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## **Consumers' Perception of Sustainably Produced Food**

The case of local and organic production technologies

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## **Abstract**

This paper identifies ways to improve on the current literature regarding sustainable production technologies, in this case, organic and local products. A survey method is used to examine organic and local markets in place of a single product to gain a better understanding of consumers' response to these products, their reactions to price differences of these products, and how their preferences change based on changing income level and prices. The sample was drawn from a commercial database and was attempted to be made random across the U.S. population. In place of results, hypotheses are presented as data were late coming back.

## **Introduction**

Over the past half-century scholars have sought to strictly define what constitutes sustainability. Attempts and failures to define sustainability can easily be found within the literature (Lyman and Herdt, 1989; Brown et al., 1987) and almost all authors write of the struggles inherent in creating a definition for such a wide-ranging and diverse concept (Toman, M, 1992). The challenge does not arise in discussing the topic but from trying to discuss how the concept of sustainability can be applied to today's society and culture in an operational way. Almost every paper written on the topic of sustainability since 1987 quotes the most popular definition as it was published in the Brundtland Commission's Report by the United Nations (1987). The Brundtland Commission defines sustainability and sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

As scholars are challenged to create a complete and operational definition of sustainability, the trend itself is catching fire with citizens world-wide. The internet has provided a quick way to share information globally on this topic that so many are rapidly becoming interested in. The word "sustainability" yields more than 31 million hits on the Internet using the Google search engine (Google, 2010). Several facets of sustainability are being explored; sustainable development, sustainable agriculture, sustainable consumption, and sustainable energy sources, to name a few. Some might argue that the demand for political guidance on the subject far outweighs the scientific knowledge on the topic, thus the lack of a legal definition (Sustain, 2009).

Several policies have been set forth to begin guiding the fight towards sustainable production. The first subset of policies addresses the ecological definition of sustainability. This is often the most common perspective of sustainability as it has to do with preserving the

environment. These policies have to do with environmentally degrading factors and externalities of production. For example, carbon dioxide emissions and how their reduction will positively impact the environment. One such policy, the Kyoto Protocol (1997), commits 37 industrialized nations to reduce their greenhouse gas emissions at a rate of five percent between 2008 and 2012. This policy has created a “carbon market”, where countries can trade contracts that allow them to emit a given number of carbon units. If a company has not used their allotted number of units, they are allowed to sell their contracts to another company or country. However, critics could argue that the carbon limits placed on industry by the policy are too high, therefore rendering the policy somewhat ineffective. Further reform of, and amendments to, existing policies along with the development and creation of new policies are needed to guide the current industrial sector to be more conscientious. Policies that internalize the unaccounted for costs of negative externalities are needed before companies will see it as more profitable to change their ways.

The next set of policies aimed at restructuring production towards global sustainability, deals with the bio-physical definition of sustainability. This definition deals with the production resources themselves, such as water purification, soil health, and carbon sequestration. The Conservation Reserve Program (CRP) through the NRCS is a program that seeks to take land out of production thereby preserving the integrity of the land for future generations. The CRP program involves paying farmers or landowners to retire land and is intended to reduce soil erosion, improve water quality and preserve the nation’s ability to produce its food supply. Along with protecting resources invaluable to food and fiber production, CRP is also intended to enhance wildlife habitat and reduce sedimentation in rivers and streams (by reducing soil erosion), and protect forest and wetland resources (USDA – NRCS, 2009). Every program or

policy has critics and CRP's critics argue that farmers and ranchers are taking only marginally productive land out of production, hence not protecting the most nutrient rich soils by leaving them in production. The 2002 U.S. farm bill included the passage of the Conservation Security Act (CSA) which allowed the USDA to make payments to farmers for using conservation tillage. This policy is focused on land that is currently in production and attempts to incentivize farmers to utilize sustainable tillage practices in place of conventional tillage. Farmers are encouraged to take advantage of this subsidy as an option for post-CRP land so the positive effects of CRP can be preserved and maximized. It is difficult to encourage U.S. farmers to take advantage of these programs because the payment may seem riskier than the guarantee of keeping the land in production (Kurkalova et al., 2006). Therefore, the incentive to utilize these programs must be carefully set to achieve socially optimal utilization.

Finally, the least sculpted definition of sustainability centers around preserving cultural nuances in agriculture production. These nuances include, but are not limited to, organic farming, local food consumption, the connection between production and consumption, keeping farm size lower and farmers' markets. These niche markets are characterized by consumer demand driven production and are only a small part of global food consumption. The first legal definition to fall into this category was for "organic production" and was documented in 2000. Because organic food products cost more to produce, price premiums have been established for food carrying the "USDA Organic" label. However, as the gap between domestic demand and domestic supply for organic products has widened, imports and price premiums have increased (ERS, 2009). Local and organic products are closely related because of the connection between nature and farmer, farmer and food, food and consumer. These connections are driving the growth in demand of these niche markets that provide closeness between farmer, food and

consumer. This cluster of niche markets that preserves these cultural nuances has been deemed the “agri-culture” definition of sustainability.

The foregoing illustrates the difficulty associated with the definition of sustainability. With that difficulty comes the challenge of determining consumer response to sustainably produced products. Statistics showing consumption patterns can be found (ERS, 2009) but detailed, concrete demographics of the consumers driving these niche markets are not available. Studies have provided basic and sometimes contradicting effects of demographics on consumption decisions for some of the commodities in this product segment. For example, Rosa et al. (2009) and Carpio and Isengildina-Massa (2009) found a positive relationship between income and consumption of organic products but the ERS (2009) could not make such a case. The body of research on this topic addresses one product with very specific attributes at a time and therefore cannot be used to draw conclusions regarding the organic and local markets as a whole. This research seeks to address this gap.

The overall research objective is to examine the characteristics of consumers and their willingness to pay for products with specific characteristics vis-à-vis production methods, distance travelled to market and size of production operations. The assumption is that these factors are dimensions of sustainability and therefore represent sustainable production technologies (SPT). The specific objectives are as follows: (1) determine the extent of differences between consumers willing to pay for these sustainability characteristics and those who are not; (2) quantify the premium consumers place on these sustainability characteristics; (3) evaluate the sensitivity of the identified preferences to prices and incomes. A survey method is used in gathering data from a sample of US adult population and statistical and econometric analytical tools are employed to address the objectives.

## **Literature Review**

“Business competitiveness should be based on an appropriate mix of economic, societal, and environmental criteria” (Rosa et al., 2009, p. 659). To this extent, it is not surprising that the gospel of sustainability has strengthened and become more popular over the last several decades or that research in this area has grown exponentially. Issues facing the agricultural industry concerning the difference between organic and conventional food products have drastically increased the profile of sustainable production technologies (SPT) and the demand for food from such technologies (Clonan et al., 2010). The organic and local food markets have both grown radically during the previous decade. The supply of these products is also growing since studies have proven that price premiums can be charged for organic (ERS, 2009) and local products (Darby et al., 2006). Other factors contribute to the growth of the organic and local markets. For instance, the creation of the USDA Organic label and subsequent production standards have aided the growth of the organic market while the creation of state guided campaigns to promote locally grown food products such as Colorado Proud, Pennsylvania Preferred, and South Carolina Grown (Constanigro et al., 2010; James et al., 2009; Carpio and Isengildina-Massa, 2008) have significantly enhanced the visibility of local products. Also helping grow the demand for local food is the increase in the number of farmers’ markets around the country (James et al., 2009).

As trends in the agriculture industry, such as organic and local food products, continue to grow, price premiums are becoming more common and more pronounced (Galloway and Bailey, 2005). Current research seeks to address why consumers are willing to pay more for a product carrying a label indicating that SPT were used. Of great importance to sellers trying to charge a premium for their product is the label that the product dons. Labels indicate product attributes that are important to the consumer, differentiate the product (James et al., 2009), and generate



loyalty to a certain product or attribute (Wettstein et al., 2009). However, not all labels indicating SPT are substantiated by a government agency. The USDA Organic label is earned by the seller for adhering to certain production guidelines while labels like ‘local’ and ‘sustainably produced’ are left to the consumer to interpret as they will. Also, even though freshness is one of the most commonly cited reasons for wanting to purchase local products, Darby et al. (2006) found that between two products harvested only 24 hours prior to purchase, consumers preferred the local product. This result suggests that even if consumers are attracted to a label, for example “fresh”, they may still choose a different product.

An alternative method to determining why consumers value these sustainable attributes is to interpret their attitudes toward these products. Their attitudes signal information about themselves, including to what extent they feel that purchasing SPT products will impact themselves, their communities, and their environment. Nurse et al. (2010) call this feeling perceived consumer effectiveness (PCE) while Seyfang (2006) refers to it as ecological citizenship. Both ideas are similar in that they attempt to measure to what extent consumers feel their purchasing decisions affect the people and places around them. Both PCE and ecological citizenship are positively correlated with frequency of purchase and willingness to pay for SPT products (Nurse et al., 2010; Seyfang, 2006).

As of 2010, the United States government and its agencies had yet to publish a legal definition for the terms sustainable or sustainably produced. Umberger and Mueller (2010) suggest that SPT include, but are not limited to, hormone and antibiotic free, environmentally friendly, and certified humane. While that is not a legal definition, some aspects contributing to SPT have been legally defined, such as organic or fair trade. For example, the term organic was legally defined in 2000 with the creation of the “USDA Organic” label. This label signifies to

consumers that their product was produced using an “ecological production system that fosters cycling of resources, promotes ecological balance, and conserves biodiversity” (ERS, 2009).

While organic producers have strict guidelines that they must meet before they can legally label their product as USDA Organic, producers who market their product as being “local” are not legally bound to follow any set of production standards. The most common definitions of local are within the state of consumption, within 100 miles of consumption, or as close to the point of origin as possible (ERS, 2009; Seyfang, 2006; Darby et al., 2006).

The organic market has existed for much longer than the local market and therefore, should theoretically be more mature and have a larger consumer base than the local market. While organic food is a national and global movement that promotes wellness for our entire planet, local food promotes economic success for each individual consumers’ home. Therefore, it is not surprising to experience widespread results that show consumers choose local over organic food products. The ERS’ (2009) study of the organic market revealed that on a head to head direct comparison of two products only differing between the local and organic attributes, consumers more often chose local. Clonan et al. (2010) also reported that local products are purchased much more frequently than organic products, with eggs and poultry, vegetables, and milk being popular choices for local consumption. The reasoning behind consumers’ preference for local products over organic becomes clearer when examining specific reasons that consumers create preferences for each product attribute. Different consumers value SPT products for different reasons and at varying levels. While “health benefits” is cited by Rosa et al. (2009) as consumers’ largest motive for purchasing organic milk products, “freshness/taste” is cited most often as the reason for purchasing local products (Tonsor and Shupp, 2009; Dentoni et al., 2009; Darby et al., 2006).

Many reasons are mentioned in the literature as driving the consumption of organic and local products. The pursuit of quality of life (i.e. SPT products) suggests that price may not be a highly important factor to those who are purchasing agri-cultural products. Novotorova and Mazzocco (2008) clarify by adding that price is very important, but exempt from this generalization are those consumers who are already willing to pay a premium for locally grown products. However, most consumers' specific reasons for purchasing either organic or local products remain dependent on the specific attribute. For example, reasons for favoring organic over conventional products include: taste, nutritional value, absence of preservatives, and environmental benefits (Rosa et al., 2009). The reasons for shopping locally tend to be tied to community and the short time period between harvest and consumption. Consumers' motives for purchasing local products are traced to freshness, environmentally friendly, pest- and disease-free, flavor, nutrition, safety, supporting the regional economy and local businesses, and maintaining a connection with the food source (Dentoni et al., 2009; Darby et al., 2006; Constanigro et al., 2010).

The number of willingness to pay or willingness to value studies related to SPT has increased dramatically in the last decade as firms, researchers, and marketing teams are trying to establish the value, consumers place on SPT products. These studies focus mainly on produce (Tonsor and Shupp, 2009; Darby et al., 2006; Dentoni et al., 2009) and animal products (Latvala and Kola, 2004; Umberger and Mueller, 2010; Nurse et al., 2010). Other studies can be found that use coffee possessing sustainable attributes (Galloway and Bailey, 2005) and organic milk products (Rosa et al., 2009). Researchers take varying approaches in determining how consumers value SPT. Dentoni et al. (2009) focused on determining if consumers value the sustainable attribute on its own or value the qualities that the sustainable attribute signals to

them. For example, do consumers value local fruit because they want to promote local consumption or because they associate local with fresh? The approach of comparing consumer attitude to purchasing behavior and willingness to pay has also become more and more popular as a means of determining value of SPT products (Nurse et al., 2010; Dentoni et al., 2009).

Willingness to value sustainable attributes has not been generalized for the entire food industry and the results from the recent willingness to pay studies are cause for debate. The results are split and cannot be generalized whether or not products employing SPT should be valued at a premium or a discount relative to their conventional substitutes, although most studies conclude that SPT products are worth a premium. The findings are very specific to certain products, methodology, and the sample population used for the study. Even within the produce segment of the food industry results are specific to the product being examined. For example, Tonsor and Shupp (2009) found that sustainable apples and tomatoes were being discounted by consumers. However, the magnitude of the premium or discount being assigned to the product was conditional on socio-economic factors. Differing from the previous study, Loureiro et al. (2001) found that organic apples were worth a premium over conventional apples and apples labeled as 'environmentally friendly'. Likewise, Umberger and Mueller (2010) established that consumers were willing to pay a premium for beef labeled as 'environmentally sustainable'. Price premiums were also found for local strawberries in a study conducted by Darby et al. (2006) and for SC grown produce and animal products in Carpio and Isengildina-Massa's 2008 study.

It is equally important to know how much consumers are willing to pay for SPT products as it is to know what characteristics these consumers possess. Once the characteristics of current consumers are pinpointed, the location and acquisition of new consumers may be more

straightforward. Almost all of the willingness to pay studies includes a segment to evaluate demographic characteristics to focus on the characteristics possessed by the consumers who are already purchasing SPT regularly. Each study uses slightly different food products, methods, and sample populations so each study reports slightly different statistically significant and insignificant variables. For example, Tonsor and Shupp (2009) found that consumers with a college education were willing to pay more for sustainably produced tomatoes and apples, while Novotorova and Mazzocco (2008) reported that education level was insignificant for consumers purchasing genetically modified apples. The number of children was found to be significant, but in different ways. As the number of children in the household increased, the demand for sustainably produced tomatoes decreased (Tonsor and Shupp, 2009), the demand for organic apples increased and the demand for environmentally friendly labeled apples decreased (Loureiro et al., 2001). Whether or not the gender of the person making the purchasing decision is significant, is unclear. Carpio and Isengildina-Massa (2008) found that female's willingness to pay was higher than males in the case of local beef products but Novotorova and Mazzocco (2008) found that gender was irrelevant in the case of preference for genetically modified apples. Marital status is not reported frequently but in the case of genetically modified apples, being married caused a higher willingness to pay than being unmarried (Novotorova and Mazzocco, 2008).

Much has been reported regarding the age of the consumers interested in SPT products. Galloway and Bailey (2005) reported a general increase in interest in sustainable attributes as age increases. In the study of local apples by Carpio and Isengildina-Massa (2008), older consumers were found to have a higher willingness to pay for the local attribute than younger consumers. Novotorova and Mazzocco (2008) produced detailed results regarding how age affects

purchasing decisions for genetically modified apples versus conventional apples. They found that the method of production was increasingly important as age increased, especially with the 65 and over age group. Also, the age group of 35-49 was found to be the most sensitive to the price premium associated with genetically modified apples. James et al. (2009) supported the significance of price when their study of local and organic applesauce revealed that price negatively impacts the demand for the local product.

If the research objective is to mobilize the data to enhance business or marketing strategies, then the current research has gaps that can be addressed. Utilizing only one product and set of attributes at a time is an excellent starting point to determine basic consumer preferences for attributes and whether or not a premium may be associated with such attributes. However, research has proven that there is a strong consumer base for organic and local products and almost all consumers who purchase these products is willing to pay a premium for them. The next logical step is to extrapolate these research methods to focus on the entire local and organic industries. By examining the two markets in their entirety, the markets themselves become clearer and offer an opportunity to firms who want to expand into these areas. With market level data in hand, firms can examine potential markets and make informed decisions regarding expansion. The following research uses product categories such as fruits, vegetables, and meats instead of individual products, for instance, watermelon and sirloin. Also, a random sample of United States residents is used to gain an understanding of the geographic effect of preferences for these two markets: organic and local; price, income, and substitution effects are also determined.

## Analysis and Results

This research presents unique complexities and challenges. By including all organic products in the organic category and all local products in the local category, the data portrays a different dimension of consumer preferences than if the research focused on only one product at a time. Similar to previous singular studies, economic modeling is used to generate trends for the markets as wholes. This analytical model seeks to determine consumers' probability to choose SPT products (i.e. organic and local products) as a function of demographic and psychographic characteristics of the consumer. The demographic characteristics include age, income, gender, education level, geographic location, race and number of household members. The psychographic variables include the degree to which the respondent is responsible for purchasing decisions for their household (PD), and the degree to which they agree that their individual actions make a global difference (IA); as shown in equation (1) below.

$$P_{y(=1)}^{y(=0)} = f(X, \varepsilon) = \frac{\exp^{a+bX_i+\varepsilon}}{1+\exp^{a+bX_i+\varepsilon}} \quad (1)$$

The research also sought to determine the premium that consumers are willing to pay for SPT products. The premium is modeled as a continuous endogenous variable on the basis of a reference price for each basket of SPT goods and estimated using a linear regression model with the demographic and psychographic variables as explanatory variables. This model is illustrated as follows:

$$p = g(X, Y, \varepsilon | Z, R) \quad (2)$$

Where X is a vector of demographic characteristics and Y is a vector of psychographic characteristics while p defines the premium that the respondent is willing to pay for a bundle of

specific SPT basket of products. The regression error term is represented by  $\epsilon$ . The model was simulated under alternative income assumptions with the view to determining the income  $Z$  and base reference price  $R$  effects on the price premium consumers are willing to pay for a bundle of SPT products. The models were estimated using data collected from a cross-sectional sample of U.S. consumers, drawn from a commercial database. This suggests the possibility that the sample is nonrandom. However, the base sample was organized to ensure representation across the country. However, there was no priori foundation to ensure that all demographic and psychographic segments of the population are represented. This may contribute to some biasedness in the results and this possibility is recognized in reporting the results and conducting inferences.

The literature provides insight into the expected relationships between the endogenous variables and the exogenous variables. Using singularly focused studies instead of a holistic approach limits and the degree to which the vision for which consumer markets have high preferences for SPT products. By using a holistic approach, the individual premium associated with individual products may be lost but a greater understanding of consumer markets is gained. Lastly, by using local and organic product markets together, in the same study, the two markets can be compared as well as provide a significant indication of the status of the SPT product market as a whole. Because local and organic products make up such a large part of all SPT products sold, information regarding these two individual markets can begin to provide trends for all sustainably produced food products.

The results of this research provide input into market segmentation on the basis of demographic and psychographic characteristics of consumers, allowing agri-food organizations interested in seizing emerging opportunities to focus their marketing efforts to segments that



have the highest probability of being profitable. For instance, we will determine the income level, education level, and gender to market local and organic products to. The first hypothesis, regarding the income effect can be demonstrated by equation (3) below. Our hypothesis is that as income increases, the probability that consumers will choose SPT products will increase. Similar hypotheses are formed for education, IA and female. The opposite can be hypothesized for several other variables suggesting that as certain characteristics increase, the probability of selecting SPT products will decrease as represented by equation (4) below. The variables that we hypothesize will have a negative effect on probability of purchase are size of household and PD. The latter hypotheses state that as household size grows and as the consumer is more responsible for the purchasing decisions of the household, their probability of purchasing SPT products decreases.

$$\begin{aligned}
 H_0 : P'_{x_i} &= 0 \\
 H_1 : P'_{x_i} &> 0
 \end{aligned}
 \tag{3}$$

$$\begin{aligned}
 H_0 : P'_{x_i} &= 0 \\
 H_1 : P'_{x_i} &< 0
 \end{aligned}
 \tag{4}$$

The data also reveal a threshold for acceptance of the price premium associated with SPT. The other interesting contribution from the data is the strength of association of such terms as ‘environmentally friendly’, ‘safe’ and ‘chemical free’ with organic and local. This information indicates how local and organic products could be marketed and labeled to consumers of different demographic and psychographic profiles to increase the probability of success.

This study makes a significant contribution to the consumer willingness to value products of sustainable technologies and processes literature, taking a unique approach to population

sampling and product presentation. Because the two markets, organic and local, were generalized into two broad categories, it is recommended that individual products be presented to the same sample population to verify the overall trends and that other sustainable production technologies be used to continue to expand on the literature for the SPT product market. Unfortunately, the data are late coming back, therefore the models and hypotheses were not able to be tested with the data. However, we believe that the data will confirm the hypotheses that we have presented.

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