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## **CHARACTERISTICS OF CONSUMERS WHO ARE WILLING TO BUY CERTIFIED ORGANIC PRODUCE: AN ECONOMETRIC ANALYSIS**

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### **Abstract**

*The profitability of farms in the northeastern U.S. is hampered by the high cost of production in the region. Production of high-value crops such as organic produce is one of the solutions to keep these farms viable in the region. However, production challenges and limited information related to marketing are likely to hamper the potential growth of organic agriculture in the northeastern U. S. A logit model was developed to predict who is more likely to buy certified organic produce using 1,100 respondents in the Mid-Atlantic region. About 87% of the consumers were willing to buy certified organic produce, and the remaining 13% were not. While 6% of respondents stated that they would not pay slightly more for organic produce, nearly 43 % of the respondents stated that they would pay more than 10 cents premium for a dollar's worth of organic produce. The results indicate that those who have a graduate degree, those who are influenced by an eco-friendly label, country of origin label, or pesticide-free label are more likely to purchase certified organic produce. Producers and marketers of certified organic vegetables and fruits can target customers with these specific traits to enhance their sales and profitability.*

**Keywords:** Organic produce, characteristics of consumers, willingness to buy, logistic regression model, Mid-Atlantic region.

**Jel Codes:** D1, Q13

## **1. Introduction**

The trend toward buying organic food is increasing worldwide. For the first time, the U.S. organic market in 2018 broke through the \$50 billion mark, with sales hitting a record \$52.5 billion, up 6.3 percent from the previous year. Organic food sales reached \$47.9 billion, which is an increase of 5.9 percent compared to 2017. Similarly, sales of organic non-food products jumped by 10.6 percent to \$4.6 billion (U.S. Organic Industry Survey 2019). The demand for organic fruits and vegetables continues to grow at a rate far higher than the rest of the agricultural industry (Richards, Acharya, and Molina 2011). In recent years, worldwide rapid expansion in agriculture trade and income growth, especially in emerging economies attributed to the diversification of consumer diets including organic produce (Harrison 2003).

U.S. consumer demand for all products organic products is increasing (Green 2007), however, the share of organic vegetables and fruit is much higher than organic grain crops. Since 2000, more organic food was bought in conventional supermarkets, where the best-selling organic category is fresh produce in comparison to other categories in the United States. At the same time, fruits and vegetables are defined as “gateway” for other organic products. The second best-selling organic category is nondairy beverages, followed by bread and grains, packaged foods, and dairy products. The latest article from the West Coast supports this interest in purchasing value-added organic products at local community farmers' markets (Bramwell and Debieen 2019).

A comparison of farming methods between organic and non-organic products dates back to the 1970s. Organic products are usually more price elastic than non-organic fruits and vegetables (Fourmouzi, Genius, and Midmore 2012). Some scholars have confirmed that the price relationship between organic vegetables and traditional vegetables is very different due to the quality guarantee period, price premium volatility, and substitutability, based on the 2006 to 2015 data from the United States (Kim et al. 2019). To buy organic products, most consumers are willing to pay more than the price of non-organic food (Heggde and Mekoth 2012). Consumers with more income are more likely to buy fresh organic fruits and vegetables and have higher perceptions of negative impacts of pesticide usage on health (Haghiri, Hobbs, and McNamara 2009).

The decision-making process for consumers to buy organic fruits and vegetables is complicated (Ozguven 2012). When it comes to making organic fresh fruit and vegetable choices, consumers usually prioritize health attributes over environmental reasons (Haghiri, Hobbs, and McNamara 2009). Some scholars used a bivariate Tobit model to analyze the willingness to purchase organic produce and found that socioeconomic characteristics, product freshness, and cleanliness had positive effects on consumer willingness to pay. Another reason consumers purchase organic fruit and vegetables is due to negative information about pesticides contained in conventional produce and misunderstanding that pesticides are not allowed and used in organic production (Smed 2012). For consumers, human values and personality are also very important when choosing whether to buy organic products. The consumers who have strong hedonism, stimulation, and collectivist domain conformity are more likely to buy organic products (Grebitus and Dumortier 2016). Consumers who usually peruse advertisements, and look for certified organic labels and natural labels when buying foods are more likely to demand organic products (Govindasamy et al. 2017). Consumers' preference for organic food is also related to intangible attributes of geographical location, and residents are more likely to buy ‘local’ searching for organic products grown in nearby areas (Printezis and Grebitus 2018; Bojnec et al. 2019).

This study attempts to identify the characteristics of consumers in the Mid-Atlantic region of the United States who are willing to buy certified organic produce. These characteristics

may include social, economic, demographic attributes, buying behavior, and attitudes towards organic fruits and vegetables. An analysis of such traits can provide policymakers, farmers, and marketers important feedback to target efforts and investment in the development of markets for organic fruits and vegetables.

## 2. Data and Methodology

### 2.1 Data

The Sampling Survey International, LLC, a market research company conducted the online survey from March 7<sup>th</sup> to 15<sup>th</sup> in 2016 in the Mid-Atlantic region to examine consumers' preferences, perceptions, and attitudes towards organic produce. The survey respondents were selected based on the total population of each state. The online tool was pre-tested on 100 organic consumers to refine and clarify each proposed question before the final deployment of the survey. A raffle incentive was provided to the respondents by the market research firm and the survey took about 12 minutes to complete. Out of 5,191 candidates from the pool, 1,100 were selected to participate in the study. The selection of participants was based on (a) at least 18 years of age, (b) responsible for shopping for food in the family, and (c) purchased organic produce at least once March 2015 through March 2016. To avert any confusion among the participants about the term "organic", all participants were required to read the definition of "Organic" as defined by the National Organic Produce (NOP) standards, outlined by the United States Department of Agriculture (USDA). The research team adhered to all protocols set forth by the Office of Research and Sponsored Programs.

### 2.2 Analytical Framework

The respondents were asked, among other socio-economic questions, whether they were willing to buy certified organic produce. In the logit model design, the response variable is defined as, '1' if the respondent was willing to buy certified organic produce, and '0' otherwise. The logit model assumes that the chance of observing the response variable,  $P_i$ , is contingent upon a vector of explanatory variables,  $x_{ij}$  associated with consumer  $i$  and variable  $j$ . The relationship between willingness to buy certified organic produce and consumers' purchase behavior, attributes of organic fruits and vegetables, and socio-demographic characteristics can be expressed as:

$$\begin{aligned}
 P_i &= F(\beta_j \chi_{ij} + \varepsilon) \\
 &= \beta_0 + \beta_{1 \text{ to } 6} \text{ Demographic Variables} \\
 &\quad + \beta_{7 \text{ to } 18} \text{ Attitude / Behavioral Variables} \\
 &\quad + \beta_{19 \text{ to } 22} \text{ Purchase Variables} \\
 &\quad + \beta_{23 \text{ to } 27} \text{ Opinion Variables} + \varepsilon
 \end{aligned}
 \tag{1}$$

Where,  $P_i$  is the probability of willingness to buy certified organic produce,  $\chi_{ij}$  is the set of explanatory variables,  $\beta_s$  are the parameters to be estimated, and  $\varepsilon$  is the error term.

The probability  $P_i$  can be expressed as:

$$P_i = F(\beta_0 + \sum_{j=1}^j \beta_j \chi_{ij}) = F(\beta \chi_i) = 1/[1 + \exp(-\beta \chi_i)]
 \tag{2}$$

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The estimated coefficients of probability function (Eq. 2) do not directly denote marginal effects (ME) of the explanatory variables on the probability  $P_i$ .

If the response variable is continuous, the marginal effect of  $\chi_i$  on  $P_i$  is given as:

$$\partial P_i / \partial \chi_{ij} = [\beta_j \exp(-\beta \chi_i)] / [1 + \exp(-\beta \chi_i)]^2 \quad (3)$$

Whereas for a binary explanatory variable  $\chi_{ij}$ , that takes values of 1 or 0, the marginal effect is determined as:

$$\partial P_i / \partial \chi_{ij} = [P(\chi_{ij} = 1) - P(\chi_{ij} = 0)] / [1 - 0] \quad (4)$$

The empirical specification of the logit model is:

$$\begin{aligned} \text{COC\_ORGANIC} = & \beta_{-0} + \beta_{-1} \text{SUBURBAN} + \beta_{-2} \text{HOUSEHOLD} + \beta_{-3} \text{GENDER} + \beta_{-4} \\ & \text{GRADUATE} + \beta_{-5} \text{ANNUAL\_INCOME} + \beta_{-6} \text{AGE} + \beta_{-7} \text{ECO-FRIENDLY} + \beta_{-8} \text{COOL} + \beta_{-9} \\ & \text{P\_FREE} + \beta_{-10} \text{C \& L\_GROWN} + \beta_{-11} \text{O \& NL\_GRN} + \beta_{-12} \text{ORG\_SUPPORT} + \beta_{-13} \\ & \text{SWI\_SUPEMRT} + \beta_{-14} \text{STILLBUY\_PPRICE} + \beta_{-15} \text{NO\_AVAILABLE} + \beta_{-16} \\ & \text{NO\_PRODUCED\_ORG} + \beta_{-17} \text{ORG\_SLICED} + \beta_{-18} \\ & \text{ORG\_DRIED/CHIPS} + \beta_{-19} \text{CS\_FARM} + \beta_{-20} \text{RS\_FARM} + \beta_{-21} \text{VISITS\_MONTH} + \beta_{-22} \\ & \text{ANT\_SPEND} + \beta_{-23} \text{RIPENESS} + \beta_{-24} \text{FRESHNESS} + \beta_{-25} \text{BET\_TASTE} + \beta_{-26} \\ & \text{NODIF\_FEELING} + \beta_{-27} \text{ENVIRONMENT\_FEELING} + \varepsilon \quad (5) \end{aligned}$$

The definitions of the variables in Equation 5 and their units of measurements are explained in Table 2.

### 3. Results and Discussion

#### 3.1 Respondent Demographics

A stratified random sampling, meaning, based on the population of each state, is used to determine the sample size. A total of 1,100 organic produce consumers responded to this survey. The results indicate that 41% of the respondents were from the state of New York, 27% from Pennsylvania, 19% from New Jersey, 12% from Maryland, and 1.9% from Delaware. Organic produce consumers were asked about their neighborhood environment. About 57% of the respondents considered their neighborhood to be suburban, 26 % of the respondents considered their neighborhood to be urban, and the remaining 17 % considered their neighborhood as rural.

On average the respondents are living in the current location for about 14.4 years. The average household size was about 2.7. On average, each household had one member below the age of seventeen. Generally, smaller families with older members are residing in one place for a long period. There are not many young children living in a location with the respondents. This may be because the average age of the respondents was 47.97 and generally would not have children under the age of 17 years.

About 76 % of the respondents were female and the remaining 24% were male. There were varying levels of education levels obtained by the respondents. About 40 % of the respondents obtained their 4-year college degree, 23% attended up to a graduate degree, 20 % obtained up to high school, and 17% obtained their 2-year college degree. The majority of the respondents attended college and obtained an undergraduate degree, so they possess sufficient knowledge about organic produce.

**Table 2. Definition of Variables used in the Logit Model**

| Variables                            | Description   | Mean or % |
|--------------------------------------|---|-----------|
| COC_ORGANIC                          | 1 if the respondent thinks certified organic labeling can influence their decision to purchase food products; otherwise 0       | 86.818%   |
| <b>Demographic Variables</b>         |   |           |
| SUBURBAN                             | 1 if the respondent resides in the suburban area; otherwise 0   | 56.909%   |
| HOUSEHOLD                            | Number of persons aged 17 and younger in the household  | 0.602     |
| GENDER                               | 1 if the respondent is male; otherwise 0  | 24.545%   |
| GRADUATE                             | 1 if the respondent has a graduate degree; otherwise 0  | 22.909%   |
| ANNUAL_INCOME                        | 1 if the respondent earned (before taxes) \$100,000 and above; otherwise 0  | 32.273%   |
| AGE                                  | AGE   | 47.972    |
| <b>Attitude/Behavioral Variables</b> |   |           |
| ECO-FRIENDLY                         | 1 if the respondent influenced by the eco-friendly label; otherwise 0   | 57.636%   |
| COOL                                 | 1 if the respondent influenced by country of origin label; otherwise 0  | 65.000%   |
| P_FREE                               | 1 if the respondent influenced by pesticide-free label; otherwise 0   | 84.727%   |
| C & L_GROWN                          | 1 if the respondent preferred conventionally grown local produce; otherwise 0   | 16.818%   |
| O & NL_GRN                           | 1 if the respondent preferred organically grown but not local produce; otherwise 0  | 25.273%   |
| ORG_SUPPORT                          | 1 if the respondent likes to support local farmers and agriculture when purchasing organic produce; otherwise 0                 | 82.909%   |
| SWI_SUPEMRT                          | 1 if the respondent likes to switch supermarkets to be able to purchase organic produce; otherwise 0.                           | 66.182%   |
| STILLBUY_PPRICE                      | 1 if the respondent still buys the same quantity of organic produce even though sold at a premium price; otherwise 0.           | 68.091%   |
| NO_AVAILABLE                         | 1 if the respondent would buy organic vegetables and fruits if they are more readily available; otherwise 0.                    | 18.818%   |
| NO_PRODUCEDORG                       | 1 if the respondent does not trust that food sold as organic is produced organically; otherwise 0.                              | 10.091%   |
| ORG_SLICED                           | 1 if the respondent would like to buy organic sliced fruits and vegetables; otherwise 0.  | 46.273%   |
| ORG_DRIED                            | 1 if the respondent would like to buy organic dried chips of fruits and vegetables; otherwise 0.                                | 38.545%   |
| <b>Purchase Variables</b>            |   |           |
| CS_FARM                              | 1 if the respondent purchased agricultural products from community supported agriculture 4 times or more per month; otherwise 0 | 12.091%   |
| RS_FARM                              | 1 if the respondent purchased agricultural products from roadside stands 4 times or more per month; otherwise 0                 | 11.818%   |
| VISITS_MONTH                         | Average number of visits/ month to organic fruits and vegetable shops.  | 3.968     |
| ANT_SPEND                            | Average amount spent on each visit for organic fruits and vegetables (\$)   | 18.489    |
| <b>Opinion Variables</b>             |   |           |
| RIPENESS                             | 1 if ripeness is very important for you to purchase organic produce; otherwise 0.   | 52.455%   |
| FRESHNESS                            | 1 if freshness is very important for you to purchase organic produce; otherwise 0.  | 90.182%   |
| BET_TASTE                            | 1 if the respondent thinks organic food tastes better than non-organic food; otherwise 0.                                       | 62.909%   |
| NODIF_FEELING                        | Feeling of no difference between the safety of conventional and organically produced fruits and vegetables                      | 12.455%   |
| ENVIRONMENT_FEELING                  | Feeling that synthetic chemicals in agriculture have a negative effect on the environment                                       | 78.091%   |

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The most common occupation was employed by others (48%), followed by retired (20%), homemaker (14%), self-employed (12%), and others were almost 6%. The draft survey also included ethnicity related information. Among the total response, 83 % of the respondents belong to Caucasian, 6% Asian and African American, and 5% Hispanic or Latino. American Indian and Alaska Native and other ethnicity were less than 2%. In the case of income, about 28% of respondents earned between \$100,000 – 249,999 annually. Similarly, 18% earned between \$60,000 - 79,999, 17% between \$40,000 – 59,999, 14% between \$20,000 - 39,999, 13% between \$80,000 – 99,999, 6% earned less than \$20,000 and only 4% earned income \$250,000 and above. There is a vast disparity in income earned, as it depends on the education and nature of jobs.

### **3.2 Descriptive Statistics**

The response variable (COC\_ORGANIC) is dichotomous such that it equals 1 if the respondent is willing to buy certified organic produce and zero otherwise. Among the explanatory variables, HOUSEHOLD, ANNUAL\_INCOME, AGE, CS\_FARM, RS\_FARM, VISITS\_MONTH, and ANT\_SPEND are continuous variables and all others are dummy variables. The continuous variables are measured as means over the sample and the dummy variables are described in terms of percentage. Table 1 provides the cross-tabulation between willing to buy organic food and demographic variables.

**Table 1. Cross-tabulation between Willing to Buy Organic Food and Demographic Variables**

| <b>Variables</b> | <b>Sum</b> | <b>Category</b> | <b>Amount</b> |
|------------------|------------|-----------------|---------------|
| SUBURBAN         | 1100       | YES             | 626           |
|                  |            | NO              | 474           |
| GENDER           | 1100       | MALE            | 270           |
|                  |            | FEMALE          | 830           |
| GRADUATE         | 1100       | YES             | 252           |
|                  |            | NO              | 848           |
| EMPLOYED         | 1100       | YES             | 531           |
|                  |            | NO              | 569           |
| CAUCASIAN        | 1100       | YES             | 909           |
|                  |            | NO              | 191           |
| STATE            | 1100       | NY              | 449           |
|                  |            | NJ              | 203           |
|                  |            | MD              | 291           |
|                  |            | PA              | 136           |

About 87% of the consumers were willing to buy certified organic produce, and the remaining 13% were not. While 6% of respondents stated that they would not pay slightly more for organic produce, 20% of the respondents stated that they would pay between one and five cents more for a dollar's worth of organic produce and 21% stated that they would pay 6 than 10 cents for a dollar's worth of organic produce. Nearly, 43 % of the respondents stated that they would pay more than 10 cents for a dollar's worth of organic produce. Of the total respondents, 57% were located in suburban areas (SUBURBAN). The average number of persons aged 17 and younger living in the household was 0.60 (HOUSEHOLD). Regarding

gender, females represented 75% of the participants in this survey (GENDER). Further, 23% of the respondents had a graduate degree (GRADUATE). The average age of the respondents was 48, with the majority falling under 50. The age of the respondents ranged from 18 to 89. In terms of the label, 58% were influenced to purchase food products by eco-friendly label (ECO-FRIENDLY), 65% by country of origin label (COOL), and 85% by pesticide-free label (P\_FREE). Nearly 17% of the respondents preferred conventionally grown local produce (C & L\_GROWN), and 25% preferred organically grown but not local produce (O&NL\_GRN). In terms of respondents purchasing behavior, 12% purchased through community-supported agriculture (CS\_FARM). Also, 12% purchased through roadside stand (RS\_FARM). When it came to purchasing organic products, 52% of respondents thought ripeness was very important (RIPENESS), and 90% of respondents thought freshness was very important (FRESHNESS). Of the total number of respondents, approximately 63% thought organic produce tasted better than non-organic produce (BET\_TASTE), 83% would like to provide support for local farmers and agriculture when purchasing organic produce (ORG\_SUPPORT), and 66% would like to switch supermarkets to be able to purchase organic produce (SWI\_SUPEMRT). On average, 68% of the respondents still buy the same quantity, even though organic produce was sold at a premium price (STILLBUY\_PPRICE).

About 12% of the respondents thought there was no difference between the safety of conventional and organically produced fruits and vegetables (NODIF\_FEELING), and 78% thought using synthetic chemicals in agriculture harm the environment (ENVIRONMENT\_FEELING). On average, 19% of the respondents didn't purchase more organic fruits and vegetables due to limited choices (NO\_AVAILABLE), and 10% didn't trust that food sold as organic was produced organically (NO\_PRODUCEDORG). On average, a respondent spent \$18 on each visit for organic produce (ANT\_SPEND). On average, 46% of the respondents would like to buy value-added / processed organic sliced fruits and vegetables from the food outlets (ORG\_SLICED), 39% would like to buy organic dried/chips, fruits and vegetables (ORG\_DRIED/CHIPS) (Table 2).

### 3.3 Results of the Logit Model

The logit model results capture the characteristics of consumers who are willing to buy certified organic produce. The correct prediction outcome of the response is 91% (Table 3). The  $\chi^2$  test rejects the null hypothesis that the explanatory variables as a set are insignificant in explaining variations in the response variable at 0.00 level. The McFadden Pseudo R-squared is 0.38, and the  $\chi^2$  value is 322 with 27 degrees of freedom (df). The estimated logit model results are presented in Table 4. The results are discussed under four categories: Demographics Variables, Attitude/Behavioral Variables, Purchase Variables, and Opinion Variables.

**Table 3. Logit Model Predictive Accuracy**

| Actual | Predicted    |                 | Total             |
|--------|--------------|-----------------|-------------------|
|        | 0            | 1               |                   |
| 0      | 67<br>(6.1%) | 78<br>(7.1%)    | 145<br>(13.2%)    |
| 1      | 22<br>(2.0%) | 933<br>(84.8%)  | 955<br>(86.8%)    |
| Total  | 89<br>(8.1%) | 1011<br>(91.9%) | 1,100<br>(100.0%) |

**Note:** Successful prediction: 90.91%; Pseudo R<sup>2</sup>: 0.38; Overall model significance level; 0.00



**Table 4. Logit Model Results and Marginals**

| Variables                            | Coefficient | Standard error | Marginal effect |
|--------------------------------------|-------------|----------------|-----------------|
| Constant                             | -1.04065757 | 0.65100839     | -0.04882        |
| <b>Demographic Variables</b>         |             |                |                 |
| SUBURBAN                             | 0.26562996  | 0.23941787     | 0.0127          |
| HOUSEHOLD                            | 0.00125046  | 0.13974608     | 0.00006         |
| GENDER                               | 0.00851571  | 0.27189307     | 0.0004          |
| GRADUATE***                          | 0.8697098   | 0.31477815     | 0.03372         |
| ANNUAL_INCOME                        | -0.22155187 | 0.26125199     | -0.01078        |
| AGE                                  | -0.0132468  | 0.00873907     | -0.00062        |
| <b>Attitude/Behavioral Variables</b> |             |                |                 |
| ECO-FRIENDLY**                       | 0.49735525  | 0.26001899     | 0.02432         |
| COOL***                              | 0.7713215   | 0.24790704     | 0.04082         |
| P_FREE*                              | 0.48476586  | 0.28536938     | 0.0266          |
| C & L_GROWN***                       | -0.95971861 | 0.26011467     | -0.0611         |
| O & NL_GRN**                         | 0.87965989  | 0.40860886     | 0.03469         |
| ORG_SUPPORT                          | 0.43883071  | 0.28091762     | 0.02355         |
| SWI_SUPEMRT***                       | 0.69299279  | 0.27198142     | 0.03644         |
| STILLBUY_PPRICE***                   | 0.92803058  | 0.24006265     | 0.05179         |
| NO_AVAILABLE**                       | 0.75731907  | 0.38478476     | 0.02918         |
| NO_PRODUCEDORG***                    | -1.18714956 | 0.29917249     | -0.08712        |
| ORG_SLICED**                         | 0.53556375  | 0.26087983     | 0.02489         |
| ORG_DRIED**                          | -0.58813361 | 0.26864538     | -0.02961        |
| <b>Purchase Variables</b>            |             |                |                 |
| CS_FARM***                           | -1.02944809 | 0.40700574     | -0.06989        |
| RS_FARM                              | 0.63813801  | 0.42959551     | 0.02429         |
| VISITS_MONTH***                      | 0.00069693  | 0.00027307     | 0.00003         |
| ANT_SPEND**                          | 0.00221211  | 0.00097362     | 0.0001          |
| <b>Opinion Variables</b>             |             |                |                 |
| RIPENESS**                           | -0.48354914 | 0.24725354     | -0.0226         |
| FRESHNESS***                         | 1.0486976   | 0.36413223     | 0.07316         |
| BET_TASTE***                         | 0.65641893  | 0.26452679     | 0.03364         |
| NODIF_FEELING***                     | -0.91217398 | 0.29233193     | -0.05914        |
| ENVIRONMENT_FEELING***               | 0.90324715  | 0.25097511     | 0.05425         |

**Note:** \*\*\* = significant at 1%, \*\* = significant at 5%, and \* = significant at 10%

### 3.3.1. Demographic Variables

The demographic variables included in the model are gender (GENDER), age (AGE), income (ANNUAL\_INCOME), education (GRADUATE), living environment (SUBURBAN)

and the number of persons aged 17 and under (HOUSEHOLD). Among the 6 demographic variables, GRADUATE is the only significant variable contributing positively towards the decision to purchase certified organic produce (COC\_ORGANIC). That is, graduates are more likely to purchase certified organic produce compared to those who do not have a graduate degree. In particular, those with a graduate degree are 3% more likely to purchase certified organic produce compared to those without an advanced degree. Other scholars have also confirmed that a higher level of education is associated with a greater likelihood to buy organic products (Roitner-Schobesberger et al. 2008).

### **3.3.2. Attitude / Behavioral Variables**

In the case of attitude / behavioral category, 12 variables namely, ECO-FRIENDLY (influence of eco-friendly label), COOL (influence of country of origin label), P\_FREE (influence of pesticide-free label), C&L\_GROWN (those who prefer conventionally grown local produce), O&NL\_GRN (those who prefer organically grown but not local produce), ORG\_SUPPORT (those who support local farmers and agriculture), SWI\_SUPEMRT (those who switch supermarkets to purchase organic products), STILLBUY\_PPRICE (those who purchase the same quantity of organic produce even though sold at a premium), NO\_AVAILABLE (those who would buy organic vegetables and fruits if they are more readily available), NO\_PRODUCEDORG (those who don't trust that food sold as organic is produced organically), ORG\_SLICED (those who would like to buy organic sliced fruits and vegetables), ORG\_DRIED (those who would like to buy organic dried chips of vegetables and fruits) are included in the model.

Of the 12 variables, 11 contributed significantly toward the decision to purchase certified organic produce (COC\_ORGANIC). Of the 11 variables that significantly contributed to the decision to purchase certified organic produce, 8 are positive. That is, variables ECO-FRIENDLY, COOL, P\_FREE, O&NL\_GRN, SWI\_SUPEMRT, STILLBUY\_PPRICE, NO\_AVAILABLE, and ORG\_SLICED positively influence the decision to purchase certified organic produce. The variables NO\_PRODUCEDORG, ORG\_DRIED, C & L\_GROWN negatively contributed toward the decision to purchase certified organic produce.

The results from the logit model indicate that those who are influenced by the eco-friendly label to purchase food products are 2.4% more likely to buy certified organic produce. Those who are influenced by the country of origin label and pesticide-free produce label are 4% and 2.7% more likely to buy certified organic produce, respectively. Those who prefer eco-friendly labels and pesticide-free labels are likely to care about the environment and therefore it is not surprising that they are more likely to purchase certified organic produce. Those who prefer organically grown but not local produce are 3.5% more likely to buy certified organic produce. Those who switch supermarkets to be able to purchase organic products and those who purchase the same quantity of organic produce, even though sold at a premium, are 3.6% and 5.1% more likely to purchase certified organic produce, respectively. Those who would buy organic vegetables and fruits if they are more readily available and those who would like to buy organic sliced fruits and vegetables are 2.9% and 2.5% more likely to purchase certified organic produce, respectively.

Those who prefer conventionally grown local produce are 6.1% less likely to purchase certified organic produce compared to those who prefer other kinds of produce. Those who don't trust that food sold as organic are produced organically are 8.7% less likely to purchase certified organic produce. Those who would like to buy organic dried chips of vegetables and fruits are 3% less likely to purchase certified organic produce.

### **3.3.3. Purchase Variables**

Four variables, namely, CS\_FARM (those who visit community supported agriculture 4 times or more per month to buy agricultural products), RS\_FARM (those who visit roadside stands 4 times or more per month to buy agricultural products), VISITS\_MONTH (average number of visits per month to organic fruits and vegetable shops), and ANT\_SPEND (average amount spent per visit on organic fruits and vegetables) were grouped under the purchase category. Among the 4 variables, CS\_FARM, VISITS\_MONTH, and ANT\_SPEND significantly contributed to the decision to purchase certified organic produce (COC\_ORGANIC). The variable, RS\_FARM didn't have a significant impact on the decision to purchase certified organic produce.

The results from the logit model indicate that VISITS\_MONTH and ANT\_SPEND positively influence the decision to purchase certified organic produce. Although these two variables significantly contribute toward the decision to purchase certified organic produce, the magnitude of the marginals is close to zero. The results indicate that those who participate in community-supported agriculture 4 times or more per month to buy agricultural products are 7% more likely to buy certified organic produce compared to those who visit other markets.

### **3.3.4. Opinion Variables**

Under opinion category, 5 variables, namely, RIPENESS (those who feel ripeness is more important to purchase organic products), FRESHNESS (those who feel freshness is more important to purchase organic products), BET\_TASTE (those who think organic food tastes better than non-organic foods), NODIF\_FEELING (those who think there is no difference between organic food and conventional food in terms of food safety), and ENVIRONMENT\_FEELING (those who think synthetic chemicals in agriculture harm the environment) are included. Of these 5 variables in this category, all significantly contribute toward the decision to purchase certified organic produce (COC\_ORGANIC). The variables RIPENESS and NODIF\_FEELING negatively contributed to the decision to purchase certified organic produce. As expected, the variables FRESHNESS, BET\_TASTE, and ENVIRONMENT\_FEELING positively contributed to the decision to purchase certified organic produce. Similar evidence linking FRESHNESS to the willingness to buy organic produce has been reported before (Owusu and Anifori 2013).

Those who feel ripeness is more important to purchase organic products and those who think there is no difference between organic food and conventional food in terms of food safety are 2.3% and 5.9% less like to purchase certified organic produce compared to those who think otherwise. Those who feel freshness is more important to purchase organic products are 7.3% more likely to purchase certified organic produce compared to those who think otherwise. Those who think organic food tastes better than non-organic foods are 3.3% more likely to purchase certified organic produce compared to those who think otherwise. Those who think synthetic chemicals in agriculture harm the environment are 5.4% more likely to purchase certified organic produce compared to those who think otherwise.

## **4. Conclusion**

The findings indicate that, among the demographic variables, respondents who have a graduate or advanced degree are more likely to buy certified organic produce. Similar studies have indicated that education from consumer's demographic factors positively influences the attitude towards buying organic food (Roitner-Schobesberger et al. 2008; Paul and Rana 2012).

This indicates that producers and marketers can target highly educated consumers and develop effective marketing strategies to positively influence the decision to purchase certified organic fruits and vegetables.

Among the attitude / behavioral variables category, those who are influenced by the eco-friendly label, country of origin label, and pesticide-free label are more likely to purchase certified organic fruits and vegetables. This result is expected because those who care about the environment are likely to pollute less by purchasing certified organic products. The results indicate that those who prefer organically grown but not local produce, those who switch supermarkets to purchase organic products, those who purchase the same quantity of organic produce even though sold at a premium, those who would buy organic vegetables and fruits if they are more readily available, those who would like to buy organic sliced fruits and vegetables are also more likely to purchase certified organic produce. The logit model results show that those who prefer conventionally grown local produce, those who don't trust that food sold as organic is produced organically, and those who would like to buy organic sliced fruits and vegetables are less likely to purchase certified organic produce.

Among the purchase variables, those who make frequent visits to shops to buy organic fruits and vegetables and those who spend more per visit to buy organic fruits and vegetables are more likely to buy certified organic produce. Those who visit community supported agriculture 4 times or more per month to buy agricultural products are less likely to buy certified organic produce.

Among the opinion variables, those who feel freshness is more important to purchase organic products, those who think organic food tastes better than non-organic foods, and those who think synthetic chemicals in agriculture harm the environment are more likely to purchase certified organic produce. Similar evidence linking taste to the willingness to buy organic products have been reported in the field of organic milk consumption (Hill and Lynchehaun 2002). Those who feel ripeness is more important to purchase organic products and those who think there is no difference between organic food and conventional food in terms of food safety are less likely to purchase certified organic produce.

The themes identified in this paper suggest that stakeholders in the production and marketing of organic fruits and vegetables have much to do if the industry is to serve varied consumer interests. It is incumbent on marketers, retailers, and producers to better convey relevant information to consumers. Given the complexity of consumer decision making, appropriate educational materials that could broaden the organic food consumer base need to be developed. At the same time, marketers need to include information on the authenticity of the 'organic' label, freshness and taste of organic fruits and vegetables, environmental benefits, etc. The themes also revealed that some educated young people are the main potential consumers of organic fruits and vegetables. Some consumers with higher shopping frequency tend to buy organic fruits and vegetables, hence, these shoppers should be targeted with more information about the availability of local Mid-Atlantic organic produce.

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