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Hispanic consumer's perceptions towards organically grown ethnic produce: A logistic analysis

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Organic foods sector is one of the fastest growing agricultural markets in the U.S and sales of organic products have increased on average by 20% annually since 1990. The rapid expansion of Hispanic ethnic populations presents significant opportunities for organic and conventional fruit and vegetable producers in the region to take advantage of their close proximity to densely populated areas. The main objective of this study was to gather market information on Hispanic customer behavior towards organic produce in the east-coast region of United States. The results indicate that those who were willing to buy country of origin labeled produce and those who were willing to buy ethnic produce when it is recently introduced or new to the market were more likely willing to buy organically grown ethnic produce. The results also indicate that those who were vegetarians, those living in urban areas and those with average annual incomes of between \$125,000 and 149,999 were more likely willing to buy organically grown ethnic produce. These results will help policy makers understand Hispanic consumer's behavior towards organically produce and facilitate effective segmentation by producers, wholesalers, and retailers to target Hispanic markets and locations.

Key words: Hispanic consumer, organic produce, logit model, United States.

INTRODUCTION

To increase profitability, many farmers have been adopting the move towards growing specialty crops. Specialty crops are non-commodity crops, and have unique characteristics for which consumers are typically willing to pay a premium. Niche crops are usually targeted toward a specific, small consumer base such as Asian or Hispanic population. Since the Hispanic population in the east-coast states from Florida to Maine including Washington D.C. has been growing steadily in the past decade, producing and marketing Hispanic fruits and vegetables could be a profitable venture for east coast growers.

The growing immigrant population also brings a niche demand for familiar foods of their homelands. This creates a market for such produce fueled by the increasing number of consumer's eagerness to purchase them. The increasing immigrant population has also led to an increase in the number of produce stores that cater to Hispanic ethnic population (Govindasamy et al., 2009). Studies conducted throughout the region have shown that growing demand for ethnic produce provides a potential opportunity for farmers in the region (Govindasamy et al., 2006; Mendonca et al., 2006; Sciarappa, 2001-2003; Tubene, 2001). As U.S. Census indicated, the Hispanic or Latino population grew from about 9% of the country's population in 1990 to 13% in 2000, with 35 million people (U.S. Census, 1990 and 2000). According to the Census Bureau of United states, Hispanic population mushroomed by 58% from 1990 to

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2000, making it the fastest growing minority group in the United States.

The rapid expansion of ethnic population presents significant opportunities for organic and conventional fruit and vegetable producers in the region to take advantage of their close proximity to densely populated areas. Organic sector is one of the fastest growing agricultural markets in the U.S and the market for organic food has been growing five times faster than food sales in general over the past decade (Dimitri et al., 2002). Ethnic communities' organic produce consumption has also been a significant contribution to the produce demand (Ariyawardana, 2009). Yet, to date studies have not been conducted to document Hispanic consumer's behavior towards organic produce.

For USDA (or National Organic Produce) certification, organic produce is grown with a maximum of 5% synthetic pesticide residues and no USDA prohibited substance can be used on the land three years prior to producing organic produce. To be certified organic, no genetic engineering can be used on the crops, and no antibiotics are to be used on the livestock (U.S. Department of Agriculture, 2001). Organic produce is sold at a premium price compared to conventional produce due to the increased production costs associated with low production compared to the conventional produce.

The main objective of this study is to gather market information on Hispanic customer behavior towards organic produce in the east-coast region of United States. The paper attempts to present the results of socio-economic characteristics of Hispanic consumers and their preferences towards organic produce.

METHODOLOGY

The logit model was selected as the regression model in this analysis because of its asymptotic characteristic constraint that the predicted probabilities range zero to one. The logit model is favored for its mathematical simplicity and is commonly used in settings where the dependent variable is binary (Amemiya, 1983). Because the data sources provided individual rather than aggregate observations, the common estimation method of choice was the maximum likelihood method (Gujarati, 1992). Among the beneficial characteristics of MLE are that the parameter estimates are consistent and efficient asymptotically (Pindyck et al., 1991). Given that the objective was to decompose the effects of explanatory demographic variables, the final model specifications were more dependent on the significance of the parameter estimates than the overall predictive power of the models.

The empirical model assumes that the probability of observing the dependent variable (for instance, who is more willing to buy organically grown ethnic produce), P_i , is contingent on a vector of independent variables (X_{ij}) associated with consumer i and variable j , and a vector of unknown parameters b . The likelihood of observing the dependent variable was tested as a function of dependent variables including socio-demographic and consumption characteristics:

$$P_i = F(Z_i) = F(\alpha + \beta X_{ij}) = 1 / [1 + \exp(-Z_i)]$$

where: P_i is the probability of willing to buy organically grown ethnic produce depend upon a vector of independent variables X_{ij} ; $F(Z_i)$ represents the value of the standard logistic density function associated with each possible value of the underlying index Z_i ; Z_i is the underlying index number or $\alpha + \beta X_{ij}$, and βX_{ij} is a linear combination of independent variables so that:

$$Z_i = \log [P_i / (1 - P_i)] = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_n X_{in} + \varepsilon_i$$

where $i=1,2,\dots,n$ are observations; Z_i is the unobserved index level or the log odds of choice for the i^{th} observation; X_{in} is the n^{th} explanatory variable for the i^{th} observation; β the parameters to be estimated, and ε_i is the error or disturbance term

The dependent variable Z_i in the above equation is the logarithm of the probability that a particular choice will be made. The parameter estimates do not directly represent the effect of the independent variables. To obtain the estimators for continuous explanatory variables in the logit model, the changes in probability that $Y_i = 1(P_i)$ brought about by a change in the independent variable, X_{ij} is given by:

$$(\partial P_i / \partial X_{ij}) = [\beta \exp(-\beta X_{ij})] / [1 + \exp(-\beta X_{ij})]$$

For qualitative discrete variables such as the explanatory variables used in this study, $\partial P_i / \partial X_{ij}$ does not exist. Probability changes are then determined by:

$$(\partial P_i / \partial X_{ij}) = [P_i(Y_i = 1) - P_i(Y_i = 0)] / [1 - 0]$$

The following model was developed to predict „who would be more willing to buy organically grown ethnic produce“. The model was formulated as:

$$\text{ORG_PROD} = \beta_0 + \beta_1 \text{VISIT_TIMES} + \beta_2 \text{ETH_SPND} + \beta_3 \text{ETH_BUY_AMER} + \beta_4 \text{PRICE_IMP} + \beta_5 \text{PAKG_NOTIMP} + \beta_6 \text{WTB_COOL} + \beta_7 \text{WTB_NEWMRK} + \beta_8 \text{OUT_STORE_ADD} + \beta_9 \text{POINT_OF_PUR} + \beta_{10} \text{EAT_VEG} + \beta_{11} \text{LIVE_URBAN} + \beta_{12} \text{BELOW17} + \beta_{13} \text{AGE21-35} + \beta_{14} \text{AGE36-50} + \beta_{15} \text{HSCHOOL} + \beta_{16} \text{SELF_EMP} + \beta_{17} \text{RETIRED} + \beta_{18} \text{INC20-40} + \beta_{19} \text{INC40-60} + \beta_{20} \text{INC60-80} + \beta_{21} \text{INC80-125} + \beta_{22} \text{INC125-150} + \beta_{23} \text{MARRIED}$$

The description and summary of explanatory variables are shown in Table 1.

Survey

A questionnaire was prepared for the Hispanic ethnic group consisting of Mexicans and Puerto Ricans in 16 states of east-coast region (Connecticut, Delaware, Florida, Georgia, Massachusetts, Maryland, Maine, North Carolina, New Hampshire, New Jersey, New York, Pennsylvania, Rhode D.C. Island, South Carolina, Vermont and Virginia) and Washington D.C and based on random sampling, 542 samples were interviewed through a telephone survey in 2006. One of the survey instruments asked respondents whether they were willing to buy organically grown ethnic produce, and based on this, a logit model was developed to predict the willingness to buy organically grown ethnic produce.

Descriptive statistics

The summary statistics of explanatory variables used in the logit

Table 1. Description of explanatory variables.

S.No	Variable	Description	Percentage/ Mean	Standard deviation
1.	VISIT_TIMES	Number of Times to purchase Fruits and Vegetables within a month	3.78	2.92
2.	ETH_SPND	Expenditure on Ethnic Fruits and Vegetables for visit	22.24	18.86
3.	ETH_BUY_AMER	1 if the respondents purchased all ethnic fruits and vegetables from typical American grocery store; 0=otherwise	28%	0.45
4.	PRICE_IMP	1 if price is very important; 0=otherwise	62%	0.49
5.	PAKG_NOTIMP	1 if packaging is not important; 0=otherwise	25%	0.43
6.	WTB_COOL	1 if respondent willing to buy when country of origin label available;0=otherwise	47%	0.50
7.	WTB_NEWMRKT	1 if respondent willing to buy when recently introduced or new to market;0=otherwise	54%	0.50
8.	OUT_STORE_ADD	1 if the respondent influenced by out-of –store ads; 0=otherwise	55%	0.50
9.	POINT_OF_PUR	1 if the respondent influenced by point-of purchase ads; 0=otherwise	22%	0.41
10.	EAT_VEG	1 if respondent is vegetarian; 0=otherwise	5%	0.22
11.	LIVE_URBAN	1 if the respondent resides in urban area; 0=otherwise	39%	0.49
12.	BELOW17	Number of children below 17 years age group	1.42	1.40
13.	AGE21-35	1 if the respondent age was between 21 and 35; 0=otherwise	41%	0.49
14.	AGE36-50	1 if the respondent age was between 36 and 50; 0=otherwise	43%	0.50
15.	HSCHOOL	1 if the respondent education was graduated from high school; 0=otherwise	34%	0.48
16.	SELF_EMP	1 if the respondent was self employed; 0=otherwise	12%	0.33
17.	RETIRED	1 if the respondent was retired; 0=otherwise	4%	0.19
18.	INC20-40	1 if the respondent income between \$20,000 and \$39,999;0=otherwise	27%	0.44
19.	INC40-60	1 if the respondent income between \$40,000 and \$59,999;0=otherwise	23%	0.42
20.	INC60-80	1 if the respondent income between \$60,000 and \$79,999;0=otherwise	13%	0.33
21.	INC80-125	1 if the respondent income between \$80,000-99,999; 0=otherwise	8%	0.27
22.	INC125-150	1 if the respondent income between \$125,000-149,999; 0=otherwise	1%	0.11
23.	MARRIED	1 if the respondent is married; 0=otherwise	61%	0.49

model are obtained from the survey results which include mean and standard deviation values (Table 1). As results indicate, on average, the respondents visited 3.8 times (VISIT_TIMES) ethnic grocery stores in a month. The respondent's mean expenditure on ethnic fruits and vegetables (ETH_SPEND) was \$22.24 per visit. About 28% of the respondents purchased all ethnic fruits and vegetables from a typical American grocery store (ETH_BUY_AMER). About 62% of the respondents indicated price is very important (PRICE_IMP) in terms of decision to shop for ethnic fruits and vegetables. About 25% of the respondents stated that the packaging is not important (PAKG_NOTIMP) while making decision to shop for ethnic produce. About 47% of the Hispanic respondents were willing to buy country of origin labeled produce (WTB_COOL) that is made available to them. Around 54% of the respondents were willing to buy ethnic produce when it is recently introduced or new to the market (WTB_NEWMRKT). Approximately 55% of the respondents indicated that they were influenced by out-of-store advertisements, whereas, 22% of them were influenced by point-of-purchase advertisements when purchasing ethnic produce. Only 5% of the survey respondents were vegetarians (EAT_VEG) and 39% of them were living in urban areas (LIVE_URBAN).

Among respondents, on average, there were 1.42 persons in the age category of "below 17 years" (BELOW17), in each household. Forty-one percent of respondents' ages were between 21 and 35 years (AGE21-35) and about 43% of them were in the range of ages between 36 and 50 (AGE36-50). About 34% of respondents were high school graduates (HSCHOOL). As results indicated, 12% were self-employed (SELF-EMP) and only 4% of them were retired (RETIRED). In terms of income, 27% of respondents were in the range of \$20,000-39,999 (INC20-40), 23% of them were in the range of \$40,000-59,999 (INC40-60), 13% of them were in the range of \$60,000-79,999 (INC60-80), 8% of them were in the range of \$80,000-124,999 (INC80-125) and only 1% of them were in the range of \$125,000-149,999 (INC125-150). Among the respondents, 61% of them were married (MARRIED).

MODEL EXPLANATION

Tables 2 and 3 illustrate the results from logit model estimates and predictive accuracy of the model. The logit

Table 2. Willing to buy organically grown produce: Logit model estimates.

S.No	Variable	Coefficient	Standard error	t- Ratio	Marginal probabilities
	Constant	0.1189	0.2883	0.412	
1.	VISIT_TIMES	-0.0006	0.0005	-1.291	
2.	ETH_SPND	0.0002	0.0003	0.646	
3.	ETH_BUY_AMER	-0.1686	0.2113	-0.798	
4.	PRICE_IMP*	-0.3404	0.2016	-1.688	-0.0830
5.	PAKG_NOTIMP***	-0.6210	0.2252	-2.757	-0.1536
6.	WTB_COOL***	0.6412	0.2020	3.174	0.1560
7.	WTB_NEWMRKT ***	0.6958	0.1984	3.506	0.1700
8.	OUT_STORE_ADD	0.2864	0.2157	1.328	
9.	POINT_OF_PUR	-0.3739	0.2644	-1.414	
10.	EAT_VEG**	0.9742	0.4745	2.053	0.2134
11.	LIVE_URBAN*	0.3492	0.1960	1.782	0.0852
12.	BELOW17	-0.0018	0.0015	-1.209	
13.	AGE21-35	0.0969	0.1053	0.920	
14.	AGE36-50	-0.0977	0.1053	-0.928	
15.	HSCHOOL**	0.0036	0.0017	2.104	0.0009
16.	SELF_EMP	0.2870	0.2418	1.187	
17.	RETIRED	-0.2887	0.2419	-1.194	
18.	INC20-40*	-0.4967	0.2719	-1.826	-0.1221
19.	INC40-60	-0.4278	0.2859	-1.496	
20.	INC60-80*	-0.5998	0.3377	-1.776	-0.1474
21.	INC80-125**	-0.9233	0.4044	-2.283	-0.2270
22.	INC125-150***	2.4482	0.8741	2.801	0.6018
23.	MARRIED	0.0005	0.0009	0.559	

*** P < 0.01; ** P < 0.05; * P > 0.10.

Table 3. Predictive accuracy of logit model.

Actual	Predicted		Correct
	0	1	
0	128	113	128/241
1	75	226	226/301
Total	203	339	354/542
Number of correct predictions			354
Percentage of correct predictions			65.31%
McFadden R ²			0.102
Overall model significance			0.00

model predicts the likelihood whether a Hispanic ethnic respondent is willing to buy organically grown ethnic produce, given his or her behavioral, attitudinal and demographic characteristics. A total of 542 observations were used in this model, of which 301 (55.5%) of respondents indicated that they are willing to buy organically grown ethnic produce when they are available

at ethnic produce stores. The model correctly predicted the state of independent variable in 65.7% of the total observations. To increase the regression fit, explanatory variables were dropped or added based on how they impact the overall performance of the models and the effect on other explanatory variables. The Chi-square statistic indicated that the explanatory variables as a set

were significant in explaining variations in the dependent variable at 0.00% significance and the pseudo or McFadden's R-square was 0.10 (Table 3).

The marginal effects of the logit model estimation (Table 2) indicate the magnitude and direction of the impact of each dependent variable on the willingness to buy organic produce. As can be seen from Table 2, among those who indicated price is very important (PRICE_IMP) in terms of decision to shop for ethnic fruits and vegetables, and those who stated that packaging is not important PAKG_NOTIMP while making decision to shop for ethnic produce are negatively associated towards willing to buy organically grown ethnic produce, and also, those who had an average annual income of \$20,000 to 39,999 (INC20 to 40), \$40,000 to 59,999 (INC40 to 60), \$60,000 to 79,999 (INC60 to 80) and \$80,000 to 124,999 (INC80 to 125) are negatively related towards willing to buy organically grown ethnic produce compared to those who had an average annual income of over \$150,000.

Those who are willing to buy country of origin labeled produce that is made available to them, those who are willing to buy ethnic produce when it is recently introduced or new to the market (WTB_NEWMRKT), those who are vegetarians (EAT_VEG), those who are living in urban area (LIVE_URBAN), those who graduated from high school (HSCHOOL), and those who receive an average annual income between \$125,000 and 149,999 (INC125-150) are positively related to willing to buy organically grown ethnic produce.

Price plays an important role in consumers' organic produce purchase decisions. According to a survey by Walnut (2002), 68% of consumers did not buy organic foods because of high prices. Similarly, the current study has also shown a negative impact of price on willingness to buy organic produce. Among the Hispanic respondents, those who indicated price is very important (PRICE_IMP) in terms of decision to shop for ethnic fruits and vegetables are 8% less likely willing to buy organically grown ethnic produce compared to those who thought otherwise. Generally, price has a negative effect on willingness to buy organic ethnic produce. Most of the grocery stores sell organic produce at premium price. In general, demand for organic produce quickly decreases as the price premium increases.

In the case of those who felt that the packaging is not important (PAKG_IMP), while making decision to shop for ethnic produce are 15% less likely willing to buy organically grown ethnic produce compared to those who felt otherwise. More often, consumers feel that they pay more for packaging and labeling of produce items. This is quite common in the case of lower household incomes. The study also indicates that the low income consumers are not willing to buy organic produce compared to high income group. In terms of income, those who had an average annual income ranges of \$20,000 to 39,999

(INC20 to 40), \$60,000 to 79,999 (INC40 to 60) and \$80,000 to 124,999 (INC80 to 125), are 12, 15 and 23% less likely willing to buy organically grown ethnic produce compared to other income categories. With respect to country of origin labeling, those who are willing to buy country of origin labeled (WTB_COOL) produce are 16% more likely willing to buy organically grown ethnic produce compared to those who are not willing to buy country of origin labeled produce. In the case of new products, those who are willing to buy ethnic produce when it is recently introduced or new to the market (WTB_NEWMRKT), are 17% more likely willing to buy organically grown ethnic produce compared to others.

As Onyango et al. (2006) analyzed factors explaining consumers' choice of organic food in the USA, with respect to consumer food habits, being a vegetarian is an important factor increasing consumers' probability of purchasing organic foods. This study also shows a similar behavior with EAT_VEG variable. The vegetarians are 21% more likely willing to buy organically grown ethnic produce compared to those who are non-vegetarians. With respect to location, those who are living in urban (LIVE_URBAN) area are 9% more likely willing to buy organically grown ethnic produce compared to those who are residing in suburban and rural areas. This result is also similar to a Turkish study. According to Akgungoret al. (2007), 36% of urban consumers were willing to pay a premium for organic products in Turkey.

Various previous studies found that the education factor influences consumers buying behavior towards organic produce items. An Australian study (Lockie et al., 2004) found that more educated people are less likely to eat organic food. Similarly, according to our results, those who graduated from high school (HSCHOOL) are more likely (0.09%) willing to buy organically grown ethnic produce compared to graduates and post graduates.

Several previous studies indicate that income largely determines the purchasing of organic fruits and vegetables (Kuhar et al., 2005; Onyango et al., 2006). Our results are also reflecting the same attitude towards respondents' high household income which is positively impacting willingness to buy organic produce. Those with average annual incomes between \$125,000 and 149,999 (INC125 to 150) are 60% more likely willing to buy organically grown ethnic produce compared to the lower income groups.

Conclusions

The practice of organically growing fruits and vegetables in agriculture is a common phenomenon and familiar concept to most of the producers and consumers. The organic produce has the potential to minimize the risk of exposure to pesticide residues, promote health benefits and environmental friendly practices compared to

conventional produce. This paper makes a contribution in identification and segmentation of Hispanic ethnic population that is willing to buy organically grown ethnic produce. The results indicate that those who are willing to buy country of origin labeled produce and those who are willing to buy ethnic produce when it is recently introduced or new to the market are more likely willing to buy organically grown ethnic produce. The results also indicate that those who are vegetarians, those who live in urban areas and those with average annual incomes of between \$125,000 and 149,999 are more likely willing to buy organically grown ethnic produce. Price is also one of the factors negatively influencing willingness to buy organic produce. The market expansion leading to economies of scale in production will lower cost of production, resulting in price reduction. Since organic produce minimizes pesticide and chemical consumption, it results in clean and green environment. In order to introduce a plan to place organic products successfully in the market, appropriate information is needed. The present study provides primary information to the policy makers, producers and marketers including wholesalers and retailers in order to increase the share of Hispanic markets in organic sector by targeting specific consumer attributes. Policy makers might suggest farm subsidies and new technologies, and providing current market information to the farmers will encourage organic production. In addition, these results will help understand Hispanic consumer's behavior towards organic produce sector and facilitate effective segmentation by producers, wholesalers, and retailers to target Hispanic markets and locations, based upon demographic profiles and geographic population concentrations. Since this research is limited to east-coast of United States, results may not be applicable to other parts of the country. However, further research is needed to explore other areas of United States in developing the organic produce industry.

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