oka (1989). More promotional activities for consumers via advertising campaign, ethnic cuisine, menu versatility and cooking demonstration are recommended by Azabagaoglu and Gaytancioglu (2009) and Suwannaporn and Linnemann (2008).

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